PROJECT MANUAL

PROJECT:

Eddy Street Commons Phase II Parking Garage
1200 Edison Road
South Bend, Indiana

General Construction

City Project No. 108-004

OWNER:

City of South Bend
Board of Public Works
1316 County-City Building
South Bend, IN 46601

CONSTRUCTION MANAGER:

Kite Realty Group
30 South Meridian Street, Suite 1100
Indianapolis, IN 46204

ARCHITECT/ ENGINEERS:

Fink Roberts & Petrie, Inc.
4040 Vincennes Circle, Suite 300
Indianapolis, IN 46268

Looney Ricks Kiss
175 Toyota Plaza
Memphis, TN 38103

Circle Design Group
5510 South East Street, Suite F
Indianapolis, IN 46227

PRE-BID MEETING:

February 4, 2008
1:30 p.m., EST
1118 North Eddy Street
South Bend, IN

BID DATE:

February 21, 2008
9:30 a.m., EST
Board of Public Works
County-City Building – Room 1316
227 West Jefferson Street
South Bend, IN

Fink Roberts & Petrie, Inc. Project No. 07097
January 23, 2008

CONSTRUCTION DOCUMENTS

VOLUME I (Sections 0-14)

CERTIFICATIONS

PROJECT MANUAL FOR:

Eddy Street Commons
Phase II Parking Garage
South Bend, Indiana

CIRCLE DESIGN GROUP, INC.

JEFFERY L. WYLIE REGISTERED NO. 870242 STATE OF INDIANA PROFESSIONAL ENGINEER

Jeffery L. Wylie

Divisions include:
21
22
23
26
27
28

FINK ROBERTS & PETRIE, INC.

JOSEPH M. PETROLIA REGISTERED PE10100203 STATE OF INDIANA PROFESSIONAL ENGINEER

Joseph M. Petrolia

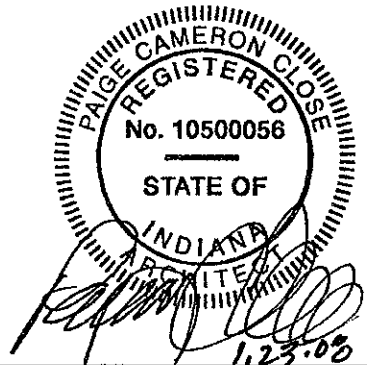
Divisions include:
0
1
3
4 (Section 04810)
5 (Sections 05100, 05310 and 05315)
7 (Section 07100)

CERTIFICATIONS

PROJECT MANUAL FOR:

Eddy Street Commons
Phase II Parking Garage
South Bend, Indiana

LOONEY RICKS KISS ARCHITECTS, INC.



Paige C. Close

Sections Include:

02361	08710
04720	08800
04811	08911
05500	09220
05511	09260
07115	09900
07131	09963
07425	10200
07543	10240
07811	10441
07920	10522
08110	14240
08331	14560
08410	

CERTIFICATIONS

PROJECT MANUAL FOR:

Eddy Street Commons
Phase II Parking Garage
South Bend, Indiana

WALKER PARKING CONSULTANTS

Steve F. Totten

Section 11152

Table of Contents

VOLUME I

DIVISION 21 - FIRE PROTECTION

DIVISION 22 - PLUMBING

DIVISION 23 - HVAC

NOTICE TO BIDDERS

Notice is hereby given that the City of South Bend, Indiana, Department of Public Works will receive sealed bids at the Office of the Board of Public Works, County-City Building Room 1316, 227 West Jefferson Street, South Bend, Indiana, 46601 until the hour of 9:30 a.m. EST on February 14, 2008 for the following:

Eddy Street Commons Phase II, Parking Garage
Project No. 108-004

Work includes construction of a 5-level concrete parking garage at 1200 Edison Road in South Bend, all more particularly described in plans and specifications prepared by Fink Roberts & Petrie, Inc., 4040 Vincennes Circle, Suite 300, Indianapolis, Indiana 46268, phone 317-872-8400.

The contract documents are on file and available for public inspection or purchase, commencing on January 24, 2008, during regular working hours at South Bend Reprographics, 1303 Northside Boulevard, South Bend, Indiana 46615. Arrangements to receive the Plans and Specifications by mail can be made by contacting South Bend Reprographics at 574-287-2944. The Plans and Specifications are available for review by contractors during regular working hours commencing January 19, 2008, in the Department of Public Works, 1316 County-City Building, South Bend, Indiana at MACIAF, and at the Builders Exchange in South Bend. There will be a non-refundable charge of the cost for reproduction as set by South Bend Reprographics for every set of documents for all bidders.

Bids must be on Form 96, as prescribed by the State Board of Accounts, accompanied by a Certified Check or Bid Bond in the amount of not less than five percent (5%) of the base bid plus add alternates. Each bid shall include a Non-Discrimination Commitment as described in the Contract Documents.

Each bidder or contractor (hereinafter the contractor) must comply with Part I and Part II of these bid conditions as to each construction trade it intends to use on this construction contract and all other construction work (both federal and non-federal) in the St. Joseph County area during the performance of this contract or subcontract. The contractor commits itself to the goals for minority manpower utilization in Part I or Part II, as applicable, and all other requirements, terms and conditions of these bid conditions by submitting a properly sealed bid.

Work under this project is subject to the Common Wage Determination as established in accordance with IC 5-16-7-4.

The Contractor shall appoint a company executive to assume responsibility for the implementation of the requirements, terms and conditions of the bid conditions.

A Mandatory Pre-Bid Conference will be held on February 4, 2008 at 1:30 p.m. EST at 1118 North Eddy Street, South Bend, IN. Any questions about bidding conditions must be addressed to the Architect in writing no later than February 12, 2008.

The Board reserves the right to reject any or all bids or to accept a full or partial award of the bid or bids which, in its judgment, will be to the best interests of the City of South Bend.

BOARD OF PUBLIC WORKS
Linda M. Martin, Clerk

Publish two (2) times:
January 25, 2008
February 1, 2008

DOCUMENT 00100

AIA DOCUMENT A701

INSTRUCTIONS TO BIDDERS

1997 EDITION

This document is part of the contract documents and is

incorporated herein by reference as if included

Copies may be obtained from Architect.

END OF DOCUMENT

DOCUMENT 00120

SUPPLMENTARY INSTRUCTIONS TO BIDDERS

PART 1 GENERAL

1.01 AIA Document A701 "Instructions to Bidders", dated 1997, is supplemented by the items in this section.

1.02 Owner

A. City of South Bend, Board of Public Works, 1316 County-City Building, South Bend, IN 46601

1.03 Title and Location of Work

A. Eddy Street Commons Phase II, Parking Garage, 1200 Edison Road, South Bend, Indiana.

1.04 Reference to Indiana Statutes

A. The provisions of I.C. 36-1-12-1 and other provisions of Indiana law pertaining to public works projects by Indiana state agencies are applicable and must be complied with by all bidders.

1.05 Bidding Procedure

A. Bid Bond

1. Each proposal shall be accomplished by an acceptable certified check or an acceptable bidder's bond in the amount of not less than five percent (5%) of the bidder's total lump sum plus all costs based on unit prices for site preparation or total price, including all add alternates for General Construction, as a guarantee that the successful bidder will enter into a contract with the Owner to perform and furnish materials for the proposed work and furnish bond as required. In the event that the bidder fails or refuses to execute the contract and furnish the required bond within ten (10) days after receiving notice of such award, then the respective sum or sums deposited by said bidder may be retained by the Owner as liquidated damages and not as a penalty, it being now agreed that said sum is a fair estimate of the amount of damages that the Owner will sustain in case said bidder fails to enter into a contract and furnish bonds as herein required.

2. All bid bonds and certified checks will be endorsed and made payable to the order of the City of South Bend.

3. Checks or bid bonds will be returned to all bidders, except the three (3) lowest bidders for each division of the work within three (3) days after opening of bids. The retained check or bonds will be returned to the three (3) lowest bidders within 48 hours after the Owner and the accepted bidder have executed the contract and the executed performance bond has been approved by the Owner. If the required contract has not been executed within one hundred eighty (180) days after the opening of bids, the check or bond of any bidder will be returned, provided he has not been notified of the acceptance of his bid prior to the date of such request.

4. All bid bonds shall be on AIA Form A310.

B. Bid proposal Address

1. Each proposal shall be enclosed in a SEALED envelope addressed to:

   a. City of South Bend, Board of Public Works, 1316 County-City Building, South Bend, IN 46601

2. The envelope shall be endorsed as follows in the upper left-hand corner.

   Bid for General Construction

   Project Name: Eddy Street Commons Phase II, Parking Garage - Project No. 108-004

   Contractor's Name

C. Bid Documents Required

1. Each proposal shall contain the following completed documents:

   a. Bid Form (Refer to Document and 00300, pages 1 thru 4)

   b. Bid Bond or Certified Check

   c. Non-Indiana Notarization - All bidders whose non-collusion affidavit is notarized by a non-Indiana Notary Public, must supply an authentication of the Notary Public's commission, with the affidavit.

   d. Certificate as to Corporate Principal if bid is submitted by corporation.

   e. List of similar projects completed in last five (5) years. List shall include job name, client contact and telephone number, and dollar amount of contract.

   f. Completion Time and Schedule:

      1. General Contractor shall state in his bid the number of days required to complete this project. The General Contractor shall submit a detailed graphic schedule with his bid. Work shall begin one week after notification of award of contract.

   g. Ineligible Contractor Certification, included herein.

   h. Unit prices shall be listed in the contractor's proposal. See Bid Forms for unit prices.

D. Signing of Bids

1. Bid Submitted by an Individual

a. If a bid is submitted by an individual, said proposal shall be signed by the person making such bid, or the bid must have attached thereto a power-of-attorney evidencing authority to sign the bid in the name of the person for whom it is signed.

2. Bid Submitted by a Partnership

a. If a bid is submitted by a partnership, said proposal shall be signed by all of the partners or by an attorney-in-fact. If signed by an attorney-in-fact there must be attached to the bid a power-of-attorney for the individuals for whom it is signed.

3. Bid Submitted by a Corporation

a. If the bid is submitted by a corporation, said proposal shall be signed by the correct corporate name thereof, and the signature of the President or other authorized officer manually written below the corporate name, and the attesting signature of the secretary of the Corporation. The enclosed Certificate as to Corporate Principal shall be completed and included with the bid.

E. Firm Bids

1. Bids MUST be for a FIRM PRICE ONLY. No bids will be considered which include an escalation clause.

F. Completeness of Bids and Alternates

1. Each bid shall be construed to cover all work specified for the class of work bid upon, whether or not enumerated in the bid. The bidders are required to inform themselves fully of the conditions relating to construction and labor under which the work will be performed.

2. In addition to the base bid, contractor shall also enter the amount base bid shall be modified by Alternates, as indicated in Section 00460.

G. Withdrawal of Bids

1. Bidder shall not be able to withdraw their bids for sixty (60) calendar days after receipt of bids.

H. Rejection of Bids

1. The Contractor(s) will be awarded to the lowest responsible Bidder(s) complying with the conditions set forth herein, provided such Bid(s) is reasonable and it is to the interest of the Owner to accept it.

2. The Owner reserves the right to reject any and all Bids and to waive any informality in Bids received whenever such rejection or waiver is in its interest. The Bidder(s) to whom the Award(s) is made will be notified at the earliest possible date.

3. The Owner reserves the right to consider as unqualified to perform the Contract, any Bidder who does not habitually perform with his own

forces the major portion of the work involved in the phase of the contract bid or does not meet completion schedules.

1.06 Post Bid Information

A. AIA Document A701, Article 6, Paragraph 6.3.1

1. This article is amended from as soon as practicable to seven (7) days after notification of selection. In addition, the contractor shall include a job schedule and delivery dates of all equipment. He shall also include a cost break out itemized by Specification Section and a schedule of estimated monthly billings, which shall be revised to reflect actual changes in the schedule.

1.07 Performance Bond and Payment Bond

A. Each contractor to whom awards are made shall furnish a Performance Bond and Payment Bond within ten (10) days after official notice of the contract, by the Owner. The surety on such bond shall be a corporation approved by the Owner and authorized to perform business in the State of Indiana.

B. Said performance bond shall be in the amount of at least equal to one hundred twenty five percent (125%) of the contract price as security for:

1. The faithful performance of all provisions of the contract and the satisfactory completion of the work included thereunder.

2. The payment of all persons performing labor and furnishing materials in connection with the contract.

3. The covering of all guarantees included therein.

4. Forms to be used: AIA Document A312. Copy may be obtained from the Architect.

1.08 Agreement

A. The contract will be deemed as having been awarded when formal notice of award has been duly served or mailed to the bidder, and to whom the Owner contemplates awarding the contract. The contract to be used shall be AIA Document A101, "Standard Form of Agreement Between Owner and Contractor", 1997 Edition; Arbitration shall be deleted from this Agreement.

B. The drawings noted on the Cover Sheet are part of these Contract Documents.

C. Owner shall award contract within 180 days of bid.

1.09 Off-Site Storage

A. The Owner shall not pay for any materials, which are stored off the site.

1.10 Substitutions

A. Add to the provisions of Article 3.3 of AIA Document A701 "Instructions to Bidders" the following paragraph:

3.3.5 The approval of a manufacturer does not exempt him from complying with these specifications in total.

1.11 Retainage

A. Retainage shall be withheld in the amount of 5% of the contract until substantial completion.

1.12 Indiana Gross Retail Tax (Sales Tax)

A. This project is exempt from Indiana Sales Tax.

B. Materials and properties purchased that become a permanent part of this structure are not subject to the Indiana Gross Retail Tax.

1.13 Liquidated Damages

A. The Contractor shall proceed with the work at such rate of progress to insure full completion within the Contract Time. It is expressly understood and agreed, by and between the Contractor and the Owner, that the Contract Time for completion of the work described herein is a reasonable time, taking into consideration the average climate and economic conditions and other factors prevailing in the locality of the work, and excludes the time for unavoidable delays which were beyond the control and without the fault of the Contractor.

B. If the Contractor shall fail to complete the work within the Contract time, or extension of time granted by the Owner, then the Contractor will pay to the Owner the amount of liquidated damages as specified in the Contract for each calendar day that the Contractor shall remain in default after the time of completion stipulated in the Contract Documents. The amount for liquidated damages shall be $1,500 (One Thousand Five Hundred Dollars) per calendar day.

C. The Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due to the following and the Contractor has promptly given written notice of such delay to the Owner and Engineer/Architect.

1. To any preference, priority, or allocation order duly issued by the Owner.

2. To unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to acts of God, acts of public enemy, acts of the Owner, acts of another Contractor in the performance of a Contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather.

1.14 Pre-Bid Conference and Access to the Building

A. All bidders and their subcontractors shall attend a mandatory pre-bid meeting at 1118 North Eddy Street, South Bend, Indiana on February 4, 2008 at 1:30 pm. EST.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF DOCUMENT

CITY OF SOUTH BEND, INDIANA
CONTRACTOR'S BID FOR PUBLIC WORK

Project Name: Eddy Street Commons Parking Garage
Project No. 108-004
For Bids Due February 21, 2008

PART I

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

Date: _____ Bidder (Firm): _____

Address: _____

City/State/Zip: _____ Telephone Number: (_____) _____

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:

Eddy Street Commons Parking Garage

the City of South Bend, Indiana, in accordance with plans and specifications prepared by:

Fink Roberts & Petrie, Inc.

and dated January 23, 2008 for the sum of (enter the Total Bid as shown on the Proposal)

_____ ($ _____)

(Enter sum of Total Bid plus Alternates shown on Proposal) (Numerical)

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 City of South Bend. If the bid is to be awarded on a unit basis, the itemization of the units shall be shown on a separate attachment.

By _____
(Signature)

_____
(Printed Name of Person Signing)

ACCEPTANCE

The above bid is accepted this _____ day of _____ 200 _____

Subject to the following conditions: _____

BOARD OF PUBLIC WORKS

_____
Gary A. Gilot, President

_____
Carl P. Littrell, Member

_____
Donald E. Inks, Member

ATTEST:

_____
Linda M. Martin, Clerk

PART II

(For projects of $100,000 or more – IC 36-1-12-4)

These statements to be submitted under oath by each bidder with and as part of his bid.

Attach additional pages for each section as needed.

SECTION I EXPERIENCE QUESTIONNAIRE

1. Attach information regarding projects your organization has completed for the period of one (1) year prior to the date of the current bid.

2. Attach a listing of public works projects currently in process of construction by your organization.

3. Attach information regarding any failure to complete any work awarded to you and the location thereof.

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

SECTION II PLAN AND EQUIPMENT QUESTIONNAIRE

1. Attach an explanation of 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 City of South Bend to consider your bid.)

2. Attach a listing of 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, attach 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 City of South Bend in the event that you subsequently determine that you will use a subcontractor on the proposed project.

4. Attach a listing of equipment you have available to use for the proposed project.

5. Have you entered into contracts or received offers for all materials which substantiate the prices used in preparing your proposal? If not, attach an explanation for 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 City of South Bend awarding the contract must be specific enough in detail so that said City of South Bend can make a proper determination of the bidder's capability for completing the project if awarded.

PART III

CONTRACTOR'S NON – COLLUSION AFFIDAVIT, NON-DEBARMENT AFFIDAVIT, NON-DISCRIMINATION COMMITMENT FOR CONTRACTORS, AND CERTIFICATION OF USE OF UNITED STATES STEEL PRODUCTS

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

The undersigned bidder or agent, being duly sworn on oath, says that he has not, nor has any other member, representative, or agent of the firm, company, corporation or partnership represented by him, entered into any combination, collusion or agreement with any person relative to the price to be bid by anyone at such letting nor to prevent any person from bidding nor to induce anyone to refrain from bidding, and that this bid is made without reference to any other bid and without any agreement, understanding or combination with any other person in reference to such bidding.

He further says that no person or persons, firms, or corporation has, have or will receive directly or indirectly any rebate, fee, gift, commission or thing of value on account of such sale.

The prospective contractor certifies, by submission of this proposal that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

The undersigned contractor agrees that the following nondiscrimination commitment shall be made a part of any contract which it may henceforth enter into with the City of South Bend, Indiana or any of its agencies, boards or commissions.

Contractor agrees not to discriminate against or intimidate any employee or applicant for employment in the performance of this contract with privileges of employment, or any matter directly or indirectly related to employment, because of race, religion, color, sex, handicap, national origin or ancestry. Breach of this provision may be regarded as a material breach of the contract.

I, the undersigned bidder or agent as a contractor on a public works project, understand my statutory obligations to the use of steel products or foundry products made in the United States (I.C. 5-16-8-1 et seq.). I hereby certify that I and all subcontractors employed by me for this project will use U.S. steel products or foundry products on this project if awarded. I understand that violations hereunder may result in forfeiture of contractual payments.

I hereby affirm under the penalties for perjury that the facts and information contained in the foregoing bid for public works are true and correct.

_____
(Name of Organization)

By _____

_____
(Printed Name and Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF _____)
)SS
COUNTY OF _____)

Before me, a Notary Public, personally appeared the above-named _____

and swore that the statements contained in the foregoing document are true and correct.

Subscribed and sworn to before me this _____ day of _____, _____.

_____
(Notary Public Signature)

_____
(Notary Printed Name)

_____
County of Residence

_____
Commission Expiration

BID/PROPOSAL
CITY OF SOUTH BEND

Project Name: Eddy Street Commons Parking Garage
Project No: 108-004
For Bids Due: February 21, 2008

BASE BID _____ Dollars $ _____
(written) (figures)

ALTERNATES

No. 1 Precast Concrete Garage (Voluntary) ..... add or deduct $ _____

No. 2 DCI Admixture ..... add or deduct $ _____

No. 3 PARCS Systems ..... add or deduct $ _____

No. 4 Emergency Stations ..... add or deduct $ _____

No. 5 Brick Façade ..... add or deduct $ _____

Total Bid (Greater of Base Bid or Alt No. 1 + all other add alternates) ..... $ _____
(Enter Total to right and on 00300 - 1)

UNIT PRICES

Removal of unacceptable earth bearing material and replacement with compacted fill $ _____ per cu. yd.

ACKNOWLEDGMENTS

In submitting this Bid, we understand that the right is reserved by the Owner to accept or reject any or all bids and that this bid may not be withdrawn for a period of one hundred eighty (180) calendar days after the Bid Opening date.

We hereby acknowledge receipt of Addenda Numbers _____, _____, _____, _____, _____.

COMPLETION

We agree to commence Work under Base Bid when directed by Owner to proceed, and to achieve Substantial Completion in _____ calendar days from date contract is awarded.

CONTRACTOR PERSONNEL

Project Manager's name _____

Superintendent's name _____

Bidder (Firm): _____

Address: _____

City/State/Zip: _____ Telephone Number: (____) _____

By: _____

_____
(Printed Name of Person Signing)

AIA DOCUMENT A310

BID BOND

1970 EDITION

This document is part of the contract documents and is

incorporated herein by reference as if included

Copies may be obtained from Architect

Performance Bond

AIA Document A312 - Electronic Format

THIS DOCUMENT HAS IMPORTANT LEGAL CONSEQUENCES: CONSULTATION WITH AN ATTORNEY IS ENCOURAGED WITH RESPECT TO ITS COMPLETION OR MODIFICATION. AUTHENTICATION OF THIS ELECTRONICALLY DRAFTED AIA DOCUMENT MAY BE MADE BY USING AIA DOCUMENT D401.

Any singular reference to Contract, Surety, Owner or Other Party Shall be considered plural where applicable.

CONTRACTOR *(Name and Address)*:

SURETY *(Name and Principal Place of Business)*

OWNER *(Name and Address)*:

CONSTRUCTION CONTRACT
Date:
Amount:
Description (Name and Location):

BOND
Date (Not earlier than Construction Contract Date):
Amount:
Modifications to this Bond:

[ ] None

[ ] See Page

CONTRACTOR AS PRINCIPAL
Company:

(Corporate Seal)

SURETY
Company:

(Corporate Seal)

Signature:_____

Name and Title:

Signature: _____
Name and Title:

(Any additional signatures appear on the last page)

(FOR INFORMATION ONLY - Name, Address and Telephone)

AGENT or BROKER:

OWNER'S REPRESENTATIVE (Architect, Engineer or other

party):

1 The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except to participate in conferences as provided in Subparagraph 3.1.

3 If there is no Owner Default, the Surety's obligation under this Bond shall arise after:

3.1 The Owner has notified the Contractor and the Surety at its address described in Paragraph 10 below that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Construction Contract. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default; and

3.2 The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the contract. Such Contractor Default shall not be declared earlier than twenty days after the Contractor and the Surety have received notice as provided in Sub-paragraph 3.1; and

3.3 The Owner has agreed to pay the Balance of the Contract Price to the Surety in accordance with the terms of the Construction Contract or to a contractor selected to perform the Construction Contract in accordance with the terms of the contract with the Owner.

4 When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

4.1 Arrange for the Contractor, with consent of the Owner, to perform and complete the Construction Contract; or

4.2 Undertake to perform and complete the Construction Contract itself, through its agents or through independent contractors; or

4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and the contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor's default; or

4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, tender payment therefor to the Owner; or

.2 Deny liability in whole or in part and notify the Owner citing reasons therefor.

5 If the Surety does not proceed as provided in Paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Subparagraph 4.4, and the Owner refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

6 After the Owner has terminated the Contractor's right to complete the Construction Contract, and if the Surety elects to act under Subparagraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. To the limit of the amount of this Bond, but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Construction

Contract, the Surety is obligated without duplication for:

6.1 The responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

6.2 Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 4; and

6.3 Liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

7 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators or successors.

8 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

9 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page.

11 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

12 DEFINITIONS

12.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract

12.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

12.3 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract.

12.4 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

MODIFICATIONS TO THIS BOND ARE AS FOLLOWS:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		SURETY	
Company:	(Corporate Seal)	Company:	(Corporate Seal)
Signature:_____		Signature: _____	
Name and Title:		Name and Title:	

Payment Bond

AIA Document A312 - Electronic Format

CONTRACTOR *(Name and Address):*

SURETY *(Name and Principal Place of Business):*

OWNER *(Name and Address):*

CONSTRUCTION CONTRACT
Date:
Amount:
Description *(Name and Location):*

BOND
Date (Not earlier than Construction Contract Date):
Amount:
Modifications to this Bond: [ ] None [ ] See Page

CONTRACTOR AS PRINCIPAL
Company: (Corporate Seal)

SURETY
Company: (Corporate Seal)

Signature:_____
Name and Title:

Signature:_____
Name and Title:

(Any additional signatures appear on the last page)

(FOR INFORMATION ONLY - Name, Address and Telephone)

AGENT or BROKER:

OWNER'S REPRESENTATIVE (Architect, Engineer or other party):

1 The Contractor and the Surety, jointly and severally bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference.

2 With respect to the Owner, this obligation shall be null and void if the Contractor:

2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and

2.2 Defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity whose claim, demand, lien or suit is for the payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, provided the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety, and provided there is no Owner Default.

3 With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.

4 The Surety shall have no obligation to Claimants under this Bond until:

4.1 Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2 Claimants who do not have a direct contract with the Contractor:

.1 Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and

.2 Have either received a rejection in whole or in part from the Contractor, or not received within 30 days of furnishing the above notice any communication from the Contractor by which the Contractor has indicated the claim will be paid directly or indirectly; and

.3 Not having been paid within the above 30 days, have sent a written notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor.

5 If a notice required by Paragraph 4 is given by the Owner to the Contractor or to the Surety, that is sufficient compliance.

6 When the Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:

6.1 Send an answer to the Claimant, with a copy to the Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

6.2 Pay or arrange for payment of any undisputed amounts.

7 The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

8 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any Construction Performance Bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

9 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for payment of any costs or expenses of any Claimant under this

Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

11 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the work or part of the work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Subparagraph 4.1 or Clause 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable

12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page. Actual receipt of notice by Surety, the Owner or the Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15 DEFINITIONS

15.1 Claimant: An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

15.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

MODIFICATIONS TO THIS BOND ARE AS FOLLOWS:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		SURETY	
Company:	(Corporate Seal)	Company:	(Corporate Seal)
Signature:_____		Signature:_____	
Name and Title:		Name and Title:	

DOCUMENT 00200

INFORMATION AVAILABLE TO BIDDERS

PART 1 GENERAL

1.01 Applicable Information

A. The following information incorporated in the Project Manual and Drawings is information supplied by the Owner and is not a part of the Contract Documents.

1. Planimetric information indicating existing conditions incorporated in the set of Drawings prepared by the Architect.

B. Where Owner supplied information has been incorporated in documents prepared by the Architect/Engineer it has been extracted from Owner supplied documents for the convenience of Bidders and/or the Contractor and his Sub bidders. Each shall be responsible for verifying the accuracy and reliability of such information by visiting the site and/or careful review of the documents.

C. Extra Payment Limitations: When the premises are accessible for inspection, no consideration for extra payment will be given for conditions occurring which could have been anticipated by visiting the premises for the Work. If conditions occur resulting in extra work which could not have been anticipated or reasonably inferred from such visits or when the premises are not accessible, the Conditions of the Contract for changes in the Work shall apply.

1.02 Geotechnical Information

A. Owner has engaged the services of Earth Exploration, Inc. to report on subsurface conditions to provide design information.

B. Borings: Because the sub-surface conditions indicated by the borings are a sampling in relation to the entire construction area, and for other reasons, Owner, Architect or firm reporting the sub-surface conditions based on borings, do not warrant the conditions below the depths of the borings or the strata logged from the borings are necessarily typical of the entire site.

1. Any party using soil information described in this Section shall accept full responsibility for its use and obtaining additional soil information which may be required.

2. This report was obtained only for the Architect's use in design and is not a part of the Contract Documents. The report is for bidders' information, but is not a warranty of subsurface conditions.

C. Refer to reports following this section.

END OF DOCUMENT

DOCUMENT 00481

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____ Certify that I am the _____

_____ Secretary of the Corporation named as Principal in the within Bond/Bid: that

_____ Who signed the said Bond/Bid on behalf of the Principal was then ____

_____ of said corporation; that I know his signature, and his signature thereto is genuine; and that said Bond/Bid was duly signed, sealed and attested for an in behalf of said corporation by authority of its governing body.

_____ (SEAL)

END OF DOCUMENT

STATEMENT OF POLICY - RECEIPT OF BIDS

The Board of Public Works of the City of South Bend had adopted the following policy regarding receipt of sealed bids:

All sealed bids submitted to the Board of Public Works must be received in the Board of Public Works Office, 1316 County-City Building, South Bend, Indiana, no later than 9:30 a.m. on the advertised date of the bid opening.

It shall be the responsibility of the bidder to see that his bid is received prior to the deadline stipulated in the bid advertisement.

Bids submitted by mail and received after the 9:30 a.m. deadline will not be considered by the Board.

CITY OF SOUTH BEND
BOARD OF PUBLIC WORKS

Angela K. Jacob, Clerk

CITY OF SOUTH BEND

CHECKLIST FOR BIDDERS

From time to time the South Bend Board of Public Works finds it necessary to reject a bid because it does not comply with statutory requirements. In preparing your bid, please use the following checklist in order to make sure that your bid is done in the proper manner.

_____ Bid prepared on appropriate State Board of Accounts form provided by the Board of Public Works.

_____ Bid **signed** by proper party with name either printed or typed underneath signature.

_____ Non-Collusion Affidavit (found on prescribed State Board of Accounts form provided) properly notarized. Please note that proper notarization includes name and county of residence of notary typed beneath notary's signature, date commission expires and notary seal.

_____ Proper bid security included. The Bidder has the option of providing either a Certified Check or Bid Bond in the amount indicated in the "Notice to Bidders".

_____ All required additional information is included with the bid.

_____ Non-Discrimination Commitment form, as provided in bid packet.

_____ Bid forwarded to the Board of Public Works, 1316 County-City Building, with adequate time to enable it to arrive before 9:30 a.m. on the deadline date. All bids received after the legally published deadline date and time will be rejected.

NOTE: **Incoming mail does not reach the Board of Public Works until after 9:30 a.m. If you are sending your bid via Federal Express or another overnight source, please confirm that your package will arrive before the bid opening time and date.**

CITY OF SOUTH BEND

EEO CONTRACTING PROVISIONS

It is the policy of the City of South Bend to provide equal employment and business opportunity for all persons, partnerships, companies, and corporations in accordance with the rules, regulations and guidelines of the applicable federal, state and local laws. This policy of equal employment and business opportunity shall apply to every contractor or subcontractor bidding or holding a public contract with the City of South Bend.

In furtherance of this policy, the following Equal Opportunity Clauses are hereby made a part of every construction contract entered into by the City of South Bend and all subcontractors entered into pursuant to any such contract and the bidder hereby certifies that it/he/she will abide by these provisions.

The contractor will not discriminate against any applicant or employee because of race, color, religion, sex, national origin, or handicap. The contractor will take affirmative action to ensure that all applicants or employees are treated fairly and equitably. Such action shall include but not be limited to the following: hiring, up-grading, demotion or transfer, recruitment, advertising, lay-offs or termination, rates of pay or other forms of compensation and selection for training including apprenticeship programs.

The contractor shall agree to post in conspicuous places available to employees and applicants, notices to be provided setting forth the provisions of the Non-Discrimination Clause.

The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.

The contractor will send to each labor union or representative of workers with which he has a bargaining agreement or other contract or understanding, a notice to be provided, advising the labor union or worker's representatives of the contractor's commitment under this section, and shall post copies of the notices in conspicuous places available to applicants and employees.

The contractor will comply with all provisions of Executive Order 11246 (as amended by 11375) and of the rules, regulations and relevant orders of the Department of Labor.

Subpart B -- Contractors' Agreements

Sec. 202. Except in contracts exempted in accordance with Section 204 of this Order, all Government contracting agencies shall include in every Government contract hereinafter entered into the following provisions:

"During the performance of this contract, the contractor agrees as follows:"

"(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated equally during employment, without regard to their race, color, religion, sex or national origin. Such action will include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause."

"(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin."

"(3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract of understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment."

"(4) The contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, and of the rules and regulations, and relevant orders of the Secretary of Labor."

"(5) The contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders."

"(6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, in this contract may be cancelled, terminated or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked* as provided in Executive Order No 11246 of September 24, 1965, or by rule, regulations, or order of the Secretary of Labor, or as otherwise provided by law."

"(7) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the contractor may request the United States to enter into such litigation to protect the interests of the United States."

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: Provided, that if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

* Corrected to read "invoked". In the original text the word "involved" was printed in error.

NON-DEBARMENT AFFIDAVIT AND NONDISCRIMINATION COMMITMENT FOR CONTRACTORS

STATE OF INDIANA)
) SS:
_____ COUNTY)

The prospective contractor certifies, by submission of this proposal, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

The undersigned contractor agrees that the following nondiscrimination commitment shall be made a part of any contract which it may henceforth enter into with the City of South Bend, Indiana or any of its agencies, boards or commissions:

> Contractor agrees not to discriminate against any employee or applicant for employment in the performance of this contract with privileges of employment, or any matter directly or indirectly related to employment, because of race, religion, color, sex, handicap, national origin or ancestry. Breach of this provision may be regarded as a material breach of the contract.

_____
_____Offerer (Contractor)

_____
_____Signature of Contractor or Agent

Subscribed and sworn to before me this _____ day of _____, 2_____.

My Commission Expires: _____
_____Notary Public

County of Residence: _____

F:\HOME\Gjones\Wpdata\Contractor Non-Discriminatoin.wpd

DOCUMENT 00700

AIA DOCUMENT A201

GENERAL CONDITIONS OF THE CONTRACT

1997 EDITION

This document is part of the contract documents and is

incorporated herein by reference as if included

Copies may be obtained from Architect.

END OF DOCUMENT

DOCUMENT 00800

SUPPLEMENTAL GENERAL CONDITIONS

Modifications to General Conditions

These Supplemental Conditions supplement and amend the General Conditions of this Contractor ("General Conditions of the Contract for Construction", AIA Document A201, 1997 Edition). All portions of the General Conditions specifically amended, voided, or superseded by these Supplemental Conditions shall remain in full effect.

ARTICLE 1
GENERAL PROVISIONS

1.1.3 Add the following sentence to the end of this Paragraph:

NO ASBESTOS CONTAINING MATERIAL NOR ASBESTOS OF ANY KIND SHALL BE USED WITHIN THE WORK OF THIS PROJECT.

ADD THE FOLLOWING SUBPARAGRAPH TO 1.1

1.1.8 CONTRACT DOCUMENTS

One complete set of Contract Documents includes this Project Manual, the Construction Drawings, Specifications, Appendices/Schedules, and all Addenda.

1.1.9 ACCEPTABLE/EQUAL, APPROVED EQUAL

The terms "as acceptable by the Architect," "acceptable equal," or any other term that requires or implies acceptance or approval, shall mean acceptance with Architect review either during the bid period or after award of the Contract.

1.1.10 SIMILAR AND/OR EQUAL

When the term "similar" or "equal" is used in a Specification Section in conjunction with a named component object(s) to be considered for use in the Project by manufacturers other than those specified, require Architect review and acceptance either during the bid period or after award of the Contract.

ADD THE FOLLOWING TO PARAGRAPH 1.2.3

In the event of conflicts or discrepancies amend the Contract Documents; the Documents shall be interpreted on the basis of the following priorities:

First:	Agreement
Second:	Addenda, with those of later date having precedence over those of earlier date.
Third:	Supplemental General Conditions
Fourth:	General Conditions
	Drawings and Specifications
Fifth:	Division 1 of the Specifications
Sixth:	Division 2 thru end of Specifications
Seventh:	Drawings
Eighth:	Other Contract Documents

In drawings, large scale details shall govern smaller scale drawings. Inc ase of conflicts between drawings and specifications, or within either the drawings or specifications, the Architect may interpret the Documents so as to secure the most substantial and comprehensive performance of the work consistent with the intent and requirements of the Contract, and such work shall be performed by the Contractor without extra cost to the Owner. It is understood that the event of unresolved discrepancies, the Contractor shall have bid the most expensive material or method in each case.

ADD THE FOLLOWING SUBPARAGRAPH TO 1.2

1.2.4 Material and equipment incorporated into the Project which by their nature are governed by OSHA regulations, shall conform to said OSHA regulations for both manufacturer and installation. If, during the progress of the Work it is discovered that installation does not conform to said OSHA regulations, the Contractor shall take such steps as necessary to comply at no additional cost to the Owner.

1.2.5 If the Drawings disagree with themselves or with the Specification manual, the better quality or greater quantity of work or materials shall be estimated upon, and unless specified in writing, shall be provided.

ARTICLE 2
OWNER

2.1 GENERAL

2.1.2 DELETE THIS SUBPARAGRAPH IN ITS ENTIRETY

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.2.1 DELETE THIS SUBPARAGRAPH IN ITS ENTIRETY

2.4 OWNERS RIGHT TO CARRY OUT THE WORK

2.4.1 DELETE THIS SUBPARAGRAPH IN ITS ENTIRETY AND SUBSTITUTE THE FOLLOWING:

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, and fails within seventy-two (72) hours after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, after forty-eight (48) hours following receipt by the Contractor of an additional written notice and without prejudice to any other remedy the Owner may have, make good such deficiencies. In such case an appropriate Change Order shall be used deducting from the payments then or thereafter due to Contractor the cost of correcting such deficiencies, including compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and the amount charged to the Contractor are both subject to the prior approval of the Architect. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.

ADD THE FOLLOWING SUBPARAGRAPH TO 2.4

2.4.2 The Owner reserves the right to go on this project and do work which is not connected to the Contract. If the work by the Owner hinders the progress of the Contractor or creates undue hardship for the Contractor in fulfilling the contract obligations, the Contractor shall notify the Architect, in writing, within a period of five (5) working days of the occurrence, stating the amount of delay or cost burden along with the specific causes.

2.4.3 The Owner shall have the right to take possession of, or use, any completed or partially completed part of the work. Such possession shall not hinder the progress of the Contractor. The Owner shall be responsible for all damages to the completed work as a result of his use.

ARTICLE 3
CONTRACTOR

3.2.1 ADD THE FOLLOWING: "The Contractor shall be held responsible for any damages resulting from work which he proceeds with, knowing to be in error, without having given the Architect prior notice as required hereinbefore."

ADD THE FOLLOWING SUBPARAGRAPHS TO 3.4

3.4.3.1 Strict discipline and good order shall include no fighting, no possession or use of drugs, no possession or use of alcohol, no use of tobacco products, and no profane language on the Owner's property. The Owner shall have the authority to require a contractor to have non-compliant workers removed from the Owner's property.

3.4.4 In compliance with the Acts of Indiana General Assembly, 1933, Chapter 270; the Age Discrimination in Employment Act of 1967; the Civil Rights Act of 1964; and any and all relevant Executive Orders, the Contractor hereby agrees:

.1 That in hiring, tenure, terms and conditions of employment, in work performed under this contract or any subcontract hereunder, no contractor, subcontractor, nor any person acting on behalf of such contractor or subcontractor, shall be reason of race, religion, color, sex, handicap, national origin or ancestry, discriminate against any citizen of the State of Indiana, who is qualified and available to perform the work to which this employment relates;

.2 That no contractor, subcontractor, not any person on his behalf shall in any manner, discriminate against or intimidate any employee hired for the performance of work under this contract on account of race, religion, color, sex, handicap, national origin or ancestry.

3.4.5 There shall be paid to each employee engaged in work on the project under this contract in the trade or occupation listed herein, not less than wage rates set opposite the same, which will be filled in, in accordance with the requirements of Chapter 319 of the Acts of the General Assembly of Indiana, 1935. Refer to wage rates included at the end of this section.

3.4.6 The Contractor shall provide a list for approval under the conditions set forth in the General Requirements of the Specifications, showing the name of the manufacturer, and other information where required, proposed to be used for each of the products identified in the General Requirements of the specifications which apply to their portion of the work.

3.4.7 Products are generally specified by ASTM or other referenced standard, and/or by manufacturer's name and model number or trade name. When specified only by reference standard, the Contractor may select any product or manufacturer as specified as being equally acceptable. The Contractor has the option of using any product and manufacturer combination listed. (When only one product and manufacturer is specified, this is the basis of the Contract, without substitution or exception.)

3.4.8 After the Contract has been executed, the Owner and Architect will consider a formal request for substitution of products in place of those specified only if the product is not available or not available within the time frame of the project, under the following conditions:

a. The request is accompanied by complete data on the proposed substitution substantiating compliance with the Contract Documents, including product identification and description, performance and test data, reference, and samples where applicable, and an itemized comparison of the proposed substitution with the products specified or named by Addenda, with data relating to contract time, schedule, design and artistic effect where applicable, and its relationship to separate Contracts.

b. The Request is accompanied by accurate cost data on the proposed substitution in comparison with the product specified, whether or not medication of the Contract sum is to be a consideration.

3.4.9 Request for substitution based on Clause 3.4.5 above, when forwarded by the Contractor to the Architect, are understood to mean the Contractor:

a. represents that he has personally investigated the proposed substitute product and determined it is equal or superior in all respects to that specified.

b. Will provide the same guarantee for the substitution that he would for that specified.

c. Certifies that cost data presented is complete and includes all related costs under this Contract, but excludes costs under separate Contracts and Architect's redesign costs, and that he waives all claim for additional cost related to the substitution which subsequently become apparent.

d. Will coordinate the installation of the accepted substitute, making such changes as may be required of the work to be complete in all respects.

3.4.10 Substitutions will not be considered if:

a. they are indicated or implied on shop drawing submissions without he formal request required in Clause 3.4.8.

b. for their implementation they require a substantial revision of the Contract Documents in order to accommodate their use.

3.4.11 All Contractors or subcontractors who are signatory to any union agreement shall observe all established union rules and regulations, and/or state and local laws and regulations, and shall cooperate with the labor union officials toward elimination and/or settlement of all labor disputes, in order to insure an even and uninterrupted rate of progress in the work.

3.4.12 All Contractors and subcontractors employed on the work shall be required to conform to the governing labor laws and the various acts amendatory thereto, and all other laws, ordinances and legal requirements applicable thereto.

3.5 WARRANTY

3.5.2 ADD THE FOLLOWING CLAUSES:

3.5.2.1 All specific warranties or bonds called for in the Contract Documents, in addition to that falling under the general warranty as set forth in the General Conditions, shall be furnished in accordance with the requirements of the Specifications.

3.5.2.2 The Contractor shall and does hereby agree to warrant for a period of one (1) year, or for longer periods, where so provided in the Technical Specifications, as evidenced by the Date of Substantial Completion issued by the Architect, all products installed under the contract to be of good quality in every respect and to remain so for periods described herein.

3.5.2.3 Should any defects develop in the aforesaid Work within the specified periods, due to faults in products or their workmanship, the Contractor hereby agrees to make all repairs and do all necessary work to correct defective work to the Architect's satisfaction. Such repairs and corrective work, including costs of making good all other Work damaged by or otherwise affected by making repairs or corrective work, shall be done without cost to the Owner and at the entire cost and expense of the Contractors within fourteen (14) days after written notice to the Contractor by the Owner and/or the Architect.

3.6 TAXES

3.6.2 ADD THE FOLLOWING SUBPARAGRAPH: Materials and properties purchased pursuant to contracts with the Owner that become affixed to the structure or facilities constructed are not subject to the Indiana Gross Retail Tax (Sales Tax). The Contractor shall obtain a copy of the Owner's exemption certificate and then issue copies of this certificate to his suppliers when acquiring materials and properties for use on this project. The Contractor shall enforce this exemption clause for all his purchases and for those of his Subcontractors.

3.6.3 ADD THE FOLLOWING SUBPARAGRAPH: If the Contractor is an out-of-state corporation, it shall furnish to the Owner, prior to contract execution, a certificate from the Secretary of State of Indiana as evidence that the Corporation is registered and authorized to transact business in the State of Indiana.

3.7 PERMITS, FEES, AND NOTICES

ADD THE FOLLOWING SUBPARAGRAPHS:

3.7.1.1 The General Contractor with whom the Owner has a bona fide Construction agreement shall pay all costs for all permits required by federal, state or local codes and/or ordinances, and include such costs in all bids. Each bidder shall be responsible for contacting the appropriate governing agency for such cost information. No work shall be started until all permits have been obtained and all costs and fees have been paid.

3.7.1.2 The General Contractor shall pay all costs for all required tests and inspections.

3.7.1.3 The General Contractor shall obtain the Occupancy Permit at the completion of the building.

3.8.3 ADD THE FOLLOWING SUBPARAGRAPH: Additional provisions pertaining to cash allowances are included in Division 1, General Requirements.

3.9 SUPERINTENDENT

3.9.2 ADD THE FOLLOWING SUBPARAGRAPH: The Superintendent shall be satisfactory to the Architect and shall not be changed except with the consent of the Architect, unless the Superintendent proves to be unsatisfactory to the Contractor or ceases to be in his employ. The Architect shall reserve the right to have any Superintendent removed from the project for failure to fulfill contract obligations, poor workmanship, abuse to other Contractors, or their work, or failure to meet the construction schedule.

3.9.3 ADD THE FOLLOWING SUBPARAGRAPH: The General Contractor shall not replace his Superintendent without written approval from the Owner and the Architect.

3.12 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

ADD THE FOLLOWING SUBPARAGRAPHS:

3.12.11 The specifications, drawings and directions furnished by the Owner's Architect are intended to cooperate and agree. The drawings and specifications shall be interpreted by the Architect according to the true meaning, spirit and intention of the same, without any extra charge, and if any discrepancies or variations appear between any of the drawings or specifications, such discrepancies or variations shall be interpreted by the Architect, who shall have the right to correct any errors or omissions in them as are necessary for proper fulfillment of their intention. Specifications take preference over plans; detailed drawings take preference over general sections.

3.12.12 Anything shown on the plans and not mentioned in the Specifications, or vice versa, must be furnished by the contractor without extra compensation. Further, if any materials or work are required which is absolutely necessary to carry out the full meaning and intent of the plans and specifications, the contractor hereby agrees to consider and allow for the same as fully as if they are so noted, and perform the work

without extra charge or claim for extra charge.

3.13 USE OF SITE

ADD THE FOLLOWING SUBPARAGRAPHS:

3.13.2 Smoking and eating shall not be allowed in any room which has had finished flooring installed.

3.13.3 The location and arrangement of the various parts of the installation are indicated on the drawings and the parts shall be installed as approximately thereon shown. Any change necessary to pass immovable obstructions shall be made by each contractor without additional cost. Under no circumstances shall any sizes be decreased or radical changes made in any part of the installation without written consent of the Architect.

3.13.4 The General Contractor and all Subcontractors doing excavation shall familiarize himself with all underground pipes, conduits, and utilities. The General Contractor and Subcontractors shall proceed in a careful manner always assuming there are unknown buried pipes, conduits, and utilities. If buried pipes, conduits or utilities are encountered they shall be reported to the Architect. Any damage done to these lines shall be repaired at no expense to the Owner.

3.14 CUTTING AND PATCHING

ADD THE FOLLOWING SUBPARAGRAPHS:

3.14.3 In new construction cutting and patching of walls, floor, and roof shall not be allowed without the approval of the Architect/Engineer.

3.14.4 The General Contractor shall install all frames and sleeves necessary in walls, floors, and roofs. Mechanical, Electrical, and Fire Protection Subcontractors shall supply necessary sleeves.

3.14.5 The Contractor requiring the opening shall verify the size and locate the opening. Each Contractor shall be prepared to do this at the job progress meeting.

3.14.6 ALL MISSED OPENINGS SHALL BE PAID FOR BY THE GENERAL CONTRACTOR AND THE SUBCONTRACTOR REQUIRING THE OPENING.

3.14.7 THE COST OF CORRECTING ALL MISPLACED AND MIS-SIZED OPENINGS SHALL BE PAID FOR BY THE CONTRACTOR REQUIRING THE OPENINGS.

3.14.8 In existing construction, cutting shall be done by the subcontractor requiring the opening using proper cutting tools which protect the integrity of the building. The General Contractor shall patch all openings to match adjacent finished surfaces.

3.14.9 Each subcontractor shall be responsible for reviewing all drawings and specifications. Each subcontractor shall give the other subcontractors a minimum of one week's notice when their plans require certain work to be completed prior to their continuation of work. If more than one week's time is needed prior to the continuation of work, the notifying subcontractor shall increase his notification time accordingly after written notice to the Contractor by the Owner and/or the Architect.

3.15 CLEANING UP

3.15.1 DELETE THIS SUBPARAGRAPH IN ITS ENTIRETY, AND SUBSTITUTE THE FOLLOWING:

The General Contractor shall, on a daily basis, keep the premises free from accumulation of waste materials or rubbish caused by its operations and keep its areas broom clean, neat, and orderly. Should any Contractor fail to comply with the daily clean-up requirements, the Owner, either directly or through its

Architect may order the daily clean-up to be performed by an independent agency, the cost of which shall be deducted from the Contractor's monthly progress payments. At completion of the Work, the Contractor shall remove from and about the Project waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials.

3.15.2 ADD THE FOLLOWING SUBPARAGRAPHS TO 3.15

3.15.2.1 All material waste generated by the Contractor during demolition and construction, including waste which is classified as hazardous by the Environmental Protection Agency (EPA) shall be removed from the site and disposed of in a manner meeting EPA standards. This shall include but not be limited to such items as fluorescent and HID lamps containing mercury; fluorescent and HID ballasts and liquid filled transformers which can contain polychlorinated biphenyls (especially if manufactured prior to 1978); mercury wetted (silent) toggle switches; water coolers and air conditioners containing Freon; floor tile, ceiling tile, plaster, pipe insulation, and other asbestos containing materials. The site shall be left free of all waste and cleaned to meet EPA standards.

3.15.2.2 Materials and equipment accruing from the work in the building shall be disposed of by the Contractor.

3.18 INDEMNIFICATION

3.18.1 DELETE THIS SUBPARAGRAPH IN ITS ENTIRETY, AND REPLACE WITH THE FOLLOWING: The Contractor and Subcontractor (hereinafter "Indemnitors") hereby agree to indemnify, save, and hold harmless, and defined at its own expense, the Owner and Architect performing services on this Project, their respective partners, agents, employees, and anyone else acting for or on behalf of any of them, and any other person or entity for whom any of them may be legally responsible, (hereinafter collectively called "Indemnitees"), against all claims, losses, damages, suits, costs, and expenses, including attorneys' fees or actions of any nature whatsoever, which arise out of, result from, or are related to or are alleged to arise out of, result from or relate to the work to be performed pursuant to this contract, including the Work to be performed by either of the Indemnitors; including without limiting the generality of the foregoing, all liability for damages, loss, costs, expenses, claims, including death, damage to property, damages to and Indemnitee or Indemnitor or its employees, servants, and agents, whether based upon, or claimed to be based upon, statutory, contractual, tort, or other liability of any Indemnitee whether or not caused, or alleged to be caused, in whole or in part, by the joint or several, negligence (but not sole negligence) breach of contract, breach of warranty, strict liability of other breach of duty by an Indemnitee. In the event more than one Indemnitor is responsible or alleged to be responsible in respect to an accident or occurrence covered by this Indemnification, then all of such Indemnitors shall be jointly and severally responsible to the Indemnitees for indemnification, and the ultimate responsibility among such Indemnitors for the loss and expense of any such indemnification shall be settled by separate proceedings and without jeopardy to any Indemnitee.

ADD THE FOLLOWING CLAUSES TO 3.18.1:

3.18.1.2 The Contractor is solely responsible for all citations and penalties arising out of, or resulting from, the performance of the work under his Contract.

3.18.1.3 The Contractor shall indemnify and hold harmless the Owner, the Architect, and their agents and employees from and against all claims, damages, losses and expenses, including attorney's fees, arising out of such Occupational Safety and Health Act violations and other applicable ordinances, rules, and regulations outlined in Article 10.

ARTICLE 4
ADMINISTRATION OF THE CONTRACT

4.1 ARCHITECT

4.2.2 SUPPLEMENT WITH THE FOLLOWING: The Architect shall designate the time interval that job

progress meetings shall be held. The job site shall be the meeting location, with the General Contractor and all Prime Subcontractors represented by their field superintendent and an official of each firm who has been designated as project manager and has the authority to make decisions for the Contractor.

4.4 RESOLUTION OF CLAIMS AND DISPUTES

4.4.1 DELETE ALL REFERENCES TO THE WORD "ARBITRATION" Voluntary mediation at the discretion of all parties to disputes is acceptable.

4.4.4 DELETE ALL REFERENCES TO THE WORD "ARBITRATION, AND SUBSTITUTE "LITIGATION" Voluntary mediation at the discretion of all parties to disputes is acceptable.

4.4.5 DELETE ALL REFERENCES TO THE WORD "ARBITRATION" Voluntary mediation at the discretion of all parties to disputes is acceptable.

4.4.6 DELETE ALL REFERENCES TO THE WORD "ARBITRATION" Voluntary mediation at the discretion of all parties to disputes is acceptable.

4.4.8 DELETE ALL REFERENCES TO THE WORD "ARBITRATION" Voluntary mediation at the discretion of all parties to disputes is acceptable.

4.6 ARBITRATION: DELETE THIS SECTION IN ITS ENTIRETY

ARTICLE 5
SUBCONTRACTORS

5.2.1 DELETE THE FIRST SENTENCE THIS PARAGRAPH AND SUBSTITUTE THE FOLLOWING: The low bidders, within 48 hours after bid opening, shall submit to the Architect a complete list of all subcontractors, suppliers, and manufacturers furnishing and/or installing materials and products (including those who are to furnish materials or equipment fabricated to a special design) specified on this project. The list shall be complete with names, addresses, city, state and zip code.

ARTICLE 7
CHANGES IN THE WORK

7.3.3 ADD THE FOLLOWING SUBPARAGRAPH:

7.3.3.5 Mutually agreed upon mark-up shall be as follows:

a. Subcontractors: 5% plus maximum of 1% for bond

b. Material: 10% plus maximum of 1% for bond

c. Labor: Actual cost hourly wages which includes FICA, pension and vacation multiplied by 1.2 plus a maximum of 1% for bond.

d. Taxes: Taxes including Indiana Gross Tax shall not be an additional extra. They are included in the above mark-up.

ARTICLE 8
TIME

8.1 DEFINITIONS

8.1.3 AMEND SUBPARAGRAPH TO READ: The Date of Substantial Completion of the Work is the date on

which the Owner receives the certification from the Architect that the installation is sufficiently complete, in accordance with the drawings, details, and Project Manual, as modified by any completed change orders agreed to by the parties, so the Owner can utilize the Work for the use for which it was intended. The warranty period shall commence no earlier than the Date on which the Owner receives the Certificate of Substantial Completion of the Project.

ADD THE FOLLOWING CLAUSE:

8.1.3.1 As between the Owner and the Contractor, as to all acts or failures to act occurring prior to the relevant Date of Substantial Completion of the Work, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events no later than such Date of Substantial Completion of the Work, any applicable statute of limitation shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment.

8.2 PROGRESS AND COMPLETION

DELETE SUBPARAGRAPH 8.2.3 AND SUBSTITUTE THE FOLLOWING:

8.2.3 The contractor, his subcontractors, and/or material company shall furnish sufficient labor forces, construction forces, construction plant and equipment, etc., required for their work and protection unless specified elsewhere, and shall work such hours, including night shifts and overtime operations as may be necessary to insure the prosecution of the work in accordance with the approved current progress schedule. If in the opinion of the Architect, the Contractor falls behind the progress schedule, the Contractor shall take such steps as may be necessary to improve his progress and the Architect may require him to increase the number of shifts, and/or overtime operations, days of work, and/or the amount of the construction plant, all without additional cost to the Owner. Failure of the Contractor to comply with the requirements of the Architect shall be grounds for determination by the Architect that the contractor is not prosecuting the work with such diligence as will insure completion within the time specified. Upon such determination, the Owner shall have the right, without limiting any other right he may have to either not approve reduction of retainage or to terminate the Contractor's right to proceed with the work or any separable part thereof.

ADD THE FOLLOWING CLAUSE:

8.2.4 Timely performance is an express condition of the contract and any delay in the Contractor's performance may excuse the Owner from his obligation to perform. Failure to abide by the time condition may be treated as a breach of contract.

DELETE THE FOLLOWING PHRASE FROM THE PARAGRAPH:

8.3.1 Delete "or by delay authorized by the Owner pending mediation or arbitration."

ADD THE FOLLOWING CLAUSE:

8.3.4 In the event the Contractor is deemed by the Architect as unable to meet the Project Construction Schedule because of the failure of any of the Contractor's suppliers and/or subcontractors to timely deliver materials, equipment and labor for the project, the Contractor agrees that Architect shall be authorized, on behalf of the Contractor, to deal directly with such delinquent suppliers and/or subcontractors. The Contractor shall take such actions as the Architect shall request to assist the Architect in dealing with such delinquent suppliers and/or subcontractors in such manner as the Architect shall deem necessary for the completion of the project, which may include, but shall not be limited to the termination of such delinquent suppliers and/or subcontractors and the issuance of replacement orders to other suppliers chosen by the Architect on behalf of the Contractor. Any expediting measures carried out by the Architect does not relieve the Contractor of his obligations. The Architect shall not alter contract conditions except by authorized Change Order. No additional costs will be passed on to the Owner as a result of the failure of the Contractor's suppliers or subcontractors to meet their obligations.

ARTICLE 9
PAYMENTS AND COMPLETION

9.3 APPLICATION FOR PAYMENT

9.3.1 DELETE THIS PARAGRAPH AND SUBSTITUTE THE FOLLOWING: Applications for Payment shall be made no later than the 25th of the month through the Architect to the Owner. Payment to the Contractor will not be made until the final approval by the Owner's Board. Applications made by the 25th of the month, if approved, will be paid approximately thirty (30) days later except for the first payment which will be paid approximately sixty (60) days later. The Contractor shall submit to the Architect, in duplicate, an itemized Application for Payment, supported by such data, such invoices sustaining the Contractor's right to payment as the Owner and Architect may require. Contractors shall utilize Application Payment Form AIA G702 and with the Owner's Claim Form as prescribed by the State Board of Accounts. The Architect will provide the Owner's claim form. The Application for Payment Forms will be provided by the Contractor. The first Application for Payment shall not be acceptable until the Architect has given written approval of the schedule of values breakdown as specified in Article 9.2.

ADD NEW PARAGRAPH TO 9.3.2 AS FOLLOWS:

Contractors may receive payments for materials suitably stored on site provided the items are organized, protected from the elements, grouped together and can be counted in a reasonable period of time.

ADD NEW PARAGRAPH TO 9.3.3 AS FOLLOWS:

WAIVER OF LIEN:

Each Contractor must provide Partial Waivers of Lien for themselves and from all suppliers with each Application for Payment. Each Contractor must further provide Final Waivers of Lien for themselves and from all suppliers before final payment will be made. The waivers for suppliers shall cover disbursements made from the previous payment request. Lien forms may be obtained from any local office supply business.

ADD NEW PARAGRAPH TO 9.4:

RETAINAGE:

9.4.3 Retainage withheld shall be 5% of Contract sum throughout until the Contractor has successfully completed all work on the project, and fulfilled all contractual obligations as stated in the General Requirements.

9.4.4 The Owner shall set up an Escrow Account for the retainage according to the governing laws.

9.6 PROGRESS PAYMENTS

ADD THE FOLLOWING SUBPARAGRAPH:

9.6.8 On all Contracts totaling one hundred thousand dollars ($100,000) or more, an escrow account shall be established in a financial institution, an escrow agent, selected by mutual agreement between the Contractor and the Owner at the time Contracts are executed. The establishing of the escrow shall be in compliance with the requirements of Indiana Code 36-1-12-14.

.1 The Escrow Agent shall promptly invest all escrowed principal in such obligations as shall be selected by the Escrow Agent at its discretion.

.2 The Escrow Agent shall hold the escrowed principal and income in receipt of notice from the

Owner and the Contractor, specifying the portion or portions of the escrowed principal to be released from the escrow and to whom such portion(s) shall be released. Upon receipt of such notice the Escrow Agent shall promptly remit the designated portion of escrowed principal and the same proportion of then escrowed income.

.3 The Escrow Agent shall be compensated for its services as the parties agree in the amount not to exceed fifty (50%) of the escrowed income of the escrow account.

.4 See Section 9.10 – Final Completion and Final Payment, for provisions of retainage in escrow and final payment.

9.7 FAILURE OF PAYMENT

9.7.1 AMEND THIS SUBPARAGRAPH AS FOLLOWS:

Delete the phrase "or awarded by arbitration" from this paragraph, and delete the final sentence of this subparagraph.

9.8 ADD THE FOLLOWING SUBPARAGRAPHS:

9.8.6 When any work included in these specifications is completed and at such time as directed by the Owner, the Contractor installing the same, shall carefully adjust all parts of his equipment and/or systems advising the Owner when the same is complete and ready for use.

9.8.7 The respective contractors shall, after the work is complete, fully and carefully instruct the Owner's operator having charge of the system, as to adjustment, efficient and proper methods of operation of each system and various apparatus. The contractor shall submit a written report of the training session which contains a list of attendees, items discussed and procedures reviewed. All moving parts of the apparatus shall be left field and all grease cups, oilers, etc. shall be left filled.

9.9 PARTIAL OCCUPANCY OR USE

9.9.1 DELETE THE PHRASE "occupy or use" from this paragraph and SUBSTITUTE "utilize".

ARTICLE 10
PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

10.1.1 ADD AT THE END OF SUBPARAGRAPH THE FOLLOWING: Furthermore, the Contractor shall conform to the safety and health standards for construction as set forth in the Federal Register publication for the Occupational Health and Safety Health Administration (OSHA), Department of Labor, title Bureau of Labor Standards "Safety and Health Regulations for Construction; and any state or local regulations or codes governing or providing for the safety and health of employees and the general public.

10.1.2 ADD THE FOLLOWING SUBPARAGRAPH: In the event the Contractor encounters on the site hazardous material reasonably believed to be asbestos or polychlorinated biphenyl (PCB) which has not been rendered harmless, the Contractor shall immediately stop work in the area affected and report the condition to the Owner and Architect in writing. The work in the affected area shall not thereafter be resumed except by written agreement of the Owner and Contractor if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless. The work in the affected area shall be resumed in the absence of asbestos or polychlorinated biphenyl (PCB), or when it has been rendered harmless."

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.1 ADD THE FOLLOWING CLAUSES:

.4 All work, materials, apparatus and fixtures, which may be caused by weather (rain, winds, storms, frost and heat).

.5 Excavated banks, trenches and/or building from damage from rainwater, spring water, groundwater, backing up of drains of sewers and all other water admitted to the work by his operation. He shall provide all pumps and other equipment and enclosures to provide this protection. In the case of any work involving a trench greater than five (5) feet in depth, IOSHA regulations shall prevail.

10.2.2 ADD THE FOLLOWING CLAUSES:

.1 The Contractor shall conform with the United States Department of Labor and Indiana Division of Occupational Safety and Health Administration regulations.

.2 The Contractor shall have their Hazard Communication Program in effect with all their personnel working on the project. All Material Safety Data Sheets should be current as required by law.

10.2.3 ADD THE FOLLOWING: Additional protection shall be taken when (i) utilities cross existing streets, drives, lawn, shrubs, etc., (ii) repair or replace to original conditions as approved by Owner and Architect. In streets, roads, highways, work to be as directed by City Engineer, County or State Highway Department.

10.2.5 TWICE in Subparagraph 10.2.5 CHANGE "Clauses 10.2.2 and 10.2.3" TO READ "Clauses 10.2.1.2, 10.2.1.3, 10.2.1.4, and 10.2.1.5."

ADD THE FOLLOWING CLAUSES:

10.2.5.1 Should the Contractor within twenty-four (24) hours notice fail to remedy all damage or loss (other than damage or loss insured under Paragraph 11.3) to property referenced in Provision 10.2.5, the Owner shall have the right to remedy the situation and the cost thereof will be back-charged to the Contractor responsible for the damage or loss.

ARTICLE 11
INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.1 FIRST SENTENCE FOLLOWING THE WORDS "SET FORTH BELOW", MODIFY AS FOLLOWS: In a company or companies with ratings of no less than A as determined by A.M. Best Company licensed to do business in the state where the project is located, with claims representation in South Bend, Indiana, and to which the Owner has no reasonable objection.

ADD TO PARAGRAPH:

Before starting work, the Contractor shall furnish to the Owner, through the Architect, duly executed certificates of all required insurance on the latest edition of AIA Form G705 or on ACCORD Form. The certificates shall also state that such insurance is in force and cannot be canceled or released except upon thirty (30) days prior written notice to the Owner, through the Architect. All policies shall be written specifically for this Project, with the name of the Project on said policies.

It shall be the Contractor's responsibility to provide the Owner with written certification of renewal of insurance in sufficient time so as to be in possession of the Owner no later than fifteen (15) days prior to policy expiration date. The Contractor shall prove the Architect with a copy of said renewal certification. Allowing the insurance to expire is a **breach of contract** on the part of the Contractor and shall be grounds

to immediately stop the work by direction of the Owner. No work shall proceed until renewal insurance has been reviewed and approved by the Owner.

All insurance required under this Article 11 shall remain in effect for a period of one (1) year from date of Substantial Completion. The Owner and Architect shall be named as additional insureds on all liability policies.

11.1.2 DELETE THIS PARAGRAPH AND SUBSTITUTE THE FOLLOWING: The insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits and requirements or required by law, whichever is greater and with the Owner, the Trustee, its assignee, the Architect, and their consultants, named as "Additional Insureds" on the insurance policy. Coverages written on an occurrence basis, shall be maintained without interruption from date of commencement of the Work until day of final payment and termination of any coverage required to have been maintained after final payment.

ADD THE FOLLOWING CLAUSE:

11.1.2.1

1. Prior to the commencement of any work and prior to the performance of any service, the Contractor shall procure and pay for the following insurance coverages, and the Contractor shall maintain them in force after his work is completed and accepted for final payment and throughout the one (1) year guarantee period. The insurers and policies shall be subject to the Owner's approval.

2. Workman's Compensation

   a. Statutory Workmen's Compensation and Occupational Disease Insurance with all elective employments covered and all excluded employments covered on a voluntary basis where permissible.

   b. The Workmen's Compensation policy shall contain the following endorsement, unless specifically prohibited by compensation insurance authorities having jurisdiction: "Whereas, Contractor may undertake to perform work for Owner; and, whereas, said Owner may exercise some degree of jurisdiction or control over the employees of Contractor engaged in such work, it is agreed that, subject to the conditions and limitations of this policy, said Owner is named as an additional insured employer under this policy, but only with respect to employees of Contractor whose names appear on the payroll records of Contractor while performing such work for said company.

   c. The Contractor shall effect and maintain insurance covering himself or his agents, the Owner or its assignee, the Trustee, the Architect, and their consultants against all claims, demands or actions arising under the Indiana Workmen's Compensation law against all other claims, demands or actions for injury to, or death of, persons and damage to property, and will furnish the Owner with certificates showing the following coverages in complete satisfaction to the Owner.

      1) Worker's Compensation Insurance, Occupational Disease Insurance and Employer's Liability Insurance for all employees engaged in work under this agreement.

3. Bodily Injury and Property Damage Liability

   a. The liability policy shall be on a comprehensive liability form and shall include, but not be limited to, coverage for all operations of the Contractor, including automobile,

premises, contractual liability, completed operations liability, Contractors protective liability and contingent liability for the operations of subcontractors. Coverage is also to be provided for explosion, demolition, collapse, and underground liability for all contractors.

1) Comprehensive General Liability Insurance, including Contractor's Protective Liability, Completed Operations, Blanket (Contractual and Personal Injury Liability, and Coverage as Respects the Explosion, Collapse, and Underground Hazards:

   a) Bodily Injury and Property Damage (including explosion, collapse, and undermining coverage) in the amount of $1,000,000 each occurance and a $2,000,000 aggregate limit.

   b) Automobile Bodily Injury and Property Damage Liability coverage in the amount of $1,000,000 each occurrence and a $2,000,000 aggregate limit.

2) Umbrella Liability Coverage with a $2,000,000 aggregate limit. The insurance coverage provided shall meet the exposures relating to the type of work performed. The above underlying primary limits of liability for both comprehensive general liability and comprehensive automobile liability may be reduced onlyi f an excess umbrella policy is obtained with a minimum limit of $3,000,000 and then only to the extent to the minimum required for primary coverage under such excess contract.

3) Aircraft Liability Insurance. If any aircraft is to be used by the Contractor in connection with this contract either as a conveyance to and form the location of the job site or for use in the course of construction, liability insurance in the amounts acceptable to the Owner shall be obtained by the Contractor and this liability coverage shall be shown on the insurance certificate. If the Contractor will not be using aircraft as described above, then the Contractor shall have the following statement on his certificate of insurance: "No aircraft is intended for use and said insurance for same is not required."

4) Blanket broad form contractual liability coverage shall be obtained specifically to include coverage for the "hold harmless" clause contained elsewhere in this contract and this shall appear in the certificate.

5) Contractor shall provide Pollution Liability Insurance that provides coverage for bodily injury, property damage and regulatory response costs and other necessary remedies arising out of or related to the presence, release, or threatened release of hazardous substances, or pollutants in amounts not less than $2,000,000 per occurrence.

   b. The policy of insurance referred to above shall contain the following endorsement:

   "It is further understood that the coverage of this policy shall not be canceled or reduced by the company until the company has mailed written notice to Owner stating when, but in no case les than thirty (30) days thereafter, such cancellation or reduction in coverage shall be effective."

   The Contractor shall indemnify and hold harmless the Owner or assignee, and Architect, and their agents and employees in accordance with Article 3.18, herein.

   The policy provided by the Contractor shall provide coverage for the professional acts of that Contractor.

For the duration of this Contract, Contractor shall maintain Comprehensive Automobile Liability Insurance for all owned, non-owned and hired vehicles. Contractor shall require subcontractors to provide Comprehensive Automobile Liability Insurance with same limits.

Contractor shall not commence work at the site under this contract until he/she has obtained all required insurance, and until such insurance has been approved by the Owner and Architect. The Contractor shall not allow any subcontractor to commence work until all liability insurance required has been obtained and approved.

Approval of the insurance, by the Owner and Architect, shall not relieve or decrease the liability of the contractor hereunder. Certificates shall be filed with the Owner and Architect prior to commencing work.

4. Proof of Carriage of Insurance

a. The Contractor shall not commence work under this contract until he has obtained all required insurance, as specified herein, and has filed with the Architect two (2) certificates of insurance, evidenced in the carriage of insurance and the requisite amounts placed with satisfactory carriers licensed in the State of Indiana, and countersigned by a resident Indiana agent. The Contractor shall furnish to Owner and Architect certificates issued by the Industrial Board of Indiana (Form Number 19 and 105) as proof of compliance with Workmen's Compensation and Occupational Disease Insurance as provided under the laws of the State of Indiana. No work shall be started by either Contractor of subcontractor until such certificates are delivered. Owner reserves the right to stop work in all cases where such renewal certificates and insurance policies are not delivered to Owner prior to the expiration date shown on the policies and/or certificates.

b. The Contractor shall be responsible for his subcontractors obtaining the required insurance prior to commencing work.

c. All Contractor's insurance policies shall name the Owner and/or its representatives or assignees, the Trustees, the Architect and their consultants as additional insureds, and shall deliver evidence of such insurance to the Owner through the Architect.

d. Should any coverage approach expiration during the contract period, it shall be renewed prior to its expiration and certificate again filed with the Architect. Certificates are to contain the following language:

"It is hereby agreed that the Owner shall be notified thirty (30) days prior to cancellation of any insurance, material alternation and/or election not to renew."

e. All insurance policies shall be maintained in full force and effect until the contract is performed. However, completed operations coverage shall be maintained for at least three years following the issue of a Certificate of Substantial Completion.

f. Each Contractor shall be responsible for paying any deductibles and the $1,000 deductible for Builders Risk Insurance.

11.1.3 DELETE PARAGRAPH 11.1.3 AND SUBSTITUTE THE FOLLOWING: Certificates of Insurance shall be filed with the Owner prior to commencement of the Work. Furnish one copy of the certificate for each copy of the Owner-Contractor Agreement. Specifically set forth evidence required by the Contractor by this Article 11. The form of the certificate shall be AIA Document G705, ACCORD Form 25 or Form 25S, current edition. Furnish copies of any endorsements that are subsequently issued amending coverage or limits.

11.2 OWNER'S LIABILITY INSURANCE

DELETE 11.2.1 AND SUBSTITUTE THE FOLLOWING:

11.2.1.1 Owner shall maintain "All Risk Insurance which shall include, but not be limited to fire, lightning, extended coverage perils, vandalism and malicious mischief, collapse, water damage from bursting pipes, and theft of building materials from the job site upon the addition or new building which is the subject of this contract. Coverage shall include items of labor and materials connected therewith whether in or within 100 feet of the structure insured, materials in place or to be used as part of the permanent construction, including surplus incidental to the work, and such scaffolding, staging, towers, forms, and equipment as are not owned or rented by the Contractor, the cost of which is included in the cost of the work. The policy shall insure the Owner and shall also include the interest of the Contractor during the course of construction until completed and accepted by the Owner. Coverage shall not be voided by partial occupancy until the work is completed and accepted by the Owner. Each Contractor shall be responsible for paying the $1,000 deductible for Builder's Risk Insurance.

11.2.1.2 Loss, if any, is to be adjusted both with and payable to the Owner as trustees for the insureds as their interest may appear.

11.2.1.3 Exclusions: the insurance does not cover any tools owned by mechanics, any tools, equipment, scaffolding, staging, towers, and forms owned or rented by the Contractor, the capital value of which is not included in the cost of the work, or contractor's sheds or other structures that are erected for housing the workmen.

11.2.1.4 Owner's Liability Insurance: the Owner is self-insured.

DELETE PARAGRAPHS 11.3.2 – 11.3.3 IN THEIR ENTIRETY

ADD THE FOLLOWING SENTENCE: The policies shall not prohibit waivers of subrogation.

11.3.4 ADD THE FOLLOWING PARAGRAPH: The Owner, as Trustee, shall have the Power to adjust and settle any loss with the insurers.

11.5 PERFORMANCE BOND AND PAYMENT BOND

11.5.1 DELETE THIS SUBPARAGRAPH IN ITS ENTIRETY AND SUBSTITUTE THE FOLLOWING: The Contractor shall provide a Performance Bond and Labor and Material Payment Bond, each in an amount equal to one hundred twenty-five percent (125%) of the Contract Sum and drawn in favor of the Owner.

ADD SUBPARAGRAPHS 11.5.3, 11.5.4, AND 11.5.5 AS FOLLOWS:

11.5.3 Performance Bond and Labor and Material Bond shall be executed by a surety acceptable to the Owner on the edition of AIA Document A312 current as of the date of the award of the Contract, as modified.

11.5.4 The Contractor shall sue as a Surety for the applicable bond one of the acceptable companies determined strictly in accordance with the following: Insurance and Surety companies shall be deemed qualified and acceptable to Owner's Legal Counsel, in connection with Contractor bonding and insurance requirements under said Contracts only if such companies have a Policy Holders Rating of "A", a financial category of not less than Class Vi and Policy Holder Surplus of not less than $25,000,000.00 all as shown in "Best's Key Rating Guide", latest edition, provided however, that the bond furnished is furnished by one of the aforesaid qualified Sureties who is also listed in the Department of the Treasury Circular 570 – Volume 41 No. 132, Part V (Federal Register) and is licensed in the State of Indiana and the penal sum of the bond does not extend the underwriting limitation set forth in the subject Circular, unless the excess, if any, is reinsured with the approval of the Owner.

11.5.5 The Contractor shall deliver the required bonds to the Owner prior to the date of execution of the contract. The Owner or Architect shall not be responsible for any costs associated with securing the bond should the project be cancelled prior to contracts being fully executed.

a. Said bonds shall remain in full force and effect, during the life of the contract and form date of completion and during the term of any warranty required by the Specifications. Should the Contractor's bonding company give notice of cancellation; the Contractor will be responsible for securing a new bond within fourteen (14) calendar days.

b. Contractor shall keep his/her Bonding Company informed of any and all changes in amount of his contract with the Owner and shall furnish the Architect with copies of all notices of such changes upon request.

ARTICLE 12
UNCOVERING AND CORRECTION OF WORK

12.2 CORRECTION OF WORK

ADD TO 12.2.4 THE FOLLOWING:

If any Subcontractor chooses to use any system, equipment, facilities, or services which have been installed into the building as a permanent part thereof by any other Contractor, said Contractor shall assume full responsibility for damage to said system, equipment, facilities, or services and shall make such arrangements with the installing subcontractor as are necessary, so that in no case the performance of the period mentioned above shall be jeopardized as a result of such use; and said use can be implemented only after written approval is given by the Architect.

ARTICLE 13
MISCELLANEOUS PROVISIONS

13.2 SUCCESSORS AND ASSIGN

13.2.1 REVISE THE FIRST LINE TO READ: The Owner, to the extend permitted by law, and Contractor...

13.5 TESTS AND INSPECTIONS

13.5.1 DELETE THE LAST SENTENCE OF THIS SUBPARAGRAPH

13.5.5 DELETE THE SUBPARAGRAPH AND SUBSTITUTE THE FOLLOWING: All equipment shall be inspected and tested under operating conditions. The Architect, and/or Owner reserve the right to be present at said testing. Contractor shall give the Architect and the Owner at least thirty-six (36) hours advance notice by telephone prior to scheduling said tests and operations. If inspection or tests show defects, they shall be corrected and inspections and tests repeated until proven satisfactory. Neither the observations of the Architect in administration of the Contract, no inspections, tests or approvals by persons other than the Contractor, shall relieve the Contractor from obligations to perform the Work in accordance with the Contract Documents.

13.6 INTEREST

13.6.1 DELETE THIS SUBPARAGRAPH IN ITS ENTIRETY

ADD NEW PARAGRAPH TO ARTICLE 13:

13.8 NO LIEN CONTRACTS

13.8.1 Owner and all Contractors shall agree that no lien shall attach to the real estate by Contractor, Subcontractor, mechanics, journeymen, laborers or persons performing labor upon or furnishing materials or machinery for the work provided for under terms of this Contract, and for the purpose of complying with provisions of I.C. 32-8-3-1, Chapter 116 of the Acts of Indiana General Assembly for the year 1909, Chapter 41 of said Acts 1911, Chapter 50 of said Acts of 1915, Chapter 56 of said Acts of 1921, Chapter 187 of said Acts of 1943, Chapter 376 of said Acts of 1963, Section I.P.L. 424 of said Acts of 1971, the parties agree that this Contract shall be recorded with the Recorder of the county in which the Project is located within five (5) days after its execution.

ARTICLE 14
TERMINATION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

14.1.3 REVISE THIS SUBPARAGRAPH AS FOLLOWS: Put a period after "...Contract" and delete "and recover from the Owner payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead, profits and damages."

14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

ADD THE FOLLOWING SUBPARAGRAPH

14.4.4 The Owner shall have the right at anytime to terminate the contract if such termination is in the public interest. In such case, the Owner's liability to the Contractor will be limited to payment of work completed, and reasonable charges for return and restocking of materials purchased, but not incorporated into the work.

END OF DOCUMENT

PREVAILING WAGE RATES

END OF DOCUMENT

December 5, 2007

South Bend **County: ST. JOSEPH** **State of Indiana**

We the undersigned common construction wage committee, appointed pursuant to Indiana Code 5-16-17, as amended in 1995, do hereby fix and determine the following common construction wage scales to apply on the:

City of South Bend:

1. South Bend Regional Fire Training Center, Phase I and II;
2. Eddy Street Commons;

bend

TYPE OF CONSTRUCTION: Building
WAGE RATES

The wage rates under the column "Total" as set forth by the committee are the minimum wage rates to be paid and shall not prevent a contractor from paying a higher wage rate.

Classification	*Class*	*Hourly Rate*	*Fringes*	*Total*
Asbestos Worker				
Journeyman	Skilled	$28.65	$10.59	$39.24
	Semiskilled	$22.92	$10.59	$33.51
	Unskilled	$17.19	$10.59	$27.78
Asbestos Abatement				
Journeyman	Skilled	$18.75	$9.70	$28.45
	Semiskilled	$13.00	$6.90	$19.90
	Unskilled	$11.00	$0.65	$11.65
Boilermakers				
Journeyman	Skilled	$30.00	$17.81	$47.81
	Semiskilled	$24.00	$17.81	$41.81
	Unskilled	$21.00	$17.81	$38.81
Bricklayers				
Journeyman	Skilled	$26.75	$10.59	$37.34
	Semiskilled	$20.06	$10.59	$30.65
	Unskilled	$13.37	$10.59	$23.96
Carpenters				
Journeyman	Skilled	$24.74	$10.71	$35.45
	Semiskilled	$19.79	$10.71	$30.50
	Unskilled	$15.69	$9.86	$25.55
Carpet Layer				
Journeyman	Skilled	$23.66	$10.47	$34.13
	Semiskilled	$18.93	$10.47	$29.40
	Unskilled	$15.05	$9.62	$24.67
Cement Masons				
Journeyman	Skilled	$23.79	$10.18	$33.97
	Semiskilled	$19.03	$10.18	$29.21
	Unskilled	$14.27	$10.18	$24.45
Drywall Finishers				
Journeyman	Skilled	$22.33	$8.41	$30.74
	Semiskilled	$16.75	$5.55	$22.30
	Unskilled	$11.17	$5.55	$16.72

Drywall Installers				
Journeyman	Skilled	$23.66	$10.47	$34.13
	Semiskilled	$18.93	$10.47	$29.40
	Unskilled	$15.05	$9.62	$24.67
Dynamite Men				
Journeyman	Skilled	$20.58	$7.08	$27.66
	Semiskilled	N/A	N/A	
	Unskilled	N/A	N/A	
Electricians				
Journeyman	Skilled	$27.75	$13.72	$41.47
	Semiskilled	$18.04	$12.31	$30.35
	Unskilled	$11.10	$6.61	$17.71
Elevator Constructors				
	Skilled	$36.85	$19.23	$56.08
	Semiskilled	$25.79	$17.41	$43.20
	Unskilled	$18.42	$0.35	$18.77
Glaziers				
Journeyman	Skilled	$24.14	$10.20	$34.34
	Semiskilled	$19.31	$10.20	$29.51
	Unskilled	$12.07	$10.20	$22.27
Iron Workers				
Journeyman	Skilled	$23.00	$15.81	$38.81
	Semiskilled	$18.40	$15.81	$34.21
	Unskilled	$13.80	$15.81	$29.61
Laborers	Skilled	$20.58	$8.98	$29.56
	Semiskilled	$20.08	$8.98	$29.06
	Unskilled	$19.58	$8.98	$28.56
Millwrights				
Journeyman	Skilled	$22.46	$12.79	$35.25
	Semiskilled	$17.97	$12.79	$30.76
	Unskilled	$13.48	$12.79	$26.27
Operating Engineers				
Journeyman	Skilled	$24.60	$16.45	$41.05
	Semiskilled	$21.10	$16.45	$37.55
	Unskilled	$17.55	$13.80	$31.35
Painters/Brush/Roll				
Journeyman	Skilled	$23.03	$9.38	$32.41
	Semiskilled	$17.27	$6.10	$23.37
	Unskilled	$11.52	$6.10	$17.62
Painters/Sprays/Sandblast				
Journeyman	Skilled	$23.53	$9.38	$32.91
	Semiskilled	$17.27	$6.10	$23.37
	Unskilled	$11.52	$6.10	$17.62
Automatic Drywall Tools				
Journeyman	Skilled	$23.28	$9.38	$32.66
	Semiskilled	$17.27	$6.10	$23.37
	Unskilled	$11.52	$6.10	$17.62
Vinyl/Paper Hanger				
Journeyman	Skilled	$23.03	$8.83	$9.38
	Semiskilled	$17.27	$6.10	$23.37
	Unskilled	$11.52	$6.10	$17.62

Pipefitters & Steamfitters				
Journeyman	Skilled	$28.35	$12.56	$40.91
	Semiskilled	$21.25	$12.56	$33.81
	Unskilled	$12.75	$12.56	$25.31
Plasterers				
Journeyman	Skilled	$24.04	$11.43	$35.47
	Semiskilled	$19.24	$11.43	$30.67
	Unskilled	$14.43	$11.38	$25.81
Plumbers				
Journeyman	Skilled	$28.35	$12.56	$40.91
	Semiskilled	$21.25	$12.56	$33.81
	Unskilled	$12.75	$12.56	$25.31
Pointer/Caulker/Cleaners				
Journeyman	Skilled	$26.25	$9.93	$36.18
	Semiskilled	$21.00	$9.93	$30.93
	Unskilled	$13.12	$9.93	$23.05
Roofers				
Journeyman	Skilled	$25.41	$9.47	$34.88
	Semiskilled	$20.33	$9.47	$29.80
	Unskilled	$10.67	$2.87	$13.54
Sheet Metal Workers				
Journeyman	Skilled	$26.85	$14.49	$41.34
	Semiskilled	$20.14	$13.71	$33.85
	Unskilled	$13.43	$13.01	$26.44
Sound and Communication Workers				
Journeyman	Skilled	$22.85	$8.73	$31.58
	Semiskilled	$19.42	$8.62	$28.04
	Unskilled	$11.43	$6.32	$17.75
Sprinkler Fitters				
Journeyman	Skilled	$31.29	$12.75	$44.04
	Semiskilled	$20.34	$12.75	$33.09
	Unskilled	$15.65	$6.81	$22.46
Teamsters				
Pickup Truck	Skilled	$19.33	$6.85	$26.18
	Semiskilled	N/A	N/A	
	Unskilled	N/A	N/A	
Single Axle	Skilled	$19.54	$6.85	$26.39
	Semiskilled	N/A	N/A	
	Unskilled	N/A	N/A	
Tandem, Tri Axle, Fuel	Skilled	$19.67	$6.85	$26.52
	Semiskilled	N/A	N/A	
	Unskilled	N/A	N/A	
Semi-low Boy	Skilled	$19.67	$6.85	$26.52
	Semiskilled	N/A	N/A	
	Unskilled	N/A	N/A	
Tile Mechanics				
Journeyman	Skilled	$25.73	$9.63	$35.36
	Semiskilled	$20.06	$9.63	$29.69
	Unskilled	$12.86	$9.63	$22.49
Tile Finishers				
Journeyman	Skilled	$23.86	$8.64	$32.50
	Semiskilled	$17.89	$8.64	$26.53
	Unskilled	$11.93	$8.64	$20.57

Skilled: An individual who performs work in a classification listed on the scale of wages. It shall be presumed that an employee is a skilled worker in that classification, and entitled to receive compensation at the skilled rate, unless the worker satisfies all of the criteria for being categorized as a semi-skilled or unskilled worker.

Semi-skilled: An individual registered in a bona fide apprenticeship program registered with the United States Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training. Apprentices are paid pursuant to their individually warranted percentage for the classification of work that they perform as set forth in the apprentice program standards.

Unskilled: An individual with less than twelve months of cumulative experience in the construction trades and who is not registered in a bona fide apprenticeship program.

The above definitions shall not apply to workers in the classification of Laborer.

Apprenticeship Programs:

The Wage Committee determines that the common practice in the county is for contractors to participate in bona fide apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training and that the rate of pay for the classifications of labor that participate in such programs is based in part on a percentage of the journeyman's rate (skilled rate herein) depending on the individual's progress in the program.

Workers engaged in such an apprenticeship program will be permitted to work at less than the predetermined rate set out above for the work they perform. Such apprentices must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate which is the skilled hourly rate in this wage scale.

Any worker who is not registered or otherwise employed in a bona fide apprenticeship program registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training and has twelve or more months of cumulative experience in the construction trades shall be paid at the skilled wage rate on this wage determination for the classification of work actually performed by the worker regardless of how the employer classifies such a worker.

Disputes regarding the appropriate classification of workers and the amounts said workers should be paid may be submitted to the Indiana Department of Labor for investigation.

SIGNATURES OF APPOINTEES

Appointee named by the Indiana State AFL-CIO

Industry Appointee named by the Awarding Agency

Appointee named by the Governor of Indiana

Taxpayer Appointee named by the Awarding Agency

Taxpayer Appointee named by the County Legislative Body

5-Dec-07
Date

INDIANA DEPARTMENT OF LABOR

GUIDE TO BUILDING TRADES CLASSIFICATIONS WITH DESCRIPTIONS

1. ASBESTOS WORKERS/ MECHANICAL INSULATOR

Applies and removes all insulation materials on all mechanical structures, pipes, boilers, ducts, breechings, etc., application of damming and fireproofing materials for penetration seals.

2. ASBESTOS ABATEMENT – SKILLED

Supervisor/Competent person supervises asbestos abatement workers and/or constructs the containment areas.

3. ASBESTOS ABATEMENT – (MECHANICAL SYSTEMS WHICH REMAIN IN PLACE)

Cuts and removes asbestos material from mechanical systems, (pipes, boilers, ducts, flues, breeching, etc.); constructs or erects scaffolding; seals off work area with sheets of plastic visqueen or any material; sets up air monitors and negative air machines; sets up clean rooms; wets asbestos with a wetting agent; double bags, seals and marks asbestos debris; removes bags of asbestos debris from the containment area; cleans up the sealed off area; cleans all mechanical systems and scaffolding; disassembles scaffolding; takes down sheets of plastic visqueen and prepares same for disposal.

4. ASBESTOS ABATEMENT – (NON-MECHANICAL)

Removes asbestos material from non-mechanical systems, (floors, ceilings, walls, etc.) and mechanical systems I(boilers, ducts, flues, breechings, etc.) which are being scrapped.

5. BOILERMAKER

Assembles, erects and repairs boilers and related equipment, attachments and accessories. Includes laying out, cutting, fitting and bolting, welding or riveting heavy metal plates, boiler tubes and castings, and all other work associated with the erection and repair of boilers and related equipment.

6. BRICKLAYER

Lays building materials such as brick, structural tile, concrete cinder, glass, gypsum, terra cotta block (except stone) to construct or repair walls, partitions, arches, and other structures.

6. BRICKLAYER (Continued)

Measures distance from reference points and marks guidelines on working surface to lay out work. Spreads and applies mortar, removes excess mortar, finishes mortar. Breaks bricks to fit spaces too small for whole brick, fastens brick or terra cotta veneer to face of structures with tie wires embedded in mortar between bricks or in anchor holes in veneer brick, and all other work associated with the laying of building materials such as: brick, structural tile, concrete cinder, glass, gypsum and terra cotta block (except stone).

7. CARPENTER

Constructs, erects, installs and repairs structures and fixtures of wood, plywood and wallboard. Studies blueprints, selects specified type of lumber or other materials, prepares layout, marks cutting and assembly lines, shapes materials to prescribed measurements, assembles cut and shaped materials and fastens them together, verifies trueness of structure with plumb bob and carpenter's level, erects framework for structures and lays subflooring, builds stairs, lays out and installs partitions and cabinet work, covers subfloor with building paper to keep out moisture and lays hardwood, parquet and wood strip block floors by nailing to subfloor or cementing to mastic or asphalt base, applies shock-absorbing, sound-deadening and decorative paneling to ceilings and walls, fits and installs prefabricated window frames, doors and doorframes, weather stripping, interior and exterior trim, installs finish hardware such as locks, letterdrops and kick plates, constructs form and wooden chutes for pouring concrete, erects scaffolding and ladders for assembling structures above grounds level, and all other work associated with the construction, erection, installation or repair of structures and fixtures of wood, plywood and wallboard.

8. CARPETLAYER

Lays carpet, rugs and linoleum including measuring, cutting, sewing and trimming carpet to fit along wall edges, openings and projections; installs composition, plastics, Venetian blinds; install carpet on walls, ceiling and any composition base tile or linoleum and any other accessory to carpet.

9. CEMENT MASON

All concrete construction, including foremanship of the same, such as buildings, silos, elevators, smoke stacks, curbs, and gutters, sidewalks, and roofs, or mass or reinforces concrete slabs and flat surfaces of cement. The operation and control of all types of vacuum mats used in the drying of cement floors in preparing same for finish, the operation of power driven floats and toweling machines. The finishing or washing of all concrete construction, using any color pigment when mixed with cement, in any other form-mosaic and nail coat whether done by brush, broom, trowel, float, or any other process including operation of machine scoring floors or any other purpose they may use for in connection with Cement Mason's Trade. The rodding, spreading and tamping of all concrete and the spreading and finishing of all top materials, sills, coping, steps, stairs, and risers, running all cement, and plastic material 6" base or less shall be the work of Cement Mason, all preparatory work on concrete construction to be finished or rubbed,

9. CEMENT MASON (Continued)

patching, brushing, rubbing if done by machine or carborundum stone of all concrete construction, the setting of screeds of lumber, metal or other materials to determine the proper grade of concrete, when used to serve as forms, such as 2 by 4's or other plain pieces of materials, when held in place by stakes and or spreaders shall be done by Cement Masons. Any bulkhead that is one single board in height, and that has no key attached or which is not notched or fitted shall be set and braced or staked by Cement Mason, providing same is used as a screed. The pointing and patching and caulking around all steel and metal window frames that touch concrete. The operation of all gas or electric powered concrete saws when used for cutting a definite line where new concrete must be joined to old concrete. For any decorative purposed. The setting or nailing of all expansion joint materials when used for the purpose of grading concrete when taking place of a screed. The finishing of gypsum material roof. The spreading and finishing of latex materials when used for patching and leveling floors. All dry packing, grouting and finishing in connection with setting all machinery such as engines, pumps, generators, air compressors, tanks, leveling plates, etc., that is set on concrete foundations. All prefabricated and prestressed concrete construction; including the supervision of same, such as sidewalks, steps, floor slabs, beams, joists, walls and columns, also the screeding, finishing, rubbing, grouting, pointing and patching of same. The straight edging and, or finishing of all foundations and walls when poured to a definite grade. When troweling in hardeners of all concrete where chemicals are used. The spreading, screeding, darbying, trowel finishing of all types of magnesium oxychloride cement composition floors shall be the work of the magnetite composition cement mason, including all types of oxychloride granolithic or terrazzo composition floors, hand grinding or machine grinding, the preparation of all sub-floor surfaces, bonding, the preparation and installation of ground or base courses, steps and cove base. The waterproofing of all work included in this classification such as ironite, hydrocide or mastic and any similar products, regardless of the tools used or the method of application, or color of materials used and regardless of the type of base these materials may be applied to. The placing and bedding of all perforated metal tile in concrete or grout.

10. DRYWALL FINISHER

Points, tapes, finishes and sands all joints, nail holes, cornerbeads and blemishes on drywall surfaces, regardless of the type of materials or tools used; applies decorative textures to all surfaces.

11. DRYWALL INSTALLER

Installs plasterboard or other wallboard to ceilings and interior walls of building, installs horizontal and vertical metal studs for attachment of wall board on interior walls, cuts angle iron and channel iron to specified size, suspends angle iron grid and channel iron from ceiling using wire, scribes measurements or wallboard, cuts wallboard to size, cuts out openings for electrical and other outlet, nails wallboard to wall and ceiling supports, trims rough edges from wallboard to maintain even joints, nails prefabricated metal pieces around windows and doors and between dissimilar materials to protect drywall edges, and all other work associated with the installation of plasterboard or other wallboard to ceilings and interior walls.

12. ELECTRICIAN

Plans layout, installs, repairs, and handles in its entirety, wiring, electrical fixtures, apparatus, and control equipment not covered within the scope of Sound and Communication; measures, cuts, bends, threads, assembles, devise and perform means for the installation of, and installs all conduit and raceways; pulls wiring through conduit, and on/in any structure so designed to support electrical wiring; installs controls and distribution apparatus such as; switches, relays, panels, programmable computers, receptacles, etc.; connects power cables and branch circuits to equipment, and installs grounding wiring and/or devices; test continuity of circuits to insure electrical compatibility and safety components; observes functioning of installed equipment to detect hazards and/or performs need for adjustments; locates, relocates, replaces, and all other work associated with the installation and repairing of wiring, electrical fixtures, apparatus, and control equipment.

13. ELEVATOR CONSTRUCTOR

Assembles, handles and installs electric and hydraulic freight and passenger elevators, escalators and dumbwaiters, determining layout and electrical connections from blueprints, pay out location of framework, counterbalance rails, motor pump, cylinder and plunger foundations, drills holes on concrete or structural steel members, secures anchor bolts or welds brackets to support rails and framework, verifies alignment with plumb bob and level, cuts prefabricated sections of framework, rails and other elevator components to specified dimensions, installs cables, counterweights, pumps, motor foundations, escalator drives, guide rails elevator entrances and sills, elevator cars and control panels, connects electrical wiring to control panels and electric motors, installs conduit to all electrical control devices, safety and control devices, positions electric motor and equipment on top of elevator shaft using hoists and cable slings, and all other work associated with the assemble and installation of electric and hydraulic freight and passenger elevators, escalators and dumbwaiters; the performance of any and all repair, maintenance, adjusting, contract service, and/or on-call classification of work.

14. GLAZIER

Installs glass in windows, skylights, store fronts and display cases, or on surfaces such as building fronts, interior walls, ceilings and tabletops; marks outline or pattern on glass, cuts glass, breaks off excess glass, fastens glass panes into wood sash with glazier's points, spreads and smoothes putty around edge of panes with knife to seal joints, installs mirrors or structural glass on building fronts, walls ceilings or tables, bolts metal hinges, handles, locks and other hardware to prefabricated glass doors, set glass doors into frame and fits hinges, may install metal window and door frames into which glass panels are to be fitted, may press plastic adhesive film to glass or spray glass with tinting solution to prevent light glare, may install stained glass windows, may assemble and install metal framed glass enclosures for showers, and all other work associated with the installation of glass in windows, skylights, store fronts and display cases or on surfaces such as: building fronts, interior walls, ceilings and tabletops.

15. HOD CARRIER

Mixes and conveys mortar and bricks and tends mason. Builds scaffolds and places planks for masons.

16. IRONWORKER

Erects, installs, handles, secures, plumbs and aligns girders, columns, trusses and other structural steel members to form complete structures and frameworks, as well as all associated sheeting and decking; installs reinforcing steel for concrete and does all rigging and handling required; erects, installs, secures, plumbs and aligns pre-cast and/or pre-stressed concrete girders, columns, trusses and other structural type members and loads and unloads same; installs and secures chain link fence; does hooking on to, hand hoisting and placing on the foundation, all heavy machinery and all heavy electrical equipment.

17. LABORER – SKILLED

Working foreman who oversees the duties of all workers classified as laborers; blasting, shooting, scaling, bottom work on installation, sheeting hand trenching for sewer, air, water and conduit lines. Drillers and shooters for explosives, laborer specialists.

18. LABORER – SEMI-SKILLED

The tending of mason and plasterers, shall consist of preparation of all materials and the handling and conveying by hand of materials to the point of erection or installation; scaffold erection, plonking, bolting, lining, leveling, bracing and total dismantling of same. This includes staging, signing and hanging scaffolds. The cutting, burning or otherwise cutting all steel structural beams, pipes, supports and other building components related to demolition; jackhammer, burner, air tools, cement vibrator and grinder, hand work on hazardous waste; work on installation and sheeting. Unloads and distributes fence and
pours concrete posts.

19. LABORER – SKILLED

Unless excluded otherwise the tending of Building Construction Crafts shall consist of preparation and handling, of materials to the point of erection or installation and the hand loading, unloading, handling and distribution of materials; hand digging of all ditches for any purpose, the hand excavation of all piers, foundations, holes and trenches, mixing and pouring of concrete and related work; concrete, bituminous concrete or aggregates for walls, footings, foundations, floors and for any other construction; all vibrating, spreading. Flowing, puddling of aggregates by hand; wrecking, stripping, dismantling and handling concrete forms and false work. Handling of creosote lumber, hand held earth compactors, motor driven wheelbarrows and concrete buggies, pump crete assemblers, cement, lime or silica clay handlers, pneumatic spikes screed man or screw operator on asphalt paver and chain saw operator, manhole erectors,

19. LABORER – SKILLED (Continued)

hand cutting of streets and surfaces for sewers, air lines, water lines and conduit lines. The laying of pipe and making of all connections and/or joints on gravity sewer and sub-surface to the building line with the exception of traditional plumbing and pipefitting work in Sections 25 and 27. Rakes asphalt; any general labor on building construction not designated to any other classification of work, including but not limited to digging, materials and work areas; and may assist in tearing down forms that are being scrapped; clears, fills backfills, grades and landscapes by hand all sites; traffic control. Portable temporary head. Rodman.

20. MILLWRIGHT

Installs machinery and equipment according to layout plans, blueprints and other drawings in industrial establishment, reads blueprints and schematic drawings to determine work procedures. Dismantles machines, moves machinery and equipment, assembles and installs equipment such as shafting, conveyors and tram rails, constructs foundation for machines using hand tools and building materials such as wood, cement and steel. Aligns machines and equipment, assembles machines and bolts, welds, rivets or otherwise fastens them to foundation or other structures, may operate engine lathe to grind, file and turn machine parts to dimensional specifications, may repair and lubricate machines and equipment.

21. OPERATING ENGINEERS

Operates all power equipment irrespective of motive of power associated with or incidental to construction work of the following nature: building (commercial, industrial, etc.), quarries, mining, underground utilities (gas, oil, water, sewer, etc.), dredging, wrecking, demolition, and hazardous waste operation. Power equipment shall include, but not limited to, all hoisting, excavating, drilling, and portable electric equipment such as: pumps, generators, welders, compressors, boilers. Operating Engineers shall also erect, dismantle, repair and maintain all power equipment.

GROUP I

Air Compressors 600 Cu. Ft. and over, Two Air Compressors, Apsco Paver, Asphalt Plant Engineers or Pug Mill, Back Filler, Backhoe, Barber Green Loader, Boiler Operator, Boom Tractor, Boom or Winch Truck, Boring Machine, Brush Mulcher, Bulldozer, Bilk Cement Plant, CMI or Similar Type Machine, Calbeways, Central Mix Plant Engineer, Chair Cart (Self-Propelled), Cherry Picker, Chip Spreader, Concrete or Asphalt Milling Machine, Concrete Mixers with Skip, Concrete Plant Engineers, Concrete Pump, Concrete Spreader, Curing Machine, Derricks, Ditching Machine 6" and Over, Ditching Machine with Dual Attachment, Draglines, Dredge Engineers, Dredge Operator, Dredging Equipment, Drilling Machine, including Well Testing, Caissons, Shaft or any similar type Drilling Machine, Electric Overhead Cranes, Elevating Machine, Engine or Rock Crusher Plant, Euclid Loader, Farm Tractor with Attachment, Finish Machine, Forklift (except when used for landscaping work), Formless Paver, Freezing Operator, Gradall, Gravel Processing Machine, Head Equipment Greasers, Helicopter

21. OPERATING ENGINEERS (Continued)

GROUP I (Continued)

Crew (3), Hydra Ax, Hydra Crane, Incinerator Operator, Loaders, Lull (or similar type machine), Marine Scoops, Mechanics, Mesh Placer, Mixer over 14S Capacity, Motor Patrol, Mudcat, One Drum Hoists with Tower or Boom, Pavement Breaker (Self-Propelled), Paver Operator, Paint Machine, Pile Driver (Skid or Crawler), Pipe Bending Machine, Pipe Cleaning Machine, Pipe Wrapping Machine, 4 Post Lift System(Power Lift or similar type), Post Hole Digger (when attached to the equipment), Power Blade, Power Broom (Self-Propelled), Power Cranes, Power Shovel, Power Sub-Grader, Push Tractor, Refrigerating Machine, Repair and Maintenance of All Equipment, Rock Spreader, Rollers on Asphalt, Gravel, Macadam and Brick Surface, Large Roller on Earth, Root Rake, Ross Carrier or Similar Machine, Scoop-Mobiles, Skid Steer (Bobcat or similar type), Soil Cement Machines, Soil Stabilizer (Seaman Tiller, Bo Mag, Rago Gater and similar types), Snooper Truck Operator, Span Saw (and similar types), Standard or Dinkey Locomotives, Stump Remover, Tampers (other than hand operated), Tournadozer, Tournamixer, Tournapull, Tower Machines, Tractor Highlight, Tractor Operating Scoops, Tractors Without Winch, Tree Mover, Trimmer, Truck Crane, Truck or Skid Mounted Tower Crane, Tug Boat Operator, Two Drum Machine, Two Cage Hoist, Wall Point System, Winch or Hydraulic Boom Truck.

GROUP II

Air Compressor under 600 Cu. Ft., Air Tugger, Air Valves or Steam Valves from Plant, Barrell Type Mixer, Bull Float, Concrete Mixers without Skip, Conveyor, Deck Hands, Distributor Operator on Trucks, Ditching Machine under 6", Engine Tenders, Equipment Greaser, Fireman, Flex Plane, Forklift (when used for landscaping work), Form Grader, Form Tamper, Gunite Machine, House Elevators (when used for hoisting material), Micers - 14S Capacity or less, Mud Jack, Oilers, One Drum Machine, One Welding Machine, One Water Pump, Operators to do winter repair work in shop between November 1st and March 1st, Rock Crusher, Siphon and Pulsometer, Rollers on Earth, Snooper Truck Helper, Striping Machine (Motor Driven), Super Sucker (and similar type), Switchman, Track Jack, Truck Crane Drivers - Oilers, Two to Four Generators or Welding Machine, Two to Four Water Pumps, Wagon Drill.

22. PAINTER-BRUSH OR ROLL

Applies coats of paint, varnish, stain, enamel or lacquer to decorate and protect interior or exterior surfaces, trimmings and fixtures of buildings and other structures including sign and pictorial painting, mural and scenic painting; smoothes surfaces using sandpaper, brusher or steel wool and removes old paint from surfaces for painting; fills nail holes, cracks and joints with putty, plaster or other filler; selects premixed paints or mixes requires portions of substance to prepare paint; paints surfaces using brushes, or paint rollers; erects scaffolding or sets up ladders to perform tasks above ground level, takes care of all tools and equipment used by painters; and all other work associated with the application of paint, varnish, stain, enamel or lacquer to buildings and other structures.

23. PAINTER-SPRAY/SANDBLAST

Applies coats of paint, varnish, stain, enamel or lacquer using spray gun, removes old paint from surfaces using blowtorch or sandblaster. Removes said coating or cleans surfaces to receive coatings, using liquid, steam water blast, sandblast or any other power tools necessary.

24. PAPERHANGER

Applies all material of whatever kind or quality to walls or ceilings, with paste or adhesive, and tacks on muslin or other material which is used as wall or ceiling coverings or covered with material pasted on; removes said materials by whatever method necessary (scraping, steaming, etc.).

25. PIPEFITTERS & STEAMFITTERS

Lays out, fabricates, assembles, installs, handles and maintains piping and piping systems, fixtures and equipment for steam, hot water, heating cooling, lubricating, sprinkling and industrial processing systems, cuts pipe, threads pipe, bends pipe, assembles and installs by any means, pipefittings including those made of iron, brass, copper, lead, glass, plastic and fiberglass, joins pipe, secures pipes to structure, installs and maintains refrigeration and air-conditioning systems, test piping system for leaks, may weld holding fixtures to structural steel members, installs piping systems that must withstand pressure and all other work associated with the lay out, fabrication, assembly, installation and maintenance of piping systems. Sets all equipment and reinforcement thereto.

26. PLASTERER

All interior or exterior plastering cement, stucco, stone imitation, dryvit, sto, R-wall, Sure-Wall and other outsulation materials, and all similar materials pertaining to the plastering industry or any paten material when cast, the setting of same, and also corner heads when stuck. This includes the plastering and finishing with hot composition material in vats, compartments or wherever applied; also taping and pointing of all joints, nail holes and bruises on wallboard, regardless of the type of materials or tools used; also the setting in place of plasterboards, ground blocks, patent dots, cork plates, Styrofoam, brownstone, and acoustical tile including temporary nailing, cutting and fitting in connection with the sticking of same. All acoustic blocks when stuck with any plastic materials, regardless of thickness. The sticking, nailing and screwing of all composition caps and ornaments. The preparing, scratching and browning of all ceilings and walls when finished with terrazzo, or tile. All mouldings run in place and all staff work, the making of templates and hersing of moulds in and on buildings.

27. PLUMBER

Assembles, installs, handles and repairs pipes, fittings and fixtures of heating, water and drainage systems according to specifications and plumbing codes, studies building plans and working drawings to determine work aids required and sequence of installations, inspects structure to ascertain obstructions to be avoided to prevent weakening of the structure resulting from

27. PLUMBER (Continued)

installation of pipe, locates and marks position of pipe and pipe connections and passage holes for pipes in walls and floors, cuts and threads pipe, bends pipe to required angel, assembles and installs valves, pipe fittings and pipes, joins pipes, fills pipe system with water or air and reads pressure gages to determine whether system is leaking, installs and repairs plumbing fixtures, repairs and maintains plumbing, may weld holding fixtures to steel structural members. Lays pipe and make joints and connectors on water, air, sewers and other piping within the building line.

28. POINTER/CLEANER/CAULKER

Sprays materials such as water, sand, steam, vinyl, paint or stucco through hose to clean, coat or seal surfaces, applies caulking compounds to seal crevices, grinds, sands or polishes surfaces such as: concrete, marble, terrazzo or wood flooring using abrasive tools or machines and all other work associated with the cleaning, sealing and caulking of surfaces.

29. ROOFERS

Covers roofs with roofing materials, handles materials, cuts roofing paper to size and nails or staples it to roof in overlapping strips to form base for roofing materials, aligns roofing material with edge of roof and overlaps successive layers, fastens composition shingles or sheets to roof with asphalt, cement or nails, punches holes in slate, tile, terra cotta or wooden shingles, cuts strips of flashing and fits them into angles formed by walls, vents and intersecting roof surfaces, when applying asphalt or tar and gravel to roof, mops or pours hot asphalt or tar onto roof base, applies alternate layers of hat asphalt or tar and roofing paper until roof covering is as specified, applies gravel or pebbles over top layer using rake or stiff bristled broom, applies waterproofing. Does all tear off of roofing systems. Applies all single ply systems pertaining to roofing and waterproofing. Applies all ballast when used in roofing for protection of same.

30. SHEET METAL WORKER

The Sheet Metal Worker is engaged, but not limited to, the (a) manufacture, fabrication, assembling, handling, erection, installation, dismantling, conditioning, adjustment, alteration, repairing and servicing of all ferrous or nonferrous metal work and all other materials used in lieu thereof and of all air-veyor systems and air handling systems regardless of material used including the setting of all equipment and all reinforcements in connection therewith; (b) all lagging over insulation and all duct lining; (c) testing and balancing of all air-handling equipment and duct work, including all work pertaining to energy audits and management; (d) the preparation of all shop and field sketches used in fabrication and erection, including those taken from original architectural and engineering drawings or sketches. Also included is handling, installation, application, adjusting, alteration and repair of all types of sheets of tiles, flat, formed, corrugated or otherwise formed or reinforced of plain or protected metal specified for use in connection with or incidental to roofing, decking, flooring, siding, waterproofing for base and support of other materials or for ornamental or other purposed; handling, installation, application, adjusting, alteration and repair of sheet metal specified for use in connection with or

30. SHEET METAL WORKER (Continued)

incidental to roofs, steeples, domes, formers, ridges, copings, roofing, decking, gutters, roof flanges, flashings, gravel steps, down spouts, skylights and all other shapes, form and design of sheet metal; construction or repair of buildings fabricated with sheet metal and all types of building components (door enclosures, window frames, sills, partitions, etc.) made of sheet metal; installation, application, adjusting, alteration and repair, specified for use in connection with or incidental to direct, indirect of heating, ventilating, air conditioning and cooling systems, including risers, stacks, ducts, fittings, retrofittings, dampers, casings, recess boxes, outlets, radiator enclosures, exhausts, ventilators, frames, grilles, registers, cabinets, fans and motors, air washers, filters, air brushes, housing, air conditioning chambers, all setting and hanging of air conditioning units, unit heaters or air-veyor systems and air handling and air treating systems; handling, installation, application, adjusting, alteration and repair of all types of sheet metal furniture and equipment, lockers, shelving, library and storage stacks, bins, sinks, drain boards and sheet metal kitchen equipment.

31. SOUND AND COMMUNICATION

Performs installation, operation, inspection, maintenance, repair, handling and service of radio, television, recording, voice sound and vision production and reproduction apparatus, equipment and appliances used for domestic, commercial, education, entertainment and private telephone systems and micro processor controlled fire alarm systems.

32. SPRINKLER FITTER

Installs, dismantles, maintains, handles, repairs, makes adjustments and corrections of all fire protection and fire control systems including the unloading, handling by hand, installation of all piping or tubing, appurtenances and equipment pertaining thereto, including both overhead and underground fire mains, fire hydrants and hydrant mains, standpipes and hose connections to sprinkler systems, sprinkler tank heaters, air lines and thermal systems used in connection with sprinkler and alarm systems, also all tanks and pumps connected thereto, also included shall be CO-2 and Cardox Systems, Dry Chemical Systems, Foam Systems, and all other fire protection systems, but excluding steam fire protection systems.

33. STONE MASON

Sets stone structures such as piers, walls, abutments or lays walks, curbstones or special types of masonry, shapes stone preparatory to setting, spread mortar over stone and foundation with trowel and sets stone in place by hand or with aid of crane, aligns stone with plumb line and finishes joints between stone with pointing trowel and all other work associated with the setting of stone.

34. TEAMSTER

Drives truck to transport materials in liquid or packaged form to and from specified destinations. May load and unload truck, inspect truck equipment and supplies and may perform emergency roadside repairs and performs all other work associated with the transporting of materials.

35. TECHNICAL ENGINEER

Layout Man - Lays out exterior of building, interior walls and any other lines or elevations of structure. Instrument – Performs any instrument work concerning the layout of buildings.

36. TERRAZZO, TILE AND MARBLE SETTER-SKILLED

Applies cement, sand, pigment and marble chips to floors and walls of buildings. Also applies tile, and sets marble slabs and repairs and polishes slabs previously set in buildings.

37. TERRAZZO, TILE AND MARBLE SETTER-UNSKILLED

Tends terrazzo, tile and marble setter, according to level of skill.

38. TRUCK DRIVER MECHANIC

Repairs and overhauls trucks and other automotive vehicles. Rebuilds parts, rewires ignition system, lights and instrument panels, relines and adjust brakes, aligns front end, repairs and replaces shock absorbers, solder leaks in radiator, replaces and adjust headlights, installs and repairs accessories and all other work associated with the repair of trucks and other automotive vehicles.

SECTION 01010

SUMMARY OF WORK

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 SCOPE OF WORK

A. The Work consists of, but is not limited to the following items (for the Base Bid):

1. Five level (1241 cars ±) post-tensioned concrete parking structure including connection of new utilities (sanitary, storm, water, electrical) to existing utilities.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. All applicable requirements of the Project Manual, including Bidding Requirements, General and Supplementary General Conditions, Special Conditions and General Requirements, apply to each section of the specifications.

B. Project Number: 108-004

C. Project Location: 1200 Edison Road, South Bend, Indiana.

D. Work consists of furnishing all labor, tools, materials, transportation and equipment necessary for the construction of the Eddy Street Commons Phase II, Parking Garage as set forth in the Contract Documents.

E. Contractor shall comply with all applicable laws, ordinances, rules, regulations and lawful orders of any public authority having jurisdiction for the safety of persons or property, or to protect them from injury or loss. The Contractor shall erect and maintain, as required by existing conditions and progress of work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards. All requirements of the Occupational Safety and Health Act are to be followed explicitly and are the responsibility of the contractor.

F. Owner: City of South Bend, Board of Public Works, 1316 County-City Building, South Bend, Indiana 46601.

1. Owner's Representative: Carl Littrell, P.E., City Engineer, 1316 County-City Building, South Bend, Indiana 46601.

1.4 TYPE OF CONTRACT

A. Project will be constructed under a single prime contract.

1.5 INSPECTION OF SITE

A. A mandatory pre-bid conference has been scheduled for 1:30 p.m. (local time) on Monday, February 4, 2008. The conference will be held at 1118 North Eddy Street, South Bend, Indiana 46617.

B. All prospective bidders are urged to visit the project site and to examine existing conditions and make note of any conditions, which may pertain to their class of work. Failure to do so will not relieve bidder of responsibility in connection with his work.

1.6 SALES TAX EXEMPTION

A. Owner is exempt from sales tax on products permanently incorporated in work.

B. Upon completion of work, file with Owner notarized statement that all purchases made under exemption certificate were entitled to be exempt.

C. Pay legally assessed penalties for improper use of exemption certificate number.

1.7 USE OF PREMISES

A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. All adjacent streets alleys, except for those that have been vacated, are to remain open at all times. Contractor is not permitted to utilize these streets and alleys for vehicle parking or staging.

C. All existing sidewalks are to remain usable by the public at all times throughout construction.

1.8 WORK RESTRICTIONS

A. Existing Utility Interruptions: Do not interrupt utilities serving others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated.

1. Notify Architect and Owner not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's Owner's written permission.

1.9 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the CSI format and CSI "MasterFormat" numbering system. The format(s) are unique to this project.

1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the Table of Contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
2. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by other when so noted.
   a. The words, "shall," "shall be," or "shall comply with,"depending on the context, are implied where a colon (:) is used within a sentence or phase.

1.10 FINAL CLEAN-UP

A. Remove all debris, rubbish, broken glass, and unused materials. Repair all damaged surfaces.

1.11 CLOSE-OUT

A. Owner's Representative and contractor shall make a joint final inspection. Contractor to deliver a complete release of all liens up to any retained amount, and clarify that all bills for labor and materials or services have been paid.

1.12 ALTERNATES

A. Bids are required for the following described "Alternates" as a means of obtaining information for proper consideration of the project in its entirety. Owner reserves the right to accept any or all of the alternates without consideration as to sequence. All alternate bids may be held for a period not to exceed ninety (90) days, after receipt of bids, before incorporation into the contract by proper construction change directive. Applicable sections of General Conditions, Supplementary General Conditions, Special Conditions and Technical Specifications govern all work covered by these alternates. Contractor to furnish all labor, materials, equipment, etc., as required for completion of work described by alternates.

1. You may state the change in your base bid to design, and furnish all construction and components for a precast concrete parking garage of capacity and function equal to the cast-in-place garage indicated. THIS IS A VOLUNTARY ALTERNATE 1.

2. State the change in your base bid to furnish DCI corrosion inhibitor additive to Type E concrete indicated on drawings and in this Project Manual.

3. State the change in your base bid to provide and install PARCS systems as shown on the drawings and described in this Project Manual.

4. State the change in your base bid to provide and install Emergency Stations including wiring as shown on the drawings and described in this Project Manual.

5. State the change in your base bid to provide and install additional brick façade as shown on the drawings and described in this Project Manual.

1.13 UNIT PRICES

A. The base bid shall include an allowance for the removal of unacceptable earth bearing materials, and replacement of such with compacted engineered fill, as described on Drawings. This allowance shall be used for establishing adequate footing bearing materials. Variations from the quantity allowance shall be handled by a unit price per cubic yard, as indicated on the Bid Form.

1. The single unit price shall be used for expenditures or credits to the Contract Sum, resulting from additions or reductions to the above described quantity allowance, respectively.

2. The unit price shall include all costs necessary for the complete installation of the materials or items indicated, including materials, labor, equipment, operations, administration, overhead, profit and taxes (as applicable).

1.14 SCHEDULING

A. A detailed schedule shall be submitted by the Contractor for Owner's approval.

B. The Contractor shall inform the Owner immediately of any delays in the schedule of work.

C. The schedule of work shall be adhered to by the Contractor. Failure to achieve completion of the work by the dates indicated, without prior notification to the Owner, may result in the work being delayed to a later date at the Owner's convenience. The Owner will assume no responsibility for increased costs due to rescheduling caused by the Contractor's failure to adhere to the schedule.

1.15 GUARANTEE

A. Provide 1 year labor and materials guarantee as specified in the General Conditions.

1.16 SUMMARY OF WORK AND CONTRACTS

A. Requirements:

1. This Section provides specific information which may be also included in the General Conditions. Any conflict between this Section and the General Conditions shall be resolved in favor of the General Conditions.

A. Bidding:

1. Bidder's proposal shall contemplate a complete, operable, and acceptable installation as indicated or implied by the Contract Documents.

2. Bid shall include the entire cost and expense of each and every item of labor and material/equipment necessary to complete the work in accordance with the Contract Documents, and be ready for occupancy and/or use. The risk of all such costs and expenses shall be assumed by the successful bidder.

3. Stated quantities, if any, in the Contract Documents are approximate only, and each bidder shall be required to make his own estimate of quantities and calculate his bid accordingly.

4. Bidder shall thoroughly examine the Drawings and Specifications of all other trades and include all such additional costs for same, insofar as they affect their proposal.

5. Bidder must submit, within 48 hours, a list of the material manufacturers, systems, and subcontractors they propose for the work.

6. Any addenda issued during the time of bidding becomes a part of the Contract Documents, and shall be included in the Contractor's proposal. Receipt of each addendum shall be acknowledged in the Contractor's proposal.

7. Before submitting proposals, each bidder shall thoroughly examine the project site, premises, existing structures, utilities, and all existing architectural, structural, mechanical, and electrical installations, and all conditions thereof. Proposals shall take into consideration all such conditions as may affect contract work and/or cost.

8. Should bidder find, during examination of the Contract Documents, or after visit to the project site, any discrepancies, omissions, ambiguities, or conflicts in the Contract Documents, or be in doubt as to their meaning, they shall submit questions to the Architect/Engineer in writing. The Architect/Engineer will review question and, where information sought is not clearly indicated or specified, will issue a clarifying addendum to all bidders of record, and said addendum shall become a part of the Contract Documents.

9. The Architect/Engineer will not be responsible for any other explanation or interpretation. Failure to submit questions as required, and/or starting work, will be considered as acceptance by the Contractor of all existing conditions.

10. Where variances occur in the Contract Documents, the item in question shall be of the better quality, higher cost, or greater capacity.

B. Contract Documents:

1. The Contract Documents indicate the general arrangement of the systems. If deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted in writing to the Architect/Engineer for review, before proceeding with the work.

2. The Drawings and Specifications shall be considered to be cooperative and anything appearing in the Specifications, which may not be indicated on the Drawings, or visa-versa, shall be considered as part of the contract and must be executed by the Contractor the same as though indicated by both.

3. Contractor shall make all measurements in the field and shall be responsible for correct fitting.

4. The Architect/Engineer reserves the right to make minor adjustments (maximum of 10'-0") in location of piping, outlets, and/or equipment at no additional charge if so directed prior to their installations.

5. Where offsets in piping, additional fittings, necessary drains, minor valves, traps, devices, etc., are required to complete the installation, to clear obstructions or the work of other Contractors, or for the proper operation of the system, these shall be deemed to be included in the contract and shall be furnished and installed complete by the Contractor at no additional charge.

6. Installations shall be made to maintain maximum headroom and clearance around equipment. When space and/or headroom appear inadequate, Contractor shall notify Architect/Engineer, prior to proceeding with the installation.

7. Contract Documents, except the Contractor's executed set, are and remain the property of the Architect/Engineer. Such Contract Documents shall not be used on other work, and those sets in usable condition shall be returned to the Architect/Engineer, upon request, at the completion of, or cessation of, the work or termination of the contract.

C. Permits and Regulations:

1. Unless provided otherwise by the Owner, Contractor shall give all necessary notices, obtain all permits and pay all governmental taxes and fees and other costs in connection with his work. Contractor shall file all necessary drawings, prepare all documents and obtain all necessary approvals of all governmental departments and agencies having jurisdiction, and obtain all required Certificates of Inspection for work and deliver same to the Architect/Engineer before request for acceptance and final payment for the work.

2. Contractor shall include in the work, without extra additional cost, any labor, materials, services, apparatus, drawings (in addition to the Contract Documents) in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on the Contract Documents.

3. All work for the project must be performed in accordance with all Federal, State, local laws, ordinances, rules and regulations relating to the work. Where the Contract Documents exceed these requirements, the Contract Documents shall govern. In no case shall work be installed contrary to, or below, minimum legal standards.

D. Communications:

1. All notices, demands, requests, instructions, approvals, proposals, and claims must be in writing.

2. Any notice to, or demand upon, the Contractor shall be deemed sufficiently given if delivered at the office of the Contractor stated on the signature page of the contract, or at such other office as he may from time to time designate in writing to the Owner and Architect/Engineer, or deposited in the United States mail in a

sealed, postage-prepaid envelope, or delivered with charges prepaid by any recognized courier service, to such other representatives of the Contractor, or to such other address as the Contractor may subsequently specify in writing to the Owner for such purpose.

3. All papers required to be delivered to the Owner shall, unless otherwise specified in writing to the Contractor, be delivered to the address stated in the Notice to Bidders, and any notice to, or demand upon, the Owner shall be sufficiently given if so delivered, or deposited in the United States mail in a sealed, postage-prepaid envelope, or delivered with charges prepaid by any recognized courier service, to such other representatives of the Owner, or to such other address as the Owner may subsequently specify in writing to the Contractor for such purpose.

E. Maintenance of Services:

1. All work shall be so planned and executed as to provide continuous service of all main and branch line utilities throughout the construction period.

2. Where necessary to disrupt services for short periods to complete connections, these shall be arranged to be made at the Owner's convenience, and the Owner shall be notified in advance. Such disruptions to service shall be planned to be accomplished at periods other than regular working hours, if necessary and all proposals shall be prepared accordingly to include all premium and overtime allowances and any other expenses, as required.

F. Winter Construction:

1. Contractor shall take special precaution against damage to his materials and work installed in freezing weather, to provide adequate special heat and coverings to prevent damage by the elements, in a manner as approved by the Architect/Engineer.

2. Contractor shall remove all snow and ice as may be required for the proper protection and prosecution of his work.

END OF SECTION

SECTION 01011

GUARANTEES

PART 1 – GENERAL

1.1 REQUIREMENTS

A. Contractor warranty shall be in accordance with General Conditions.

B. Except for abuse, neglect by the Owner, or normal wear, the Contractor shall promptly correct defective materials, equipment and/or workmanship, including any other work which may be displaced or damaged in so doing, at no cost to the Owner.

C. In the event the Contractor fails to remedy such defects after reasonable time to make corrections, the Owner may correct the work and the Contractor thereby shall fully and promptly reimburse the Owner.

D. The Contractor shall comply with the applicable local, state, and federal codes.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01045

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

A. Contractor shall be responsible for all cutting, fitting and patching, as required to complete the work.

1.2 PREPARATION

A. Provide devices and methods to protect other portions of project from damage.

1.3 PERFORMANCE

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

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

C. Restore work which has been cut or removed. Install new products to provide completed work in accordance with requirements of Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Unless otherwise noted on Drawings, use materials of similar quality, color and finish to compliment or match existing.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare existing surfaces to receive new materials.

3.2 INSTALLATION

A. Install materials plumb, level, flush and true to line.

B. Finish surfaces to blend in with existing to fully finished appearance.

END OF SECTION

SECTION 01100

SUBSTITUTIONS

PART 1 - GENERAL

1.1 REQUIREMENTS

A. The products, materials, and equipment of manufacturers referred to in the Specifications and on the Drawings are intended to establish the standard of quality and design required by the Architect/Engineer. Products, materials, and equipment of manufacturers other than those specified, may be used, if equivalent and approved by the Architect/Engineer.

B. The Architect/Engineer will be the sole judge of equivalency of proposed substitute products, materials, and equipment.

C. If the bidder or Contractor desires to use a substitute item, they shall make application to the Architect/Engineer in writing, stating and fully identifying the proposed substitute, cost changes (if any) and submit substantiating data, samples, brochures, etc., of item proposed. It is the Contractor's responsibility to provide sufficient evidence by tests or other means to support any request for approval of substitutions. Substitution Request Form 00440 is included in this Project Manual.

D. Prior to proposing any substitute item, the Contractor shall be satisfied that the item proposed is, in fact, equal to that specified, that it will fit into the space allocated, that it affords comparable ease of operation, maintenance and service, that its appearance, longevity, and suitability for the climate and use are comparable to that specified, and that the substitution is in the Owner's interest.

E. The burden of proof that a proposed substitution is equal to a specified item shall be upon the Contractor, who shall support request with sufficient test data and other means to permit the Architect/Engineer to make a fair and equitable decision on the merits of the proposal. Any item by a manufacturer other than those cited in the Contract Documents, or of brand name or model number, or of generic species, other than those cited in the Contract Documents, will be considered a substitution.

F. Materials and methods proposed as substitutions for specified items shall be supported by certification of their acceptance for use by any authority, person or persons having jurisdiction over the use of specified material or method.

G. Acceptance of substitutions shall not relieve the Contractor from responsibility for compliance with the requirements of the Contract Documents. The Contractor shall be responsible at their own expense for any changes in other parts of the work of their contract or the work of other Contractors caused by their substitutions, including cost of all design and redesign services related thereto, incurred by the Architect/Engineer.

H. The contract completion time shall not be extended by any circumstances resulting from proposed substitution, nor shall the Contractor be entitled to any compensation for any delay caused thereby or related thereto.

I. All costs for the evaluation of proposed substitutions, whether approved or not, shall be borne by the Contractor.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01250

CONTRACT MODIFICATION PROCEDURES

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 handling and processing Contract modifications.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions", or similar document.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustments to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within seven (7) days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.

1. Include a statement outlining 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 the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signature of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the 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 change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01250

SECTION 01270

UNIT PRICES

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 includes administrative and procedural requirements for unit prices.

B. Related Sections include the following:

1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
2. Division 1 Section "Quality Requirements" for general testing and inspecting requirements.

1.3 DEFINITIONS

A. Unit price is an amount stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit. This project is exempt from Indiana Gross Retail Tax (Sales Tax). Refer to Article 3.6, Supplemental General Conditions.

B. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

C. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

A. These unit prices have been requested during bidding and will be part of the successful contractor's contract.

1. Extra excavation and replacement with compacted fill.

END OF SECTION 01270

SECTION 01290

PAYMENT PROCEDURES

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 necessary to prepare and process Applications for Payment.

B. Related Sections include the following:

1. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
2. Division 1 Section "Unit Prices" for administrative requirements governing use of unit prices.
3. Division 1 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

   a. Application for Payment forms with Continuation Sheets.
   b. Contractor's Construction Schedule.

2. Submit the Schedule of Values to Architect at earliest possible date but no later than ten (10) days after award of contract.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for

the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values.

    a. Project name and location.
    b. Name of Architect.
    c. Architect's project number.
    d. Contractor's name and address.
    e. Date of submittal.

2. Submit draft of AIA Document G703 Continuation Sheets.
3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed.

    a. Related Specification Section or Division.
    b. Description of the Work.
    c. Dollar value.

        1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Separate labor and materials for each line item.
5. Round amounts to nearest whole dollar, total shall equal the Contract Sum.
6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

8. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion,

and final Application for Payment involve additional requirements.

B. Payment Application Times: Refer to Supplemental General Conditions, paragraph 9.3.

C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Transmittal: Submit three (3) signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered b the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or proceeded by final waivers form every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Products list.
5. Schedule of unit prices.
6. Copies of building permits.

H. Certified Payroll Report: Utilize State of Indiana Form 51454 (8-03)

1. Form shall be required to be submitted by both prime contractors and subcontractors.
2. Form shall be submitted directly to the City of South Bend, to the person yet to be determined.
3. Form shall be submitted no later than 14 days from date of each payroll.
4. Employee information required shall be for employees working on the project site only.
5. Sample form is included at the end of this Section.

I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Updated final statement, accounting for final changes to the Contract Sum.
3. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
4. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
5. AIA Document G707, "Consent of Surety to Final Payment".
6. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
7. Final, liquidated damages settlement statement.
8. Final Waivers of Liens.

K. Final Payment, constituting the unpaid balance of the contract sum shall be paid to the Contractor in full, including any retainage, not less than sixty-one (61) days following the Date of Substantial Completion. If at that time there are any remaining uncompleted items, an amount equal to two hundred percent (200%) of the value of each item as determined by the Architect shall be withheld until said items are completed and a Final Certificate of Payment issued by the Architect.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01290

SECTION 01310

PROJECT MANAGEMENT AND COORDINATION

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 includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Coordination Drawings.
2. Administrative and supervisory personnel.
3. Project meetings.
4. Requests for Interpretation (RFIs).

B. Related Sections include the following:

1. Division 1 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
2. Division 1 Section "Project Closeout" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service and repair of all components, including mechanical and electrical.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

D. Conservation: 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 into, the Work. Refer to other Sections for disposition of salvaged materials are designated as Owner's property.

1.5 SUBMITTALS

A. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names,

addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project. Identify at least three individuals per contractor to be contacted in an emergency.

1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.6 PROJECT MEETINGS

B. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of schedule meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:
   a. Tentative construction schedule.
   b. Critical work sequencing and long-lead items.
   c. Designation of key personnel and their duties.
   d. Procedures for processing field decisions and Change Orders.
   e. Procedures for RFIs.
   f. Procedures for testing and inspecting.
   g. Procedures for processing Applications for Payment.
   h. Distribution of the Contract Documents.
   i. Submittal procedures.
   j. Preparation of Record Documents.

k. Work restrictions.
l. Responsibility for temporary facilities and controls.
m. Construction waste management and recycling.
n. Parking availability.
o. Office, work, and storage areas.
p. Equipment deliveries and priorities.
q. First Aid.
r. Security.
s. Safety.
t. Progress cleaning.
u. Working hours.

3. Minutes: Architect will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. The Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Deliveries.
f. Submittals.
g. Review of mockups.
h. Possible conflicts.
i. Compatibility problems.
j. Time schedules.
k. Weather limitations.
l. Manufacturer's written recommendations.
m. Warranty requirements.
n. Compatibility of materials.
o. Acceptability of substrates.
p. Temporary facilities and controls.
q. Regulations of authorities having jurisdiction.
r. Testing and inspecting requirements.
s. Installation procedures.
t. Coordination with other work.

u. Protection of adjacent work.
v. Protection of construction and personnel.

D. Progress Meetings: Conduct progress meetings at biweekly intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contract Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction 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.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Access.
6) Temporary facilities and controls.
7) Work hours.
8) Progress cleaning.
9) Quality and work standards.
10) Status of correction of deficient items.
11) Field observations.
12) RFIs.
13) Status of proposal requests.
14) Pending changes.
15) Status of Change Orders.
16) Documentation of information for payment requests.

3. Minutes: Architect will record and distribute to Contractor the meeting minutes

4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
   a. Schedule Updating: Review Contractor's Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.7 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit and RFI in the form specified.

1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

1. Project name.
2. Date.
3. Name of Contractor.
4. Name of Architect.
5. RFI number, numbered sequentially.
6. Specification Section number and title and related paragraphs, as appropriate.
7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate.
9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
10. Contractor's signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
    a. Supplementary drawings prepared by Contractor shall include dimensions, thickness, structural grid references, and details of affected materials, assemblies and attachments.

C. Hard-Copy RFIs:

1. Identify each page of attachments with the RFI number and sequential page number.

D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

E. Architect's Action: Architect will review each RFI, determine action required, and return it . Allow five (5) working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.

2. The following RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for coordination information already indicated in the Contract Documents.
d. Requests for adjustments in the Contract Time or the Contract Sum.
e. Requests for interpretation of Architect's actions on submittals.
f. Incomplete RFIs or RFIs with numerous errors.

2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.

3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum my be eligible for Contractor to submit Change Proposal according to Division 1 Section "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days of receipt of the RFI response.

G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log two (2) days before each progress meeting.

1. Project name.

2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 01320

CONSTRUCTION PROGRESS DOCUMENTATION

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 includes administrative procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Preliminary Construction Schedule.
2. Contractor's Construction Schedule.
3. Submittals Schedule.
4. Special reports.

B. Related Sections include the following:

1. Division 1 Section "Payment Procedures" for submitting the Schedule of Values.
2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
3. Division 1 Section "Submittals" for submitting schedules and reports.
4. Division 1 Section "Photographic Documentation" for submitting construction photographs.

1.3 SUBMITTALS

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

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

B. Preliminary Construction Schedule: Submit two opaque copies.

1. Approval of cost-loaded preliminary construction schedule will not constitute approval of Schedule of Values for cost-loaded activities.

C. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.

1. Submit an electronic copy of schedule, using software indicated, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.

1.4 COORDINATION

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

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

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

C. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication and delivery when establishing dates.

1. Coordinate Submittals Schedule with list of subcontractors, the Schedule of Values, and Contractor's Construction Schedule.
2. Initial Submittal: Submit concurrently with preliminary bar-chart schedule. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice of Award to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 1 Section "Summary". Delivery dates indicated stipulate the earliest possible delivery date.

C. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

2.3 PRELIMINARY CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit preliminary horizontal bar-chart construction schedule within seven days of date established for the Notice of Award.

1. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 60 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirements prediction based on indicated activities.

PART 3 – EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules 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 not longer involved in performance of construction activities.

END OF SECTION

SECTION 01322

PHOTOGRAPHIC DOCUMENTATION

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 the following:

1. Preconstruction photographs.
2. Periodic construction photographs.
3. Final Completion construction photographs.

B. Related Sections include the following:

1. Division 1 Section "Submittals" for submitting photographic documentation.
2. Division 1 Section "Closeout Procedures" for submitting digital media as Project Record Documents at Project closeout.

1.3 SUBMITTALS

A. Construction Digital Photographs

1. Submit twenty (20) photos taken from ten different locations. At each location take each photo with a different view.
2. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.
3. Email to Architect/Construction Manager.

1.4 USAGE RIGHTS

A. Obtain and transfer copyright usage rights from photographer to Architect and Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in uncompressed TIFF format, produced by a digital camera with minimum sensor size of 4.0 mega pixels, and at an image resolution of not less than 1024 by 768 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in filename for each image.
2. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Architect.

C. Preconstruction Photographs: Before starting construction, take digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.

1. Flag construction limits and property corners before taking construction photographs.
2. Take twenty (20) photographs to show existing conditions adjacent to property before starting the Work.
3. Take photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.

D. Periodic Construction Photographs: Take twenty (20) color, digital photographs four days before cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

END OF SECTION 01322

SECTION 01340

SUBMITTALS

PART 1 - GENERAL

1.1 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall submit shop drawings, product information, and samples to the Architect/Engineer at the earliest practical time, and in the order of priority in which materials are required at the project site to maintain schedule. They shall submit required information with such promptness so as to cause no delay in their work, or in that of any subcontractor.

B. Failure to submit shop drawings, product information, and samples in ample time to allow for proper review, approval, return, and distribution will not justify delays or extension of time for fabrication, deliveries, and installation of the work.

C. The Contractor shall thoroughly and accurately prepare and/or review shop drawings, product information, and samples for completeness and compliance with the Contract Documents, before submitting them to the Architect/Engineer.

D. Each subcontractor shall submit their shop drawings, product information, and samples to the Contractor. Information shall be thoroughly checked and approved by the Contractor, for completeness and compliance with the Contract Documents, before submission to the Architect/Engineer.

1.2 CONTRACTOR'S SUBMISSION REQUIREMENTS

A. Time for Architect/Engineer's review:

1. The Contractor shall submit shop drawings, product information, and samples to the Architect/Engineer in ample time to allow 10 working days for the Architect/Engineer's review.

2. Submit shop drawings, product information and samples to:
Fink Roberts & Petrie, Inc.
4040 Vincennes Circle, Suite 300
Indianapolis, Indiana 46268

B. Transmittal Letter:

1. The Contractor shall accompany all submittals with a transmittal letter containing the following information:
   a. Date.
   b. Project Name and Project Number.
   c. Contractor's Name and Address.
   d. Project Manual section and submittal number (03200-001 for example).

e. The quantity of each type of information submitted.
f. Description of information submitted.
g. Notification of any deviations from the Contract Documents.
h. Notification of any other pertinent information such as questions, clarifications, etc.

C. Quantity Requirements:

1. Shop drawings: Submit one (1) reproducible transparency and two (2) prints for each shop drawing.

2. Product information: Submit six (6) copies of each.

3. Samples: Submit three (3) samples or three (3) sets of samples.

D. Shop Drawings:

1. Shop drawings shall bear the following identification and information:
   a. Date (use same date on each sheet in set).
   b. Project Name and Project Number.
   c. Name of Contractor, subcontractor, and/or supplier.
   d. Project Manual section and submittal number (03200-001 for example).
   e. Number sheets in a set consecutively and retain same numbering system throughout all revisions.
   f. Revision dates.
   g. Shop drawings shall be submitted on sheet sizes as follows:
      1. Minimum size: 8-½" x 11".
      2. Preferred size: 24" x 36", or 30" x 42".
   h. Leave adequate clear space on each drawing for Architect/Engineer's stamp.
   i. Reference to Specifications and/or Drawings, if applicable and practical.
   j. Reference to applicable standards, such as ASTM or Federal Specification numbers.
   k. Show complete and thorough identification, layout, details, and all pertinent information in order to fully describe and illustrate the work.
   l. Field measurements shall be made, as required, and noted on the shop drawings as such.
   m. Details and/or other information to show the relationship of materials to adjoining and/or adjacent materials and structures.
   n. Show or note any qualifications, departure, or deviation from the requirements of the Contract Documents.
   o. Show additional information as may be required by the Drawings and Specifications.
   p. Contractor's approval stamp. Architect will not review submittals that do not bear Contractor's approval stamp.

E. Product Information:

1. Product information shall bear the following identification:
   a. Date of submittal.
   b. Project Name and Project Number.
   c. Name of Contractor, subcontractor, and/or supplier/manufacturer.
   d. Project Manual section and submittal number (03200-001 for example).
   e. Contractor's approval stamp.

2. Product Information shall include the following: Manufacturer's/Supplier's standard drawings, catalog cuts, data sheets, performance charts, schedules, brochures, diagrams, illustrations, and other standard descriptive data.
   a. Modify drawings to delete information which is not applicable.
   b. Supplement standard information to provide additional information applicable.
   c. Clearly mark each copy to identify pertinent materials, products or models applicable.
   d. Show performance characteristics and capacities.
   e. Show dimensions and clearances required.
   f. Show wiring diagrams and controls.

1.3 RESUBMISSION REQUIREMENTS

A. Shop Drawings: Revise original drawings as required and resubmit as specified for initial submission. Clearly indicate on revised drawings any changes which have been made, other than those requested by the Architect/Engineer.

B. Product Information and Samples: Submit revised or new product information and/or new samples as required.

1.4 ARCHITECT/ENGINEER'S RESPONSIBILITIES

A. The Architect/Engineer shall review shop drawings, product information, and samples for conformance with the design concept of the project, as outlined in the General Conditions.

B. Allow 10 work days for initial review. Allow additional time if the Architect/Engineer must delay processing to permit coordination with subsequent submittals. Allow 10 work days for reprocessing each submittal.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01410

TESTING LABORATORY SERVICES

PART 1 – GENERAL

1.1 TESTING LABORATORY SERVICES

A. Provide all testing laboratory services, as required or implied by the Contract Documents.

B. Select a testing laboratory mutually acceptable to the Owner, Architect/Engineer and Contractor.

C. The testing laboratory shall perform all laboratory tests within a reasonable time, consistent with the specified standards, and shall furnish a written report of each test.

D. Testing laboratory shall take samples and furnish all supplies and incidental labor for sampling and field testing activities, interrupting the work when necessary. When sampling or testing activities are performed in the field by testing laboratory personnel, Contractor shall furnish personnel and facilities to assist in the activities.

E. Testing laboratory shall furnish one copy of results of each test to Contractor and one copy to Architect/Engineer.

1.2 QUALITY ASSURANCE

A. Qualifications of testing laboratory: Experienced in performing the type of tests required.

B. Codes and Standards: Testing will be in accordance with all pertinent codes and regulations, and with selected standards of the American Society for Testing and Materials.

1.3 PRODUCT HANDLING

A. Promptly process and distribute all required copies of test reports and related instructions, to ensure all necessary retesting and/or replacement of materials with the least possible delay in the progress of the work.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

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 includes requirements for temporary utilities, support facilities and security and protection facilities.

1.3 SERVICE CONNECTION CHARGES

A. Owner shall pay service connection charges (or accept credits as may be applicable) for electric and natural gas.

1.4 USE CHARGES

A. General: Cost or use charges for temporary facilities until the date of Substantial Completion shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.

B. Water Service: Owner shall pay water service use charges for water used by all entities for construction operations.

C. Electric Power Service: Contractor shall pay electric power service use charges for electricity used by all entities for construction operations.

D. Gas Service: Contractor shall pay gas service use charges for gas used by all entities for construction operations.

1.5 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.6 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.7 PROJECT CONDITIONS

A. Temporary use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

1.8 SIGNS

A. Within ten (10) days of commencing work, the General Contractor shall furnish and erect one sign, 8'-0" x 4'-0". The design and layout of the sign will be provided by Architect.

B. No other sign or advertising device will be permitted on the premises, except on the express approval of the Architect/Construction Manager and subject to mutual agreement with the Owner concerning extent and arrangement of such device.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portable Construction Chain-Link Fencing: Minimum 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2 3/8" (60 mm) OD line posts and 2 7/8" (73 mm) OD corner and pull posts, with 1 5/8" (42 mm) OD top and bottom rails. Provide galvanized steel bases for supporting posts.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-v ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot (1.2 m) square tack board.
3. Drinking water.
4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 degrees F (20 to 22 deg C).
5. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk

height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.2 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 11 at each return air grille in system and remove at end of construction. Warranty of equipment utilized shall not commence until date of Substantial Completion. Contractor shall pay all fuel costs until date of Substantial Completion.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. 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: Install temporary service or connect to permanent service.

1. Arrange with utility company and Owner to make connections for temporary services.

B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

D. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Comply with codes and OSHA requirements.

G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line for field office.

1. Provide a dedicated telephone line for each facsimile machine and computer in each field office.
   a. Provide a dedicated telephone line for each facsimile machine and computer in each field office.

2. At each telephone, post a list of important telephone numbers.
   a. Police and fire departments.
   b. Ambulance service.
   c. Contractor's home office.
   d. Architect's office.
   e. Principal subcontractor's field and home offices.
   f. Construction Manager's office.

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

I. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, in common-use facilities.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Parking: Provide temporary parking area for construction personnel within the construction site. Parking on the adjacent streets and alleys is not permitted.

C. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. The Contractor is encouraged to recycle waste as much as practical. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.

D. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

E. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

F. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Storm Water Pollution Prevention Plan: Maintain measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction and erosion control plan. Refer to Appendix I. Indiana Administrative Code 327 IAC 15-5-7 "Rule 5" (Article 15) shall be followed.

1. Site Preparation Contractor shall establish/install the erosion and sedimentation control measures at the beginning of their work, as necessary for the entire project, including General Construction, and shall inspect, repair and maintain these measures until the General Construction Contractor takes control of the entire project site.
2. General Contractor shall inspect, repair, and maintain erosion and sedimentation control measures during construction and remove once permanent vegetation has been established.

C. Site Enclosure Fence: When work begins, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined

sufficient to accommodate construction operations.

2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.

D. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

F. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating conditions until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been 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 temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 1 Section "Closeout Procedures."

END OF SECTION 01500

SECTION 01640

PRODUCT HANDLING

PART 1 - GENERAL

1.1 DEFINITION

A. Product handling shall mean the complete process of delivery, handling, unloading, and storage of all materials, including equipment, tools, and supplies shipped to the project site.

1.2 DELIVERY

A. Deliver material, supplies, or equipment to project site during working hours. Coordinate all deliveries with Owner.

B. Deliveries made during other than normal working hours must be received by an authorized agent of Contractor involved or be received by other means which shall be the sole responsibility of that Contractor.

C. The Owner will under no circumstances receive any materials/equipment for the Contractor. The Owner will refuse such deliveries, and said deliveries will be returned to the supplier with any charges resulting from such being refused the responsibility of the Contractor.

D. Under no circumstances shall shipments be directed to, or in care of, the Owner.

E. Each Contractor, subcontractor, manufacturer, or supplier furnishing materials/equipment to the project site, shall identify, ship, address, consign, etc., all such materials/equipment to the Contractor, who may be charged therewith, by giving the name of the Contractor, and the name and address of the project.

1.3 HANDLING AND UNLOADING

A. Immediately upon delivery, the Contractor shall check for any damage to materials/equipment that occurred prior to, or during shipment. Damaged material/equipment shall be replaced or repaired to a "like new" condition and must be approved and/or acceptable to the Owner and/or the Architect/Engineer.

B. Handling and/or unloading shall be performed so as to not cause any damage to materials/equipment permanently incorporated in the work.

C. Unload materials/equipment only where it will not interfere with the Owner's and other Contractor's operations.

D. Owner may require that Contractor use a dummy load as a test for rigging of major equipment or material items.

1.4 STORAGE

A. The Contractor shall provide suitable storage facilities at the project site for the proper protection and safe storage of their materials/equipment. Contractor shall provide storage at a suitable location other than at the site for materials/equipment until required for rigging. Contractor is responsible for the safe storage of the materials/equipment. Consult the Owner's Representative before storing any materials/equipment.

B. All materials/equipment delivered to the project site, that are permanent parts of the work, are to be considered the property of the Owner and shall not be removed without the Owner's consent. The Contractor shall remove all surplus materials upon completion of each phase of the work, and as directed by the Owner.

C. Confine storage at the project site to areas permitted by laws, ordinances, permits, the Contract Documents, and/or otherwise required by the Owner. Do not unreasonably encumber the project site with materials/equipment.

D. Contractor shall obtain and pay for use of any additional storage or work areas that he requires for the satisfactory performance of their work.

E. Contractor shall be cautious and not load the structure with weight that might cause damage or endanger the structure. Verify construction loading limits with the Architect/Engineer prior to any loading of the structure.

F. Contractor shall remove, or relocate, stored materials/equipment that encumbers other Contractor's work or the Owners operations.

G. When any room is used as a shop, storeroom, etc., by the various Contractors during the construction of the building, the Contractors making use of these spaces will be held responsible for any repairs, patching, or cleaning arising from such use.

1.5 RIGGING

A. If rigging of materials/equipment require the use of a crane, or any other major piece of rigging equipment, the Contractor shall notify the Owner seven (7) days in advance of the date of rigging. The Contractor shall coordinate the time, place, and traffic effects with the Owner in order to minimize the safety and traffic hazards created.

B. The Contractor is responsible for any/all costs required for traffic control.

PART 2 - PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

END OF SECTION

SECTION 01700

PROJECT CLOSEOUT

PART 1 – GENERAL

1.1 SECTIONS INCLUDES

A. Operating and maintenance manuals.

1.2 RELATED SECTIONS

A. Section 01720 – Project Record Documents.

1.3 OPERATING AND MAINTENANCE MANUALS

A. When the project construction is completed, "Operating and Maintenance Manuals" are required for the Owner's use in operating and maintaining the facility.

B. The "Operating and Maintenance Manual" shall be composed of certificates, guarantees, bonds, drawings, equipment data, operating and maintenance instructions, and all other relevant documents.

C. Contractor shall submit to Architect one copy of bound sets of "Operating and Maintenance Manuals" for mechanical and electrical work, and product information for other equipment and architectural specialties. Submit at least 15 days prior to final inspection. Submit one copy of modified or corrected manual to comply with Architect's comments within 15 days of receipt of comments.

D. These manuals shall be delivered to the Owner when the work is deemed 100 percent complete.

E. Manuals and product information for other work shall adequately describe equipment and systems with instructions for proper and efficient operation and maintenance by the Owner.

F. Operating and maintenance information submittals shall be reviewed and accepted by the Architect/Engineer prior to processing final application for payment.

G. Each Contractor shall orient and instruct the maintenance personnel designated by the Owner in the operation of all equipment installed by the Contractor.

H. Manuals and product information shall consist of, but not limited to, the following: (Bind in a stiff cover, properly identified with the name of the project, Project Manual Division or Section of work, and name of the Contractor. Index thoroughly and accurately.)

1. Contractor and Material Supplier List.

2. Certificate of Substantial Completion.
3. Guarantees.
4. Certificates of Inspection.
5. Catalog photocopies of all major equipment and/or components, properly identified.
6. Wiring and control diagrams.
7. Normal start-up and shut-down instructions.
8. Normal operating characteristics, instructions, and procedures.
9. Special emergency shut-down procedures and if applicable.
10. Troubleshooting charts and procedures, and repair procedures.
11. Routine and normal preventive maintenance and servicing instructions.
12. Special cleaning instructions, including the care and maintenance of all finish materials and finishes on equipment. Instructions shall recommend the types of cleaning agents and methods, as well as cautionary provisions regarding agents and methods detrimental to the equipment.
13. Parts lists, and names and addresses of nearest service outlets, distributors, or manufacturer's outlets for each piece of equipment.
14. Any other pertinent information necessary to enable the Owner's personnel to properly operate and maintain the equipment.
15. Generic part numbers for motor and pump bearings.
16. Characteristic performance curves for pumps, fans, heat exchangers, etc.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01710

CLEANING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Progress cleaning.

B. Final cleaning.

1.2 GENERAL

A. In general, each Contractor shall be responsible for all clean-up and cleaning of their work.

B. Cleaning of certain specific products may be specified in their respective Sections of the Project Manual.

C. Conduct all clean-up operations to comply with local ordinances and anti-pollution laws.

1. Do not burn or bury rubbish and waste materials on project site.
2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary sewers.
3. Do not dispose of wastes into streams or waterways.

D. Conduct all clean-up operations to maintain safety and hazard control.

1. Store volatile wastes in covered metal containers and remove from premises daily.
2. Prevent accumulation of wastes which create hazardous conditions.
3. Provide adequate ventilation during use of volatile or noxious substances.

1.3 PROGRESS CLEANING

A. As a result of, or during the performance of their work, each Contractor shall perform clean-up on a continuing basis.

B. Perform clean-up to ensure that the building, project site, and all adjacent properties are maintained free from accumulations of waste, debris, and rubbish.

C. At reasonable intervals or as conditions require, perform project site clean-up of waste and surplus materials. Maintain and clean public and private streets and roadways, as required.

D. The Contractor shall provide, at a convenient location on the project site, a trash container

of appropriate size, and shall be responsible for periodic servicing of same.

E. Each Contractor shall be responsible to collect and deposit in the trash container all waste, debris, and rubbish caused by their operations, on a daily basis, except that each Contractor shall collect and remove from the job site their own liquid waste, asbestos, and other waste requiring special handling for disposal.

F. Perform clean-up without causing damage to the work. Schedule clean-up so that dust, etc,. will not fall on wet, newly painted surfaces.

G. If Contractor fails to keep project site clean, the Owner may have project cleaned and all costs incurred will be paid by the Contractor.

1.4 FINAL CLEANING

A. As a result of, and following the performance of their work, each Contractor shall perform cleaning of their finished work, in the preparation for final project assessment.

B. Use experienced workmen or professional cleaners for final cleaning.

C. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces.

D. Repair, replace, patch, and touch-up marred surfaces to specified finish, to match the finish of the product.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Broom clean all concrete surfaces.

G. Clean project site. Sweep paved areas, and rake clean landscaped surfaces.

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

I. Should the Owner determine that additional cleaning is required, following substantial completion and final cleaning of the work by the Contractor, the Contractor responsible for such additional cleaning shall bear the cost thereof.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Project Record Documents.

1.2 RELATED SECTIONS

A. Supplementary Special Conditions.

B. Section 01700 - Project Closeout.

1.3 PROJECT RECORD DOCUMENTS

A. The Contractor shall maintain, on a regular basis, at the project site, for periodic inspection by the Owner or Architect/Engineer, one complete set of Project Record Documents, as follows, for the sole purpose of recording all changes, errors, omissions, corrections, and discrepancies occurring during the course of the work.

1. Contract Documents (Drawings and Specifications).

2. Addenda.

3. Construction Change Directives and other modifications to the contract.

4. Reviewed shop drawings, product information and samples.

B. Project Record Documents shall be accessible to workers to make immediate notes or revisions.

1. Maintain daily and keep current with all changes.

C. Ensure entries are complete and accurate, enabling future reference by Owner.

D. Store Project Record Documents separate from documents used for construction.

E. Record information concurrent with construction progress.

F. Drawings and Shop Drawings: Legibly mark each item to record all revisions and actual construction including:

1. Show location of underground mechanical and electrical services, utilities, and

appurtenances referenced to permanent surface improvements.

2. Show location of interior mechanical and electrical services, utilities, and appurtenances concealed in the facility, referenced to visible and accessible features of the facility.

3. Show mechanical equipment in its actual installed locations and show all installed piping sizes, motor sizes, air volumes, etc.

4. Show electrical equipment in its actual installed locations, approximate feeder and branch circuit routing, the circuit number of the actual feeder or branch circuit to which each electrical device has been connected.

5. Refer to Division 15 through Division 28 for additional requirements pertaining to plumbing and electrical work.

6. Structural and architectural dimensional changes to the Drawings.

7. Revisions, no matter how minor, to any detail shown on the Drawings.

8. Details not included on the Drawings.

G. Specifications: Legibly mark and record, within each applicable Section, description of actual products installed, including the following:

1. Manufacturer's name, and product model and number.

2. Product substitutions or alternates utilized.

3. Changes made by Addenda and modifications.

H. The maintenance of this information will be a condition for acceptance of monthly applications for payment.

1. Failure to maintain Project Record Documents, as outlined, will be cause for rejection of Contractor's pay request.

1.4 SUBMITTALS

A. At completion of the project, the Project Record Documents shall be reviewed as to accuracy and completeness by the Contractor, prior to submission to the Owner.

B. Project Record Documents shall be submitted under the provisions of the Supplementary Special Conditions, to the Architect/Engineer within thirty (30) days of the date of substantial completion. Acceptability of Project Record Documents shall be a condition for final payment.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 02010

GEOTECHNICAL INFORMATION

PART 1 - GENERAL

1.1 GEOTECHNICAL ENGINEERING INVESTIGATION REPORT

A. A Geotechnical Engineering Investigation Report has been prepared by ATC Associates, Inc., dated August 9, 1999 (ATC Project No. 86.06015.0007). A copy of this report may be examined at the office of the Architect/Engineer. This report was obtained only for use in design and is not a part of the Contract Documents. This report is available for information but is not a warranty of subsurface conditions.

B. The soil bearing logs from the Geotechnical Engineering Investigation Report have been provided on Drawing S8A for information only.

C. The recommendations described in the Geotechnical Engineering Investigation Report shall not be construed as Contract Requirements.

D. The Geotechnical Engineering Investigation Report, by its nature, cannot reveal all conditions that exist on the site. The base bid shall include an allowance for the removal of unacceptable earth bearing materials, and replacement of such with compacted engineered fill, as described on Drawing S8. Variations from the quantity allowance (additions or reductions) shall be handled by a unit price, as described on the Bid Form and in Section 01010, Summary of Work, of the Project Manual.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS AND WORK

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

1.2 DESCRIPTION OF WORK

A. Provide earthwork as shown and indicated.

1. Preparation of subgrade for building slabs is included as part of this work.
2. Drainage fill course for support of building slabs is included as part of this work.
3. Backfilling of trenches within building lines is included as part of this work.

B. Excavation for Mechanical/Electrical Work: Excavation and backfill required in conjunction with underground mechanical and electrical utilities, and buried mechanical and electrical appurtenances is included as work of this section.

C. Definition: "Excavation" consists of removal of material encountered to subgrade elevations indicated and subsequent disposal of materials removed.

1.3 QUALITY ASSURANCE

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Testing and Inspection Service:

1. Employ, at Contractor's expense, testing laboratory approved by Architect/Engineer, to perform soil testing and inspection service for quality control testing during earthwork operations.
2. The Contractor shall prepare a scope of work for testing and a schedule of proposed tests and inspection reports which will be required to meet the requirements of this specification for submittal to the Architect/Engineer for review and approval.
3. If it is determined that the submittal does not meet or exceed the minimum requirements of the specifications, additional test or reports will be added at no additional cost to the Owner.
4. If the tests or reports are not received by the Architect/Engineer before additional work is performed, remedial action shall be taken as directed by the

Architect/Engineer in order to insure that the requirements of the specifications are met. The cost of such additional work will be paid for by the Contractor.

5. Testing laboratory shall have Soils Engineer present to observe and perform tests at all times earthwork operations are in progress.
   a. Testing Service Shall: Determine suitability of materials for compacted fill, backfill and engineered fill.
   b. Determine preparation and placing of materials for fill, backfill and engineered fill.
   c. Determine maximum density and optimum moisture content for placing and compacting materials.
   d. Perform necessary field density tests to insure adequate compaction for fill, backfill and engineered fill, for each compacted layer of fill.
   e. Perform necessary field inspection of different phases of earthwork.
   f. Perform necessary field inspection for borrow pits.

1.4 SUBMITTALS

A. Test Reports-Excavating: Testing service shall submit following reports with their recommendations directly to Architect/Engineer with copy to Contractor:

1. Scope of work for testing service.
2. Schedule of reports and tests outlining the number and type of each test necessary to meet specified requirements.
3. Test reports on borrow materials.
4. Verification of each footing subgrade.
5. Field density test reports.
6. One optimum moisture maximum density curve for each type of soil encountered.
7. Report of actual unconfined compressive strength and results of bearing tests of each strata tested.

1.5 JOB CONDITIONS

A. Site Information: Geotechnical report is included in Division 1 specifications.

1. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn therefrom by Contractor. Data is made available solely for convenience of Contractor.
2. Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.

B. Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.

1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner, and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner at Contractor's expense.
2. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, during occupied hours, except when permitted in writing by Architect/ Engineer and then only after acceptable temporary utility services have been provided.
   a. Provide minimum of 48 hour notice to Architect/ Engineer, and receive written notice to proceed before interrupting any utility.

3. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.

C. Use of Explosives: The use of explosives is not permitted.

D. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.
1. Operate warning lights as recommended by authorities having jurisdiction.

2. Protect structures, utilities, sidewalks, pavements, and other facilities from damages caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

PART 2 - PRODUCTS

2.1 SOILS MATERIALS

A. Definitions

1. Satisfactory soils materials are as defined in the soils report.
2. Base Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand.
3. Drainage Fill: Clean granular material: Sand, pit run gravel containing a maximum of 2%, by weight, passing the 200 sieve, 100% passing the 3/4" sieve.

4. Backfill and Fill Materials: Satisfactory soil materials free of rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetable and other deleterious matter.
5. Aggregate for Under Drains: Coarse aggregate Class A, B, C, D and E, Size No. 8 in accordance with INDOT Standard Specification 903.02.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Excavation is unclassified, and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.

B. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Soils Engineer. Unauthorized excavation, as well as remedial work directed by Soils Engineer, shall be at Contractor's expense.

1. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classifications, unless otherwise directed by Soils Engineer.

C. Additional Excavations: When excavation has reached required subgrade elevations, notify Soils Engineer who will make an inspection of conditions.

1. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated materials as directed by the Soils Engineer.
2. Removal of unsuitable material and its replacement as directed will be paid on basis of contract conditions relative to changes in work.

D. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

1. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

E. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross braces, in good serviceable condition.

1. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.
2. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

F. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.

1. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.

G. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown.

H. Excavation for Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room. Provide 6" to 9" clearance on both sides of pipe or conduit.

1. Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations.
2. Where rock is encountered, carry excavation 6" below required elevation and backfill with a 6" layer of crushed stone or gravel prior to installation pipe.
3. For pipes or conduit 5" or less in nominal size and for flat bottomed multiple duct conduit units, do not excavate beyond indicated depths. Hand excavate bottom cuts to accurate elevations and support pipe or conduit on undisturbed soil.
4. For pipes or conduit 6" or larger in nominal size, tanks and other mechanical/electrical work indicated to receive base material, excavate to depth indicated, or, if not otherwise indicated, to 6" below bottom of work to be supported.
5. Except as otherwise indicated, excavate for exterior water-bearing piping (water, steam, condensate, drainage) so top of piping is not less than 5'-0" below finished grade.
6. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for entire body of pipe.
7. Do not backfill trenches until tests and inspections have been made and backfilling authorized by Architect/ Engineer. Use care in backfilling to avoid damage or displacement of pipe systems.

I. Backfill Trenches: Backfill trenches to subgrade elevation with base material and satisfactory soils material as indicated.

3.2 COMPACTION

A. General: Control soil compaction during construction, providing minimum percentage of density specified in soils report, or as directed by Soils Engineer, for each area classification indicated.

1. Fill areas shall be compacted using equipment capable of compacting each lift its full depth. Moisture during compaction operations shall be maintained at optimum content.
2. Compacting equipment shall be approved equipment of such design, weight and quantity to obtain the required density in accordance with soils report and drawings.
3. Any areas inaccessible to a roller shall be consolidated and compacted by mechanical tampers.
4. Operate equipment so that hardpan, cemented gravel, clay, or other chunky soil material will be broken up into small particles and become incorporated with the material in the layer.

B. Cut Areas: Disk to 6" below subgrade and compact to density as determined by Soils Engineer.

1. Compaction by flooding is not acceptable.

C. Proof-rolling: At end of each work day of filling and compaction operations, proof roll with smooth tired vehicle to leave smooth surface sealed to shed all water.

D. Foundation Excavation: Shall be inspected as specified in the soils report and any action required will be done as therein described.

E. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.

1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
2. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing, until moisture content is reduced to a satisfactory value.

3.3 BACKFILL AND FILL

A. General: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.

1. In excavations and trenches, use satisfactory excavated or borrow material, or base material.
2. Under piping and conduit, use base material where base is indicated under piping or conduit.
3. Underdrains, use aggregate for underdrains.
4. Under grassed areas, use satisfactory excavated or borrow material.
5. Under walks and pavements, use base material, or satisfactory excavated or borrow material, or combination of both.
6. Under steps, use base material, or drainage fill material.
7. Under building slabs, use satisfactory excavated material, or drainage fill material, or a combination of both.

B. Backfill excavation as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
2. Inspection, testing, approval, and recording locations of underground utilities.
3. Removal of concrete formwork.
4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
5. Removal of trash and debris.
6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

C. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

1. When existing ground surface has a density less than that specified in the soils report for particular area classification, break up ground surface, pulverize, moisture condition to optimum moisture content, and compact to required depth and percentage of maximum density.

D. Placement and Compaction: Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" loose depth for material compacted by hand operated tampers.

1. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum density indicated in soils report. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
2. Place backfill and fill materials evenly adjacent to structures, piping or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping or conduit to approximately same elevation in each lift.
3. Field Density tests shall be performed on each lift as necessary to insure adequate compaction is being achieved.

3.4 GRADING

A. General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surfaces within specified tolerances, compact with uniform levels or slopes between points and existing grades.
   a. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 1/2" above or below required subgrade elevation.

B. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum density.

3.5 PAVEMENT AGGREGATE BASE COURSE

A. General: Aggregate base course consists of placing base material, in layers of specified thickness, over compacted subgrade surface to support a pavement base course.

B. Grade Control: During construction, maintain lines and grades including crown and cross slope of aggregate base course.

C. Placing: Place aggregate base course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting aggregate base material during placement operations.

1. Aggregate base course material placed for access and service roads shall not be used for construction traffic.

2. The Contractor shall install and maintain temporary entrances and drives for use by construction traffic.

3.6 BUILDING SLAB DRAINAGE COURSE

A. General: Drainage course consists of placement of drainage fill material, in layers of indicated thickness, over subgrade surface to support concrete building slabs.

B. Placing: Place drainage fill material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting material during placement operations.

1. When compacted drainage course is shown to be 6" thick or less, place material in a single layer. When shown to be more than 6" thick, place material in equal layers, except no single layer more than 6" or less than 3" in thickness when compacted.

3.7 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades, fill and backfill (including trenches) layers before further construction work is performed.

1. Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D2167 (rubber balloon method), as applicable.
2. Paved Areas and Building Slab Subgrade: Make at least one field density test of subgrade for every 2000 sq. ft. of paved area or building slab, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 2000 sq. ft. of overlaying building slab or paved area, but in no case less than 3 tests.
3. Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to Soils Engineer.

B. If in opinion of Soils Engineer, based on testing reports and inspection, subgrade, fill or backfill which have been placed are below specified density, provide additional compaction and testing at no additional expense.

3.8 MAINTENANCE

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

1. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

C. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.9 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash and debris, and dispose of it off Owner's property.

1. Remove excess excavated material, trash, debris and waste materials, and dispose of it off property in a legal manner.

END OF SECTION

SECTION 02361

TERMITE CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes soil treatment with termiticide.

B. Related Sections include the following:

1. Division 2 Sections regarding earthwork, back-filling, and compaction of earth in trenches and under the building slab.

C. Service Life of Soil Treatment: Soil treatment by use of a termiticide that is effective for not less than five years against infestation of subterranean termites.

1.2 SUBMITTALS

A. Product Data: For termiticide. Include the EPA-Registered Label for termiticide products.

B. Product Certificates: For termite control products, signed by product manufacturer.

C. Qualification Data: For Installer of termite control products.

D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following, bound into the Project Record binder:

1. Date and time of application.
2. Moisture content of soil before application.
3. Brand name and manufacturer of termiticide.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes, and rates of application used.
6. Areas of application.
7. Water source for application.

E. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Formulate and apply termiticides according to the EPA-Registered Label.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

1.5 COORDINATION

A. Coordinate soil treatment application with excavating, filling, grading, and concrete placement operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

B. Provide warranty for a period of 5 years from date of treatment, signed by Applicator and Contractor.

C. In addition, provide the Owner an annually renewable termite inspection control contract, to be accepted at the Owner's option, effective five years from date of original soil treatment, to assure necessary re-treatment and liability for termite damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering termiticide products that may be incorporated into the Work include, but are not limited to, the following:

1. Aventis Environmental Science USA LP;
2. BASF Corporation
3. Bayer Corporation;
4. Dow AgroSciences LLC;
5. FMC Corporation, Agricultural Products Group;
6. Syngenta;

2.2 SOIL TREATMENT

A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control.

1. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.

1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.

1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Foundations: Adjacent soil including soil along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, piers, and chimney bases; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Masonry: Treat voids, including insides of hollow masonry units and behind brick veneer.
4. Penetrations: At expansion joints, control joints, plumbing and electrical pipes, and other areas where slabs will be penetrated.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

D. Post warning signs in areas of application.

E. Re-apply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work under this Section includes labor, equipment, materials and services (including the design and detailing) required for formwork for cast-in-place concrete indicated on the Drawings, and subsequent removal of such formwork.

1.2 RELATED WORK

A. Section 03200 - Concrete Reinforcement.

B. Section 03300 - Cast-In-Place Concrete.

C. Section 03365 – Post-Tensioned Concrete.

D. Division 23 - Mechanical.

1. Coordinate sizes and locations of openings in formwork.

E. Division 26 - Electrical.

1. Coordinate sizes and locations of openings in formwork.

1.3 QUALITY ASSURANCE

A. Qualifications of Workers:

1. Provide at least one experienced person, to be present at all times during execution of this work thoroughly familiar with the materials being installed, the referenced standards, and the requirements of this work, to direct all work included in this Section.

B. Codes and Standards:

1. ACI 301 - Specifications for Structural Concrete for Buildings.

2. ACI 347 - Recommended Practice for Concrete Formwork.

1.4 DESIGN

A. Formwork, including reshoring, shall be designed by the contractor, who shall be solely responsible for this work.

B. Formwork for post-tensioned concrete shall be designed taking into account the possibility of the member lifting off the formwork during the stressing operation.

PART 2 - PRODUCTS

2.1 FORM MATERIALS AND ACCESSORIES

A. Form Lumber:

1. Form lumber, in contact with concrete exposed to view, shall be new or of sufficient quality to insure an unblemished texture.

2. Face Forms: B-B Plyform Class I or II, exterior, bearing APA grade stamp on each piece. Minimum thickness: 3/4".

B. Steel Beam Forms:

1. Steel beam forms shall be "like new", producing a clean, smooth, unblemished texture for concrete exposed in the finished structure.

C. Form Ties:

1. Factory fabricated, adjustable length, snap-off metal form ties, designed to prevent form deflection and to prevent spalling of concrete upon removal. The metal, after breaking, should be at least 1" from the face of the wall.

D. Form Release Agent:

1. Non-staining, neutral, barrier type which will not cause softening or impede curing.

2. Standards:
   a. Magic Kote by Symons Manufacturing Company.
   b. Formshield Chemical Release Agent by Grace Construction Products.

E. Falsework:

1. The contractor is responsible for the design, safety and serviceability of falsework.

2.2 OTHER MATERIALS

A. Other materials, not specifically described but required for proper completion of concrete

formwork, shall be as selected by the contractor, subject to the advance approval of the Architect/Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to work of this Section, carefully inspect the work of other trades and verify that such work is completed to the point where this installation may properly commence.

2. Verify that formwork is constructed in accordance with pertinent codes and regulations, the referenced standards, and the Drawings.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Architect/Engineer.

2. Do not proceed with installation in areas of discrepancy until such discrepancies have been fully resolved.

3.2 CONSTRUCTION OF FORMWORK

A. Construction of formwork to be substantial, sufficiently tight to prevent leakage of concrete, and able to prevent excessive deflection when filled with wet concrete.

B. Layout:

1. Form cast-in-place concrete to the shapes, sizes, lines and dimensions indicated on the Drawings. Provide 3/4 inch chamfers on exposed corners of concrete, except those abutting or aligning with masonry.

2. Exercise particular care in the layout of formwork to avoid the necessity for cutting of concrete after it is in place.

3. Make proper provision for openings, offsets, recesses, anchorage, blocking, and other features of the work, as indicated or required.

4. Perform forming required for work of other trades and do cutting and repairing of formwork required to permit such installation.

5. Carefully examine the Drawings and Specifications and consult with other trades relative to providing for openings and other items in the formwork.

C. Bracing:

1. Properly brace and tie the formwork together so as to maintain position and shape, and to ensure safety to workers.

D. Construct formwork straight, true, plumb, level and square within tolerance, as specified in ACI 301. Use a reference point on the ground to check plumbness and elevations. Do not use a previously placed supported level as the reference.

E. Keep formwork sufficiently wetted to prevent joints opening up before concrete is placed.

F. Provide holes at bottom of formwork for cleaning and inspection. Close prior to placing concrete.

3.3 FOOTING FORMS

A. Wood Forms:

1. Footing formwork shall be wood.

3.4 FORM REMOVAL

A. Remove formwork in an approved manner, so as to avoid damage to the concrete. Take particular care to avoid spalling.

B. The contractor shall bear full responsibility for formwork removal. Concrete damaged by too early removal of supports shall be repaired to the satisfaction of the Architect/Engineer, or replaced.

C. Do not remove falsework until concrete has attained sufficient strength to support, without objectionable deflections, its own weight and anticipated construction loads.

1. For non post-tensioned cocrete, the concrete shall have attained, as indicated by the field-cured cylinders, at least 70 percent of its specified 28-day strength before falsework is removed.

2. For post-tensioned concrete, form removal shall be done in accordance with the provisions of Section 03365.

D. Reshore supported levels as required to support construction loads from supported levels above. Provide a minimum of two levels of reshores.

E. Do not remove formwork for vertical elements (walls and columns) until the day after the completion of concrete placement. Removal shall be handled in such as manner as to avoid damage to the concrete.

3.5 MAINTENANCE

A. Clean and recondition formwork before each use. Any damage to formwork during placing, removal, or storage shall be repaired. Formwork with repairs or patches which would result in adverse effects to the concrete finish shall not be used.

B. Store formwork and form materials in a manner to prevent damage or distortion.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work under this Section includes labor, equipment, materials and services required for the installation of concrete reinforcement and associated items indicated on the Drawings or specified herein.

1.2 RELATED WORK

A. Section 03100 - Concrete Formwork.

B. Section 03300 - Cast-In-Place Concrete.

C. Section 03365 – Post-Tensioned Concrete.

1.3 QUALITY ASSURANCE

A. Provide at least one experienced person, to be present at all times during execution of this work, thoroughly familiar with the materials being installed and the methods for their installation, to direct all work included in this Section.

B. Codes and Standards:

1. ACI 315 - Details and Detailing of Concrete Reinforcement.

2. ACI 315R - Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.

3. ACI 318 - Building Code Requirements for Structural Concrete.

4. CRSI Manual of Standard Practice.

5. AWS D1.4 Structural Welding Code – Reinforcing Steel.

C. A pre-construction meeting, to be attended by the contractor, the shop drawing detailer and the reinforcement installer, will be conducted by the Architect/Engineer, to review and discuss the requirements of the Drawings and this Section.

1.4 SUBMITTALS

A. Shop Drawings:

1. Prepare shop drawings indicating details of fabrication and installation of reinforcement.

2. Submit shop drawings under the provisions of Division 1. They will be reviewed by the Architect/Engineer for correct interpretation of the Drawings. This review shall not relieve the contractor of his primary responsibility to provide the required reinforcement.

3. See the Drawings for typical details and general notes for additional reinforcement around openings and other general information.

4. Prepare shop drawings in accordance with the following:
   a. Beams and walls: Provide 1/4 inch scale elevations with the reinforcement shown on the elevations, not scheduled.
   b. Columns: Provide full height elevations with elevations of all supported levels marked. Reinforcement shall be shown on the elevations, not scheduled.
   c. Slabs: Show reinforcement on a plan drawn exclusively for this use. Do not schedule reinforcement. Clearly detail reinforcement around slab openings.
   d. Slabs: Provide a support system plan. Show supports for top and bottom reinforcement in number and location. The maximum spacing for support bars shall be 4'-0". The maximum overhang beyond a support bar or a slab bolster shall be 1'-0".
   e. Provide bar bending diagrams for bent bars (within a submittal) in that same submittal.
   f. Provide sections of walls, beams, and slabs showing clearly bar positions and clearances to formwork.
   g. On wall sections, indicate spacers to be used to maintain clearances for vertical wall reinforcement.
   h. Indicate size and spacing of beam bolsters and joist chairs on the sections and elevations.
   i. Include sections, details and notes, pertinent to the installation of reinforcement, indicated on the Drawings. The shop drawings shall provide sufficient information to allow the reinforcement installer to complete the reinforcement installation without using the Drawings.
   j. Indicate grade of reinforcement.

5. Submit the following information regarding the mechanical tension butt splices and the dowel bar replacement system:
   a. Shop drawings indicating fabrication and installation details.

b. Manufacturer's information, product samples, and certified test reports substantiating compliance with the Specifications.

6. Shop Drawing Action Codes:
   a. Shop drawings marked "Furnish As Submitted" require no corrections. No resubmittal is required. Fabrication may commence.
   b. Shop drawings marked "Furnish As Corrected" require the noted corrections to be made. No resubmittal is required. Fabrication may commence.
   c. Shop drawings marked "Revise & Resubmit" require the noted corrections to be made. Resubmit the corrected shop drawings for review. Fabrication may not commence.
   d. Shop drawings marked both "Furnish As Corrected" and "Revise & Resubmit" require the noted corrections to be made. Resubmit the corrected shop drawings for review. Fabrication may commence. Installation may not begin until the resubmitted shop drawings have been reviewed and returned for use in reinforcement installation.

7. Shop drawing revisions shall be clouded and noted on the resubmitted shop drawings. Information which was correct on the previously submitted shop drawings shall not be changed on the resubmitted shop drawings.

1.5 PRODUCT HANDLING

A. Protection:

1. Protect concrete reinforcement before, during and after installation. Protect the installed work and materials of other trades.

2. Store in a manner to prevent excessive rusting and fouling with dirt, grease, and other bondbreaking coatings.

3. Maintain identification after the bundles are broken.

4. See Paragraph 3.03H for requirements for the handling of epoxy-coated reinforcement.

B. In the event of damage, immediately make repairs and replacements necessary for the approval of the Architect/Engineer, and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 CONCRETE REINFORCEMENT

A. Reinforcing Bars: ASTM A615, Grade 60.

B. Epoxy-coated Reinforcing Bars: ASTM A775.

C. Welded Wire Fabric: ASTM A185.

2.2 ACCESSORIES

A. Provide bar supports, ties, blocking and accessories in accordance with CRSI Manual of Standard Practice.

B. Supports for non epoxy-coated reinforcing bars shall be stainless steel or protected with plastic in contact area.

C. Supports for epoxy-coated reinforcing bars supported from formwork shall be coated wire or made of a dielectric material.

D. Provide plastic snap-on spacers to maintain required concrete cover for vertical wall reinforcement.

1. Standard:
   a. Space Wheels by Aztec.

2.3 MECHANICAL TENSION BUTT SPLICES

A. Conform to ACI 318.

1. Standards:
   a. Lenton Rebar Splicing by Erico Products, Inc.
   b. Grip Twist System by Dayton Barsplice, Inc.
   c. Cadweld, C-Series by Erico Products, Inc.

B. Provide position threaded couplers or Cadweld butt splices for hooked bars that must be butt spliced.

2.4 DOWEL BAR REPLACEMENT SYSTEM

C. Conform to ACI 318.

1. Standards:
   a. DB-SAE Dowel Bar Splicer System by Richmond Screw Anchor Co.
   b. Dowel Bar Replacement System by Dayton Superior Corporation.

c. Lenton Form Saver by Erico Products, Inc.

PART 3 - EXECUTION

3.1 FABRICATION

A. Fabrication, including bar bending, shall comply with the requirements of ACI 318, ACI 315, ACI 315R and CRSI Manual of Standard Practice.

B. Welding of reinforcing steel shall comply with the provisions of AWS D1.4 Structural Welding Code – Reinforcing Steel.

C. Do not begin fabrication of reinforcement until the shop drawings have been marked "Furnish As Submitted", "Furnish As Corrected" or "Furnish As Corrected/Revise & Resubmit" by the Architect/Engineer.

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to installation of the work of this Section, carefully inspect the work of other trades and verify that such work is complete to the point where this installation may properly commence.

2. Verify that concrete reinforcement may be installed in accordance with pertinent codes and regulations, the reviewed shop drawings, and the Drawings.

B. Discrepancies:

1. Do not proceed with installation in areas of discrepancy until such discrepancies have been fully resolved.

3.2 INSTALLATION

A. Shop drawings used for installation of reinforcement must be marked "Furnish As Submitted" or "Furnish As Corrected" by the Architect/Engineer.

B. Support reinforcement securely in design position by wiring to supports in accordance with CRSI standards and, in addition, provide any other supports needed to secure every bar against displacement. Support overhanging tails positively. Bend tie wire tails inward away from formwork. Bars bent or displaced during concrete placement shall be straightened and repositioned before they are encased in concrete.

C. Tolerances on Placement of Reinforcement:

MEMBER	TOP BARS	BOTTOM BARS	SIDE BARS
Slabs	±3/8"	±1/4"	
Beams	±1/2"	±1/4"	±1/2"

D. Splicing of main reinforcement will not be permitted unless indicated on the Drawings or approved by the Architect/Engineer.

E. Concrete cover for reinforcement shall comply with the requirements of ACI 318, except as modified on the Drawings.

F. Obstructions:

1. In the event conduits, piping, inserts, sleeves or any other items interfere with placing reinforcement, as indicated on the Drawings, or as otherwise required, immediately consult the Architect/Engineer and obtain approval of new procedure before placing concrete. Make field adjustments as required.

G. Support top slab reinforcement with #5 support bars and individual high chairs.

H. Epoxy-coated Reinforcing Bars:

1. Epoxy-coated reinforcing bars shall <u>not</u> be field bent.

2. Epoxy-coated reinforcing bars shall not be cut in the field, unless approved by the Architect/Engineer. When epoxy-coated reinforcing bars are cut in the field, the ends of the bars shall be coated with the same material used for repair of coating damage.

3. Handling of epoxy-coated reinforcing bars:
   a. Equipment used for handling epoxy-coated reinforcing bars shall have protected contact areas.
   b. Bundles of epoxy-coated reinforcing bars shall be lifted at multiple pick-up points to minimize bar-to-bar abrasion from sags in the bundles.
   c. Epoxy-coated reinforcing bars shall not be dropped or dragged.
   d. Epoxy-coated reinforcing bars shall be stored on protective cribbing.

4. Repair of epoxy-coated reinforcing bars:

a. Fading of the color of the coating shall not be cause for rejection of epoxy-coated reinforcing bars.
b. Coating damage due to handling, shipment and placing need not be repaired in cases where the damaged area is 0.10 square inches or smaller. Damaged areas larger than 0.10 square inches shall be repaired using the epoxy-coating patching material in accordance with the manufacturer's recommendations.
c. The maximum amount of coating damage, including both repaired and unrepaired areas, shall not exceed 2 percent of the surface area for each bar.

I. Install mechanical tension butt splices in accordance with manufacturer's instructions.

3.4 NOTIFICATION

A. Notify the Architect/Engineer when reinforcement for a supported level pour is nearing completion so that reinforcement in place may be reviewed.

1. Allow sufficient time for installers to make adjustments or corrections so that reinforcement, correct in size, shape and position, will be in place when concrete placing is started.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work under this Section includes labor, equipment, materials and services required for placing, finishing and curing cast-in-place concrete, including the following:

1. Installation of items to be embedded in cast-in-place concrete, not specified under this Section, including, but not limited to, the following:
   a. Anchor bolts.
   b. Plates and shapes for structural steel connections.
   c. Dovetail anchor slots for masonry connections and ties.
   d. Plates and shapes for anchorage of facade supports.
   e. Plates and shapes for metal fabrications connections.
   f. Plates, shapes and items required by other trades.
   g. Cast-in stair nosings.

1.2 RELATED WORK

A. Section 03100 - Concrete Formwork.

B. Section 03200 - Concrete Reinforcement.

C. Section 03365 – Post-Tensioned Concrete.

D. Section 04810 – Unit Masonry Assemblies.

1. Coordinate location and installation of embedded items.

E. Division 5-Metals.

1. Coordinate location and installation of embedded items.
2. Concrete slabs placed on composite steel floor deck.
3. Concrete fill for stair treads.

F. Division 7 – Thermal and Moisture Protection.

1. Waterproofing for concrete surfaces.
2. Traffic coatings for concrete surfaces.

G. Division 23 - Mechanical.

1. Coordinate location and installation of sleeves and drains.

H. Division 26 - Electrical.

1. Coordinate location and installation of sleeves, conduit and embedded light fixtures.

1.3 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.

B. ACI 305 - Hot Weather Concreting.

C. ACI 306 - Cold Weather Concreting.

D. ACI 318 - Building Code Requirements for Structural Concrete.

E. ASTM C31 - Making and Curing Concrete Test Specimens in the Field.

F. ASTM C33 - Concrete Aggregates.

G. ASTM C39 - Test for Compressive Strength of Cylindrical Concrete Specimens.

H. ASTM C42 - Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

I. ASTM C94 - Ready-Mixed Concrete.

J. ASTM C143 - Test for Slump of Portland Cement Concrete.

K. ASTM C150 - Portland Cement.

L. ASTM C171 - Sheet Materials for Curing Concrete.

M. ASTM C172 - Sampling Fresh Concrete.

N. ASTM C173 - Test for Air Content of Freshly Mixed Concrete by the Volumetric Method.

O. ASTM C231 - Test for Air Content of Freshly Mixed Concrete by the Pressure Method.

P. ASTM C260 - Air-Entraining Admixtures for Concrete.

Q. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.

R. ASTM C494 - Chemical Admixtures for Concrete.

S. ASTM C618 - Fly Ash and Raw or Calcined Natural Pozzolans for Use in Portland Cement Concrete.

T. ASTM D1752 – Performed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

U. AASHTO T260 – Method of Sampling and Testing for Total Chloride Ion in Concrete and Concrete Raw Materials.

V. AASHTO T277 – Standard Method of Test for Rapid Determination of Chloride Permeability of Concrete.

W. Indiana Department of Highways - Standard Specifications.

1.4 SUBMITTALS

A. Concrete Mix Designs:

1. Submit a mix design for each class of concrete required for the project under the provisions of Division 1, and including:
   a. Standard deviation analysis, required average strength and documentation of average strength verifying compliance with ACI 318.
   b. Mix proportions by weight, water-cement ratio, slump and air content.
   c. Sieve analyses of fine and coarse aggregates.
   d. Complete list of materials specified in Article 2.1 with product information demonstrating compliance with specified requirements.
   e. For concrete mix Classes D, E and F (post-tensioned concrete), submit results of tests conducted on trial mixes for water soluable chloride ion content, as described in Paragraph 2.3G.
   f. For concrete mix Class E (microsilica concrete), submit results of tests conducted on a trial mix for chloride permeability, as described in Paragraph 2.3H.
2. Submit with sufficient time allowed for review before concrete is required for the project.

B. Shop Drawings:

1. Submit complete shop drawings, under the provisions of Division 1, indicating:
   a. Locations of construction joints in the supported levels.
   b. Openings, slab depressions and blockouts in the supported levels.
   c. Locations and sizes of items embedded in the cast-in-place concrete as described in Subparagraph 1.1A.1. This work must be fully coordinated

with the trades involved, as described in Article 1.2.

d. Locations and sizes of sleeves to be installed by mechanical and electrical contractors. This work must be fully coordinated with the trades involved, as described in Article 1.2.

e. Locations of shear keys.

f. Locations of waterstops.

2. Submit with sufficient time allowed for review by multiple disciplines before installation and concrete placement is required.

C. Product Information:

1. Submit product information for materials specified in Article 2.2, under the provisions of Division 1, and demonstrating compliance with specified requirements.
2. Submit documentation substantiating compatibility between curing compounds and applied sealers and finishes specified for the concrete surfaces to be cured.

D. Field Quality Control Test Reports: Submit to the Owner and Architect/Engineer, under the provisions of Division 1, and within 3 days after completion of the 7-day and 28-day tests.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. A pre-construction meeting, to be attended by the contractor, the concrete supplier, the concrete placer/finisher and the engineering testing firm, will be conducted by the Architect/Engineer, to review and discuss the requirements of the Drawings and this Section.

C. Conduct field sampling and testing of concrete, including the making of test specimens, with personnel holding current certificates issued by the Concrete Technician Certification Committee of Indiana.

D. Sample Finish: Place and finish a 20'-0" x 20'-0" sample area to establish acceptable finishing texture for the parking surfaces, as described in Article 3.5. Sample finish must be approved by the Owner and Architect/Engineer before placement of concrete requiring this finish begins.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver concrete in accordance with ASTM C94. Do not use non-agitating transporting equipment.

B. Deliver materials and equipment in undamaged condition.

C. Store materials and equipment in designated areas and in accordance with manufacturer's instructions.

D. Store materials and equipment off the ground, totally protected from ground splash, mud, weather separation, intrusion of foreign materials, and other damage.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Inclement Weather: Do not place concrete during rain, sleet or snow unless adequate protection is provided.

B. Hot Weather: Perform work under provisions of Article 3.10.

C. Cold Weather: Perform work under provisions of Article 3.11.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Portland Cement: ASTM C150, Type I or Type III.

B. Flyash: ASTM C618, Class C.

1. Maximum loss on ignition: 1.50 percent.
2. Maximum amount retained when wet-sieved on No. 325 sieve: 30 percent.

C. Fine Aggregate: ASTM C33.

1. Natural sand of clean, hard, durable particles.
2. Indiana Department of Highways, Standard Specifications: Size #23.

D. Coarse Aggregate:

1. Crushed stone or gravel of clean, sound, tough, durable particles.
   a. Air-entrained concrete mixes: ASTM C33, Class 4S.
   b. Non air-entrained concrete mixes: ASTM C33, Class 2S.
2. Indiana Department of Highways, Standard Specifications: Class A, Size 8, 3/4 inch maximum size.

E. Water: Clean and free from injurious amounts of oil, acids, alkalis, salts, organic materials and other deleterious substances.

F. Air-Entraining Admixture: ASTM C260.

1. Standards:
   a. Micro-Air by Master Builders.
   b. MBAE 90 by Master Builders.
   c. Darex Series by W. R. Grace & Co.
   d. Daravair 1400 by W. R. Grace & Co.
   e. Air Mix by The Euclid Chemical Co.
   f. AEA 92 by The Euclid Chemical Co.

G. Water-Reducing Admixture: ASTM C494, Type A.

1. Standards:
   a. Pozzolith 322-N or 220-N by Master Builders.
   b. WRDA with Hycol by W. R. Grace & Co.
   c. Eucon WR-75 or Eucon MR by The Euclid Chemical Co.

H. Accelerating Admixture: ASTM C494, Type C or E.

1. The accelerating admixture shall be non-chloride, non-corrosive. Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions, are not permitted.
2. Standards:
   a. Pozzatec 20 or Pozzolith NC534-Accelerator by Master Builders.
   b. Polarset by W. R. Grace & Co.
   c. Accelguard 80 or 90 by The Euclid Chemical Co.

I. Water-Reducing & Retarding Admixture: ASTM C494, Type D.

1. Standards:
   a. Pozzolith 122-R by Master Builders.
   b. Daratard-17 by W. R. Grace & Co.

J. High Range Water-Reducing Admixture: ASTM C494, Type F.

1. High range water-reducing admixture shall be added to the concrete at the batch plant. High range water-reducing admixture may be added in the field to adjust slump.
2. Standards:
   a. Pozzolith 440-N by Master Builders.
   b. Rheobuild 1000 by Master Builders.
   c. Daracem 19, 100, ML 330 or ML 500 by W. R. Grace & Co.
   d. Eucon 37 or 537 by The Euclid Chemical Co.

K. Corrosion Inhibitor Admixture:

1. Calcium nitrite–based corrosion inhibitor.

a. Active corrosion shall be inhibited to 9.9 pounds of chlorides per cubic yard of concrete, at the reinforcing steel level.
b. The corrosion inhibitor shall contain 30 ± 2 percent of calcium nitrite by weight.
c. The corrosion inhibitor shall have a minimum of five years of field history, demonstrating adequate background performance. The manufacturer shall submit documentation for five similar projects.

2. Standard:
   a. DCI by W.R. Grace Co.

L. Synthetic Fibers:

2. Virgin (non-recycled), nylon or polypropylene fibers.
3. Length : 3/4 inch.
4. Use in accordance with manufacturer's instructions.
5. Introduce fibers into the concrete at the batch plant.
6. Standards:
   e. Nycon RC by Nycon, Inc.
   f. Fibermesh MD by Fibermesh Company.
   c. FORTA CFP by Forta Corporation.

2.2 RELATED MATERIALS

A. Moisture Retention Cover: ASTM C171.

1. Burlap and polyethylene film.

B. Evaporation Retardant:

1. Apply in accordance with manufacturer's instructions.
2. Standard:
   a. Confilm by Master Builders.
   b. EUCO-BAR by The Euclid Chemical Co.

C. Epoxy Bonding Adhesive:

1. Two-part structural epoxy adhesive.
2. Use to bond fresh, plastic concrete or patching mortar to hardened concrete.
3. Standard:
   a. Sikadur 32, Hi-Mod by Sika Corporation.
   b. Euco 452 by The Euclid Chemical Co.

D. Adhesive Anchor System:

1. Moisture insensitive epoxy.
2. Use to anchor reinforcing steel into hardened concrete.
3. Drilled hole size and installation procedure shall conform to manufacturer's instructions.
4. Use carbide bit drill to prevent damage to reinforcement.
5. Standards:
   a. HIT HY 150 by Hilti Fastening Systems.
   b. Vertical holes: Sikadur 32, Hi-Mod by Sika Corporation, or Euco 452MV Epoxy by The Euclid Chemical Co.
   c. Horizontal holes: Sikadur Injection Gel by Sika Corporation, or Euco Epoxy 620 by The Euclid Chemical Co.
   d. Overhead application: Sikadur 31, Hi-Mod Gel by Sika Corporation, or Euco 452 Gel by The Euclid Chemical Co.

E. Patching Material:

1. Use to repair honeycombed and other defective concrete.
2. Standards:
   a. SikaTop 122 Plus (horizontal and vertical surfaces), by Sika Corporation.
   b. SikaTop 123 Plus (overhead surfaces), by Sika Corporation.
   c. Sto Trowel Grade Mortar (horizontal surfaces), by Sto Corporation.
   d. Sto High Strength Overhead Mortar (vertical and overhead surfaces), by Sto Corporation.
   e. EMACO R310 (horizontal surfaces) by Master Builders.
   f. EMACO R320 (vertical and overhead surfaces) by Master Builders.

F. Joint Filler: ASTM D1752, Type III.

1. Granulated cork particles, specially treated, dehydrated, and compressed to enable expansion in presence of moisture.
2. Standard:
   a. Self Expanding Cork by W. R. Meadows, Inc.

G. Precompressed Expanding Sealant:

1. Standard:
   a. Will-Seal 150 by Will-Seal Construction Foams.

H. Curing Compound: ASTM C309.

1. Compatible with the applied sealers and finishes specified for the concrete surfaces to be cured.

I. Waterstops:

1. Standard:
   a. Waterstop-RX by American Colloid Company.

2.3 PROPORTIONING CONCRETE MIXES

A. Establish concrete proportions to produce homogeneous, durable mixes with the required average strength based on the appropriate amount of overdesign as required by Section 5.3 of ACI 318.

B. Proportion concrete mixes to provide workability and consistency to permit concrete to be worked readily into the corners and angles of the forms and around reinforcement by the methods of placement and consolidation to be employed, without segregation or excessive bleeding.

C. Include a water-reducing or high range water-reducing admixture, used in strict accordance with manufacturer's instructions, in all mix designs. Specified minimum cement contents are based on the use of such admixtures.

D. Include an air-entraining admixture in mix designs for concrete exposed to freezing and thawing during service and for concrete exposed to cold weather, as defined in Article 3.11, during construction, before attaining its specified compressive strength.

E. Base mix design on saturated surface dry aggregates. Adjust the amount of mixing water added at the batch plant for the moisture condition of the aggregates.

F. Flyash may be used as a cement substitute with a maximum 15 percent substitution rate on a pound for pound basis.

1. The water-cement ratio for each class of concrete shall be calculated using the amount of cement plus flyash.

G. Water Soluble Chloride Ion Content:

1. Maximum percent in concrete by weight of cement:
   a. Post-tensioned concrete: 0.06
   b. Concrete exposed to earth or weather: 0.15.
   c. Other concrete construction: 0.30.
2. For concrete mix Classes D, E and F (post-tensioned concrete), conduct tests on trial mixes to verify compliance with the requirement of Subparagraph 2.2G.1. Test samples of the hardened concrete for water soluble chloride ion content at an age of 28 to 42 days, using the test procedure contained in AASHTO T260.
3. When water soluble chloride ion content exceeds the maximum limit, adjust the concrete

mix by adding one gallon of corrosion inhibitor admixture per cubic yard of concrete for each pound of chloride ion in excess of the limit. A maximum of 1.5 pounds of excess chloride ion content may be compensated for in this manner.

H. Chloride Permeability of Concrete.

1. For concrete mix Class E (microsilica concrete), conduct tests on a trial mix to determine chloride permeability, using the test procedure contained in AASHTO T277.
2. Test three cylinders at 42 days. The concrete shall pass no more than an average of 800 coulombs, with no single test result exceeding 1000 coulombs.

I. Slump:

1. Mixes containing high range water-reducing admixture: 5 to 8 inches.
2. Mixes containing water-reducing admixture: 5 inches maximum.

J. Adjustments to the reviewed mix designs may be requested by the contractor when job conditions, weather, test results, or other circumstances warrant. These revised concrete mix designs shall be submitted to the Architect/Engineer for review prior to their use.

K. Concrete Mix Classes:

1. Class A concrete:
   a. Compressive strength at 28 days: 3000 psi.
   b. Minimum cement content: 423 lb/cu yd.
   c. Maximum water-cement ratio: 0.58.
   d. Air content: optional.
   e. Water-reducing admixture required.
2. Class B concrete:
   a. Compressive strength at 28 days: 4000 psi.
   b. Minimum cement content: 564 lb/cu yd.
   c. Maximum water-cement ratio: 0.40.
   d. Coarse aggregate: crushed stone.
   e. Air content: 6 ± 1 percent.
   f. High range water-reducing admixture required.
3. Class C concrete:
   a. Compressive strength at 28 days: 4000 psi.
   b. Minimum cement content: 564 lb/cu yd.
   c. Maximum water-cement ratio: 0.40.
   d. Coarse aggregate: crushed stone.
   e. Air content: 6 ± 1 percent.
   f. High range water-reducing admixture required.
   g. Synthetic fibers required.
4. Class D concrete:
   a. Compressive strength at 28 days: 5000 psi.

b. Compressive strength at time of post-tensioning (1 to 3 days): 3000 psi.
c. Minimum cement content: 611 lb/cu yd.
d. Maximum water-cement ratio: 0.40.
e. Coarse aggregate: crushed stone.
f. Air content: 6 ± 1 percent.
g. Water soluble chloride content: as specified in Paragraph 2.3G.
h. High range water-reducing admixture required.

5. Class E concrete:
   a. Compressive strength at 28 days: 6000 psi.
   b. Compressive strength at time of post-tensioning (1 to 3 days): 3000 psi.
   c. Minimum cement content: 705 lb/cu yd.
   d. Maximum water-cement ratio: 0.38.
   e. Coarse aggregate: crushed stone.
   f. Air content: 6 ± 1 percent.
   g. Water soluble chloride content: as specified in Paragraph 2.3G.
   h. High range water-reducing admixture required.
6. Class F concrete:
   a. Compressive strength at 28 days: 5000 psi.
   b. Compressive strength at time of post-tensioning (1 to 3 days): 3000 psi.
   c. Minimum cement content: 611 lb/cu yd.
   d. Maximum water-cement ratio: 0.40. (Include water in corrosion inhibitor.)
   e. Coarse aggregate: crushed stone.
   f. Air content: 6 ± 1 percent.
   g. High range water-reducing admixture required.
   h. Corrosion inhibitor dosage: 3 gallons/cu yd.
   i. Water soluble chloride ion content: as specified in Paragraph 2.3G.
   j. Admixtures shall be approved by the corrosion inhibitor supplier for compatibility.
7. Class G concrete:
   a. Compressive strength at 28 days: 6000 psi.
   b. Minimum cement content: 705 lb/cu yd.
   c. Maximum water-cement ratio: 0.35
   d. Air content: 5 ± 1 percent.
   e. High range water reducing admixture required.
8. Class H concrete:
   a. Compressive strength at 28 days: 6000 psi.
   b. Compressive strength at time of post-tensioning (1 to 3 days): 3000 psi.
   c. Minimum cement content: 705 lb/cu yd.
   d. Maximum water-cement ratio: 0.38.
   e. Coarse aggregate: crushed stone.
   f. Air content: 6 ± 1 percent.
   g. Water soluble chloride content: as specified in Paragraph 2.3G.
   h. High range water-reducing admixture required.
   i. Corrosion inhibitor dosage: 3 gallons/cu yd.

j. Admixtures shall be approved by the corrosion inhibitor supplier for compatibility.

2.4 BATCHING AND MIXING

A. Batch and mix concrete in accordance with ASTM C94.

B. Mix concrete until there is a uniform distribution of materials.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install items to be embedded in concrete. Position accurately and secure against displacement.

1. Do not embed aluminum items in concrete.

B. Remove wood scraps, ice, snow, frost, standing water and debris from areas in which concrete will be placed.

C. Before fresh concrete is placed against hardened concrete, retighten forms and suitably clean and moisten the surface of the hardened concrete for bond to the fresh concrete.

D. Thoroughly moisten subgrade on which concrete is to be placed. Do not place concrete on frozen subgrade.

E. Thoroughly clean conveying and handling equipment.

3.2 SURFACE CONDITIONS

A. Before concrete is placed, inspect the installed work of this and other Sections and verify that all such work is complete.

B. Verify that concrete can be placed to the required lines and elevations with required cover for reinforcement.

C. Prevent groupings of conduits, pipes and sleeves in concrete that would significantly impair the strength of the concrete.

D. Notify the Architect/Engineer when concrete placement for a supported level pour is planned. Allow sufficient time for review of formwork, reinforcement and embedded items, and for any required corrective work.

3.3 PLACING

A. Addition of water to the concrete during transport, or at the site, is strictly prohibited.

B. Convey concrete by methods and equipment capable of supplying concrete from mixer to place of final deposit without segregation, and such that detectable setting of concrete does not occur before adjacent concrete is placed.

C. Use pumping equipment with sufficient design and pumping capacity to ensure a practically continuous flow of concrete at the point of discharge, without segregation.

1. Do not add water or alter the mix design in any way to facilitate pumping.
2. Pumping concrete through aluminum pipe is prohibited.

D. Limit vertical drop of concrete to 10 feet for concrete containing a high range water reducing admixture and 5 feet for other concrete. Choose appropriate equipment to prevent segregation.

E. Do not bear concrete conveying equipment on fresh concrete or reinforcement.

F. After concrete placing has started, provide continuous operation until placement of the section is complete. Do not place a greater section at one time than can be properly finished.

G. Deposit concrete as nearly as practicable to its final position to avoid segregation due to rehandling or flowing.

H. Place concrete at a rate such that the concrete is at all times plastic and flows readily between reinforcement and into corners of forms without segregation.

I. Place concrete in slabs, mats, and beams for the full depth of the member at one time, in such a way as to prevent horizontal cold joints.

J. Discharge concrete into the forms within 90 minutes after batching, in accordance with ASTM C94.

K. Do not place concrete that has partially hardened, been retempered or contaminated by foreign materials.

3.4 CONSOLIDATION

A. Thoroughly consolidate concrete with high frequency vibrators, working the concrete thoroughly around reinforcement and embedded items and into corners of formwork.

B. Use a sufficient number of vibrators, of appropriate size and type, to provide complete vibration throughout the concrete at the same rate it is placed.

1. Provide at least one spare vibrator at the site for use in case of breakdown.

C. Provide properly spaced vibration of duration sufficient to produce complete consolidation, but not long enough to cause segregation or the raising of cement paste to the surface. Continue vibration until mortar just begins to puddle at the surface. Remove any excess free water that collects on the surface.

D. Do not use vibrators to transport concrete within formwork.

E. Supplement internal vibration with manual consolidation methods and external formwork vibration, as required, to produce concrete free of voids, honeycomb and rough surfaces.

1. Vibrate formwork in such a way as to avoid formwork displacement.

3.5 FINISHING SLABS

A. Tolerances: Finish level slabs on grade to a true plane with a tolerance of ¼ inch in 10 feet, as determined by a 10 foot straightedge placed anywhere on the slab, in any direction. Finish supported and sloped slabs with comparable precision unless otherwise specified.

B. Screeding:

1. Immediately after placing, strike off excess concrete with a straightedge to bring the top surface to proper grade, aligning it to the contours of screeds.
2. Screed off edge forms, intermediate screed strips or pipe set accurately and firmly to the required elevations and contours for the finished surface.
3. Move straightedge across the concrete surface with a sawing motion, advancing forward a short distance with each movement. There should be a surplus of concrete against the front face of the straightedge to fill in low areas as the straightedge passes over the surface.
4. Complete screeding before any excess moisture or bleeding water is present on the surface.

C. Bull Floating or Leveling:

1. Immediately after screeding, bull float the concrete surface, eliminating high and low spots, smoothing the surface and embedding the coarse aggregate.
2. Avoid overworking the concrete. Do not close up or seal the surface of the concrete.

3. Complete bull floating before any excess moisture or bleeding water is present on the surface.

D. Floating:

1. Begin floating operations when bleeding water has disappeared or been removed from the surface, and when the surface has stiffened sufficiently to support the operation.
   a. Do not use dry cement and sand to take up bleeding water.
2. Hand or power float the concrete surface, removing slight imperfections and producing a relatively even and true surface with a uniform, sandy texture prepared for final finishing.
3. Avoid overworking the concrete. Do not close up or seal the surface of the concrete.

E. Final Finishing:

1. Rough Swirl Finish:
   b. Hand float the concrete surface, removing slight imperfections and producing a roughened surface with approximately 1/16 inch roughness amplitude.
   c. Avoid overworking the concrete.
   d. Do not begin finishing until all bleed water has disappeared.
   e. Do not add water during the finishing operation.
   f. See paragraph 1.5D for sample finish requirements.
2. Hard Trowel Finish:
   a. Immediately after floating, use power trowel for first trowelling to produce a smooth surface relatively free of defects.
   b. For first trowelling, use hand trowelling in areas inaccessible to power trowelling.
   c. Use hand trowel and heavy pressure for final trowelling after concrete has become hard enough to produce a ringing sound as the trowel is moved over the surface. Produce a smooth, hard, dense surface, uniform in texture and appearance, and free of defects.
3. Broom Finish:
   a. Immediately after floating, draw a broom across the concrete surface transversely to the main direction of traffic, producing a coarse, scored, slip-resistant texture.

F. Finishing Class F Concrete (Microsilica Concrete):

1. Screed the concrete surface and follow by bullfloating for preliminary surface closure.
2. Use fresno float for complete closure of concrete surface.
3. Final finish shall be a broom finish.

4. Use of a light fog mist of water, or the use of an evaporation retardant is required, to accommodate the broom finishing operation.
5. See Paragraph 1.5D for sample finish requirements.

3.6 FINISHING FORMED SURFACES

A. Rough Form Finish:

1. After being cleaned and thoroughly dampened, fill tie holes solid with patching mortar matching the color of the surrounding concrete.
2. Patch defective areas in accordance with Article 3.7.
3. Chip or rub off fins and projections exceeding 1/4 inch in height.

B. Smooth Form Finish (Sack-Rubbed):

1. After being cleaned and thoroughly dampened, fill tie holes solid with patching mortar matching the color of the surrounding concrete.
2. Patch defective areas in accordance with Article 3.7.
3. Completely remove fins and projections.
4. Apply grout cleandown treatment to surface areas.
   a Saturate surface thoroughly with water.
   b. A grout, consisting of 1 part cement, 1 ½ to 2 parts of fine sand, and water shall be applied uniformly, completely filling all voids.
   c. Immediately after applying grout, vigorously float the surface. Remove remaining excess grout.
   d. The grout remaining on the surface shall be allowed to remain until it loses some of its plasticity, but not its damp appearance.
5. Rub the surface with clean, dry burlap to remove all excess grout.
   a. When completely dry, the surface shall have a uniform color and texture.

C. Smooth Rubbed Finish:

1. Following the smooth form finish procedure, described in Paragraph 3.6B, wet the concrete surface and rub with a carborundum brick or other abrasive, until uniform color and texture are produced.
2. Do not use cement grout other than the cement paste drawn from the concrete by the rubbing process.

3.7 REPAIR OF DEFECTIVE AREAS

A. Remove honeycombed and other defective concrete, exposing sound concrete. Cut and chip edges straight and perpendicular to the surface or slightly undercut to a depth of 1/2 inch. Featheredges are not permitted.

B. Dampen areas to be patched and surrounding areas. Patch with patching material according to manufacturer's instructions.

C. After surface water has evaporated from the area to be patched, apply patching material to the surface.

D. Apply curing to the repaired surface as soon as possible and maintain for a minimum of 3 days.

3.8 CURING

A. Maintain concrete in a moist condition for at least 5 days at temperatures above 70°F, and at least 7 days at temperatures between 40°F and 70°F.

B. Curing Slabs: Moisture retention covers.

1. Cover concrete surface with single layer of clean wet burlap, once the surface is capable of supporting it without damage.
2. Cover burlap with contiunous single thickness of 4 mil polyethylene film, lapping edges 6 inches.
3. Maintain damp condition of surface.
4. Curing compounds are prohibited.

C. Curing Formed Surfaces:

1. Formed surfaces may be cured by leaving formwork in place. During hot, dry weather, keep formwork moist by sprinkling.
2. When formwork is removed before the end of the curing period, apply curing compound to walls and columns.

3.9 JOINTS

A. Construction Joints:

1. Locate construction joints so as not to impair the strength of the structure.
2. Continue reinforcement across construction joints, unless detailed otherwise.
3. Provide keys in vertical construction joint surfaces.
4. Thoroughly clean the concrete surface at construction joints and remove all laitance before placing adjoining concrete.
5. Beams or slabs, supported by columns or walls, shall not be placed until the concrete in vertical support members is no longer plastic.
6. In slabs on grade with control joints, locate construction joints at control joint locations.

B. Slab on Grade Control Joints:

1. Hand-tooled control joints: Tool joints with hand groovers in straight lines to avoid unsightly joints.

3.10 HOT WEATHER CONCRETING

A. Follow the provisions of this Article and ACI 305 when the rate of evaporation of surface moisture from the concrete exceeds 0.18 lb/sq ft/hr (Figure 2.1.5, ACI 305).

B. Control concrete setting time with the use of water-reducing & retarding admixtures, as required to facilitate placing and finishing operations.

C. Before placing concrete, spray the subgrade, formwork and reinforcement with water to keep them cool and to prevent absorption of water from the concrete.

D. Transport, place and finish concrete as quickly as practicable. Plan concrete delivery, placing techniques and consolidation methods to avoid cold joints.

E. Maximum temperature of concrete during placing: 90°F.

F. Apply evaporation retardant to the surface of the fresh concrete after screeding, and as needed, during finishing.

G. Take additional precautions, as necessary, to prevent plastic shrinkage cracking.

H. Start curing the concrete immediately after finishing operations have been completed.

3.11 COLD WEATHER CONCRETING

A. Follow the provisions of this Article and ACI 306 when the average daily temperature (average of the highest and lowest temperature during the period from midnight to midnight) is less than 40°F.

B. Control concrete setting time with the use of accelerating admixtures, as required, to facilitate placing and finishing operations.

1. Do not use calcium chloride as an accelerating admixture. Only the accelerating admixtures specified in Paragraph 2.1H shall be used.

C. Temperature of concrete during placing: 55°F to 75°F.

D. Provide heated enclosures and insulation to maintain the temperature at the concrete surface between 55°F and 75°F until the concrete reaches 70 percent of its specified compressive strength.

1. Construct weathertight enclosures, allowing the heated air to circulate around the outer edges of the concrete.
2. Provide a sufficient number of heaters to assure an even temperature within the enclosure.
   a. Use indirect-fired heaters, vented to the exterior, where heat is supplied to the top of fresh concrete to prevent dusting due to carbonation.
3. Add moisture to the heated air, as required, to maintain a minimum relative humidity of 40 percent within the enclosure. Do not allow any concrete surface to become dry during the protection period.
4. Maintain enclosures for 24 hours after heating has been discontinued, to allow the concrete to cool gradually.
5. Lap insulating materials and cover the edges and corners of the concrete, to provide adequate protection.
6. Wrap columns and walls with insulated blankets.
7. Monitor the temperature of the concrete surface regularly with suitable thermometers throughout the protection period.

E. Provide insulation or temporary backfill to protect earth supported concrete from damage due to frost heaving.

3.12 PROTECTION

A. Protect finished concrete surfaces from damage by construction equipment, materials or methods, and by rain or running water.

B. Do not load any concrete member in such a way as to overstress the concrete.

3.13 FIELD QUALITY CONTROL

A. The engineering testing firm shall conduct testing and write reports as outlined in this Article, under provisions of Division 1.

B. Strength Tests:

1. During the progress of the work, take samples of concrete for strength tests in accordance with ASTM C172.

2. Make and cure a minimum of 4 cylinders in accordance with ASTM C31 for each of the following:
   a. Each 50 cubic yards of concrete.
   b. Each 3000 square feet of surface area for slabs and walls.
   c. Each class of concrete placed in a day's work.
3. Test each group of 4 cylinders in accordance with ASTM C39 as follows:
   a. Two field cured cylinders to be tested at 7 days or just before anticipated time of formwork removal. For post-tensioned concrete, test cylinders prior to stressing of tendons.
   b. Two laboratory cured cylinders to be tested at 28 days.
4. A strength test is the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days.
5. The strength level of an individual class of concrete will be considered satisfactory if each strength test equals or exceeds the specified compressive strength.
6. If the strength level of an individual class of concrete is found to be unsatisfactory, conduct core testing in accordance with ASTM C42, impactometer testing or load testing on the area of concrete in question, as required by the Architect/Engineer. If such additional testing does not produce acceptable results, corrective measures will be required to ensure structural adequacy.
   a. Make appropriate adjustments to the concrete mix designs, as required.

C. Slump Tests:

1. Make one slump test in accordance with ASTM C143 with each group of 4 cylinders.
2. When concrete is pumped, make the slump test at the point of discharge.
3. Keep a slump cone available at the site for additional testing as required.

D. Air Content Tests:

1. Concrete for parking slabs: Make one air content test in accordance with ASTM C173 or ASTM C231 for each truckload of concrete, at the point of discharge.
2. Other air-entrained concrete: Make one air content test in accordance with ASTM C173 or ASTM 231 for each group of 4 cylinders, at the point of discharge.

E. Rejection of Concrete:

1. Any concrete that does not meet the specified requirements for air-entrainment, concrete temperature, or slump shall not be placed until corrective measures have been taken, and the concrete has been re-tested to indicate compliance.

F. Field Quality Control Test Reports:

1. Include the following information in test reports:
   a. Project identification and portion of structure represented.
   b. Concrete mix class and specified compressive strength requirements.
   c. Weather conditions and air temperature.
   d. Concrete temperature, slump and air content test results.
   e. Dates of placing and testing.
   f. Method of curing (field or laboratory).
   g. Strength test results.
   h. Technician's name and certification number with expiration date.

END OF SECTION

SECTION 03365

POST-TENSIONED CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work under this Section includes labor, equipment, materials and services required for the installation and stressing of post-tensioning tendons and associated items indicated on the Drawings or specified herein.

1.2 RELATED WORK

A. Section 03100 - Concrete Formwork.

B. Section 03200 - Concrete Reinforcement.

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

1.3 REFERENCES

A. ACI 318 - Building Code Requirements for Structural Concrete.

B. ASTM A416 – Uncoated Seven-Wire Stress-Relieved Steel Strand for Prestressed Concrete.

C. Post-Tensioning Institute - Post-Tensioning Manual.

D. Post-Tensioning Institute - Specification for Unbonded Single Strand Tendons, July 1993.

E. ACI/ASCE Committee 423 - Recommendations for Concrete Members Prestressed with Unbonded Tendons.

1.4 SUBMITTALS

A. Prestressing Steel Mill Certificates: Submit under the provisions of Division 1, indicating:

1. Heat number and identification.

2. Location within structure (pour identification).

3. Ultimate tensile strength.

4. Yield strength at one percent extension under load.

5. Elongation at failure.

6. Modulus of elasticity.

7. Diameter and net area of strand.

8. Type of material.

9. ASTM conformance.

B. Jack Calibration Certificates: Submit under the provisions of Division 1, indicating:

1. Jack designation.

2. Test date.

3. Calibration curve certified by a testing laboratory.

4. Gauge pressure corresponding to 80 percent of the ultimate strength of the strand.

C. Stress Loss Calculations: Submit under the provisions of Division 1, including:

1. Final effective prestress force per tendon for each different beam and slab condition.

2. Submit prior to shop drawing preparation.

3. References to be used to calculate losses shall include:
   a. Friction loss: ACI 318 – Building Code Requirements for Structural Concrete.
   b. Anchorage seating loss: Post-Tensioning Manual, Appendix A.3.
   c. Long-term losses (elastic shortening, creep, shrinkage, relaxation): Concrete International, June 1979 – Estimating Prestress Losses.

D. Shop Drawings: Submit under the provisions of Division 1, indicating:

1. Layout of tendons, and dimensions locating tendons in horizontal plane at all points.

2. Detailed horizontal curvature of tendons at anchorages and at openings.

3. Number of tendons required for each beam and each slab.

4. Each post-tensioned beam shall be individually elevated, indicating the tendon profiles with tendon height at all support points. Method of tendon support shall be indicated. Anchorage details shall be detailed separately for each condition and referenced to each beam.

5. Support plan for slab tendons, including method of tendon support and tendon height at all support points. Temperature tendons shall be supported directly by the slab main tendons.

6. Details of reinforcing steel at anchorages.

7. Placing sequence for tendons.

8. Stressing sequence for tendons.

9. Jacking force for tendons.

10. Calculated elongations for tendons.

11. Shop Drawing Action Codes:
    a. Shop drawings marked "Furnish As Submitted" require no corrections. No resubmittal is required. Fabrication may commence.
    b. Shop drawings marked "Furnish As Corrected" require the noted corrections to be made. No resubmittal is required. Fabrication may commence.
    c. Shop drawings marked "Revise & Resubmit" require the noted corrections to be made. Resubmit the corrected shop drawings for review. Fabrication may not commence.
    d. Shop drawings marked both "Furnish As Corrected" and "Revise & Resubmit" require the noted corrections to be made. Resubmit the corrected shop drawings for review. Fabrication may commence. Installation may not begin until the resubmitted shop drawings have been reviewed and returned for use in reinforcement installation.

12. Shop drawing revisions shall be clouded and noted on the resubmitted shop drawings. Information which was correct on the previously submitted shop drawings shall not be changed on the resubmitted shop drawings.

E. Post-tensioning Component and System Compliances: Submit under the provisions of Division 1 , indicating:

1. Minimum sheathing compliance.

2. Coating compliance.

3. Post-tensioning system compliance with PTI Specification for Unbonded Single Strand Tendons, July 1993, for aggressive environments.

F. Stressing Records: Submit under the provisions of Division 1, within 24 hours after stressing, using stressing record forms, including:

1. Jack designation.

2. Jacking pressure.

3. Calculated elongation for each tendon.

4. Actual measured elongation for each jacking point and totals for each tendon.

5. Date of stressing operation.

6. Concrete pour designation.

7. Signature of the contractor's stressing personnel.

G. Non-shrink Grout Compliance: Submit under the provisions of Division 1.

H. Plant Certification: Submit proof, as described in Article 1.5, under the provisions of Division 1.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. The post-tensioning tendons shall be fabricated at, and shipped from, a plant that is currently certified.
   a. Proof of plant certification is required and shall accompany each tendon shipment to the jobsite.
   b. The certification program shall meet or exceed the requirements of the Post-Tensioning Institute Plant Certification Program and shall be administered by an independent agency or firm.
   c. Proof of plant certification, or a copy of the certification program, for all plants supplying materials to the project shall be submitted as described in Paragraph 1.4H.

2. The post-tensioning materials shall be supplied by a firm which has been in the post-tensioning business for a minimum of 5 years.

3. The post-tensioning materials shall be supplied by a firm that has successfully performed on at least five previous similar projects.

4. Post-tensioned concrete work shall be under the supervision of a person experienced in this type of work, who shall be available at the jobsite at all times during installation of post-tensioning tendons and reinforcing steel, concrete placement, and stressing operations.

5. The post-tensioning contractor shall provide a minimum of 5 days of on-site technical assistance to assure that correct procedures for placement of tendons and tendon stressing are implemented.

6. Post-tensioning system shall be an unbonded mono-strand system and shall conform to all material and installation requirements of ACI 318 – Building Code Requirements for Structural Concrete, and of this Section.

7. The post-tensioning system shall provide a complete watertight encapsulation of the prestressing steel conforming to the PTI Specification for Unbonded Single Strand Tendons, July 1993, for aggressive environments. Unapproved corrosion protection systems shall be approved 14 days in advance of the bid date. Approved systems are as follows:
   a. VSL CP+ Monostrand Post-Tensioning System.
   b. Mono-strand Corrosion Protection System by Hayes Industries, Inc.
   c. Mono-strand Corrosion Protection System by General Technologies, Inc.

1.6 DELIVERY, STORAGE, HANDLING

A. Post-tensioning tendons shall be coiled and securely tied for shipping and handling. Coils shall be clearly identified as to grade, coil and heat number, and type (low relaxation).

B. Equipment used to handle the post-tensioning tendons shall not cause damage to the tendon sheathing.

C. During shipping, post-tensioning tendons shall be covered with a waterproof sheet.

D. Adequate precaution shall be taken during loading to prevent damage in transit.

E. Post-tensioning tendons shall be stored in weatherproof enclosures at the jobsite to insure that they remain dry.

PART 2 - PRODUCTS

2.1 PRESTRESSING STEEL

A. The prestressing steel shall conform to the following:

1. One-half inch diameter, seven-wire, low relaxation strand for prestressed concrete, manufactured in accordance with ASTM A416, Grade 270.

2. Minimum ultimate tensile strength of 41,300 pounds.

3. Strand finish: Grade A, B, or C (PTI Specification for Unbonded Single Strand Tendons, July 1993).

2.2 COATING

A. The corrosion preventive coating material shall have the following properties:

1. Provide corrosion protection to the prestressing steel.

2. Provide lubrication between the strand and the sheathing.

3. Resist flow from the sheathing within the anticipated temperature range of exposure.

4. Provide a continuous nonbrittle film at the lowest anticipated temperature of exposure.

5. Be chemically stable and non-reactive with the prestressing steel, the sheathing material, and the concrete.

6. Meet requirements of the Performance Specification for Corrosion Inhibiting Coating, as documented in PTI Specification for Unbonded Single Strand Tendons, July 1993, for aggressive environments, including 1000 hour salt fog test.

B. Minimum weight of coating material on a one-half inch diameter prestressing strand shall be 2.5 pounds of coating material per 100 feet of strand, and shall extend over the entire tendon length.

2.3 SHEATHING

A. The sheathing shall conform to the following:

1. Be formed by a continuous extrusion process which applies a seamless polyethylene or polypropylene jacket to the prestressing steel.

2. Prevent the intrusion of cement paste and the escape of the coating material.

3. Be chemically stable, without embrittlement or softening, over the anticipated exposure temperature range.

4. Be non-reactive with concrete, steel, and the coating.

5. Have a minimum thickness of 0.040 inches for high density polyethylene or polypropylene.

6. Be of a light color so that coating leaks at damaged sheathing locations can be easily detected. Black and dark brown sheathing is not allowed. Sheathing shall be of a uniform, opaque color.

2.4 COUPLERS

A. Couplers shall conform to the PTI Specification for Unbonded Single Strand Tendons, July 1993, Section 3.4.

B. Couplers shall be coated with the same corrosion preventive coating used on the strand, and shall be enclosed in sleeves which permit the necessary movements during stressing.

2.5 ANCHORAGES

A. Anchorages shall conform to the PTI Specification for Unbonded Single Strand Tendons, July 1993, Sections 3.1, 3.2, 3.3, and 3.6.

B. Anchorages shall include design features permitting a watertight connection of the sheathing to the anchorage, and a watertight closing of the wedge cavity for stressing and nonstressing anchorages.

C. Anchorages shall be protected by a fusion-bonded epoxy coating conforming to ASTM A775 or be plastic-encased.

D. Prestressing steel shall be secured at the ends by acceptable anchoring devices such that wires will not kink, break down, or otherwise be damaged.

E. Anchorage devices shall hold the prestressing steel without slip of more than 1/4 inch at a load equal to the applied load on the strand at stressing.

F. The maximum concentrated bearing stress in the concrete shall not exceed that permitted by ACI 318-Building Code Requirements for Stuctural Concrete.

2.6 GROMMET

A. The grommet shall provide a minimum concrete cover to the anchorage of 2 inches.

2.7 ACCESSORIES

A. Post-tensioning tendons shall be supported by tying to reinforcing steel and to standard reinforcing steel accessories.

B. Reinforcing bars and high chairs shall conform to the requirements of Section 03200, Concrete Reinforcement.

2.8 GROUT

A. A non-shrink, non-metallic grout containing no chlorides (or other chemicals known to be deleterious to the prestressing steel) shall be used to grout the anchorage recesses.

1. Standard:
   a. Sonogrout by Sonneborn.

2.9 BARRIER CABLE

A. Prestressing steel shall be one-half inch diameter, seven-wire, low relaxation strand manufactured in accordance with ASTM A416, Grade 270.

B. Epoxy coated barrier cable shall conform to ASTM A882 with a minimum coating thickness of 30 mils after curing. The coating shall be stable when exposed to direct ultraviolet light. Color shall be black.

C. Standard:

1. Florida Wire and Cable Company.

2.10 BARRIER CABLE ANCHORS

A. Barrier cable anchors shall be electro-galvanized for corrosion resistance.

B. Barrier cable anchors shall be compatible with the barrier cable supplied.

C. Standard:

1. GRABB-IT Cable Anchor by Precision SURE-LOCK.

PART 3 EXECUTION

3.1 FABRICATION

A. Post-tensioning tendons shall be manufactured in such sequence and quantity as to avoid lengthy storage at the jobsite.

B. Post-tensioning tendons shall be clearly identified, as indicated for on the placing drawings for easy placement.

C. Prestressing steel within every group, or in the same member, shall be of the same heat, where practical. Mill certificates for fabricated material shall be kept by the post-tensioning tendon supplier.

3.2 FORMWORK

A. Formwork shall be drilled to receive post-tensioning tendons at slab edges and construction joints.

B. Formwork shall be designed taking into account the possibility of the member lifting off the formwork during stressing.

C. Do not remove any formwork, except that required to allow stressing, until stressing operations are complete.

D. Formwork or scaffolding shall be extended beyond the post-tensioning tendon terminal to provide space for the stressing operations.

E. Construction Joints:

1. Construction joints through post-tensioned beams are not allowed.

2. Construction joints shall be located in the slabs at the quarter points of the slab span, where post-tensioning tendons are at mid-depth of slab.

3. Slab construction joints shall be located at the first quarter point of the slab span measured in the direction of uniform tendon stressing.

F. Refer to Section 03100, Concrete Formwork, for additional requirements.

3.3 INSTALLATION

A. Tolerances: Maximum permissible deviation from detailed placement.

1. Post-tensioning tendons and anchorages.
   a. Slab tendons and anchorages: $\pm$ 1/8 inch.
   b. Beam tendons and anchorages: $\pm$ ¼ inch.

B. Broken strands and strands showing severe fabrication defects shall be removed and replaced.

C. Post-tensioning tendons shall have a parabolic profile and shall conform to the control points shown on the Drawings. Tendons shall be supported at a maximum spacing of 4 feet.

D. Uniform slab tendons shall be supported at midspan with a slab bolster.

E. Slight deviation in spacing of the slab tendons is permitted where required to avoid openings and inserts which are specifically located. The maximum horizontal sweep of a tendon shall be 1 in 6.

F. Post-tensioning tendons shall clear openings and drains by a minimum of 4 inches.

G. Post-tensioning tendons shall be placed normal to anchorage plates.

H. Post-tensioning tendons shall be firmly supported to prevent displacement during concrete placement. Slab tendons, support bars, and high chairs shall all be tied to one another.

I. Anchorages shall be secured to the formwork with ring shank nails.

J. Wrap bare strand at all anchorages and at all sheathing tears. Use a flexible, polyethylene, non-porous, waterproof tape.

K. Welding of support bars, or any welding in the vicinity of the post-tensioning tendons, will not be allowed, nor shall the tendons or anchorages be used as a ground for any welding.

L. Placement of mild steel reinforcement shall be coordinated with placement of post-tensioning tendons. Proper tendon location has priority.

M. Install post-tensioning system in accordance with the supplier's requirements to result in a complete watertight encapsulation of the prestressing steel.

3.4 CONCRETE PLACEMENT

A. Concrete shall not be placed in post-tensioned members until the installation of post-tensioning tendons and reinforcing steel has been reviewed by the Architect/Engineer.

B. Concrete shall be placed in such a manner as to insure that the position of post-tensioning tendons and reinforcing steel remains unchanged. If tendons move out of their design positions, they shall be adjusted to their correct position before proceeding with placing operations.

C. Concrete shall be placed in conformance with the requirements of Section 03300, Cast-In-Place Concrete.

3.5 STRESSING

A. Stressing of tendons may commence when concrete has obtained a compressive strength of 3000 psi, as indicated by strength tests on the field-cured cylinders. Stressing of tendons shall be done within 72 hours after placement of concrete. If the concrete does not reach 3000 psi compressive strength at 72 hours, partial stressing of tendons is required.

1. For microsilica concrete, stressing of tendons shall be done within 48 hours after placement of concrete.

B. Tendons shall be stressed by means of hydraulic jacks, equipped with accurate reading calibrated hydraulic pressure gauges to permit the stress in the prestressing steel to be computed at any time. A certified calibration curve from a recognized testing laboratory shall

accompany each jack. If inconsistencies between the measured elongation and the jack gauge reading occur, the jack gauges shall immediately be recalibrated.

C. In order to insure that proper calibration is maintained, care shall be exercised in the handling of all stressing equipment. Adequate power should be available to avoid power drop at the equipment.

D. There shall be a minimum of two properly calibrated jacks at the jobsite at all times.

E. Safety precautions shall be taken to prevent workers from standing over or behind the jacks when tendons are being stressed.

F. The maximum tendon jacking force shall not exceed 80 percent of the ultimate strength of the strand.

G. Measure and record the elongation for each individual tendon. Present the data in a tabular form.

H. Tendon measured elongation must agree, within 7 percent, with the tendon calculated elongation. If inconsistencies exceeding ±7 percent occur, the cause of the inconsistency shall be determined and resolved.

I. Excess tendon strand shall not be cut until the stressing records have been approved.

J. No material shall be stored on post-tensioned members before final stressing is accomplished. At no time shall the weight of the storage material placed on the member, after stressing is completed and the concrete has obtained its specified 28 day compressive strength, exceed the total design load of the member.

3.6 FORM REMOVAL

A. Full shoring shall be left in place until the stressing operations on each pour have been completed.

3.7 GROUTING ANCHORAGE RECESSES

A. After stressing is completed and stressing records have been approved, cut off the excess tendon strand approximately 1 inch away from the face of the wedges with torch or hydraulic shear.

1. If a plastic-encased anchorage with threaded cap is used, a hydraulic shear must be used to cut the tendon.

B. Complete the installation of the watertight encapsulation system by coating the end of the strand, and then installing the corrosion protection cap.

C. Repair any damage to anchorages, prior to grouting, to ensure a watertight system.

D. Fill recess flush with grout.

E. The grouting shall be completed within one week after stressing has been completed.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. The Precast Concrete Manufacturer shall be responsible for the design, manufacture, delivery and erection of all precast and precast prestressed concrete sections and connections as required to construct a complete garage meeting form and function on the Structural Drawings and herein specified. He shall provide and install as required all anchors, inserts, bolts, structural shapes, and all other items required to connect the precast elements to one another and to the cast-in-place concrete construction and to the structural steel construction.

B. The precast and precast prestressed concrete elements include:
1. Double tees and slabs
2. Roof and floor beams
3. Columns
4. Lite walls

C. Related work described elsewhere:
1. Cast-in-Place Concrete - Section 03300
2. Concrete Reinforcement - Section 03200
3. Structural Steel - Section 05100

1.2 QUALITY ASSURANCE

A. Standard Specifications

1. Where reference is made to Standard Specifications in this section, the latest issues are intended.

B. Precast Concrete Manufacturer Qualifications: the manufacturer shall have a minimum of 5 years experience in precast and precast prestressed concrete work of the quality and scope required on this project. All precast concrete shall be fabricated in a PCI certified plant; category C4 per PCI Plant Certification Program.

C. Erector Qualifications: Erector shall have been regularly engaged for at least 5 years in erection of precast and prestressed concrete similar to the requirements to this project.

D. Qualifications of Welders and Tackers: In accordance with AWS D1.1. (Qualified within the past year).

E. Testing: In compliance with applicable provisions of Prestressed Concrete Institute MNL-116.

1.3 DESIGN

A. The manufacturer of the precast units shall be fully responsible for the design of all precast units to adequately withstand all stresses due to all dead, live, wind, seismic and temperature loads encountered during manufacture, handling, erection and in service uses.

1. The precast units shall be checked and provided with additional reinforcing as required for handling and erection stresses. Adequate pick devices shall be provided for all units.
2. The Manufacturer shall design and detail all connections for precast and prestressed members using the concepts indicated in the connection details on the Structural Drawings. Any deviation from these details must be approved by the Structural Engineer prior to shop drawing preparation.

B. Design Criteria

1. Precast units and their connections shall be designed in accordance with the PCI Design Handbook, Edition 6 and the American Concrete Institute Building Code requirements, ACI 318-95.
2. Applicable building code: Uniform Building Code with Indiana amendments.
3. All precast elements shall be cast using normal weight concrete.
4. The columns may be either prestressed or conventionally reinforced.
5. All columns supporting the L-beams shall be designed for bending produced by the L-beam torsion.
6. All beam ledges shall be reinforced to support the slab reactions neglecting the concrete shear capacity.
7. All L-beams shall be designed for torsion induced by dead load + live load.
8. For precast, prestressed concrete elements, the tension stress in a precompressed tension zone at service loads, after the allowance for all losses shall not exceed 7.5 times the square root of f'_c.
9. Design Loads:
   a. Wind - per building code; Exposure __B____.
   b. Seismic - per building code
   c. Maximum dead load of precast double tees _____ [90] PSF
   d. Floor loads
      Superimposed dead load ____ [5] PSF
      Live load _____ [50] PSF
   e. Roof loads
      Superimposed dead load ____ [5] PSF

Live load _____ [70] PSF

10. Maximum live load deflection = 50 psf + 35 psf snow

1.4 TOLERANCES

A. Manufacturing Tolerances

1. Length: ± L/960 except at expansion joints + 1/8 inch, - 1/4 inch.
2. Width: ± 1/4 inch.
3. Depth: ± 1/4 inch.
4. Position of tendons: ± 1/8 inch.
5. Position of handling devices: ± 6 inches.
6. Position of weld plates: ± 1 inch.
7. Camber deviation from design camber: ± 1/8 inch per 10 feet but not greater than + 1/2 inch.
8. Differential camber between adjacent members: 1/4 inch per 10 feet but not greater than 1/2 inch.
9. Squareness of ends: ± 1/4 inch.

1.5 SUBMITTALS

A. Shop Drawings

1. Erection drawings with details indicating sections and connections conforming to the construction documents for precast and precast prestressed concrete units shall be submitted for review to the Structural Engineer.
2. The shop drawings shall be fully detailed and dimensioned. Shop drawings must be stamped by a registered structural engineer.

B. Design Calculations

1. The Precast Concrete Manufacturer shall submit to the Structural Engineer design calculations prepared and stamped by a structural engineer that is registered in the state the project is located.
2. Design load data are provided in Section 1.03.
3. The Manufacturer's Engineer shall provide complete design calculations for all precast members and their connections.

C. Concrete Mix Designs:

1. Submit a mix design for each class of concrete required for the project and including:

a. Standard deviation analysis, required average strength and documentation of average strength verifying compliance with Section 5.3 (Proportioning on the basis of field experience and/or trial mixtures) of ACI 318.
b. Mix proportions by weight, water-cement ratio, slump and air content.
c. Sieve analysis of fine and coarse aggregates.
d. Results of tests for water soluble chloride ion content described in Section 2.02.
e. Complete list of materials specified in Article 2.01 with product information demonstrating compliance with all specified requirements.

D. Product Information: Submit product information for all material specified in Section 2.01 demonstrating compliance with specified requirements.

E. Plant Quality Control Test Reports: Submit to the Engineer within 3 days after completion of the tests.

F. Proof of Plant Certification including certification category.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling:

1. Transport and handle precast concrete units with equipment adequate to protect from dirt and damage.
2. Do not place units in positions which will cause overstress, warp or twist.
3. Handle by means of lifting inserts.

B. Storage

1. Store units off ground. Protect from soil contact and other damage.
2. Place stored units so identification marks are discernible.
3. Separate stacked members by non-staining battens across full width of bearing.
4. Stack so lifting devices are accessible and undamaged.
5. Do not use upper member of stack tier as storage area for starter members or heavy equipment.

PART 2 - **PRODUCTS**

2.1 MATERIALS

A. Concrete

1. Portland Cement: ASTM C150, Type 1 or III.

2. Fine Aggregate: ASTM C33, Natural sand of clean, sound, hard, durable particles, Indiana Department of Highways, Standard specifications, Size #23.
3. Coarse Aggregate: ASTM C33, Crushed stone or gravel, clean, sound, tough, durable particles; Indiana Department of Highways, Standard Specifications, Class A, Size 8.
4. Water: Clean, free from injurious amounts of oil, acids, alkalies, organic matter and other deleterious substances.
5. Air Entraining Agent: ASTM C260
   a. Approved products:
      1) Micro-Air by Master Builders
      2) Darex AEA by W. R. Grace and Co.
      3) Daravair by W. R. Grace and Co.
6. Water-Reducing Admixture: ASTM C-494, Type A
   a. Approved products:
      1) Pozzolith 322N by Master Builders
      2) WRDA with Hycol by W. R. Grace and Co.
7. High Range Water-reducing Admixture: ASTM C-494, Type F
   a. Approved products:
      1) Daracem 100 by W. R. Grace and Co.
      2) Pozzolith 440-N by Master Builders
8. Water-reducing, Retarding Admixture: ASTM C-494, Type D
   a. Approved products:
      1) Pozzolith 122-R by Master Builders
      2) Daratard-17 by W. R. Grace and Co.

B. Reinforcing Steel:

1. All reinforcing steel shall comply with following reference standards:
   a. Main reinforcing bars: ASTM A-615 Grade 60
   b. Stirrups and column ties: ASTM A-615 Grade 60
   c. Weldable reinforcing: ASTM A706 (Grade 60)
   d. Welded wire fabric: ASTM A-185
   e. Epoxy-coated reinforcing bars: ASTM A775
   f. Epoxy-coated patching material: ASTM A775

C. Prestressing tendons:

1. Prestressing tendons shall be uncoated, 7 wire, stress relieved or low relaxation strand complying with ASTM A416, Grade 270 ksi.

D. Accessories: bar supports shall be stainless steel or protected with plastic in contact area.

E. Structural steel:

1. All structural steel used in the connections shall conform to ASTM A36.
2. All structural steel shall be hot-dipped galvanized conforming to ASTM A-123 except for column base plates.

F. Welding:

1. Welding of structural steel:
   a. Welding of structural steel shall be accomplished using low hydrogen E70XX electrodes. Welding shall comply with the American Welding Society Structural Welding Code, latest edition.
2. Welding of reinforcing bars:
   a. Welding of reinforcing bars shall conform with AWS D1.4.Low hydrogen E90XX electrodes shall be used, and bars conforming to ASTM A706 only shall be welded.

G. Headed studs: ASTM A108

1. Nelson Stud Welding, TRW Nelson Division
2. Blue Arc Welding Studs, Erico Products

H. Deformed bar anchors: ASTM A-496

1. Nelson Stud Welding, TRW Nelson Division
   a. The use of manually welded anchors, rods, bars, straps, or reinforcing bars is not acceptable as a substitute for headed studs or deformed bar anchors.

I. Non-Shrink Grout:

1. Grout shall be prepackaged requiring only the addition of potable water.
2. Grout shall not contain metallic substances or aluminum powder.
3. Grout shall attain compressive strengths per ASTM C-1107.
4. Grout shall meet the dimensional stability requirements of ASTM C-1107, Grade C, when prepared according to the manufacturer's instructions and tested at 40°F and 90°F.
5. Grout shall be capable of maintaining a flowable consistency for a minimum of 45 minutes at 70°F.
6. Standards:
   a. Five Star Grout; Five Star Products, Inc.
   b. Sonogrout 14k; Sonneborn

J. Inserts: Threaded inserts to accept bolts shall be electro-galvanized.

1. Richmond, Inserts, Richmond Screw Anchor Company (or approved equal).

K. Bolts: Bolts shall conform to ASTM A325 (or equivalent), electrogalvanized.

L. Bearing pads:

1. Reinforced elastomeric pads: Bearing pads shall be a homogeneous blend of ozone-resistant rubber elastomer and high strength random synthetic fiber cords cured together to form a durable material with uniform behavior in all directions suitable to support structural bearing loads.
   a. Masticord bearing pads; JVI, Inc. (or approved equal).
2. Cotton-duck fabric reinforced pads: Bearing pads shall be composed of multiple layers of cotton duck bound with ozone-resistant rubber elastomer compressed into resilient pads of uniform thickness.
   a. Capralon bearing pads; JVI, Inc. (or approved equal).
3. Plastic shims: shims shall be a multipolymer plastic with minimum compressive strength of 8000 psi.
   a. Korolath, KORO Corporation (or approved equal).

2.2 PROPORTIONING CONCRETE MIXES

A. Establish concrete proportions to produce homogeneous, durable mixes with the required average strength based on the appropriate amount of overdesign as required by Section 5.3 of ACI 318.

B. Proportion concrete mixes to provide workability and consistency to permit concrete to be worked readily into the corners and angles of the forms and around reinforcement by the methods of placement and consolidation to be employed, without segregation or excessive bleeding.

C. Include a water-reducing or high range water-reducing admixture, used in strict accordance with manufacturer's instructions, in all mix designs. Specified minimum cement contents are based on the use of such admixtures.

D. Include an air-entraining admixture in mix designs for all concrete exposed to freezing and thawing during service and for all concrete exposed to cold weather during production before attaining its specified compressive strength.

E. Base mix design on saturated surface dry aggregates. Adjust the amount of mixing water added at the batch plant for the moisture condition of the aggregates.

F. Water Soluble Chloride Ion Content:

1. Maximum percent in concrete by weight of cement:
   a. Prestressed or post-tensioned concrete: 0.06.
   b. Reinforced concrete exposed to earth or weather: 0.15.
2. Conduct tests for each class of concrete to verify compliance with the above requirements. Test samples of the hardened concrete for water soluble chloride ion content at an age of 28 to 42 days.

G. Slump

1. Mixes containing high range water-reducing admixture: 5 to 8 inches.
2. Mixes containing water-reducing admixtures: 5 inches maximum.

H. Concrete Mix Classes:

1. Class PC-A concrete:
   a. Compressive strength at 28 days: 5000 psi.
   b. Compressive strength at time of detensioning: 3500 psi
   c. Minimum cement content: 611 lb/cu yd.
   d. Maximum water-cement ratio: 0.40.
   e. Coarse aggregate: crushed stone.
   f. Air content: 6 ± 1 percent
   g. High range water-reducing admixture required.
2. Class PC-B concrete:
   a. Compressive strength at 28 days: 7000 psi.
   b. Compressive strength at time of detensioning: 3500 psi.
   c. Minimum cement content: 705 lb/cu yd.
   d. Maximum water-cement ratio: 0.45.
   e. High range water-reducing admixture required.

PART 3 - EXECUTION

3.1 FABRICATION

A. Forms

1. Units shall be cast in adequately braced steel forms. Construct forms to maintain units within their specified tolerances and to withstand tensioning and detensioning operations.

2. Anchorage devices shall be securely attached to forms in locations not affecting position of main reinforcement.
3. Provide nominal chamfers on all exposed corners.

B. Placing and curing concrete.

1. Place concrete in continuous operation to prevent formation of seams.
2. Consolidate concrete by internal vibration without dislocation or damage to reinforcement, ducts and built-in items.
3. Cure units until 70 percent of 28-day strength is obtained. This may be accomplished either by use of moisture retention covers or by application of a membrane curing compound (ASTM C309).

C. Prestressing Strands

1. Strands shall be painted with a rust-inhibitive paint at the ends of each precast unit.

D. Detensioning

1. Concrete shall have attained a minimum of 3500 psi compressive strength at time of detensioning.

E. Markings

1. Provide all units with permanent markings to identify pick-up points and location of units in structure. Markings on units shall correspond with those given on the erection drawings.

F. Finishing Top of Double Tees

1. The top surface of double the flanges shall have a light broom finish.

G. Finishing of Precast Spandrels

1. Remove fins and protrusions and fill holes. Rub or grind ragged edges. Faces to be true, well defined surfaces.
2. Exterior surfaces shall have light sandblast finish to match architects control sample.
3. Interior surfaces shall be steel formed or have a trowel finish.

H. Plant Quality Control of Concrete:

1. Testing Laboratory: Conduct testing and write reports as outlined in this Article.

2. Strength Tests:
   a. During the progress of the work, take samples of concrete for strength tests in accordance with ASTM C172.
   b. Make and cure a minimum of 4 cylinders in accordance with ASTM C31 for each of the following:
      1) Each 50 cubic yards of concrete.
      2) 2.Each class of concrete placed in a day's work.
   c. Test each group of 4 cylinders in accordance with ASTM C39 as follows:
      1) Two plant cured cylinders to be tested just before anticipated time of detensioning.
      2) Two laboratory cured cylinders to be tested at 28 days.
3. Slump Tests:
   a. Make one slump test in accordance with ASTM C143 with each group of 4 cylinders.
4. Air Content Tests:
   a. Make one air content test in accordance with ASTM C173 or ASTM C231 with each group of 4 cylinders for air-entrained concrete mixes.
5. Plant Quality Control Test Reports: Include the following information in test reports:
   a. Project identification and portion of structure represented.
   b. Concrete mix class and specified compressive strength requirements.
   c. Weather conditions and air temperature.
   d. Concrete temperature, slump and air content test results.
   e. Dates of placing and testing.
   f. Method of curing (field or laboratory).
   g. Strength testing results.
   h. Technician's name and certification number with expiration date.

3.2 ERECTION

A. Preparation

1. Before starting erection of precast units, verify that the anchor bolts have been set within required tolerances.
2. Precast units, that are cracked prior to erection, shall not be erected until those units have been accepted by the Engineer.
3. Precast units shall not be erected until 28 days after being cast.

B. Installation

1. Fit and align precast concrete units straight, plumb, level and square.

2. Set bearing pads within 3/8" ± of the positions detailed on the structural drawings. Maintain pads in correct positions during erection of precast.
3. Adjust differential camber between units to within tolerance before making final connection.
4. Fasten precast units in place per details on structural drawings.
5. Provide temporary bracing, as required, to maintain stability and alignment until the entire system is erected, permanently connected, and braced by the permanent lateral load-resisting system.
6. The minimum acceptable bearing length for the double tees on the beam ledges is 6".
7. Welding procedure:
   a. Remove galvanizing from area to be welded.
   b. Protect units from damage by use of non-combustible shields as required.
   c. Weld
   d. Remove weld slag.
   e. Touch-up area with galvanized compound such as ZRC.

C. Patching and repair

1. Cut off all lifting loops and patch in such a manner that no part of the loop is exposed. This requirement does not apply to loops in the top surface of the double tees or hollowcore deck.
2. Use care in proportioning, mixing and placing patching mixture to match adjacent surface area.
3. Adhere patch to hardened concrete with an approved two component epoxy.

D. Cleaning

1. After installation, remove all debris and broom clean all exterior surfaces.
2. Use extreme care to prevent damage to precast concrete surfaces and to adjacent materials.

3.3 TESTING

A. All testing shall be by a testing agency approved by the Architect/Engineer, performed by registered/qualified technicians.

B. Test shop and field welds as indicated below:

1. All complete penetration welds shall be tested for 100% of the total weld length using ultrasonic testing apparatus.

2. All partial penetration welds shall be tested for 50% of the total weld length using the magnetic particle method.
3. 20% of all field fillet welds shall be tested using the magnetic particle method.
4. All welds shall be visually inspected.

C. Test reports shall be prepared by the testing agency giving the following:

1. The type and location of test conducted.
2. The test results.
3. Interpretation of the test results stating whether they comply with the Specification requirements.
4. Procedure taken if the test results are not acceptable.
5. Test results of re-tests after corrective measures have been completed. The cost of all re-testing shall be borne by the Contractor.

3.4 GUARANTEE, INSPECTION AND ACCEPTANCE

A. The Precast and Prestressed Contractor shall guarantee all his work for a period of three years after final acceptance by the Owner against all defects of material, manufacturer and workmanship. This Contractor shall replace, without additional expense to the Owner, all defective work which becomes apparent within the guarantee period with new and finished materials.

B. Final inspection and acceptance of erected precast concrete shall be made to verify conformance with plans and specifications.

END OF SECTION 03410

SECTION 04720

CAST STONE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes, but is not limited to, the following:

1. Cast stone veneer.
2. Lintels
3. Accent bands

B. Related Sections include the following:

1. Section 01330 – Submittals for job-site mock-up.
2. Section 04811 – Brick Veneer for requirements for through-wall flashing and for batching and handling mortar.
3. Section 07920 – Joint Sealers

1.2 PERFORMANCE REQUIREMENTS

A. Comply with ASTM C 1364, except the compressive strength may be not less than 4,000 pounds per square inch per ASTM C140, and the following:

Absorption	ASTM C1195	less than 6 percent
Density	ASTM C140	greater than 120 pcf
Linear Shrinkage	ASTM C426	less than .05 percent
Freeze-Thaw	ASTM C666	less than 4 percent

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each type of unit, accessory, and other manufactured products, including certifications that each type complies with specified requirements.

1. Include product data for through-wall weeps and Mortar Net.

B. Cast stone manufacturer's published recommendations for cleaning products and methods.

C. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions; details of reinforcement and anchorages, if any; and indication of finished faces. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for cast stone units.

1. Include building elevations showing layout of units and locations of joints and anchors.

D. Mockup Samples: Furnish sample units as indicated on Drawings for installation in mock-up.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1. Include copies of material test reports for completed projects, indicating compliance of cast stone with ASTM C 1364, or as indicated.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing cast stone units similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to manufacture required units.

1. Source Limitations for Cast Stone: Obtain cast stone units through one source from a single manufacturer.
2. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

B. Mock-up: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Pack, handle, and ship cast stone units in suitable packs or pallets.

B. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.

C. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

D. Store installation materials on elevated platforms, under cover, and in a dry location.

E. Store mortar aggregates where grading and other required characteristics can be maintained and contamination avoided.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Architectural Concrete Co., Inc.
2. Architectural Ornamental Castings
3. Custom Cast Stone
4. Continental Cast Stone Manufacturing, Inc.
5. D. C. Kerckhoff Company
6. Rock Cast by Reading Rock, Inc.

2.2 CAST STONE MATERIALS

A. General:

1. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation as needed to produce required textures.
2. Fine Aggregates: Manufactured or natural sands complying with ASTM C 33, gradation as needed to produce required textures.
3. Reinforcement: Deformed steel bars complying with ASTM A 615. Galvanized Coating per ASTM A 767.
4. Embedded Anchors and Other Inserts: Fabricated from steel complying with ASTM A 36, and hot-dip galvanized to comply with ASTM A 123.
5. Reinforce units as indicated and as required by ASTM C 1364. Use galvanized or epoxy-coated reinforcement when covered with less than 1-1/2 inches of material.
6. Fabricate units with sharp arris and details accurately reproduced with indicated texture on all exposed surfaces, unless otherwise indicated.
   a. Slope exposed horizontal surfaces at least 1:12, unless otherwise indicated.
   b. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
   c. Provide drips on projecting elements, unless otherwise indicated.
7. Cure and finish units as follows:
   a. Cure units in totally enclosed curing room under dense fog and water spray at 95 percent relative humidity for 24 hours.
   b. Yard cure units until the sum of the mean daily temperatures for each day equals or exceeds 350 degrees F.
   c. Acid etch units to remove cement film from surfaces indicated to be finished.
8. Basis of Design: Custom Cast Stone.

a. Color: "Sandstone"
b. Texture: smooth

B. Corner pieces: Provide factory-formed corner pieces. Do not miter stretcher pieces to form corners.

2.3 MORTAR MATERIALS

A. Provide the type of mortar recommended by the manufacturer.

B. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.

1. Use Type N mix, unless recommended otherwise by cast stone manufacturer.

C. For pigmented mortars, use colored portland cement-lime mix of formulation required to produce color indicated.

1. Mortar color shall match the color of the cast stone.
2. Mortar Aggregate: ASTM C 144.
   a. White-Mortar Aggregates: Natural, white sand or ground, white stone.

3. Water: Potable.

2.4 ACCESSORIES

A. Anchors: Type and size indicated, fabricated from steel complying with ASTM A 36, and hot-dip galvanized to comply with ASTM A 123.

B. Dowels: Round steel bars complying with ASTM A 36 or ASTM A 615, 1/2-inch diameter, and hot-dip galvanized to comply with ASTM A 123.

C. Weep Vent Material: Polystyrene sheet 6 inches wide, corrugated to 3/16-inch thick. Vent material configured to provide sets of 4 vent holes at 9-1/2 inches on center, with continuous "spine" in cavity, below the MortarNet cavity drainage material. Use corrugated polystyrene only for weeps in cast stone joints.

1. "Cavity Vent" by Masonry Technology Incorporated (phone 800-879-3348).

D. Proprietary Cleaner: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.

1. Cleaner shall be compatible with and approved by the manufacturer of the adjacent brick veneer.
2. Products: Subject to compliance with requirements, provide one of the following:
   a. 202 New Masonry Detergent; Diedrich Technologies, Inc.
   b. Sure Klean No. 600 Detergent; ProSoCo, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of cast stone.

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

3.2 INSTALLATION

A. Install cast stone units to comply with requirements in Division 4 Section "Unit Masonry" for installing stone units.

B. Set cast stone as indicated on Drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.

C. Set units in full bed of mortar with full head joints, unless otherwise indicated. Build anchors and ties into mortar joints as units are set.

   1. Fill dowel holes and anchor slots with mortar.
   2. Fill collar joint solid as units are set.
   3. Build concealed flashing into mortar joints as units are set.

D. Mortar joints not more than 1/4-inch wide.

E. Position "Cavity Vent" weep system on through-wall flashing with continuous edge twoward back of cavity and intermittent edge extending past the exterior face of the masonry. Apply mortar bed over "Cavity Vent" and install masonry.

   1. Trim excess "Cavity Vent" flush with face of masonry, as recommended by the manufacturer.

F. Rake out joints for pointing with mortar to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.

G. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.

H. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

I. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.

1. Sealing joints is specified in Division 7 Section "Joint Sealants."
2. Keep joints free of mortar and other rigid materials.
3. Seal head joints at slab edge pieces. Do not place mortar in head joints to be sealed. Sealant color shall match the color of the limestone.
4. Provide one sealed joint at each corner piece.
5. Protect cast stone from damage, staining, discoloration, or other effects of masonry work above the cast stone. Protect the cast stone from staining from brick cleaning the work above the cast stone.

3.3 INSTALLATION TOLERANCES

A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.

B. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.

C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.

D. Variation in Plane between Adjacent Surfaces (Lipping): Do not exceed 1/16-inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.4 ADJUSTING AND CLEANING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.

B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean cast stone as work progresses. Remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

2. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
4. Clean cast stone by bucket and brush hand-cleaning method described in BIA Technical Notes No. 20 Revised II, using job-mixed detergent solution.
5. If any locations where the cleaning method above using detergent solution is not effective, clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION

SECTION 04810

MASONRY ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes concrete masonry units; reinforcement, anchorage, and accessories.

B. Related Sections:

1. Section 04811 –Unit Masonry
2. Section 05100 - Structural Steel: Product requirements for steel anchors for placement by this section.
3. Section 05500 - Metal Fabrications: Product requirements for loose steel lintels and fabricated steel items for placement by this section.
4. Section 07130 – Sheet Waterproofing.
5. Section 07620 - Sheet Metal Flashing and Trim: Product requirements for reglets for flashings for placement by this section.
6. Section 07900 - Joint Sealers: Rod and sealant at control and expansion joints.

1.2 REFERENCES

A. American Society for Testing and Materials:

1. ASTM A153/A153M - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
2. ASTM A580/A580M - Standard Specification for Stainless Steel Wire.
3. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
4. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
5. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
6. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
7. ASTM A951 - Standard Specification for Masonry Joint Reinforcement.
8. ASTM C5 - Standard Specification for Quicklime for Structural Purposes.
9. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.
10. ASTM C91 - Standard Specification for Masonry Cement.
11. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
12. ASTM C126 - Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.
13. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units.
14. ASTM C140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units.

15. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
16. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
17. ASTM C150 - Standard Specification for Portland Cement.
18. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
19. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
20. ASTM C387 - Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
21. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
22. ASTM C476 - Standard Specification for Grout for Masonry.
23. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
24. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
25. ASTM C1019 - Standard Test Method for Sampling and Testing Grout.
26. ASTM C1329 - Standard Specification for Mortar Cement.

B. The Masonry Society:

1. TMS MSJC - Building Code for Masonry Structures (ACI 530/ASCE 5/TMS 402), Specification for Masonry Structures (ACI 530.1/ASCE 6/TMS 602) and Commentaries.

1.3 SUBMITTALS

A. Section 01340 - Submittal Procedures: Submittal requirements.

B. Product Data: Submit data for concrete masonry units, fabricated wire reinforcement, wall ties, anchors, and other accessories.

C. Design Data: Submit design mix for mortar when Property specification of ASTM C270 is to be used, required environmental conditions, and admixture limitations.

D. Manufacturer's Installation Instructions: Submit manufacturer's installation instructions.

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

F. Shop Drawings: Provide ¼" = 1'-0" scale elevations of all Structural Masonry. Indicate control joints, reinforcing, and ties to structure. Include bar positions, clearance, and positioning accessories.

1.4 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.5 MOCKUP

A. Construct cavity masonry wall mockup, 4 feet long by 4 feet high, including masonry, mortar and accessories, structural backup, wall openings, and flashings.

B. Locate where directed by Architect/Engineer.

C. Accepted mockup may be incorporated as part of Work.

1.6 PRE-INSTALLATION MEETINGS

A. Section 01200 – Meetings and Schedules: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01640 - Product Handling: Product storage and handling requirements.

B. Accept concrete masonry units on site. Inspect for damage.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Section 01600 - Product Handling.

B. Hot and Cold Weather Requirements: TMS MSJC Specification.

1.9 COORDINATION

A. Coordinate Masonry work with installation of window and door anchors.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Portland Cement: ASTM C150, Type I or II, gray.

B. Mortar Cement: ASTM C1329, Types S, gray.

C. Mortar Aggregate: ASTM C144, standard masonry type.

D. Hydrated Lime: ASTM C207, Type.

E. Grout Aggregate: ASTM C404, fine and coarse.

F. Water: Clean and potable.

G. Calcium chloride is not permitted.

2.2 UNIT MASONRY COMPONENTS

A. Precast Concrete in shapes indicated on Drawings and described in Section 04811.

B. Hollow Load Bearing Concrete Masonry Units (CMU): ASTM C90, Type I - Moisture Controlled; light weight.

C. Solid Load-Bearing Concrete Masonry Units (CMU): ASTM C90, Type I - Moisture Controlled; light weight.

D. Concrete Masonry Unit Size and Shape: Nominal modular size of 3-5/8, 5-5/8, 7-5/8 & 11-5/8 x 7-5/8 x15-5/8 inches. Furnish special units for 90 degree corners, bond beams, lintels, and bullnosed corners.

2.3 MIXES

A. Mortar Mixes:

1. Mortar For Structural Masonry: ASTM C270, Type S using Proportion specification.
2. Mortar for Brick Veneer is specified in section 04811.

B. Mortar Mixing:

1. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use.
2. Achieve uniformly damp sand immediately before mixing process.
3. Re-temper only within two hours of mixing.

C. Grout Mixes:

1. Grout for Non-Structural Masonry: 2,500 psi strength at 28 days; 8-11 inches slump.
2. Application:
   a. Coarse Grout: For grouting spaces with minimum 4 inches dimension in every direction.
   b. Fine Grout: For grouting other spaces.

D. Grout Mixing:

1. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476.

2.4 ACCESSORIES

A. Single Wythe Joint Reinforcement: Truss or Ladder type; steel wire, hot dip galvanized to ASTM A641/A641M Class 1 after fabrication, 0.188 inch side rods with 0.188 inch cross ties.

B. Multiple Wythe Joint Reinforcement: Truss or Ladder type; with moisture drip; adjustable type, steel wire, hot dip galvanized to ASTM A641/A641M Class 1 after fabrication, 0.188 inch side rods with 0.188 inch cross ties.

C. Reinforcing Steel: ASTM A615/A615M, 60 ksi yield grade, deformed billet bars, uncoated finish.

D. Strap Anchors: bent steel shape, 16 x 1 inch size 1/8 minimum inch thick, hot dip galvanized to ASTM A153/A153M finish.

E. Wall Ties: Formed steel wire, 9 gage thick, adjustable, eye and pintle type, hot dip galvanized to ASTM A153/A153M finish. Coordinate with requirements of Section 04811 for Cavity Walls and Veneers.

F. Ties: Triangular masonry ties with weld-on anchor straps as noted on Drawings.

G. Dovetail Anchors: Triangular masonry ties in dovetail slots as noted on Drawings.

H. Anchor Bolts: Headed, J-shaped or L-shaped.

I. Plastic Flashings: Specified in Section 04811.

J. Joint Filler: Closed cell polyurethane; oversized 50 percent to joint width; self expanding.

K. Weeps: Preformed plastic vents with sloping louvers.

L. Cavity Vents: Molded polyvinyl chloride grilles; insect resistant.

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

N. Precast Concrete Lintels: size, as indicated on Drawings, 4,000 psi strength at 28 days..

O. Steel Lintels: size as indicated on Drawings, hot-dip galvanized.

P. Core Insulation: Expanded polystyrene complying with ASTM C578-02, Type 1. Expanded polystyrene shall be molded with density 1.0 PCF. Inserts shall be installed at the block producer's plant.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify field conditions are acceptable and are ready to receive work.

B. Verify items provided by other sections of work are properly sized and located.

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

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied to other sections.

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

3.3 INSTALLATION

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

B. Maintain masonry courses to uniform dimension. Form bed and head joints of uniform thickness.

C. Coursing of Concrete Masonry Units:

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

D. Placing and Bonding:

1. Lay solid masonry units in full bed of mortar, with full head joints.
2. Lay hollow masonry units with face shell bedding on head and bed joints.
3. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
4. Remove excess mortar as work progresses.
5. Interlock intersections and external corners.
6. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is required, remove mortar and replace.
7. Perform job site cutting of masonry units with proper tools to assure straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
8. Cut mortar joints flush where resilient base is scheduled, or where waterproofing is applied.
9. Isolate masonry from vertical structural framing members with movement joint.
10. Isolate top of masonry from horizontal structural framing members and slabs or decks with compressible joint filler.

E. Weeps and Vents: Furnish weeps and vents in outer wythe at 24 inches oc horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.

F. Cavity Wall: Do not permit mortar to drop or accumulate into cavity air space or to plug weeps.

G. Joint Reinforcement And Anchorage - Single Wythe Masonry and Cavity Wall Masonry.

1. Install horizontal joint reinforcement 16 inches oc.
2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
3. Place joint reinforcement continuous in first joint below top of walls.
4. Lap joint reinforcement ends minimum 6 inches.

5. Embed wall ties in masonry backing to bond veneer at maximum 16 inches oc vertically and 36 inches oc horizontally. Place at maximum 8 inches oc each way around perimeter of openings, within 12 inches of openings.

H. Masonry Flashings:

1. Extend flashings horizontally through outer wythe at foundation walls, above ledge or shelf angles and lintels, under parapet caps, at bottom of walls, and turn down on outside face to form drip.
2. Turn flashing up minimum 8 inches and bed into mortar joint of masonry or seal to concrete backing.
3. Lap end joints minimum 6 inches and seal watertight.
4. Turn flashing, fold, and seal at corners, bends, and interruptions.

I. Lintels:

1. Install loose steel lintels over openings.
2. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled or indicated.
3. Do not splice reinforcing bars.
4. Support and secure reinforcing bars from displacement.
5. Place and consolidate grout fill without displacing reinforcing.
6. Allow masonry lintels to attain specified strength before removing temporary supports.
7. Maintain minimum 16 inch bearing on each side of opening unless indicated otherwise on Drawings.

J. Grouted Components:

1. Reinforce bond beam with 2 minimum No. 6 bars, 1inch from bottom web.
2. Lap splices bar diameters required by code.
3. Support and secure reinforcing bars from displacement.
4. Place and consolidate grout fill without displacing reinforcing.
5. At bearing locations, fill masonry cores with grout for minimum 16 inches both sides of opening.

K. Reinforced Masonry:

1. Lay masonry units with core cells vertically aligned and cavities between wythes clear of mortar and unobstructed.
2. Place reinforcement bars as indicated on Drawings.
3. Splice reinforcement in accordance with Section 03300.
4. Support and secure reinforcement from displacement.
5. Place and consolidate grout fill without displacing reinforcing.
6. Place grout in accordance with TMS MSJC Specification.

L. Insulated CMU:

1. Install CMU with preinstalled core insulation where insulated walls are noted on Drawings.

M. Control Joints:

1. Do not continue horizontal joint reinforcement through control joints.
2. Form control joint with sheet building paper bond breaker fitted to one side of hollow contour end of block unit. Fill resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.
3. Size control joint in accordance with Section 07900 for sealant performance.

N. Built-In Work:

1. As work progresses, install built-in metal door frames, window frames, anchor bolts, plates, and other items to be built-in the work and furnished by other sections.
2. Install built-in items plumb and level.
3. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout or mortar. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
4. Do not build in materials subject to deterioration.

O. Cutting And Fitting:

1. Cut and fit for chases, pipes, conduit, sleeves, and grounds. Coordinate with other sections of work to provide correct size, shape, and location.
2. Obtain Architect/Engineer's approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.4 ERECTION TOLERANCES

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

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

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

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

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

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

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

H. Maximum Variation for Steel Reinforcement:
1. Plus or minus 1/2 inch when distance from centerline of steel to opposite face of masonry is 8 inches or less.
2. Plus or minus 1 inch when distance is between 8 and 24 inches.
3. Plus or minus 1 1/4 inch when distance is greater than 24 inches.
4. Plus or minus 2 inches from location along face of wall.

3.5 FIELD QUALITY CONTROL

A. Section 01410 – Testing Laboratory Services.

B. Concrete Masonry Units: Test each type in accordance with ASTM C140.

3.6 CLEANING

A. Section 01710 - Cleaning.

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

C. Replace defective mortar. Match adjacent work.

D. Clean soiled surfaces with cleaning solution.

E. Use non-metallic tools in cleaning operations.

END OF SECTION 04810

SECTION 04811

BRICK VENEER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Unless otherwise indicated, conform to the requirements of ACI 530.1-02/ASCE 6-02/TMS 602-02 – "Specifications for Masonry Structures".

1.2 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:

1. Face brick veneer.
2. Mortar for brick veneer.
3. Ties and anchors.
4. Embedded flashing.
5. Cavity drainage material.
6. Miscellaneous masonry accessories.

B. Related Sections include the following:

1. Section 04720 "Cast Stone" for simulated limestone cast stone.
2. Section 04810 "Masonry Assemblies" for load-bearing and non-loadbearing CMU.
3. Section 04810 "Masonry Assemblies" for mortar and grout for CMU walls.
4. Division 5 Section "Cold-formed Metal Framing" for exterior wall framing
5. Division 6 Section "Rough Carpentry" for sheathing over steel and wood studs.
6. Division 7 Section "Weather Barriers" for air and weather barrier
7. Division 7 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
8. Division 7 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.

C. Products installed, but not furnished, under this Section include the following:

1. Cast-stone veneer and trim, furnished under Division 4 Section "Cast Stone."
2. Steel lintels for unit masonry, furnished under Division 5 Section "Metal Fabrications."

1.3 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

C. Deliver pre-blended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store pre-blended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.5 PROJECT CONDITIONS

A. Protection of Masonry: During construction, 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 1 wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to un-constructed wythe and hold cover in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings 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.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 degrees F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

B. General: Provide shapes indicated and as follows:

1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners.

2.2 BRICK

A. Brick Veneer: ASTM C216, Grade SW, Type FBX.

1. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
2. Size: Modular, 3-5/8 inches bed depth by 2-1/4 inches high by 7-5/8 inches long.

B. Basis of Design Product: Belden Brick Concord Blend 07-40, modular size with sanded velour face

C. Provide shapes indicated and as follows:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.

2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

2.3 STONE TRIM UNITS

A. Refer to Section 04720 – Cast Stone.

2.4 MORTAR MATERIALS

A. Do not use masonry cement in brick veneer construction.

B. Colored Cement Product: Packaged blend made from Portland cement and lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
2. Pigments shall not exceed 5 percent of cement by weight.
3. Available Products:
   a. Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
   b. Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
   c. Lafarge North America Inc.; Eaglebond.
   d. Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.

4. For exterior, above-grade brick veneer, and for other applications where another type is not indicated, use Type N mortar.

C. Aggregate for Mortar: ASTM C 144.

1. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

D. Water: Potable.

2.5 MORTAR MIXES

A. General: Do not use admixtures, including 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.
2. Limit cementitious materials in mortar to Portland cement and lime.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Pre-blended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a pre-blended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Measurement of sand by shovel at the mortar mixer is not permitted.

2.6 TIES AND ANCHORS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to:

1. Dur-O-Wal
2. Heckmann Building Products Inc..
3. Hohmann & Barnard, Inc.
4. Wire-Bond

B. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with eight subparagraphs below, unless otherwise indicated.

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153, not less than 2.0 ounces per square foot.

C. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but not less than 1-1/2 inches cover on outside face. Outer ends of wires are bent 90 degrees and extend not less than 2 inches parallel to face of veneer.

D. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:

a. Structural Performance Characteristics: Capable of withstanding a 100-pound load in both tension and compression without deforming or developing play in excess of 0.05 inch.

2. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.

a. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 2-3/4 inches wide by 3 inches high; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section.
i) Dayton Superior Corporation, Dur-O-Wal Division; D/A 213 – Basis of Design.

b. Anchor Section: Gasketed sheet metal plate, 1-1/4 inches wide by 6 inches long, with screw holes top and bottom; top and bottom ends bent to form pronged legs of length to match thickness of insulation or sheathing; and raised rib-stiffened strap, 5/8 inch wide by 6 inches long, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and extend beyond pronged legs.
   i) Hohmann & Barnard's "DW-10."

3. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.188-inch-diameter, hot-dip galvanized steel wire.
4. Brick ties with drips are not allowed.

E. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 diameter by length required to penetrate steel stud flange with not less than 3 exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.

1. Available Products:

   a. ITW Buildex; Teks Maxiseal with Climaseal finish.
   b. Textron Inc., Textron Fastening Systems; Elco Dril-Flex with Stalgard finish.

2.7 EMBEDDED FLASHING MATERIALS

A. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch.

1. Provide one of the following products:
   a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
   b. Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier-44.
   c. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
   d. Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
   e. Hohmann & Barnard, Inc.; Textroflash.
   f. Polyguard Products, Inc.; Polyguard 400.

B. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

C. Provide manufacturer's standard fabricated outside corner pieces. Provide either the manufacturer's standard inside corner flashing pieces; or if none available, field-fabricate inside corners according to the manufacturer's recommendations.

D. Provide aluminum or stainless steel termination bar, 1 inch wide by 1/8-inch thick, with 1/4-inch diameter holes spaced at 8 inches on center. Termination bar shall have 3/8-inch wide flange along top side for sealant.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Pre-molded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

C. Weep/Vent Products: Use one of the following, unless otherwise indicated:

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
   a. Advanced Building Products Inc.; Mortar Maze weep vent.
   b. Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
   c. Heckmann Building Products Inc.; No. 85 Cell Vent.
   d. Hohmann & Barnard, Inc.; Quadro-Vent.
   e. Wire-Bond; Cell Vent.

2. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected from manufacturer's standard.
   a. Products: Mortar Net USA, Ltd.; Mortar Net Weep Vents.

D. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Provide strips, 2 inches thick and 10 inches wide, with dovetail shaped notches 7 inches deep that prevent mesh from being clogged with mortar droppings.

2. Products: Mortar Net USA, Ltd.; Mortar Net.

2.9 MASONRY CLEANERS

A. Use only masonry cleaning materials and cleaning methods approved by the brick manufacturer.

B. Test masonry cleaner on mock-up panel to confirm compatibility with substrate before starting work.

C. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Available Manufacturers:
   a. Diedrich Technologies, Inc., 202V Vana-Stop
   b. ProSoCo, Inc., Vana Trol.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

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

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

   1. Mix units from several pallets or cubes as they are placed.

F. Draw a circle the size of a quarter with a wax pencil or crayon on a brick and place 20 drops of water in the circle. If water is absorbed within 1-1/2 minutes, the brick requires wetting.

1. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 grams per 30 square inches per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

G. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.
7. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.

F. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

A. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.5 CAVITY WALLS

A. Bond wythes of cavity walls together using one of the following methods:

1. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
   a. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement to allow for differential movement regardless of whether bed joints align.

2. Masonry Veneer Anchors: Comply with requirements for anchoring masonry veneers.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

3.6 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors through sheathing to wall framing and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Embed tie sections [connector sections and continuous wire] in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of sheathing.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally, with not less than 1 anchor for each 1.8 square feet of wall area.

5. Install additional anchors within 12 inches of openings and at intervals not exceeding 8 inches, around perimeter of each opening.
6. Install additional anchors within 12 inches of both sides of vertical expansion joints in brick veneer, at intervals not exceeding 8 inches.

3.7 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form expansion joints in brick made from clay or shale as follows: Form open joint full depth of brick wythe and of width indicated, but not less than 1/2 inch, for installation of sealant and backer rod specified in Division 7 Section "Joint Sealants."

C. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 7 Section "Joint Sealants," but not less than 3/8 inch.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.8 LINTELS

A. Install steel lintels where indicated.

B. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.9 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows, unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under building paper or building wrap, lapping at least 4 inches.
3. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.

4. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products to form weep holes.
2. Space weep holes 24 inches o.c., unless otherwise indicated.

D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article.

3.10 REPAIR, POINTING AND CLEANING:

A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install 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 work to provide a neat, uniform appearance, prepared for application of sealants.

C. Final Cleaning: After mortar is thoroughly set and cured, clean masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave 1/2 panel un-cleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film or waterproof masking tape.
4. Saturate wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Use bucket and brush hand cleaning method described in BIA "Technical Note No. 20 Revised" to clean brick masonry made from clay or shale, except use masonry cleaner indicated below.

D. Clean concrete unit masonry to comply with masonry manufacturer's directions and applicable NCMA "Tek" bulletins.

E. Clean brick veneer only with products recommended in writing by the brick manufacturer, using methods recommended by the brick-cleaning product manufacturer and according to the recommendations of the brick manufacturer.

1. The brick should be cleaned with the lowest effective concentration of cleaning solution.
2. Protect surfaces and finishes adjacent to the cleaning work.

3. Thoroughly wet the brick with clean water before applying cleaning solution.
4. Use bucket and brush method.
5. Rinse water pressure should not exceed the recommendation of the brick manufacturer, but not more than 400 pounds per square inch.

F. Protection: Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit masonry work being without damage and deterioration at time of substantial completion.

END OF SECTION

SECTION 05100
STRUCTURAL STEEL

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work under this Section consists of providing all labor, materials and equipment necessary or required for the complete fabrication and erection of all structural steel as detailed on the Structural Drawings and as specified herein. The work includes furnishing and installing the non-shrink grout beneath the structural steel.

B. Related work specified elsewhere:

1. Steel Joist - Section 05200
2. Steel Roof Deck - Section 05310
3. Composite Steel Floor Deck - Section 05315
4. Miscellaneous and Architectural Metal - Section 05500
5. Painting - Section 09800 and 09900
6. Loose lintels are furnished under Section 05500; Miscellaneous Metals.

C. Work furnished but not installed: Anchor bolts and other embedded connection components.

1.2 QUALITY ASSURANCE

A. The latest editions of the following standard specifications shall govern the fabrication and erection of the structural steel, except as modified by the design drawings or this specification:

1. AISC "Specifications for Structural Steel Buildings".
2. AISC: Code of Standard Practice for Steel Buildings and Bridges.
3. AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".
4. AWS "Structural Welding Code D1.1".
5. Steel Structures Painting Council Specifications SSPC.
6. AWS "Structural Welding Code - Reinforcing Steel", D1.4.

B. All welders in both shop and field shall be certified under AWS "Standard Qualification Procedure" for the type or types of welding being performed and shall have been continuously engaged in such welding.

C. Fabricator and erector shall have continuous business operation for at least 5 years. Furthermore, by evidence of a minimum of 5 projects similar in complexity to this project, indicate capability of conducting work of a similar nature; have sufficient well maintained equipment to perform the work; maintain an adequate stockpile of materials; and have qualified labor to fabricate or erect without delaying the project.

1.3 SUBMITTALS

A. SHOP DRAWINGS

1. Submit the proposed Shop Drawing Submittal Schedule prior to submitting any of the shop drawings for review.
2. Shop drawings shall be submitted to the Engineer for review. Shop Drawings shall include erection plans and framing elevations, all shop and erection details including copes, connections, threaded fasteners, and welds.
3. Erection plans shall clearly denote locations of all connections which require field welds, slip critical bolts, and any bolts other than ¾" diameter A325, if specified.
4. Provide setting drawings, templates and directions for installation of anchor bolts and other devices.
5. Shop drawings shall include the grade of steel, connection bolt and anchor bolt material types, and the type of welding rods.
6. Resubmitted shop drawings:
   a. All information, which is correct on the original submittal, will not be changed in any way on the resubmitted shop drawings.
   b. If information on a shop drawing must be changed due to a Change Order, then all the changes must be clouded on the resubmitted shop drawings.
7. Shop drawing action codes:
   a. Shop drawings marked "reviewed with exceptions" require the marked corrections to be made. No resubmittal is required. Fabrication may commence leading to steel erection.
   b. Shop drawings marked "revise and resubmit" require the marked corrections to be made. The drawings must be resubmitted for review. Fabrication may not commence.
   c. Shop drawings marked both "reviewed with exceptions" and "revise and resubmit" require the marked corrections to be made. The drawings must be resubmitted for review. Fabrication may commence. Steel erection may not begin until the subsequent submission has been reviewed and returned for use in steel erection.

8. Shop Drawings will be reviewed by the Architect/Engineer for correct interpretation of the Drawings but this check shall not relieve the Contractor of his primary

responsibility to provide structural steel complying with the Construction Documents.

B. CERTIFICATIONS

1. Provide certification for all welders used in field and shop work.
2. Provide certification that shop drawings, including all connections, were prepared under the supervision of a Professional Engineer registered in the state where the project is located.

C. TEST REPORTS

1. Submit all test reports regarding welding, bolting, and headed studs per Section 3.04.

D. PRODUCT INFORMATION

1. Submit product information for materials specified in Article 2.01 under the provisions of Division 1 and demonstrating compliance with specified requirements.

1.4 PRODUCT HANDLING

A. Exercise care in handling, storing and erection of structural steel to avoid damage to pieces, welds, joints and paint. Secure pieces against displacement in transit.

B. Structural steel members, which are stored at the job site, shall be stored above ground on platforms, skids or other supports. Protect with weatherproof cover held in place.

C. Clean members, which have become soiled before erecting.

D. Anchor bolts and other anchorage devices, which are embedded in cast-in-place concrete, shall be delivered to the project site in time to be installed before the start of concrete operations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Shapes, Bars and Plates: ASTM A36 unless noted otherwise on the Structural Drawings. High strength steel is designated on the Structural Drawings by using the yield

point strength parenthetically as a suffix, thus (50), high strength steel shall conform to the requirements of ASTM A992.

B. Rectangular and Square HSS: ASTM A500, Grade B, Fy = 46 ksi.

C. Structural steel pipe: ASTM A53, Type E or S, Grade B, Fy = 35 ksi or ASTM A501, Fy=36 ksi.

D. Round HSS members: ASTM A500, Grade B, Fy=42 ksi.

E. Connection bolts:

1. ASTM A325N (bearing bolts) - unless otherwise noted.
2. ASTM A325SC (Slip Critical) - per Section 3.01B.

F. Anchor rods: ASTM F1554, Grades 36, 55 or 105 as indicated.

G. Welding rods:

1. AWS E70XX for A36 steel.
2. AWS E70XX low hydrogen for Grade 50 steel.

H. Nuts: All nuts shall have a minimum Rockwell hardness of 89HRB or a Brinell hardness of 10HB.

I. Drilled-in anchors (expansion bolts): Hilti KWIK-Bolt 3 (carbon steel, zinc plated per ASTM B633) by Hilti Fastening Systems (or approved equal).

J. Adhesive Anchor System:

1. Moisture insensitive epoxy.
2. Use to anchor bolts into hardened concrete.
3. Standard:
   a. Hilti HIT HY 150 MAX by Hilti Fastening Systems.
4. Drilled hole size and installation procedure shall conform to manufacturer's instructions.

K. Headed studs (used as anchor studs or as shear connectors): ASTM A108.

1. Standards:
   a. KSM Fastening Systems, Omark Industries

b. Nelson Stud Welding, TRW Nelson Division
c. Blue Arc Welding Studs, Erico Products

L. Deformed bar anchors: ASTM A496.

1. Standards:
   a. KSM Fastening Systems, Omark Industries
   b. Nelson Stud Welding, TRW Nelson Division
2. The use of manually welded anchors, rods, bars, straps, or reinforcing bars is not acceptable as a substitute for headed studs or deformed bar anchors.

M. Malleable Iron Wedge Inserts: Peerless Wedge Inserts, Richmond Screw Anchor Company (3/4" long).

N. Non-Shrink Grout:

1. Grout shall be prepackaged requiring only the addition of potable water.
2. Grout shall not contain metallic substances or aluminum powder.
3. Grout shall attain compressive strengths per ASTM C-1107.
4. Grout shall meet the dimensional stability requirements of ASTM C-1107, Grade C, when prepared according to the manufacturer's instructions and tested at 40°F and 90°F.
5. Grout shall be capable of maintaining a flowable consistency for a minimum of 45 minutes at 70°F.
6. Standards:
   a. Five Star Grout; Five Star Products, Inc.
   b. Sonogrout 14k; Sonneborn

O. Shop paint: per Section 05100 - 2.03.

2.2 FABRICATION

A. Fabricate structural steel in accordance with the AISC "Specification for Structural Steel Buildings" with the modifications and additional requirements specified in this Section.

B. Shop connections shall be welded or bolted with A325 bolts.

C. Manual welding shall be accomplished with shielded arc electrodes of E70XX series or the strength equivalent of flux cored arc weld. Submerged arc process welding shall be grade SAW-2. Welding shall be accomplished by welders certified for weld types and positions involved according to the "Structural Welding Code" A.W.S. D1.1.

D. Connections:

1. All connections not detailed on the structural drawings shall be designed by the steel fabricator in accordance with the AISC Manual of Steel Construction consistent with the member design.
2. Unless otherwise noted, beam connections shall be simple connections.
3. The steel supplier shall design the connections for the reactions indicated on the framing plans. Where reactions are not given, the connections for non-composite beams shall be designed for 50% of the total allowable uniform load on the span.
4. Connection angles shall be 5/16" in thickness (minimum).
5. Minimum connection strength shall not be less than that of two 3/4" diameter A325 bolts.
6. Beam connections shall consist of double web angles unless detailed otherwise on the drawings or as specified below.
7. Skewed shear connections shall consist of double bent plates unless the angle between the intersecting webs is less than 70°.
8. The design of single plate shear connections shall conform to AISC Manual of Steel Construction, 13th Edition.

E. Welds shall be tested as outlined in Article 3.04. The correction of faulty welds shall be in accordance with AWS "Structural Welding Code D1.1".

F. Welding of all reinforcing steel shall comply with the provisions of AWS D1.4.

2.3 SHOP PAINTING

A. Shop paint all structural steel except the following:

1. Contact surfaces in connections using high strength slip critical bolts.
2. Surfaces to be field welded.
3. Structural steel that will receive sprayed-on fireproofing.
4. Steel encased in concrete.
5. Embedded steel items (surfaces in contact with concrete).
6. The top surface of the top flange for all composite beams.
7. Crane rails.

B. Shop Primer:

1. Modified alkyd, lead-free, chromate-free, rust-inhibitive primer.
2. Volume solids: 55.0 ± 2 per cent minimum

3. Shop primer shall be compatible with the specified finish paint.
4. Standard:
   a. Series 88HS Azeron Primer; Tnemec Company, Inc.
   b. Interlac 260 HS; International Protective Coating (or an approved equal).

C. Surface Preparation:

1. SSPC - SP6 Commercial Blast Cleaning (for structural steel exposed to weather).
2. SSPC - SP3 Power Tool Cleaning (for steel not exposed to weather).

D. Application:

1. Structural steel shall receive one coat of shop paint except surfaces inaccessible after assembly shall receive a second coat.
2. Dry film thickness: 2.0 mils minimum.
3. Follow coating manufacturer's printed directions.

2.4 SHOP GALVANIZING

A. Shop hot-dip galvanize all structural steel embedded in concrete and any steel indicated on the drawings in accordance with ASTM A123.

B. Surface Preparation: SSPC – SP6 Commercial Blast Cleaning.

PART 3 - EXECUTION

3.1 ERECTION

A. Erect in accordance with the AISC "Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design".

B. Field connections shall be made using A325 high strength bolts, bearing type, except where welded connections or where slip critical type bolts are indicated on the Structural Drawings.

1. Where slip critical bolts are indicated on the Structural Drawings, the faying surfaces shall be left unpainted.

C. Bolt Tightening:

1. All bolts shall be tensioned in accordance with Table 8.1 of the "Specification for Structural Joints Using ASTM A325 or A490 Bolts".
2. High strength bolts may be tightened by any method found acceptable by the "Specification for Structural Joints Using ASTM A325 or A490 Bolts", section 8.2.

D. Field welds shall be accomplished by welders certified for the weld types and positions involved according to the "Structural Welding Code", A.W.S. D1.1. Use only shielded arc electrodes; E70xx, structural type.

1. Low hydrogen electrodes shall be stored in strict accordance with the provisions of AWS D1.1.

E. Welding procedure for galvanized steel:

1. Remove galvanizing from area to be welded.
2. Protect units from damage by use of non-combustible shields as required.
3. Weld
4. Remove weld slag.
5. Touch-up area with galvanized compound such as ZRC.

F. Set all structural steel accurately to lines and grades. Connect temporarily with sufficient high strength bolts to insure complete safety of the structural until permanent connections are made. Erection tolerances shall be in accordance with the AISC Code of Standard Practice.

G. Provide temporary guidelines, bracing, and shoring as required, to maintain stability and alignment until the entire system (including metal deck erection) is erected, permanently connected, braced and set.

H. Any and all misfits shall be reported to the Engineer for resolution. Burning of new or unfair holes or cutting with a torch will not be permitted without the approval of the Engineer. Reamers, twist drills and saws shall be employed where burning is prohibited.

I. Any member that has assumed a bend or buckle in its final position due to forced fit shall have one or both ends and any intermediate connections unbolted and re-drilled or reamed to relieve such bowing to the satisfaction of the Engineer.

J. No piece that has been bent, broken, twisted or otherwise damaged shall be incorporated into the work. Such pieces shall be repaired or corrected on the ground to the satisfaction

of the Engineer or replaced with a new piece. Failure to observe this will be cause for rejection of the piece in place.

K. Prior to the erection of any steel, the Contractor shall verify the location, elevation and plumbness of all anchor bolts and concrete surfaces. The Contractor shall report immediately to the Engineer in writing any condition which he finds unacceptable or that would prevent erection of the structural steel within AISC tolerance for plumbness and elevation. The Contractor shall be responsible for all corrections, and all corrections shall be made in a manner acceptable to the Engineer.

L. The erector shall acquaint himself with all conditions at the site, which can affect his methods and sequence of operations. Abide by Owner's regulations concerning traffic, parking and construction material delivery.

M. FIELD TOUCH-UP BY STEEL ERECTOR: Field bolts, field welds and abrasions to the shop coat shall be repaired and painted by the structural steel erector using the same paint and care as for shop coat. All such surfaces shall be washed with a suitable degreasing solvent. This contractor shall also remove any and all accumulations of mud, clay, rust, scale, grease, etc. that have been acquired, for any reason, during shipment, storage and erection and the shop coat restored to its original condition.

N. Sub base (leveling) plates under column base plates will not be permitted.

O. Install headed studs using manufacturer-approved equipment in accordance with the manufacturer's instructions.

P. Furnish all anchor bolts for anchorage of structural steel at an advance date for incorporation into the concrete foundation by others. Provide heavy hex nuts and washers for each bolt. Anchor bolts shall not be installed until shop drawings have been reviewed.

Q. When installing drilled-in anchors (Article 2.01 I) or adhesive anchors (Article 2.01 J), locate the reinforcement within the concrete to avoid damaging the reinforcement during the anchor installation process.

R. Observe all federal, state and local laws and area trade rules in the erection and handling of structural steel.

3.2 BASEPLATE GROUTING

A. Concrete surfaces and baseplates shall be clean and free from rust, grease, oil, and other debris.

B. Place a watertight form around the area to be grouted. Formwork should be designed to insure free flow of the grout under the baseplate and preventing the creation of air pockets. The height of the formwork should be sufficient to allow for complete gravity fill under the plate.

C. Saturate the area to be grouted with water until uniformly damp. Remove excess water just before placing the grout.

D. In order to avoid air pockets and ensure complete filling of the cavity between the baseplate and concrete, the grout shall be placed from one side only. Placement shall be completed without interruption.

E. Dry packing or damp packing is not allowed.

F. See manufacturer's printed instructions for additional information regarding preparation, mixing, placing and curing of the grout.

3.3 CLEANING UP

A. Upon completion of erection, promptly remove all tools, equipment and rubbish caused by or resulting from the erection work.

3.4 TESTING

A. All testing shall be by a testing agency approved by the Architect-Engineer, performed by registered/qualified technicians.

B. Prior to testing bolts and welds in the field, all field assembled connections shall be visually inspected. The inspector shall review the Engineer-approved shop drawings prior to inspection. The inspector shall verify that bolts, field welds, field added plates and stiffeners agree with the Engineer-approved field connection detail on the shop drawings. This inspection shall include verifying weld lengths, faying bolt surfaces have been brought into contact, and connected member alignment is true. The inspector shall be given any Engineer-approved field changes made to the connections to include in the review.

C. Test shop and field welds as indicated below:

1. All complete penetration welds shall be tested for 100% of the total weld length using ultrasonic testing apparatus.

2. All partial penetration welds shall be tested for 50% of the total weld length using the magnetic particle method.
3. 20% of all field fillet welds shall be tested using the magnetic particle method.
4. All welds shall be visually inspected.

D. Inspect and test bolted connections.

1. For connections where slip critical bolts are indicated on the Structural Drawings, testing and inspection methods shall conform to the "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for slip critical bolts. The testing shall include the inspector observing the "pre-installation testing" of each combination of grade, diameter, length and production lot of bolts and nuts to be used on the project. The "pre-installation testing" shall include bolt crews installing three sample bolts, of each combination, in a device that directly reads tension in the bolt. (e.g. Skidmore - Wilhelm Machine) Bolt crews shall demonstrate to the inspector the ability to install bolts to the tensions given in table 8.1 of "Specification for Structural Joints Using ASTM A325 and A490 Bolts". The inspector shall observe bolt installation practices in the field to verify procedures used during the "pre-installation testing" are being properly applied.

   Any disputes that arise concerning the tension in the bolts shall be resolved with methods set forth in section 10 of "Specification for Structural Joints Using ASTM A325 and A490 Bolts": Arbitration.
2. For all other connections, visual inspection to ensure that the plies of the connected elements have been brought into snug contact is required.

E. Verify number and spacing of headed anchor studs agree with the construction documents. Visually inspect all headed anchor stud welds and test those required by "Structural Welding Code", AWS D1.1, by bending the stud 15° from its original axis with no cracks or fracture in weld.

F. Test reports shall be prepared by the testing agency giving the following:

1. The type and location of test conducted.
2. The test results.
3. Interpretation of the test results stating whether they comply with the Specification requirements.
4. Procedure taken if the test results are not acceptable.
5. Test results of re-tests after corrective measures have been completed. The cost of all re-testing shall be borne by the Contractor.

END OF SECTION

PART 1 - GENERAL

1.1 SCOPE

A. Provide all labor, materials, equipment and services necessary or incidental to complete the fabrication and erection of all steel roof deck work shown on the contract drawings and specified herein.

B. Related Work Specified Elsewhere:

1. Section 05100 - Structural Steel
2. Section 05200 – Steel Joists

1.2 QUALITY ASSURANCE

A. Material, fabrication, and erection shall meet the requirements of:

1. AISI Specifications for the Design of Cold Formed Steel Structural Members.
2. Steel Deck Institute Design Manual for Composite Decks, Form Decks, and Roof Decks.

B. Qualifications

1. Welders: AWS qualified and hold a current and valid certificate.

1.3 SUBMITTALS

A. Prepare and submit completely dimensioned shop drawings for review.

B. Shop drawings shall indicate the following:

1. Deck type, gage, and finish.
2. Connections of deck to framing members (type and locations).
3. Connections of deck to adjacent deck pieces (type and locations).
4. Shop and erection details.
5. Markings, quantities, and locations of all deck sheets.
6. Details of all deck accessories.
7. Locations and dimensions of all shop cut openings.
8. Details showing method of framing openings less than 12 inches square.

C. Manufacturer's literature substantiating compliance with minimum requirements shall be

submitted for review.

D. Fabrication shall not begin until shop drawings have been reviewed.

1.4 PRODUCT HANDLING

A. Protect steel deck and accessories to prevent damage during delivery, storage and handling.

B. Steel deck which is stored at the project site shall be stored off the ground with one end elevated to provide drainage, and shall be covered with a ventilated, waterproof cover.

C. Steel deck which has become soiled shall be cleaned prior to installation.

PART 2 - PRODUCTS

2.1 DECK

A. Steel roof deck shall be fabricated from steel conforming to ASTM A-653 SQ Grades 33,40 or 80 with coating designation G60, (for galvanized deck), or to ASTM A-611 Grades C or D, (for painted deck).

B. Prior to forming, clean the sheet steel of all grease, oil and other foreign matter with a phosphatized type cleaner and provide one of the applicable protective coatings.

1. For roof deck to receive sprayed-on fireproofing, apply a protective coating of zinc per Article 2.01A. See Architectural drawings for steel roof deck that is to receive fireproofing.
2. For all other roof decks, unless otherwise noted, apply a stabilized vinyl wash primer to phosphatize the surface then apply a shop coat of the manufacturer's standard baked-on rust inhibitor primer paint.

C. Steel roof units shall be continuous over as many spans as the structural steel layout will permit.

D. Live load deflection under uniform total load capacity shall not exceed L/240.

E. Provide 3" deep, 20 gage steel roof deck that complies with the following minimum requirements:

1. Uniform total load capacity based on SDI design criteria:

( ) span | simple span_____( )PSF
two spans _____( )PSF
three spans_____( )PSF

F. Provide 1½" deep, 20 gage, wide rib deck steel roof deck that complies with the following minimum requirements:

1. Uniform total load capacity based on SDI design criteria:

( ) span | simple span_____( )PSF
two spans _____( )PSF
three spans_____( )PSF

2.2 ACCESSORIES

A. Provide closures, ridge and valley plates, and related accessories in 20 gage sheet steel with same finish as steel roof deck.

B. Provide sump pans made of 14 gage, hot dipped galvanized steel, (sloped pan type).

C. Mechanical fasteners for fastening side laps shall be self-drilling, steel-to-steel screws.

1. Standard: Stitch Teks by Buildex.

D. Pneumatically driven fasteners for fastening roof deck to support steel shall be low velocity, forced entry fasteners. Fastener material shall be AISI 1062 modified or 1566 steel with a minimum hardness of Rc52-56 and a minimum tensile strength of 240,000 psi. Fastener finish shall be zinc chromate plating of 0.3 mils minimum thickness. Fasteners provided shall meet or exceed the shear and uplift capacity provided by the specified 5/8" puddle weld patterns.

1. Standard: PNEUTEK Fasteners by PNEUTEK, Inc.

PART 3 - EXECUTION

3.1 ERECTION

A. Erection of steel deck shall be accomplished in accordance with the manufacturer's standards and with the approved erection layout drawing.

B. Install deck after structural support is in place, plumb, and true.

C. End laps of sheets shall be a minimum of 2 inches and shall occur over supports.

D. Erect steel deck units beginning at the low side working toward the high side to insure that end laps are shingle fashion.

E. Fasten steel roof deck as follows:

1. Steel roof deck units shall be fastened to the steel framework at each support by welds not less than 5/8" diameter, spaced at not more than 12" across the width of the roof units.
2. The side laps of adjacent units shall be fastened between supports at the one third points of the span with self-tapping screws not smaller than #10 or by 5/8" diameter welds if the deck is 18 gage or heavier.
3. Steel deck units shall be welded using 5/8" diameter welds at intervals not exceeding 12" to steel beams extending in a direction parallel to the direction of the deck span for the following cases:
   a. Connect to steel beams that either line up or are part of a lateral load resisting frame.
   b. Connect to all perimeter steel beams.
   c. Connect to all struts as detailed on the Structural Drawings.
4. Welds shall be free of sharp points and edges.
5. In the event low velocity, forced entry, pneumatically driven fasteners are to be substituted for the welded fastening system specified in sections 3.01, E, 1-3, calculations stamped by a registered structural engineer shall be submitted. These calculations shall demonstrate that both diaphragm shear and uplift capacities of the pneumatic fastening system meet or exceed that of the specified welded system.
6. All forced entry, pneumatically driven fasteners connecting roof deck to steel framing members shall be driven with the appropriately sized pneumatically powered low velocity fastening tool operated at sufficient pressure to insure tight contact between the fastener head and the attached panel. All work shall be done in strict compliance with the pneumatic fastening system manufacturer's specifications.

F. Install closures, sump pans, ridge and valley plates, and other accessories required for complete installation in accordance with the manufacturer's specifications and erection drawings. Lap all adjoining pieces 3 inches minimum.

G. Provide all required openings in the roof deck. Openings 12" square or larger shall be framed with structural steel per the "Typical Roof Opening Detail". All openings less

than 12 inches wide shall be framed per the deck manufacturer's recommendations as shown on the shop drawings.

H. Repair damaged primed finish using same primer used by deck manufacturer; include welds and screws.

I. Suspended ceilings, light fixtures, ducts, etc. are not to be supported by the steel roof deck.

3.2 FIELD QUALITY CONTROL

A. The Owner's testing laboratory shall inspect all attachments of the steel roof deck units to the structural steel framing for compliance with the contract documents and approved shop drawings. Daily inspection reports shall address all areas which have been inspected, and any deficiencies.

END OF SECTION

PART 1 - GENERAL

1.1 SCOPE

A. Provide all labor, materials, equipment and services necessary or incidental to the complete fabrication and erection of all steel floor deck work shown on the contract drawings and specified herein.

B. Related Work Specified Elsewhere.

1. Section 03300 Cast-In-Place Concrete
2. Section 05100 Structural Steel

1.2 QUALITY ASSURANCE

A. Material, fabrication, and erection shall meet the requirements of:

1. AISI Specifications for the Design of Cold Formed Steel Structural Members.
2. Steel Deck Institute Design Manual for Composite Decks, Form Decks, and Roof Decks.

B. Qualifications

1. Welders: AWS qualified and hold a current and valid certificate.

1.3 SUBMITTALS

A. Prepare and submit completely dimensioned shop drawings for review.

B. Shop drawings shall indicate the following:

1. Deck type, gage, and finish.
2. Connections of deck to framing members (type and locations).
3. Connections of deck to adjacent deck pieces (type and locations).
4. Shop and erection details.
5. Markings, quantities, and locations of all deck sheets.
6. Locations and dimensions of shop cut openings.
7. Closures, finish strips, pour stops, and related accessories.
8. Dimensioned layout of shear connectors for each beam along with the shear connector capacity based on the deck provided. If the deck supplied yields a shear

value different from the assumed value (on the drawings), the number of connectors shall be adjusted accordingly by the deck supplier.

9. UL design number for which deck is approved (when lightweight concrete is used).

C. Manufacturer's literature substantiating compliance with minimum requirements shall be submitted for review.

D. Investigate all conditions for the need for temporary shoring. Indicate any such requirements on the shop drawings.

E. Fabrication shall not begin until shop drawings have been reviewed.

1.4 PRODUCT HANDLING

A. Protect steel deck and accessories to prevent damage during delivery, storage and handling.

B. Steel deck which is stored at the project site shall be stored off the ground with one end elevated to provide drainage, and shall be covered with a ventilated, waterproof cover.

C. Steel deck which has become soiled shall be cleaned prior to installation.

PART 2 - PRODUCTS

2.1 DECK

A. The steel floor units shall be formed from steel sheets conforming to ASTM A-653 SQ Grades 33, 40 or 80 with coating designation G60. The steel sheet before forming shall be thoroughly cleaned using a phosphatised type cleaner to remove all grease, oil and other foreign matter, and shall receive a protective coating of zinc conforming to ASTM A924.

B. Floor units shall be formed with integral locking lugs or embossments to provide a mechanical lock between the steel floor and the concrete slab.

C. Floor units shall be classified by Underwriters' Laboratories, Inc. Each unit or bundle shall be labeled and marked as required by Underwriters' Laboratories, Inc., indicating manufacturer, testing and inspection.

D. Floor units shall be continuous over as many spans as the structural steel layout will permit.

E. Provide 2" deep, 20 gage, composite steel floor deck that complies with the following minimum requirements with a 6" total slab thickness (145 PCF, normal weight concrete):

1. Maximum unshored spans for deck as a form based on SDI design criteria and loading recommendation:
   a. (6'-4") span_____(one span)
   b. (8'-4") span_____(two spans)
   c. (8'-7") span_____(three spans)
2. Superimposed uniform load capacity for composite slab (without shear studs on the supporting beams) based on SDI design criteria:
   a. (10') span_____(159)PSF

2.2 ACCESSORIES

A. Provide a complete closure system (using minimum 20 gage, galvanized sheet steel) so that the concrete slab can be placed without additional forming. Coordinate closure system with the structural steel.

B. Provide deck supports as required. Coordinate deck supports with the structural steel.

PART 3 - EXECUTION

3.1 ERECTION

A. Erection of steel deck shall be accomplished in accordance with the manufacturer's standards.

B. Install deck after structural support is in place, plumb, and true. Each unit shall be brought to proper bearing on supporting beams which must be properly aligned and level before the placement of the units. If the supporting beams are not properly aligned or sufficiently level to permit proper bearing, the supporting steel shall be corrected. The steel units shall not be placed until the correction is made.

C. The floor units shall be placed in straight alignment for the entire length of run of the flutes and with close registration of the flutes of one unit with those of the adjacent units and with a minimum gap between the ends of abutting units, (1/2" maximum gap). Do not lap deck ends.

D. Minimum bearing of the deck shall be 1½ inches.

E. Fasten steel floor deck as follows:

1. Steel floor units shall be fastened to the steel framework at each support by welds not less than 3/4" in diameter, spaced at not more than 12" across the width of the floor units. Where two units abut, each unit shall be so fastened.
2. The side laps of adjacent units shall be fastened by crimps (button-punching), welds, or steel screws between supports at intervals not to exceed 3' with a minimum of 1 fastener in any span.
3. Steel deck units shall be welded using 3/4" diameter welds to all steel beams extending in a direction parallel to the direction of the deck span at intervals not exceeding 12".
4. Welds shall be free of sharp points and edges.

F. Weld in place, where required, steel deck supports that are not detailed as part of the structural steel work.

G. Provide temporary shoring for deck during placement of concrete slab where indicated. Leave shoring in place until the concrete has attained 75 percent of its 28 day strength.

H. Floor deck shall be cut to fit framed openings located and dimensioned on the structural plans. Holes required but not shown on the plans, shall be cut and reinforced after approval of the Engineer.

I. Closure plates as required to form openings and edge of slab shall be furnished by the steel floor deck manufacturer and shall be welded in place. Closure plates shall be of heavy gage sufficiently strong to remain straight during concrete pouring.

J. Repair damaged finish using zinc rich paint, include welds and screws.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes, but is not limited to, the following metal fabrications:

1. Rough hardware.
2. Elevator pit ladder.
3. Steel angle frame and plate over elevator sump pit.
4. Miscellaneous framing and supports for the Elevator door sills.
5. Fixed vertical roof access ladders.

B. Related Sections include the following: Division 5 Section "Ornamental Handrails And Railings"

1.2 SUBMITTALS

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

B. Submit product data for shop primers. Label each product for use in interior or exterior exposure.

1. Submit proposed surface preparation method for each type of primer.

C. Refer to Concurrent Review requirements in Section 01330 "Submittal Requirements" for processing time and number of copies of each submittal.

D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience.

1.3 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 re-certification.

1.4 PROJECT 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.

1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating products without field measurements. Coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

PART 2 - PRODUCTS

2.1 FERROUS 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 Tubing: Product type (manufacturing method) and as follows:

1. Cold-Formed Steel Tubing: ASTM A 500.
2. Hot-Formed Steel Tubing: ASTM A 501.
3. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A 53.

D. 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.
2. Galvanized finish for exterior installations and where indicated.

E. Malleable-Iron Castings: ASTM A 47, Grade 32510.

F. 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 malleable iron or ASTM A 27 cast steel. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.

G. 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 in Exterior Locations, and Loading Dock area: Organic zinc-rich primer, complying with SSPC-Paint 20 and compatible with topcoat.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Carboline 621; Carboline Company.
   b. Aquapon Zinc-Rich Primer 97-670; PPG Industries, Inc.
   c. Tneme-Zinc 90-97; Tnemec Company, Inc.

2. Galvanized Metal in Exterior locations: Porter Paints #290 Galvanized Metal Primer.

B. Galvanizing Repair Paint: High-zinc-dust-content paint for re-galvanizing 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.

C. Universal Shop Primer for Interior Locations Only: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

D. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers.

2.3 FASTENERS

A. General: Provide plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electro-deposited 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, and, where indicated, flat washers.

C. Machine Screws: ANSI B18.6.3.

D. Lag Bolts: ANSI B18.2.1.

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

F. Plain Washers: Round, carbon steel, ANSI B18.22.1.

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

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Material: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Group 1 alloy 304 or 316 stainless-steel bolts and nuts complying with ASTM F 593 and ASTM F 594.

I. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as required.

2.4 GROUT

A. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

B. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

1. Five Star Grout; Five Star Products.
2. Euco N-S Grout; Euclid Chemical Co.
3. B-6 Construction Grout; W. R. Bonsal Co.

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. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 100 degrees F.

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

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

F. Remove sharp or rough areas on exposed surfaces.

G. 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.

H. 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.

I. 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.

J. Shop Assembly: Pre-assemble 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 re-assembly and coordinated installation.

K. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

L. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

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 STEEL LADDERS

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

1. For elevator pit ladders, comply with ASME A17.1.

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

C. Bar Rungs: 3/4 inch diameter round steel bars, 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 5 feet o.c. with 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 and rungs 48 inches above floor level.

2.8 ELEVATOR SUMP PIT COVER

A. Sump pit cover plate shall be 1/8 inch thick steel plate, not less than 4 inches greater than the sump pit opening dimensions. Weld four L1 x 1 x 1/8 x 8-inch long steel angle lugs on the bottom of the cover plate to fit inside the sump pit opening to hold the cover plate in place.

2.9 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.

B. Fabricate Units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.
   a. Except as otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.

2.10 FINISHES, GENERAL

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

B. Finish metal fabrications after assembly.

2.11 STEEL 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 un-fabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch 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:

1. Exteriors and Garage (SSPC Zone 1B): SSPC-SP 6 "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3 "Power Tool Cleaning."

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 unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorage, setting drawings, diagrams, templates, instructions, and directions for installing anchorage, 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 form-work 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.
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.

3.3 SETTING 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.

B. Set loose leveling and bearing plates on wedges or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.

1. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

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

SECTION 05511

METAL STAIRS AND RAILING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Pre-assembled steel stairs with concrete-filled treads.
2. Handrails and guard rails attached to metal stairs and landings.
3. Handrails attached to walls adjacent to metal stairs.

B. Related Sections include the following:

1. Division 3 Section "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal stairs capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each component of metal stairs.

1. Treads and Platforms of Metal Stairs: Capable of withstanding a uniform load of 100 pounds per square foot or a concentrated load of 300 pounds on an area of 4 square inches whichever produces the greater stress.

2. Stair Framing: Capable of withstanding stresses resulting from loads specified above in addition to stresses resulting from railing system loads.

3. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

B. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding the allowable design working stress of materials for handrails, railings, anchors, and connections:

1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:

a. Concentrated load of 200 pounds applied at any point and in any direction.
b. Uniform load of 50 pounds per lineal foot applied horizontally and concurrently with uniform load of 100 pounds per lineal foot applied vertically downward.

c. Concentrated and uniform loads above need not be assumed to act concurrently.

2. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:

a. Concentrated load of 200 pounds applied at any point and in any direction.
b. Uniform load of 50 pounds per lineal foot applied in any direction.
c. Concentrated and uniform loads above need not be assumed to act concurrently.

3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 pounds applied to 1 square foot at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.

a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guards.

1.3 SUBMITTALS

A. Product data: For metal stairs and the following:

1. Shop-applied primer
2. Handrail wall brackets

B. Shop drawings: Show fabrication and installation details for metal stairs. Include plans, elevations, sections, and details of metal stairs and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections.

1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welder certificates Copies of certificates for welding procedures and personnel.

D. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names, addresses, names and addresses of Architects and Owners, and other information specified.

1.4 QUALITY ASSURANCE

A. Professional Engineer Qualifications: A professional engineer legally qualified to practice in jurisdiction where Project is located and experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal stairs (including handrails and railing systems) that are similar to those indicated for this Project in material, design, and extent.

B. Fabricator Qualifications: A firm experienced in producing metal stairs similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Welding: Qualify procedures and personnel according to AWS D1.1 "Structural Welding Code Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel."

1.5 COORDINATION

A. Coordinate installation of anchorage's for metal stairs. Furnish setting drawings, templates, and directions, for installing anchorage, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Metal Surfaces, General: Provide metal free from pitting, seam marks, roller marks, and other imperfections where exposed to view on finished units. Do not use steel sheet with variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet.

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

C. Steel Tubing: Cold-Formed steel tubing complying with ASTM A 500.

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

E. Rolled Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A 36 or ASTM A 283, Grade C or D.

F. Steel Bars for Grating: ASTM A 36.

G. Zinc (Hot-dip Galvanized) Coatings on Iron and Steel: ASTM A 123 – 00.

H. Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process: ASTM A653/A 653M – 00.

I. Wire Rod for Grating Crossbars: ASTM A 510 (ASTM A 510M).

J. Uncoated, Cold-Rolled Steel Sheet: Commercial quality, complying with ASTM A 366/A 366M; or structural quality, complying with ASTM A 611, Grade A, unless another grade is required by design loads.

K. Uncoated, Hot-Rolled Steel Sheet: Commercial quality, complying with ASTM A 1008; or structural quality, complying with ASTM A 1011, Grade 30, unless another grade is required by design loads.

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

2.2 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 25 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for the type, grade, and class required.

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

C. Machine Screws ASME B18.6.3.

D. Lag Bolts: ASME B18.2.1.

E. Plain Washers: Round, carbon steel, ASME B18.22.1.

F. Lock Washers: Helical, spring type, carbon steel, ASME B 18.21.1.

G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

2.3 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.

1. Use primer with a VOC content of 420 grams per liter (3.5 pounds per gallon) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers or cold-applied asphalt emulsion complying with ASTM D 1187.

1. Apply bituminous paint to concealed bottoms, sides, and edges of cast-metal units set into concrete.

2.4 CONCRETE FILL AND REINFORCING MATERIALS

A. Concrete Materials and Properties: Comply with requirements of Division 3 Section "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 3,000 pounds per square inch, unless higher strengths indicated.

B. Welded Wire Fabric: ASTM A 185, 4 by 4 inches - W1.4 by W1.4, unless otherwise indicated.

2.5 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, handrails, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.

1. Join Components by welding, unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.

B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.

1. Industrial Class, unless otherwise indicated.

C. Shop Assembly: Pre-assemble stairs in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for field assembly and coordinated installation.

D. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Shear and punch metals cleanly and accurately. Remove sharp or rough areas on exposed surfaces.

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

F. Weld Connections to Comply with 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 that of adjacent surfaces.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat head (countersunk) screws or bolts. Locate joints where least conspicuous.

2.6 STEEL-FRAMED STAIRS

A. Stair Framing: Fabricate stringers of structural steel channels, plates, or a combination of both, as indicated. Provide closures for exposed ends of stringers. Construct platforms of structural steel channel headers and miscellaneous framing members as indicated. Bolt or weld headers to stringers; and bolt or weld newels and framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finish surfaces.

1. Where stairs are enclosed by gypsum board shaft-wall assemblies, provide hanger rods to support landings from floor construction above. Locate hanger rods within stud space of shaft-wall construction.
2. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

B. Metal Pan Risers, Sub-treads Pans, and Sub-platforms: Form to configurations shown from steel sheet of thickness necessary to support indicated loads, but not less than 0.0677 inch.

1. Steel Sheet: Uncoated hot-rolled steel sheet, unless otherwise indicated.
2. Attach risers and sub-treads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
3. Shape metal pans to include nosing integral with riser.
4. At Contractor's option, provide stair assemblies with metal-pan sub-treads filled with reinforced concrete during fabrication.
5. Provide sub-platforms of configuration indicated or, if not indicated, the same as sub-treads. Weld sub-platforms to platforms framing.

2.7 STEEL TUBE HANDRAILS AND RAILINGS

A. General: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacing, and anchorage, but not less than that needed to withstand indicated loads.

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

1. At tee and cross intersections, cope ends, of intersecting members to fit contour of tube to which end is joined, and welded all around.

C. Form changes in direction of handrails and rail as follows:

1. By bending or by inserting prefabricated elbow fittings.
2. By flush-radius bends or by inserting prefabricated flush-elbow fittings.

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

E. Close exposed ends of handrail and railing members with prefabricated end fittings.

F. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4-inch or less.

G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting railings and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete masonry work.

1. Connect railing posts to stair framing by direct welding, unless otherwise indicated.
2. Connect railing to walls with formed steel handrail brackets, equal to R&B Wagner Company, Style C.

H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thickness and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.

C. Install steel stairs by welding stair framing to steel structure or to weld plates cast into concrete, unless otherwise indicated.

D. Provide temporary bracing or anchors in form work for items that are to be built into concrete, masonry, or similar construction.

E. 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 for bolted or screwed field connections.

F. 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.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

3.2 INSTALLING STEEL TUBE RAILINGS AND HANDRAILS

A. Adjust handrails and railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and railing ends to building construction as follows:

1. Anchor posts to steel by welding directly to steel supporting members.
2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with post-installed anchors and bolts.

B. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2 inch clearance from inside of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as follows:

1. Use type of bracket with pre-drilled hole for exposed bolt anchorage.
2. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
3. For hollow masonry anchorage, use toggle bolts.
4. For wood stud partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
5. For steel-framed gypsum board assemblies, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
6. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

C. Space wall brackets at not more than 5 feet on center, and align with brackets on interior side of stairs. Space wall brackets as required to limit load on each wall bracket to less than 250 pounds.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed

B. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

C. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting".

D. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 07100

DECK WATERPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of the deck waterproofing system is indicated on the Drawings and in this Section. It includes the following components:

1. Expansion Joint Sealing System.
2. Elastomeric Joint Sealants.
3. Penetrating Concrete Deck Sealer.
4. Traffic Bearing Membrane.

B. The work of this section includes the following crack repair.

1. In the event cracks occur in the post-tensioned concrete deck, the waterproofing contractor shall provide the labor and materials to repair the cracks as indicated below at no additional cost to the Owner.
2. The cracks shall be routed and sealed with a traffic grade elastomeric joint sealant, (Article 2.3). The garage shall be inspected again after the first winter, and the balance of any crack repairs shall be undertaken that spring.
3. Should the amount of cracking in any one bay exceed three (3) lineal feet of crack per one hundred square feet of gross deck area, that bay shall be deemed unacceptable. Remedial action, such as the application of a traffic bearing membrane, may be required at no additional cost to the Owner.
4. The sealing of these cracks shall be included within the Special Project Warranty, (Article 1.6).

1.2 QUALITY ASSURANCE

A. Installer Qualifications: Engage an installer who has successfully completed, within the last 5 years, at least 5 applications similar in type and size to that of this project for each different product. Experienced personnel from such applications shall provide supervision for this project.

B. Single Source Responsibility for Materials: Obtain deck waterproofing materials from a single manufacturer for each different product required.

C. Prior to commencement of concrete work, review the Drawings, Specifications, shop drawings and concrete mix designs. Advise the contractor and Architect/Engineer of conditions that would adversely affect the work of this Section.

1. Complete review at earliest feasible date. Do not delay work of other contractors.

1.3 SUBMITTALS

A. Product Information: Submit, under the provisions of Division 1, product information for each deck waterproofing product specified in Part 2, demonstrating compliance with specified requirements.

B. Submit reports indicating chloride levels as required in Article 3.10.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in original unopened containers, or bundles with labels indicating manufacturer, product name, expiration period for use, pot life and curing time.

B. Store and handle materials in a manner to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.5 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of deck waterproofing materials under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by product manufacturer, or below 40°F.

2. When substrates are wet due to rain, frost, condensation or other causes, or when substrate surface temperature is less than 5°F above the dew point temperature. Penetrating concrete deck sealers may be applied to damp (not wet) substrates in accordance with manufacturer's recommendations.

3. When rain is predicted, or anticipated, within 4 hours after application of deck waterproofing materials.

B. Joint Conditions: Do not proceed with installation of joint sealants when joint dimensions are outside of limits allowed by joint sealant manufacturer for application indicated.

1.6 SPECIAL PROJECT WARRANTY

A. The manufacturer of each deck waterproofing product shall provide a written, single-source performance warranty to the Owner covering the work of this Section. The special project warranty shall include the following:

1. Expansion Joint Sealing System.

2. Elastomeric Joint Sealants.

3. Penetrating Concrete Deck Sealer.

4. Traffic Bearing Membrane.

B. The special project warranty shall warrant to the Owner that the products and materials used on the project are free of manufacturing defects, meet or exceed specification requirements, and are suitable for their indicated use under environmental and traffic conditions that will exist during the life of the warranty. The following unsatisfactory conditions shall be specifically covered under the special project warranty:

5. Expansion Joint Sealing System and Elastomeric Joint Sealants:
   a. Adhesive or cohesive failure.
   b. Tearing or abrasive failure resulting from normal, rubber-wheeled traffic.
   c. Loss of watertightness at construction joints and expansion joints.
   d. Weathering or aging deficiencies which result in failure of the deck waterproofing system or its components.
   e. Product deficiencies which result from the effects of automotive fluids or the occasional use of commercial de-icing salts.

6. Penetrating Concrete Deck Sealer:
   a. Concrete deck surfaces treated with penetrating concrete deck sealers that demonstrate absorption over 250 ppm total chloride, at the 1/2 to 1 inch depth level, over established baseline chlorides when tested in accordance with AASHTO T260. See Article 3.10.

7. Traffic Bearing Membrane:
   a. Traffic bearing membrane shall be capable of bridging cracks in the substrate up to 1/16" in width, without rupture of the membrane or loss of watertightness.
   b. Substantial degradation of the aggregate wearing surface, loss of skid resistance, or the exposure of the base coat of the traffic bearing membrane.
   c. Peeling, rupturing, or tearing of the traffic bearing membrane resulting from normal, rubber-wheeled traffic.

C. The manufacturer of the expansion joint sealing system, the elastomeric joint sealants, and the traffic bearing membrane agree to replace, at no cost to the Owner, materials or systems that are defective, or which fail by reason of any of the above listed conditions. Failed joint sealants shall be removed back to sound, acceptable surfaces and replaced with new materials.

D. Ineffective sealed decks shall be retreated with penetrating concrete deck sealer back to nearest acceptable deck test site at no cost to the Owner.

E. The warranty period shall be five (5) years after the date of substantial completion of the work of this Section.

F. The special project warranty shall not cover water or chloride penetration of the substrate for the following reasons:

1. Concrete not meeting specified requirements for compressive strength and air content.

2. Cracks in the concrete substrate which have developed from structural movement, except cracks that develop at control joints, construction joints, and on decks with a traffic bearing membrane.

PART 2 - PRODUCTS

2.1 GENERAL

A. Compatibility: Provide deck waterproofing materials and other related materials, that are compatible with one another, and with substrates, under conditions of service and application, as demonstrated by testing and field experience.

2.2 EXPANSION JOINT SEALING SYSTEM

A. Factory molded joint sealing system specifically developed for sealing expansion joints in parking garages.

B. Standards:

1. Expansion joints through parking structure and around stair/elevator towers, at all levels:
   a. Jeene Structural Sealing Joint, FW-Series by Watson Bowman Acme.
   b. Vulkem 265 HD by Tremco, Inc.
   c. Wabocrete 201 Membrane System by Watson Bowman Acme.
   d. Iso-Flex Winged Expansion Joint Sealing System, "J" Seal Type by LymTal International, Inc.

C. Design expansion joint sealing system to accommodate the joint movement requirements indicated on the Drawings.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated, which complies with ASTM C920 requirements, including those for type, grade, class, and uses.

B. Multi-Part Nonsag Urethane Sealant: Type M, Grade NS, Class 25, and Use T.

1. Standards:
   a. Iso-flex 881 by LymTal International, Inc.
   b. THC-901 by Tremco, Inc.
   c. Sikaflex - 2cNS by Sika Corp.

C. Multi-Part Pourable Urethane Sealant: Type M, Grade P, Class 25, and Use T.

1. Standards:
   a. Iso-flex 880 G.B. by LymTal International, Inc.
   b. THC-900 by Tremco, Inc.
   c. Sikaflex - 2cSL by Sika Corp.

2.4 PENETRATING CONCRETE DECK SEALER

A. Penetrating concrete deck sealer shall be a proprietary, 40 percent silane solution specifically developed to deeply penetrate concrete surfaces typically found in parking garages. The sealer shall provide a long-term barrier to moisture absorption, freeze-thaw protection, and shall limit chloride ion penetration of the concrete surface in accordance with Article 1.6.

B. Sealing of the concrete shall take place within the concrete. Surface coatings are not acceptable.

C. Standards:

1. Chem-Trete BSM-40 by Huls America, Inc.

2. Hydrozo Silane 40 by Hydrozo, Inc.

3. Hydrozo Enviroseal 40 by Hydrozo, Inc.

4. Iso-Flex 618 VOC by LymTal International, Inc.

5. Iso-Flex 618 W.B. by LymTal International, Inc.

D. Penetrating concrete deck sealer shall pass water absorption, chloride ion protection, and weathering resistance criteria of NCHRP Report #244.

2.5 TRAFFIC BEARING MEMBRANE

A. Traffic bearing membrane system shall be capable of bridging existing and new cracks up to 1/16 inch in width without rupture of the membrane or loss of watertightness. The following standards are allowed provided that each one is installed to comply with this requirement.

B. Standards:

1. CCW-5123 Deck Coating System by Carlisle Corporation: CCW-5123.

2. Stellar Mark Pro-Deck TDC: Heavy duty.

3. Iso-Flex 760 Low Odor by LymTal International, Inc.: HVT.

4. Vulkem Traffic Deck Coating System by Tremco, Inc.: 350/345/346 NF, 93 dry mils.

C. Traffic bearing membrane on decks exposed to sunlight shall be an ultraviolet stable system.

2.6 MISCELLANEOUS MATERIALS

A. Primers: Provide types recommended by deck waterproofing system manufacturers, where required for adhesion of products to substrates indicated.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect joints and substrates indicated to receive deck waterproofing system for compliance with indicated requirements and other conditions affecting system performance. Provide written report listing any conditions detrimental to performance of work. Work shall not proceed until unsatisfactory conditions have been corrected.

3.2 GENERAL PREPARATION

A. The installer, manufacturers' representatives, and other trades whose work affects installation of the deck waterproofing system shall meet at project site to review procedures and time schedule proposed for installation of deck waterproofing system components.

3.3 JOINT PREPARATION

A. Surface cleaning of joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturers and the following requirements.

1. Remove foreign material from joint substrates which could interfere with adhesion of joint sealant, including dust, oil, water and frost.

2. Clean concrete by brushing, grinding, blast cleaning, mechanical abrading, acid washing 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. Dress control joints and construction joints with an abrasive blade before beginning joint sealant work.

B. Joint priming: 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 which 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.

3.4 PENETRATING CONCRETE DECK SEALER PREPARATION

A. Remove foreign material from deck surface which could interfere with complete coverage of deck surface, inadequate penetration of deck sealer, or contaminate deck sealer.

1. Shot blast or water blast deck for proper deck sealer penetration.

2. Remove laitance from deck surface.

B. Do not begin penetrating concrete deck sealer application until all required elastomeric joint sealants have been installed, repaired (if necessary) and are fully cured in accordance with joint sealant manufacturer's requirements.

C. Install penetrating concrete deck sealer at least 72 hours before application of traffic paints.

3.5 TRAFFIC BEARING MEMBRANE PREPARATION

A. Comply with manufacturer's requirements for the preparation of the substrate to receive the traffic bearing membrane.

B. The application of the traffic bearing membrane shall not begin until at least 28 days after the concrete has been placed.

3.6 INSTALLATION OF JOINT SEALANTS

A. Comply with joint sealant manufacturers' installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

1. Install joint sealants in construction joints in supported structural slabs and in slabs on grade and in slab on grade control joints.

B. Elastomeric joint sealant installation: Comply with recommendations of ASTM C962 for use of joint sealants as applicable to materials, applications and conditions indicated.

C. Installation of sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates. Completely fill recesses provided for each joint configuration and provide uniform, cross-sectional shapes and depths relative to joint widths, which allow optimum sealant movement capability.

D. 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 which discolor sealants or adjacent surfaces, or are not approved by sealant manufacturer.

E. Do not proceed with the installation of the expansion joint sealing system unless the ambient temperature has been above 40°F for a minimum of (7) days prior to the start of installation.

F. Install expansion joint sealing system a minimum of (30) days after concrete has been placed on each side of joint.

3.7 PROTECTION AND CLEANING - JOINT SEALANTS

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, and reseal joints with new materials to produce sealed joint with repaired areas indistinguishable from original work.

B. 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.

3.8 APPLICATION OF PENETRATING CONCRETE DECK SEALER

A. Apply penetrating concrete deck sealer top surfaces of slabs on grade within the garage and post-tensioned slabs.

B. Apply penetrating concrete deck sealer in conformance with manufacturer's recommendations using low-pressure airless or gravity-type spray equipment.

C. Apply penetrating concrete deck sealer at the application rate recommended by the manufacturer. However, the application rate shall be such as to limit chloride absorption in accordance with Article 1.6. In no case shall the application rate be greater than 125 square feet per gallon.

D. Apply penetrating concrete deck sealer when the ambient temperature and wind velocity are such that they will not interfere with the sealer meeting the requirement of Article 1.6, regarding the chloride screening criteria.

E. Materials used on site shall be taken from manufacturer's original, unopened, labeled, factory-sealed containers. Evidence of tampering with seals will result in rejection of materials. Materials shall be used in an "as-delivered" condition. Materials shall not be altered or modified in any way.

F. Do not allow traffic on deck until penetrating concrete deck sealer has completely penetrated surface and surface appears to be completely dry.

G. Remove ponding sealer materials before they dry with squeegees or by other means.

3.9 APPLICATION OF TRAFFIC BEARING MEMBRANE

A. Comply with manufacturer's requirements for the application of the traffic bearing membrane including the preparation of joints and cracks.

B. Apply traffic bearing membrane as specified in Article 2.5.

C. Apply traffic bearing membrane to the supported structural slabs as indicated on the Drawings.

3.10 WARRANTY REQUIREMENTS - PENETRATING CONCRETE DECK SEALER

A. Systematic monitoring, pursuant to the procedures set forth below, shall be accomplished before application of the sealer, and in the spring of the first through fourth years after application. Costs for this monitoring service shall be included in the Contract Sum. This monitoring program is not required when a corrosion inhibitor admixture is used in the concrete to be tested.

B. Before the penetrating concrete deck sealer is applied, perform the following:

1. One representative control area will be established on each of the supported parking levels, located within a driving lane near the entry point to that level.

2. Core samples shall be taken to establish the baseline chloride level. Locations of cores must be accurately correlated with the slab tendons by use of an R-meter in order to prevent damage to the post-tensioning tendons.

3. Rapid permeability and/or other tests as designated by manufacturer shall be run to verify the baseline characteristics of the concrete.

4. Manufacturer shall report the test results and issue a statement of their willingness to issue the warranty.

5. The cost of the preliminary testing shall be paid by the manufacturer.

C. The warranty shall be issued after the sealer is applied in accordance to the manufacturer's directions.

D. In the spring of each year of the monitoring program (March, April or May), an inspection will be made of the structure by the manufacturer, or its assignee, and a report issued to the Owner. The report shall cover general maintenance requirements and any remedial action deemed necessary. The cost of this report will be paid by the manufacturer.

E. The spring of each year shall be considered the "anniversary date" of the project, and the first through fourth anniversary dates designated as "monitoring years". This monitoring shall consist of taking cores from the designated control areas and testing them in accordance with Paragraph 1.6B. A report of the results of the tests shall be issued to the Owner and Architect/Engineer by the approved testing agency.

F. The testing must be completed by the end of May in each monitoring year.

G. Chloride testing shall be performed by an independent testing laboratory.

H. Slabs on grade are excluded from the sealer warranty.

END OF SECTION

SECTION 07115

BITUMINOUS DAMPPROOFING

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 cold-applied, emulsified- asphalt dampproofing applied to the exterior face of existing concrete masonry units indicated to receive new brick veneer.

B. Related Sections include:

1. Division 4 Section "Unit Masonry" for brick veneer, anchors, and through-wall flashing.
2. Division 7 Section "Sealants"

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.5 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt dampproofing to be performed according to manufacturers' written instructions.

B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has thoroughly cured.

PART 2 - PRODUCTS

2.1 BITUMINOUS DAMPPROOFING

A. Cold-Applied, Emulsified-Asphalt Dampproofing: Fibered Brush and Spray Coats, ASTM D 1227, Type IV.

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

1. "220AF" by Karnak Corporation.
2. "Sealmastic" Type 2 by W.R. Meadows, Inc.
3. "Hydrocide" 700B by Sonneborn, Div. of ChemRex, Inc.

2.2 MISCELLANEOUS MATERIALS

A. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Applicator present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.

1. Begin dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

3.3 APPLICATION, GENERAL

A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.

1. Apply additional coats if recommended by manufacturer or required to achieve coverage indicated.
2. Allow each coat of dampproofing to cure 24 hours before applying subsequent coats.

B. Apply dampproofing to provide continuous plane of protection on exterior face of inner wythe of exterior masonry cavity walls.

1. Lap dampproofing at least 1/4 inch onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.
2. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe, and lap dampproofing at least 1/4 inch onto shelf angles supporting veneer.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. On Masonry Backup for Brick Veneered Walls: Apply primer and dampproofing as recommended by the manufacturer for the substrate, but not less than the following:

1. Apply primer and two brush or spray coats at not less than 1.5 gallons per 100 square feet for first coat and 1.5 gallons per 100 square feet for second coat.

3.5 CLEANING

A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

END OF SECTION

SECTION 07131

SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Rubberized-asphalt sheet waterproofing.
2. HDPE sheet waterproofing.
3. Interface with continuous perforated foundation drain pipe.

B. Related Sections include the following:

1. Division 2 for granular backfill and geotextile fabric.
2. Division 15 for foundation drain pipe.

1.2 PERFORMANCE REQUIREMENTS

A. Provide waterproofing that prevents the passage of water.

1.3 SUBMITTALS

A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.

B. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who is authorized, approved, or licensed by waterproofing manufacturer to install manufacturer's products.

B. Source Limitations: Obtain waterproofing materials molded-sheet drainage panels through one source from a single manufacturer.

C. Mockups: Apply waterproofing to 100 square feet of wall to demonstrate surface preparation, crack and joint treatment, corner treatment, and execution quality.

1. If Architect determines mockups do not comply with requirements, reapply waterproofing until mockups are approved.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review requirements for waterproofing, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.

C. Remove and replace liquid materials that cannot be applied within their stated shelf life.

D. Store rolls according to manufacturer's written instructions.

E. Protect stored materials from direct sunlight.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1. Do not apply waterproofing in snow, rain, fog, or mist.

B. Maintain adequate ventilation during preparation and application of waterproofing materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Rubberized-Asphalt Sheet Waterproofing:
   a. American Hydrotech, Inc.; VM 75. (vertical applications only)
   b. American Permaquik Inc.; PQ 7100.
   c. Carlisle Corporation, Carlisle Coatings & Waterproofing Div.; CCW 701.
   d. W. R. Grace & Co.; Bituthene 3000.
   e. W. R. Meadows, Inc.; Mel-Rol.
   f. T. C. MiraDri; MiraDri.
   g. Polyguard Products, Inc.; Polyguard 650.

2. HDPE Sheet Waterproofing: W. R. Grace & Co.; Preprufe.

2.2 SHEET WATERPROOFING

A. Rubberized-Asphalt Sheet for Vertical Applications and Split-Slab Balconies: 60-mil- thick, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated to a 4-mil- thick, polyethylene film with release liner on adhesive side.

1. Physical Properties: As follows, measured per standard test methods referenced:
   a. Tensile Strength: 250 psi minimum; ASTM D 412, Die C, modified.
   b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
   c. Low-Temperature Flexibility: Pass at minus 20 degrees F; ASTM D 1970.
   d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C 836.
   e. Puncture Resistance: 40 pounds minimum; ASTM E 154.
   f. Hydrostatic-Head Resistance: 150 feet minimum; ASTM D 5385.
   g. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D 570.
   h. Vapor Permeance: 0.05 perms; ASTM E 96, Water Method.

B. HDPE Sheet for Below-Grade Slab Applications: 56-mil- thick, uniform, flexible sheets consisting of 30-mil- thick, HDPE sheet coated with a pressure-sensitive rubber adhesive, a protective adhesive coating, a detackifying surface treatment, an uncoated self-adhering side lap strip, and a release liner.

1. Physical Properties: As follows, measured per standard test methods referenced:
   a. Tensile Strength, Film: 4,000 psi minimum; ASTM D 412.
   b. Low-Temperature Flexibility: Pass at minus 10 degrees F; ASTM D 1970.
   c. Peel Adhesion to Concrete: 5 pounds-force per inch; ASTM D 903, modified.
   d. Lap Adhesion: 2.5 pounds-force per inch; ASTM D 1876, modified.
   e. Hydrostatic-Head Resistance: 231 feet; ASTM D 5385, modified.
   f. Vapor Permeance: 0.01 perms; ASTM E 96, Water Method.

2.3 INSULATION

A. Board Insulation: For protection of underground vertical waterproofing and for perimeter thermal insulation where indicated at waterproofed surfaces. Extruded-polystyrene board insulation complying with ASTM C 578, square edged; Type IV, 1.6-pounds per cubic foot minimum density and 25-psi compressive strength.

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

1. Diversifoam Products.
2. Dow Chemical Company (The).
3. Owens Corning.
4. Tenneco Building Products.

2.4 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.

1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid solvent-borne primer recommended for substrate by manufacturer of sheet waterproofing material.

C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.

D. Sheet Strips: Self-adhering, rubberized-asphalt composite sheet strips of same material and thickness as sheet waterproofing.

E. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.

F. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.

G. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

H. Metal Termination Bars: Aluminum bars, approximately 1 inch by 1/8-inch thick, pre-drilled at 9-inch centers.

I. Protection Course for Split-Slab Balconies: Semi-rigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:

1. Thickness: 1/4 inch, nominal.

J. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for type of protection course.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.

1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
2. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.

1. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.

F. Bridge and cover isolation joints expansion joints and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips.

1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.

1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
   a. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.

H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.3 RUBBERIZED-ASPHALT SHEET APPLICATION

A. Install self-adhering sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.

B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Re-prime areas exposed for more than 24 hours.

C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.

1. When ambient and substrate temperatures range between 25 and 40 degrees F, install self-adhering, rubberized-asphalt sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 degrees F.

D. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.

E. Seal exposed edges of sheets at terminations not concealed by metal counter-flashings or ending in reglets with mastic or sealant.

F. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.

G. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheets extending 6 inches beyond repaired areas in all directions.

H. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.

3.4 HDPE SHEET APPLICATION

A. Install HDPE sheets according to waterproofing manufacturer's written instructions.

B. Horizontal Applications: Install sheet membrane with HDPE face against substrate. Accurately align sheets and maintain uniform 3-inch- minimum lap widths and end laps. Overlap and seal seams. Overlap, stagger, and seal end laps with detail tape to ensure watertight installation.

C. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.

D. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling.

E. Install sheet waterproofing and auxiliary materials to produce a continuous watertight tie into adjacent waterproofing.

F. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches beyond repaired areas in all directions. Apply a patch of sheet membrane and firmly secure with detail tape.

G. Correct deficiencies in or remove waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.

3.5 PROTECTION AND CLEANING

A. Protect waterproofing from damage and wear during remainder of construction period.

B. Protect installed insulation panels from damage due to ultraviolet light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

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

END OF SECTION

SECTION 07425

ALUMINUM COMPOSITE PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Field-assembled metal-faced composite panels with concealed fasteners.
2. Girts, purlins, and other secondary panel support members as required for a complete installation.

B. Related Sections:

1. Division 5 Section "Cold-Formed Metal Framing" for secondary support framing supporting metal wall panels.
2. Division 7 Section "Building Insulation" for wall insulation.
3. Division 7 Section "Sheet Metal Flashing and Trim" for wall flashing and other sheet metal work.
4. Division 7 Section "Joint Sealants" for field-applied panel sealants.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide certified test results by a recognized testing laboratory or agency in accordance with specified test methods for each system.

B. Panels shall be designed to withstand the Design Wind Load based upon the local building code, but in no case less than 20 pounds per square foot and 30 pounds per square foot on parapet and corner panels. Wind load testing shall be conducted in accordance with ASTM E 330.

C. Air Infiltration: Provide wall panel systems with an air infiltration rate of not more than 0.06 cubic feet per minute per square foot of fixed wall area when tested in accordance with ASTM E 283 at a static air pressure differential of 1.57 pounds per square foot.

D. Water Penetration: Provide panel systems with no water penetration as defined in the test method when tested in accordance with ASTM E331 at an inward static air_pressure differential of not less than 6.24 pounds per square foot and not more than 12.0 pounds per square foot.

1. Water penetration is defined as the appearance of uncontrolled water in the wall.

2. Wall design shall feature provisions to drain to the exterior face of the wall any leakage of water at joints and any condensation that may occur within the construction.

E. Deflections and thermal movements: Provide manufacturer's products and system which are capable of withstanding building movements and weather exposures including wind loading, and which are capable of performing within the following limitations:

1. Normal to the Plane of the Wall: Deflection of perimeter framing members shall not exceed L/175 of span length or 3/4-inch, whichever is less. Deflection of individual panels shall not exceed L/60.
2. At connection points of framing members to anchors, anchor deflection in any direction shall not exceed 1/16-inch.
3. Thermal Movements: Make allowances for free vertical and horizontal thermal movement due to the contraction and expansion of component parts. For an ambient air temperature range from plus 0 degrees F to 100 degrees F, buckling, opening of joints, undue stress on fasteners, failure of sealants or any other detrimental effect due to the thermal movement of component parts will not be permitted. Fabrication, assembly, and erection procedure shall take into account the ambient temperature range at the time of the respective operation.
4. Structural Performance: Shall be tested in accordance with ASTM E330 at design pressure. No permanent deformation or failures of structural members shall occur.
5. Panel Flatness Criteria: Maximum 1/32-inch in 24 inches on panel in any direction for assembled units (non-accumulative).
6. Bond Integrity: When testing in accordance with ASTM D 1781 for bond integrity, simulating resistance to delamination:
   a. Bond Strength: 1,500 psi minimum, per ASTM C297.
   b. Peel Strength: minimum 33.6 inch-pounds per inch, per ASTM D1781.
   c. Shall have successfully passed 6 each ASTM D 1037 weather cycling test.
   d. Shall have no change in bond performance after 8 hours of submersion in boiling water and after 21 days immersion in water at 70 degrees F.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product specifications, standard details, certified product test results, installation instructions, and general recommendations, as applicable to materials and finishes for each component and for total panel system.

B. Samples for Initial Selection Purposes: Color charts or chips showing full range of colors, textures, and patterns available for roof and wall panels with factory-applied finishes.

C. Samples for Verification Purposes: Panels 12 inches long by actual panel width, in the profile, style, color, and texture indicated. Include clips, battens, fasteners, closures, and other panel accessories.

D. Shop Drawings: Showing layout of panels, details of edge conditions, joints, corners, panel profiles, supports, anchorage, trim, flashing, closures, and special details. Distinguish between factory and field assembly work.

E. Compatibility and Adhesion Test Reports: From sealant manufacturer indicating the following:

1. Materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.4 QUALITY ASSURANCE

A. Field Measurements: Where possible, prior to fabrication of panels, take field measurements of structure or substrates to receive panel system. Allow for trimming panel units where final dimensions cannot be established prior to fabrication.

B. Source Limitations: Obtain each type of metal wall panel through one source from a single manufacturer.

C. Manufacturer's Qualifications: Manufacturers of components of the facing panel system, including composite panels, framing, and mounting system shall have not less than five (5) years experience in the manufacture of each component.

D. Fabricator / Installer Qualifications: Facing panel system shall be fabricated and installed by a firm with not less than five (5) years of successful experience in the fabrication and erection of wall systems similar to systems required for this project and shall be acceptable to the composite panel manufacturer who shall state this in writing.

1. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

E. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal wall panels and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

F. Pre-construction Compatibility and Adhesion Testing: Submit to joint sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
   a. Perform tests under environmental conditions replicating those that will exist during installation.

2. Submit no fewer than nine pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.

G. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:

1. Meet with Owner, Architect, testing and inspecting agency representative, metal wall panel Installer, metal wall panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal wall panels including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal wall panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
6. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
7. Review temporary protection requirements for metal wall panel assembly during and after installation.
8. Review wall panel observation and repair procedures after metal wall panel installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver panels and other components so they will not be damaged or deformed. Package wall and roof panels for protection against transportation damage.

B. Handling: Exercise care in unloading, storing, and erecting wall and roof covering panels to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weather-tight ventilated covering. Store metal wall panels so that they will not accumulate water. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal wall panel fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION

A. Coordinate metal wall panel assemblies with rain drainage work, flashing, trim, and construction of girts, soffits, and other adjoining work to provide a leak-proof, secure, and non-corrosive installation.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures, including rupturing, cracking, or puncturing.
   b. Water intrusion in excess of the specified maximum amount.
   c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Finish Warranty: Furnish panel manufacturer's written warranty covering failure of the factory-applied exterior finish on metal wall panels within the warranty period. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

1. Warranty period for factory-applied exterior finishes on wall panels is 20 years after the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Alucobond, as manufactured by Alcan Composites USA Inc., or a comparable product by one of the following:

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include shall be one of the following:

1. Alcan Composites USA Inc. - "Alucobond"
2. Alcoa Cladding Systems - "Reynobond".
3. Mitsubishi Chemical Corporation - "Alpolic"

C. Obtain products specified within this section from a single manufacturer.

2.2 MATERIALS

A. Composite Facing Panels: Provide aluminum faced composite panel material as follows:

1. Core: Solid thermoplastic material free of voids and/or air spaces and not containing foamed insulation material. Extrude core in a continuous process (not laminated by sheet in a batch process) and bonded to face sheets without glues or adhesives between dissimilar materials.
2. Face Sheets: Coil coated 0.020 aluminum 3003 alloy or 3105-H14 alloy, bonded under tension in a continuous process to core material.
3. Thickness: 4 mm minimum.
4. Panel Mounted System: Provide continuous extrusions, formed members, sheet and plate, of alloy, temper and thickness recommended by the manufacturer to comply with the requirements of ASTM B 209 for sheet or plate.
5. Copings and Edge Trim: Composite Aluminum with integral weather-stripping, minimum wall thickness of 4 mm.
6. Stiffeners: Extruded aluminum section secured to edge trim and bonded and structurally fastened to rear face of composite panel with silicone, and of sufficient size and strength to maintain flatness within specified panel strength. Stiffeners shall have a primed finish compatible with silicone.
7. Sealant Systems: concealed sealants and gaskets within the panel system shall be as per manufacturer standards to meet performance requirements.
8. Flashing: Aluminum sheet, .062 inch thick minimum. Where exposed to view, finish to match adjacent surfaces. Provide lap strip under flashing at abutted conditions with lapped surfaces sealed with a full bed of non-hardening sealant.

9. Furring: hat type aluminum extrusions of size and thickness determined by panel system manufacturer for indicated applications.
10. Fasteners: Concealed, non-corrosive as recommended by panel manufacturer.
11. Anchors, Clips, and Accessories: Depending on strength and corrosion-inhibiting requirements, fabricate unit of aluminum, non-magnetic stainless steel, or hot-dipped zinc coated steel or iron.

2.3 ACCESSORIES

A. Extrusions, formed members, sheet, and plate shall conform with ASTM B 209 and the recommendations of the panel manufacturer.

B. Panel stiffeners shall be structurally fastened or restrained at the ends and shall be secured to the rear face of the composite panel with silicone of sufficient size and strength to maintain panel flatness. Stiffener material and/or finish shall be compatible with the silicone.

C. Sealants and gaskets within the panel system shall be as per manufacturer's standards to meet performance requirements.

2.4 FABRICATION

A. System characteristics: Plans, elevations, details, characteristics, and other requirements indicated are based upon standards by Basis of Design manufacturer. It is intended that other manufacturers may be acceptable, provided their details and characteristics comply with requirements of size and profiles, and material/performance standard as indicated and as follows:

1. System shall consist of composite panels with joints with "Rout-and-Return Dry" type joints. System must provide a perimeter aluminum extrusion with integral weather-stripping.
   a. No field sealant required in joints, except at joints between panels and adjacent dissimilar materials or as specifically noted on drawings.
2. System shall provide a non-destructive, semi-sequential, removable panel assembly.
3. System shall not generally have any visible fasteners, telegraphing or fastening or assembly on the panel faces or any other compromise of a neat, flat, fasteners and sealant free panels and joint appearance.
4. The panels will not deviate from true plane more than 1/4 inch in 20 feet.

B. General:

1. Fabricate panel system to dimensions, size and profiles indicated on the drawings, based on an assumed design temperature of 70 degrees F. Allow ambient temperature range of time of fabrication and erection.
2. Coordination of Fabrication: Where possible, check actual field dimensions in construction work by accurate field measurements on final shop drawings. However, coordinate fabrications schedule with construction progress as directed by the Contractor to avoid delay of work. Where necessary, proceed with fabrication without field measurements and coordinate installation tolerance to ensure proper fit of all system components.
3. Shop fabricate units, where practical, ready for erection. If not shop assembled, prefabricate components at the shop as required for proper and expeditious field assembly.
4. Design, fabricate, assemble, and erect system including sealed joints with other work, to be free of water leakage. Provide means of concealed drainage with baffles and weeps for water and condensation which may accumulate in members of the system.

C. Composite Panel and Mounting System:

1. Fabricate panels in sizes shown using composite panel material and perimeter extrusions. Completed panels shall be properly fabricated and designed so that no restraints can be placed on the panel which might result in compressive skin stresses. The installation detailing shall be such that the installed panels shall remain flat regardless of temperature changes and at all time remain water and wind-tight.
2. Provide required stiffeners secured to rear face of panels and mechanically secured to edge trim members.

D. Accessories: Except as indicated as work of another specification section, provide components required for a complete panel system, including trim, copings, fascias, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashing, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.

E. Bituminous Coating: Cold-applied asphalt mastic, SSPC paint 12, compounded for 15 mil dry film thickness per coat.

2.5 FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.

C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

D. High-Performance Organic Coating Finish: AA C12C42R1x (Chemical finish: cleaned with inhibited chemical; Chemical Finish: acid chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.

1. Fluoropolymer 2-Coat System – thermo-cured system composed of specially formulated inhibitive primer, barrier, fluoropolymer color coat, and clear fluorocarbon topcoat, with both color coat and clear topcoat containing not less than 70 percent Kynar or Hylar fluoropolymer resin by weight; that meets or exceeds the values of AAMA 2605.
   a. Durability: Provide coating field-tested under normal range of weather conditions for a minimum of 20 years without significant peel, blister, flake, chip, crack or check in finish; without chalking in excess of a chalk rating of 8 according to ASTM D4214; and without fading in excess of 5 Hunter units.
   b. Color: To be determined.

PART 3 - EXECUTION

3.1 PANEL SUPPORTS AND ANCHORAGE

A. Girts, purlins, and other secondary structural panel support members and anchorage shall be installed in accordance with AISC Manual of Steel Construction "Code of Standard Practice."

3.2 EXAMINATION

A. Examine supporting structure and conditions under which the work is to be erected, and notify the Contractor in writing of conditions detrimental to proper and timely completion of the work. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.3 PANEL INSTALLATION

A. General: Comply with manufacturers' instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor panels and other components of the work securely in place, with provisions for thermal and structural movement.

1. Field cutting of exterior panels by torch is not permitted.
2. Install panels with concealed fasteners.

B. Attachment System Installation, General: Install attachment system required to support metal-faced composite wall panels and to provide a complete weather-tight wall system, including sub-girts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.

1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
2. Do not begin installation until weather barrier and flashings that will be concealed by composite panels are installed.

C. Track-Support Installation: Provide manufacturer's standard horizontal and vertical tracks that provide support and complete secondary drainage system, draining to the exterior at horizontal joints. Install support system at locations, spacings, and with fasteners recommended by manufacturer. Attach panels to wall or canopy framing by interlocking tracks with perimeter extrusions attached to wall panels. Fully engage integral gaskets and leave horizontal and vertical joints with open reveal.

1. Attach routed-and-returned flanges of wall panels to perimeter extrusions with manufacturer's standard fasteners.
2. Install wall panels to allow individual panels to "free float" and be installed and removed without disturbing adjacent panels.
3. Do not apply sealants to joints unless otherwise indicated on Drawings.

D. Erect panels plumb, level and true.

E. Anchor panels securely in place in accordance with manufacturer's approved shop drawings.

F. Conform to panel manufacturer's instructions for installation of concealed fasteners.

G. Do not install component parts which are observed to be defective, including warped, bowed, dented, abraded and broken members.

H. Do not cut, trim, weld, or braze component parts during erection in a manner which would damage the finish, decrease strength, or result in a visual imperfection or a failure in performance. Return component parts which require alteration to shop or re-fabrication, if possible, or for replacement by new parts.

I. Dissimilar Metals: Apply a coat of bituminous paint, concealed, on one or both surfaces where dissimilar metals would otherwise be in contact. Use gasketed fasteners where needed to eliminate the possibility of corrosive or electrolytic action between metals.

J. Anchor component parts of the system securely in place, provide for necessary thermal and structural movement.

K. Tolerances: Provide adjustment within system to accommodate variations of the structure. Deviation from established vertical, horizontal, or designed position must not exceed 1/8-inch per 12 feet of length of any member of 1/4-inch in any total run in any line.

3.4 CLEANING AND PROTECTION

A. Damaged Units: Replace panels and other components of the work that have been damaged or have deteriorated beyond successful repair by means of finish touch-up or similar minor repair procedures.

B. Cleaning: Remove temporary protective coverings and strippable films (if any) as soon as each panel is installed. Upon completion of panel installation, clean finished surfaces as recommended by panel manufacturer, and maintain in a clean condition during construction.

END OF SECTION

SECTION 07543

THERMOPLASTIC POLYOLEFIN (TPO) 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 the following:

1. Adhered membrane roofing system, including sidewall membrane flashing around the roof well.
2. Roof insulation.
3. Walkway protection pads.

B. Related Sections include the following:

1. Division 5 Section "Architectural Joint Systems" for joint covers at building expansion joints.
2. Division 6 Section "Rough Carpentry" for plywood deck, wood nailers, curbs, and blocking.
3. Division 7 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counter-flashings.
4. Division 7 Section "Joint Sealants."

1.3 DEFINITIONS

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

B. Thermal Resistivity (R-value) is the reciprocal of thermal conductivity (k-value) which is the rate of heat flow through a homogenous material exactly 1 inch thick. Thermal resistivity (R-value) is expressed by the temperature difference in degrees F between two parallel surfaces required to cause 1 BTU to flow through 1 square foot of a homogenous material exactly 1 inch thick per hour at the mean temperature indicated.

C. LTTR: Long Term Thermal Resistance. Determine LTTR values using techniques from CAN/ULC S 770, based on ASTM C 1303.

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.

C. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

1. Fire/Windstorm Classification: Class 1-90
2. Hail Resistance: SH.

D. Insulation Fire-Performance Characteristics: Provide insulation materials that are identical to materials whose fire-performance characteristics have been determined for the assemblies of which the insulation materials are a part, per test method listed below, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Surface Burning Characteristics: ASTM E 84.
2. Fire Resistance Ratings: ASTM E 119.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.

1. Project specific details of base flashings and membrane terminations.
2. Tapered insulation, including slopes.
3. Roof plan showing orientation of steel roof deck and orientation of membrane roofing.

C. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

D. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

E. Qualification Data: For Installer and manufacturer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.

G. Maintenance Data: For roofing system to include in maintenance manuals.

H. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.

B. Source Limitations: Obtain components for membrane roofing system from or approved by roofing membrane manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

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

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

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

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

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

1.8 PROJECT CONDITIONS

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

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of complete roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks. Warranty wind speed limitation based shall not be less than the Building Code minimum design speed for the Project.

1. Total System Warranty Period: 20 years from date of Substantial Completion.

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:

1. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC POLYOLEFIN ROOFING MEMBRANE

A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: Uniform, flexible sheet formed from a thermoplastic polyolefin, internally fabric or scrim reinforced, and as follows:

1. Manufacturers:
   a. Carlisle SynTec Incorporated.
   b. Firestone Building Products Company.
   c. GAF Materials Corporation.
   d. GenFlex Roofing Systems.
   e. Stevens Roofing Systems; Div. of JPS Elastomerics.

2. Thickness: 60 mils, nominal.
3. Exposed Face Color: White.
4. Physical Properties:
   a. Breaking Strength: 225 lbf minimum; ASTM D 751, grab method.
   b. Elongation at Break: 25 percent; ASTM D 751.
   c. Tearing Strength: 55 lbf minimum; ASTM D 751, Procedure B.
   d. Brittleness Point: Minus 40 degrees F.
   e. Ozone Resistance: No cracks after sample, wrapped around a 3-inch- diameter mandrel, is exposed for 166 hours to a temperature of 104 degrees F and an ozone level of 100 pphm; ASTM D 1149.
   f. Resistance to Heat Aging: 90 percent minimum retention of breaking strength, elongation at break, and tearing strength after 166 hours at 240 degrees F; ASTM D 573.

g. Water Absorption: Less than 4 percent mass change after 166 hours' immersion at 158 degrees F; ASTM D 471.
h. Linear Dimension Change: Plus or minus 2 percent; ASTM D 1204.

2.2 ROOF INSULATION

A. Roof insulation board shall be manufactured by or approved by the roof membrane manufacturer for use with the roof membrane system.

B. Polyisocyanurate-Foam Board Insulation: Rigid boards of minimum 2.0 pounds per cubic foot density polyisocyanurate-based foam core, bonded to glass fiber-reinforced facer sheets. Provide long-term thermal resistance value indicated, determined in accordance with CAN/ULC-S770, based on ASTM C1303.

1. Minimum LTTR value: 20
2. Conform to ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Insulation Board, Type II, Class I, Grade 2.
3. Manufacturers:
   a. Atlas Roofing Corporation, ACFoam III
   b. Hunter Panels, LLC, "H-Shield"
   c. Johns Manville International, Inc., "ENRGY 3"
   d. Roof membrane manufacturer's brand of polyisocyanurate insulation.

C. Tapered Insulation: Provide perlite tapered insulation where indicated or necessary to provide positive drainage.

2.3 AUXILIARY MATERIALS

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

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

B. Sheet Flashing: Manufacturer's standard un-reinforced thermoplastic polyolefin sheet flashing, 55 mils thick, minimum, of same color as sheet membrane.

C. Bonding Adhesive: Manufacturer's standard bonding adhesive for membrane and flashings.

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

E. Metal Battens: Manufacturer's standard aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, pre-punched.

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

G. Walk pads: Roof membrane manufacturer's standard heat-weldable TPO pads, approximately 4 millimeters thick, 30 inches wide by the length indicated on the Roof Plan.

1. Color of walk pads shall contrast with roof membrane color. Color to be selected from the manufacturer's available standard colors.

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

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

3.3 INSTALLING INSULATION

A. General: Comply with insulation manufacturer's instructions and recommendations for the handling, installation, and bonding or anchorage of insulation to substrate.

B. Install tapered insulation under areas of roofing to conform to slopes indicated on Drawings.

C. Two-Layer Installation: Install required thickness in two layers of equal thickness, with joints of second layer staggered from joints of first layer a minimum of 12 inches each direction.

D. Secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for attaching specified board-type insulation to deck type shown. Fasten insulation over entire area of roofing at spacing as required by FM for specified Windstorm Resistance Classification. Run long joints for insulation in continuous straight lines, perpendicular to roof slope with end joints staggered between rows.

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

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

F. Trim surface of insulation where necessary at roof drains so completed surface is flush with ring of drain.

3.4 ADHERED ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.

B. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Bonding Adhesive: Apply solvent-based bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.

D. Apply roofing membrane with side laps shingled with slope of roof deck where possible.

E. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.

3. Repair tears, voids, and lapped seams in roofing membrane that does not meet requirements.

F. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

3.5 BASE FLASHING INSTALLATION

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

1. Do not mechanically-attach sidewall flashing to plywood sheathing over studs.

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

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

D. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.

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

3.6 WALKWAY INSTALLATION

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

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.

1. Notify Architect or Owner 48 hours in advance of date and time of inspection.

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

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 PROTECTING AND CLEANING

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

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

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

3.9 ROOFING INSTALLER'S WARRANTY

A. WHEREAS <**Insert name**> of <**Insert address**>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: <**Insert name of Owner.**>
2. Address: <**Insert address.**>
3. Building Name/Type: <**Insert information.**>
4. Address: <**Insert address.**>
5. Area of Work: <**Insert information.**>
6. Acceptance Date: <**Insert date.**>
7. Warranty Period: Two (2) years
8. Expiration Date: <**Insert date.**>

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

a. lightning;
b. peak gust wind speed exceeding 75 mph;
c. fire;
d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
f. vapor condensation on bottom of roofing; and
g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <**Insert day**> day of <**Insert month**>, <**Insert year**>.

1. Authorized Signature:_____

2. Name:_____

3. Title:_____

END OF SECTION

SECTION 07811

SPRAYED FIRE RESISTIVE MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes concealed cementitious sprayed fire-resistive materials listed for use in the referenced UL Designs.

B. Related Sections include the following:

1. Division 5 Section "Structural Steel" for surface conditions required for structural steel receiving sprayed fire-resistive materials.
2. Division 7 Section "Fire-stopping" for through-penetration and construction gap fire-stopping systems.
3. Division 9 Section "Gypsum Board Assemblies" for gypsum-board-based fire protection.
4. Division 9 Section "Gypsum Board Shaft-wall Assemblies".

1.2 DEFINITIONS

A. Concealed sprayed fire-resistive material is applied to surfaces that are concealed from view behind other construction when the Work is completed.

B. Exposed sprayed fire-resistive material is applied to surfaces that are exposed to view when the Work is completed.

1.3 SUBMITTALS

A. Product Data: For each fire-resistive product specified.

B. Shop Drawings: Structural framing plans indicating the following:

1. Locations and types of surface preparations required before applying sprayed fire-resistive material.
2. Extent of sprayed fire-resistive material for each construction and fire-resistance rating, including the following:
   a. Applicable fire-resistive design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
   b. Minimum thicknesses needed to achieve required fire-resistance ratings of structural components and assemblies.

3. Treatment of sprayed fire-resistive material after application.

C. Product Certificates: Signed by manufacturer of sprayed fire-resistive material certifying that the products furnished comply with requirements.

D. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. Compatibility and Adhesion Test Reports: For primers and other coatings applied to structural steel. Provide reports from a qualified independent testing and inspecting agency engaged by Contractor. Confirm that primers and coatings proposed for application in shop or field are compatible with fire-resistive material. Instruct laboratory to determine compatibility according to requirements specified in "Quality Assurance" Article.

G. Product Test Reports: Indicate that physical properties of proposed sprayed fire-resistive materials comply with specified requirements based on comprehensive testing of current product formulations by a qualified testing and inspecting agency according to requirements specified in "Quality Assurance" Article.

H. Research / Evaluation Reports: Evidence of sprayed fire-resistive material's compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer certified, licensed, or otherwise qualified by sprayed fire-resistive material manufacturer as having the necessary experience, staff, and training to install manufacturer's products according to specified requirements. A manufacturer's willingness to sell its sprayed fire-resistive materials to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of sprayed fire-resistive materials that are similar to those indicated for this Project in material, design, and extent.

C. Testing Agency Qualifications: An independent testing and inspecting agency with the experience and capability to conduct the testing indicated without delaying the Work, as documented according to ASTM E 699.

D. Testing of Fire-Resistive Materials: By a qualified testing and inspecting agency engaged by Contractor or manufacturer according to the following requirements:

1. Sprayed fire-resistive materials are randomly selected for testing from bags bearing the applicable classification marking of UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
2. Testing is performed on specimens of sprayed fire-resistive materials that comply with laboratory testing requirements specified in Part 2 and are otherwise identical to installed fire-resistive materials, including application of accelerant, sealers, topcoats, tamping, troweling, rolling, and water over-spray, if any of these are used in final application.
3. Testing is performed on specimens whose application the independent testing and inspecting agency witnessed during preparation and conditioning. Include in test reports a full description of preparation and conditioning of laboratory test specimens.

E. Testing for Compatibility and Adhesion: Engage a qualified testing and inspecting agency to prepare compatibility and adhesion test reports required in "Submittals" Article based on testing that complies with the following requirements:

1. Testing for bond per ASTM E 736 and requirements specified in UL's "Fire Resistance Directory" about coating materials.
2. Verify that manufacturer of fire-resistive material has not found primers or coatings to be incompatible with fire-resistive material based on its own laboratory testing or field experience.

F. Source Limitations: Obtain each type of sprayed fire-resistive material from one source and by a single manufacturer.

G. Fire-Test-Response Characteristics: Provide sprayed fire-resistive materials and assemblies identical to those tested for the following fire-test-response characteristics per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify packages (bags) containing sprayed fire-resistive material with appropriate markings of applicable testing and inspecting agency.

1. Fire-Resistance Ratings: As indicated by reference to fire-resistive designs listed in UL's "Fire Resistance Directory," or in the comparable publication of another testing and inspecting agency acceptable to authorities having jurisdiction, for sprayed fire-resistive material serving as direct-applied protection, tested per ASTM E 119.
2. Surface-Burning Characteristics: As indicated for each sprayed fire-resistive product required, tested per ASTM E 84.

H. Provide products containing no detectable asbestos as determined according to the method specified in 40 CFR, Part 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; shelf life, if applicable; and fire-resistance ratings applicable to Project.

B. Use materials with limited shelf life within period indicated. Remove from Project site and discard materials whose shelf life has expired.

C. Store materials inside, under cover, aboveground, so they are kept dry until ready for use. Remove from Project site and discard materials that have deteriorated.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply sprayed fire-resistive material when ambient or substrate temperatures are 40 degrees F or lower, unless temporary protection and heat is provided to maintain temperatures at or above this level for 24 hours before, during, and for 24 hours after product application.

B. Ventilation: Ventilate building spaces during and after application of sprayed fire-resistive material. Use natural means or, where this is inadequate, forced-air circulation until fire-resistive material dries thoroughly.

1.7 SEQUENCING

A. Sequence and coordinate application of sprayed fire-resistive materials with other related work specified in other Sections to comply with the following requirements:

1. Provide temporary enclosures for interior applications to prevent deterioration of fire-resistive material due to exposure to unfavorable environmental conditions.
2. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.
3. Do not apply fire-resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire-resistive material.
4. Do not begin applying fire-resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
5. Defer installing ducts, piping, and other items that would interfere with applying fire-resistive material until application of fire protection is completed.
6. Do not install enclosing or concealing construction until after fire-resistive material has been applied, inspected, tested, and corrections have been made to defective applications.

1.8 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Submit a written warranty, executed by Contractor and cosigned by Installer, agreeing to repair or replace sprayed fire-resistive materials that fail within the specified warranty period.

1. Failures include, but are not limited to, cracking, flaking, eroding in excess of specified requirements; peeling; and delaminating of sprayed fire-resistive materials from subrates due to defective materials and workmanship within the specified warranty period.
2. Not covered under the warranty are failures due to damage by occupants and Owner's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.

C. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCEALED SPRAYED FIRE-RESISTIVE MATERIALS

A. General: For concealed applications of sprayed fire-resistive materials, provide manufacturer's standard products complying with requirements indicated in this Article for material composition and physical properties representative of installed products.

B. Material Composition: Cementitious sprayed fire-resistive material consisting of factory-mixed, dry formulation of gypsum or portland cement binders and lightweight mineral or synthetic aggregates mixed with water at Project site to form a slurry or mortar for conveyance and application.

C. Physical Properties: Minimum values, unless otherwise indicated, or higher values required to attain designated fire-resistance ratings, measured per standard test methods referenced with each property listed as follows:

1. Dry Density: 15 pounds per cubic foot for average and individual densities regardless of density indicated in referenced fire-resistive design, or greater if required to attain fire-resistance ratings indicated, per ASTM E 605 or AWCI Technical Manual 12-A, Appendix A, "Alternate Method for Density Determination."
2. Thickness: Provide minimum average thickness required for fire-resistive design indicated according to the following criteria, but not less than 0.375 inch, per ASTM E 605.

a. Where the referenced fire-resistive design lists a thickness of 1 inch or greater, the minimum allowable individual thickness of sprayed fire-resistive material is the design thickness minus 0.25 inch .
b. Where the referenced fire-resistive design lists a thickness of less than 1 inch but more than 0.375 inch, the minimum allowable individual thickness of sprayed fire-resistive material is the greater of 0.375 inch or 75 percent of the design thickness.
c. No reduction in average thickness is permitted for those fire-resistive designs whose fire-resistance ratings were established at densities of less than 15 pounds per cubic foot..

3. Bond Strength: 150 pounds per square foot, per ASTM E 736 under the following conditions:
   a. Field test sprayed fire-resistive material that is applied to flanges of wide-flange structural-steel members on surfaces matching those that will exist for remainder of steel receiving fire-resistive material.
   b. If surfaces of structural steel receiving sprayed fire-resistive material are primed or otherwise painted, perform series of bond tests specified in UL's "Fire Resistance Directory" for coating materials.
   c. Minimum thickness of sprayed fire-resistive material tested in laboratory shall be 0.75 inch.

4. Compressive Strength: 5.21 pounds per square inch as determined in the laboratory per ASTM E 761. Minimum thickness of sprayed fire-resistive material tested shall be 0.75 inch and minimum dry density shall be as specified, but not less than 15 pounds per cubic foot.
5. Corrosion Resistance: No evidence of corrosion per ASTM E 937.
6. Deflection: No cracking, spalling, delamination, or the like per ASTM E 759.
7. Effect of Impact on Bonding: No cracking, spalling, delamination, or the like per ASTM E 760.
8. Air Erosion: Maximum weight loss of 0.025 grams per square foot in 24 hours per ASTM E 859. For laboratory tests, minimum thickness of sprayed fire-resistive material is 0.75 inch, maximum dry density is 15 pounds per cubic foot, test specimens are not pre-purged by mechanically induced air velocities, and tests are terminated after 24 hours.

D. Fire-Test-Response Characteristics: Provide sprayed fire-resistive materials with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Flame Spread: 0
2. Smoke Developed: 0.

E. Available Products: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cementitious Sprayed Fire-Resistive Material:
   a. Grace, W. R. & Co.--Conn., Construction Products Div.; Monokote Type MK-6s, Type MK-6/HY – Basis of Design.

b. Other manufacturers and products listed for use in the UL Designs that are referenced in the Drawings.

2.2 AUXILIARY FIRE-RESISTIVE MATERIALS

A. General: Provide auxiliary fire-resistive materials that are compatible with sprayed fire-resistive materials and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistive designs indicated.

B. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required to comply with fire-resistive designs indicated and fire-resistive product manufacturer's written recommendations. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive sprayed fire-resistive material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, to determine whether they are in satisfactory condition to receive sprayed fire-resistive material. A substrate is in satisfactory condition if it complies with the following:

1. Substrates comply with requirements in the Section where the substrate and related materials and construction are specified.
2. Substrates are free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt, or other foreign substances capable of impairing bond of fire-resistive material with substrate under conditions of normal use or fire exposure.
3. Objects penetrating fire-resistive material, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
4. Substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying fire-resistive material.

B. Conduct tests according to fire-resistive material manufacturer's written recommendations to verify that substrates are free of oil, rolling compounds, and other substances capable of interfering with bond.

C. Do not proceed with installation of fire-resistive material until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances that could impair bond of fire-resistive material, including oil, grease, rolling compounds, incompatible primers, and loose mill scale.

B. Prime substrates where recommended in writing by fire-resistive material manufacturer, unless compatible shop primer has been applied and is in satisfactory condition to receive fire-resistive material.

C. For exposed applications, repair substrates to remove any surface imperfections that could affect uniformity of texture and thickness in finished surface of sprayed fire-resistive material. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

D. Cover other work subject to damage from fallout or overspray of fire-resistive materials during application. Provide temporary enclosure as required to confine spraying operations, protect the environment, and ensure maintenance of adequate ambient conditions for temperature and ventilation.

3.3 INSTALLATION, GENERAL

A. Comply with fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to convey and spray on fire-resistive material, as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

B. Apply sprayed fire-resistive material that is identical to products tested as specified in Part 1 in "Product Test Reports" in "Submittals" Article, with respect to rate of application, accelerator use, sealers, topcoats, tamping, troweling, water overspray, or other materials and procedures affecting test results.

C. Install metal lath, as required, to comply with fire-resistance ratings and fire-resistive material manufacturer's written recommendations for conditions of exposure and intended use. Securely attach lath to substrate in position required for support and reinforcement of fire-resistive material. Use anchorage devices of type recommended in writing by fire-resistive material manufacturer. Attach lathing accessories where indicated or required for secure attachment to substrate.

D. Extend fire-resistive material in full thickness over entire area of each substrate to be protected. Unless otherwise recommended in writing by fire-resistive material manufacturer, install body of fire-resistive covering in a single course.

E. Spray apply fire-resistive materials to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by manufacturer.

3.4 INSTALLING CONCEALED SPRAYED FIRE-RESISTIVE MATERIALS

A. Apply concealed fire-resistive material in thicknesses and densities indicated, but not less than those required to achieve fire-resistance ratings designated for each condition, and comply with requirements for thickness specified in Part 2 "Concealed Sprayed Fire-Resistive Materials" Article.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Construction Manager will contract with a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing and inspecting of completed applications of sprayed fire-resistive material will take place in successive stages, in areas of extent and using methods as follows. Do not proceed with application of fire-resistive material for the next area until test results for previously completed applications of fire-resistive material show compliance with requirements.

1. Extent: For each 1,000-square foot area, or partial area, on each floor, testing and inspecting agency will evaluate the following characteristics. Tested values must equal or exceed values indicated and values required for approved fire-resistance design.
   a. Thickness for Floors, Roofs, and Walls: From the average of 10 measurements from a 144-square inches sample area, with sample width of not less than 6 inches per ASTM E 605.
   b. Thickness for Structural Frame Members: From a sample of 25 percent of structural members per floor, taking 9 measurements at a single cross section for joists and trusses and 7 measurements of a single cross section for columns per ASTM E 605.
   c. Density for Floors, Roofs, Walls, and Structural Frame Members: At frequency and from sample size indicated for determining thickness of each type of construction, per ASTM E 605 or AWCI Technical Manual 12-A, Appendix A, "Alternate Method for Density Determination."
   d. Bond Strength for Floors, Roofs, Walls, and Structural Framing Members: Cohesion and adhesion at frequency and from sample size indicated for determining thickness of each type of construction, per ASTM E 736.

2. When testing discovers applications of fire-resistive material not in compliance with requirements, testing and inspecting agency will perform additional random testing to determine extent of noncompliance.

C. Remove and replace applications of fire-resistive material where test results indicate that they do not comply with specified requirements for cohesion and adhesion or for density, or both.

D. Apply additional fire-resistive material per manufacturer's written instructions where test results indicate that thickness does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 CLEANING, PROTECTING, AND REPAIR

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material over-spray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Cure exposed cementitious sprayed fire-resistive material according to product manufacturer's written recommendations to prevent premature drying.

C. Protect fire-resistive material, according to advice of product manufacturer and Installer, from damage resulting from construction operations or other causes so fire protection will be without damage or deterioration at the time of Substantial Completion.

D. Coordinate application of fire-resistive material with other construction to minimize the need to cut or remove fire protection. As installation of other construction proceeds, inspect fire-resistive material and patch any damaged or removed areas.

E. Repair or replace work that has been damaged.

END OF SECTION

SECTION 07920

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Extent of each form and type of joint sealer is indicated on drawings and schedules.

B. This Section includes joint sealants for but not limited to the following locations:

1. Exterior and interior joints in vertical surfaces and non-traffic horizontal surfaces as indicated below.
   a. Control and expansion joints in unit masonry.
   b. Cement plaster stucco expansion joints.
   c. Joints between different materials.
   d. Perimeter joints between wall materials and frames of doors and windows.
   e. Under thresholds at exterior doors.
   f. Other joints as indicated.

2. Exterior expansion and isolation joints in cast-in-place concrete slabs for sidewalks and paving. Seal expansion joints where sidewalks abut the building.

C. Sealing joints related to flashing and sheet metal for roofing is specified in Division-7 Section: "Sheet Metal Flashings and Trim."

D. Sealants for glazing purposes are specified in Division-8 Section "Glazing."

E. Sealing concealed perimeter joints of gypsum drywall partitions to reduce sound transmission characteristics is specified in Division-9 Section "Gypsum Drywall."

F. Sealants submitted for joints in and adjacent to brick veneer and aluminum and glass framing systems shall be non-staining and non-bleeding type. Sealants must be tested on samples prior to submitting to verify that the sealant will not stain the brick veneer or aluminum framing and glass.

1.2 SYSTEM PERFORMANCES

A. Provide elastomeric joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

1.3 SUBMITTALS

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

B. Product Data from manufacturers for each joint sealer product required, including instructions for joint preparation and joint sealer application.

C. Samples for Initial Selection Purposes: Manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available, for each product exposed to view.

D. Samples for verification purposes of each type and color of joint sealer required. Install joint sealer samples in 1/2 inch wide joints formed between two 6 inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealers. Provide minimum of three custom color samples as noted above for Architect/Owner review.

E. Certificates from manufacturers of joint sealers attesting that their products comply with specification requirements and are suitable for the use indicated.

F. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

G. Product test reports for each type of joint sealers indicated, evidencing compliance with requirements specified.

H. Pre-construction field test reports indicating which products and joint preparation methods demonstrated acceptable adhesion to joint substrates.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an Installer who has successfully completed within the last 3 years at least 3 joint sealer applications similar in type and size to that of this Project.

B. Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from a single manufacturer for each different product required.

C. Pre-construction Compatibility and Adhesion Testing: Submit samples of all materials that will contact or affect joint sealers to joint sealer manufacturers for compatibility and adhesion testing, as indicated below:

1. Use test methods standard with manufacturer to determine if priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealers to joint substrates.
2. Perform tests under normal environmental conditions that will exist during actual installation.

D. Product Testing: Provide comprehensive test data for each type of joint sealer based on tests conducted by a qualified independent testing laboratory on current product formulations within a 24-month period preceding date of Contractor's submittal of test results to Architect.

1. Test elastomeric sealants for compliance with requirements specified by reference to ASTM C 920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C 719), low-temperature flexibility, modulus of elasticity at 100 percent strain, effects of heat aging, and effects of accelerated weathering.

E. Pre-construction Field Testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows:

1. Locate test joints where indicated or, if not indicated, as directed by Architect.
2. Conduct field tests for each application indicated below:
   a. Each type of elastomeric sealant and joint substrate indicated.
3. Notify Architect one week in advance of the dates and times when mock-ups will be erected.
4. Arrange for tests to take place with Architect present.
5. Test Method: Test joint sealers by hand pull method described below:
   a. Install joint sealants in 5-feet joint lengths using same materials and methods for joint preparation and joint sealant installation required for completed Work. Allow sealants to cure fully before testing.
   b. Make knife cuts as follows: A horizontal cut from one side of joint to the other followed by 2 vertical cuts approximately 2 inches long at side of joint and meeting horizontal cut at top of 2 inch cuts. Place a mark 1 inch from top of 2 inch piece.
   c. Use fingers to grasp 2 inch piece of sealant just above 1 inch mark; pull firmly down at a 90 degree angle or more while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
6. Report whether or not sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
7. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants which fail to adhere to joint substrates during testing.

F. Field-Constructed Mock-Ups: Prior to installation of joint sealers, apply elastomeric sealants to the following selected building joints as indicated below for further verification of colors selected from sample submittals and to represent completed work for qualities of appearance, materials, and application:

1. Joints in field-constructed mock-ups of assemblies specified in other sections which are indicated to receive elastomeric joint sealants specified in this section.
2. Retain mock-ups during construction as standard for judging completed construction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials in compliance with manufacturers' 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 sealers under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturers.
2. When joint substrates are wet due to rain, frost, condensation, or other causes.

B. Joint Width Conditions: Do not proceed with installation of joint sealers where joint widths are less than allowed by joint sealer manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.7 SEQUENCING AND SCHEDULING

A. Sequence installation of joint sealers 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 sealers, 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 sealers indicated or, if not otherwise indicated, as selected by Architect from manufacturer's full range of colors. For all exterior applications, the sealant color shall match the color of the adjacent and adjoining materials. Product substitutions must offer at least the same number and quality of available colors as the products listed.

2.2 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class, and Uses.

B. One-Part Nonacid-Curing Silicone Sealant: Type S, Grade NS, Class 25, and complying with the following requirements for Uses and additional joint movement capability:

1. Uses NT, M, G, A, and, as applicable to joint substrates indicated, O.

a. Additional capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the following percentage changes in joint width as measured at time of application and remain in compliance with other requirements of ASTM C 920 for Uses indicated:
b. 50 percent movement in both extension and compression for a total of 100 percent movement.

C. One-Part Mildew-Resistant Silicone Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide; intended for sealing interior joints with nonporous substrates and subject to in-service exposure to conditions of high humidity and temperature extremes.

D. Multi-Part Pourable Urethane Sealant for Use T: Type M, Grade P, Class 25, and complying with the following requirements for Uses:

1. Uses T, M, A, and, as applicable to joint substrates indicated, O.

E. Available Products: Subject to compliance with requirements and compatibility with the substrates, elastomeric sealants which may be incorporated in the Work include, but are not limited to, the following:

1. One-Part Nonacid-Curing Silicone Sealant for joints in the brick veneer, cement plaster stucco, and at perimeter of wood, aluminum, and steel frames, and in joints of other exterior materials compatible with the sealant manufacturer's recommendations:

a. "Dow Corning 795"; Dow Corning Corp.
b. "Dow Corning 790"; Dow Corning Corp.
c. "Pecora 890", Pecora Corporation.
d. "SilPruf 2000", GE Silicones

2. Multi-Part, Pourable, Urethane Sealant for Use T, for parking areas, sidewalks:
   a. "Vulkem 245"; Mameco International, Inc.
   b. "NR-200 Urexpan"; Pecora Corp.
   c. "THC-900"; Tremco Inc.

3. Butyl-Rubber-Based Solvent-Release Joint Sealant under thresholds at exterior doors: Comply with ASTM C 1085.
   a. Bostik Findley; Bostik 300.
   b. Pecora Corporation; BC-158.
   c. Polymeric Systems Inc.; PSI-301
   d. Sonneborn, Division of ChemRex Inc.; Sonneborn Multi-Purpose Sealant.
   e. Tremco; Tremco Butyl Sealant.

2.3 LATEX JOINT SEALANTS

A. Acrylic-Emulsion Sealant: Manufacturer's standard, one part, non-sag, mildew-resistant, acrylic-emulsion sealant complying with ASTM C 834, formulated to be paintable and recommended for exposed applications on interior locations involving joint movement of not more than plus or minus 5 percent, at interior door and window frames.

B. Available Products: Subject to compliance with requirements, latex joint sealants which may be incorporated in the Work include, but are not limited to, the following:

1. Acrylic-Emulsion Sealant:
   a. "AC-20"; Pecora Corp.
   b. "Tremflex 834"; Tremco Inc.

2.4 JOINT SEALANT BACKING

A. General: Provide sealant backings of material and type which are non-staining; 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. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Use open-cell backer rod only where open-cell rod is specifically recommended by the sealant manufacturer for the application.

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.

2.5 MISCELLANEOUS MATERIALS

A. Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from pre-construction joint sealer-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Provide non-staining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

C. Masking Tape: Provide non-staining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

B. Examine joints indicated to receive preformed foam joint seal, with Installer present. Verify compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:

1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer); old joint sealers; 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 sealers. 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 by chemical cleaners or other means which are not harmful to 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 sealer manufacturer based on pre-construction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer 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 which 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 SEALERS

A. General: Comply with joint sealer manufacturers' 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. Latex Sealant Installation Standard: Comply with requirements of ASTM C 790 for use of latex sealants.

D. 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 which 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 which have become wet prior to sealant application and replace with dry material.

2. Install bond breaker tape between sealants and joint fillers, compression seals, or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.

3. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.

E. 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 which allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

F. Color of sealants in vertical joints in brick veneer shall match brick color.

G. Install sealant in joints at the edges of cementitious siding panels, and the ends of lapped cementitious siding. Seal joints between siding and trim.

1. Where batten strips are placed over joints between cementitious panels, seal joints before applying the batten strip.

H. Tooling of Non-sag 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 which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

1. Provide concave joint configuration per Figure 6A in ASTM C962, unless otherwise indicated.
2. Provide flush joint configuration per Figure 6B in ASTM C962, where indicated.
   a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

3.4 INSTALLATION OF PREFORMED JOINT SEALANT

A. Install preformed joint sealant in accordance with manufacturer's published installation instructions.

3.5 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 sealers and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealers 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 sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

END OF SECTION

SECTION 08110

STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Steel doors and frames
2. Fire-rated door and frame assemblies.

B. Related Sections include the following:

1. Division 8 Section "Door Hardware " for door hardware and weather-stripping.
2. Division 9 Section "Gypsum Board Assemblies" for wall construction.
3. Division 9 Section "Painting" for field painting factory-primed doors and frames.

1.2 DEFINITIONS

A. Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets.

1.3 SUBMITTALS

A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.

B. Shop Drawings: Show the following:

1. Elevation of each door design.
2. Details of doors including vertical and horizontal edge details.
3. Frame details for each frame type including dimensioned profiles.
4. Details and locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, accessories, joints, and connections.

C. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

1.4 QUALITY ASSURANCE

A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.

1. Test Pressure: Test according to NFPA 252 or UL 10C. After 5 minutes into the test, the neutral pressure level in furnace shall be established at 40 inches or less above the sill.
2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
3. Temperature-Rise Rating: At stairwell enclosures, provide doors that have a temperature-rise rating of 450 degrees F maximum in 30 minutes of fire exposure.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4-inch- high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to permit air circulation.

1.6 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide Steel Doors and Frames of one of the following:

1. Amweld Building Products, Inc.
2. Benchmark Commercial Doors; a division of General Products Co., Inc.
3. Ceco Door Products.
4. Curries Company.
5. Kewanee Corporation (The).
6. Mesker Door, Inc.
7. Steelcraft; a division of Ingersoll-Rand.

2.2 MATERIALS

A. Hot-Rolled Steel Sheets for Concealed Work: ASTM A 569, Commercial Steel (CS), Type B; free of scale, pitting or surface defects; pickled and oiled.

B. Cold-Rolled Steel Sheets: ASTM A 36, Commercial Steel (CS), or ASTM A 620, Drawing Steel (DS), Type B; stretcher-leveled standard flatness.

C. Metallic-Coated Steel Sheets: ASTM A653, Commercial Steel (CS), Type B, with an A60 zinc-iron-alloy galvannealed coating, or G90 galvanized coating where indicated; stretcher-leveled standard of flatness.

D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

2.3 DOORS

A. General: Provide doors of sizes, thicknesses, and designs indicated.

B. Basis of Design: Ceco Door Products; "Versadoor".

C. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. Flush panel, Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (seamless), G90 galvanized, with 16 gauge face sheet.

D. Interior Doors: Face sheets fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush), with 18 gauge face sheet.

2.4 FRAMES

A. General: Provide steel frames for doors, transoms, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.

B. Frames for Exterior Doors: minimum of 0.067-inch thick (14 gauge) steel sheet, galvanized (G90 minimum), for exterior Level 3 steel doors, unless otherwise indicated.

C. Frames for Interior Doors: minimum of 0.053-inch thick (16 gauge) steel sheet for interior doors, unless otherwise indicated.

1. Provide A60 galvanealed metallic-coated steel for doors exposed to unconditioned space in garage areas.

D. Plaster Guards: Provide 0.016-inch thick, steel sheet mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.

E. Supports and Anchors: Fabricated from not less than 0.042-inch- thick, electrolytic zinc-coated or metallic-coated steel sheet, metallic-coated per ANSI A250.8.

1. Wall Anchors in Masonry Construction: 0.177-inch- diameter, steel wire complying with ASTM A 510 may be used in place of steel sheet.

F. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153, Class C or D as applicable.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 FABRICATION

A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.

B. Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch- thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.

1. Cold-rolled steel sheet, unless otherwise indicated.

C. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.

1. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
2. Thermal-Rated (Insulated) Doors: Exterior doors, provide doors fabricated with thermal-resistance value (R-value) of not less than 12

D. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.

1. Unless otherwise indicated, provide thermal-rated assemblies with minimum R-value of 12.

E. Clearances for Fire-Rated Doors: As required by NFPA 80.

F. Single-Acting Door-Edge Profile: Square edge at hinge side. Beveled edge at lock side.

G. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

H. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.

I. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."

1. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware. Reinforce doors and frames to receive non-templated, mortised and surface-mounted door hardware.
2. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
3. Coordinate locations of conduit and wiring boxes for electrical connections with Division 16 Sections.

J. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

K. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
6. Jamb Anchors: Provide number and spacing of anchors as follows, unless fire-rating requires otherwise:
   a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      i) Two anchors per jamb up to 60 inches high.

ii) Three anchors per jamb from 60 to 90 inches high.
iii) Four anchors per jamb from 90 to 120 inches high.
iv) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
i) Three anchors per jamb up to 60 inches high.
ii) Four anchors per jamb from 60 to 90 inches high.
iii) Five anchors per jamb from 90 to 96 inches high.
iv) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
v) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.

c. Compression Type: Not less than two anchors in each jamb.
d. Post-installed Expansion Type: Locate anchors not more than 6 inches top and bottom of frame. Space anchors not more than 26 inches o.c.

7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

2.7 FINISHES

A. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
2. At fire-protection-rated openings, install frames according to NFPA 80.
3. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
4. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.

a. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
b. In-Place Concrete Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

3.2 ADJUSTING AND CLEANING

A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION

SECTION 08331

OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Service doors.

B. Related Sections: Division 16 Sections for electrical service and connections for powered operators and accessories.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance, Exterior Doors: Exterior overhead coiling doors shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated according to structural engineer's documents.

1. Wind Loads: As indicated on Drawings.
2. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.

B. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.3 SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:

1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Delegated-Design Submittal: For overhead coiling doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Summary of forces and loads on walls and jambs.

D. Qualification Data: For qualified Installer.

E. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.

1. Obtain operators and controls from overhead coiling door manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.1 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with G90 zinc coating; nominal sheet thickness (coated) of 0.028 inch and as required to meet requirements.
2. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with G90 zinc coating; nominal sheet thickness as required to meet requirements for each door size and wind load condition.

B. Endlocks and Windlocks for Service Doors: Malleable-iron casings galvanized after fabrication, secured to curtain slats with galvanized rivets or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.

C. Bottom Bar for Service Doors: Consisting of two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from manufacturer's standard hot-dip galvanized steel, stainless steel, or aluminum extrusions to match curtain slats and finish.

D. Bottom Bar for Counter Doors: Manufacturer's standard continuous channel or tubular shape, fabricated from manufacturer's standard hot-dip galvanized steel, stainless steel, or aluminum extrusions to match curtain slats and finish.

E. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.

2.2 HOOD

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Galvanized Steel: Nominal 0.024-inch- thick, hot-dip galvanized steel sheet with G90 zinc coating, complying with ASTM A 653/A 653M.

2.3 CURTAIN ACCESSORIES

A. Weatherseals: Equip each exterior door with weather-stripping gaskets fitted to entire perimeter of door for a weathertight installation, unless otherwise indicated.

1. At door head, use 1/8-inch- thick, replaceable, continuous sheet secured to inside of hood.
2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch- thick seals of flexible vinyl, rubber, or neoprene.

2.4 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a

spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 inch per foot of span under full load.

C. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.5 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door Operator Location(s): Operator location indicated for each door.

1. Front-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on coil side of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.

D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 11 Section "Common Motor Requirements for Equipment" unless otherwise indicated.

1. Electrical Characteristics:

a. Phase: single.
b. Volts: 120 – verify with electrical documents.

c. Hertz: 60.

2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 inch per second and not more than 12 inch per second without exceeding nameplate ratings or service factor.
4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

F. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.

1. Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.

G. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."

1. Exterior units, full-guarded, standard-duty, recessed, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.

H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 pounds force.

I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.6 DOOR ASSEMBLY

A. Service Door: Overhead coiling door formed with curtain of interlocking metal slats.

B. Basis-of-Design Product: Subject to compliance with requirements, provide Cookson Company, model FCM, or comparable product by one of the following:

1. Cornell Iron Works, Inc.
2. McKeon Rolling Steel Door Company, Inc.
3. Overhead Door Corporation.
4. Raynor.
5. Windsor Door.

C. Operation Cycles: Not less than 20,000.

D. Door Curtain Material: Galvanized steel.

E. Door Curtain Slats: Flat profile slats of 2-1/2 to 3 inches center-to-center height.

F. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.

G. Hood: Match curtain material and finish.

1. Shape: Round or Square.
2. Mounting: Face of wall.

H. Electric Door Operator:

1. Usage Classification: Medium duty, up to 15 cycles per hour.
2. Operator Location: Front of hood.
3. Motor Exposure: Exterior, wet, and humid.
4. Emergency Manual Operation: Chain type.
5. Obstruction-Detection Device: Automatic pneumatic sensor edge on bottom bar.
6. Remote-Control Station: Where shown on Drawings.

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. 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.

2.8 STEEL AND GALVANIZED-STEEL FINISHES

A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

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

3.2 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.

C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

D. Smoke-Control Doors: Install according to NFPA 80 and NFPA 105.

3.3 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

C. Adjust seals to provide weather-tight fit around entire perimeter.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION

SECTION 08410

ALUMINUM ENTRANCES AND STOREFRONT

PART 1 - GENERAL

1.1 SUMMARY

A. Aluminum entrance and storefront types required for the project include:

1. Exterior entrance doors.
2. Frames for exterior entrances.
3. Storefront type framing system.
4. Aluminum cover plates and break-shapes

B. Glazing: Refer to Section 08800 – Glazing section for additional technical requirements for glazing in aluminum entrances and storefront specified to be factory-glazed.

1.2 SYSTEM DESCRIPTION

A. Performance Requirements: Provide aluminum entrance, storefront, and curtain wall assemblies that comply with specified performance characteristics. Each system shall be tested by a recognized testing laboratory or agency in accordance with specified test methods. Provide certified test results.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product specifications, technical product data, standard details, and installation recommendations for each type of entrance and storefront product required. Include the following information:

1. Fabrication methods.
2. Finishing.
3. Hardware.
4. Accessories.

B. Shop Drawings: Submit shop drawings for fabrication and installation of entrances, storefronts and curtain walls, including the following:

1. Elevations.
2. Detail sections of typical composite members.
3. Detail sections through custom fabricated cover plates and break-shapes.
4. Hardware, mounting heights.
5. Anchorage and reinforcements.
6. Expansion provisions.

7. Glazing details.

C. Details shall be half full scale as far as practical, showing construction of all parts of the work, including metal and glass thickness, glass types, manufacture and locations, methods of joining. Include project-specific details of all field connections, and anchorage, fastening and sealing methods, associated sub-sills, pans, and flashings. Shop drawings shall include spotting plans for pre-set inserts.

1. Manufacturer's profiles of standard extrusions without project-specific adjoining materials and conditions are not considered Details, and will not be reviewed.

D. Before any work is fabricated, the following samples, data and calculations shall be submitted to the Architect for his approval or review.

1. Color finish samples of specified finishes on appropriate extrusions and/or sheet. Paint samples are to indicate any color variation which may be expected on the project.
2. Product data on all proposed sealants along with color chart, and cured samples for approval.
3. Catalogs, brochures, test reports and technical data.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Provide entrance and storefronts produced by a single manufacturer capable of showing prior production of units similar to those required.

B. Installer's Qualifications: Entrances, storefront and windows shall be installed by a firm that has not less than 5-years successful experience in the installation of systems similar to those required.

C. Design Criteria: Drawings indicate sizes, spacing of members, profiles and dimensional requirements of entrance, storefront and window work. Minor deviations will be accepted in order to utilize manufacturer's standard products when, in the Architect's sole judgment, such deviations do not materially detract from the design concept or intended performances.

1.5 PERFORMANCE REQUIREMENTS

A. Thermal Movements: The wall shall be constructed so as to provide for such expansion and contraction of component materials as will be caused by metal temperature range of 180 degrees F without causing harmful buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

B. Structural Properties: The wall shall be designed to withstand wind loads of 20 pounds per square foot positive and negative for typical areas of the building and 20 pounds per square foot positive, 30 pounds per square foot negative for corner zones. Test in accordance with ASTM E330. Deflections shall not exceed the following:

1. Deflection in a direction normal to the plane of the wall shall not exceed L/175 of its clear span, with a maximum of 3/4 inch.
2. Deflection of any member in a direction parallel to the plane of the wall, when carrying its full design load, shall not exceed 1/8-inch. In plane deflections at corner mullions shall not exceed 1/4-inch at any time.

C. Water Resistance: System shall be designed to meet an 12 PSF static water test when tested in accordance with ASTM E 331, and 12 PSF dynamic water test when tested in accordance with AAMA 501, latest edition. No uncontrolled water penetration is allowed for both tests. Water penetration is defined as the appearance of uncontrolled water on the indoor face of any part of the work. "Controlled" water or condensation is that which is demonstrably drained harmlessly to the exterior of the work without endangering or wetting adjacent surfaces or insulation, and not visible in the final construction. Make provisions for drainage of any water entering at joints to the exterior face of the work.

D. Air Infiltration: System shall be designed to meet an allowable air leakage of 0.06 CFM per square foot of fixed wall when tested in accordance with ASTM E 283 using a pressure of 6.24 pounds per square foot.

E. Air Infiltration – Doors: With door closed and locked, test unit in accordance with ASTM E 283 at a static air pressure difference of 1.56 pounds per square foot.

1. Single doors: Air infiltration shall not exceed 0.50 cubic feet per minute per foot of perimeter crack length.
2. Pair of doors: Air infiltration shall not exceed 1.0 cubic feet per minute per foot.

1.6 DELIVERY AND STORAGE OF MATERIALS

A. All materials delivered to the site shall be stored in spaces provided by the General Contractor on each floor of the building. These spaces shall be located where the stored materials will not be exposed to wetting or damage, and shall permit easy access to, and handling of, the materials. Materials shall be stored neatly, properly stacked and the wall contractor shall not be required to move them except for installation.

B. Deliver other materials, except bulk materials, to project site in manufacturer's unopened containers with name, brand, type, grade and color fully indicated thereon. Store bulk materials as required to avoid any deleterious effects of weather, soiling or contamination.

1.7 CORRECTION OF WORK

A. In the event that any failure in the material or workmanship occurs within a period of (3) three years from the date of final acceptance of the work, and such failure is the result of defective material furnished, or workmanship performed by this Contractor, same shall repair or replace such defective materials or workmanship at no cost to the Owner.

B. If exploratory work is required to determine the cause of defects, the cost of such work shall be borne by this Contractor only in case his work is found, in the judgment of the Architect, to be at fault.

1.8 FIELD TESTING

A. Storefront shall receive a minimum of three water hose tests in field during construction. Area and time of test shall be per Architect. Tests to be conducted per AAMA 501.2. Tests to be conducted at 15 percent, 50 percent, and 75 percent completion.

B. Depending upon prevalence or absence of leakage in initial water penetration test, and upon measures adopted by Contractor to eliminate sources of leakage, Architect will determine necessity for (and scope of) additional tests. However, in no case will total of tested area amount to less than 1.0 percent nor more than 10.0 percent of the building skin area, except as subsequently authorized by Owner.

C. All costs of additional tests resulting from failure, including fees and costs incurred by the Owner, Architect, and their Consultants shall be paid for by the Contractor.

1.9 WARRANTY / GUARANTEE

A. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of entrance and storefront systems that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures including, but not limited to, excessive deflection.
2. Adhesive sealant failures.
3. Cohesive sealant failures.
4. Failure of system to meet performance requirements.
5. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
6. Failure of operating components to function normally.
7. Water leakage through fixed glazing and frame areas.

B. Warranty Period: 3 years from date of Substantial Completion.

1.10 PROJECT CONDITIONS

A. Field Measurements: Check openings by field measurement before fabrication to ensure proper fitting of work; show measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay in the work. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: The design of the aluminum entrance doors and storefront is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers listed.

1. Storefront: Kawneer Trifab VG 451T, 2 inches by 4-1/2 inches, thermally broken, flush glazed with center-set glass – Basis of Design.
2. Entrance Doors: Kawneer Series 500 Wide Stile (Basis of design)

B. Subject to compliance with the requirements, other manufacturers whose products may be incorporated into the Project include:

1. EFCO Corporation
2. United States Aluminum Corp., International Aluminum Corp.
3. Vistawall Architectural Products
4. YKK

2.2 MATERIALS

A. Aluminum Members: Provide alloy and temper recommended by the manufacturer for strength, corrosion resistance, and application of required finish; comply with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate.

B. Fasteners: Provide fasteners of aluminum, non-magnetic stainless steel, or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components.

C. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125-inch thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.

D. Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For the application of hardware, use fasteners that match the finish of member or hardware being fastened. Provide Phillips flat-head machine screws for exposed fasteners.

E. Concealed Flashing: Provide 26 gauge minimum dead-soft stainless steel, or 0.026-inch minimum extruded aluminum or formed aluminum of alloy and type selected by manufacturer for compatibility with other components.

F. Brackets and Reinforcements: Where feasible, provide high-strength aluminum brackets and reinforcements; otherwise provide nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.

G. Concrete/Masonry Inserts: Provide concrete and masonry inserts fabricated from cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.

H. Compression Weather-stripping: Provide the manufacturer's standard replaceable compressible weather-stripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with AAMA D 2287.

I. Glass and Glazing Materials: Glass and glazing materials shall comply with requirements of "Glazing" section of these specifications.

J. Break metal and miscellaneous closure material wider than 3 inches shall be 0.125 inch thick aluminum, prefinished to match the frames where exposed to view. Other pieces of break metal less than 3 inches wide may be 0.090.

2.3 COMPONENTS

A. Storefront Framing System: Shop-fabricate and pre-assemble frame components where possible.

B. Stile-and-Rail Type Aluminum Doors:

1. Doors: Provide manufacturer's standard 1-3/4 inch thick glazed doors with minimum 0.125 inch thick, extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded. No through-bolts.
2. Design: Provide 1-3/4 inches thick doors of design indicated (Wide Stile). Bottom rail shall be 10 inches high.

C. Glazing: Fabricate doors to facilitate replacement of glass or panels, without disassembly of stiles and rails. Provide snap-on extruded aluminum glazing stops. Beveled gaskets are not acceptable.

1. Exterior Doors: 1/4 inch thick tempered safety glass.

D. Insulating glass units in storefront framing shall be "dry glazed" with EPDM gasket on both exterior and interior.

2.4 HARDWARE

A. General: Refer to hardware section in Division-8 for requirements for hardware items other than those indicated to be provided by the aluminum entrance manufacturer. Coordinate provisions of hardware with other sections to provide a complete hardware set for each door.

B. Provide manufacturer's heavy-duty hardware units as indicated, scheduled, or required for operation of each door, including the following items of sizes, number, and type recommended by manufacturer for service required; finish to match door.

C. Pivots: Provide top, bottom, and intermediate pivots where surface-mounted closer is indicated. Finish shall be clear satin aluminum.

D. Concealed Overhead Closers: ANSI/BHMA 156.4, Grade 1, and as follows:

1. Type: Single acting, with double lever arm.
2. Hold Open: Automatic, at 90 degrees.
3. Back Check: Adjustable.
4. Positive Dead Stop: Coordinated with hold-open angle at 90 degrees.
5. Basis-of-Design Product: The design for each product is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.
   a. LCN 5030 Series – Basis of Design.

6. Subject to compliance with requirements, other manufacturers offering products that may be incorporated into the Work include:
   a. Kawneer
   b. Dorma

E. Exterior Single Doors: Adams Rite MS+1890 with 4560 lever handle. All exposed metal clear satin aluminum finish.

F. Exterior Double Doors:

1. Active Leaf: Dead-latch – Adams Rite MS+1891 Series with lever handle, Adams Rite #4560.
2. Inactive Leaf: Two-Point Flush-bolt – Adams Rite #MS 1880. Provide strike plate in floor and frame head.
3. Align thumb-turn and lever handle on the push side of the active and inactive leafs.
4. Lock Cylinder – furnished under Section 08710

G. Push / Pulls: provide door manufacturer's heavy-duty 1 inch diameter satin stainless steel push bar and offset pull handle set.

1. Kawneer Standard Classic – Basis of Design. Provide push/pull unless other hardware is indicated in Section 08710 "Finish Hardware".

H. Thresholds: Brushed aluminum threshold for exterior entry doors .

I. Key Cylinder: Provide cylinder mounting kit for locking cylinder specified in Section 08710.

2.5 FABRICATION

A. General: Sizes of door and frame units, and window frame, and profile requirements, are indicated on drawings. Variable dimensions are indicated, with maximum and minimum dimensions required to achieve design requirements and coordination with other work.

B. Prefabrication: Before shipment to the project site, complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible. Disassemble components only as necessary for shipment and installation.

C. Pre-glaze door and frame units to greatest extent possible.

D. Doors shall be welded, no through-bolts.

E. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.

F. Welding: Comply with AWS recommendations; grind exposed welds smooth and restore mechanical finish.

G. Reinforcing: Install reinforcing as required for hardware and necessary for performance requirements, sag resistance and rigidity. Provide internal reinforcing in window frames if necessary to meet wind load.

H. Dissimilar Metals: Separate dissimilar metals with zinc chromate primer, bituminous paint, or other separator that will prevent corrosion.

I. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.

J. Uniformity of Finish: Abutting extruded aluminum members shall not have an integral color or texture variation greater than half the range indicated in the sample pair submittal.

K. Fasteners: Conceal fasteners wherever possible.

L. Weather-stripping: For exterior doors, provide compression weather-stripping against fixed stops; at other edges, provide sliding weather-stripping retained in adjustable strip mortised into door edge.

1. Provide EPDM or vinyl blade gasket weather-stripping in bottom door rail, adjustable for contact with threshold.

2.6 FINISHES

A. Finish: All exposed exterior aluminum shall receive a Valspar Corporation two-coat (primer, color coat) spray-applied fluoropolymer coating containing a 50 percent Kynar 500 or Hylar5000 Resin (PVDF) - Coating must meet the performance requirements of AAMA 2604.

1. Color: As indicated on Drawings
2. Doors shall match the frame color, unless noted otherwise.

B. Labels: Manufacturer's labels, if required, shall be located on the edge of the door at the hinged side.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation.

B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Provide proper support and anchor securely in place.

1. Separate aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials. Comply with requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101.

C. Drill and tap frames and doors and apply surface-mounted hardware items. Comply with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.

D. Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weather-tight construction. Comply with requirements of Division 7 for sealants, fillers, and gaskets.

E. Refer to "Glazing" Section of Division 8 for installation of glass and other panels shown to be glazed into doors and framing, and not pre-glazed by manufacturer.

3.2 ADJUSTING

A. Adjust operating hardware to function properly, for smooth operation without binding, and for weather-tight closure.

3.3 CLEANING

A. Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.

B. Clean glass surfaces after installation, complying with requirements contained in the "Glazing" section for cleaning and maintenance. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

3.4 PROTECTION

A. Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration at time of acceptance.

END OF SECTION

SECTION 08710

FINISH HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Finish hardware for all swinging doors, unless otherwise indicated.
2. Coordinate with factory-furnished hardware to insure complete hardware package for each door.

1.2 SUBMITTALS

A. Product Data: Include installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Submit complete hardware schedule (identifying each item as to manufacturer and number) to for review prior to ordering of materials. If requested, submit samples for review.

C. Shop Drawings: Details of electrified door hardware, indicating the following:

1. System schematic.
2. Riser diagram.
3. Detail interface between electrified door hardware and access control system. Coordinate requirements with Owner's security vendor.

D. Furnish all necessary templates and schedules of hardware specified to door and frame manufacturers and to installer. Submit actual samples of hardware, if required, for proper setting of cutouts or reinforcing.

E. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, wiring/riser diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

1.3 QUALITY ASSURANCE

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches or less above the sill.

B. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Material delivered in manufacturer's unbroken containers bearing on the outside, name and model number. Materials stored in dry storage space and with not moisture or condensation present.

1.5 COORDINATION

A. Contractor responsible for coordination of information between hardware and door and frame manufacturers. Contractor shall advise each party of any changes during course of construction. Replace hardware, doors, or frames that are not properly coordinated.

PART 2 - PRODUCTS

2.1 HARDWARE

A. All hardware shall be the quality, size, weight and method of operation as required by door size and conditions. As much hardware as possible shall be the same manufacturer to maintain continuity of finish and style and to simplify maintenance and replacement. Include all fastenings with exposed surfaces matching finish of adjacent metal parts of hardware.

B. Coordinate dimensions of lock-set components as needed to assure complete alignment and function, including dimensions of escutcheon openings for lock cylinder cores, lever handle spindles, thumb turns, etc.

C. ANSI/BHMA designations used elsewhere in this section or in schedules to describe hardware items or to define quality or function are derived from the following standards and requirements specified elsewhere in this section.

1. Butts and Hinges: ANSI A156.1
2. Door Controls - Closers: ANSI A156.4, Grade 1.
3. Auxiliary Locks: ANSI A 156.5
4. Architectural Door Trim: ANSI A156.6
5. Template Hinge Dimensions: ANSI A156.7
6. Cylindrical Locks & Latches: ANSI A156.2-2003, Series 4000, Grade 1.
7. Auxiliary Hardware: ANSI A156.16 (BHMA 1201)
8. Materials & Finishes: ANSI A156.18 (BHMA 1301)

D. Hardware on fire-rated doors shall bear the UL label and be listed for use in that application.

E. Finish on interior door hardware: BHMA 626 (US26D): Satin chrome over bronze or brass base metal, unless noted otherwise.

1. Provide plated steel where required for UL listed hardware.

2.2 CYLINDRICAL LOCKSETS:

A. Schlage 'D' Series extra heavy duty cylindrical locks where indicated.

1. Finish – BHMA 626 satin chrome.

B. Door locks exposed to the exterior shall have corrosion-resistance components throughout.

C. Permanent key core face must be the same finish as the lock-set finish.

2.3 ELECTRIFIED HARDWARE

A. Where electrified door hardware is indicated in conjunction with access control card readers, coordinate with the Owner's security system vendor to verify and confirm the specific requirements of the electrical hardware to insure complete compatibility and function at each door location.

1. Provide accessories such as power units and integral or integrated raceways for wiring for the specified electrified hardware.
2. Where electrified hardware is indicated, ensure compatibility between all door frame, door leaf, and related locking hardware components.

B. Electric Strikes: The design for each product is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

1. Adams Rite #7100, fail secure.
2. Dorma ES-110 Series or #7300 Compact Strike

C. Power Supplies: Coordinate the requirements of the Owner-furnished card reader security system with the electrical requirements of the electrified hardware and raceways.

1. Provide a compatible power supply capable of powering each electrified hardware device specified. A separate supply for each device is not required provided the supply and the devices powered are no more than 75 feet apart.
2. Provide power supply modules as recommended and required by the door hardware manufacturer and as necessary to provide the security and control required by the Owner-furnished security system.

2.4 HINGES:

A. Provide hinges for each swinging door that is not pre-hung by the manufacturer.

B. Conventional Hinges: Hinge open widths minimum, but of sufficient throw to permit maximum door swing. Steel or stainless steel pins and concealed bearings.

1. Three hinges per leaf to 7'- 6" height. Add one hinge for each additional 30 inches in height, or any fraction thereof.
2. Extra heavy weight hinges on doors over 3'- 5" in width.
3. Out-swinging exterior doors: non-ferrous with non-removable (NRP) pins.
4. Provide non-removable pins at all doors with keyed locks.
5. Non-ferrous material at exterior doors and at doors subject to corrosive atmospheric conditions.
6. Provide shims and shimming instructions for proper door adjustment.

C. Screws: Furnish Phillips flat-head or machine screws for installation of units, except furnish Phillips flat-head or wood screws for installation of units into wood. Finish screw heads to match surface of hinges or pivots.

D. Tips: Flat button and matching plug, finished to match leaves.

E. Provide UL listed ball-bearing hinges at doors with closers.

1. Doors 1-3/4 inches thick: Hager BB1279, 4-1/2 inches by 4 inches wide, not less than 0.134-inch gauge.

2.5 SURFACE-MOUNTED CLOSERS

A. Surface Closers: Dorma 8600 Series

1. Full rack-and-pinion type cylinder with removable non-ferrous cover. Single piece forged piston chrome – silicon steel spring.
2. Do not use through-bolts at wood doors unless doors are not provided with closer blocking.
3. Non-sized, non-handed and adjustable.
4. Place closers inside building, stairs, and rooms.
5. Provide Heavy Duty Parallel Arm Door Saver x Dead Stop at out-swing locations.
6. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
7. Opening pressure: Exterior doors 8.5 pounds, interior doors 5 pounds, labeled fire not more than doors 15 pounds.
8. Separate adjusting valves for closing speed, latching speed and back-check, fourth valve for delayed action where scheduled.
9. Exterior doors do not require seasonal adjustments in temperatures from 120 degrees F to 0 degrees F, furnish data on request.
10. Non-flaming fluid will not fuel door or floor covering fires.

11. Sprayed Finish, 689 (aluminum color)
12. Warranty: 25 years.

B. Provide door closers at fire-rated doors and where indicated.

2.6 DOOR BOLTS

A. Manual Flush Bolts: BHMA A156.16, Grade 1 unless Grade 2 is indicated; designed for mortising into door edge.

B. Manual flush extension bolts shall be used to latch the inactive door of a pair. The length of the rod shall be long enough to place the centerline of the mechanisms 72 inches from the bottom of the door.

1. Manufacturers:
   a. Adams Rite Manufacturing Co. (ARM).
   b. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
   c. Hager Companies (HAG).
   d. IVES Hardware; an Ingersoll-Rand Company (IVS).
   e. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
   f. Trimco (TBM).

2. Automatic Flush Bolts – Basis of Design:
   a. Trimco W3810 at metal doors
   b. Trimco W3815 at wood doors

3. Manual Flush Bolts – Basis of Design: Trimco W3913

2.7 EXIT DEVICES

A. Exit Devices: BHMA A156.3, Grade 1 unless Grade 2 is indicated.

B. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." and Indiana Building Code accessibility requirements.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 pounds.

C. Exit Devices for Means of Egress Doors: Comply with NFPA 101. Exit devices shall not require more than 15 pounds force to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

D. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

1. Basis of Design: Von Duprin 98L-BE-F, unless noted otherwise in Hardware Schedule.

E. Outside Trim: Lever; material and finish to match locksets, unless otherwise indicated.

1. Match design for locksets and latchsets, unless otherwise indicated.
2. Basis of Design: Von Duprin 992L-BE

F. Available Manufacturers:

1. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company (CR).
2. DORMA Architectural Hardware; Member of The DORMA Group North America (DAH).
3. Monarch Exit Devices & Door Hardware; an Ingersoll-Rand Company (MON).
4. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
5. Von Duprin; an Ingersoll-Rand Company (VD).
6. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company (YAL).

2.8 DOOR GASKETING

A. Standard: BHMA A156.22.

B. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide non-corrosive fasteners for exterior applications and elsewhere as indicated.

1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

C. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated, based on testing according to UL 1784.

1. Provide smoke-labeled gasketing on fire-rated doors and on smoke-labeled doors.

D. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches or less above the sill.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Gasketing Materials: ASTM D 2000 and AAMA 701/702.

G. Available Products:

1. Door and Hardware Systems, Inc, #105 "Cush-'N'-Seal" (716) 235-8543.
2. National Guard Products Series 5020
3. Pemko Manufacturing No. S773.

H. Manufacturers:

1. Hager Companies.
2. National Guard Products.
3. Pemko Manufacturing Co.
4. Sealeze; a unit of Jason Incorporated.
5. Zero International.

2.9 MISCELLANEOUS HARDWARE:

A. Floor Stops: Trimco 1212 with 1210AR riser as required.

B. Wall Stops – Basis of Design: Rockwood 409

C. Overhead stops: Heavy Duty Concealed Overhead Stop, ANSI A156.8 Grade 1. Provide stop only function only on fire-rated doors.

1. Dorma 910.
2. Glynn-Johnson 100 Series.

D. Silencers for Steel Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum diameter 1/2 inch; fabricated for drilled-in application to frame. Trimco, Ives, Sargent, Stanley, or equal.

1. Provide silencers in door frames that do not receive gaskets or weatherstripping.
2. Provide 3 silencers on strike side jamb at single doors. Provide 4 silencers on frame head at pairs of doors.

E. Metal Thresholds – Basis of Design: Pemko 2005AS

1. Set thresholds in full bed of butyl-rubber or polyisobutylene mastic sealant. Non-ferrous 1/4-inch fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (SS/FHSL).

F. Metal Protection Plates: Stainless steel, 0.050 inch thick; beveled top and 2 sides.

1. Width: 2 inches less than door width on single doors.
2. Height:
   a. Armor plate – 34 inches (or 1/2-inch less than height of bottom of hardware, whichever is less). Coordinate mounting height with Owner's equipment.
   b. Kick plate – 10 inches (or 1/2-inch less than height of bottom rail, whichever is less).
3. Countersink mounting screws to provide heads flush with face of plate.
4. Acceptable manufacturers: Hager, Rockwood, Trimco.

G. Fire Department Key Lock Box: Provide and install secured key lock boxes as required by local Fire Department. "Knox Box" or as approved by Fire Department.

1. Subject to compliance with requirements, other manufacturers offering products that may be incorporated into the Work include:
   a. ABLOY Security, Inc.; an ASSA ABLOY Group company.
   b. Supra Products .
2. Coordinate the location and position of the key lock boxes with the Fire Department and the Architect.

2.10 KEYING

A. Key System: New Grandmaster System. For estimate use factory GMK charge. Initiate and conduct meeting(s) with Owner to determine system structure, furnish Owner's written approval of the system. Obtain Owner's keying instructions and approval of final keying.

B. Coordinate with Owner's requirements.

C. All locks shall be construction keyed. Furnish six (6) master keys for each group. Provide two (2) change keys for all locks.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance of door hardware.

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

3.2 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Install finish hardware and upon completion shall check and adjust hardware, and leave acceptable in operating condition. Hardware accurately fitted and installed (using boring jigs and special equipment) in accordance with manufacturer's specifications. All butts, lock plates and strikes shall be neatly and accurately mortised to finish flush and accurately aligned to insure a smooth and quiet operation of all parts without striking, binding hanging or rattling. Doors hung with equal clearance at head and jambs.

D. Hardware items not requiring paint shall be fitted and removed before painting is done and then replaced. All hardware shall be cleaned prior to final acceptance. When required, remove and replace doors so that door bottoms and tops may be finished as required.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of non-hardening sealant. Fasten each threshold with a minimum of three (3) anchors in a secure and substantial manner. Take up and reinstall, or replace if necessary, thresholds that move or make noise under foot pressure.

F. Install weather-stripping and smoke seals at heads, jambs of interior and exterior doors in accordance with manufacturer's recommendations.

3.3 CLOSERS

A. Install surface closers on room side or stair side of door, unless noted otherwise. Provide parallel arm mounting at out-swing doors, unless indicated otherwise.

3.4 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 so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door, as required by the accessibility code.

3.5 FINISH HARDWARE SCHEDULE:

A. Set No. 1 – Pair hollow metal doors/hollow metal frame

1. Doors Numbered:
   E003 Garage from Sprinkler Riser
   E103 Garage from Sprinkler Riser
   E203 Garage from Sprinkler Riser
   E303 Garage from Sprinkler Riser

2. For Each Opening provide:
   6 Hinges
   1 Lock – storeroom function ANSI F86
   1 pair Manual Flush Bolts
   1 set Gaskets
   2 Door sweeps – Pemko 307AV

B. Set No. 2 – Single hollow metal door/hollow metal frame

1. Doors Numbered:
   E006a Garage to Retail Maintenance
   E007a Garage to Residential Maintenance

2. For Each Opening provide:
   3 Hinges
   1 Lock – Corridor function ANSI F90

C. Set No. 3 – Single hollow metal door/hollow metal frame

1. Doors Numbered:
   E004 Lobby from Elevator Machine Room (fire-rated)
   E005 Garage from Elevator Machine Room (fire-rated)
   E008a Garage to Electrical
   E008b Residential Maintenance to Electrical

2. For Each Opening provide:
   - 3 Hinges
   - 1 Lock – storeroom function ANSI F86
   - 1 Closer
   - 1 set Gaskets at Door E004

D. Set No. 4 – Single hollow metal door/hollow metal frame

1. Doors Numbered:
   - S001 Garage to Stair (fire-rated)
   - S002 Garage to Stair (fire-rated)
   - S003 Garage to Stair (fire-rated)
   - S101a Garage to Stair (fire-rated)
   - S102a Garage to Stair (fire-rated)
   - S201a Garage to Stair (fire-rated)
   - S202 Garage to Stair (fire-rated)
   - S203 Garage to Stair (fire-rated)
   - S301a Garage to Stair (fire-rated)
   - S302 Garage to Stair (fire-rated)
   - S303 Garage to Stair (fire-rated)
   - S401a Garage to Stair (fire-rated)
   - S402 Garage to Stair (fire-rated)
   - S403 Garage to Stair (fire-rated)

2. For Each Opening provide:
   - 3 Hinges
   - 1 Fire Exit Device
   - 1 Closer
   - 1 set Gaskets
   - 1 Wall stop - Rockwood 409

E. Set No. 5 – Single hollow metal door/hollow metal frame

1. Doors Numbered:
   - S101b Apartment Building from Stair #1 (fire-rated)

2. For Each Opening provide:
   - 3 Hinges
   - 1 Fire Exit Device Von Duprin 98L-NL-F x992L-NL
   - 1 Closer
   - 1 set Gaskets
   - Threshold
   - 1 Wall stop - Rockwood 409

F. Set No. 6 – Single hollow metal door/hollow metal frame

1. Doors Numbered:
   - S103 Stair #3 to Apartment Building (fire-rated)
   - S201b Apartment Building to Stair (fire-rated)
   - S301b Apartment Building to Stair (fire-rated)
   - S401b Apartment Building to Stair (fire-rated)

2. For Each Opening provide:
   - 3 Hinges
   - 1 Fire Exit Device Von Duprin 98L-NL-F x992L-NL
   - 1 Electric Strike
   - 1 Closer
   - 1 set Gaskets
   - 1 Wall stop - Rockwood 409

G. Set No. 7 – Pair hollow metal doors/hollow metal frame

1. Doors Numbered:
   - E104 Garage from Trash (fire-rated)

2. For Each Opening provide:
   - 6 Hinges
   - 1 Lock – Classroom function ANSI F84
   - 1 pair Manual Flush Bolts
   - 2 Armor Plates

H. Set No. 8 – Single hollow metal door/hollow metal frame

1. Doors Numbered:
   - E110a Garage from Apartment Building (fire-rated)
   - E110b Garage from Apartment Building (fire-rated)
   - E210a Garage from Apartment Building (fire-rated)
   - E210b Garage from Apartment Building (fire-rated)
   - E210c Garage from Apartment Building (fire-rated)
   - E310a Garage from Apartment Building (fire-rated)
   - E310b Garage from Apartment Building (fire-rated)
   - E310c Garage from Apartment Building (fire-rated)

2. For Each Opening provide:
   - 3 Hinges
   - 1 Lock – storeroom function ANSI F86
   - 1 Electric strike
   - 1 Closer
   - 1 set Gaskets
   - 1 Door sweep – Pemko 57AV
   - 1 Threshold

1 Wall stop

I. Set No. 9 – Single hollow metal door/hollow metal frame

1. Doors Numbered:
   E204 Apartment Building to Trash (fire-rated)
   E304 Apartment Building to Trash (fire-rated)

2. For Each Opening provide:
   3 Hinges
   1 Lock – passage function ANSI F75
   1 Closer
   1 set Gaskets at Door E004

J. Set No. 10 – Pair hollow metal doors/hollow metal frame, with access control

1. Doors Numbered:
   E201b Apartment Building to Lobby
   E301b Apartment Building to Lobby
   E401b Apartment Building to Lobby

2. For Each Opening provide:
   6 Hinges
   1 Lock – storeroom function ANSI F86
   1 Electric Strike in edge of inactive leaf
   1 pair Manual Flush Bolts
   1 set Gaskets

K. Door Openings with finish hardware furnished by door manufacturer:

1. Doors Numbered:
   E001 Aluminum Entrance Door
   E002 Aluminum Entrance Door
   E006b Coiling door
   E007b Coiling door
   E101 Aluminum Entrance Door
   E102a Aluminum Entrance Door
   E102b Aluminum Entrance Door
   S102b Aluminum Entrance Door
   E201a Aluminum Entrance Door
   E202 Aluminum Entrance Door
   E301a Aluminum Entrance Door
   E302 Aluminum Entrance Door
   E401a Aluminum Entrance Door
   E402 Aluminum Entrance Door

END OF SECTION

SECTION 08800

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Glazing of the Aluminum Storefront.
2. Glazing of the Aluminum Curtain Walls
3. Glazing in interior borrowed lite frames and sidelights.

B. Related Work Specified Elsewhere:

1. Division 8 Section "Aluminum Entrances and Storefront".
2. Division 8 Section "Glazed Aluminum Curtain Walls"

1.2 DEFINITIONS

A. Manufacturer: A firm that produces primary glass or fabrication glass as defined in referenced glazing publications.

B. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

C. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

D. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulation glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.3 QUALIFICATIONS

A. Submit manufacturer's certified identification, showing strength, grade, thickness, type and quality for each type of glass used. Mark tempered, heat strengthened and laminated glass with permanent identification labels.

B. Comply with all building, fire, and safety codes relating to the work and ASTM C1048-85. Safety glazing shall conform to the requirements of Federal rules and regulations titled "Safety Standards for Architectural Glazing materials" (16 CFR Part 1201), and ANSI Z97.1-1975. Use tempered glass for safety glazing unless shown otherwise. Provide certification that the glazing used conforms to the referenced standards.

C. Safety Glazing Products: For tempered safety glazing, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.

D. Each glass type is to match the approved samples, be uniform in appearance, free from irregularities and differences in appearance when viewed from exterior as judged by the Architect. Glass not complying with this requirement to be replaced with conforming glass at no additional cost to Owner.

E. The Contractor shall assume undivided responsibility for the glass and glazing and coordination with the components of related work. This firm must demonstrate not less than 5 years successful experience at work similar to the work of this project. Provide at least one person who shall be thoroughly trained and experienced in the skills required, who shall be completely familiar with the referenced standards and the requirements of this work, and who shall personally direct all installation performed under this Section of these specifications.

1.4 PLANS AND SPECIFICATIONS

A. These specifications are intended to provide performance criteria for the design, fabrication and installation of the glass and glazing. The Contractor is responsible for the engineering and design of all components and materials as well as the fabrication, installation and performance of the glass and glazing.

B. Architectural drawings are diagrammatic. The details shown are intended as a guide for the aesthetic and interfacing requirements of the glass and glazing to and with other work. The requirements shown by the details are intended to establish basic dimensions, locations of glass panels and locations of different glass types. The Contractor is responsible for the design and engineering of the glass and glazing within these aesthetic parameters. The drawings are not to be construed as engineering design, or adequate to meet the engineering design requirements.

C. It is recognized that the architectural design details do not cover some conditions or modifications, which may be required. It is, however, intended that conditions not detailed shall be developed through the shop drawings to the same level of aesthetics and in compliance with performance criteria as indicated for detailed areas and as stipulated in these specifications. The Contractor, by accepting a contract for the work, acknowledges this and agrees that the Architect shall have the final say as to all matters whether detailed or not on the architectural design details.

D. If conflicts exist between this section of the specification and the glass framing specifications, the more stringent specification shall apply.

1.5 CODES AND REFERENCES

A. The glass and glazing work, except as otherwise shown or specified shall comply with the minimum requirements of the latest edition of the following codes, specifications and standards. Where conflicting requirements arise, follow the more stringent.

1. GANA's Glazing Manual.
2. ASTM C509, Cellular Preformed Rubbers.
3. ASTM C864, Compression Seals Spacers and Setting Blocks.
4. ASTM C998, Test for Glass Under Static Loads by Non-Destructive Methods.
5. ASTM C1036, Standard Specification for Flat Glass.
6. ASTM C1048, Standard Specification for Heat Treated Flat Glass.
7. ASTM E 546, Standard Test Method for Frost Point of Sealed Insulating Glass Units.
8. ASTM E 576, Standard Test Method for Dew/Frost Point of Sealed Insulating Glass Units in Vertical Position.
9. ASTM E773, Standard Test Method for Sealed Durability of Insulating Glass Units.
10. ASTM E774, Standard Specification for Sealed Insulating Glass Units.
11. ASTM E997, Test for Glass Under Static Loads by Destructive Methods.
12. AAMA "Metal Curtain Wall Specification Manual".
13. AAMA CWS-12, Structural Properties of Glass.
14. AAMA 807.1 Glazing tapes.
15. Federal Standard CPSC 16 CRF 1201.
16. ANSI Z97.1-1984, Safety Glazing Materials.

1.6 SUBMITTALS

A. Submit shop drawings showing details of each type glazing system indicating sizes, shapes, material and quantity. Show details indicating sealant thickness and profile, bite on glass, glass edge clearance, depth of rabbet and thickness of glass. Identify gasket materials, side spacer blocks, and setting blocks. Show weepage system in glass pockets. Details shall be full scale and fully drawn, not outlined.

B. Submit manufacturer's published data for glazing material specified and recommended installation requirements.

C. Submit calculations demonstrating the structural integrity of the glass in meeting the design load pressures which are specified in the respective glass framing systems. Glass shall be designed using the probability of breakage of 8 lites per 1,000 for vertically glazed areas, and one lite per 1,000 for sloped glazed areas. Include thermal stress analysis calculations and center deflection calculations as part of this submittal. Calculations shall be performed by the glass manufacturer. Where glass manufacturer cannot assure adequate structural performance of insulating glass units based upon combination of inner/outer lite, assume outer lite alone must satisfy structural requirements.

D. Provide certification from glass producer/fabricator that glass producer/fabricator has reviewed all glazing details, project conditions and thicknesses and compositions of all glass and finds same suitable for the purpose intended in accordance with these specifications. Glass manufacturer's recommendations are to be accompanied by the required wind load and thermal stress analysis.

E. Submit certification from manufacturer stating that insulated glass units meet standards specified herein.

1.7 JOB CONDITIONS

A. Prior to beginning of installation, meet with the Architect, Glass Manufacturer, Curtain Wall Contractor and other trades affected by glass installation. Review all material selections, handling, storage, sealant work, glass pocket alignment tolerances, bedding of gaskets, protection, weather conditions under which glazing can be performed, and cleaning.

B. Do not perform work under adverse weather or job conditions.

C. Install liquid sealants when temperatures are within lower or middle third of temperature range recommended by manufacturer.

1.8 DELIVERY AND STORAGE

A. Deliver glass to site with manufacturer's labels showing thickness, quality and type, floor location, and/or other denotations which identify where glass is to be used.

B. Deliver glazing compound and other glazing items to site in manufacturer's original unopened packages or containers.

C. Remove from the job site and replace with acceptable material all cracked, broken, chipped or otherwise damaged glass, and all glazing and sealing materials unfit for use.

D. Store glass in dry, well-vented location at a temperature maintained above dew point. Minimize the handling of glass and protect from soiling, atmospheric condensation and other moisture.

E. Store, at Owner's direction, attic stock of all glass equal to 1% of job requirements. Additional gaskets, reglazing beads, etc. equal to amount of glass shall be provided. Selection of attic stock glass shall be by the Architect from a list of all sizes of glass furnished for the project. List shall be compiled by the Contractor.

F. All delivered items, whether F.O.B. job site for unloading and installation by others, or whether fabricated and installed by the Contractor shall be properly crated. Crates shall be marked with installation location and fabrication/piece numbers, shop drawing references, etc. as applicable.

1.9 WARRANTY

A. The Contractor shall guarantee glazing occurring on the building to be weather and watertight for a period of three years after date of final acceptance by the Owner.

B. The manufacturer of the insulated glass shall warrant and guarantee direct to the Owner each insulating glass unit installed to be free from material obstructions of vision as a result of dust or film formation on the internal glass surfaces caused by failure of the hermetic seal other than glass breakage and that spacer bars shall not "walk up" into the cavity between the glass lites. Units using coated glass shall be free from discoloration, mottling or deteriorating of the coating regardless of loss of insulating glass seal, for a period of 10 years.

C. All warranties shall agree to replace the glass F.O.B. project site, including labor, at no cost to the Owner, provided the manufacturers instructions for protection and maintenance have been adhered to during the warranty period and failure is not due to vandalism or glass breakage caused by external projectiles.

PART 2 - PRODUCTS

2.1 INSULATING GLAZING TYPES

A. Type CI: 1-inch thick Clear Insulating Glass Units:

1. Indoor Lite: 1/4 inch thick clear float glass, "Solarban 60" Solar Control Low-E sputter-coated on second surface (2), by PPG Industries, Inc.
2. Air space: 1/2 inch.
3. Outdoor Lite: 1/4 inch thick clear float glass.

B. Type CTI : Same as Type "CI" except with tempered glass as required to meet Building Code requirements for safety glazing in hazardous locations. Both interior and exterior lites shall be tempered where tempered insulating glazing is indicated.

2.2 NON-INSULATING GLASS TYPES

A. Type CT : Clear tempered 1/4-inch safety glass.

B. Type C : Clear 1/4-inch thick annealed or Kind HS (heat strengthened), Condition A (uncoated surfaces) where heat strengthening is required to resist thermal stresses induced by differential shading of individual glass lites and to comply with performance requirements.

2.3 COMPONENTS

A. Float Glass shall be 1/4-inch thickness minimum, unless otherwise noted or required thicker by glass manufacturer. Clear or as indicated, meeting ASTM 1036-85, type 1, class 1 or class 2.

B. Heat-Treated Float Glass shall be 1/4-inch thickness minimum, unless otherwise noted or required thicker by glass manufacturer. Clear or as indicated, meeting ASTM C 1048-85, Federal Standard 16 CFR 1201 and ANSI Z97.1-1984. Glass shall be treated using a horizontal process. No tong marks shall be allowed. Heat strengthened as recommended by the glass manufacturer due to thermal stress or structural considerations. Tempered as required to meet code requirements. The orientation of the inherent roller marks in the heat strengthened shall be horizontal, not vertical, when the glass is in installed position.

C. Insulating Glass shall be double glazed, dual sealed units, with air space between panes hermetically sealed with silicone at the perimeter of the unit. Units to meet Class CBA of the IGCC, ASTM E 773-83, ASTM E-576, and ASTM E774-84a, level CBA.

D. The vision glass used is to be heat strengthened as recommended by the manufacturer due to thermal stress, or structural considerations. Tempered glass should only be used to meet safety glazing codes. Increase glass thickness as necessary to meet other performance criteria.

E. The exterior lite in all insulating glass units shall be fabricated from the same materials in order to maintain visual uniformity.

F. The lites comprising insulating glass units shall be annealed, heat strengthened, or fully tempered, as specified, required, or as recommended by the glass manufacturer to insure against heat breakage; to assure adequate glass performance at the specified design pressures; and assure adequate performance under test conditions specified under the performance criteria specified in the respective glass framing specification sections.

G. Ceramic-coated Spandrel Glass: ASTM C 1048, condition B (Spandrel glass, one-surface ceramic coated), Type I (transparent glass, flat), Quality q3 (glazing select), and complying with other requirements specified in Glass Types.

1. Fallout Resistance: Provide spandrel units identical to those passing the fallout-resistance test for spandrel glass specified in ASTM C 1048.

2.4 GLAZING ACCESSORIES

A. Setting blocks must be 80 to 90 durometer extruded neoprene or EPDM, minimum 4 inches long, sized per FGMA guidelines.

B. Exterior glazing gaskets to be cellular neoprene complying with ASTM C509-84. Exterior gaskets to have shop molded corners. Interior wedge gaskets to be non-cellular neoprene complying with ASTM C864-84, option 1, with molded corners at vision areas. All corners shall be bed in an elastomeric sealant compatible with glazing gaskets.

C. Side spacer blocks must be 65+5 durometer extruded neoprene or EPDM, sized and profiled for intended use.

D. Where wet seal is required, use a one part non-acidic moisture-curing, neutral curing silicone sealant complying with F.S. TT-S-001543, Class A.

E. Glazing Tape shall be pre-formed macro-polyisobutylene with a continuous integral shim of a Shore "A" of 40 to 60. Tape shall comply with AAMA 807.1. Tape should compress to the shim without excessive force being required, as recommended by the glass manufacturer, to avoid pressure points or breakage.

F. Compressible Filler Rod shall be closed-cell or waterproof-jacketed rods stock of synthetic rubber or plastic foam, proven to be compatible with sealants used. Rod is not to be used in the glazing rabbet.

G. Cleaners, Primers and Sealers shall be type as recommended by manufacturers of sealant or gasket.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the areas and conditions where glass and glazing are to be installed and notify in writing the Architect and General Contractor of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Architect.

3.2 STANDARDS AND PERFORMANCE

A. Method of installation must be in accordance with the manufacturer's published literature, as well as the latest standards of the FGMA and SIGMA.

B. Comply with combined recommendations and technical reports by manufacturers of glass and glazing products as used in each glazing system and with recommendations of Flat Glass Marketing Assoc. "Glazing Manual" except where more stringent requirements are indicated by the specifications, or the framing systems.

C. 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.

D. Install insulating glass units to comply with recommendations by Sealed Insulating Glass Manufacturers Assoc., except as otherwise specifically indicated or recommended by glass and sealant manufacturers. Insulating glass units shall be installed in such a manner as to adequately drain the glazing rabbet as approved in writing by the Insulating Glass manufacturer.

E. Watertight and airtight installation of each glass product is required. Each installation must withstand normal temperature changes, wind loading, and 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.

F. Glazing channel dimensions as shown on shop drawings for the glazing systems are intended to provide for necessary bite on glass, minimum edge clearance, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by job conditions at a time of installation, but stay within the minimum bites as stipulated by the glass framing shop drawings, the specifications, or the FGMA guidelines.

3.3 PREPARATION

A. Thoroughly clean all joints, gutters and glass pockets, removing all foreign matter such as dirt, oil, grease, fireproofing, surface dust, foreign debris and frost.

B. Loose particles present or resulting from cleaning shall be removed by blowing out joints with oil free compressed air, or by vacuuming joints. Remove protective coatings or fabrication oils and residue on metallic surfaces with solvents that leave no residue. Do not allow solvent to air dry without wiping. Use only clean lint free towels for wiping of surfaces.

C. Do not glaze when the ambient temperature and weather conditions cause frost or moisture/condensation on framing, or during damp weather unless approved measures to eliminate these conditions are used. Cut all glass accurately to sizes required to the openings and in such a way that edges are smooth and straight. Clean glass free from dust, oil, etc., and wipe clean immediately before installation.

D. Set, remove, and later reset glazing stops so as to avoid marking or defacing any portion of the frames, stops, settings, etc. Prime surfaces of openings properly where recommended by the sealant manufacturer.

E. All glazed openings shall be checked prior to glazing to make certain that the openings are square, plumb, and secure in order that uniform face and edge clearances are maintained. Inspect all framing joint intersections to insure that the offset in the jointery will not inflect undue edge pressure on the glass in accordance with FGMA Guidelines.

F. Maintain minimum face distances on both sides of glass as per FGMA Guidelines.

3.4 INSTALLATION AND APPLICATION

A. Set all glass in a true plane, tight and straight, with proper and adequate clearance, firmly anchored to prevent rattling and looseness, with all edges cleanly cut.

B. Install glass in accordance with instructions contained in the Flat Glass Jobber's Glazing Manual and FGMA guidelines. Use workmen specialized in the application of glass and sealants. Apply glazing compound or gaskets in accordance with manufacturer's recommendations.

C. Install setting blocks at quarter points or at location as recommended by FGMA or glass manufacturer. In no case shall edge of block be closer than 6" to the vertical edge of the glass unless specifically approved otherwise in writing by the glass manufacturer. Setting blocks shall be restricted from lateral movement. Setting blocks at insulated glass units and laminated glass shall support both lites of glass.

D. Apply glazing sealants under pressure with hand or power actuated gun or other appropriate means. Use gun having nozzle of proper size and provide sufficient pressure to completely fill joint. Neatly point or tool all joint surfaces to provide the proper contour.

E. Cut glass at factory to exact size with proper edge clearance so that glass will not contact frame at any point. Do not nip or seam the edges.

1. Do not mark installed glass with an "X", or other symbol, or with any material whatsoever. Tapes or banners may be fastened to the frame head without damage to the surface and suspended over the glass.

F. Apply masking tape, where required by glazing operation, in continuous strips in alignment with joint edge. Remove tape immediately after joints have been sealed and tooled. Dry tool joints. Do not use water-wet tool or tooling solution.

G. Follow sealant manufacturer's instructions regarding mixing, surface preparation, priming, application procedure.

H. Any stickers, separators or glass identification markings applied to the glass must be on the fourth surface of the insulating units. No stickers or separators shall be on the exterior (number one surface) when glass is installed.

I. Fabricate and install all glass so roller marks from heat strengthening process are in the horizontal position. Mixing the direction will not be acceptable.

J. Use of temporary wedge gaskets or dutchmans shall be in accordance with FGMA and glass manufacturers recommendation.

K. Factory molded corners on gaskets must be set in a wet compatible no-curing sealant or compatible wet silicone.

3.5 PROTECTION

A. The Glazing Contractor shall exercise extreme caution and care to protect exposed non-coated surfaces from scratching or abrading until Owner occupies the building.

B. Any and all scratched, abraded or otherwise damaged glass shall be removed and replaced with new damage-free glass by the Contractor.

C. Protect all glass from weld splatter. Any glass with weld splatter or burns shall be removed and replaced.

3.6 CLEANING

A. Prior to date of substantial completion, wash glass on interior and exterior of buildings to remove paint, soil prints and foreign matter. Remove adhered matter and excess glazing materials. Clean glass only with a mild detergent and water recommended by the glass manufacturer. Do not use abrasive materials. Use professional window washers.

B. Glass scratched or otherwise damaged during cleaning shall be removed and replaced. Dispose of excess materials, containers and debris from site.

3.7 CLEAN UP

A. Immediately upon completion of this work, remove from site all debris and scrap material and clean up all dust and dirt resulting from this work, including caulk, sealant, glazing compound, daubs, smears and droppings.

END OF SECTION

SECTION 08911

GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes conventionally glazed aluminum curtain walls.

B. Related Sections include the following:

1. Division 7 Section "Joint Sealants" for installation of joint sealants installed with glazed aluminum curtain-wall systems and for sealants to the extent not specified in this Section.
2. Division 8 Section "Aluminum Entrances and Storefront" for entrance doors installed with glazed aluminum curtain-wall systems.
3. Division 8 Section "Glazing" for insulating-glass requirements.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide glazed aluminum curtain-wall systems, including anchorage, capable of withstanding, without failure, the effects of the following:

1. Structural loads.
2. Thermal movements.
3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
4. Dimensional tolerances of building frame and other adjacent construction.
5. Failure includes the following:
   a. Deflection exceeding specified limits.
   b. Thermal stresses transferred to building structure.
   c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
   d. Noise or vibration created by wind and thermal and structural movements.
   e. Loosening or weakening of fasteners, attachments, and other components.
   f. Sealant failure.

B. Structural Loads:

1. Wind Loads: As indicated on Drawings.
2. Seismic Loads: As indicated on Drawings.

C. Structural-Test Performance: Provide glazed aluminum curtain-wall systems tested according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Duration: As required by design wind velocity but not less than 60 seconds.

D. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches, and to 1/240 of clear span plus 1/4 inch, for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
   a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.

E. Story Drift: Provide glazed aluminum curtain-wall systems that accommodate design displacement of adjacent stories indicated.

1. Design Displacement: As indicated on Drawings.
2. Test Performance: No glass breakage, anchor failures, or structural damage when tested according to AAMA 501.4.

F. Thermal Movements: Provide glazed aluminum curtain-wall systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 degrees F, ambient; 180 degrees F, material surfaces.

G. Air Infiltration: Provide glazed aluminum curtain-wall systems with maximum air leakage of 0.06 CFM per square foot of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure differential of 6.24 pounds per square foot.

H. Water Penetration Under Static Pressure: Provide aluminum glazed curtain-wall systems that do not evidence water penetration when tested according to ASTM E 331 at a minimum differential static pressure of 20 percent of positive design wind load, but not less than 12 pounds per square foot.

I. Water Penetration Under Dynamic Pressure: Provide glazed aluminum curtain-wall systems that do not evidence water leakage when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive design wind load, but not less than 12 pounds per square foot.

1. Maximum Water Leakage: No uncontrolled water penetrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained to exterior and cannot damage adjacent materials or finishes is not considered water leakage.

J. Condensation Resistance: Provide glazed aluminum curtain-wall systems with condensation-resistance factor (CRF) of not less than 75_{fr} and 67_{gl} when tested according to AAMA 1503.1.

K. Average Thermal Conductance: Provide glazed aluminum curtain-wall systems with average U-factor of not more than 0.46 BTU per square foot per hour per degree F when tested according to AAMA 1503.1.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.

B. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of glazed aluminum curtain-wall systems.

1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Test Reports: Submit certified test reports showing compliance with specified performance characteristics.

D. Test Reports: Furnish samples of aluminum framing members, insulated glazing units, and structural silicone sealant to the sealant manufacturer for testing to determine the adequacy of the adhesion and compatibility of the materials and the assembly.

E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

F. Qualification Data: For Installer.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for glazed aluminum curtain-wall systems.

H. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Capable of assuming engineering responsibility and performing Work of this Section and who is acceptable to manufacturer.

1. Engineering Responsibility: Preparation of data for glazed aluminum curtain-wall systems including the following:
   a. Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.
   b. Shop Drawings, Project-specific preconstruction-testing program development, and comprehensive engineering analysis by a qualified professional engineer.

B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 699 for testing indicated.

C. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code--Aluminum."

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for glazed aluminum curtain-wall systems by field measurements before fabrication and indicate measurements on Shop Drawings.

   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating glazed aluminum curtain-wall systems without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.6 WARRANTY

A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of glazed aluminum curtain-wall systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.

   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Noise or vibration caused by thermal movements.

c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
d. Water leakage.
e. Failure of operating components to function normally.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: The design for glazed aluminum curtain-wall systems is based on Kawneer System 1600 System 1 glazed curtain wall. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. EFCO
2. United States Aluminum Corp., International Aluminum Corp.
3. Vistawall Architectural Products.

2.2 FRAMING SYSTEMS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 611.
3. Hot-Rolled Sheet and Strip: ASTM A 570/A 570M.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.

D. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.

1. Where fasteners are subject to loosening or turn out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads.
4. Finish exposed portions to match framing system.
5. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.

E. Anchors: Three-way adjustable anchors that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

F. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing compatible with adjacent materials.

G. Framing Gaskets: As recommended by manufacturer for joint type.

H. Framing Sealants: As recommended by manufacturer for joint type.

2.3 GLAZING SYSTEMS

A. Glazing: As specified in Division 8 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type and as follows:

1. Weather-seal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; neutral-curing silicone formulation compatible with structural sealant and other system components with which it comes in contact; and recommended by structural- and weather-seal sealant and aluminum-framed system manufacturers for this use.
   a. Dow Corning 790
   b. Color: As selected by Architect from manufacturer's full range of colors.

2.4 OPERABLE UNITS

A. Doors: As specified in Division 8 Section "Aluminum Entrances and Store Front."

2.5 ACCESSORY MATERIALS

A. Insulating Materials: Specified in Division 7 Section "Building Insulation."

B. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.6 FABRICATION

A. Form aluminum shapes before finishing.

B. Fabricate components that, when assembled, have the following characteristics:

1. Sharp profiles, straight and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to prevent glazing-to-glazing contact and to maintain required glazing edge clearances.
6. Provisions for re-glazing from exterior.

C. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by de-scaling or grinding.

D. Factory-Assembled Frame Units:

1. Rigidly secure non-movement joints.
2. Seal joints watertight, unless otherwise indicated.
3. Pressure equalize system at its interior face.
4. Install glazing to comply with requirements in Division 8 Section "Glazing."

E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.7 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

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

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure non-movement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
7. Seal joints watertight, unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified Division 8 Section "Glazing."

G. Install sealants as specified in Division 7 Section "Joint Sealants."

H. Install insulation materials as specified in Division 7 Section "Building Insulation."

I. Erection Tolerances: Install glazed aluminum curtain-wall systems to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:
   a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
   b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
   c. Where surfaces are separated by reveal or protruding element of 1 inch wide or greater, limit offset from true alignment to 1/4 inch.
4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing and inspecting of representative areas to determine compliance of installed system with specified requirements shall take place as follows and in successive stages as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.

1. Water Spray Test: After the installation of minimum area of 20-feet- by 20-foot glazed aluminum curtain-wall system has been completed but before installation of interior finishes has begun, three areas of system designated by Architect shall be tested according to AAMA 501.2 "Field Check of Metal Curtain Walls for Water Leakage" and shall not evidence water penetration.

C. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.

D. Perform additional testing and inspecting to determine compliance of remediated work with specified requirements.

END OF SECTION

SECTION 09220

PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Non-structural steel framing and furring.
2. Exterior Portland cement plasterwork (stucco) on metal lath.

B. Related Sections include the following:

1. Division 5 Section "Cold-Formed Metal Framing" for structural, load-bearing (transverse and axial) steel studs and joists that support lath and portland cement plaster.
2. Division 7 Section "Joint Sealants" for sealants installed with exterior portland cement plaster (stucco).

C. Where the term "stucco" is used in the Drawings, it refers to Portland cement plaster.

1.2 QUALITY ASSURANCE:

A. Coordination of Work: Coordinate layout and installation of suspension system components for suspended ceilings with other work supported by, or penetrating through, ceiling.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's product specifications and installation instructions for each product, including data showing compliance with the requirements.

B. Material Certificates: Submit producer's certificate for each kind of plaster aggregate indicated evidencing that materials comply with requirements.

C. Plaster Mix Design: Submit proposed mix design for three coat plaster system (scratch, brown and finish coats).

D. Submit Samples of Accessory Items: Metal lath, edge molding, trim shapes, control joint accessory, etc.

1.4 DELIVERY, STORAGE, AND HANDLING:

A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer.

B. Store materials inside, under cover and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, aging, corrosion, and damage from construction traffic and other causes.

1.5 PROJECT CONDITIONS:

A. Comply with ASTM C 926 requirements.

B. Environmental Requirements, General: Comply with requirements of referenced plaster application standards and recommendations of plaster manufacturer for environmental conditions before, during, and after application of plaster.

C. Exterior Plaster work:

1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
2. Apply plaster when ambient temperature is greater than 40 degrees F.
3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

D. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

E. Protect contiguous work from soiling, spattering, moisture deterioration and other harmful effects which might result from plastering.

PART 2 - PRODUCTS

2.1 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. Metal Supports:
   a. Allied Structural Industries, Inc.
   b. Chicago Metallic Corp.
   c. Gold Bond Building Products Div., National Gypsum Co.
   d. Milcor Division; Inryco, Inc.
   e. United States Gypsum Co.

2. Expanded Metal Lath:
   a. Chapman Industries.

b. Gold Bond Building Products Div., National Gypsum Co.
c. Milcor Division; Inryco, Inc.
d. United States Gypsum Co.

3. Accessories:
   a. Fry Reglet Corp.
   b. Gold Bond Building Products Div., National Gypsum Co.
   c. Keene Corp.

2.2 NON-STRUCTURAL STEEL FRAMING MEMBERS – GENERAL

A. Components, General: Comply with ASTM C 1063. For steel sheet components not included in ASTM C 1063, comply with ASTM C 645 requirements for metal, unless otherwise indicated.

B. Cold-Rolled Channels: Base metal thickness of 0.0538 inch with ASTM A 653, G60 (Z180), hot-dip galvanized zinc coating.

C. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter, unless otherwise indicated.

2.3 METAL SUPPORTS FOR SUSPENDED AND FURRED CEILINGS

A. General: Size metal ceiling supports to comply with the following, unless otherwise indicated.

B. Portland Cement Plaster Installation: ASTM C 1063.

C. Wire for Hangers and Ties: ASTM C 641, Class 1 zinc coating, soft temper.

D. Rod Hangers: Mild steel, zinc or cadmium coated.

E. Flat Hangers: Mild steel, zinc or cadmium coated or protected with rust-inhibitive paint.

F. Channels: Cold-rolled steel, 0.0598 inch minimum thickness of base metal (uncoated), allowable bending stress of 18,000 psi, protected with galvanizing complying with ASTM A 525 for G60 coating designation, and as follows:

1. Carrying Channels: 1-1/2 inches deep x 7/16 inch wide flanges, 475 pounds. per 1,000 feet painted, 508 pounds per 1,000 feet galvanized.
2. Furring Channels: 3/4 inch deep x 7/16 inch wide flanges, 300 pounds per 1,000 feet painted, 316 pounds per 1,000 feet galvanized.
3. Provide galvanized channels for exterior installations.
4. Size devices to develop full strength of hanger but not less than 3 times calculated hanger loading, except size direct pull-out concrete inserts for 5 times calculated hanger loading.

5. Braces to resist wind uplift: Same as carrying channels, spaced not more than 4 feet on center.

2.4 METAL LATH

A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653, G60, hot-dip galvanized zinc coating.

1. Available Manufacturers:
   a. Alabama Metal Industries Corporation (AMICO).
   b. Dale/Incor.
   c. Marino/Ware; Division of Ware Industries, Inc.
   d. Unimast, Inc.

2. Flat Rib Lath: Rib depth of not more than 1/8 inch.
   a. Weight: 3.4 pounds per square yard.

3. Lath Attachment Devices: Devices of material and type required by reinforced standards and recommended by lath manufacturer for secure attachment of lath to framing members and attachment of lath to lath.

2.5 PLASTER ACCESSORIES

A. General: Comply with material provisions of ASTM C1063; coordinate depth of accessories with thicknesses and number of coats required.

B. Plastic Trim: Fabricated from high-impact PVC.

1. Manufacturers:
   a. Alabama Metal Industries Corporation (AMICO).
   b. Plastic Components, Inc.
   c. Vinyl Corp.

2. Casing Beads: With perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated.
   a. Square-edge style; use unless otherwise indicated.

3. Control Joints: One-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.

C. Soffit Vents: Vented Soffit Molding, extruded aluminum 6063 T5 alloy. Free area of vent slots approximately 3 square inches per linear foot.

1. Finish: Factory spray and bake-on primer to serve as base for field painting.
2. Basis of Design: Fry Reglet Vented Soffit Molding, size as indicated.

D. Miscellaneous Trim: Refer to drawings for miscellaneous trim components manufactured by Fry Reglet. Drawings indicate manufacturer's component numbers and description. Components shall be manufactured by Fry Reglet or approved equal.

2.6 PORTLAND CEMENT PLASTER MATERIALS:

A. Portland cement, ASTM C 150, Type I or II.

B. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.

C. Sand Aggregate for Base Coats: ASTM C 897.

D. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, and proprietary ingredients.

2.7 MISCELLANEOUS MATERIALS:

A. Water for Mixing and Finishing Plaster: Drinkable, free of substances capable of affecting plaster set or of damaging plaster, lath or accessories.

B. Bonding Coat for Portland Cement Plaster: ASTM C 1059, Type II, non-re-emulsifable. Mix with cement to form a bond coat.

1. "Flex-Con" by Euco
2. "Acrylbond" by Lambert Corporation
3. "Strong Bond" by Symons Corporation

C. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.

D. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in portland cement plaster. Conform to the requirements of ASTM C1116.

E. Sealant for internal joints, laps, intersections, and terminations in accessories:

1. Comply with ASTM C 920 and other requirements indicated for each liquid-applied sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates. Prime surfaces according to the sealant manufacturer's recommendations.
2. Single-Component Neutral-Curing Silicone Sealant:
   a. Dow Corning Corporation; 791.
   b. Dow Corning Corporation; 795
   c. GE Silicones; SilPruf NB SCS9000.
   d. GE Silicones; UltraPruf II SCS2900.

2.8 PORTLAND CEMENT PLASTER MIXES AND COMPOSITIONS

A. General: Comply with ASTM C 926 for portland cement plaster base and finish coat mixes as applicable, and other requirements indicated.

B. Portland Cement Plaster Base Coat Mixes and Compositions: Proportion materials for respective base coats in parts by volume for cementitious materials and in parts by volume per sum of cementitious materials for aggregates to comply with the following requirements for each method of application and plaster base indicated. Adjust mix proportions below within limits specified to attain workability.

C. Base-Coat Mixes for Use on Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:

1. Scratch Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 3 to 4 parts aggregate per part of cementitious material (sum of separate volumes of each component material).
2. Brown Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 3 to 5 parts aggregate per part of cementitious material (sum of separate volumes of each component material).
3. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 pound of fiber per cubic foot of cementitious materials. Reduce aggregate quantities accordingly to maintain workability.

D. Job-Mixed Finish-Coat Mixes:

1. Portland Cement Mix: For cementitious materials, mix 1 part portland cement and 1-1/2 to 2 parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material (sum of separate volumes of each component material).
2. Factory-Prepared Portland Cement Finish Coat (Contractor's option): Add water only; comply with finish coat manufacturer's directions.

2.9 MIXING

A. Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION OF LATH AND FURRING, GENERAL:

A. Standards: Comply with ML/SFA 920, "Guide Specifications for Metal Lathing and Furring," and with requirements of ASTM C 1063.

B. General: Comply with requirements in ASTM C 1063 for applications indicated.

1. Comply with ASTM C 754 for installation of items not addressed in ASTM C 1063.

C. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement.

1. Isolate ceiling assemblies where they abut or are penetrated by building structure.
2. Where lathing and metal support system abuts building structure horizontally, isolate the work from structural movement sufficiently to prevent transfer of loading into the work from the building structure. Install slip or cushion type joints to absorb deflections but maintain lateral support.

D. Frame both sides of control and expansion joints independently, and do not bridge joints with furring and lathing or accessories.

E. Soffits: Unless otherwise detailed on Drawings, install furred or suspended soffits to comply with requirements for ceiling installation; install framed soffits to comply with requirements for partition installation.

3.2 INSTALLATION OF CEILING SUSPENSION SYSTEMS:

A. Preparation and Coordination: Coordinate installation of ceiling suspension system with installation of overhead structural systems to ensure that inserts and other structural anchorage provisions have been installed to receive ceiling hangers in a manner that will develop their full strength and at spacings required to support ceiling.

B. Suspend ceiling hangers from building structure as follows:

1. Install hangers plumb and free of contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to limit deflection to 1/360 of span while supporting ceiling loads.
3. Wire Hangers: Secure by looping and tying, either directly to structure or directly to fasteners that are secure and appropriate for substrate, in a manner that will not cause them to deteriorate or otherwise fail.
4. Rod and Flat Hangers: Secure to structure, including intermediate framing members, by attaching to fasteners that are secure and appropriate for substrate and hanger, in a manner that will not cause hangers to deteriorate or otherwise fail.

5. Do not support ceilings directly from permanent metal forms. Secure to fastener devices that extend through forms.
6. Do not attach hangers to steel deck tabs.
7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
8. Do not connect steel framing to or suspend it from ducts, pipes, or conduit.

C. Hanger Installation: Attach hangers to structure above ceiling to comply with ML/SFA "Specifications for Metal Lathing and Furring" and with referenced standards.

D. Install ceiling suspension system components of sizes and spacings indicated but not in smaller sizes or greater spacings than that required by referenced lathing and furring installation standards.

E. Wire Hangers: Space 8 gauge (0.16 inch diameter) wire hangers not over 4'-0" on center parallel with, and not over 3'-0" perpendicular to, direction of carrying channels, unless otherwise indicated, and within 6 inches of carrying channel ends.

F. Carrying Channels: Space carrying channels not over 3'-0" on center with 4'-0" on center hanger spacing.

G. Furring Channels to Receive Metal Lath: Space furring channels not over 16 inches on center for 3.4 pound. diamond mesh lath.

3.3 METAL LATHING

A. Expanded-Metal Lath: Install according to ASTM C 1063.

1. Flat-Ceiling and Horizontal Framing: Install flat rib lath.

B. Attach lath to framing at 7 inches on center with galvanized steel wire not less than 0.0475-inch diameter (18 gauge).

1. Overlap lath minimum 1inch. Use wire ties at not more than 7 inches on center between supports.
2. Extend lath over flanges of accessories.
3. Separate lath 1/2-inch at ceiling-to-walls and walls-to-dissimilar materials.

3.4 INSTALLATION OF PLASTERING ACCESSORIES:

A. Install according to ASTM C 1063 and at locations indicated on Drawings.

B. General: Comply with referenced lath and furring installation standards for provision and location of plaster accessories of type indicated. Miter or cope accessories at corners; install with tight joints and in alignment. Attach accessories securely to plaster bases at maximum 8 inches on center to hold accessories in place and alignment during plastering. Use wire ties at not more than 7 inches on center between supports.

C. Accessories for Portland Cement Plaster: Provide the following types to comply with requirements indicated for location:

1. Casing Beads: Install at terminations of plaster work unless otherwise indicated.
2. Control Joints: Install control joints at locations indicated, and where an expansion or control joint occurs in surface of construction directly behind plaster membrane.

D. Seal all joints and terminations in accessories, including, but not limited to:

1. Butt joints in control joints and casing beads.
2. Intersections of control joints.
3. Splices.

E. Wipe plastic accessories with solvent (MEK, xylene) before applying sealant.

3.5 PORTLAND CEMENT PLASTER APPLICATION

A. General: Comply with ASTM C 926.

B. Prepare monolithic surfaces for bonded base coats and use bonding compound or agent to comply with requirements of referenced plaster application standards for conditioning of monolithic surfaces.

C. Tolerances: Do not deviate more than 1/8 inch in 10'-0" from a true plane in finished plaster surfaces, as measured by a 10'-0" straightedge placed at any location on surface.

D. Sequence plaster application with the installation and protection of other work, so that neither will be damaged by the installation of the other.

1. Apply thickness and number of coats of plaster as indicated; or as required by referenced standards.

E. Portland Cement Plaster Application Standard: Apply portland cement plaster materials, compositions, and mixes to comply with ASTM C 926.

F. Number of Coats: Apply portland cement plaster, of composition indicated, to comply with the following requirements:

1. Use three-coat work over lath; not less than 3/4-inch thick.
   a. Scratch coat: 3/8-inch thick

b. Brown coat: 1/4-inch thick
c. Finish coat: 1/8-inch thick, exclusive of texture.

G. Bonding Agent: Application method and rate of coverage shall be in strict accordance with manufacturer's recommendations. Do not allow the bonding agent to dry before application of plaster base coat.

H. Plaster Finish Coat Texture: "Fine Sand Float" textured finish to match approved sample.

1. Trowel on finish coat and double-back with a second application. Plaster mix formulated with 30-mesh aggregate or a blend of 20-30.
2. Use circular motion, rub surfaces with float to achieve uniform pattern, bringing sand particles to the surface. Use an absolute minimum of water in floating.

I. Moist cure portland cement plaster base and finish coats to comply with ASTM C 926, including recommendations for time between coats and curing in "Annex A2 Design Considerations".

J. Fill expansion joints and control joints with sealant after plaster is finished.

1. Wipe exposed surfaces of plastic accessories with solvent (MEK, xylene) before applying sealant.

K. Do not apply curing compounds or any other film-forming products that might affect the adhesion of the elastomeric finish.

3.6 CUTTING AND PATCHING:

A. Cut, patch, point-up and repair plaster as necessary to accommodate other work and to restore cracks, dents and imperfections. Repair or replace work to eliminate blisters, buckles, excessive crazing and check cracking, dry-outs, efflorescence, sweat-outs and similar defects, and where bond to the substrate has failed.

1. Sand smooth-troweled finishes lightly to remove trowel marks and arrises.

3.7 CLEANING AND PROTECTION:

A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces which are not to be plastered. Repair floors, walls and other surfaces which have been stained, marred or otherwise damaged during the plastering work. When plastering work is completed, remove unused materials, containers and equipment and clean remove unused materials, containers and equipment and clean floors of plaster debris.

B. Provide final protection and maintain conditions, in a manner suitable to Installer, which ensures plaster work being without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 09260

GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Interior gypsum wallboard over light-gauge steel framing or furring.
2. Gypsum board panels for ceilings and soffits.
3. Non-load-bearing steel framing.
4. Metal trim.

1.3 DEFINITIONS

A. Gypsum Board Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Where accessory products are specified to be as recommended by a manufacturer, submit evidence of the manufacturer's recommendation with the associated product literature.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance-Rated Assemblies: Indicated by design designations from FM's "Approval Guide, Building Products," UL's "Fire Resistance Directory," GA-600, "Fire Resistance Design Manual."

B. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

1. STC-Rated Assemblies: Indicated by design designations from GA-600, "Fire Resistance Design Manual."

C. Materials and installation shall conform to the following standards:

1. ASTM A924 Standard Specification for General Requirements for Steel Sheet, Metallic-coated by the Hot-dip Process.
2. ASTM C 645 Standard Specification for Non-structural Steel Framing Members.
3. ASTM C754 Standard Specification for Installation of Steel Framing Members to Receive Screw-attached Gypsum Panel Products.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Steel Framing and Furring:
   a. Clark Steel Framing Systems.
   b. Consolidated Systems, Inc.
   c. Dale Industries, Inc. – Dale / Incor.
   d. Dietrich Industries, Inc.
   e. MarinoWare; Division of Ware Ind.
   f. National Gypsum Company.
   g. Scafco Corporation.
   h. Unimast, Inc.

2. Gypsum Board and Related Products:

a. American Gypsum Co.
b. G-P Gypsum Corp.
c. National Gypsum Company.
d. United States Gypsum Co.
e. James Hardie Gypsum
f. Temple-Inland Forest Products Corporation
g. Louisiana Pacific

2.2 STEEL PARTITION FRAMING (Interior, non-loadbearing)

A. Components, General: As follows:

1. Comply with ASTM C 754 for conditions indicated.
2. Steel Sheet Components: Complying with ASTM C 645 requirements for metal and with manufacturer's standard corrosion-resistant zinc coating.

B. Steel Studs and Runners: ASTM C 645 and ASTM A924.

1. Minimum Base Metal Thickness: 0.0179 inch.
2. Depth: As indicated
3. Steel Sheet Components: Complying with ASTM C 645 requirements for metal and with ASTM A 653 and ASTM A924, G60, hot-dip galvanized.
4. Studs at Door Openings: 0.0312 inch (20 gauge). If adjacent wall stud is heavier than 20 gauge, match wall stud gauge.

C. Deep-Leg Deflection Track: ASTM C 645 top runner with 2-inch- deep flanges.

D. Z-Shaped Furring: With slotted or non-slotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

E. Drywall Furring Channels (Hat channel):

1. Material: Cold-formed galvanized steel.
2. Conformance:
   a. AISI Specifications for Design of Cold-Formed Steel Structural Members.
   b. ASTM C 645.
   c. ASTM C 754.
3. Size: 0.0179 inch thick, 7/8 inch height, 2-11/16 inches width.
4. Hemmed edge detail.

F. Resilient Furring Channels: 1/2-inch- deep members, asymmetrical configuration, web leg segment perforated for more than 50 percent open area, designed to reduce sound transmission.

1. Basis of Design: Dietrich Industries "RC Deluxe".

G. Mechanical Fasteners:

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
2. Type: Self-drilling, self-tapping screws. Steel, ASTM C 1002. Galvanized coating, plated, or oil-phosphate coated, ASTM B 633, as needed for required corrosion resistance.
3. Drywall Furring Channel Lap Joint Connection, Steel to Steel: Framing screws, button head, 7/16-inch minimum length, #6 minimum shank, needle point, Phillips drive or greater, or double-wire tie with 18 gauge tie wire.

H. Tie Wire: 18 gauge, annealed, galvanized steel.

2.3 GYPSUM WALLBOARD

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

B. Gypsum Wallboard: ASTM C 36.

1. Regular Type:
   a. Thickness: 5/8 inch, unless indicated otherwise.
   b. Long Edges: Tapered.
   c. Location: Vertical surfaces, unless otherwise indicated.

2. Type X:
   a. Thickness: 5/8 inch, unless indicated otherwise.
   b. Long Edges: Tapered.
   c. Location: As indicated and where required for fire-resistance-rated assembly.

C. Proprietary, Special Fire-Resistive Type: ASTM C 36, having improved fire resistance over standard Type X.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   a. American Gypsum Co.; FireBloc Type C.
   b. G-P Gypsum Corp.; Firestop Type C.
   c. National Gypsum Company; Gold Bond Fire-Shield G.
   d. United States Gypsum Co.; SHEETROCK Brand Gypsum Panels, FIRECODE C Core.

2. Thickness: 5/8 inch, unless indicated otherwise.
3. Long Edges: Tapered.
4. Location: As indicated and Where required for specific fire-resistance-rated assembly indicated.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, or paper-faced galvanized steel sheet.
2. Shapes:
   a. Corner bead.
   b. Bullnose bead.
   c. LC-Bead: J-shaped; exposed long flange receives joint compound.
   d. L-Bead: L-shaped; exposed long flange receives joint compound.
   e. Expansion (control) joint.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape: Interior Gypsum Wallboard: Paper.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Pre-filling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Trim: Use taping compound type recommended by trim manufacturer for installing trim accessories. Follow trim manufacturer's recommendations for materials and installation methods.

D. Fire/Smoke Sealant: Flexible, non-hardening. Classified as an acoustical sealant. Refer to Section 07840 "Firestopping".

E. Putty Pad Sealant: Control noise transmission and fire resistance at electrical boxes and other penetrations. Refer to Section 07840 "Firestopping".

2.6 ACOUSTICAL SEALANT

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Acoustical Sealant for Exposed and Concealed Joints: Non-sag, paintable, non-staining, latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
   a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant.
   b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

2. Acoustical Sealant for Concealed Joints: Non-drying, non-hardening, non-skinning, non-staining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.
   a. Ohio Sealants, Inc.; Pro-Series SC-170 Rubber Base Sound Sealant.
   b. Pecora Corp.; BA-98.
   c. Tremco, Inc.; Tremco Acoustical Sealant.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

D. Isolation Strip at Exterior Walls: Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

E. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

   1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Ceilings: Coordinate installation of ceiling suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorage to building structure have been installed to receive ceiling hangers at spacing required to support ceilings and that hangers will develop their full strength.

1. Furnish concrete inserts and other devises indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLING STEEL FRAMING, GENERAL

A. Installation Standards: ASTM C 754, and ASTM C 840 requirements that apply to framing installation.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."

C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.

1. Isolate ceiling assemblies where they abut or are penetrated by building structure.
2. Isolate partition framing and wall furring where it abuts structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assembly and laterally support assembly.
   a. Use deep-leg deflection track where partitions extend tight to the underside of floor structure above.

D. Do not bridge building control and expansion joints with steel framing or furring members. Frame both sides of joints independently.

3.4 INSTALLING STEEL PARTITION FRAMING

A. Install tracks (runners) at floors, ceilings, and structural walls and columns where gypsum board assemblies abut other construction.

1. Where studs are installed directly against exterior walls, install asphalt-felt or foam-gasket isolation strip between studs and wall.

B. Installation Tolerance: Install each steel framing and furring member so fastening surfaces vary not more than 1/8 inch from the plane formed by the faces of adjacent framing.

C. Extend non-rated partition framing to six inches above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

1. Cut studs 1/2 inch short of full height to provide perimeter relief, except for load-bearing walls.

D. Fire-resistance-rated and STC-rated partitions: Extend studs and wallboard to the underside of floor/roof slabs and decks or other continuous solid-structure surfaces to obtain ratings. Install framing around structural and other members extending below floor/roof slabs and decks, as needed to support gypsum board closures and to make partitions continuous from floor to underside of solid structure.

E. Install steel studs so flanges point in the same direction and leading edge or end of each panel can be attached to open (unsupported) edges of stud flanges first.

F. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

1. Install two 20 gauge studs at each door jamb, unless otherwise indicated.
2. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

G. Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

H. Splicing Drywall Furring Channels:

1. Splice drywall furring channels with minimum of 6-inch laps.
2. Secure laps with 2 framing screws or 18 gauge tie wire double wrapped.

I. Resilient Channel Installation: Position resilient channel at right angles to steel studs, space 24 inches o.c. and attach to stud flanges with 3/8-inch long Type S Pan Head Screws driven through holes in channel mounting flange. Install channels with mounting flange down, except at floor to accommodate attachment. Locate channels 2 inches from floor and within 6 inches of ceiling. Splice resilient channels by nesting directly over the stud, screw-attach through both flanges. Reinforce with screws located at both ends of the splice.

J. Flanking Noise:

1. Review installation details to prevent structure-borne flanking noise.
2. Do not allow drywall furring channels or gypsum board to contact foreign materials, including floors, ceilings, or wall framing members.

K. Gypsum Board: Install gypsum board in vertical or horizontal position with 1/8-inch to 1/4-inch gap around perimeter for acoustical sealant application.

L. Acoustical Sealant:

1. Seal potential air leaks with acoustical sealant to achieve best Field Sound Transmission Class (FSTC).
2. Seal electrical outlets and penetrations with acoustical sealant.
3. Apply fire-rated acoustical sealant at locations where fire-rated assembly is required.

M. Putty Pad Sealant: Acoustically seal with putty pads, electrical boxes in walls and ceilings in which resilient sound isolation rating is indicated.

3.5 INSTALLATION - WALLS

A. Install drywall furring channels perpendicular to framing members.

B. Space drywall furring channels maximum of 24 inches on center.

C. Locate first drywall furring channel parallel to floor and a maximum of 3 inches above floor and one drywall furring channel a maximum of 6 inches from ceiling.

3.6 INSTALLATION - CEILINGS

A. Install drywall furring channels perpendicular, parallel, or angular to framing members.

B. Space Drywall Furring Channels:

1. Maximum of 24 inches on center with:
   a. Single layer of 5/8-inch gypsum board.
   b. Double layer of 5/8-inch gypsum board, weighing less than 2.25 pounds per square foot per layer.
   c. Single layer of 1/2-inch high-strength gypsum board.
   d. Double layer of 1/2-inch high-strength gypsum board.

2. Maximum of 16 inches on center with:
   a. Double layer of 5/8-inch gypsum board.
   b. Single layer of 1/2-inch regular-strength gypsum board.
   c. Double layer of 1/2-inch regular-strength gypsum board.

3. Reduce spacing of drywall furring channels to prevent potential for sagging of gypsum board or when additional loads are supported by resilient sound isolation clips.

C. Locate drywall furring channels maximum of 3 inches from parallel wall assemblies.

3.7 APPLYING AND FINISHING PANELS, GENERAL

A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.

B. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

D. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

E. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

G. Attach gypsum panels to framing provided at openings and cutouts.

H. Form control and expansion joints with space between edges of adjoining gypsum panels.

I. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 square feet in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect open concrete coffers, concrete joists, steel joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

J. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

K. STC-Rated Assemblies: Seal construction at perimeters, behind control and expansion joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at all perimeter edges of both faces of partitions and through-penetrations. Comply with ASTM C 919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

L. Resilient furring channels: Assure that resilient channels are oriented with attachment flange down except for baseboard channel. Apply gypsum boards perpendicular to framing with long dimension of boards parallel to resilient channels. Lift panels off floor and assure 1/8-inch space around perimeter to be filled with acoustical sealant.

1. Attach boards with 1-inch long Type S screws spaced 12 inches o.c. along resilient channels. Center horizontal abutting edges of boards over screw flange of channel, and screw-attach wallboard. Do not allow drywall screws to penetrate the resilient channels and contact supporting framing.
2. Attach wallboard to resilient furring with screws located offset from studs and other supporting framing. Do not allow screws into resilient furring to contact any other material.
3. For vertical applications, butt joints should be centered over the resilient furring. Where fire rating is required, wallboard must be applied in accordance with referenced fire-rated design standard.

M. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.

N. Space fasteners in panels that are tile substrates a maximum of 6 inches o.c.

3.8 PANEL APPLICATION METHODS

A. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels in a manner which minimizes the number of end-butt joints. unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints. At high walls install boards horizontally, with end joints staggered over studs.
   a. Stagger abutting end joints not less than one framing member in alternate courses of board.
   b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.

B. Multi-layer Application on Partitions/Walls: Apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.

C. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.

D. Multi-layer Fastening Methods: Fasten base layers and face layers separately to supports with screws.

E. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.9 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

1. Space drywall screws and nails to penetrate framing at not more than 12 inches on center along each flange.

B. Control Joints: Install control joints at locations indicated on Drawings.

C. Install Interior Trim in the following locations:

1. Cornerbead: Use at outside corners, unless otherwise indicated.
2. L-Bead: Use where indicated.
3. U-Bead: Use at exposed panel edges.

3.10 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Pre-fill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:

1. Level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where concealed from view unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
2. Level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where panels are substrate for ceramic tile or wood panels.
3. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, unless otherwise indicated.

END OF SECTION

SECTION 09900

PAINTING

PART 1 - GENERAL

1.1 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. Refer to Section 09963 for elastomeric coating for exterior cement plaster stucco.

C. 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 Architect will select from standard colors or finishes available.

1. Painting includes field painting exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.
2. Paint pipe color bands, stencils and flow arrows, equipment labels, and duct stencils as specified in Division 15 – Mechanical.

D. Painting is not required on pre-finished items, finished metal surfaces, concealed surfaces, operating parts, and labels.

1. Pre-finished items not to be painted include the following factory-finished components:
   a. Acoustic materials.
   b. Finished mechanical and electrical equipment.
   c. Light fixtures.
   d. Electrical switch gear.
   e. Distribution cabinets.

2. Concealed surfaces not to be painted include wall or ceiling surfaces in the following generally inaccessible areas:
   a. Foundation spaces.
   b. Furred areas.
   c. Pipe spaces.
   d. Duct shafts.

3. Finished metal surfaces not to be painted include:
   a. Anodized aluminum.
   b. Stainless steel.

4. Operating parts not to be painted include moving parts of operating equipment such as the following:
   a. Valve and damper operators.
   b. Linkages.
   c. Sensing devices.
   d. Motor and fan shafts.

5. Labels: Do not paint over Underwriter's Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

E. Related Sections: The following sections contain requirements that relate to this section:

1. Division 5 Section "Structural Steel" for shop priming structural steel.
2. Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
3. Division 9 Section "Wall Coverings" for substrate sealer under wall coverings.
4. Section 15190 – Mechanical Identification: Prepare surfaces and apply paint to exposed mechanical piping and duct, including supports. Stencil piping in accordance with mechanical requirements, and stencil mechanical ducts and equipment with name tag.
5. Electrical: Painting electrical work is specified in Division 16.

1.2 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.

1.3 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.
2. Submit coating manufacturer's recommended film thickness for each substrate.

1.4 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 Architect of problems anticipated using the materials specified.

C. Field Samples: On exterior surfaces, duplicate provide full-coat finish samples on at least 100 square feet of surface until required sheen, color and texture are obtained.

1. Final acceptance of colors will be from job-applied samples.
2. Final acceptance of colors will be from samples applied on the job. A minimum of two samples per color shall be included at no additional cost.

D. Material Quality: 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.

1.5 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 degrees F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

C. 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.

1.6 JOB CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F and 90 degrees F.

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F and 95 degrees F.

C. Do not apply paint in snow, rain, fog, or mist, when the relative humidity exceeds 85 percent, at temperatures less than 5 degrees F above the dew point, or too 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. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Benjamin Moore and Company (Moore).
2. Farrell-Calhoun Paint, Inc.
3. Pittsburgh Paints (PPG).
4. Porter Paints (Porter).
5. Pratt and Lambert (P & L).
6. The Sherwin-Williams Company (SW)

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

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 re-prime. Notify Architect in writing of problems anticipated with using the specified finish-coat material with substrates primed by others.
2. Gypsum drywall surfaces to be painted: treat with surface treatment to equalize porosity and surface texture of joint treatment and paper face of wallboard, and to minimize "telegraphing" or "banding" at the joints in the wallboard.
3. Cementitious Materials: Prepare concrete, concrete masonry block, and mineral fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
   a. Use abrasive blast-cleaning methods as recommended by the paint manufacturer.
   b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's printed directions.

4. 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.
   a. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer before application of primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.

b. Prime, stain, or seal wood to be painted. Allow all wood to products to acclimate to the environmental conditions where they will finally be installed prior to finishing. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
c. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.

5. Ferrous Metals: Clean non-galvanized 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. Blast steel surfaces clean as recommended by the paint system manufacturer and in accordance with requirements of SSPC specification SSPC-SP 10.
   b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
   c. 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.

6. Galvanized Surfaces: Clean galvanized surfaces with non- petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods. Pre-treat non-galvagrip metal with galvagrip acid and rinse process.

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.

D. 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. Paint finish on interior wood doors shall be spray-applied. Brushing or rolling paint on wood doors is not acceptable.

C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

1. Paint, surface treatments, and finishes are indicated in "schedules." (Color schedule provided by Architect.)
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 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, non-specular black paint.
8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
9. Finish interior of wall and base cabinets and similar field- finished casework to match exterior.
10. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.
11. Sand lightly between each succeeding enamel or varnish coat.
12. Primer may be omitted on shop-primed metal surfaces that are not exposed to the weather and touch-up paint/ primer. Field prime over shop primer steel that is exposed to the exterior / weather.

D. 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 re-coat 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.

E. Minimum Coating Thickness: Apply materials at not less than the manufacturer's recommended spreading rate for each coat.

F. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled. Inspect behind work and touch up as required to insure that all voids are filled. Apply a second coat if necessary to fill all CMU block pores and pin-holes in filler.

G. 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.

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. 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 Architect.

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. General: Provide the following paint systems for the various substrates indicated. Exterior ferrous metals to be field-primed, if steel is shop-primed or unprimed. Prepare unprimed steel in strict accordance with primer manufacturer's recommendations.

B. Ferrous Metal – Gloss Acrylic Urethane finish: Exterior steel railings, steel fabrications, hanger rods, decorative steel brackets, exposed structural steel framing, steel fascias, hollow metal doors and door frames. Apply primer over factory-primed surfaces:

1. PPG:
   a. Primer: PPG Industries "DTR" #97-149 or #95-245. Minimum dry film thickness – 5.0 mils.
   b. Two Finish Coats: "Pitthane 35" #95-850 Series Urethane. Minimum dry film thickness – 1.5 mils per coat.

2. Sherwin Williams:
   a. Primer: Macropoxy 646 Fast Cure Epoxy. Minimum dry film thickness – 5.0 mils
   b. Two Finish Coats: "Acrolon" 218 HS Acrylic Polyurethane B65-600 / B65V600. Minimum dry film thickness – 3.0 mils each.

C. Ferrous Metal – Semi-gloss Acrylic: Bollards, miscellaneous steel, and other steel surfaces not indicated to receive another type of paint finish:

1. Porter:
   a. Primer: Porter #296 Glyptex Rust-Inhibiting Primer (Solvent thinned). Apply not less than 2.0 mils dry film thickness over shop primer.
   b. Two Finish Coats: Porter #2809 Porter Guard DTM Acrylic Satin Enamel. Apply not less than 2.5 mils dry film thickness – each coat.

2. Sherwin Williams:
   a. Primer: "Pro-Cryl" Universal Primer, B66-310 Series
   b. Two Finish Coats: "Sher-Cryl" High Performance Acrylic, B66-350 Series. Apply not less than 2.5 mils each coat.

D. Cement Plaster Soffits – Flat Acrylic Latex:

1. Porter Paints:
   a. Primer: #PP898 "PorterLock" Pigmented Bonding Coat. Apply at 350 square feet per gallon.
   b. Two Finish Coats: "Acri-Shield" Flat Exterior Acrylic Paint #PP519. Apply to achieve dry film thickness of 1.4 mils per coat.

2. Sherwin Williams:
   a. Primer: "Loxon" Conditioner #A24-100 Series. Apply at not more than 250 square feet per gallon.
   b. Two Finish Coats: "SuperPaint" Exterior Latex Flat, #A80 Series. Apply to achieve dry film thickness of 1.4 mils per coat.

3.7 INTERIOR PAINT SCHEDULE

A. Ferrous Metal: Steel doors and door frames, miscellaneous steel.

1. Alkyd satin finish:

a. Porter #296 Glyptex Rust Inhibitive Metal Primer. Apply 2.0 mils DFT over shop primer.
b. Two Finish Coats: Porter #439 Porter Glyptex Eggshell Interior Alkyd Enamel.
c. 2 coats, minimum 3.4 mils over primer.

B. Cement Plaster Soffits – Flat Acrylic Latex:

1. Porter Paints:
   a. Primer: #PP898 "PorterLock" Pigmented Bonding Coat. Apply at 350 square feet per gallon.
   b. One Finish Coat: "Acri-Shield" Flat Exterior Acrylic Paint #PP519. Apply to achieve dry film thickness of 1.4 mils.

2. Sherwin Williams:
   a. Primer: "Loxon" Conditioner #A24-100 Series. Apply at not more than 250 square feet per gallon.
   b. One Finish Coat: "SuperPaint" Exterior Latex Flat, #A80 Series. Apply to achieve dry film thickness of 1.4 mils.

C. Gypsum Drywall Systems / Eggshell Latex: Walls, furr downs, and soffits.

1. Porter:
   a. Primer: #426 Drywall Sealer with Pumice.
   b. Two Finish Coats: #999 "Silken Touch" Eggshell. Dry film thickness 1.1 mils – each coat.

2. Sherwin Williams:
   a. Primer: PrepRite Classic Interior Latex Primer B28W101. Dry film thickness 1.6 mils.
   b. Two Finish Coats: "EverClean" Interior Latex Satin A97 Series. Dry film thickness 1.5 mils per coat.

D. Gypsum Drywall Systems / Flat Latex: Ceilings

1. Porter:
   a. Primer: #426 Drywall Sealer with Pumice.
   b. Two Finish Coats: #939 "Silken Touch" Flat Vinyl Suede Interior Latex Wall Paint. Dry film thickness 1.1 mils – each coat.

2. Sherwin Williams:
   a. Primer: PrepRite Classic Interior Latex Primer B28W101. Dry film thickness 1.6 mils.
   b. Two Finish Coats: "EverClean" Interior Latex Flat A96 Series. Dry film thickness 1.7 mils per coat.

E. Painted Wood /Acrylic Semi-gloss: wood wall base, wood trim.

1. Porter:
   a. Primer: "Blankit" Interior Acrylic Primer. Dry film thickness – 1.4 mils.
   b. Two Finish Coats: "Silken Touch" #1139 Semi-gloss Interior Acrylic Trim Paint. Dry film thickness not less than 1.1 mils – each coat.

2. Sherwin Williams:
   a. Primer: PrepRite Classic Interior Latex Primer B28W101. Dry film thickness 1.6 mils.
   b. Two Finish Coats: "EverClean" Interior Latex Semi-Gloss A98 Series. Dry film thickness 1.4 mils per coat.

F. Concrete Masonry Units:

1. Semi-gloss: Two coats over exterior grade block filler. Total film thickness over the block filler not less than 2.4 mils.
   a. Block filler: Porter Acri-Fil #896 Interior/ Exterior Acrylic Block Filler. Complete coverage and filling of pores is required. Provide multiple coats as necessary to obtain a pinhole-free substrate for the finish paint.
   b. Two Finish Coats: Porter Acri-Pro 100 Semi-gloss Exterior Acrylic Paint #6029. Dry film thickness 1.2 mils each coat.

END OF SECTION

SECTION 09963

ELASTOMERIC COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and field application of elastomeric coating systems to items and surfaces scheduled.

B. Related Sections include the following:

1. Division 4 Section "Concrete Masonry Units (CMU)" for substrate

1.2 SUBMITTALS

A. Product Data: For each coating system indicated. Include block fillers and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each material specified.

B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.

1. After color selection, Architect will finalize color selections after the mock-up panels are reviewed.

C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.3 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed elastomeric coating system applications similar in material and extent to those indicated for Project and whose work has a record of successful in-service performance.

B. Source Limitations: Obtain primers and undercoat materials for each coating system from the same manufacturer as the finish coats.

C. Benchmark Samples (Mock-ups): Provide a full-coat benchmark finish sample of each type of coating and substrate required. Duplicate finish of approved sample Submittals.

1. Final approval of colors will be from benchmark samples.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with the following information:

1. Name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. Handling instructions and precautions.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 degrees F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1.5 PROJECT CONDITIONS

A. Coating manufacturer's application instructions and recommendations shall be strictly followed.

B. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are within coating manufacturer's recommended temperature range, or between 45 and 90 degrees F, if not otherwise indicated in manufacturer's literature.

C. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before proceeding with or continuing coating operation.

PART 2 - PRODUCTS

2.1 COATINGS MATERIALS, GENERAL

A. Material Compatibility: Provide primers, undercoats, and finish-coat materials that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's highest grade of the various high-performance coatings specified. Materials not displaying manufacturer's product identification are not acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

2.2 COLORS

A. Colors: As selected by Architect from manufacturer's full range.

2.3 TYPICAL PROPERTIES As Cured

A.

Method	Test	Result
ASTM D 2240	Durometer Hardness, Shore A	38 points
ASTM D 412	Tensile Strength	greater than 145 PSI
ASTM D 412	Elongation	600 percent
ASTM D 1653	Permeance	greater than 40 perms
ASTM D 1737	Room Temperature Flex,	Pass 1/8" mandrel
ASTM C 711	Low Temperature Flex,	Pass 1/4" mandrel
ASTM D 3274	Fungus Resistance	No growth
ASTM D 3273	Mold Resistance	No growth
TT-C-555B	Wind-Driven Rain, 98 MPH	Pass
NCHRP-244	Chloride Ion Intrusion, effectiveness	90 percent
TT-C-555B	Alkali Resistance	Good

2.4 EXTERIOR ELASTOMERIC COATING SYSTEMS

A. Provide the following product over concrete masonry units where elastomeric coating is indicated:

1. Elastomeric coating shall have a perm rating of not less than 10.0 at the specified dry film thickness.
2. Basis of Design: "AllGuard" Silicone Elastomeric Coating, as manufactured by Dow Corning. Apply not fewer than 2 coats to achieve a dry film thickness not less than that recommended by the manufacturer for a waterproof coating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before commencing application, verify that the surfaces to be coated are in proper condition. New substrates should be allowed to cure for 30 days prior to application. Allow 3 to 7 days drying time for cured substrates following rainfall prior to application. Moisture content should be no higher than 15 percent as registered on an electronic moisture meter. Material shall be applied when substrate surface temperature is between 45 degrees and 90 degrees F

B. With Applicator present, examine substrates and conditions under which elastomeric coatings will be applied, for compliance with coating application requirements.

C. Test substrate for moisture content and alkalinity and confirm that coating manufacturer's application limitations are met before proceeding.

1. Apply coatings only after unsatisfactory conditions have been corrected and surfaces to receive coatings are thoroughly dry.
2. Start of application is construed as Applicator's acceptance of surfaces within that particular area.

3.2 PREPARATION

A. General: Remove plates, escutcheons, and similar items already in place that are not to be coated. If removal is impractical or impossible, provide surface-applied protection before surface preparation and coating.

1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.

B. Cleaning: Before applying primer for elastomeric coatings, clean substrates of substances that could impair bond of coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and coating application so dust and other contaminates from cleaning process will not fall on wet, newly coated surfaces.

C. Surface Preparation: Clean and prepare surfaces to be coated according to manufacturer's written instructions for each substrate condition and as specified.

1. Cementitious Substrates: Prepare concrete, concrete masonry block, and cement plaster surfaces to be coated. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surfaces.
   a. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not coat surfaces if moisture content exceeds that permitted in manufacturer's written instructions.

D. Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
3. Use only the type of thinners approved by manufacturer and only within recommended limits.

3.3 APPLICATION

A. General: Apply primer and elastomeric coatings according to manufacturer's written instructions.

1. Use applicators and techniques best suited for the material being applied.
2. Do not apply primer or coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.
3. Coating colors, surface treatments, and finishes are indicated in the coating system descriptions.

B. Apply coating as required to achieve not less than 10 mils dry film thickness on all surfaces indicated to receive elastomeric coating.

1. Coating must be applied in two coats of approximately equal thickness.
2. Coating shall be free of pin holes in the coating. Apply additional coats of elastomeric coating as necessary to achieve pinhole-free coating.

C. Scheduling Coating: Apply primer and first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for coating as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required is the same regardless of application method.
   a. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
   b. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until coating has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat does not cause undercoat to lift or lose adhesion.

2. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance. Give special attention to edges, corners, crevices, and similar surfaces to ensure that they receive a dry film thickness equivalent to that of flat surfaces.

D. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by manufacturer for the material and texture required.
2. Spray Equipment: Use mechanical methods to apply coating if permitted by manufacturer's written instructions and governing regulations.
   a. Use spray equipment with orifice size recommended by manufacturer for material and texture required.
   b. Apply each coat to provide the equivalent hiding of brush-applied coats.
   c. Do not double back with spray equipment building-up film thickness of two coats in one pass.

E. Minimum Coating Thickness: Apply each material no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.

1. Back-roll each coat for pinhole-free film.

F. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by manufacturer, to material required to be coated or finished that has not been prime coated by others.

1. Recoat primed and sealed substrates if there is evidence of suction spots or unsealed areas in first coat, to ensure a finish coat with no burn-through or other defects caused by insufficient sealing.

G. Completed Work: Match approved Samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

3.4 CLEANING

A. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

3.5 PROTECTION

A. Protect work of other trades, whether being coated or not, against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

1. Provide "Wet Paint" signs to protect newly coated finishes. After completing coating operations, remove temporary protective wrappings provided by others to protect their work.
2. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION

SECTION 10200

LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes fixed, extruded-aluminum louvers.

1.2 QUALITY ASSURANCE

A. Performance Requirements: Where louvers are indicated to comply with specific performance requirements, provide units whose performance ratings have been determined in compliance with Air Movement and Control Association (AMCA) Standard 500.

B. AMCA Certification: Provide louvers with AMCA Certified Ratings Seal evidencing that product complies with above requirement.

C. Field Measurements: Verify size, location and placement of louver units prior to fabrication, wherever possible.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's specifications; certified test data, where applicable; and installation instructions for required products, including finishes.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Manufacturer Fixed Wall Louvers: Subject to compliance with requirements, provide louvers as manufactured by one of the following:

1. Airline Products Co.
2. The Airolite Co.
3. American Warming and Ventilating Co.
4. C/S Group
5. McKinley
6. Ruskin-Elf
7. Reliable

2.2 MATERIALS:

A. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper.

B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5.

C. Aluminum Castings: ASTM B 26/B 26M, alloy 319.

D. Fastenings: Use same material as items fastened, unless otherwise indicated. Fasteners for exterior applications may be stainless steel or aluminum. Provide types, gages and lengths to suit unit installation conditions. Use Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

E. Anchors and Inserts: Use non-ferrous metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

F. Bituminous Paint: SSPC-Paint 12 (cold-applied asphalt mastic).

2.3 FABRICATION, GENERAL

A. Provide louvers and accessories of design, materials, sizes, depth, arrangement, and metal thicknesses indicated, or if not indicated, as required for optimum performance with respect to airflow; water penetration; strength; durability; and uniform appearance.

B. Fabricate frames including integral sills to suit adjacent construction with tolerances for installation including application of sealants in joints between louvers and adjoining work.

C. Include supports, anchorages, and accessories required for complete assembly.

D. Provide sill extensions and loose sills made of same materials as louver, where indicated, or required for drainage to exterior and to prevent water penetrating to interior.

E. Join frame members to one another and to stationary louver blades using manufacturer's standard manufacturing methods, except where indicated otherwise or where field bolted connections between frame members are made necessary by size of louvers. Maintain equal blade spacing including separation between blades and frames at head and sill to produce uniform appearance.

2.4 STATIONARY EXTRUDED ALUMINUM WALL LOUVERS

A. Horizontal Drainable Blade Louvers: Units designed to collect and drain water to exterior at sill by means of gutters in front edges of blades, and channels in jambs and mullions. Furnish units with frame and blade extrusions not less that 0.081-inch thick, complying with following performance requirements:

1. Frame depth: 6 inches
2. Free Area: approximately 57 percent
3. Water Resistance: 1,023 feet per minute at 0.01 ounce of water penetration

B. Basis of Design: Model ELF6375DX as manufactured by Ruskin Manufacturing.

C. AMCA Certification: Furnish units bearing AMCA Certified Ratings Seal.

2.5 LOUVER SCREENS:

A. Provide removable screens for exterior louvers where indicated.

B. Fabricate screen frames of same metal and finish as louver units to which secured, unless otherwise indicated.

C. Provide re-wireable frames consisting of formed or extruded metal with a driven spline or insert for securing screen mesh.

1. At louvers that will not be connected to mechanical equipment (ex., attic ventilation), use insect screens, 18 x 16 mesh, 0.011 inch aluminum wire.
2. At louvers that will be connected to mechanical equipment (ex. fresh air intake), use Bird Screening: Aluminum, 1/2-inch- square mesh, 0.063- wire.

D. Locate screens on inside face of louvers, unless otherwise indicated. Secure screens to louver frames with machine screws, spaced at each corner and at 12 inches on center.

2.6 METAL FINISHES

A. General: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations, except as otherwise indicated. Apply finishes in factory after products are assembled. Protect finishes on exposed surfaces with protective covering, prior to shipment. Remove scratches and blemishes from exposed surfaces which will be visible after completing finishing process.

B. High-Performance Organic Finish: 2-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 PREPARATION:

A. Coordinate setting drawings, diagrams, templates, instructions and directions for installation of anchorages which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.2 INSTALLATION:

A. Locate and place louver units plumb, level and in proper alignment with adjacent work.

B. Use concealed anchorage wherever possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.

C. Anchor louvers to supporting substrates in accordance with louver manufacturer's requirements to achieve structural performance capabilities of the louvers.

D. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers, as indicated.

E. Repair finishes damaged by cutting, welding, soldering and grinding operations require for fitting and jointing. Restore finishes so there is no evidence of corrective work. Return items which cannot be refinished in field to shop, make required alterations, and refinish entire unit, or provide new units, at Contractor's option.

F. Protect non-ferrous metal surfaces from corrosion or galvanic action by application of a heavy coating of bituminous paint on surfaces which will be in contact with concrete, masonry or dissimilar metals.

G. Provide louver manufacturer's concealed gaskets, all flashings, sub-sills, joint fillers, and install as work progresses to make the installations weather-tight.

END OF SECTION

SECTION 10240
ARCHITECTURAL GRILLES

PART 1 - GENERAL:

1.1 SUMMARY

A. Provide prefinished decorative aluminum architectural grille panels as indicated.

1.2 QUALITY ASSURANCE:

A. Comply with SMACNA "Architectural Sheet Metal Manual" recommendations for fabrication, construction details and installation procedures, except as otherwise indicated.

B. Field Measurements: Verify size, location and placement of grille units prior to fabrication, wherever possible.

C. Shop Assembly: Coordinate field measurements and shop drawings with fabrication nd shop assembly to minimize field adjustments, mechanical attachment and field assembly of units. Pre-assemble units in ship to greatest extent possible and disassemble as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's specifications, technical data, and installation instructions for required products, including finishes.

B. Shop Drawings: Submit shop drawings for fabrication and erection of grille units and accessories. Include plans, elevations and details of sections and connections to adjoining work. Indicate materials, finishes, fasteners, joinery and other information to determine compliance with specified requirements.

PART 2 - PRODUCTS:

2.1 ACCEPTABLE MANUFACTURERS:

A. Basis-of-Design Product: Subject to compliance with requirements, provide product as manufactured by Construction Specialties, Inc.

2.2 MATERIALS:

A. Aluminum extrusions: ASTM B 211, Alloy 6063-T52.

B. Clip Angles: Structural grade aluminum.

C. Fastenings: Fasteners shall be aluminum or stainless steel. Provide types, gauges and lengths to suit unit installation conditions.

D. Anchors and Inserts: Use non-ferrous metal or hot-dip galvanized anchors and inserts for installation and elsewhere as required for corrosion resistance. Use stainless steel or lead expansion bolt devices for drilled-in place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.3 FABRICATION, GENERAL:

A. Provide Modular Grille and accessories of design, materials, sizes, depth, arrangement, and metal thickness as indicated or as required for optimum performance with respect to strength; durability; and uniform appearance.

B. Include anchorages, and accessories required for complete assembly.

2.4 GRILLE CONSTRUCTION:

A. Aluminum Grilles: C/S Group "Paralinear" Grille Modular Pattern, Zero Degree Slope.

1. Vertical bars: spaced 9 inches on center
2. Horizontal bars: spaced 9 inches on center
3. Bar depth: 4 inches

B. Bars to be fabricated from extruded aluminum sections in 6063-T52 alloy, and to be minimum .125-inch thick. Blade connections within the grille shall be accomplished by cross lap joints tack welded where required. Grille to be mechanically secured to horizontal or vertical steel supports with extruded aluminum clip angles. All fasteners to be stainless steel or aluminum.

2.5 ALUMINUM FINISH:

A. General: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations, except as otherwise indicated. Apply finishes in factory after products are assembled. Protect finishes on exposed surfaces prior to shipment.

B. Remove scratches and blemishes from exposed surfaces, which will be visible after completing finishing process.

C. Color: as indicated or, if not otherwise indicated, as selected by architect from manufacturer's premium Kynar 500 colors.

D. Fluorocarbon Coating: Inhibitive thermo-cured primer, 0.2 mil minimum dry film thickness, and thermo-cured fluorocarbon coating containing "Kynar 500" resin, 1.0 mil minimum dry film thickness.

E. Furnish manufacturer's twenty (20) year guarantee of "Kynar 500" finish.

F. Finish shall be applied in the plant of the manufacturer.

PART 3 - EXECUTION:

3.1 INSTALLATION:

A. Locate and place grille units plumb, level and in proper alignment with adjacent work.

B. Use concealed anchorages wherever possible.

C. Form tight joints with exposed connections accurately fitted together.

D. Use isolation tape where aluminum comes in contact with steel or concrete.

END OF SECTION

SECTION 10441

PLASTIC SIGNS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Raised letter plastic signs.

B. Signs made of individual plastic letters.

1.2 SUBMITTALS

A. Shop Drawings: Indicate sign styles, lettering font, foreground and background colors, locations, overall dimensions of each sign.

B. Samples: Submit two full size sample signs, illustrating type, style, letter font, and colors specified; method of attachment.

1.3 QUALITY ASSURANCE

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

B. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and Indiana Building Code.

1.4 DELIVERY, STORAGE, AND PROTECTION

A. Package signs, labeled in name groups.

B. Store adhesive attachment tape at ambient room temperatures.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Do not install signs when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Plastic Signs:

1. Best Sign Systems, Inc: www.bestsigns.com.
2. Mohawk Sign Systems, Inc: www.mohawksign.com.
3. Seton Identification Products: www.seton.com/aec.
4. Substitutions: See Section 01600 - Product Requirements.

2.2 RAISED LETTER SIGNS

A. Base Material: Clear acrylic plastic:

1. Total Thickness: 1/8 inch.
2. Edges: Square

B. Raised Character Size and Style: Acrylic plastic, character adhered to base material:

1. Comply with applicable provisions of ANSI/ICC A117.1, including Braille.
2. Character Color: Black.
3. Character Thickness: 1/8 inch.
4. Edges: Square.
5. Character Font: Helvetica.
6. Character Case: Upper and lower.

C. Signage is to meet all code minimum requirements regarding size, shape, and surfacing

2.3 INDIVIDUAL GRAPHICS

A. Comply with applicable provisions of ANSI/ICC A117.1 for signs not required to be tactile.

B. Material: Clear acrylic plastic, square edges, 1/8-inch thickness.

C. Characters:

1. Character Color: Black.
2. Character Font: Helvetica.
3. Character Case: Upper and lower.

D. Graphic Style: Handicapped type.

2.4 ACCESSORIES

A. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

A. Provide tactile signage at all stairs, floors, rooms, and all other spaces as required by code.

B. Install in accordance with manufacturer's instructions.

C. Position signs as indicated on drawings, or as required to meet Building Code.

END OF SECTION

SECTION 10522

FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Extent of fire extinguishers, cabinets, and accessories is indicated on drawings and as required by local Building Code and Fire Safety officials.

B. This Section includes the following:

1. Fire extinguishers.
2. Fire extinguisher cabinets.

1.2 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain products in this section from one manufacturer.

B. UL-Listed Products: Provide new portable fire extinguishers which are UL-listed and bear UL "Listing Mark" for type, rating, and classification of extinguisher indicated.

C. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements of ASTM E 814 for fire-resistance rating of walls where they are installed.

1.3 SUBMITTALS

A. Product Data: Submit product data for each type of product included. For fire extinguisher cabinets include roughing-in dimensions and details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style and door construction, and panel style and materials.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Basis-of-Design Product: The design for each product is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.
1. Larsen's Manufacturing Co.
2. J.L. Industries.

3. Potter-Roemer

2.2 FIRE EXTINGUISHERS

A. General: Provide fire extinguishers for each extinguisher cabinet and other locations indicated, in specified finishes. Comply with requirements of governing authorities. Fill and service extinguishers to comply with requirements of governing authorities and manufacturer.

1. Extinguisher Type F2 – Multi-purpose Dry Chemical Type, UL-rated 4A-60B:C, 10 pound nominal capacity, with Larsen's B-2 bracket-mount where shown wall-mounted, for Class A, Class B, and Class C fires.
2. Basis of Design: Larson's MP10.

2.3 FIRE EXTINGUISHER CABINETS

A. General: Provide fire extinguisher cabinets where indicated, of suitable size for housing fire extinguishers of types and capacities indicated.

B. Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations except as otherwise indicated. Apply finishes in factory after products are assembled. Protect cabinets with plastic or paper covering, prior to shipment.

C. Construction: Manufacturer's standard surface-mounted aluminum box, with trim, frame, door and hardware to suit cabinet type, trim style, and door style indicated. Weld all joints and grind smooth. Miter and weld perimeter door frames.

1. Cabinet Material: Aluminum sheet, clear satin anodized.

D. Cabinet Type – Basis of Design: Cabinet box (tub) surface-mounted aluminum box mounted on walls - Larsen Cameo Series model number C2409-SM with clear acrylic door with black "Fire Extinguisher" lettering, basis of design.

E. Accessories:

1. Mounting Bracket: Manufacturer's standard stainless steel or aluminum, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.

B. Each fire extinguisher cabinet shall be equipped with an extinguisher.

C. Securely fasten fire extinguisher cabinets to structure, square and plumb.

D. Where exact location of fire extinguishers is not indicated, locate as directed by Architect, and in coordination with local building code and fire safety officials.

END OF SECTION

SECTION 14240

HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Hydraulic passenger elevators and service elevators.

1. Commercial, standard pre-engineered hydraulic passenger elevators.
2. Elevator car enclosures, hoistway entrances and signal equipment.
3. Jacks.
4. Operation and control systems.
5. Accessibility provisions for physically disabled persons.
6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
7. Materials and accessories as required to complete the elevator installation.

B. Certain hoistways are semi-exposed to the exterior. Provide manufacturer's standard adaptations to accommodate environmental effect of the exposure to outdoor temperatures and humidity.

C. Related Sections:

1. Division 3 Sections: Installing inserts, sleeves and anchors in concrete.
2. Division 4 Section Unit Masonry: masonry hoistway enclosure, building-in and grouting hoistway door frames, grouting thresholds. Installing inserts, sleeves and anchors in masonry.
3. Division 5 Sections Metal Fabrications: pit ladder, divider beams, support for entrances and rails, and hoisting beam at top of hoistway.
4. Division 7 Section "Waterproofing" for elevator pit waterproofing membrane.
5. Division 9 Sections: Providing elevator car finish flooring and field painting unfinished and shop primed ferrous materials.
6. Division 15 Section Heating, Ventilating, and Air Conditioning: ventilation and temperature control of elevator equipment room.
7. Division 16 Sections:
   a. Fire Alarm Systems: fire and smoke detectors and interconnecting devices; fire alarm signal lines to contacts in the machine room.
   b. Telephone Systems: ADAAG-required emergency communications equipment.
   c. Electrical service to main disconnect in elevator machine room; electrical power for elevator installation and testing; electrical-disconnecting device to elevator equipment prior to activation of sprinkler system; electrical service for machine room; machine room and pit receptacles with ground-fault current protection; lighting in machine room and pit; wiring for telephone service to machine room.

1.2 REFERENCES

A. Comply with applicable building codes and elevator codes at the project site, including but not limited to the following:

1. ANSI A117.1, Buildings and Facilities, Providing Accessibility and Usability for Physically Handicapped People
2. ADAAG, Americans with Disabilities Act Accessibility Guidelines
3. ANSI/NFPA 70, National Electrical Code
4. ANSI/NFPA 80, Fire Doors and Windows
5. ASME/ANSI A17.1, Safety Code for Elevators and Escalators
6. ANSI/UL 10B, Fire Tests of Door Assemblies
7. All other local applicable codes

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each system proposed for use. Include the following:

1. Signal and operating fixtures, operating panels and indicators
2. Cab design, dimensions and layout
3. Hoistway-door and frame details
4. Electrical characteristics and connection requirements
5. Expected heat dissipation of elevator equipment in machine room (BTU)

B. Shop Drawings: Submit approval layout drawings. Include the following:

1. Car, guide rails, buffers and other components in hoistway
2. Maximum rail bracket spacing
3. Maximum loads imposed on guide rails requiring load transfer to building structure
4. Loads on hoisting beams
5. Clearances and travel of car
6. Clear inside hoistway and pit dimensions
7. Location and sizes of access doors, hoistway entrances and frames

C. Operations and Maintenance Manuals: Provide manufacturer's standard operations and maintenance manual.

1.4 QUALITY ASSURANCE

A. Manufacturer: Provide elevators manufactured by a firm with a minimum of 10 years experience in fabrication of elevators equivalent to those specified. Elevator manufacturer shall be ISO9002 Certified.

B. Installer: The manufacturer shall install elevators.

C. Regulatory Requirements: Elevator system design and installation shall comply with the latest versions of ASME A17.1 and applicable local codes.

1. Elevator shall be designed in response to Americans with Disabilities Act Accessibility Guidelines (ADAAG).

D. Permits and Inspections: Provide licenses and permits and perform required inspections and tests.

1.5 WARRANTY

A. The elevator contractor's acceptance is conditional on the understanding that their warranty covers defective material and workmanship. The guarantee period shall not extend longer than one (1) year from the date of completion or acceptance thereof by beneficial use, whichever is earlier, of each elevator. The guarantee excludes: ordinary wear and tear, improper use, vandalism, abuse, misuse, or neglect or any other causes beyond the control of the elevator contractor and this express warranty is in lieu of all other warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose.

1.6 MAINTENANCE SERVICE

A. Maintenance service consisting of regular examinations, adjustments and lubrication of the elevator equipment shall be provided by the elevator contractor for a period of 12 months after the elevator has been turned over for the customer's use. This service shall not be subcontracted but shall be performed by the elevator contractor. All work shall be performed by competent employees during regular working hours of regular working days and shall include emergency 24-hour callback service. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the elevator contractor. Only genuine parts and supplies as used in the manufacture and installation of the original equipment shall be provided.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Basis-of-Design Product: The design for is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

1. ThyssenKrupp Elevator, holed hydraulic

B. Other Manufacturers: Subject to compliance with requirements, other manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Schindler Elevator
2. Otis Elevator Corp

2.2 SYSTEM DESCRIPTION:

A. Passenger Elevators:

1. Basis of Design; ThyssenKrupp "Marquis 25"
2. Rated Load: 2,500 pounds
3. Type: Under-the-car single cylinder.
4. Rated Speed: 150 feet per minute
5. Car Dimensions (inside clear): 6'-8" wide, 4'-3" deep.
6. Cab height: manufacturer's standard; approximately 9'-0"
7. Entrance Dimensions: 3'-6" by 8'-0"
8. Entrance Type: single-speed side opening
9. Stopping Accuracy: plus or minus 1/4-inch under any loading condition or direction of travel.
10. Power Supply: 208 Volts 3 Phase 60 Hz
11. Lighting Power Supply: 120 Volts, 1 Phase, 15 Amp, 60 Hz.
12. Operation System: Selective collective automatic operation.
13. Features:
    a. Dual Speed Fan
    b. On/Off Light Switch
    c. Solid State Starting
    d. Firefighters' Service Phase I & II
    e. Top of Car Inspection
    f. Card reader provisions: Make provisions for owner-furnished hoistway entrance card readers at openings where indicated, and card readers inside the cabs. Provide elevator controller that is compatible with Owner-furnished card readers and access control system.

B. Additional Features:

Anti-Stall Feature
Braille and Audible Signals
Door Open and Close Stall Protection
Emergency Lighting
Firefighter 's Service, sensors by others
Independent Service Feature
Infrared Light Curtain Door Protection
Low Oil Return
Overload Sensors
Phase Protection
Start Type: Soft Start
Card Reader Provision
Certificate Frame

Hoistway Access Switch at floor(s)
Locking Service Panel in Car Operating Panel
Pressure Switch
Remote Monitoring Capable
Telephone (ADA compliant)

C. Service Elevator:

1. Type: Under-the-car single cylinder.
2. Basis of Design: ThyssenKrupp "Continental 45"
3. Use: Service Elevator
4. Capacity: 4,500 pounds
5. Speed: 150 feet per minute
6. Travel: Varies – refer to Drawings
7. Landings: 4
   Front Openings: 3
   Rear Openings: 1 at ground floor level
8. Operation: Microprocessor Single Car Automatic Operation
9. Machine Room: Adjacent to elevator hoistway
10. Platform Size: 7'-10" deep by 5'-8" wide
11. Cab Height: 9'-0"
12. Hoistway Entrances: 4'-0" wide by 8'-0" high SSSO doors
13. Power Supply: 208 Volts 3 Phase 60 Hz
14. Rear door access shall be by means of a card reader electronic control.
15. Protective pad: Provide protective pad hooks and quilted, fire retardant protective pad.
16. Cab walls and ceiling: Manufacturer's standard finishes

D. Contract Maintenance: 12 months with emergency callback, during regular working hours

2.3 DOOR CONTROL FEATURES

A. Door noise not to exceed 58 dba.

B. Door control to open doors automatically when car arrives at a landing in response to a normal hall or car call.

1. Elevator doors shall be provided with a reopening device that will stop and reopen the car door(s) and hoistway door(s) automatically should the door(s) become obstructed by an object or person.

2. Primary door protection shall consist of a two dimensional, multi-beam array projecting across the car door opening. Under normal operation and for any door position, the system shall detect as a blockage an opaque object that is equal to or greater than 1.3 inches in diameter when inserted between the car doors at vertical positions from within 1 inch above the sill to 71 inches above the sill. Under degraded conditions (one or more blocked or failed beams), the primary protection shall detect opaque objects that are equal to or greater than 4 inches in diameter for the same vertical coverage. If the system performance is degraded to the point that the 4-inch object cannot be detected, the system shall maintain the doors open or permit closing only under nudging force conditions.
3. The door re-opening device shall also include a secondary, three dimensional, triangular infrared multi-beam array projecting across the door opening and extending into the hoistway door zone. The door opening device will cause the doors to reopen when it detects a person(s) or object(s) entering or exiting the car in the area between the hoistway doors or the entryway area adjacent to the hoistway doors.
4. The size of the secondary protection zone shall vary as the door positions vary during opening and closing. The width of the zone shall be approximately one-third the size of the separation between the doors (or door and strike plate for single-slide doors) and shall be approximately centered in the door separation. In order to minimize detection of hallway passers-by that are not entering the elevator, the maximum zone penetration into the entryway shall not exceed 20 inches for any door separation. Normal penetration depth into the entryway from the car doors shall be approximately 14 inches for a door separation of 42 inches. The penetration shall reduce proportionally as the doors close. At door separations of 18 inches or less the secondary protection system may cease its normal operation since the depth of the zone recedes to where it is inside the hoistway doors. The vertical coverage of the secondary protection shall be approximately 19 inches above the sill to approximately 55 inches above the sill (mid-thigh to shoulder of a typical adult).
5. The secondary protection shall have an anti-nuisance feature which will ignore detection in the secondary zone after continual detection occurs for a significant time period in the secondary zone without corresponding detection in the primary protection zone; i.e. a person/object is in the entryway but does not enter. Normal secondary protection shall be re-enabled whenever detection occurs in the primary zone.
6. The reaction time of the door detector sub-system shall not exceed 60 milliseconds when both primary and secondary protection capabilities are active; nor exceed 40 milliseconds when the secondary protection is disabled.

C. Door nudging operation to occur if doors are prevented from closing for an adjustable period of time.

2.4 EQUIPMENT: GENERAL

A. The hydraulic system shall be of compact design suitable for operation under the required pressure. The power component shall be mounted in the hydraulic-fluid storage tank. The control valve shall control flow for up and down directions hydraulically and shall include an integral check valve. A control section including control solenoids shall direct the main valve and control: up and down starting, acceleration, transition from full speed to leveling speed, up and down stops, pressure relief and manual lowering. All of these functions shall be fully adjustable for maximum smoothness and to meet contract conditions. System to be provided with a muffler and a shut-off valve.

B. A microprocessor-based controller shall be provided, including necessary starting switches together with all relays, switches, solid-state components and hardware required for operation, including door operation, as described herein. A three-phase overload device shall be provided to protect the motor against overloading.

C. A manual lowering feature shall permit lowering the elevator at slow speed in the event of power failure or for adjusting purposes.

D. Provide a low voltage monitoring device to protect against incorrect operation during low voltage (building power) occurrences.

E. Circuit Identification: All electrical wires throughout the elevator electrical system shall be marked with a unique circuit identifying number appearing four (4) times per foot.

2.5 EQUIPMENT: HOISTWAY COMPONENTS

A. Plungers and Cylinders: Each cylinder shall be constructed of steel pipe of sufficient thickness and suitable for the operating pressure. The top of each cylinder shall be equipped with a cylinder head with a drip ring to collect any oil seepage as well as an internal guide ring and self-adjusting packing. Each plunger shall be constructed of selected steel tubing or pipe of proper diameter machined true and smooth with a fine polished finish. Each plunger shall be provided with a stop ring electrically welded to it to prevent the plunger from leaving the cylinder. Each plunger and cylinder shall be installed plumb and shall operate freely with minimum friction.

B. Car Guide Rails: Tee-section steel rails with brackets and fasteners.

C. Buffer: Helical coil spring type.

D. Wiring: Wiring for hoistway electrical devices included in scope of the elevator system, hall panels, pit emergency stop switch, and the traveling cable for the elevator car.

E. Entrances:

1. Frames: Entrance frames shall be of bolted construction for complete one-piece unit assembly. All frames shall be securely fastened to fixing angles mounted in the hoistway and shall be of 14-gauge sheet steel.
2. Doors: Entrance doors shall be of hollow metal construction with vertical internal channel reinforcements.

3. Fire Rating: Entrance and doors shall be UL fire-rated for 1-1/2 hour.
4. Entrance Frame and Door Finish: Satin stainless steel
5. Entrance Markings: Entrance jambs shall be marked with 4-inch by 4-inch plates having raised floor markings with Braille adjacent. Markings shall be provided on both sides of the entrance.

2.6 EQUIPMENT: CAB COMPONENTS

A. Car Frame: A suitable car frame shall be provided with adequate bracing to support the platform and car enclosure. The buffer striking plate on the underside of the car-frame platform assembly must fully compress the spring buffer mounted in the pit before the plunger reaches its lower limit of travel.

B. Platform, Heavy Loading Type: The car platform shall be arranged to accommodate one-piece loads weighing up to 25 percent of the rated capacity, such as wheeled food carts, stretchers, x-ray equipment, etc. The platform shall be recessed 1/2-inch for stone flooring by others.

C. Passenger Cab Walls: Cab walls to be made of 16-gauge sheet steel painted with black powder paint and are to have perforations for hardware to mount removable panels. Laminate to be chosen from the manufacturer's standard selection.

1. Cab Panels: Wood veneer panels [wood edged in]
2. Wood Veneer Wall Panels: Wood veneer adhesively applied to 1/2-inch (13-mm) fire-retardant-treated particleboard with plastic-laminate panel backing and matching wood veneer edges. Panels have a flame-spread index of [25] [75] or less, when tested according to ASTM E 84.
   a. Wood veneer to match Architect's sample.

3. Reveal Finish: Satin Stainless Steel

D. Passenger Car front and door finish: Satin stainless steel.

E. Ceiling: Low-Voltage downlight suspended ceiling will have panels laminated with satin stainless steel finish. Set with incandescent down lights, four per panel.

F. Emergency Car Lighting: An emergency power unit employing a 6 volt, sealed rechargeable battery and totally static circuits shall be provided to illuminate the elevator car and provide current to the alarm bell in the event of building power failure.

G. Emergency Pulsating Siren: Siren mounted on top of the car that is activated when the Alarm button in the car-operating panel is engaged. Siren shall have a rated sound pressure level of 80 dba at a distance of 3.0 m from the device. Siren shall respond with a delay of not more than 1 second after the switch or push button has been pressed.

H. Cab Wiring: All wiring on the elevator cab shall use factory wired harnesses with Wago® Cage Clamp® plugs and receptacles, and shall terminate behind the car operating panel.

I. Exhaust Fan: An exhaust fan shall be mounted on the car top.

J. Utility outlet: A 125-volt 15-ampere utility outlet with ground-fault circuit-interrupter protection shall be furnished on top of the cab.

K. Handrails: Round Tubular Metal 1-1/2 inches satin stainless steel finish provided on the rear of the car enclosure.

L. Threshold: Aluminum

M. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit where required by code.

N. Protective pad: Provide protective pad hooks and quilted, fire retardant protective pad.

2.7 EQUIPMENT: SIGNAL DEVICES AND FIXTURES

A. Car-Operating Panel: Provide panel which contains all push buttons, key switches, and message indicators for elevator operation.
   1. Raised markings and Braille markings shall be provided for each push-button.
   2. Car Fixture Finish: satin stainless steel

B. Car-Operating Panel: A panel shall be provided which contains all push buttons, key switches, and message indicators for elevator operation. Each push button shall have Braille and raised floor markings provided.

C. Car Fixture Finish: Satin stainless steel

D. Car operating panel: Provide a bank of round mechanical illuminated buttons, flush-mounted to the panel and marked to correspond to the landings served. Provide an emergency call button, door open and door close buttons, and switches for lights, inspection and the exhaust fan. The emergency call button shall be connected to a bell that serves as an emergency signal.

   1. All buttons to have raised numerals and Braille markings, and green LED halo illumination with 1/8-inch projecting.
   2. Target finishes : satin stainless steel.
   3. Style: Classic Hall fixtures

E. Car Position Indicator: Car Position Indicator: A digital, LED car position indicator shall be integral to the car operating panel.

F. Provide a hands free telephone which is designed in response to ADAAG requirements integral with the car operating panel.

G. Hall Fixtures: Hall fixtures shall be provided with necessary push buttons and key switches for elevator operation. Raised floor markings with Braille shall be provided for each push-button. Hall fixtures shall have a satin stainless steel finish.

H. Landing Passing Signal: A chime bell shall sound in the car to tell a passenger that the car is either stopping at or passing a floor served by the elevator.

I. Car Lantern and Chime: Provide a directional lantern visible from the corridor in the car entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound.

J. Hall Position Indicator at Garage level hoistway entrance doors and at the Main Lobby hoistway entrance doors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Verify critical dimensions, and examine supporting structure and other conditions under which elevator work is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Use field dimensions to examine conditions of substrates, supports, and other conditions under which this work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

3.3 INSTALLATION

A. Install cylinders plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor.

B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.

C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to effectively prevent transmission of vibrations to structure and thereby eliminate sources of structure-borne noise from elevator system.

D. Install piping above the floor, where possible. Where not possible, install underground piping in Schedule 40 PVC pipe casing assembled with solvent-cement fittings.

E. Lubricate operating parts of systems as recommended by manufacturers.

F. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

G. Leveling Tolerance: 1/4-inch, up or down, regardless of load and direction of travel.

H. Set sills flush with finished floor surface at landing. Fill space under sill solidly with non-shrink, non-metallic grout.

3.4 DEMONSTRATION

A. The elevator contractor shall make a final check of each elevator operation with the Owner or Owner's representative present prior to turning each elevator over for use. The elevator contractor shall determine that control systems and operating devices are functioning properly.

END OF SECTION

SECTION 14560

CHUTES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes metal, vertical, gravity-type Waste chutes.

B. Related Sections include the following:

1. Division 15 Sections for water service connections.
2. Division 16 Sections for electrical service connections.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Detail chute assemblies and indicate installation details, dimensions, required clearances, method of field assembly, components, and location and size of each field connection.

1.3 QUALITY ASSURANCE

A. NFPA Compliance: Provide chutes complying with NFPA 82.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Cutler Manufacturing Corporation.
2. Midland Metalcraft Co.
3. U.S. Chutes Corp.
4. Wilkinson Co., Inc.
5. Valiant Products.

2.2 MATERIALS

A. Chute Metal: Aluminum-coated, cold-rolled, commercial steel sheet; ASTM A 463/A 463M, Type 1 with not less than T1-40 (T1-120) coating.

1. Thickness: 0.060 inch (nominal 16 gauge).

B. Size: 24-inch diameter.

2.3 DOORS

A. Intake Door Assemblies: ASTM A 240/A 240M, Type 302/304 stainless-steel, self-closing units with positive latch and latch handle; Class B labeled; 1-1/2-hour fire rated with 30-minute temperature rise of 250 degrees F; and with frame suitable for enclosing chase construction.

1. Waste Chute Door Type: Hopper.
2. Size: Manufacturer's standard size for door type, and chute type and diameter indicated.
3. Finish: Manufacturer's standard satin or No. 3 directional polish finish.
4. Door Operator: Fully pneumatic, button control, ADA compliant.
5. Provide safety lock-out in trash room
6. Direct Vertical Discharge: Provide inclined, horizontally rolling, shutter-type unit.

B. Discharge-Door Assemblies: Aluminum-coated-steel doors as required to provide fire-protection[and temperature-rise] ratings indicated; equipped with fusible links that cause doors to close in the event of fire.

1. Waste Chute: Direct Vertical Discharge. Provide inclined, horizontally rolling, shutter-type unit.

C. Heat- and Smoke-Detector System: Interlock system with temperature-rise elements that locks chute doors when temperature in chute reaches a predetermined, adjustable temperature.
   a. Locate smoke detector outside discharge door with solenoid to close discharge door.

D. Manual Control System: Control system with manual switches that lock doors of chute during shutdown hours and service operations.

E. Access Door Assemblies: Manufacturer's standard ASTM A 240/A 240M, Type 302/304 stainless-steel doors; as required to provide fire-protection[and temperature-rise] ratings indicated; with frame suitable for enclosing chase construction; and in satin or No. 3 directional polish finish.

2.4 ACCESSORIES

A. Fire Sprinklers: NPS 1/2 fire sprinklers ready for piping connections.

B. Flushing Spray Unit for Waste Chute: NPS 3/4 spray head unit located in chute above highest intake door, ready for hot-water piping connection, and with access for head and piping maintenance.

C. Sanitizing Unit for Waste Chute: NPS 3/4 disinfecting and sanitizing spray head unit located in chute above highest intake door, including 1-gal. tank and adjustable proportioning valve with bypass for manual control of sanitizing and flushing operation, ready for hot-water piping connection, and with access for head and piping maintenance.

D. Sound Dampening for Waste Chute: Manufacturer's standard exterior mastic coating.

1. Sound and vibration isolator pads at floor supporting frames.

2.5 FABRICATION

A. General: Factory-assemble chutes to greatest extent practical with continuously welded or lock-seamed joints without bolts, rivets, or clips projecting on chute interior. Include intake-door assemblies and chute-support frames at each floor, and chute expansion joints between each support point.

B. Roof Vent: Fabricate vent unit to extend 48 inches above roof with full-diameter, screened vent and metal safety cap or glass explosion-release cap. Fabricate with roof-deck flange, and with counter-flashing and clamping ring of nonferrous metal compatible with chute metal.

C. Fire Sprinklers: Comply with NFPA 13. Locate fire sprinklers at or above the top service opening of chutes, within the chute at alternate floor levels in buildings more than two stories tall, and at the lowest service level.

D. Equipment Access: Fabricate chutes with access for maintaining equipment located within the chute, such as flushing and sanitizing units, fire sprinklers, and plumbing and electrical connections.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with NFPA 82 requirements and with chute manufacturer's written instructions. Assemble components with tight, non-leaking joints. Anchor securely to supporting structure to withstand impact and stresses on vent units. Install chute and components to maintain fire-resistive construction of chute and enclosing chase.

B. Install chutes plumb, without offsets or obstructions that might prevent materials from free falling within chutes.

C. Coordination with Roofing: Anchor roof flanges of chute vents before installing roofing and flashing. Install counter-flashing after roofing and flashing are installed.

D. Intake and Discharge Doors: Interface door units with throat sections of chutes for safe, snag-resistant, sanitary depositing of materials in chutes by users.

1. Interconnect sanitizer control with door interlock system.

E. Interlock System: Comply with applicable NECA recommendations.

3.2 TESTING

A. Test chute components after installation. Operate doors, locks, and interlock systems to demonstrate that hardware is adjusted and electrical wiring is connected correctly. Complete test operations before installing chase enclosures.

B. Test fire sprinklers and heat- and smoke-sensing devices for proper operation.

C. If not applicable, delete sanitizing-unit testing below.

D. Operate sanitizing unit through one complete cycle of chute use and cleanup, and replenish chemicals or cleaning fluids in unit containers.

3.3 CLEANING

A. After completing chase enclosure, clean exposed surfaces of chute system's components. Do not remove labels of independent testing and inspecting agencies.

3.4 DEMONSTRATION

A. Demonstrate use of chute and equipment to Owner's personnel.

B. Demonstrate replenishment of sanitizing-unit chemicals or cleaning fluids.

END OF SECTION