Casco Bay Parking Garage

Portland, ME

Stair/Elevator Tower Restoration

For Bid & Permit

November 10, 2015

Prepared for:

Casco Bay Condo Association
c/o MHR Management, LLC
P.O. Box 7488
Portland, Maine 04112

Prepared by:

Josh Martin-McNaughton, P.E.
207-879-1838
75 York Street
Portland, Maine 04101

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CONTRACT REQUIREMENTS

SECTION 00200

INSTRUCTIONS TO BIDDERS

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ARTICLE 1 - DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated below:

A. Issuing Office--The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

Becker Structural Engineers, Inc.
75 York Street
Portland, Maine 04101

ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of the Bidding Documents to be provided by the Issuing Office.

2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

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

ARTICLE 3 - QUALIFICATIONS OF BIDDERS

3.01 To demonstrate Bidder's qualifications to perform the Work, within five days of Owner's request, Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data as may be called for below.

A. A list of five similar projects which demonstrate a minimum of five years experience in parking garage and concrete/masonry restoration work. Provide telephone numbers of appropriate contacts so that the success of the projects may be verified.

B. Ability to obtain Performance Bond for 100 percent of bid price.

C. Ability to obtain Payment Bond for 100 percent of total subcontractor and supplier cost.

ARTICLE 4 - EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

4.01 *Subsurface and Physical Conditions*

A. There is no subsurface work required in this project.

4.02 *Hazardous Environmental Condition*

A. There are no known Hazardous Environmental Conditions on this site or that are part of the scope of this work.

4.03 It is the responsibility of each Bidder before submitting a Bid to:

A. examine and carefully study the Bidding Documents, the other related data identified in the Bidding Documents, and any Addenda;

B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;

C. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work;

D. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents;

E. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;

F. correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;

G. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and

H. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.

4.04 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 5 - PRE-BID CONFERENCE

5.01 A pre-Bid conference and walk through of the proposed work will be held at the Casco Bay Parking Garage on **Wednesday November 18, 2015 at 10:00 am**. Contractors are to meet at the Main Entrance. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are required to attend and participate in the conference. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 6 - SITE AND OTHER AREAS

6.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

ARTICLE 7 - INTERPRETATIONS AND ADDENDA

7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all parties recorded by Engineer as having received the Bidding Documents. Questions received less than 2 days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.

ARTICLE 8 - BID SECURITY

8.01 A bid security will not be required.

ARTICLE 9 - CONTRACT TIMES

9.01 Substantial Completion is desired on or before **May 23, 2016**.

ARTICLE 10 - LIQUIDATED DAMAGES

10.01 Provisions for liquidated damages, if any, are set forth in the Agreement.

ARTICLE 11 - SUBSTITUTE AND "OR-EQUAL" ITEMS

11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or those substitute or "or-equal" materials and equipment approved by Engineer and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function and quality to be met by any proposed substitute or "or-equal" item. No item of material or equipment will be considered by Engineer as a substitute or "or-equal" unless written request for approval has been submitted by Bidder and has been received by Engineer at least 5 days prior to the date for receipt of Bids.

ARTICLE 12 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS

12.01 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by Owner. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute,

[in which case apparent Successful Bidder shall submit an acceptable substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.]

12.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement.

12.03 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

ARTICLE 13 - PREPARATION OF BID

13.01 The Bid Form is included with the Bidding Documents. Additional copies may be obtained from Engineer.

13.02 All blanks on the Bid Form shall be completed by printing in ink or by typewriter and the Bid signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each [section, Bid item, alternative, adjustment unit price item, and unit price item] listed therein, or the words "No Bid," "No Change," or "Not Applicable" entered.

13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.

13.04 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown below the signature.

13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown below the signature.

13.06 A Bid by an individual shall show the Bidder's name and official address.

13.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown below the signature.

13.08 All names shall be typed or printed in ink below the signatures.

13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.

13.10 The address and telephone number for communications regarding the Bid shall be shown.

13.11 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the Contract. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

ARTICLE 14 - BASIS OF BID; COMPARISON OF BIDS

14.01 *Lump Sum*

A. Bidders shall submit a Bid on a lump sum basis for the work not indicated in the Bid Schedule as "Unit Price Work" and include a separate price for each alternate described in the Bidding Documents as provided for in the Bid Form. The price for each alternate will be the **amount added to or deleted from** the base Bid if Owner selects the alternate. In the comparison of Bids, alternates will be applied in the same order as listed in the Bid form.

14.02 *Unit Price*

A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Bid schedule as "Unit Price Work".

B. The total of all estimated prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price.

C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

ARTICLE 15 - SUBMITTAL OF BID

15.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the following data:

15.02 A Bid shall be submitted no later than **3:00 p.m. on December 4, 2015** **to Becker Structural Engineers, Inc., 75 York Street, Portland, Maine 04101**. The Bid and shall be enclosed in an opaque sealed envelope plainly marked with the Project title, the name and address of Bidder, and shall be accompanied by any other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "BID ENCLOSED." A mailed Bid shall be addressed to **Becker Structural Engineers, Inc.**

ARTICLE 16 - MODIFICATION AND WITHDRAWAL OF BID

16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.

16.02 If within 24 hours after Bids are opened, any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 - OPENING OF BIDS

17.01 Bids will be opened privately.

ARTICLE 18 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid prior to the end of this period.

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

19.03 In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

19.04 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.

19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities to perform the Work in accordance with the Contract Documents.

19.06 If the Contract is to be awarded, Owner will award the Contract to the Bidder whose Bid is in the best interests of the Project.

ARTICLE 20 - CONTRACT SECURITY AND INSURANCE

20.01 The Contract Agreement sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by such bonds.

ARTICLE 21 - SIGNING OF AGREEMENT

21.01 When Owner gives a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents which are identified in the Agreement as attached thereto. Within 15 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within ten days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

ARTICLE 22 - SALES AND USE TAXES

22.01 Owner is not exempt from state sales and use taxes on labor, materials and equipment to be incorporated in the Work.

ARTICLE 23 - RETAINAGE

23.01 Provisions concerning Contractor's rights to deposit securities in lieu of retainage are set forth in the Agreement.

SECTION 00410

BID FORM

To: Becker Structural Engineers, Inc.
75 York Street
Portland, Maine 04101
Attn: Josh Martin-McNaughton

From:

1. The undersigned, having examined the proposed Contract Documents consisting of Drawings, The Contract Agreement, Specifications and have examined the site for the proposed work titled:

Casco Bay Parking Garage
Stair Tower Restoration
Portland, Maine

Hereby propose and agrees to furnish all permits, labor, materials, equipment, tools, and appliances, and perform operations necessary to complete the Work as required by the Contract Documents for the stipulated sum as follows:

A. For all Work other than the Unit Price Work and Lump Sum Work listed in sections B and C (Including but not limited to all temporary shoring, temporary enclosures and protection, temporary traffic control, signage, re-striping, heat and utilities, etc.), a Lump Sum of:

_____
(words) (numerals)

B. GENERAL CONDITONS

_____
(words) (numerals)

C. STAIR/ELEVATOR TOWER #2 RESTORATION

Unit Price Work, based on quantities shown:

UNIT PRICE WORK

Item No.	Description	Unit	Estimated Quantity	Unit Price	Estimated Cost
1	CMU wall reconstruction	SF	400		
2	CMU repointing	LF	300		
3	Concrete repairs	SF	75		
4	Demo vertical CMU face shell, install vertical #5 rebar and grout/shotcrete cell	LF	4,250		
5	Steel plate band	LF	850		
6	CMU bond beam (includes demo, reinf and grout)	LF	50		
7	Window replacement	EA	13		
8	Curtain wall replacement	LS	1		
9	Door replacement	EA	5		
10	Paint interior walls/interior steel	SF	7,500		
11	New split face masonry	SF	720		
12	Metal wall panel siding and assembly	LS	1		
13	Masonry façade demolition	SF	3,050		
		TOTAL ESTIMATED COST			
					(numerals)

D. ELEVATOR: All elevator work to be performed by KONE (contact: Todd Petterson, todd.pettersen@kone.com #207.233.1291) including but not limited to temporary elevator shutdown and protection, removal/replacement of conduit or systems as required and elevator re-commissioning of elevator upon completion of work.

_____
(words) (numerals)

E. **BASE BID** TOTAL ESTIMATED BID AMOUNT OF (Items A + B + C+D):

_____ **$**
(words) (numerals)

2. ADD ALTERNATE #1 (Stair Tower #1):

A. For all Work other than the Unit Price Work and Lump Sum Work listed in sections B and C (Including but not limited to all temporary shoring, temporary enclosures and protection, temporary traffic control, signage, re-striping, heat and utilities, etc.), a Lump Sum of:

_____ _____
(words) (numerals)

B. GENERAL CONDITONS

_____ _____
(words) (numerals)

C. ADD ALT #1 STAIR TOWER #1 RESTORATION

Unit Price Work, based on quantities shown:

UNIT PRICE WORK

Item No.	Description	Unit	Estimated Quantity	Unit Price	Estimated Cost
1	CMU repointing	LF	75		
2	Brick masonry repointing	LF	75		
3	Demo vertical CMU face shell, install vertical #5 rebar and grout/shotcrete cell	LF	1,350		
4	CMU bond beam (includes demo, reinf and grout)	LF	225		
5	New brick masonry	SF	215		
6	Masonry façade demolition	SF	215		
		TOTAL ESTIMATED COST			
					(numerals)

D. **ADD ALT #1** TOTAL ESTIMATED BID AMOUNT OF (Items A + B + C):

_____ **$** _____
(words) (numerals)

3. The following unit prices are required for the Owner to evaluate additions to or deductions from the work:

UNIT PRICING STAIR TOWER RESTORATION

Item No.	Description	Unit	Addition Unit Price	Deductions Unit Price
1	CMU wall reconstruction	SF		
2	CMU repointing	LF		
3	Concrete repairs	SF		
4	Demo vertical CMU face shell, install vertical #5 rebar and grout/shotcrete cell	LF		
5	Steel plate band	LF		
6	CMU bond beam (includes demo, reinf and grout)	LF		
7	Window replacement	EA		
8	Curtain wall replacement	LS		
9	Door replacement	EA		
10	Paint interior walls/interior steel	SF		
11	New split face masonry	SF		
12	Metal wall panel siding and assembly	LS		
13	Masonry façade demolition	SF		
14	Brick masonry repointing	LF		
15	New brick masonry	SF		

4. The undersigned acknowledges the receipt of addenda numbers (if applicable):
   Addenda #1 Dated:
   Addenda #2 Dated:

5. Accompanying this Bid Form the Contractor shall provide the following information representing their qualifications to perform the Work:

   A. Provide sample of 5 year material and 1 year labor contractor warranty for the complete repair project.
   B. Provide sample of 5 year joint manufacturer warranty for joint sealant replacement.

6. The Contractor shall provide along with this Bid Form, copies of the following documentation:
   A. List of all subcontractors, including:
      1. Company Name.
      2. Address.
      3. Type of Construction/Supplies.
      4. Percent of contract price.

   B. List of all proposed materials substitutions, including:
      1. Manufacturer.
      2. Proposed use.
      3. Cut sheets for all proposed Materials.

   C. Proof of Insurance: General Liability, Vehicle and Worker's Compensation Insurance as required by the Contract Agreement.

D. Proposed Schedule. Substantial completion by May 23, 2016.

7. The undersigned agrees that if he/she is selected as Contractor, he/she will within five days, Saturdays, Sundays, and legal holidays excluded, after presentation thereof by the Awarding Authority, execute the Contract in accordance with the terms of this bid and furnish proof of the capacity of the contractor to furnish a performance bond and also a labor and materials bond, each of a surety company qualified to do business under the laws of the State and satisfactory to the Awarding Authority, and each in the sum of one hundred percent of the Contract Price, the premiums for which are (if bond are required by the Owner) to be paid by the Contractor and are included in the Contract Price.

8. The undersigned agrees that if selected as general contractor, they will promptly confer with Owner on the question of subcontractors; and that the Owner may request a substitute for any subcontractor listed, as noted above.

9. Commencement and Completion of Work: The undersigned agrees to commence work on the Contract as per the Contract Agreement and to thereafter diligently and continuously carry on with the work.

10. The undersigned agrees that the Work will be substantially complete in accordance with the Contract Documents on or before May 23, 2016.

11. The right is reserved to reject any or all bids or to waive informalities or defects in bids if it is deemed to be in the best interest of the Owner.

12. The undersigned certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word person shall me any natural person, joint venture, partnership, corporation or other business or legal entity.

13. The undersigned agrees that this Bid shall be good and may not be withdrawn for a period of 30 business days after the scheduled bid due date.

Date: _____

Name of Bidder: _____

Signed: _____

By: _____
(Name and title of person signing bid)

Business Address: _____

City and State: _____

Phone Number: _____

AGREEMENT
BETWEEN OWNER AND CONTRACTOR FOR
CONSTRUCTION CONTRACT (STIPULATED PRICE)

THIS AGREEMENT is by and between Casco Bay Condo Association c/o MHR Management, LLC (Owner)

and _____

Owner and Contractor, in consideration of the mutual covenants set forth herein, agree as follows:

ARTICLE 1 - WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents in a workmanlike manner and in accordance with all of the terms of the Contract Documents. The Work is generally described as follows:

Restoration and repairs to the existing Stair and Elevator Tower #2 wall assemblies. Replacement of the exterior windows, removal of the exterior split face CMU façade and installation of new metal wall panel siding (Base Bid). Stair #1 is Add Alt #1.

The Contractor shall provide all materials, labor, services and equipment to complete the Work, and any other items necessary to perform all of the Work described above. The Contract Documents shall consist of this Agreement, any drawings and specifications relating to the Work, written orders for changes to the Work issued after execution of this Agreement, and any executed change orders as described in Paragraph 15of this Agreement. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and any item exhibited in one part of the Contract Documents shall be performed as if required in all parts of the Contract Documents.

ARTICLE 2 - THE PROJECT

2.01The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Casco Bay Parking Garage
Stair Tower Restoration
Portland, Maine

ARTICLE 3 - ENGINEER

3.01 The Project has been designed by

Becker Structural Engineers, Inc.
75 York Street
Portland, Maine 04101

Engineer, who is to act as Owner's representative, may be assigned the duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents. To the extent the Engineer has not been assigned such duties, they shall be performed by Owner and references to "Engineer" in the Contract Documents shall mean "Owner" in such event.

ARTICLE 4 - CONTRACT TIMES

4.01 Time of the Essence

A. Time is of the essence in this Agreement.

4.02 Days to Achieve Substantial Completion and Final Payment

A. The Work will begin upon execution of this Agreement, but not later than **January 1, 2016** with substantial completion to occur no later than **May 23, 2016**. All work to be completed beyond the scope of this contract shall be conducted at the unit pricing included in this contract.

B. The Contractor shall provide to the Owner within five (5) days from execution of this Agreement a construction schedule for the Work demonstrating the achievement of substantial completion and final completion by the respective dates in this Paragraph. The Owner must approve the construction schedule in writing and any changes subsequently made to it.

C. The Contractor and Owner acknowledge that time is of the essence in this Agreement and that the Owner will suffer financial loss if the Work is not substantially complete by **May 23, 2016**. Contractor acknowledges that it shall be liable for any damages caused by its failure to complete the Work in a timely fashion.

ARTICLE 5 - CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraphs 5.01.A, 5.01.B, and 5.01.C below:

A. For all Work other than the Unit Price Work and Lump Sum Work listed in sections B and C (Including but not limited to all temporary shoring, temporary enclosures and protection, temporary traffic control, signage, re-striping, heat and utilities, etc.), a Lump Sum of:

_____ (words) (numerals)

B. GENERAL CONDITONS

_____ (words) (numerals)

C. BASE BID UNIT PRICE WORK

Item No.	Description	Unit	Estimated Quantity	Unit Price	Estimated Cost
1	CMU wall reconstruction	SF	400		
2	CMU repointing	LF	300		
3	Concrete repairs	SF	75		
4	Demo vertical CMU face shell, install vertical #5 rebar and grout/shotcrete cell	LF	4,250		
5	Steel plate band	LF	850		
6	CMU bond beam (includes demo, reinf and grout)	LF	50		
7	Window replacement	EA	13		
8	Curtain wall replacement	LS	1		
9	Door replacement	EA	5		
10	Paint interior walls/interior steel	SF	7,500		
11	New split face masonry	SF	720		
12	Metal wall panel siding and assembly	LS	1		
13	Masonry façade demolition	SF	3,050		
				TOTAL ESTIMATED COST	
					(numerals)

D. ELEVATOR: All elevator work to be performed by KONE (contact: Todd Petterson, todd.pettersen@kone.com #207.233.1291) including but not limited to temporary elevator shutdown and protection, removal/replacement of conduit or systems as required and elevator re-commissioning of elevator upon completion of work.

_____
(words) (numerals)

E. **BASE BID** TOTAL ESTIMATED BID AMOUNT OF (Items A + B + C+D):

_____
(words) (numerals)

5.02 ADD ALTERNATE #1 (Stair Tower #1):

A. For all Work other than the Unit Price Work and Lump Sum Work listed in sections B and C (Including but not limited to all temporary shoring, temporary enclosures and protection, temporary traffic control, signage, re-striping, heat and utilities, etc.), a Lump Sum of:

_____ _____
(words) (numerals)

B. GENERAL CONDITONS

_____ _____
(words) (numerals)

C. ADD ALT #1 STAIR TOWER #1 RESTORATION

Unit Price Work, based on quantities shown:

UNIT PRICE WORK

Item No.	Description	Unit	Estimated Quantity	Unit Price	Estimated Cost
1	CMU repointing	LF	75		
2	Brick masonry repointing	LF	75		
3	Demo vertical CMU face shell, install vertical #5 rebar and grout/shotcrete cell	LF	1,350		
4	CMU bond beam (includes demo, reinf and grout)	LF	225		
5	New brick masonry	SF	215		
6	Masonry façade demolition	SF	215		
		TOTAL ESTIMATED COST			
					(numerals)

D. **ADD ALT #1** TOTAL ESTIMATED BID AMOUNT OF (Items A + B + C):

_____ **$**
(words) (numerals)

ARTICLE 6 - PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

A. Contractor shall submit Applications for Payment on forms approved by the Owner. Applications for Payment will be processed by the Engineer.

6.02 Progress Payments; Retainage

A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 20th day of each month during performance of the Work as provided in Paragraphs 6.02.A.1 and 6.02.A.2 below. All such payments will be measured by the schedule of values established by the Contractor and approved by the Engineer and the Owner prior to the submission of the first requisition. (and in the case of Unit Price Work based on the number of units completed):

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Article 6 herein.

a. 95 percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, Owner, on recommendation of Engineer, may, in its sole discretion, determine that as long as the character and progress of the Work remain satisfactory to them, there will be no additional retainage; and

b. 95 percent of cost of materials and equipment procured for, but not yet incorporated in the Work (with the balance being retainage) if such materials are suitably accounted for and stored by Contractor, all conditions of which must be approved by the Owner in writing, in advance.

2. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less such amounts as Engineer and Owner shall determine in accordance with Paragraph 14.02.B.5 of the General Conditions and less 100 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

B. The Owner may withhold payments from the Contractor from any requisition in amounts sufficient to protect the Owner from unsatisfactory job progress, defective construction or materials, disputed work, liens, or third party claims

6.03 Final Payment

A. Upon final completion and acceptance of the Work by the Owner. Owner shall pay the remainder of the Contract Price upon approval by the Engineer; provided however, that nothing in the paragraph shall restrict Owner's right to withhold payment, including Final Payment, for defective construction or materials, disputed work, liens, or third party claims.

ARTICLE 7 - INTEREST

7.01 All moneys not paid when due shall bear interest at the rate of 5% percent per annum.

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce Owner to enter into this Agreement Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. The Contractor represents that it is familiar with and will comply with all applicable state and local building codes, local, state and federal laws, rules and regulations applicable to the Work. The Contractor shall comply with and give any notices required by agencies having jurisdiction over the Work. If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume full responsibility for such Work and shall bear the attributable costs. The Contractor shall promptly notify the Owner in writing of any known inconsistencies in the Contract Documents with such governmental laws, rules and regulations of any kind.

D. Contractor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

E. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

F. Contractor has correlated the information known to Contractor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

J. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

K. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 9 – WARRANTIES

9.01. The Contractor warrants to the Owner that: (1) materials and equipment furnished under the Agreement will be new and of good quality unless otherwise required or permitted by the Contract Documents; (2) the Work will be free from defects not inherent in the quality required or permitted; and (3) the Work will be performed in a good and workmanlike manner, will strictly conform to the requirements of the Contract Documents, and will comply with all applicable local, state and federal laws, ordinances, rules and regulations. Any Work not complying with the obligations of this Paragraph shall be considered defective.

ARTICLE 10- LABOR AND MATERIALS, SAFETY, SUPERVISION

10.01 The Contractor shall provide and pay for all labor, materials, equipment, tools, transportation, and anything else necessary for the completion of the Work. The Contractor shall enforce strict discipline among its employees and anyone else carrying out the Work, and shall not permit the employment of unfit persons not skilled in tasks assigned to them. The Contractor affirms that any and all employees, agents, or subcontractors of the Contractor shall satisfy any training guidelines in accordance with any and all pertinent State and Federal Laws and will comply with the guidelines therein set forth.

10.02 The Contractor shall ensure timely completion of the Work in conformance with generally accepted labor standards. The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over the construction means, methods, techniques, sequences and procedure, and for coordinating the progress of the Work.

ARTICLE 11- FORCE MAJEURE

11.01 If the Contractor is delayed by labor disputes, fire, war, natural disaster, unusual delays in deliveries, unavoidable casualties, or unusually inclement weather, the Contractor shall be entitled to additional time to perform its Work. The Contractor acknowledges and agrees that any time extension granted by the Owner for the delay shall be the exclusive remedy

for such a delay. In such event, the Contractor shall provide to the Owner a written remedial plan ensuring the Contractor's completion of the Work in the extended time granted under this Paragraph.

ARTICLE 12-CUTTING AND PATCHING, CLEANING UP

12.01. The Contractor shall be responsible for all cutting, fitting or patching required to complete the Work or to make its parts fit together properly. The Contractor shall keep the premises and surrounding area free from accumulation of debris and trash related to the Work. At the completion of the Work, the Contractor shall remove its tools, construction equipment, machinery and surplus material and shall properly dispose of waste materials.

12.02 If applicable, the Contractor shall be responsible for the proper disposal of any waste including hazardous waste generated during the performance of its obligations and the Work pursuant to this Agreement. The Contractor is responsible for the proper labeling and storage of all chemicals/cleaning agents and will provide to the Owner the proper Material Safety Data Sheets (MSDS), as such is defined under State and Federal law.

ARTICLE 13-INSURANCE

13.01 The Contractor shall deliver to the Owner the following if checked and applicable below, all to the reasonable satisfaction of the Bank. In addition, the Contractor must deliver to the Owner a copy of the Endorsement naming the Casco Bay MHR, LLC, the City of Portland, and MHR Management, LLC as "Additional Insured" and "Certificate Holder" on General Liability, Auto Liability and E&O policies; (ii) a Certificate of Workers' Compensation, and (iii) a copy of the Bond, if applicable.

☒ General Liability: $1,000,000 / $2,000,000
☒ Workers' Compensation: $500,000 / $500,000 / $500,000
☐ Professional Bond: In the amount $_____
X Auto Liability: $1,000,000
☐ E & O – Professional Liability: $2,000,000.

ARTICLE 14-INDEMNITY

14.01 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, the Owner's consultants, agents and employees or any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from the performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. The Contractor specifically waives its workers compensation immunity under any applicable workers compensation statute for purpose of this indemnity obligation only.

ARTICLE 15 - CHANGES

15.01 The Owner make minor changes to the Work, and the Contractor shall not be entitled to any additional compensation for such minor changes. Any material alteration or deviation from the Contract Documents that results in a revision of the Contract Sum will be valid only upon the Parties entering into a written change order, signed by both Parties, which includes a description of the work to be performed, the previous contract price and the revised contract price. If the Contractor and the Owner should dispute whether any work is within the original scope of Contractor's Work under this Agreement, the Contractor shall promptly follow the written orders of the Owner as to the performance of the Work and the dispute shall be settled later.

ARTICLE 16 CONTRATOR DEFAULT

16.01 If the Contractor refuses or fails to perform its Work in accordance with the Contract Documents and/or the Contractor's schedule as approved by the Owner, to make payment when due to its workers, subcontractors or suppliers, or if the Contractor disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, or is

otherwise guilty of any material breach of this Agreement, then the Owner shall provide written notice of such default to the Contractor. If the Contractor fails within 24 hours after receiving the written notice to commence and continue satisfactory correction of such default with diligence and promptness, then the Owner, without prejudice to any other rights or remedies it may have, shall have the right to exercise any or all of the following remedies:

A. Supply labor, materials and services as the Owner deems appropriate for the completion of the Work, and/or relet the Work to another entity or person, or any portion thereof, to any other persons, corporations or entities by one or more contracts, and charge the cost of same to the Contractor; and/or

B. Terminate the Agreement entirely and take possession of all materials, appliances, and supplies belonging to the Contractor for use in carrying out the Work. If the Owner terminates this Agreement for cause, the Contractor shall not be entitled to any additional payment and shall remain liable to the Owner for any costs or damages the Owner incurs as a result of the Contractor's default; and/or

C. Collect all reasonable expenses, including overhead and attorneys' fees, incurred as a result of the Contractor's default and/or termination.

ARTICLE 17 – BANKRUPTCY

17.01If the Contractor files a petition under the Bankruptcy Code, this Agreement shall terminate for cause if the Contractor or the Contractor's trustee (a) rejects the Agreement, or (b) if there has been a default, and the Contractor is unable to give adequate assurance that the Contractor will perform as required under this Agreement, or (c) is otherwise unable to comply with the requirements for assuming this Agreement under the Bankruptcy Code.

ARTICLE 18 – TERMINATION

18.01The Owner shall have the right at any time, by written notice to the Contractor, to terminate this Agreement without cause and in the Owner's sole discretion. In such event, provided the Contractor is not in default, the Owner shall pay the Contractor a pro-rata portion of the price set forth in the Agreement based upon the percentage of the Contractor's Work that has been completed as of the effective date of termination, except that the Contractor shall not be entitled to anticipated profits on work unperformed or materials or equipment unfurnished.

ARTICLE 19- ATTORNEY FEES

19.01The Contractor agrees to pay, upon demand, the Owner's costs and expenses, including the Owner's attorneys' fees and Owner's legal expenses, incurred in connection with the enforcement of this Agreement. The Owner may hire or pay someone else to enforce this Agreement, and the Contractor shall pay the costs and expenses of such enforcement. Costs and expenses include the Owner's attorneys' fees and legal expenses whether or not there is a lawsuit, appeals, and any anticipated post-judgment collection services. The Contractor also shall pay all court costs and such additional fees as may be directed by the court.

ARTICLE 20 – DISPUTE RESOLUTION

20.01Mediation. If the parties become involved in a dispute arising out of, connected with, or resulting from the work performed under this Contract or the interpretation thereof, they shall first attempt to resolve the dispute in mediation. If the parties are unable to resolve the dispute within 10 days after one of them requests mediation, then the dispute will be resolved by arbitration between the parties.

20.02 Demand for Arbitration. Either party may make a demand for arbitration within a reasonable time after a dispute has arisen. In no event shall a demand for arbitration be made after the date when institution of legal or equitable proceedings based on such a dispute would be barred by the applicable statute of limitations. The Contractor shall continue with the progress of the Work despite the claim and presence of a mediation and/or arbitration

20.03 Arbitration Procedure. Any dispute for which arbitration has been demanded will be resolved by arbitration in accordance with the Construction Industry Rules of the American Arbitration Association, and judgment may be entered on the award. The arbitrator shall award attorney fees and costs to the prevailing party. If a party after due notice fails to appear

at and participate in the proceedings, the arbitrator will make an award based on evidence presented by the party who does participate.

ARTICLE 21 – NO OTHER AGREEMENT

This Agreement embodies the entire understanding between the Parties and supersedes prior negotiations, representations or agreements, either written or oral. This Agreement shall not be altered, amended or augmented except by writing signed by both of the Parties.

ARTICLE 22 – CHOICE OF LAW

22.01 All of the terms and conditions of this Agreement and the Contract Documents shall be construed according to the laws of the State of Maine unless otherwise agreed by the parties.

ARTICLE 23 - CONTRACT DOCUMENTS

23.01 Contents

A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to 11, inclusive).

2. Specifications as listed in the table of contents of the Project Manual.

3. Drawings consisting of seventeen sheets:

S0	General Notes
S1	Stair 2 Plans
S2	Stair 2 Sections
S3	Stair 2 Sections
S4	Stair 2 Exterior Elevations
S5	Stair 2 Exterior Elevations
S6	Sections & Typical Details
S7	Sections & Typical Details
S8	Sections & Typical Details
S9	Stair 1Plans (Add Alternate #1)
S10	Stair 1 Sections (Add Alternate #1)
S11	Stair 1 Exterior Elevation (Add Alternate #1)
S12	Stair 1 Exterior Elevation (Add Alternate #1)
S13	Stair 1 Sections & Details (Add Alternate #1)
A1	Building Elevations
A2	Building Elevations
A3	Metal Siding Details
A4	Window Details

4. Addenda:

5. Exhibits to this Agreement (enumerated as follows):

   a. Contractor's Bid Form 00410 (pages 1 to 5 inclusive).

   b. Documentation submitted by Contractor prior to Notice of Award:
      i. Sample General Guarantee
      ii. List of Similar Projects
      iii. Certificate of Liability Insurance

6. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:

   A. Work Change Directives.

   B. Change Order(s).

C. The documents listed in Paragraph 22.01.A are attached to this Agreement (except as expressly noted otherwise above).

D. There are no Contract Documents other than those listed above in this Article 23.

E. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

ARTICLE 24 - MISCELLANEOUS

24.01 Terms

A. Terms used in this Agreement will have the meanings as defined in the Contract Documents or as they are commonly used in the English language.

25.02 Assignment of Contract

A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

25.03 Successors and Assigns

A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

25.04 Severability

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement in duplicate. One counterpart each has been delivered to Owner and Contractor. All portions of the Contract Documents have been signed or identified by Owner and Contractor or on their behalf.

This Agreement will be effective on _____(which is the Effective Date of the Agreement).

OWNER:

_____

By: _____

Title: _____

[CORPORATE SEAL]

Attest: _____

Title: _____

Address for giving notices:

_____

_____

_____

(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of Owner-Contractor Agreement.)

CONTRACTOR:

_____

By: _____

Title: _____

[CORPORATE SEAL]

Attest: _____

Title: _____

Address for giving notices:

_____

_____

_____

License No.: _____
(Where applicable)

Agent for service or process: _____

_____

(If Contractor is a corporation or a partnership, attach evidence of authority to sign.)

DIVISION 1

GENERAL REQUIREMENTS

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. The CONDITIONS OF THE CONTRACT, all Drawings, and all Sections of Division 1 are hereby made a part of this Section.

1.02 WORK INCLUDED

A. This Section specifies administrative and procedural requirements for submittals required for performance of work, including:

1. Product data

B. Administrative Submittals: Refer to requirements specified in other Division 1 Specification Sections, and other Contract Documents, for administrative submittals, including:

1. Permits
2. Applications for payment
3. Performance and payment bonds (where required).
4. Insurance certificates
5. List of subcontractors

1.03 SUBMITTAL PROCEDURES

A. Coordination of Submittals: Coordinate timing of submittals with construction activities. Transmit submittals well enough in advance of performance of work to avoid delays. Coordinate submittals of related elements of work.

1. Engineer may reject, or withhold action on submittals requiring coordination with other submittals until related submittals are received.

B. Processing of Submittals: Allow sufficient review time to ensure installation will not be delayed because of time required to process submittals. Minimum processing times are as follows:

1. Review by Engineer: Allow ten (10) business days for review and processing.

2. No extension of Contract Time will be authorized due to failure to transmit submittals sufficiently in advance of scheduled performance of work.

C. Contractors Preparation of Submittals: Place permanent label or title block on each submittal for identification. Indicate Project Name, Engineer's Project Number, Specification Section number and title, date of submittal, name and address of Engineer, name and address of Contractor, name and address of subcontractor and/or supplier, name of manufacturer, Drawing number and detail reference.

1. Contractor's Review and Action Stamp: Provide suitable space on label or title block for Contractor's review and action stamp. Stamp and sign each submittal to show Contractor's review and approval prior to transmittal to Engineer. Submittals not signed and stamped by Contractor will be returned without action.

2. Engineer's Review and Action Stamp: Provide minimum 6 in. x 4 in. space on drawing for Engineer's review and action stamp. Deliver submittals to Engineer at address listed on cover of Project Manual.

3. Modify and customize submittals as required to show interface with adjacent work and attachment to building.

D. Transmittal of Submittals: Transmit each item with transmittal form. Identify Project, Contractor, subcontractor, major supplier; identify pertinent Drawing sheet and detail number and Specification section number, as appropriate, on transmittal form.

1. Source: Submittals received from sources other than Contractor will be returned without action.

2. Deviations from Contract Documents: When products, materials or systems submitted deviate from Contract Documents, record deviations clearly on transmittal form, or separate attached sheet.

3. If deviation includes design and/or material change, this shall be accompanied by design calculations stamped by a registered professional Engineer.

E. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

1. All field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with the respect thereto;

a. the suitability of all materials with respect to the intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

b. all information relative to the Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

c. shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

F. Each Submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review an approval of that submittal.

G. With each Submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawing's or Sample Submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

H. After Engineer reviews submittal, revise and resubmit as required. Identify recipients to promptly report inability to comply with provisions.

I. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report inability to comply with provisions.

1.04 SUBMITAL SCHEDULE

A. Not required for this project.

1.05 SHOP DRAWINGS

A. Stairs:

1. Steel

2. Precast concrete treads

1.06 PRODUCT DATA

A. Definition: Product data includes manufacturer's standard published literature, such as installation instructions, catalog cuts and color charts. When product data must be prepared specifically because standard published data is not suitable for use, submit as shop drawing.

B. Preparation: Mark each copy of product data to show applicable choices and options. Where published product data includes information on several products and choices, mark copies to clearly indicate information applicable to this Project.

C. Do not submit product data until compliance with requirements of Contract Documents has been confirmed.

D. Submittal Quantities: Submit product data in following quantities:

1. Submit three copies for review. One copy will be returned to Contractor for printing and distribution. Multiple copies will not be marked by Engineer.

E. Installer Copy: Verify that installer of work possesses a current copy of Engineer approved product data prior to installation.

1.07 ENGINEER'S ACTION

A. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

B. Engineer's review and approval shall not relieve the Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with all requirements of this section, the general conditions of the Contract and the Engineer has given approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of paragraph 1.04.

1.08 DISTRIBUTION BY CONTRACTOR

A. Distribution: When submittal is marked “APPROVED” or “APPROVED AS NOTED”, make prints and copies and distribute to subcontractors, suppliers, fabricators, and other parties requiring information from submittal for proper coordination and performance of work. Print copies of shop drawings from approved reproducible only.

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

A. This Section specifies construction facilities and temporary controls, including, but not limiting to:

1. Temporary restrictions on construction activity.
2. Temporary utilities.
3. Temporary construction and support facilities.
4. Temporary signage.
5. Security and protection facilities.

B. Contractor shall pay for all costs related to temporary facilities and utility service including but not limited to temporary heat, water and power, if required.

1.03 RELATED REQUIREMENTS

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. CONTRACT AGREEMENT.
2. Section 01300: SUBMITTALS

1.04 SUBMITTALS

A. Schedule: Submit a schedule indicating implementation and termination of each temporary utility within fifteen days of date established for Commencement of the Work.

1.05 QUALITY ASSURANCE

A. Comply with requirements of authorities having jurisdiction, codes, utility companies, OSHA, and industry standards including, but not limiting to:

1. NFPA 241.

2. NFPA 70.

3. ANSI A10.

4. NECA NJG-6.

B. Electric Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70.

C. Inspections: Arrange for authorities having jurisdiction to inspect temporary utilities prior to use. Obtain required certifications and permits.

1.06 PROJECT CONDITIONS

A. Conditions of Use: Maintain temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload temporary facilities. Do not allow hazardous, dangerous, or unsanitary conditions to develop on site.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

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

B. Lumber and Plywood:

1. Signs and Directory Boards: Provide exterior grade, Medium Density Overlay (MDO) plywood, conforming to USDC PS1, of size and thickness indicated.

2. Fences, Vision Barriers, and Safety Barriers: Provide exterior grade, C-D veneered plywood.

2.02 TEMPORARY UTILITIES

A. Scope: Temporary utility work includes, but is not limited to:

1. Electric power

2. Telephone Service.

B. Temporary Electric Power and Light:

1. Power is currently available in the garage and can be used. Not all outlets are currently operational and may not provide easy access to all areas of work. Additional power maybe required and should be provided by the contractor.

2. Provide generator to run any large equipment.

C. Telephone Service: Provide cell phone contact for project superintendent and project manager for this project.

2.03 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES

A. Scope: Temporary construction and support facilities include, without limitation:

1. Temporary heat.

2. Temporary enclosures.

3. Construction aids.

4. Waste disposal services.

5. Water control.

6. Rodent and pest control.

7. Pollution and dust control.

B. Temporary Heat and Ventilation: Provide temporary ventilation required to maintain adequate environmental conditions to facilitate progress of work, to meet manufacturers' specified minimum installation conditions, and to protect materials and finishes from damage due to temperature and humidity.

1. Ventilate enclosed areas for curing of installed materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors and gases.

2. Portable heaters shall be standard approved units with controls.

3. Pay costs of installation, inspection, maintenance, operation, removal, and fuel consumed.

C. Contractor's Field Offices and Sheds: Prior to installation of offices and sheds, consult with Engineer and Owner on location, access, and related facilities.

D. Sanitary Facilities: Contractor to provide portable toilets for their employees and subcontractor.

1. Maintain washrooms in clean and sanitary condition.

E. Temporary Enclosures: Provide temporary weathertight enclosures of exterior walls as Work progresses. Design and construct temporary enclosures to provide acceptable working conditions, to provide weather protection for materials, to allow effective temporary heating, and to prevent entry of unauthorized persons.

1. Provide temporary exterior doors with self-closing hardware and padlocks.

2. Design enclosures to be removable to allow handling of materials.

F. Construction Aids: Provide construction aids and equipment required by personnel to facilitate execution of the work; scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes, and other such facilities and equipment.

1. Refer to respective sections for particular requirements for each trade.

2. When permanent stair framing is in lace, provide temporary treads, platforms, and railings, for use by construction personnel.

G. Use of Elevator: Will not be permitted for construction use.

H. Waste Disposal: Maintain all areas under Contractor's control free of debris. Initiate and maintain a specific program to prevent accumulation of debris at construction area, storage and parking areas, or along access roads.

1. Provide containers for deposit of debris.

2. Schedule daily collection and weekly disposal of debris.

3. Provide additional collections and disposals of debris whenever the weekly schedule is inadequate to prevent accumulation.

I. Water Control: Provide methods to control surface water to prevent damage to Project, site, and adjoining properties.

J. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas and properties.

K. Pollution Control: Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by the discharge of noxious substances from construction operations. Provide equipment and personnel, perform emergency measures required to contain any spillage and to remove contaminated soils or liquids.

1. Take special measures to prevent harmful substances from entering public waters.

2. Prevent disposal of wastes, effluents, chemicals, or other such substances in sanitary or storm sewers.

3. Provide systems for control of atmospheric pollutants.

4. Prevent toxic concentrations of chemicals.

5. Prevent harmful dispersal of pollutants to atmosphere.

L. Dust Control: Provide positive methods and apply dust control materials to minimize raising dust from construction/demolition operations. Provide positive means to prevent air-borne dust from dispersing into the atmosphere.

2.04 TEMPORARY SIGNAGE

A. Scope: Temporary signage includes, but is not limited to:

1. Traffic.

2. Pedestrian.

3. Project identification sign.

4. Means of Egress.

5. Other signage as required in the Contract Documents or required by the owner.

B. Project Identification Signs: Provide one painted sign, of not more than 32 sq. ft. area, with painted graphic content to include, title of Project, name of Owner, name of Owner's Representative, name of Contractor and name of Engineer. Sign design shall be approved by the Owner.

C. Sign Structure and Framing: New or used, wood or metal, in sound condition structurally adequate to work and suitable for specified finish.

D. Rough Hardware: Galvanized steel or cadmium plated.

E. Paint: Exterior quality.

2.05 SECURITY AND PROTECTION FACILITIES

A. Scope: Security and protection facilities includes, but is not limited to:

1. Temporary fire protection.

2. Barricades, warning signs, lights.

3. Temporary access routes.

4. Security procedures.

B. Temporary Fire Protection: Provide and maintain suitable fire protection equipment and services. Establish procedures for fire protection for welding and other potentially hazardous construction operations. Ascertain and comply with requirements of Project insurance carrier, City of Auburn Fire Department and the State of Maine Fire Marshal. Permanent fire protection system may be activated to meet these requirements. Replace fusible ink heads and other expended or discharged components at time of Substantial Completion.

1. Locate temporary portable fire extinguishers in convenient locations, not less than one extinguisher per floor.

2. Store combustible materials in containers in fire-safe locations.

3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes.

C. Construction Parking Control: Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, Owner's operations, or construction operations. Monitor parking of construction personnel's private vehicles:

1. Maintain free vehicular access to parking spaces and through parking garage.

2. Prohibit parking on or adjacent to access roads, or in non-designated areas.

3. Contractor has been provided with spaces. See contract drawings.

D. Safety Controls and Safety Signing:

1. Detour signs shall have breakaway post assemblies conforming to the applicable provisions of MDOT Specifications.

E. Barricades, Warning Signs, and Lights: Provide and maintain barricades, warning signs, warning lights, railings, walkways, and the like. Paint signs and barricades with appropriate colors, graphics, and warnings to inform public and job-site personnel of hazards.

PART 3 EXECUTION

3.01 MAINTENANCE, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Limit waste and abuse.

B. Maintenance: Maintain temporary facilities in operating conditions; repair damages immediately upon discovery. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour per day basis.

C. Termination and Removal: Unless otherwise requested by Engineer, remove each temporary facilities when no longer useful, or when replaced by permanent facility. Clean and renovate permanent facilities that have been used during construction period.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. The CONTRACT AGREEMENT, all Drawings, and all Sections of Division 1 are hereby made a part of this Section.

1.02 WORK INCLUDED

A. This Section specifies administrative and procedural requirements for materials and equipment used for the Project.

1.03 MATERIAL AND EQUIPMENT INCORPORATED INTO THE WORK.

A. Conform to applicable specifications and standards.

B. Comply with size, make, type and quality specified, or as specifically approved in writing by the Engineer.

C. Manufactured and Fabricated Products:

1. Design, fabricate and assemble in accordance with the best engineering and shop practices.

2. Manufacture like parts of duplicate units to standard size and gages, to be interchangeable.

3. Two or more items of the same kind shall be identical, by the same manufacturer.

4. Products shall be suitable for service conditions.

D. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

1.04 WORKMANSHIP

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

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

C. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.05 MANUFACTURERS' INSTRUCTIONS:

A. When work is specified to comply with manufacturers' instructions, submit copies of said instructions, as specified in Section 01300, SUBMITTALS, distribute copies to persons involved, and maintain one set in field office.

B. Perform work in accordance with details of instructions and specified requirements. Should a conflict exist between Specifications and manufacturer's instructions, consult with Engineer.

1.06 TRANSPORTATION AND HANDLING

A. Arrange deliveries of products in accordance with construction schedules, coordinate to avoid conflict with work and conditions at the site.

B. Transport Products by methods to avoid Product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.

C. Provide equipment and personnel to handle Products by methods to prevent soiling or damage.

D. Promptly inspect shipments to assure that Products comply with requirements, quantities are correct, and products are undamaged.

1.07 STORAGE AND PROTECTION

A. Store Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive Products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.

B. For exterior storage of fabricated Products, place on sloped supports above ground. Cover Products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

C. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.

D. Arrange storage to provide access for inspection. Periodically inspect to assure Products are undamaged and are maintained under required conditions.

E. Note limited storage areas provided for this project and shall be preapproved by Owner and Engineer.

1.08 MATERIAL SUBSTITUTIONS

A. Where products or materials are specified by manufacturer's name, trade name or catalog reference, the words "or approved equal" shall be understood to follow unless there is a statement specifically indicating that no substitution will be allowed. An item shall be considered equal to the item so named or described if in the opinion of the Engineer.

   1. It is at least equal in quality, durability, appearance, strength and design; including compliance with applicable specifications and compatibility with physical space allocations provided for the item;

   2. It performs at least equally the function imposed by the general design for the work;

   3. It conforms substantially, even with deviations to the detailed requirements for the item as indicated by the specifications.

   4. Contractor supplies a list of reference projects (3 min.) where they have successfully used this product.

B. Where two or more products or materials are specified, the choice of these shall be optional with the Contractor.

C. Material substitutions shall be listed in bid document. Material substitutions will be approved after contract has been awarded.

D. Request constitutes a representation that the Contractor:

   1. Has investigated proposed Product and determined that it meets or exceeds, in all respects, specified Product;

   2. Will provide the same warranty for substitution as for specified Product;

   3. Will coordinate installation and make other changes which may be required for Work to be complete in all respects; and

   4. Waives claims for additional costs which may subsequently become apparent.

E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals without separate written request on the form included at the end of this Section, or when acceptance will require substantial revision of Contract Documents.

F. The Engineer will determine acceptability of proposed substitution, and will notify Contractor of acceptance or rejection in writing within a reasonable time.

G. Any additional costs, or any loss or damage arising from the substitution of any materials, equipment or execution of work for those originally specified shall be borne by the Contractor, notwithstanding approval or acceptance of such substitution by the Engineer, unless such substitution was made at the written request or direction of the Engineer.

1.09 EQUIPMENT

A. Contractor shall provide all necessary equipment to complete the Work.

END OF SECTION

SECTION 01710

CLEANING

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included: Throughout the construction period, maintain the buildings and site in a standard of cleanliness as described in this Section.

B. Provide waste storage containers.

C. Related work: In addition to standards described in this Section, comply with requirements for cleaning as described in pertinent other Sections of these Specifications.

1.02 QUALITY ASSURANCE

A. Conduct inspections to verify that requirements for cleanliness are being met.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

A. Provide required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

2.02 COMPATIBILITY

A. Use only the cleaning materials and equipment that are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

2.03 WASTE STORAGE CONTAINER

A. The Contractor is responsible for providing a suitable waste storage container of sufficient size or numbers for the temporary storage of wastes generated by the work of this Section and other Sections of these Specifications.

B. The Contractor is responsible for the proper and timely transfer of stored wastes to a proper off-site disposal.

C. Demolition debris shall not be stored on the garage deck, pedestrian walkways or access road.

PART 3 – EXECUTION

3.01 PROGRESS CLEANING

A. General:

1. Retain stored items in an orderly arrangement, in designated areas allowing maximum access, not impeding traffic or drainage, and providing required protection of materials.

2. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of this work, except in proper waste container(s).

3. Provide adequate storage for all debris and trash awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.

4. Waste containers shall be emptied, off site, a minimum of once per week.

B. Site:

1. Continuously inspect the site and pick up all scrap, debris, and waste material. Remove such items to the container(s) designated for their storage.

2. Daily and more often if necessary, inspect all arrangements of construction materials stored on the site. Restack, organize neatly, tidy or otherwise service arrangements to meet requirements of subparagraph 3.01-A-1 above.

C. Building:

1. Daily, and more often if necessary, inspect and pick up all scrap, debris, and waste material. Remove such items to the container(s) designated for their storage.

2. As required preparatory to installation of succeeding materials, clean the surfaces to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.

3.02 FINAL CLEANING

A. Prior to completion of the work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as described in Article 3.01 above.

B. Site:

1. Broom clean paved areas used by construction.

2. Rake grass and garden areas to remove construction debris.

3. Completely remove resultant debris.

C. Building:

1. Exterior:

    a. Visually inspect exterior building surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter caused by the work.

    b. Remove all traces of splashed materials from adjacent surfaces.

2. Interior:

    a. Visually inspect interior of building and remove all traces of soil, waste material, smudges, and other foreign matter caused by the work.

    b. Remove all unused construction material.

    c. Remove all temporary protection and shoring.

    d. Wash down all decks.

END OF SECTION

DIVISION 2

EXISTING CONDITIONS

SECTION 02070

SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included: Remove existing split face block façade, windows, curtain wall, joint sealant, stairs, CMU and any other material as directed.

1. Removal of materials and debris includes proper site storage and off-site disposal.

B. Should contractor discover, upon removal of damaged concrete, damage or deterioration of the embedded structural steel connections or reinforcement, they shall, immediately and prior to performing any repairs to these surfaces, inform the Engineer of encountered conditions. The Engineer will promptly review these conditions. As appropriate, the Engineer will provide the contractor with recommendations for repair of these conditions as described on the plans and in the specifications.

C. Conform to all Federal, State and local safety requirements.

1.02 SUBMITTALS

A. Request for Engineer's consent:

1. Should conditions of the work, or schedule, indicate a required change of materials or methods for cutting and patching, so notify the Engineer and secure their written permission and the required Change Order prior to proceeding.

PART 2 PRODUCTS

2.01 TOOLS AND EQUIPMENT

A. Provide the adequate tools and equipment necessary to carry out the work of this Section.

B. Do not use tools, products and/or equipment which could damage the portions of the building which are to remain.

C. Operations within the building are sensitive to noise and tools. Equipment should be selected based on minimizing disruptions.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Inspections:

1. Inspect existing conditions, including elements subject to movement or damage during cutting and patching.

2. After uncovering the work, inspect conditions affecting installation of new work.

3. Visually examine all areas of the project to determine actual conditions

B. Discrepancies:

1. If uncovered conditions are not as indicated, immediately notify the Engineer and secure needed directions prior to proceeding.

2. Do not proceed until written directions are obtained from the Engineer.

3.02 PREPARATION PRIOR TO CUTTING

A. Provide required protection including, but not necessarily limited to, shoring, bracing and support to maintain structural integrity of the work and existing members.

B. Contractor shall construct barriers and other methods of protecting people and property prior to demolition.

1. Barriers and other methods shall be constructed in a manner that is acceptable to the Owner and the Building Inspector.

C. Barriers and other methods shall be maintained throughout construction.

1. As a minimum, all portions of deck areas where demolition or construction is taking place shall be completely closed to public access.

3.03 PERFORMANCE

A. Perform required cutting and patching as required under other Sections of these Specifications.

1. Perform cutting and demolition by methods which will prevent damage

END OF SECTION

DIVISION 3

CONCRETE

SECTION 03310

CONCRETE REPAIR

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.

B. Examine all other sections of the Specifications for requirements that affect work of this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK:

A. Work included: Provide labor, materials, and equipment necessary to complete the work of this Section and, without limiting the generality thereof, furnish and include the following:

1. The extent of the concrete repairs include miscellaneous repairs to elevated slabs and stairs.

1.03 RELATED WORK:

A. Structural Steel: Section 05120

1.04 QUALITY ASSURANCE:

A. Codes and Standards: Comply with provisions of the latest edition of the following except where more stringent requirements are shown or specified:

1. ACI 362.1R-97 “Guide for the Design of Durable Parking Structures.”

2. ACI 546R-04 "Concrete Repair Guide."

3. ICRI Technical Guideline No. 03731 “Guide for Selecting Application Methods for the Repair of Concrete Surfaces.”

4. ICRI Technical Guideline No. 03730 “Guide for Surface Preparation for the Repair of Deteriorated Concreter Resulting from Reinforcing Steel Corrosion”

5. ICRI Technical Guideline No. 03732 “Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.”

6. “Code of Federal Regulations, Part 1926” per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

B. Materials and installed work may require testing and retesting, as directed by the Engineer, at any time during progress of work. Allow free access to material stockpiles and facilities. Tests not specifically indicated to be done at Owner's expense, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

1.05 SUBMITTALS

A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with Division 1.

B. All submittals shall be reviewed and returned to the Contractor within 10 working days.

C. **Incomplete submittals will not be reviewed**.

D. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with.

E. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate the owner for Engineer’s for additional review(s) cycles.

F. Product Data: Submit producer’s or manufacturer’s specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

1. One Component, Early Strength Gaining, Cementitious Repair Material.

2. Admixtures.

3. Primers/Bonding Agents.

G. Contraction/Construction Joints: Reference Section 07920.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in manufacturer's original unopened containers and packaging bearing labels as to type and names of products and manufacturers.

B. Deliver and store restoration material in manufacturer's original, unopened containers with the grade, batch and production data shown on the container or packaging.

C. Protect restoration material during storage and construction from rain, ground water, and other sources of moisture and from staining or intermixture with soils or other types of material.

D. Protect grout, mortar and other materials from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

E. Damaged Material: Remove any damaged or contaminated materials from job site immediately, including materials in broken packages or packages containing water marks or other evidence of damage, unless Engineer specifically authorizes correction and use on project.

1.07 PROTECTION/SITE CONDITIONS:

A. Protect pedestrians, vehicles, building site and surrounding buildings from injury resulting from concrete restoration work.

B. Clean surfaces only when air temperatures are above 40 degrees F and will remain so until concrete has cured.

C. Do not perform any repair work if precipitation is expected. In case of unexpected precipitation, work shall cease and all uncured material shall be adequately protected with an impermeable polyethylene sheet.

D. Do not perform any repair unless the air temperatures are between 40 degrees F and 86 degrees F and will remain a minimum of 40 degrees F for at least 48 hours after completion of work.

E. If the ambient or subsurface temperature is expected to rise above 86 degrees F during curing then the hot weather requirements of ACI 305R hot weather concreting shall be followed.

F. If the ambient or subsurface temperature is expected to fall below 40 degrees F during curing then the cold weather requirements of ACI 306R cold weather concreting shall be followed.

G. Prevent repair materials from staining the face of other surfaces to be exposed to view. Immediately remove all patching materials that come into contact with such surfaces.

H. Do not apply any material to frozen surfaces.

I. If materials are installed and cured in temperatures outside of the range noted above or per the manufacturer's recommendations. Written approval and modified installation instructions must be provided from the manufacturer and submitted for record to the Engineer. This installation shall not void the warranty.

PART 2 PRODUCTS

2.01 FORM MATERIALS:

A. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.

B. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.02 REINFORCING MATERIALS:

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed and ASTM A 706, Grade 60, deformed, weldable.

B. Welded Wire Fabric: ASTM A 185, welded steel wire fabric. Provide welded wire fabric in flat sheets.

C. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use plastic or wire bar type supports complying with CRSI recommendations, unless otherwise specified. **Wood, concrete block, clay brick and other unspecified devices are not acceptable.**

2.03 REPAIR MATERIALS:

A. All concrete repair materials shall be compatible with each other and with existing concrete. If possible all primers, repair material, and other products should be from the same manufacturer.

B. All materials shall be compatible with chloride contents of 1.0 lbs/cy or greater.

C. All pre-mixed concrete repair products shall be one-component cemetitious products specifically noted for use in parking structures.

D. All materials shall be resistant to stresses resulting from pedestrian/automobile traffic and freeze/thaw cycles, de-icing salts, continuous presence of moisture, and a temperature range of –30 to 100 degrees F.

E. C.I.P. Slab Repairs.

1. One-component, early strength gaining cementititious repair material with the following properties:

    a. Minimum 28 day compressive strength: 5000 psi.

    b. Air Content: 6% +/-1.5%

    c. Maximum water cement ratio: 0.40

2. Product shall be recommended for vertical application in parking garages in ACI Exposure Zone III.

3. Manufacturers:

    a. Sika
    b. BASF
    c. Euclid
    d. Mapaei
    e. Approved equal (must be submitted with bid)

2.04 RELATED MATERIALS:

A. Galvanic Anode:

1. Minimum of 100 grams of zinc in compliance with ASTM B6 Special High Grade cast around a pair of steel wires.

2. For use as corrosion control and corrosion prevention.

3. The zinc anode is alkali-activated with an alkaline cementitious shell with a pH of 14 or greater

4. Contain no added constituents corrosive to reinforcing steel or detrimental to concrete, e.g. chloride, bromide, sulfate, etc.

5. Documented test results from field installations showing that the anodes have achieved a minimum of 10 years in service.

6. Anode units shall be supplied with solid zinc core (ASTM B418) cast around uncoated, non-galvanized, non-spliced steel tie wires for wrapping around the reinforcing steel and twisting to provide a durable steel to steel connection between the tie wire and the reinforcing steel

B. Reinforcement Primer: Provide primer that is compatible with concrete repair material and recommended by the concrete manufacturer..

C. Bonding Agent: Provide bonding agent that is compatible with concrete repair material and recommended by the concrete manufacturer.

D. Moisture-Retaining Cover: One of the following, complying with ANSI/ASTM C 171.

1. Waterproof paper.

2. Polyethylene film.

3. Polyethylene-coated burlap.

E. Liquid Membrane-Forming Curing Compound: Not permitted.

F. Slab Joint Filler: Multi-component polyurethane sealant (self-leveling type). Reference Section 07920.

2.05 CONCRETE MIXING:

A. Mixing shall be in strict conformance with manufacturer's recommendations.

PART 3 EXECUTION

3.01 FORMS:

A. Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.

B. Design, construct, erect, maintain, and remove forms for cast-in-place concrete work in compliance with ACI 347.

C. Design formwork to be readily removable without impact, shock or damage to existing and new concrete surfaces and adjacent materials.

D. Chamfer exposed corners and edges as indicated or to match existing, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

E. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.02 PLACING REINFORCEMENT:

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

1. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

2. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.

3. Install welded wire fabric in flat sheets in as long lengths as practicable. Lap adjoining pieces at least two full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.03 PREPARATION OF FORM SURFACES

A. Prior to repair, all surfaces must be prepared in accordance with this section of the specification and the manufacturers recommendations.

B. Sawcut perimeter of damage area to a depth of 1/2”+/- (unless note otherwise on Drawings). Do not cut reinforcement. Remove, by hand, a section to confirm depth of reinforcement and adjust depth as required.

C. The removal of all unsound concrete, using lightweight demolition hammers, not to exceed **15 pounds is recommended**. All removals to be performed per ICRI Guidelines, which shall be a part of these specifications, with regard to removal geometry, exposure, undercutting and cleaning of embedded reinforcement, and conditioning of edges and surfaces. **Damage caused as a result of using larger hammers will be repaired at the Contractors expense.**

D. Steel reinforcement shall be thoroughly prepared by mechanical cleaning to remove all traces of rust.

E. Pressure wash all surfaces, including reinforcement using 3000 to 4000 psi water blast, as required to remove all dust and dirt. The surface shall be saturate surface dry (SSD) with no standing water during application.

F. The result of this preparation shall render an exposed aggregate surface with a minimum surface profile of +/- 1/8". The surface shall be clean, meaning having complete exposure of sound original material without any deposits of contaminants, foreign matter or loose material, which could affect the bond or long term durability of the surface and the repair material.

3.04 INSPECTION:

A. Inspect all concrete surfaces prior to application of primers/adhesives to insure proper preparation and surface drying.

B. Conform to all manufacturers' preparation instructions.

C. Inspect reinforcement for section loss at locations of deterioration. If loss exceeds 25% notify Engineer prior to proceeding with the repair.

3.05 PRIMING OF REINFORCING STEEL

A. Any reinforcement exposed in the course of removing unsound materials shall be cleaned and prepared in accordance with the above specifications.

B. All exposed reinforcement shall be primed with an approved bonding agent compatible with the repair materials. Coat all exposed surfaces in accordance with the manufacturer's instructions. Care must be taken to create a continuous coating on the full surface, including the underside of the undercut reinforcement. Observe manufacturer's minimum and maximum timing window for repair after application of primer.

3.06 GALVAIC ANODE INSTALLATION

A. Install anode units and repair material immediately following preparation and cleaning of the steel reinforcement.

B. Place anodes as close as practical to edge of repair area while providing sufficient clearance for anode to be completely surrounded by repair material.

C. Galvanic anodes shall be installed along the perimeter of the repair at a maximum spacing of 24 in. At larger repair areas greater than 50 square feet galvanic anodes should be installed in a grid patter throughout the entire repair and attached to steel reinforcement where it penetrates exist concrete in the field of the repair area.

D. Place the galvanic anodes as close as possible to the patch edge while still providing sufficient clearance between anodes and substrate to allow the repair material to fully encase the anode with a minimum concrete or mortar cover over the anode of 1 in. If necessary, increase the size of the repair cavity to accommodate the anodes.

    1. Place the anode such that it fits along a single bar or at the intersection between two bars and secure to each clean bar.

    2. If less than 1 in. of concrete cover is expected, place anode beneath the bar and secure to clean reinforcing steel.

E. The tie wires shall be wrapped around the cleaned reinforcing steel at least one full turn in opposite directions and then twisted tight to create a secure electrical connection and allow no anode movement during concrete placement.

F. If repair materials with resistivity greater than 15,000 ohm-cm are to be used or if the resistivity is unknown, pack an approved mortar between the anode and the substrate concrete to create a conductive grout bridge ensuring no voids exist.

3.07 ELECTRICAL CONTINUITY

A. Confirm electrical connection between anode tie wire and reinforcing steel by measuring DC resistance (ohm Ω) or DC potential (mV) with a multi-meter.

B. Electrical connection is acceptable if the DC resistance measured with the multi-meter is 1 Ω or less or the DC potential is 1 mV or less.

C. Confirm electrical continuity of the exposed reinforcing steel within the repair area. If necessary, electrical continuity shall be established by tying discontinuous steel to continuous steel using steel tie wire.

3.08 CONCRETE REPAIR

A. Following preparation, as specified above, contractor shall maintain work area in a clean condition, including materials, equipment and workers' footwear, to avoid tracking in of contaminants, dirt, dust, mud or other materials which may interfere with adhesion and durability of repairs.

B. Prior to installation, all repair areas shall be kept continuously wet for at least 20 minutes prior to application of patching compound. Before placing repair material, excess water shall be blown, vacuumed or otherwise removed from the surface, leaving the surface damp or saturated/surface dry (SSD).

C. Vigorously brush apply a thin primer coat of acrylic latex bonding agent with added 10% neat Type 1 portland cement into all cavity surfaces or cement slurry. Unless noted otherwise in manufacturer’s installation instructions. All primers shall be compatible with repair material.

D. Within specified time frame of primer application, mix and place repair compound in accordance with manufacturer's instructions.

E. Mix the precisely measured quantity of water specified by the manufacturer with full bags of patching compound only. Mix using slow speed drill (450 rom maximum) with mud or paddle mixer. Motorized mortar mixers may be used for mixing larger quantities. Mix to a uniform consistency, free of lumps or dry material. Do not whip air into the mix. Do not overmix.

F. When placing the repair material, care shall be taken to assure that all corners and gaps under reinforcing steel and entire cavity profile is completely filled and properly compacted to prevent formation of voids or unbonded areas. "Work" the material into corners and gaps, and onto cavity sidewalls using pressure on the trowel to assure good contact between patch and substrates.

G. Repairs deeper than 1" (25 mm) may be extended by coarse aggregate addition. 20 pounds of clean, washed, 3/8" pea stone suitable in composition and surface profile for use as a concrete aggregate, may be added to each 50 pound bag of patching compound.

H. Do not re-temper material which has begun to set. Discard any unused material after 20 minutes. Do not excessively wet repair surfaces after placement or as an aid to trowelling. Limit surface water addition to light misting and do not wet or rework repeatedly.

I. Observe the curing requirements for each day's working conditions, as specified herein. Do not open to traffic or expose to weather until adequate strength has been reached, as affected by working and curing conditions.

J. Finish: Provide finish to match existing or as required for membrane application.

3.09 CRACK REPAIR:

A. Preparation:

1. Remove all existing joint sealant.

2. Center routed groove on crack.

3. Remove all loose and deteriorated material.

4. All joint wall surfaces must be clean, sound, and frost free. Joint walls must be free of oils, grease, curing compound residues, and any other foreign matter that might prevent bond. This should be accomplished by blast cleaning or equivalent mechanical means.

5. Conform to all manufacturers' preparation requirements.

B. Sealant Installation:

1. Sealant shall conform to specification Section 07920; Joint Sealant.

2. Install as per manufacturer's requirements.

3. Install sealant evenly and recess 1/8" below surface. DO NOT OVERFILL JOINT.

3.10 MONOLITHIC REPAIR FINISHES:

A. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, and as otherwise indicated.

B. Trowel Finish: Apply trowel finish to monolithic slab surfaces indicated, including slab surfaces to be covered with carpet, resilient flooring, paint or other thin-film finish coating system.

C. Slab finishes for floor coverings not indicated shall be coordinated with the Engineer prior to slab placement.

3.11 CONCRETE CURING AND PROTECTION:

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with the requirements of ACI 306 as herein specified.

B. Curing Methods: Perform curing of concrete by moist curing, with moisture-retaining cover curing. **Slab repairs shall be cured by moist curing methods for a minimum of 3 days.**

C. Protection From Mechanical Injury: During the curing period, the concrete shall be protected from damaging mechanical disturbances, such as load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage by construction equipment, materials, or methods, by application of curing procedures, and by rain or running water. Self-supporting structures shall not be loaded in such a way as to overstress the concrete.

3.12 QUALITY CONTROL TESTING DURING CONSTRUCTION:

A. Engineer shall verify reinforcement, including slab reinforcement (WWF or reinforcing bar).

B. Concrete shall be sampled and tested for quality control during placement. Quality control testing shall include the items listed in paragraph D, this section, unless otherwise directed by the Engineer.

3.13 CLEANING:

A. Clean off excess material adjacent to work in progress by methods and with cleaning materials approved by manufacturer of patch materials.

END OF SECTION

SECTION 033713

SHOTCRETE

PART 1 - GENERAL

2.01 GENERAL REQUIREMENTS

A. Related Documents: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements apply to work specified in this section.

B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

2.02 DESCRIPTION OF WORK:

A. Shotcrete work includes all labor, materials, and equipment necessary and required for shotcrete.

B. Extent of work to be performed and/or coordinated shown on the drawings and indicated in the specifications including, but not limited to shotcrete, reinforcing and accessories.

C. Dry mix or wet mix process may be used.

D. Coordinate work with all other trades, including but not limited to concrete reinforcement and structural steel.

1.03 RELATED WORK

A. Reinforced Unit Masonry: Section 04230

B. Structural Steel: Section 05120

1.04 QUALITY ASSURANCE:

A. Codes and Standards: Comply with provisions of the latest edition of the following except where more stringent requirements are shown or specified:

1. ACI 506R “Guide to Shotcrete”.

2. ACI 506.2 “Specification for Shotcrete”.

3. ACI 117R “Specification for Tolerances for Concrete Construction and Materials”.

4. ACI “Detailing Manual for Reinforced Concrete” (SP-66).

5. CRSI “Manual of Standard Practice”

6. CRSI “Placing Reinforcing Bars”

7. “Code of Federal Regulations, Part 1926” per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

B. Fire Performance Characteristics: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined by ASTM E119, by a testing and inspecting organization, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

C. Contractor Qualifications: Firm specializing in manufacturer of shotcrete materials, with minimum 10 years’ experience with shotcrete crew foreman have at least 5 years’ experience in reinforced shotcrete..

D. Nozzleman must be ACI certified per ACI C660 for vertical surfaces using wet or dry mix shotcrete. Only nozzlemen approved by the Engineer shall be used on the project.

E. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

F. Nozzlemen shall prepare an in place mock-up test demonstrating their ability to satisfactory construct the reinforced shotcrete structural elements require for this project.

G. Quality Assurance/Control Testing: Test reports prepared by a qualified independent laboratory indicating compliance with the following performance requirements:
   1. ACI 506.2 Specifications for Shotcrete.
   2. ACI 301 Specifications for Structural Concrete.

H. Materials and installed work may require testing and retesting, as directed by the Architect, at any time during progress of work. Allow free access to material stockpiles and facilities. Tests not specifically indicated to be done at Owner's expense, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

1.05 DEFINITIONS

A. Shotecrete: Mortar or concrete pneumatically projected onto a surface at high velocity.

B. Dry-Mix Shotcrete: Shotecrete with most of the water added at nozzle.

C. Wet-Mix Shotcrete: Shotcrete with ingredients, including mixing water, mixed before introduction into delivery hose.

1.06 PROJECT CONDITIONS

A. Cold-Weather Shotcreting: Protect shotcrete work from physical damage or reduced strength caused by frost, freezing, or low temperatures according to ACI 306.1 and as follows:
   1. Discontinue shotcreting when ambient temperature is 40 deg. F and falling. Uniformly heat water and pre-packaged materials before mixing to obtain a shotcrete shooting temperature of not less than 50 deg. F and not more than 90 deg. F.
   2. Do not use frozen materials or materials containing ice or snow.
   3. Do not place shotcrete on frozen surfaces or surfaces containing frozen materials.
   4. Do not use calcium chloride, salt or other materials containing antifreeze agents.

B. Unless otherwise specified, submittals required in this section shall be submitted for review.

1.07 SUBMITTALS:

A. Unless otherwise specified, submittals required in this section shall be submitted for review.

B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner's Notice to Proceed.

C. All submittals shall be reviewed and returned to the Architect within 10 working days.

D. Incomplete submittals will not be reviewed.

E. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and

that all requirements listed in this Section and Section 01000 have been complied with.

F. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.

G. Product Data: Submit producers or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

1. Reinforcement certified mill reports covering chemical and physical properties and yield strength.

2. Design Mixes for each shotcrete mix.

3. Accessories, Ties, and Joint Reinforcement

4. Admixtures.

5. Expansion/Adhesive Anchors.

H. Shop Drawings:

1. Shop Drawing Review: Electronic files of structural drawings will not be provided to the contractor for preparation of shop drawings. Submit shop drawings for fabrication, bending and placement of masonry reinforcement. Comply with ACI 315, showing bar schedules, stirrup and tie spacing, diagrams of bent bars, and arrangement of masonry reinforcement. Include special reinforcement required at openings through masonry. Include supplemental reinforcing and bar supports necessary to support reinforcing steel at proper location within masonry units and bond beams. Coordinate masonry reinforcement with concrete reinforcement.

2. Review of the shop drawings will be made for the size and arrangement of reinforcement. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility. Submit one print and one reproducible. Print will be reviewed and a reproducible will be returned to Contractor for printing and distribution. Multiple copies will not be marked by Engineer.

3. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided all items listed prior. Incomplete submittals will not be reviewed.

4. Mix designs: Submit all laboratory test reports and materials for each mix design listed within. Prepare mixes by the field experience method and/or trial mixtures per the requirements of chapter 5 of ACI 318. Proportioning by water cement ratio method will not be permitted.

5. Samples: Submit samples of materials as specified and as otherwise requested by Architect, including names, sources and descriptions.

PART 2 - PRODUCTS

2.01 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A615, Grade 60, deformed.

B. Reinforcing Anchors: ASTM A 36, unheaded rods or ASTM A 307 Grade A, hex-head bolts, carbon steel and carbon steel nuts, galvanized.

C. Supports: Bolters, chairs, spacers, ties and other devices for spacing, supporting and fastening reinforcing steel in place according to CRSI's "Manual of Standard Practice".

2.02 SHOTCRETE MATERIALS

A. Provide pre-blended high early strength, low permeability and low rebound cement based product containing Portland cement, aggregate, fly ash, silica fume, steel or synthetic fibers and chemical admixtures specifically designed for vertical shotcrete application.

B. Mix pre-packaged shotcrete materials with water either in dry mix or wet mix process. The compressive strength of shotcrete at the age of 28 days shall not be less than 5000 psi.

C. Aggregate for Shotcrete: Gradation shall be one of the three options specified by ACI 506R, Table 2.1 unless otherwise specified.

D. Water: Clean and potable.

E. Additives: None permitted.

2.03 CURING MATERIALS

A. Absorptive Cover: AASHTO M182, Class 2 burlap cloth made from jute or kenaf weighing approximately 9 oz/sq yd dry.

B. Moisture Retaining Cover: ASTM C171, polyethylene film or white burlap polyethylene sheet.

2.04 SHOTCRETE EQUIPMENT

A. Mixing equipment: Capable of thoroughly mixing shotcrete materials in sufficient quantities to maintain continuous placement.

B. Dry Mix Delivery Equipment: Capable of discharging aggregate-cement mixture into delivery hose under close control and maintaining continuous stream of uniformly mixed materials at required velocity to discharge nozzle. Equip discharge nozzle with manually operated water-injection system for directing even distribution of water to aggregate-cement mixture.

1. Provide water supply with uniform pressure at discharge nozzle to ensure uniform mixing with aggregate-cement mix. Provide water pump to system if line water pressure is inadequate.

2. Provide uniform, steady supply of clean, compressed air to mainitan constance nozzle velocity while simultaneously operating blow pipe for cleaning away rebound.

C. Wet Mix Delivery Equipment: Capable of discharging aggregate-cement-water mixture accurately, uniformly, and continuously.

2.05 MIXING

A. The proportions of the shotcrete mix shall be controlled on the basis of the weight of each component material, except that water may be measured by volume. Materials shall have the following batch tolerances of their mix proportion weights: Cement, plus or minus two (2) percent; Aggregate, plus or minus four (4) percent; Admixtures, plus or minus six (6) percent. Weighing equipment used shall be accurate to within 0.4 percent of scale capacity.

B. Dry-Mix Process: Dampen pre-packaged shotcrete materials and thoroughly mix prior to use. Verify with manufacturer the water mix ratio at head to achieve specified mix design prior to application.

C. Wet-Mix Process: Thoroughly mix clean water with pre-packaged shotcrete materials in batch mixer prior to use. Verify with manufacturer quantity of water to be added to batch to achieve specified mix design.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Concrete or Masonry: Before applying shotcrete, remove unsound or loose materials and contaminants that may inhibit shotcrete bonding. Sand blast, water blast. chip or scarify areas to be repaired to extent necessary to provide sound substrate. Cut edges square and 1/2 inch deep at perimeter of work, tapering remaining shoulder at 1:1 slope into cavity to eliminate square shoulders. Dampen surfaces before shotcreting.

B. Steel: Clean steel surfaces by abrasive blasting according to SSPC_SP6/NACE No 3, “Commercial Blast Cleaning.”

C. Abrasive blast or hydroblast existing surfaces that do not require chipping to remove paint, oil, grease, or other contaminant and to provide roughened surface for proper shortcrete bonding.

3.02 FORMS

A. General: Design, erect, support, brace, and maintain forms, according to ACI 301, to support shotcrete and construction loads and to facilitate shotcreting. Construct forms so shotcrete members and structures are secured to prevent excessive vibration or deflection during shotcreting.

B. Fabricate forms to be readily removable with impact, shock or damage to shotcrete surfaces and adjacent materials.

C. Construct forms to required sizes, shapes, lines, and dimensions using ground wires and depth gages to obtain accurate alignment, location and grades in finished structures. Construct forms to prevent leakage but permit escape of air and rebound during shotcreting. Provide for openings, offsets, blocking, screeds, anchorage, inserts, and other feature required in the Work.

3.03 STEEL REINFORCEMENT:

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. General: Clean reinforcement of loose rust, mill scale, earth, ice, or other materials which will reduce bond to mortar or grout. Do not use reinforcement with kinks or bends not shown on drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes. Position reinforcement accurately at spacing shown on contract drawings.

C. Securely embed reinforcing anchors into existing substrates, located as required.

D. Accurately position, support, and rigidly secure reinforcement against displacement by formwork, construction, or shotcreting. Locate and support reinforcement by metal chairs, runners, bolsters, spacers, and hangers, as required.

E. Place reinforcement to obtain minimum coverage for shotcrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during shotcreting. Set wire ties with ends directed into shotcrete, not toward exposed shotcrete surfaces.

F. Vertical Reinforcing: Support and secure vertical reinforcing against displacement. Vertical reinforcing shall be held in position at the top and bottom and at intervals not exceeding 192 bar diameters nor 10'-0" with a minimum clearance of ¼" from the face of the masonry and not less than one bar diameter or 1", whichever is greater, between adjacent bars.

G. Horizontal Reinforcing: Support and secure horizontal reinforcing against displacement. Horizontal reinforcing shall be held in position at intervals not exceeding 100 bar diameters with a minimum clearance of ¼" from the face of the masonry and not less than one bar diameter or 1", whichever is greater, between adjacent bars. Provide laps or dowels around corners and across intersections as indicated on the drawings.

    1. Horizontal reinforcing shall be placed in continuous bond beam or lintel block units and shall be solidly grouted in place.

H. Splices: Splice reinforcement where shown or indicated on the drawings. Do not splice at other locations unless acceptable to the Structural Engineer. Minimum lap splice length shall be 48 bar diameters, of the smaller bar diameter, unless indicated otherwise on the drawings. Stagger adjacent splices at least one full lap length so that no more than 25% of the number of bars are spliced at any one location. Where splicing at vertical bars or at dowels, provide full contact, lap ends of bars, and wire tie.

I. Reinforcing Bar Positioners: Provide where required and at required spacing to support and secure horizontal and vertical reinforcing against displacement and to accurately align and position splices in reinforcement.

J. Anchors: Install anchors for reinforced masonry elements to supporting structure as indicated on the drawings or required in the specifications.

3.04 EMBEDDED ITEMS:

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by shotcrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.05 APPLICATION

A. Apply temporary protective coverings and protect adjacent surfaces against deposit of rebound and overspray or impact from nozzle stream.

B. Moisten substrate immediately before placing shotcrete to saturated surface dry (SSD).

C. Apply shotcrete according to ACI 506.2.

D. Apply dry-mix shotcrete materials within 45 minutes after pre-dampening and wet-mix shortcrete materials within 90 minutes after batching.

E. Deposit shotcrete continuously in multiple passes, to required thickness, without cold joints and laminations developing. Place shotcrete with nozzle held perpendicular to receiving surface. Begin shotcreting in corners and recesses.

F. Remove and dispose of rebound and overspray materials during shotcreting to maintain clean surfaces and to prevent rebound entrapment.

G. Maintain reinforcement in position during shotcreting. Place shotcrete to completely encase reinforcement and other embedded items. Maintain steel reinforcement free of overspray and prevent buildup against front face during shotcreting.

H. Do not place subsequent lifts until previous lift of shotcrete is capable of supporting new shotcrete.

I. Shotcrete shall be uniform and dense, free from "drummy" areas that indicate laminations, voids, sand pockets, or disbanded material.

J. Do not permit shotcrete to sag, slough, or dislodge.

K. Remove hardened overspray, rebound, and laitance from shotcrete surfaces to receive additional layers of shotcrete; dampen surfaces before shotcreting.

L. Do not disturb shotcrete surfaces before beginning finishing operations.

M. Installation Tolerances: Place shotcrete without exceeding installation tolerances permitted by ACI 117R, increased by a factor of 2.

3.06 PLACING IN COLD WEATHER

A. When the atmospheric temperature may be expected to drop below 40° F at the time shotcrete is placed, or at any time during the curing period, the following provisions shall also apply:
   1. Shotcrete placement shall be permitted when the air temperature is at least 40° F and rising. Placement shall be discontinued if the temperature falls to 40° F and is expected to continue to fall.

   2. The temperature of the shotcrete at time of placing shall not be less than 50° F nor more than 90° F. The temperature of neither aggregates nor mixing water shall be more than 100° F just prior to mixing with the cement.

   3. When the daily minimum temperature is less than 40° F, shotcrete shall be insulated or housed and heated after placement. The temperature of the shotcrete and air adjacent to the shotcrete shall be maintained at not less than 50° F nor more than 90° F for the duration of the curing period.

   4. Methods of insulating, housing and heating the structure shall be in accordance with "Standard Specification for Cold Weather Concreting," ACI Standard 306.1.

   5. The use of accelerators or antifreeze compounds will not be allowed unless otherwise specified.

   6. When dry heat is used to protect shotcrete, means of maintaining an ambient humidity of at least 40 percent shall be provided unless the shotcrete has been covered tightly with an approved impervious material.

3.07 PLACING IN HOT WEATHER

A. When climatic factors such as high air temperature, reduced relative humidity and increased wind velocities are present, or conditions are such that the temperature of placed shotcrete exceeds 90° F at, or during the first 24 hours after placement, the following provisions shall also apply:
   1. The Contractor shall maintain the temperature of the shotcrete below 90° F during mixing, conveying, and placing.

   2. Exposed shotcrete surfaces which tend to dry or set too rapidly shall be continuously moistened by means of fog sprays or otherwise protected from drying immediately after placement.

   3. Shotcrete surfaces exposed to the air shall be covered as soon as the shotcrete has hardened sufficiently and shall be kept continuously wet for at least the first 24 hours of the curing period, and for the entire curing period.

3.08 SURFACE FINISHES:

A. Rebound material shall be carefully swept off the finished shotcrete surface and discarded before it becomes too hard for removal. After the shotcrete has been placed to the depth required, the surface shall be checked with a straightedge or template and any low spots shall be brought up to grade by placing additional shotcrete.

B. General: Finish shotcrete according to descriptions in ACI 606R for surface finishes.

C. Provide broom finish rough textured finish obtained by screeding exposed face of shotcrete to required plane by rod, cutting screed or trowel and brooming after initial set.

3.09 CURING:

A. Protect freshly placed shortcrete from premature drying and excessive cold or hot temperatures.

B. Start initial curing as soon as free water has disappeared from shotcrete surface after placing and finishing.

C. Curing exposed surfaces: Cure shotcrete by moist curing. Keep surfaces continuously moist for at least seven days with water, continuous water-fog spray, water saturated absorptive covers or moisture-retaining covers maintaining 95% relative humidity. Lap and seal sides and ends of covers.

3.10 FIELD QUALITY CONTROL:

A. Testing Laboratory: Independent of the Owner, Architect and Contractor; the testing laboratory, in addition to meeting requirements of ASTM E-329, and must be an approved laboratory competent to perform concrete physical testing. All tests must be performed in strict accordance with the applicable ASTM standard.

B. Distribution of Results of Tests: Within 24 hours of results of tests, copies of the results shall be submitted to the Architect, Contractor and the supplier if applicable.

C. Shotcrete Testing:

1. Air Content: ASTM C 173, volumetric method or ASTM C 231, pressure method; 1 test for each compressive-strength test for each mix of air-entrained, wet-mix shotcrete measured before pumping.

2. In-Place Shotcrete: Take a set of 3 unreinforced cores for each ix and for each

workday or for every 50 cu. Yards of shotcrete placed; whichever is less. Test cores for compressive strength according to ACI 506.2 and ASTM C 42. Do not cut reinforcing steel.

3. Shotcrete Temperature: ASTM C 1064; 1 test hourly when air temperatures 40 degree F and below and when 80 degrees F and above, and 1 test for each set of compressive strength specimens.

3.11 REPAIRS:

A. Remove and replace shotcrete that is delaminated or exhibits laminations, voids or sand/pockets exceeding limits for specified core grade of shotcrete.

1. Remove unsound or loose materials and contaminants that may inhibit bond of shotcrete repairs. Chip or scarify areas to be repaired to extent necessary to provide sound substrate. Cut edges square and ½ inch deep at perimeter of work, tampering remaining should at 1:1 slope into cavity to eliminate square shoulders. Dampen surfaces and apply new shotcrete.
2. Repair core holes from in-place testing according to repair provisions in ACI 301 and match adjacent finish, texture and color.
3. Verify that grouting operations are performed and grout is placed and consolidated in accordance with the specifications.

3.12 CLEANING:

A. Remove and dispose of rebound and overspray materials from final shotcrete surfaces and areas not intended for shotcrete placement.

END OF SECTION

DIVISION 4

MASONRY

SECTION 04230

REINFORCED UNIT MASONRY

PART 1 - GENERAL

2.03 GENERAL REQUIREMENTS

A. Related Documents: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements apply to work specified in this section.

B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

2.03 DESCRIPTION OF WORK:

A. Reinforced masonry work includes all labor, materials, and equipment necessary and required for reinforced concrete masonry.

B. Extent of work to be performed and/or coordinated shown on the drawings and indicated in the specifications including, but not limited to masonry units, reinforcing, accessories, and grout.

C. Coordinate work with all other trades, including but not limited to concrete reinforcement and structural steel.

1.03 RELATED WORK

A. Shotcrete: Section 03370

B. Brick Masonry Repairs: Section 04500

C. Paints and Coatings: Section 09900

D. Structural Steel: Section 05120

1.04 QUALITY ASSURANCE:

A. Codes and Standards: Comply with provisions of the latest edition of the following except where more stringent requirements are shown or specified:

1. ACI 530 “Building Code Requirements for Masonry Structures”.

2. ACI 530.1 “Specification for Masonry Structures”.

3. ACI “Detailing Manual for Reinforced Concrete” (SP-66).

4. CRSI “Manual of Standard Practice”

5. CRSI “Placing Reinforcing Bars”

6. “Code of Federal Regulations, Part 1926” per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

B. Fire Performance Characteristics: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined by ASTM E119, by a testing and inspecting organization, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

C. Materials and installed work may require testing and retesting, as directed by the Architect, at any time during progress of work. Allow free access to material stockpiles and facilities. Tests not specifically indicated to be done at Owner's expense, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

1.05 SUBMITTALS:

A. Unless otherwise specified, submittals required in this section shall be submitted for review.

B. All submittals shall be reviewed and returned to the Engineer within 10 working days.

C. Incomplete submittals will not be reviewed.

D. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Section 01300 have been complied with.

E. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.

F. Product Data: Submit producer’s or manufacturer’s specifications and installation instructions for the following products. Include laboratory test reports and other data to

show compliance with specifications (including specified standards).

1. Reinforcement certified mill reports covering chemical and physical properties and yield strength.

2. Masonry sizes, shapes, weights, densities, strengths, material composition, admixtures, colors, and manufacturing processes and procedures.

3. Mortar and/or Grout Mix Designs.

4. Accessories, Ties, and Joint Reinforcement

5. Admixtures.

6. Expansion/Adhesive Anchors.

G. Shop Drawings:

1. Shop Drawing Review: Electronic files of structural drawings will not be provided to the contractor for preparation of shop drawings. Submit shop drawings for fabrication, bending and placement of masonry reinforcement. Comply with ACI 315, showing bar schedules, stirrup and tie spacing, diagrams of bent bars, and arrangement of masonry reinforcement. Include special reinforcement required at openings through masonry. Include supplemental reinforcing and bar supports necessary to support reinforcing steel at proper location within masonry units and bond beams. Coordinate masonry reinforcement with concrete reinforcement.

2. Review of the shop drawings will be made for the size and arrangement of reinforcement. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility. Submit one print and one reproducible. Print will be reviewed and a reproducible will be returned to Contractor for printing and distribution. Multiple copies will not be marked by Engineer.

3. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided all items listed prior. Incomplete submittals will not be reviewed.

4. Mix designs: Submit all laboratory test reports and materials for each mix design listed within. Prepare mixes by the field experience method and/or trial mixtures per the requirements of chapter 5 of ACI 318. Proportioning by water cement ratio method will not be permitted.

5. Samples: Submit samples of materials as specified and as otherwise requested by Architect, including names, sources and descriptions.

6. Contraction/Construction Joints: Submit plan indicating proposed location of contraction and construction joints in masonry walls.

PART 2 - PRODUCTS

2.03 MASONRY MATERIALS

A. Load Bearing Units:

1. Hollow Load Bearing Units: ASTM C-90

a. Normal weight units

b. Minimum average net area compressive strength = 1,900 psi.

2. Solid Load Bearing Units: ASTM C-145

a. Normal weights units

b. Minimum average net area compressive strength = 1,900 psi

3. Nominal Dimensions:

a. 12” units: 15-5/8”x11-5/8”x7-5/8” actual

b. 8” units: 15-5/8x7-5/8”x7-5/8” actual

c. Provide other nominal sizes as indicated on the Architectural and Structural Drawings or in related specifications.

d. Construct lintels using reinforced concrete masonry units with grouted joints where shown. Lintels may be prefabricated for incorporation into work.

4. Single Source for Masonry Units: Obtain masonry units of uniform texture and color as specified from single manufacturer.

B. Fire Rating Requirements: Concrete masonry units shall have a U.L. listed fire rating of as indicated on the Architectural Drawings or in related specifications.

2.04 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I, except Type III may be used for cold weather construction. Provide natural color unless otherwise indicated.

B. Ready-Mixed Mortar: Cementitious materials, water, and aggregate complying with requirements specified here within, combined with set-controlling admixtures to produce ready-mixed mortar complying with ASTM C1142.

C. Aggregate for Mortar: ASTM C144, except for joints less than 1/4" thick, use aggregate graded with 100 percent passing No. 16 Sieve.

D. Aggregate for Grout: ASTM C 404.

E. Water: Clean and potable

F. Additives: None permitted.

2.03 MORTAR AND GROUT MIXES:

A. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

B. Mortar:

1. Job mixed mortar: Comply with ASTM C270, Proportion Specification for job mixed mortar
2. Ready-mixed mortar: ASTM C 1142
3. Masonry cement shall consist of portland-cement lime; mortar cement is acceptable, masonry cement is not acceptable.
4. Mortar shall be Type S, unless otherwise noted.
5. Mortar compressive stress when tested per ASTM C270 at 28-days shall be a minimum of 1,800 psi.
6. Single Source for Mortar Units: Obtain mortar materials of uniform texture and color as specified from single manufacturer.

C. Grout:

1. Comply with ASTM C476.

2.05 MASONRY REINFORCEMENT:

A. General: Comply with this specification for placing reinforcement. Comply with Division 3, Section 03300 for other requirements. Shop fabricate, whenever possible, reinforcing bars shown as bent or hooked.

B. Deformed Bars: Provide ASTM A615 Grade 60 deformed bars. Except provide ASTM A615 Grade 60s where field bending of reinforcement is required or intended, and ASTM A-706 Grade 60 for all conditions where welding of reinforcement is required.

C. Smooth Steel Wire: Provide ASTM A675 Grade 80 for all #2 bars of smooth, round stock, where noted on the drawings for use in columns or pilasters as ties.

2.04 MASONRY ACCESSORIES:

A. General: Provide accessories and other items as required herein and in related specification sections and as indicated on the drawings. For all types of accessories, hot-dip galvanize after fabrication with 1.5 oz. zinc coating, ASTM A-153, Class B2.

B. Prefabricated Joint Reinforcing: Provide continuous welded wire units prefabricated in straight lengths of not less than 10', with matching corner and tee units. Fabricate from cold-drawn steel wire complying with ASTM A-82, deformed continuous side rods with 3/16" diameter and plain 9 gage cross-rods, unit width of 1-1/2" less than thickness of wall/partition. Subject to compliance, provide products manufactured by "Dur-O-Wal", "AA Wire Products Company", or approved equal.

   a. Single Width Walls: Truss type fabricated with single pair 3/16 gauge side rods and 9 gage continuous diagonal cross-rods.

C. Reinforcing Bar Positioners: Provide reinforcing bar supports/positioners for accurate positioning of horizontal and vertical reinforcement in walls, bond beams, and lintels. Fabricate from cold-drawn plain 9 gage steel wire complying with ASTM A-82. Subject to compliance, provide products manufactured by "Dur-O-Wal", "AA Wire Products Company", or approved equal.

D. Masonry Anchors and Ties: Provide straps, bars, bolts, rods, dovetail slots, metal fasteners indicated and other required accessory items of type, size, spacing, and at locations as required in related specification sections as identified on the drawings. Where masonry is indicated to be anchored to structural framework with flexible anchors, provide 2-piece anchors which will permit horizontal and vertical movement but will provide lateral restraint out of plane of wall.

E. Related Masonry Items: Provide joint fillers, insulation, flashings, weepholes, and other

items related to masonry work as required in related specification sections and as identified on the drawings.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. General: Build masonry construction as required in related specification sections and as identified on the drawings. Build masonry construction to full thickness shown, except, single-wythe walls to actual thickness of masonry units, using units of nominal thickness shown or specified.

B. Do not use frozen materials or materials mixed/coated with ice or frost. Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing. Do not wet concrete masonry units (CMU).

C. Mortar: Provide full mortar coverage on all horizontal and vertical surfaces including face shells and webs.

D. Reinforced Concrete Masonry Unit Walls: Lay CMU wall units in running bond with vertical joints in each course centered on units above and below, unless otherwise indicated. Bond and interlock each course at corners and intersections. Use special shaped units where shown, and/or as required for corners, jambs, sash, control joints, lintels, bond beams, and other special conditions.

    1. Maintain vertical continuity of core or cell cavities which are to be reinforced and grouted Keep cavities free of mortar. Solidly bed webs of masonry with mortar where adjacent to cells to be grouted.

    2. Use special units or modify standard units, where horizontal reinforcing is shown to provide for continuous placement of reinforcing and grout. Place small mesh expanded metal lath or wire screening in joints under bond beam courses above cells of non-reinforced or non-grouted masonry elements or provide bond beam units with solid bottoms (lintel block units). Provide open end bond beam units where horizontal and vertical reinforcing pass through same units.

3.02 PLACING REINFORCEMENT:

A. General: Clean reinforcement of loose rust, mill scale, earth, ice, or other materials which will reduce bond to mortar or grout. Do not use reinforcement with kinks or bends not shown on drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes. Position reinforcement accurately at spacing shown on contract drawings.

B. Vertical Reinforcing: Support and secure vertical reinforcing against displacement. Vertical reinforcing shall be held in position at the top and bottom and at intervals not exceeding 192 bar diameters nor 10'-0" with a minimum clearance of ¼" from the face of the masonry and not less than one bar diameter or 1", whichever is greater, between adjacent bars.

1. For columns, piers, and pilasters, provide a clear distance between vertical bars as indicated, but not less than 1-1/2 times the nominal bar diameter or 1-1/2", whichever is greater. Provide lateral ties as indicated in the details.

2. All dowels shall be grouted even if the dowel is in a cell adjacent to the vertical reinforcing. Unless detailed otherwise on the drawings, dowels shall be the same size, number, and spacing as the vertical reinforcing. Provide lap length of dowels to vertical reinforcing equal to forty-eight (48) times nominal diameter of dowel, unless indicated otherwise on the drawings. Dowels for columns and pilasters shall be installed using steel or wood templates to accurately position dowels as indicated on the drawings.

C. Horizontal Reinforcing: Support and secure horizontal reinforcing against displacement. Horizontal reinforcing shall be held in position at intervals not exceeding 100 bar diameters with a minimum clearance of ¼" from the face of the masonry and not less than one bar diameter or 1", whichever is greater, between adjacent bars. Provide laps or dowels around corners and across intersections as indicated on the drawings.

1. Horizontal reinforcing shall be placed in continuous bond beam or lintel block units and shall be solidly grouted in place. Horizontal reinforcement shall be CONTINUOUS THROUGH CONTROL JOINTS, but shall be DISCONTINOUS AT EXPANSION JOINTS. Horizontal reinforcement may be placed as masonry work progresses.

D. Splices: Splice reinforcement where shown or indicated on the drawings. Do not splice at other locations unless acceptable to the Structural Engineer. Minimum lap splice length shall be 48 bar diameters, of the smaller bar diameter, unless indicated otherwise on the drawings. Stagger adjacent splices at least one full lap length so that no more than 25% of the number of bars are spliced at any one location. Where splicing at vertical bars or at dowels, provide full contact, lap ends of bars, and wire tie.

E. Reinforcing Bar Positioners: Provide where required and at required spacing to support and secure horizontal and vertical reinforcing against displacement and to accurately align and position splices in reinforcement.

F. Prefabricated Joint Reinforcing: Provide continuous horizontal joint reinforcing as shown/specified. Fully embed longitudinal side rods in mortar for entire length with minimum cover of 5/8" on exterior side of walls and ½" at other locations. Lap reinforcement a minimum of 6" at ends of units. Do not bridge control/expansion joints with joint reinforcing. Provide continuity at corners/wall intersections by the use of

prefabricated "L" and "T" sections. Cut/bend units as directed by manufacturer for continuity at returns/offsets/column fireproofing, pipe enclosures, and/or special conditions. Space continuous horizontal reinforcing as follows:

1. For single-wythe walls, space 16" o.c. vertically, unless indicated.

G. Metal Ties: Where indicate, install in mortar joints as work progresses, with a minimum mortar cover of at least 5/8" on exterior faces and ½" on interior faces of masonry work.

H. Anchors: Install anchors for reinforced masonry elements to supporting structure as indicated on the drawings or required in the specifications.

3.03 FORMWORK AND SHORING:

A. General: Provide temporary formwork and/or shoring as required for temporary support of reinforced masonry work.

B. Removal: Formwork and/or shoring shall not be removed until the reinforced masonry element has cured sufficiently to carry its own weight and any other loads that may be placed on it during construction. It is the contractor's sole responsibility to determine formwork and shoring requirements and durations. In no case shall formwork or shores be removed before the following periods:

1.	Lintels and beams:	10 days
2.	Masonry soffits:	7 days
3.	Columns and pilasters:	7 days

3.04 GROUTING

A. General: Grout mix and grout materials shall conform to ASTM C 476. Refer to Division 3, Section 03310, "Concrete Repair" for requirements.

1. Use "Fine Grout" for filling spaces less than 2" in either horizontal dimension. Where shown solid, use mortar for cavities less than ¾" in width or spaces less than 1-1/2" x 2" in horizontal dimensions.

2. Use "Coarse Grout" for filling cavities 2" or larger in width or cells 2"x3" or larger in horizontal dimensions.

3. Use "Concrete", 3000 psi normal weight, for filling spaces ten (10) inches or larger in both horizontal dimensions.

B. Preparation: Prior to grouting, inspect and clean grout spaces. Remove dust, dirt, mortar

droppings, loose pieces of masonry, and other foreign materials. Clean and position reinforcing. Clean top surface of structural members to ensure bond. After final cleaning and inspection, close and brace clean out holes.

1. Do not grout until entire height of masonry to be grouted has attained sufficient strength to resist forces and pressures of grouting operation. Install shores and braces, if required, before beginning grouting.

C. Grouting Method: Grouting shall conform to low-lift or high-lift grouting, at Contractor's option, subject to following requirements.

1. Low-Lift Grouting:

    a. Low-Lift Grouting SHALL NOT exceed a pour of more than five (5) feet in height not the "Maximum Grout Pour Height" identified below.

    b. Provide minimum clear dimension of two (2) inches and minimum clear area of eight (8) sq. inches in vertical cavities, cells, or cores to be grouted.

    c. Place vertical reinforcement prior to laying of masonry units. Extend above elevation of maximum pour height as required to allow for splicing. Support and secure reinforcing as masonry is built.

    d. Lay masonry to maximum pour height. Do not exceed five feet (5 ft.) or if bond beam occurs below five feet (5 ft.) height, stop pour or course below bond beam.

2. High-Lift Grouting:

    a. High-Lift Grouting SHALL NOT exceed a pour of one story, but in no case more than twenty-four (24) feet in height nor the "Maximum Grout Pour Height" identified below.

    b. High-Lift Grouting is NOT PERMITTED unless minimum cavity dimension exceeds three (3) inches and minimum cavity area exceeds ten (10) sq. inches.

    c. Cleanout holes ARE REQUIRED where high-lift grouting will be employed. Provide cleanouts at the bottom course of masonry at each cell to be grouted for each pour. For solid grouted masonry space cleanouts at 32 in. o.c.

    d. Cleanout holes shall have minimum width of 3 inches and a minimum

height of 6 inches. After cleaning, close cleanouts and brace closures to resist hydrostatic grout pressure.

e. Prior to grouting, construct masonry elements and place and secure reinforcing to full height of maximum grout pour. Place horizontal bond beam reinforcing as masonry units are laid.

f. Where lateral tie reinforcing is shown, embed in mortar joints at vertical spacing indicated as units are laid. Where lateral ties wrap vertical reinforcing, embed additional lateral tie reinforcing in mortar joints to resist hydrostatic rupture of masonry face shells. Provide not less than No. 2 bars or 8 gage wire ties spaced at 16 in. o.c. for members with side dimensions of 20 in. or less and at 8 in. o.c. where side dimensions exceed 20 in.

D. Maximum Grout Pour Height: In no case shall total grout pour height exceed the following heights regardless of grouting method used.

Grout Type	Max. Height	Min. Cavity	Min. Cell
Fine	1'-0"	¾"	1-1/2"x 2"
Fine	5'-0"	2"	2" x 3"
Fine	12'-0"	2-1/2"	2-1/2" x 3"
Fine	24'-0"	3"	3" x 3"
Coarse	1'-0"	2"	2" x 3"
Coarse	5'-0"	2"	2-1/2" x 3"
Coarse	12'-0"	2-1/2"	3" x 3"
Coarse	24'-0"	3"	3" x 4"

Min. Cavity applies to grouting between wythes of cavity walls. Min. Cell applies to grouting of masonry cells where dimension shown equals grout space width minus horizontal reinforcing bar diameter.

E. Grout Placement: Limit grout pours to sections which can be completed in one working day with not more than one (1) hour of interruption of pouring operation. Allow not less than thirty (30) minutes, nor more than one (1) hour between lifts of given pour. Rod or vibrate each lift during pouring operation.

1. Place grout in lifts not to exceed a maximum height of five (5) feet each, regardless of the maximum height of the pour.

2. Place grout in lintels and beams over openings in one continuous pour.

3. Pour grout using chute or container with spout. Terminate pour 1-1/2" below top course to form key for next pour.

4. Where bond beams occur, terminate grouting of vertical cells 1-1/2" below bond beam course. After placing horizontal reinforcing and prior to filling vertical cells above bond beam, pour grout into bond beam and strike off flush with top of bond beam course.

F. Lintels: Install loose lintels of steel and other materials where shown. Provide masonry lintels where shown and wherever openings of more than 1'-0" are shown without structural steel or other supporting lintels. Provide formed-in-place masonry lintels. Provide minimum bearing at each jamb, of 4" at openings less than 4'-0" wide and 8' for wider openings.

G. Other Items: Provide vertical expansion, control and isolation joints, and provide concealed flashing and weep holes in masonry where shown. Build-in related masonry accessory items as the masonry work progresses.

H. Construction Tolerances: Variations in reinforced masonry work from plumb and level, locations of built-in or embedded items, and other required tolerances shall be as required in related specification sections or as identified on the drawings.

I. Protection of Work: Do not apply uniform loading for at least 12 hours after building masonry walls or columns. Do not apply concentrated loads for at least 3 days after building masonry walls, lintels, beams, columns, pilasters, and piers.

J. Responsibility for Errors: Contractor shall bear all costs associated with corrective work resulting from errors or poor workmanship, including costs of architectural and engineering services associated with required correction.

3.05 QUALITY CONTROL TESTING DURING CONSTRUCTION:

A. Testing Agency/Project Special Inspector shall verify reinforcement, including all masonry reinforcement and slab reinforcement (WWF or reinforcing bar). Agent shall verify reinforcement has been chair/placed with proper clearances.

B. The Owner shall employ a Testing Laboratory to inspect, sample and test the materials and the production of concrete and to submit test reports. Masonry testing shall be performed by technicians certified by the Maine Concrete Technician Certification Board and/or ACI Concrete Field Testing Technician Grade I.

1. Verify that grouting operations are performed and grout is placed and consolidated in accordance with the specifications.

2. Verify that contractor is using approved admixtures for grout.

3. Sample Fresh Grout: ASTM C-172, except modified for slump to comply with ASTM C-94.

    a. Slump: ASTM C-143; one (1) test for each grout load at point of discharge; one (1) test for each set of compressive strength test specimens.

    b. Air Content: ASTM C-173; volumetric method or ASTM C-231 pressure method for normal weight concrete; one (1) for each of compressive strength test specimens.

    c. Grout Temperature; For each load, at time of arrival, at point of discharge test hourly when air temperature is 40 degree F and above; and each time a set of compression test specimens are made.

    d. Compression Test Specimens: ASTM C-31; one (1) set of four (4) standard cylinders for each truck or mixer load of grout taken when load is 50% discharged from truck, unless other wise directed. Mold/store cylinders for laboratory cured test specimens except when field-cure test specimens are required.

    e. Refer to Section 03310, “Concrete Repair” for remaining test requirements. Substitute therein the work “grout” for the word “concrete”.

END OF SECTION

SECTION 04500

BRICK MASONRY RESTORATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK

A. Work included: Provide labor, materials, and equipment necessary to complete the work of this Section and, without limiting the generality thereof, furnish and include the following:

1. Testing to determine physical properties of existing masonry.

2. Repairing clay masonry, including replacing damaged units and full depth repairs.

3. Repointing mortar joints.

4. Removal of masonry to access the CMU wall.

5. Patching scaffolding support anchor holes as scaffolding is removed. Coordinate work with scaffolding subcontractor.

1.03 RELATED WORK

A. Section 04230 – Reinforced Unit Masonry

B. Section 07920 – Joint Sealants.

1.04 QUALITY ASSURANCE

A. Restoration Specialist: Work must be performed by a masonry restoration firm having not less than 5 years successful experience in comparable masonry

restoration projects and employing personnel skilled in the restoration process and operations indicated.

1. Field Supervision: Require restoration specialist firms to maintain an experienced full-time supervisor on the Project site during times that clay masonry restoration and cleaning are in progress.

B. Source of Materials: Obtain materials for masonry restoration from a single source for each type material required (brick, cement, sand, etc.) to ensure match of quality, color, pattern, and texture.

C. Chemical Manufacturer Qualifications: A company regularly engaged in producing masonry cleaners that have been used for similar applications with successful results, and with factory-trained representatives who are available for consultation and Project site inspection and assistance at no additional cost.

D. References:

1. Friedman, Donald, Historical Building Construction, W.W. Norton & Company, 1995.

2. United States Secretary of the Interior, National Park Service, Technical Preservation, Preservation Briefs.

1.05 SUBMITTALS

A. Submit the following items in time to prevent delay of the work and to allow adequate time for review and resubmittals, if needed; do not order materials or start work before receiving the written approval:

1. Mortar Mix Design and Product Data

2. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.

3. Qualifications 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 Engineers and owners, and other information specified

4. Cleaning Program: Describe cleaning process in detail, including materials, methods and equipment to be used and protection of surrounding materials on buildings and project site, and control of runoff during operations.

a. If materials and methods other than those indicated are proposed for cleaning work, provide a written description, including evidence of successful use on comparable projects, and a testing program to demonstrate their effectiveness for this project.

5. Testing Program: Perform tests to determine the physical properties of the existing masonry including compressive strength, expansion/contraction, water absorption and e-modulus. Submit to Engineer test results and recommended repointing mortar mix design that is compatible with the physical properties of the existing masonry.

B. Mockup: Prepare field samples for restoration methods and cleaning procedures to demonstrate aesthetic effects and qualities of materials and execution. Use materials and methods proposed for completed Work and prepare samples under same weather conditions to be expected during remainder of Work.

1. The Foreperson responsible for the respective work shall be present at the sample work. Samples shall be executed by the same individuals performing the work. Provide one sample for each procedure for each individual executing repair work.

2. Locate mockups on the building where directed by Engineer.

3. Masonry Repair: Prepare sample panels approximately 16 sq. ft in area for each type of masonry material indicated to be patched, rebuilt, or replaced. Erect sample panels into an existing wall, unless otherwise indicated, to demonstrate the quality of materials and workmanship.

4. Cleaning: Prepare sample approximately 16 sq. ft. in area for each type of masonry and surface condition. Use manufacturer's application instructions. Test cleaners and methods on samples of adjacent materials for possible adverse reactions, unless cleaners and methods are known to have a deleterious effect. Allow a waiting period of not less than 7 days after completion of sample cleaning to permit a study of sample panels for negative reactions..

5. Repointing: Prepare 2 separate sample areas approximately 36 inches high by 72 inches wide for each type of repointing required; 1 for demonstrating methods and quality of workmanship expected in removing mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints.

6. Notify Engineer 7 days in advance of the dates and times when samples will be prepared.

7. Obtain Engineer's approval of mockups before starting the remainder of masonry restoration and cleaning. If samples are unsatisfactory, Contractor shall make the needed modifications and prepare new samples until they are

satisfactory. No mechanic shall be allowed to complete repair work until mockup is approved for that individual.

8. The samples accepted by the Engineer for each individual executing repair work shall serve as the standard for judging the completed Work for the entire job. They shall be marked and left undisturbed until all restoration work is completed.

1.06 DELIVERY, STORAGE AND HANDLING:

A. Carefully pack, handle, and ship masonry units and accessories strapped together in suitable packs or pallets or in heavy cartons. Unload and handle to prevent chipping and breakage.

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

B. Deliver other materials to site in manufacturer’s original and unopened containers and packaging, bearing labels as to type and names of products and manufacturers.

C. Protect masonry restoration materials during storage and construction from wetting by rain, snow, or ground water, and from staining or intermixture with earth and other types of materials.

D. Protect grout, mortar, and other materials from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing. Comply with manufacturer’s recommendations for minimum and maximum temperature requirements for storage. Do not use cementitious materials that have become damp.

E. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

F. Store lime putty covered with water in sealed containers.

G. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.07 PROJECT CONDITIONS

A. Repoint mortar joints and repair masonry only when air temperature is between and 40 and 90 deg F (4 and 32 deg C) and is predicted to remain so for at least 7 days after completion of work.

B. Cold-Weather Requirements: Comply with the following procedures for masonry repair and mortar-joint pointing:

1. When air temperature is below 40 deg F (4 deg C), heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F (4 and 49 deg C).

2. When mean daily air temperature is below 40 deg F (4 deg C), provide enclosure and heat to maintain temperatures above 32 deg F (0 deg C) within the enclosure for 7 days after repair and pointing.

C. Hot-Weather Requirements: Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 90 deg F (32 deg C) and above.

D. Patch masonry only when air and surface temperatures are between and 55 and 100 deg F (13 and 38 deg C) and are predicted to remain above 55 deg F (13 deg C) for at least 7 days after completion of work. On days when air temperature is predicted to go above 90 degF (32 deg C), schedule patching work to coincide with time that surface being patched will be in shade or during cooler morning hours.

E. Clean masonry surfaces only when air temperature is 40 deg F (4 deg C) and above and is predicted to remain so for at least 7 days after completion of cleaning.

F. Prevent grout or mortar used in repointing and repair work from staining face of surrounding masonry and other surfaces. Remove immediately grout and mortar in contact with exposed masonry and other surfaces.

G. Protect sills, ledges and projections from mortar droppings.

1.08 SEQUENCING/SCHEDULING

A. Order replacement materials at earliest possible date, to avoid delaying completion of the Work.

B. Perform masonry restoration work in the following sequence:

1. Repair existing masonry, including replacing existing masonry with new masonry materials.

2. Rake out existing mortar from joints indicated to be repointed.

3. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.

4. Point existing mortar joints of masonry indicated to be restored.

5. Clean masonry surfaces.

C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units to match existing color and texture. Patch holes in mortar joints to match existing color and texture. Coordinate work with Scaffolding Subcontractor.

PART 2 PRODUCTS

2.01 MASONRY MATERIALS

A. All attempts should be made to match size, profile, texture and style of existing brick masonry.

B. Salvaged Face Brick and Accessories: Provide face brick to the greatest extent possible using salvaged bricks from the same job site. If salvaged bricks are not available in sufficient quantity or quality, provide new face brick and accessories.

1. Remove mortar, paint and other foreign material from salvaged brick.

2. Provide replacement brick complying with ASTM C 62 and repair areas from which salvaged brick was removed.

C. New Brick and Accessories: Provide new brick and accessories, including specially molded, ground, cut, or sawed shapes where required to complete masonry restoration work.

1. Provide units with colors, size and shape, surface texture, and physical properties to match existing units.

2. Provide specially molded shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

3. Provide specially ground units, shaped to match patterns, for arches and where indicated.

D. Building Brick: Provide building bricks complying with ASTM C 62, of same vertical dimension as face brick, for masonry work concealed from view.

1. Grade SW, MW, or NW for concealed backup.

2.02 MORTAR MATERIALS:

A. Masonry Cement: Premixed Type N Mortar Cement by LaFarge North America, or approved equivalent.

B. Mortar Sand: ASTM C 144, unless otherwise indicated.

1. For pointing mortar, provide sand with rounded edges.

2. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands, if necessary, to achieve suitable match.

C. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.

D. Water: Potable.

2.03 CLEANING MATERIALS

A. Water for Cleaning: Potable

B. Job-Mixed Detergent Solution: Solution prepared by mixing 2 cups (0.5 L) of tetrasodium polyphosphate (TSPP), 1/2 cup (125 mL) of laundry detergent, and 20 quarts (20 L) of hot water for every 5 gal. (20 L) of solution required.

C. Light Duty Restoration Cleaner: Sure Klean Light Duty Restoration Cleaner manufactured by Prosoco, Inc., 3741Greenway Circle, Lawrence, KS 66046. Phone: (800) 255-4255 or approved alternate.

D. Heavy Duty Restoration Cleaner: Sure Klean Heavy Duty Restoration Cleaner manufactured by Prosoco, Inc., 3741 Greenway Circle, Lawrence, KS 66046. Phone: (800) 255-4255 or approved alternate.

2.04 MISCELLANEOUS MATERIALS

A. Masonry Repair Anchors, Expansion Type: Mechanical fasteners designed for masonry veneer stabilization consisting of a 1/4-inch - diameter, Type 304 stainless-steel rod with brass expanding shells at each end and a water-shedding washer in the middle. Expanding shells shall be designed to provide positive mechanical anchorage to veneer on one end and backup masonry on other end.

1. Mechanical Repair Anchors by Dur-O-Wal, Inc.

2. #521RA Repair/Restoration Anchor by Hohmann & Barnard, Inc.

B. Masonry Repair Anchors, Spiral Type: Type 304 stainless-steel spiral rods designed to anchor to backing and veneer. Anchors are flexible in plane of veneer but rigid perpendicular to it.

1. Provide driven in anchors designed to be installed in drilled holes and relying on screw effect rather than adhesive to secure them to backup and veneer.

a. Helifix 6mm Stainless Steel Helibar™

b. Heckmann Building Products, Inc. #391 Remedial Tie

c. Hohmann & Barnard, Inc. Helix Spiro Ties

C. Masonry Repair Anchors, Adhesive Type: Type 304 stainless-steel threaded rods designed to anchor to backing and veneer. Anchors are flexible in plane of veneer but rigid perpendicular to it.

1. Provide adhesive installed anchors complete with manufacturer's standard epoxy adhesive and injection tubes, screens, sleeves, or other devices required for installation.

a. Hohmann & Barnard, Inc. #520RA.

2.05 MORTAR MIXES:

A. Mortar Proportions: Mix sand, water and masonry cement per masonry cement manufacturer’s instructions meeting the requirements of ASTM C270 for the mortar types specified.

B. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, workable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not re-temper or use partially hardened material.

C. Do not use admixtures of any kind in mortar, unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION:

A. General: Comply with recommendations of manufacturers of chemical cleaners for protecting building surfaces against damage from exposure to their products.

B. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.

1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.

C. Prevent mortar from staining face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and projections to protect from mortar droppings.

2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.

3. Immediately remove mortar in contact with exposed masonry and other surfaces.

4. Clean mortar splatters from scaffolding at end of each day.

D. Cleaning

1. Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be injured by such contact.

2. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces. Neutralize and collect alkaline wastes for disposal off Owner's property. (NOTE: Contractor may seek approval for environmentally friendly materials, through Utility, to allow for their runoff into the city storm sewer.).

3. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

4. Erect temporary protection covers over pedestrian walkways and at points of entrance and exit for persons and vehicles that must remain in operation during course of masonry restoration work.

3.02 UNUSED ANCHOR REMOVAL

A. Remove masonry anchors, brackets, wood nailers, and other extraneous items no longer in use unless identified as historically significant or indicated to remain.

1. Remove items carefully to avoid spalling or cracking masonry.

2. If item cannot be removed without damaging surrounding masonry, cut off item flush with surface and core drill surrounding masonry and item as close around item as practical.

3. Patch holes where items were removed unless directed to remove and replace units.

3.03 BRICK REMOVAL AND REBUILDING

A. Remove bricks that are damaged, spalled, or deteriorated. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

   1. When removing single bricks, remove material from center of brick and work toward outside edges.

B. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

C. Notify Engineer of unforeseen detrimental conditions including voids, cracks, bulges, and loose masonry units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.

D. Remove in an undamaged condition (Salvage) as many whole bricks as possible.

   1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.

   2. Store brick for reuse, as indicated.

   3. Deliver cleaned brick not required for reuse to Owner, unless otherwise directed.

E. Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.

F. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.

G. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C 67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. (30 g/194 sq. cm per min.). Use wetting methods that ensure that units are nearly saturated but surface is dry when laid. Maintain joint width for replacement units to match existing joints.

   1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.

3.04 MASONRY UNIT PATCHING

A. Patch the following masonry units:

1. Units with holes.

2. Units with chipped edges or coners.

3. Units with small areas of deep deterioration.

B. Remove and replace existing patches, unless otherwise indicated or approved by Engineer.

C. Patching Bricks:

1. Remove loose material from brick surface. Remove additional material so patch will not have feathered edges and will be at least 1/4 inch (6 mm) thick, but not less than recommended by patching compound manufacturer.

2. Mask or remove surrounding mortar joints if patch will extend to edge of brick.

3. Rinse surface to be patched and leave damp, but without standing water.

4. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.

5. Place patching compound in layers as recommended by patching compound manufacturer, but not less than 1/4 inch (6 mm) or more than 2 inches (50 rnm) thick. Roughen surface of each layer to provide a key for next layer.

6. Trowel, scrape, or carve surface of patch to match texture and surface plane of surrounding brick. Shape and finish surface before or after curing, as determined by testing, to best match existing brick.

7. Keep each layer damp for 72 hours or until patching compound has set.

3.05 REPOINTING MASONRY

A. Rake out and re-point mortar joints to the following extent:

1. All joints in areas indicated.

2. Joints where mortar is missing or where they contain holes.

3. Cracked joints where cracks can be penetrated at least 1/4 inch (6 mm) by a knife blade 0.027 inch (0.7 mm) thick.

4. Cracked joints where cracks are 1/8 inch (3 mm) or more in width and of any

depth.

5. Joints where they sound hollow when tapped by metal object.

6. Joints where they are worn back 1/4 inch (6 mm) or more from surface.

7. Joints where they are deteriorated to point that mortar can be easily removed by hand.

8. Joints, other than those indicated as sealant-filled joints, where they have been filled with substances other than mortar.

B. Do not rake out and repoint joints where not required

C. Rake out joints as follows:

1. Remove mortar from joints to depth of 2 times joint width, but not less than 1/2 inch (13 mm) or not less than that required to expose sound, unweathered mortar.

2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.

3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Engineer.

a. Continuous Horizontal Joints: Cut out center of mortar bed joints using angle grinders with diamond- impregnated metal blades. Remove remaining mortar by hand with chisel and mallet. Strictly adhere to written quality-control program. Quality-control program shall include provisions for demonstrating ability of operators to use tools without damaging masonry, supervising performance, and preventing damage due to worker fatigue.

b. Vertical Joints, Non-continuous Horizontal Joints and Horizontal Joint Ends: Cut out mortar by hand with chisel and mallet. Do not use power-operated grinders. Quality-control program shall include provisions for supervising performance and preventing damage due to worker fatigue.

D. Notify Engineer of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

E. Point joints as follows:

1. Rinse masonry-joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but

free of standing water. If rinse water dries, dampen masonry-joint surfaces before pointing.

2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch (9 mm) until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.

3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch (6 mm).Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing bricks have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar over edges onto exposed masonry surfaces or to featheredge mortar.

4. When mortar is thumbprint hard, tool joints to match original appearance of joints. Remove excess mortar from edge of joint by brushing.

F. Cure mortar by maintaining in thoroughly damp condition for at least 72 hours including weekends and holidays.

1. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.

2. Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.

G. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.06 CLEANING MASONRY

A. General: Clean masonry utilizing a detergent cleaning first. Move to more aggressive products/cleaners as necessary to achieve clean surface. Provide test area prior to each successive step to ensure compatibility with masonry surface as indicated here within.

B. Detergent Cleaning:

1. Wet masonry with cold water applied by low-pressure spray.

2. Scrub masonry with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that masonry surface remains wet.

3. Rinse with cold water applied by medium-pressure spray to remove detergent solution and soil.

4. Repeat procedure above where required to produce the cleaning effect established by mockup.

3.07 RESTORATION MASONRY CLEANING

A. Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other. Start with light duty detergent and proceed to heavy duty cleaning methods as needed until clean.

B. Use only those cleaning methods indicated for each masonry material and location.

1. Do not use wire brushes or brushes that are not resistant to chemical cleaner being used. Do not use plastic-bristle brushes if natural-fiber brushes will resist chemical cleaner being used.

2. Use spray equipment that provides controlled application at volume and pressure indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning methods do not damage masonry.

a. Equip units with pressure gages.

3. For water spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.

C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including comers, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.

D. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, caulking, asphalt, and tar.

1. Carefully remove heavy accumulations of material from surface of masonry with a sharp chisel. Do not scratch or chip masonry surface.

E. Water Spray Applications: Unless otherwise indicated, hold spray nozzle at least 6 inches (150 mm) from surface of masonry and apply water in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.

F. Application: Before applying, read “Preparation” and “Safety Information” sections in the Manufacturer’s Product Data Sheet for Light Duty Restoration Cleaner. Do not dilute or alter.

1. Prewet the surface with clean water

2. Apply cleaner using a brush or roller. Gently scrub to improve results.

3. Let cleaner dwell for 5 to 15 minutes. Gently scrub heavily soiled areas. Don't let cleaner dry on the surface. If drying occurs, lightly wet treated surfaces with fresh water. Reapply the cleaner in a gentle scrubbing manner.

4. Rinse thoroughly with clean water. The best combination of rinsing pressure and water volume is provided by masonry washing equipment generating 400-1000 psi with a water flow rate of 6-8 gallons per minute delivered through a 15-45 degree fan spray tip. Equipment should be adjustable to reduce water flow rate and rinsing pressure as required for controlled cleaning of more sensitive surfaces. See also "Equipment" section of the Product Data Sheet.

5. Repeat steps 1 through 4 above if necessary.

6. Note: Application to surfaces exposed to direct sunlight or high winds may cause rapid drying. When possible, clean when surfaces are shaded from direct sunlight. Wet hot surfaces with fresh water immediately before applying cleaner to remove loose soiling and reduce surface temperature. Do not let cleaner dry on the surface. If drying occurs, lightly wet treated surfaces with fresh water and reapply the cleaner in a gentle scrubbing manner.

3.08 FINAL CLEANING

A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at low pressure.

   1. Do not use metal scrapers or brushes.

   2. Do not use acidic or alkaline cleaners.

B. Wash adjacent woodwork and other non-masonry surfaces. Use detergent and soft brushes or cloths.

C. Clean masonry debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

D. Sweep and rake adjacent pavement and grounds to remove masonry debris. Where necessary, pressure wash surfaces to remove mortar, dust, dirt, and stains.

3.09 PATCHING SCAFFOLDING ANCHOR HOLES

A. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units to match existing color and texture. Patch holes in mortar joints to match existing color and texture. Coordinate work with Scaffolding Subcontractor.

END OF SECTION

DIVISION 5

METALS

SECTION 05120

STRUCTURAL STEEL

PART 1 GENERAL

1.01 DESCRIPTION OF WORK:

A. Extent of structural steel work is shown on drawings, including schedules, notes and details to show size and location of members, typical connections, and type of steel required. This includes steel plates and connection materials and new framing for replacement stairs and loose lintels.

B. Structural steel is that work defined in AISC "Code of Standard Practice" and as otherwise shown on drawings.

1.02 Codes and Standards: Comply with provisions of the following, except as otherwise indicated:

1. AISC "Code of Standard Practice for Steel Buildings and Bridges-Current Edition".

2. AISC "Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design", Current Edition including "Commentary" and Supplements issued thereto.

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

4. AISC "*Seismic Provisions for Steel Buildings*".

5. AWS D1.1 - 2004 "Structural Welding Code" - Steel.

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

7. "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

1.03 SUBMITTALS

A. Product Data: Product data shall be included for structural steel certified mill reports, high-strength bolts (each type), structural steel primer paint, Structural steel top coat paint, welder certifications and expansion/adhesive anchors.

B. Shop Drawings: Submit complete shop drawings indicating the size and arrangement of the members for fabrication and assembly of the structural steel frame.

C. Test Reports: Submit copies of reports of tests.

PART 2 PRODUCTS

2.01 MATERIALS:

A. Structural Steel Shapes, Plates and Bars (U.N.O): ASTM A 36 minimum, higher strength steel is acceptable.

B. Structural Steel Hot Rolled Wide Flange Shapes: ASTM A 992 Grade 50 (ASTM A572 Grade 50 with special requirements per AISC Technical Bulletin #3, dated March 1997)

C. Steel Tube: ASTM A 500, Grade B, Fy = 46 ksi.

D. Steel Pipe: ASTM A 53, Grade B.

E. Anchor Bolts: ASTM A325 Galvanized

F. Anchor Bolts: ASTM F1554, Grade 36, galvanized, unless noted otherwise on drawings.

G. Unfinished Threaded Fasteners: ASTM A 307, Grade A

H. High-Strength Threaded Fasteners: Quenched and tempered medium-carbon steel bolts, nuts and washers, complying with ASTM A325 or ASTM A490.

I. Electrodes for Welding: E70XX and comply with AWS Codes with proper rod to produce optimum weld joint considering material, weld position and size of joint. Electrodes shall be compatible with steel of both connected elements.

J. Steel Coatings for Exterior Exposed Steel: Except where indicated to be primed and painted, Hot Dipped Galvanized per ASTM A123/A123M (latest edition).

K. Drilled Anchors: Expansion and adhesive by HILTI, SIMPSON or POWERS/RAWL as indicated on the drawings.

2.02 FABRICATION:

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

2.03 STRUCTURAL STEEL COATINGS

A. Coordinate coating requirements with the Division 9 of the specifications.

PART 3 EXECUTION

3.01 ERECTION:

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

B. Erection Procedures: Comply with "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

C. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to support imposed loads.

D. Anchor Bolts: Furnish anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.

E. Setting Plates and Base Plates: Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations. Refer to division 3 of the project Specifications for anchor bolt installation requirements in concrete.

F. Field Assembly: Set structural frames accurately to lines and elevations indicated.

G. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors.

H. Paint Damage: Touch up shop applied paint or galvanizing whenever damaged or bare. Clean surface and touch up with shop primer noted and top coat, as required.

I. Field Welded Moment Connections: Backing materials for top and bottom flanges for field welded moment connections shall be removed, backgouge the weld root, and apply a reinforcing fillet weld. Where top flange steel backing materials are utilized, the backing may be left in place and shall be welded with a continuous fillet.

3.02 QUALITY CONTROL:

A. Testing: Owner shall engage an Independent Testing Agency to inspect all high-strength bolted and welded connections, to perform tests and prepare reports of their findings. All connections must pass these inspections prior to the installation of subsequent work which they support.

END OF SECTION

SECTION 054000
EXTERIOR COLD FORMED METAL FRAMING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.

B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF THE WORK

A. Work specified within this Section includes, but is not necessarily limited to, the following:

1. Provide and install steel girt structural framing system at exterior walls as noted on the Drawings.

2. Providing and installing miscellaneous fasteners, hat channels, Z girts, stiffeners, bridging, expansion joints, and accessories necessary to complete the work.

B. Related work specified elsewhere:

1. Section 072413- Metal Wall Panels

1.03 QUALITY ASSURANCE

A. Materials and installation shall conform to recommendations of the following publications:

1. American Iron and Steel Institute Cold-Formed Steel Design Manual, *"Specification for the Design of Cold-Formed Steel Structural Members"*.

2. AWS D1.1 "Structural Welding Code" - Steel.

3. AWS D1.3 "Structural Welding Code" - Sheet Steel.

4. ASTM C 954, Standard specification for steel drill screws for the application of gypsum board or metal plaster bases to steel studs from 0.033 in. to 0.112 in. thickness.

5. ASTM C 955, Standard Specification for Load-Bearing Steel Studs, Runners, and Bracing or Bridging, for Screw Application of Gypsum Board and Metal Plaster Bases.

6. ASTM C 1007 Standard Specification for installation of load bearing steel studs and related accessories.

7. Standard Specification for installation of load bearing steel studs and related accessories.

8. ASCE 7, Lastest "Minimum Design Loads for Building and Other Structures."

9. International Building Code, Edition per local municipality

10. "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

B. Maximum Allowable Deflections: Deflection limitations, (either horizontal or vertical), include the effect of studs only, not sheathing or facing material. Spans are measured in inches between the attachments to structural steel or concrete.

1. Supporting Masonry or Brick Veneer: 1/600 of span or 0.3 inches

2. Supporting Siding: 1/360 of span

C. Design wind pressures: Design wind pressures calculated in accordance with ASCE 7, Latest Edition for Components and Cladding, shall be used in the design of the exterior cold formed steel framing system. Utilize wind speed, importance factor and exposure indicated on the project General Notes.

D. Slip Track Tolerances: Where non-bearing light gage framing abuts the structure, provide a slip joint capable of accommodating the vertical movement of the structure. Slip joint gaps shall allow for 3/4" Live Load deflection of the supporting member. Minimum depth of slip track shall be 2". Minimum thickness shall be 14 gage. Slide clips are also acceptable where applicable.

1.04 SUBMITTALS

A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with this section and Division 1.

B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner's Notice to Proceed.

C. All submittals shall be reviewed and returned to the Architect within 10 working days.

D. Incomplete submittals will not be reviewed.

E. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in Division 1 have been complied with.

F. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.

G. Hardcopy Submittals: Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.

H. Electronic Submittals:

1. Contractor shall include in the submittal schedule an indication of submittals that are intended to be submitted electronically. Upon receipt of the submittal schedule, the Engineer reserves the right to indicate submittals that will not be accepted electronically. Paper copies of such submittals shall be furnished as referenced in this specification.

2. The Engineer reserves the right to require paper copies of submittals that are received electronically. Provide Engineer one (1) paper copies in addition to the electronic submittal. Paper copy will be retained and electronic copy will be returned. Review cycle for such submittals shall not commence until such time that the paper copies are received.

3. Electronic Submittals shall be submitted in Protected Document Format (PDF) compatible with Bluebeam version 12 or later. Electronic files shall not be broken into smaller individual files. File sizes too large to process email or within a file transfer protocol (FTP) site shall be provided on a CD.

4. The submission of submittals electronically does not relieve the contractor of their responsibility to review the submittal prior to transmission to the Engineer. Electronic Submittals shall include contractor comments, and a statement and/or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with. Electronic submittals without the Contractor's approval will be rejected and returned.

5. The Engineer assumes no responsibility for the printed reproduction of submittals reviewed electronically, transmission errors or returned electronic submittals that become corrupted or are otherwise not accessible by the Contractor's or Subcontractor's computer hardware and/or software.

I. Product Data: Submit Manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications.

1. Steel Studs

2. Anchors and anchor bolts

3. Self drilling screws

J. Shop Drawings:

1. Shop Drawing Review: Electronic files of structural drawings **will not** be provided to the contractor for preparation of shop drawings. Reproduction of any portion of the Construction Documents for use as Shop drawings and/or Erection Drawings is prohibited. Shop drawings and/or Erection drawings created from reproduced Construction Documents will be returned without review.

2. General: Submit shop drawings showing the following:

    a. Girt and Stud gages and spacings.

    b. Sizes, gages and fastenings for all built-up members including but not limited to headers and jambs.

    c. Shop Coatings

    d. Type, size, quantity, locations and spacings of all anchorages and self drilling screws.

    e. Details of attachment to structure and adjacent work

    f. Supplemental strapping, bracing, splices, bridging, hat channels and other accessories required for proper installation.

    g. Critical installation procedures.

3. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility.

4. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided and shall include; erection and piece drawings. **Incomplete submittals will not be reviewed.**

K. Design calculations shall be prepared by a Professional Engineer (Specialty Engineer) registered in the State of Maine, illustrating the design of exterior steel stud wall systems including all all necessary stiffeners and bracing connections and anchorage required for a complete structural system.

L. Professional Engineer responsible for design of cold formed framing shall review the installation and submit a correspondence indicating compliance with the design. Review shall include all work. Any discrepancies noted shall be corrected and reviewed by the Engineer prior to the submittal of the correspondence.

1.05 DELIVERY, STORAGE AND HANDLING:

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

B. Deliver anchorage devices, which are to be embedded in cast-in-place, in ample time to not delay work.

C. Store materials to permit easy access for inspection and identification. Keep cold formed members off ground, using pallets, platforms, or other supports. Protect cold formed members and packaged materials from corrosion and deterioration.

D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Materials shall be stored in a manner to avoid ponding of precipitation on members. Repair or replace damaged materials or structures as directed.

PART 2 PRODUCTS

2.01 FRAMING MEMBERS

A. Steel Studs:

1. Acceptable manufacturers: Manufacturer shall be a member of the Steel Stud Manufacturers Association.

2. Engineering of studs is the responsibility of the Specialty Design Engineer referenced in the Submittals Section, and not the Engineer of Record nor the Architect of Record. Any exterior stud size, gage, spacing, bracing and connection information shown on the Contract Documents is schematic only. The Contractor shall provide the studs and built-up sections, engineered by the Specialty Engineer. <u>If studs of a thicker gage or lesser spacing are required by the Specialty Engineer's design, the studs shall be provided at no additional cost to the Owner.</u>

3. Provide channel-shaped load-bearing studs, channel-shaped joists, runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, stiffeners, fasteners, and other accessories recommended by manufacturer for complete framing system

4. Steel framing materials shall comply with ASTM A 446, A 570, or A 611, as applicable. Fabricate all components from structural quality sheet steel with the following minimum yield points:

   a. 16 ga. and heavier 50,000 psi

   b. 18 ga., 33,000 psi

c. 20 ga., 33,000 psi (permitted for bottom track only).

5. Manufacture of studs, runners (track), and other framing members shall comply with ASTM C 955.

6. Framing components shall be galvanized per ASTM A 525, minimum G-60 coating.

B. Screws and other attachment devices:

1. Provide a protective cadmium or zinc plated coating and comply with ASTM A 165 type NS.

2. Self-drilling screws shall comply with the Industrial Fastener Institute Standard for steel self-drilling and tapping screws (IFI-113).

3. Penetration through jointed materials shall not be less than three (3) exposed threads.

C. Standard Steel Shapes: Standard steel shapes, plates, etc. shall conform to material and finish specifications in Division 5 -Miscellaneous Metals.

PART 3 EXECUTION

3.01 INSTALLATION

A. Product Storage: Store studs, joists, track etc. on a flat plane. Material damaged (i.e. rusted, dented, bent or twisted) shall be discarded. Protect adhesives and sealants from freezing.

B. Construction Methods: Construction may be either piece-by-piece (stick-built), or by fabrication into panels either on or off site.

C. Material Fit up: All framing components shall be cut squarely or at an angle to fit squarely against abutting members. Members shall be held firmly in position until properly fastened. Prefabricated panels, if used, shall be square and braced against racking. Provide blocking and strapping within 12” of slip joint and at 8’-0” o.c., or as required for member bracing.

D. Attachment: Components shall be joined by self-drilling screws, so that connection meets or exceeds required design loads. Wire tying of framing components will not be permitted. Field welding will be permitted only where shown on the drawings.

E. Anchorage to Structure: Securely anchor studs and track to floor construction and overhead structure. Provide fasteners at a maximum of 16" on center. Provide slip joints where non-bearing vertical studs meet floor or roof structural steel, or as indicated on the drawings. Provide sill sealer beneath all floor tracks.

F. Welding: Shop and field welds shall conform to applicable AWS and AISI standards, and may be fillet, plug, butt or seam type. Touch-up damage to galvanizing caused by welding with zinc-rich paint.

G. Openings: Frame openings larger than 2 ft. square with double studs. Provide suitable reinforcements (double studs, headers, jack studs, cripples, bracing, etc.) at control joint intersections, corners, and other special conditions.

H. Lintels: Lintels supporting masonry veneer shall be secured to studs by screws or power-driven anchors. Method of anchorage shall be sufficient to support veneer with a factor of safety of 3.0.

I. Tolerances: Finished installation shall be level and plumb within a tolerance of 1/8 inch in 10 feet horizontally and vertically. Maximum deviation from plan or section dimension shall not exceed 1/8 inch. Spacing of studs shall not be more than 1/8 inch from design spacing, providing that cumulative error does not exceed requirements of finishing materials.

END OF SECTION

DIVISION 6

WOOD, PLASTIC AND COMPOSITES

SECTION 061000

ROUGH CARPENTRY

1. GENERAL

1.01 GENERAL CONDITIONS The General Conditions, Supplementary General Conditions and all Sections of Division 1 shall apply to each and every contract and contractor, person or persons supplying material, labor or entering into the work directly or indirectly.

1.02 SCOPE This section includes all labor, materials, equipment and related services necessary for the fabrication, delivery and installation of the work shown on the drawings and or specified herein, including but not limited to the following:

A. Wood blocking and nailers.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Elastomeric Membrane Roofing -075300
B. Aluminum-Framed Storefronts and Windows - 084113

1.04 STANDARDS: All lumber and plywood shall bear grade and trademarks under those rules it is produced, a mark of mill identification and shall conform to the current standards set up by the following Associations:

A. White Pine, Eastern Spruce and Balsam Fir
Northeastern Lumber Manufacturers Association, Inc.

B. Eastern Hemlock
Northeastern Lumber Manufacturers Association, Inc.

C. Southern Pine
Souther Pine Inspection Bureau

D. Douglas Fir, Western Hemlock, Englemann and Western White Spruce
Western Wood Products Association

E. Plywood
American Plywood Association

1.05 QUALITY ASSURANCE:

A. Provide lumber and plywood bearing the grade-trademark of the association under the rules or standards or which it was produced. Grade-trademarks shall conform qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.

1. Grades specified are the minimum acceptable. Lumber grades shall be determined in accordance with ASTM D 245.

2. Lumber shall bear the grade mark of an American Lumber Standards Committee, Board of Review-approved agency. Lumber shall conform to USDC PS 20.

3. Lumber shall bear a mark of mill identification.

4. Plywood shall comply with APA Ref. 1 grading requirements, USDC PS 1, and ANSI A199.1.

1.06 PRODUCT DELIVERY AND STORAGE: All materials delivered to the site shall be so stacked and stored to ensure proper drainage, ventilation and protection from weather. No kiln-dried materials shall be placed in any building until the building is sufficiently dry and authorization has been received from the Architect.

1.07 COORDINATION: Coordinate the work of this Section with the work of other Sections to assure the steady progress of all the work of the Contract.

2. PRODUCTS

2.01 LUMBER

A. Scope: Provide lumber for miscellaneous wood framing, blocking, cant strips, nailers, etc. for all work of the Project, including, but not limited to, windows, storefronts, roofing, flashing, sheet metal work, and the like.

B. Provide new lumber of consistent size, free of stains and mildew, kiln dried to a moisture content of not more than 19% by weight. Where exposed or semi-exposed, provide wood members selected for best possible appearance from the grade of stock specified.

C. Provide lumber in longest practical lengths. Use single length pieces wherever possible.

D. General Carpentry Material Schedule shall be as follows:

Item	Grade	Species
Lumber 2 in. nominal thickness or greater	Construction Grade	Spruce-Pine-Fir
Lumber less than 2 in. nominal thickness	Construction Grade	Spruce-Pine-Fir

E. Pressure Preservative Treated Lumber: Pressure preservative treat lumber above ground and in contact with roofing, flashing, sheet metal, masonry, concrete, dampproofing, and waterproofing in conformance with AWPB LP-2 and AWPA C2. Provide pressure preservative treated lumber with a minimum net retention of 0.25 pcf. Dry Lumber to maximum moisture content of 19% after treatment. Use only waterborne preservatives which conform to AWPA P5. Creosote preservatives are not acceptable.

F. All framing lumber shall be dressed four sides to American Lumber Standards Committee Standards dressed dimensions.

2.02 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: CABO NER-272

D. Wood Screws: ASME B18.6.1

E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M)

F. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM 563M) hex nuts and, where indicated, flat washers.

3. EXECUTION

3.01 GENERAL

A. All framing and structural lumber shall be closely fitted, accurately set to required lines and levels. No splicing unless shown on drawings. Cut framing members and properly reinforce with headers, full depth and with steel anchors where shown on drawings. Brace of place bridging as shown. Block all edges of sheathing joints. Cants, nailers, curbs and plates shall be rigidly bolted down.

B. Structural members whose strength is impaired by improper cutting, drilling or excessive defects shall be replaced or reinforced in a manner acceptable to the Architect.

END OF SECTION

DIVISION 7

THERMAL AND MOISTURE PROTECTION

SECTION 072713

LIQUID APPLIED AIR AND WATER VAPOR BARRIER

PART I GENERAL

1.01 GENERAL REQUIRMENTS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specifications.

1.02 WORK INCLUDED

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Air barrier and transition strips at the following locations.
   a . Air barrier at concrete masonry unit substrate.
   b. Air barrier transition strips to adjacent and penetrating materials at all substrates.

1.03 RELATED REQUIREMENTS

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. CONTRACT AGREEMENT.
2. Section 01300: SUBMITTALS
3. Division 5 Section: COLD FORMED METAL FRAMING
4. Division 6 Section: ROUGH CARPENTRY
5. Division 7 Section: SHEET METAL FLASHING & TRIM

1.04 DEFINITIONS

A. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall or soffit, including joints and junctions to abutting construction, to control air movement through the wall.

1.05 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-retarding air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of scaling substrate expansion and control joints, construction material channetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air Barrier Assembly Air Leakage: Not to exceed 0.03 cfin/sq. ft. of surface area at 1.57 lbf/sq. ft., ASTM E 283.

1.06 SUBMITTALS

A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.

B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside comers, terminations, and tie-ins with adjoining construction.

1. Include details of interfaces with other materials that form part of air barrier.

2. Include details of mockups.

C. Product Certificates: For air barriers, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with air barrier; signed by product manufacturer.

D. Qualification Data: For Applicator.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for air barriers.

1.07 QUALITY ASSURANCE

A. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Pre-installation Conference: Conduct conference at Project site.
1. Include installers of other construction connecting to air barrier, such as roofing, waterproofing, architectural precast concrete, masonry, joint sealants, windows, glazed curtain walls, and door frames.

2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air barrier manufacturer.

B. Remove and replace liquid materials that cannot be applied within their stated shelf life.

1.09 PROJECT CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART2 - PRODUCTS

2.01 AIR BARRIER

A. Fluid-Applied, Vapor-Retarding Membrane Air Barrier: Elastomeric, modified bituminous or synthetic polymer membrane.
   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. Elastomeric Modified Bituminous Membrane:
         1) Carlisle Coatings & Waterproofing; Barriseal.
         2) Henry Company; Air-Bloc 06.
         3) Meadows, W. R., In c.; Air-Shield LM.
         4) Tremco Incorporated; ExoAir.
      b. Synthetic Polymer Membrane:
         1) Grace, W. R. & Co.; Perm-A-Barrier Liquid.
         2) Henry Company; Air-Bloc 21.
         3) Rubber Polymer Corporation-, Rub-R-Wall Airtight.

   2. Physical and Performance Proper-ties:
      a. Membrane Air Permeance: Not to exceed 0.004 cfm x sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
      b. Membrane Vapor Permeance: Not to exceed 0. 1 perm; ASTM E 96

2.02 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid waterborne or solvent-borne primer recommended for substrate by manufacturer of air barrier material.

C. Counterflashing Strip: Modified bituminous 40-mil-thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil-thick, cross-laminated polyethylene film with release liner backing.

D. Butyl Strip at Termination with EPDM or TPO Roofing Membrane: Vapor-retarding, 30- to 40-mil-thick, self adhering; polyethylene-film-reinforced top surface laminated to layer of butyl adhesive, with release liner backing.

E. Modified Bituminous Strip To Cover Cracks and Joints and Terminate Air Barrier to Compatible Roofing Membrane: Vapor-retarding, 40-mil-thick, smooth-surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil-polyethylene film with release liner backing.

F. Termination Mastic: Cold fluid-applied elastomeric-liquid; trowel-grade.

G. Joint Reinforcing Strip: Air barrier manufacturer's glass-fiber-mesh tape.

H. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

I. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0187 inch thick, and Series 300 stainless-steel fasteners.

J. Sprayed Polyurethane Foam Sealant to Fill Gaps at Penetrations and Openings: I - or 2 component, foamed -in -place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft. density; flame spread index of 25 or less according to MTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

K. Modified Bituminous Transition Strip to Seal Air Barrier Terminations with Glazing Systems: Vapor-retarding, 40-mil-thick, smooth-surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil-thick polyethylene film with release liner backing.

L. Preformed Silicone-Sealant Extrusion to Seal Air Barrier Terminations with Glazing Systems: Manufacturer's standard system consisting of cured low-modulus Silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100150 (low-modulus) silicone sealant for bonding extrusions to substrates.
    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. Dow Coming Corporation, 123 Silicone Seal.
b. GE Silicone, UltraSpan US 1100.
c. Pecora Corporation, Sil-Span. d. Tremco, Incorporated, Spectrem EZ Simple Seal. e. Or approved equal.

M. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use

N. Comply with Section 07 92 00 - JOINT SEALANTS.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
3. Verify that concrete is visibly dry and -free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
4. Verify that masonry joints are flush and completely filled with mortar.
5. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SURFACE PREPARATION

A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.

B. Mask off adjoining surfaces not covered by air barrier 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 in concrete with substrate-patching membrane.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. 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 modified bituminous strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch

G. Bridge and cover isolation joints expansion joints and discontinuous deck-to-wall and deck-to-deck joints with overlapping modified bituminous strips.

H. At changes in substrate plane, apply sealant or termination mastic beads at sharp comers and edges to form a smooth transition from one plane to another.
   1. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.03 INSTALLATION OF FLUID-APPLIED AIR BARRIER MEMBRANE

A. Apply air barrier membrane to form a seal with strips and transition strips and to achieve a continuous air barrier according to air barrier manufacturer's written instructions.

B. Apply air barrier membrane within manufacturer's recommended application temperature ranges.

C. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Re-prime areas exposed for more than 24 hours.
   1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

D. Apply a continuous unbroken air barrier to substrates according to the following minimum thickness. Apply membrane in full contact around protrusions such as masonry ties.
   1. Vapor-Retarding Membrane Air Barrier: 60-mil dry film thickness.

E. Apply strip and transition strip a minimum of I inch onto cured air membrane or strip and transition strip over cured air membrane overlapping 3 inches onto each surface according to air barrier manufacturer's written instructions.

F. Do not cover air barrier until it has been inspected by Owner's agent,

G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.05 FIELD QUALITY CONTROL

A. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
   1. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.

2. Continuous structural support of air barrier system has been provided.
3. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
4. Site conditions for application temperature and dryness of substrates have been maintained.
5. Maximum exposure time of materials to UV deterioration has not been exceeded.
6. Surfaces have been primed.
10. Compatible materials have been used.
11. Transitions at changes in direction and structural support at gaps have been provided.
12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

3.06 CLEANING AND PROTECTION

A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
   1. Protect air barrier from exposure to UV- light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed to these conditions for more than 30 days.

   2. Protect air barrier from contact with creosote, uncured coal-tar products, TPO, EPDM, flexible PVC membranes, and sealants not approved by air barrier manufacturer.

B. Clean spills, stains, and soiling from adjacent construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 074213

METAL WALL PANELS

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. Drawings, Contract Conditions, and other Technical Specifications Sections apply to work of this Section insofar as applicable.

1.02 WORK INCLUDED

A. This Section includes

1. Factory Formed: concealed fastener, metal wall panels

2. Finish must comply conform to the “Metal Construction Association Certified Premium Painted™” designation.

1.03 RELATED REQUIREMENTS

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. CONTRACT AGREEMENT.

2. Section 01300: SUBMITTALS

3. Division 5 Section: COLD FORMED METAL FRAMING

4. Division 6 Section: ROUGH CARPENTRY

5. Division 7 Section: SHEET METAL FLASHING & TRIM

1.04 PERFORMANCE REQUIREMENTS

A. General: Provide metal wall panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.

B. System shall meet performance criteria as installed. Either test data or signed and sealed engineering calculations shall document the performance of the panel system to meet design loads required.

1. Wind Loading: Design and size components to withstand dead and live loads

caused by wind pressures as follows:

2. Positive pressure: 28.6 psf at corner zone / 28.6 psf at field zone normal to panel

3. Negative pressure: 38.4 psf at corner zone / 31 psf at field zone normal to panel.

D. Maximum Deflection under Design Loads:

1. 1/180 of span

E. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at a static-air-pressure difference of 6.24lbf/sq. ft.

F. Water Penetration: No water penetration when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.

1.05 SUBMITTALS

A. Product Data: Manufacturer's current product specifications and installation instructions.

B. Shop Drawings: Include small-scale elevations, as required. Show details of trim and flashing conditions, fastening and anchorage methods, weatherproofing techniques, terminations, and penetrations.

C. Samples:

1. Selection Samples: Submit actual metal chips with full range of colors available for Architect's selection.

2. Verification Samples: Submit two samples of each type of metal panel required, not less than 12 inches (305mm), and illustrating finished panel profile.

D. Product Test Reports: Submit copies of test reports or load tables verifying performance capability of panel system:

1. Metal Wall Panels: Include reports for UL 790/ASTM E 108, ASTM E 283, ASTM E 331, Field Tested, ASTM E 84 Flame Spread Rating, Paint Performance Tests.

2. Fastener test and pull-out calculations

3. Load tables

4. Maintenance Data

1.06 QUALITY ASSURANCE

A. Installer: Company specializing in the type of work required for this project, with not less than 2 years of documented experience.

B. Pre-Installation meeting: Convene meeting not less than one week prior to beginning installation between general contractor, installing contractor, owner's representative and manufacturer.

1.07 DELIVERY, STORAGE & HANDLING

A. Do not deliver materials of this section to project site until suitable facilities for storage and protection are available.

B. Protect materials from damage during transit and at project site. Store under cover, but sloped to provide positive drainage. Do not expose materials with strippable protective film to direct sunlight or extreme heat.

C. Do not allow storage of other materials or allow staging of other work on installed metal panel system.

D. Upon receipt of delivery of metal panel system, and prior to signing the delivery ticket, the installer is to examine each shipment for damage and for completion of the consignment.

1.08 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish Warranty Period: 30 years from date of Substantial Completion.

B. Special Installer's Warranty: Specified form in which Wall Installer agrees to repair or replace components of custom-fabricated sheet metal wall that fail in materials or workmanship within 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer's Qualifications: All panels are to be factory formed and packaged per job requirements.

1. Manufacturer shall have a minimum of ten (10) years experience in the factory fabrication of metal wall panels.

2. Manufacturer must be certified to ISO 9001:2008 with design.

B. Specification is based upon the products of ATAS International, Inc. No other manufacturer of metal wall systems shall be accepted as an alternate product without prior written approval. These substitution requests must meet specifications and must be submitted a minimum of ten (10) days prior to date of bid.

C. Coordinate with insulation requirements as noted by Architect.

D. Secondary framing members as required for load criteria and wind requirements.

2.02 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

A. Concealed-fastener, Lap seam Metal Wall Panels: Provide factory-formed metal wall panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation

B. Flush-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and between panel edges; with flush joint between panels. Panel to be completely flat without intermediate stiffening ribs

1. Basis-of Design Product: ATAS International, Inc.; Design Wall™ - DWF

2. Available Manufacturers:
   a. ATAS International, Inc.
   b. Berridge Manufacturing Co.
   c. Fabral
   d. Englert, Inc.
   e. MBCI
   f. AEP Span

3. Material: Aluminum - .040 thick
   a. Texture: Smooth

b. Finish: KYNAR 5000® PDVF or HYLAR 5000® Finish
c. Color: Premium color to be chosen later

4. Panel Coverage: 12"

5. Panel Height: 1-1/8"

6. Panel Application Orientation: Vertical.

2.03 FABRICATION

A. Panels:

1. Panels to be Factory fabricated in a controlled environment.

2. Panels to be tension leveled during roll forming process.

3. Panels to be produced in longest lengths possible, except when modular units are utilized.

B. Form all components true to shape, accurate in size, square and free from distortion or defects. Cut panels to precise lengths indicated on approved shop drawings or as required by field conditions.

C. Accessories: Factory fabricates trim and flashing components in standard 12-foot lengths.

1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.

2. Fabricate wall panels as required to maintain fabrication tolerances and to withstand design loads.

D. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

E. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

F. Panels, fabrication and installation shall meet the requirements of the Metal Construction Association Preformed Metal Wall Guidelines

PART 3 - EXECUTION

3.01 PREPARATION

A. Field Measurements

1. Field measurements should be taken by the installer for verification of dimensional correctness in relationship to original plans, prior to providing manufacturer with a bill of material.

B. Delivery, Storage and Handling

1. Do not deliver materials of this section to project site until suitable facilities for storage and protection are available.

2. Protect materials from damage during transit and at project site. Store under cover, but sloped to provide positive drainage. Do not expose materials with strippable protective film to direct sunlight or extreme heat.

3. Do not allow storage of other materials or allow staging of other work on installed metal panel system.

4. Upon receipt of delivery of metal panel system, and prior to signing the delivery ticket, the installer is to examine each shipment or damage and for completion of the consignment.

C. Sequencing and Scheduling

1. Installer shall coordinate with general contractor as to scheduled delivery time after receipt of field verified bill of material by manufacturer as it relates to actual project scheduling.

3.02 METAL WALL PANEL INSTALLATION, GENERAL

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Field cutting of metal wall panels by torch is not permitted.

2. Rigidly fasten metal wall panels and allow for thermal expansion and contraction as required by the panel manufacturer. Pre-drill panels as required.

3. Install screw fasteners.

4. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.

5. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing and material compatibility.

6. Provide weatherproof seals for pipe and conduit penetrating exterior walls.

B. Fasteners: Use fasteners of size and length as required for compatibility with substrate.

1. Aluminum Wall Panels: Use stainless-steel fasteners or metallic coated fasteners for surfaces exposed to the exterior and aluminum or galvanized steel fasteners for surfaces exposed to the interior.

2. Concealed fasteners shall have a high performance coating

3. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal wall panel manufacturer.

4. Coat back side of aluminum wall panels with bituminous coating where wall panels will contact wood, ferrous metal, or cementitious construction.

C. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies.

3.03 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete sheet metal roofing assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

2. Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual" and NRCA Waterproofing Manual. Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3. Panels, fabrication and installation shall meet the requirements of the Metal

Construction Association Preformed Metal Wall Guidelines.

B. Coordinate with installation of:

1. Cold Formed Metal Framing, as noted in Section 5
2. Rough Carpentry, as noted in Section 6
3. Sheet Metal Flashing and Trim, as noted in Section 7
4. Metal Copings, as noted in Section 07 71 13

3.04 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed. Maintain in a clean condition during construction.

B. Protection:

1. Provide as required completed work of this section will be without damager or deterioration at date of substantial completion.

C. Touch up minor abrasions with matching paint provided by panel manufacturer. Remove and replace panels that cannot be satisfactorily touched up. See Metal Construction Association Technical Bulletin #95-1051.

D. Sweep and remove chips, shavings and dust from roof on a daily basis during installation period. Leave installed work clean, free from grease, finger marks and stains. Remove all protective masking from material immediately after installation of product.

E. Upon completion of installation, remove scraps and debris from project site.

F. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt and sealant.

END OF SECTION

SECTION 075300

ELASTOMERIC MEMBRANE ROOFING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS The General Conditions, Supplementary General Conditions and all Sections of Division 1 shall apply to each and every contract and contractor, person or persons supplying material, labor or entering into the work directly or indirectly.

1.02 SCOPE This section includes all labor, materials, equipment and related services necessary for the fabrication, delivery and installation of the work shown on the drawings and or specified herein, including but not limited to the following:

B. FSR flashings to tie together new siding and existing EPDM Roof system as described in the drawings.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Wood nailers, blocking and plywood. 061000

B. Sheetmetal flashing. 076200

1.04 QUALITY ASSURANCE:

A. Applicator shall have applied accepted roofing system on two or more projects which have been completed in the last five years.

1.05 WARRANTY: The primary manufacturer of the roofing system shall provide the owner with a ten year written membrane and flashing's warranty covering full cost of labor and materials, subject to terms and conditions stipulated by the manufacturer. The original copy of the warranty shall be delivered to the owner when the job is completed and all parties have been paid. In addition, a separate twenty year Material Only Warranty shall be provided by the primary manufacturer of the EPDM sheeting. Warranties from fabricator's agents or installers will not constitute compliance with these warranty requirements.

1.06 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data installation instructions and maintenance recommendations for each type of roofing product required. Include data substantiating that materials comply with requirements.

B. Shop Drawings: Submit shop drawings for all work of this Section, as follows:
1. Shop drawing requirements will not be waived. Work installed without prior approval of shop drawings is subject to rejection by Architect without further cause.

2. FSR system: Submit complete shop drawings of roof configurations and sheet layout, details a perimeter, and all special conditions.

1.07 DELIVERY AND STORAGE: Materials shall be delivered in their original containers, clearly labeled with manufacturer's name, brand name, and such identifying numbers as are appropriate. Adhesives shall be stored between 60 and 80 degrees F. Should they be exposed to lower temperatures, restore to room temperature for three to five days prior to use. Do not use materials damaged in handling and storage.

1.08 PREPARATION OF SURFACES: Surfaces on which the Roofing System is to be applied shall be clean of all loose stone and foreign materials. Before beginning work, a representative of the roof membrane manufacturer shall examine the roof deck and surfaces in order to insure that the deck is acceptable. Commencement of the work of this section on any deck surface shall constitute acceptance thereof, and any reworking of the deck after the work has been completed shall be at the expense of the roofing contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

A. FSR Membrane:
   1. Adhered Roofing Membrane: Shall be EPDM .060 in. thick, Carlisle Sure Seal, Goodyear Versigard or approved alternate. Comply with ASTM D 3253, Type II, except that heat aging value shall be 210% minimum; 0.045 in. thick minimum; maximum water vapor permeability of 2.0 per mils as determined by ASTM E 96, Procedure BW; Shore A hardness of 60-80; 1400 psi minimum tensile strength; 250% elongation; ultraviolet and ozone resistant; low temperature brittleness of -40° F (-40° C) maximum; manufacturer's standard color.
   2. Membrane Flashing: Shall be Carlisle Elastoform Flashing or Goodyear Neo-Flash uncured neoprene 0.060 in. thick, or approved alternate.
   3. Adhesives: Manufacturers standard adhesives and sealants.
   4. Prefabricated Accessories (Pipe Seals, etc.): Shall be furnished by roof membrane manufacturers.

PART 3 - EXECUTION

3.01 INSPECTION OF SUBSTRATE

A. Installer must examine substrate surfaces to receive FSR roofing system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.02 GENERAL INSTALLATION REQUIREMENTS (FSR SYSTEM):

A. Cooperate with inspection and test agencies engaged or required to perform services in connection with FSR system installation.

B. Protect other work from spillage of adhesive and other materials, prevent liquid materials from entering or clogging drains and conductors. Replace, restore other work damaged by installation of FSR system work.

3.04 INSTALLATION OF FSR SYSTEMS:

A. Preparation: Inspect substrate. Remove glass, aggregate, dirt, other foreign matter. Drive flush all projecting nails or other fasteners. Leave substrate clean, smooth and level, and complying with FSR manufacturer's requirements.

B. Flashing: Flash edges of membrane, projections through the roof and changes in roof planes. Complete the splice between the flashing and the membrane before bonding the flashing to vertical surfaces. Seal splice a minimum of 3" on each side of the fasteners which attach the membrane to nailers. Nail the installed flashing at the top of the flashing a maximum of 12" on center under metal counterflashing or cap, unless otherwise indicated.

C. Pipe Seals: Use factory prefabricated pipe seals where possible. If "Witch-Hat" pipe seals are used, augment with fully adhered neoprene pipe flashing.

D. Membrane, Fully-Adhered System: Solvent Welded Systems: Lay and position on properly prepared insulation and allow to relax for 30 minute minimum or longer as recommended by FSR manufacturer. Fold sheet back 5' so that half of the underside of the sheet is exposed. Sheet fold shall be smooth without wrinkles or buckles. Apply bonding adhesive evenly, without globs or puddles, with a 9" plastic core paint roller. Do not apply bonding adhesive to the splice area. Adhesive shall be firmly applied to both the sheet and the substrate. One gallon of bonding adhesive, applied correctly, will cover 60 sq. ft. of finished surface at moderate temperature. Allow adhesive to dry until it is tacky, but will not string or stick to a dry finger touch. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down bonded half of the sheet with a push broom to achieve maximum contact. Fold back the unbonded half of the sheet and repeat the bonding procedure. Install adjoining sheets in the same manner, lapping edges a minimum of 3". Locate direction of lap such that water flows over lap. Membrane joints shall be free of wrinkles (fishmouth). Clean mating surfaces of joints. Remove adhesive on splice edges with solvents and make joints watertight. Secure membrane at roof perimeter and penetrations. Cover nails fastening membrane to grid nailer with 6" wide strips of elastomeric flashing. Inspect joints over length after completion and reseal defective areas prior to being covered by ballast. Remove any damaged areas of membrane, lapping underlying membrane by at least 3" on all sides. Mechanically fasten membrane to nailers using roofing nails.

E. Cutoffs: Provide cutoffs if work is ended before weatherproofing the roof by end of working day or when inclement weather threatens. Straighten insulation using loose laid cut sheets and seal membrane to the roof deck. Pull membrane free or cut to expose the insulation when resuming work, and remove cut insulation sheets used for fill in.

3.05 PROTECTION OF ROOFING: Upon completion of roofing work (including associated work), Roofer shall advise Contractor of recommended procedures for surveillance and protection of roofing during remainder of construction period. At end of construction period, or at a time when remaining construction work will in no way affect or endanger roofing (at Contractor's option), Roofer shall make a final inspection of roofing and prepare a written report (to Contractor with copy to Owner) describing nature and extent of deterioration of damage found in the work.

A. Roofer shall repair or replace (as required) deteriorated or defective work found at time of final inspection. Roofer shall be engaged by Contractor to repair damages to roofing which occurred subsequent to roofing installation and prior to final inspection. Repair or replace the roofing and associated work to a condition free of damage and deterioration at time of Substantial Completion.

END OF SECTION

SECTION 076200

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

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

1.02 DESCRIPTION OF WORK:

A. The extent of each type of flashing and sheet metal work is indicated on the drawings and by provisions of this Section.

B. The types of work specified in this section include the following:

1. Metal counter flashing; and base flashing (if any).

2. Metal wall-flashing and expansion joints.

4. Drip edges.

5. Metal pan window sills, head and jamb trims.

5. Miscellaneous sheet metal accessories.

C. Integral masonry flashings are specified as masonry work in sections of Division 4.

1.03 SUBMITTALS:

A. Product Data; Flashing, Sheet Metal, Accessories: Submit manufacturer's product specifications, installation instructions and general recommendations for each specified sheet material and fabricated product.

B. Samples; Flashing, Sheet Metal, Accessories: Submit samples of specified sheet materials to be exposed as finished surfaces.

1. Submit 12" long, completely finished units of specified factory-fabricated products exposed as finished work.

C. Shop Drawings; Flashings, Sheet Metal, Accessories: Submit shop drawings showing layout, joining, profiles, and anchorages of fabricated work, including major counter flashings, trim/fascia units, gutters, downspouts, scuppers and expansion joint systems; layouts at 1/4" scale, details at 3" scale.

1.04 JOB CONDITIONS:

A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of the work and protect of materials and finishes.

PART 2 - PRODUCTS

2.01 FLASHING AND SHEET METAL MATERIALS:

A. Sheet Metal Flashing/Trim:

1. Aluminum: ASTM B 209, alloy 3003, temper H14, AA- C22A43 color as specified by Owner; 0.032" thick (20 gage) except as otherwise indicated.

B. Miscellaneous Materials and Accessories:

1. Fasteners: Same metal as flashing/sheet metal or, other noncorrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.

2. Bituminous Coating: FS TT-C-494 or SSPC - Paint 12, solvent type bituminous mastic, nominally free of sulphur, compounded for 15-mil dry film thickness per coat.

3. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

4. Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, non-corrosive, size and gage required for performance.

5. Roofing Cement: ASTM D 2822, asphaltic.

6. Solder: For use with steel or copper, provide 50 - 50 tin/lead solder (ASTM B 32), with resin flux.

2.02 FABRICATED UNITS:

A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown, and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels as indicated, with exposed edges folded back to form hems.

B. Seams: Fabricate nonmoving seams in sheet metal with flat- lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.

C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used, or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1" deep, filled with mastic sealant (concealed within joints).

D. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with industry standards.

E. Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

F. Shop Finish, Rain Drainage: Provide manufacturer's standard baked-on white acrylic shop finish on sheet metal rain drainage units (gutters, downspouts, and similar exposed units); 1.0 mil dry film thickness.

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS:

A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations, and with SMACNA "Architectural Sheet Metal Manual". Anchor units of work securely in place my methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints and seams which will be permanently watertight and weatherproof.

B. Underlayment: Where stainless steel or aluminum is to be installed directly on cementitious or wood substrates, install a course of paper slip sheet and a course of polyethylene underlayment.

C. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.

D. Install beehive type strainer-guard at conductor heads, removable for cleaning downspouts.

3.02 CLEANING AND PROTECTION:

A. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.

B. Protection: Installer shall advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction, to ensure that work will be without damage or deterioration, other than natural weathering, at time of substantial completion.

END OF SECTION

SECTION 079200

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes sealants for the following applications, including those specified by reference to this Section:
   1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
      a. Control and expansion joints in cast-in-place concrete.
      b. Control and expansion joints in unit masonry.
      c. Joints between different materials listed above.
      d. Perimeter joints between materials listed above and frames of doors and windows.
      e. Other joints as indicated.
   2. Exterior joints in the following horizontal traffic surfaces:
      a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
      b. Joints between different materials listed above.
      c. Other joints as indicated.
   3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
      a. Control and expansion joints on exposed interior surfaces of exterior walls.
      b. Perimeter joints of exterior openings where indicated.
      c. Vertical control joints on exposed surfaces of interior unit masonry walls and partitions.
      d. Perimeter joints between interior wall surfaces and frames of interior doors, and windows.
      e. Joints between plumbing fixtures and adjoining walls, floors, and counters.
      f. Other joints as indicated.
   4. Interior joints in the following horizontal traffic surfaces:
      a. Control and expansion joints in cast-in-place concrete slabs.
      b. Other joints as indicated.

1.2 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Warranties: Special warranties specified in this Section.

1.4 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: 20 years from date of Substantial Completion.

C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
   1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
   2. Disintegration of joint substrates from natural causes exceeding design specifications.
   3. Mechanical damage caused by individuals, tools, or other outside agents.
   4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, 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. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   1. Sealants: 250 g/L.
   2. Sealant Primers for Nonporous Substrates: 250 g/L.
   3. Sealant Primers for Porous Substrates: 775 g/L.

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified in the Elastomeric Joint-Sealant Schedule to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Low-Modulus Nonacid-Curing Silicone Sealant: Applications: Exterior above grade control and expansion joints in vertical surfaces, joint sizes from a minimum of 1/4" wide to 3" wide, joint depth per manufacturers requirements:
   1. Control joints in concrete, concrete masonry units, and expansion joints in brick masonry and general use building sealant. Provide products complying with the following:
      a. Products: Provide one of the following:
         1) 790; Dow Corning.
         2) Spectrem 1; Tremco.
      b. Type and Grade: S (single component) and NS (nonsag).
      c. Class: 25.
      d. Movement Capability: 100 percent movement in extension and 50 percent movement in compression for a total of 150 percent movement.
      e. Stain-Test-Response Characteristics: Non-staining to porous substrates per ASTM C 1248. Manufacturer to provide 20 year non-staining warrantee based on substrate testing.
      f. Warranty: Manufacturer to provide 20 year weather-seal warranty.

D. Medium-Modulus Neutral-Curing Silicone Sealant: Applications: Exterior above grade perimeter joints in vertical surfaces; Joint sizes from a minimum of 1/4" wide to 3" wide, joint depth per manufacturers requirements:
   1. Perimeter joints around aluminum curtain walls and storefronts, aluminum clad windows, and painted steel door frames, metal louvers, and between brick and concrete masonry, and siding. Provide products complying with the following:
      a. Products: Provide one of the following:
         1) 795; Dow Corning.
         2) 791: Dow Corning.
         3) Silglaze II, GE Silicones.
         4) 864; Pecora Corporation.
      b. Type and Grade: S (single component) and NS (nonsag).
      c. Class: 25.
      d. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
      e. Warranty: Manufacturer to provide 20 year weather-seal warranty.

E. Mildew Resistant Silicone Sealant: Where joint sealants of this type are indicated provide products complying with the following:

1. Products: Provide one of the following:
   a. 786; Dow Corning
   b. Sanitary 1700; GE Silicones.
   c. 898 Silicone Sanitary Sealant; Pecora Corporation.
   d. PSI-611; Polymeric Systems, Inc.
   e. Tremsil 600 White; Tremco.
2. Type and Grade: S (single component), and NS (nonsag).
3. Class 25
4. Additional Movement Capability: 50 percent movement in extension and 50 percent movement in compression for a total of 100 percent movement.
5. Applications:
   a. Use for sealing interior joints with non-porous substrates in wet areas with ceramic tile or epoxy paint around sinks, and between equipment or counters and non-porous walls.

F. Multicomponent Pourable Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
1. Products: Provide one of the following:
   a. Chem-Calk 550; Bostik Inc.
   b. Vulkem 245; Mameco International.
   c. NR-200 Urexpan; Pecora Corporation.
   d. Sikaflex - 2c SL; Sika Corporation.
   e. SL 2; Sonneborn Building Products Div., ChemRex Inc.
   f. THC-900; Tremco.
2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Applications:
   a. Joints in exterior and interior concrete slabs on grade.
   b. Joints in existing concrete slabs on grade.
   c. At penetrations to new and existing slabs on grade.

2.4 LATEX JOINT SEALANTS

A. Latex Sealant Standard: Comply with ASTM C 834 for each product of this description indicated.

B. Latex Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
1. Products: Provide one of the following.
   a. Chem-Calk 600; Bostik Inc.
   b. NuFlex 330; NUCO Industries, Inc.
   c. LC 160 All Purpose Acrylic Caulk; Ohio Sealants, Inc.
   d. AC-20; Pecora Corporation.
   e. PSI-701; Polymeric Systems, Inc.
   f. Sonolac; Sonneborn Building Products Div., ChemRex, Inc.
   g. Tremflex 834; Tremco.

2. Applications: Interior joints in field painted vertical and overhead joints not indicated otherwise below.

2.5 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Backer Rod: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
1. Type C: Closed-cell material with a surface skin.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested

and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
   a. Concrete.
   b. Masonry.
   c. Unglazed surfaces of ceramic tile.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
   a. Metal.
   b. Glass.
   c. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where indicated and recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
   1. Apply primer on all porous surfaces such as exterior masonry, granite or precast concrete.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless 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. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of sealant backings.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

E. Install sealants by proven techniques to comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses provided for each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
   1. Remove excess sealants from surfaces adjacent to joint.
   2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
      a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

3.6 WASTE MANAGEMENT

A. Separate waste in accordance with the Waste Management Plan.

B. Close and seal tightly all partly used sealant containers and store protected in well-ventilated, fire-safe area at moderate temperatures.

C. Place used sealant tubes and containers in areas designated area for hazardous materials.

END OF SECTION

DIVISION 8

OPENINGS

SECTION 084113

ALUMINUM-FRAMED STOREFRONTS & WINDOWS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS, which are hereby made a part of this Section of the Specification.

1.02 WORK INCLUDED

A. Section Includes:

1. Exterior storefront framing, with vision glass
2. Exterior framed windows (fixed and side swing) with vision glass
3. Weatherstripping

1.03 RELATED REQUIRMENTS

A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 01300: SUBMITTALS
2. Division 6 Section: ROUGH CARPENTRY
3. Division 7 Section: SHEET METAL FLASHING & TRIM

1.04 DEFINITIONS

A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.05 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Movements of supporting structure including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.

2. Dimensional tolerances of building frame and other adjacent construction.

3. Failure includes the following:

   a. Deflection exceeding specified limits.
   b. Thermal stresses transferring 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 by thermal and structural movements.
   e. Loosening or weakening of fasteners, attachments, and other components.
   f. Sealant failure.
   g. Failure of operating units.

B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite 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 L/360 of clear span or 1/8 inch, whichever is smaller.

D. Structural-Test Performance: Provide aluminum-framed 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 Durations: As required by design wind velocity, but not fewer than 10 seconds.

E. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbs/sq. ft.

F. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 8 lbs/sq. ft..

1. Maximum Water Leakage: No uncontrolled water penetrating aluminum-framed systems or water appearing on systems' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.

G. Thermal Movements: Provide aluminum-framed 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 deg F, ambient; 180 deg F, material surfaces.

a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
b. Low Exterior Ambient-Air Temperature: 0 deg F.

2. Interior Ambient-Air Temperature: 75 deg F.

H. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.

I. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.40 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

1.06 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.

1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.

2. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

D. Delegated-Design Submittal: For aluminum-framed systems 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. Detail fabrication and assembly of aluminum-framed systems.

2. Include design calculations.

E. Seismic Qualification Certificates: For aluminum-framed systems**,** accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.

G. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

H. Warranties: Sample of special warranties.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project and has a minimum of three years of documented experience.

B. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.

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 revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

D. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

E. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.

F. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.

1. Notify Architect of details or specifications not conforming to code.

G. Pre-installation Conference: Conduct conference at Project site.

1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.

2. Review structural loading limitations.

3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

4. Review use of Rivnuts for hardware.

5. Review sill flashing details and components.

1.08 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.09 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship 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 through fixed glazing and framing areas.
e. Failure of operating components.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

1. Kawneer North America; an Alcoa company.

2. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.

B. Products:

1. Exterior Aluminum-Framed Storefronts Standard of Design:

a. Kawneer: TriFab VG 451 Center Glazed (non-thermal) 4 ½” deep x 2” face width

b. Vistawall: FG 3000 Center Glazed (non-thermal) 4 ½” deep x 2” face width

2.02 MATERIALS

A. Recycled Content of Aluminum Products: Provide products with average recycled content of aluminum products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. 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, Profiles, and Tubes: ASTM B 221.

3. Extruded Structural Pipe and Tubes: ASTM B 429.

4. Structural Profiles: ASTM B 308/B 308M.

5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

C. Steel Reinforcement: Manufacturer's standard zinc-rich, 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 1008/A 1008M.

3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.03 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken.

2. Glazing System: Retained mechanically with gaskets on four sides.

3. Glazing Plane: Center.

4. Exterior Jambs and Head Framing: Provide manufacturer’s standard extruded aluminum continuous flat filler for use at jambs and head framing. This extrusion provides the necessary profile for sealing with the building air barrier system. Channel type jamb components will not be acceptable.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.

2. Reinforce members as required to receive fastener threads.

3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system, fabricated from stainless steel.

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.

E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

F. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

G. Subsills for Exterior Storefronts: Manufacturer’s standard thermally broken extruded aluminum sill flashing, color to match framing.

1. Provide subsills at every opening configured to accommodate adjacent construction. Subsills shall extend the full width of the opening and be fitted with end dams installed on site. Seal all joints to create a continuous pan that will prevent water from entering the wall system. Provide weeps as required to direct water to the exterior.

2.04 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

2.05 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."

1. Provide interior sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

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.

2.06 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. 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 descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.

2. Accurately fitted joints with ends coped or mitered.

3. Means to drain water passing joints, condensation 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 maintain required glazing edge clearances.

6. Provisions for field replacement of glazing from exterior.

7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Storefront Framing: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.

F. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.07 ALUMINUM FINISHES

A. Finish

1. Organic: Finish all exposed areas of aluminum windows and components with Fluoropolymer coating. Color shall be selected from all standard and premium color options

AA Description	Description	AAMA Guide Spec.
AA-M12-C42-R1X	70% PVDF Ultrapon™	2605-98

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.02 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 nonmovement joints.

5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.

6. Seal joints watertight unless otherwise indicated.

7. Install sill flashings. Installed turned up end dams and seal all joints to create water tight dam.

8. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

9. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

10. Touch up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by 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. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Division 08 Section "Glazing."

G. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

3.03 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:

1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.

2. Alignment:
   a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
   b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.04 ADJUSTING

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.

END OF SECTION 084113

SECTION 088000

GLAZING

PART 1 - GENERAL

1.01 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. Windows.
   2. Storefront framing.

1.02 DEFINITIONS

A. Manufacturer: A firm that produces primary glass or fabricated 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 insulating 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.

1.03 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
   1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements or as indicated in the glazing schedules:

a. Specified Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour (meters per second) at 33 feet (10 m) above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure," based on mean roof heights above grade indicated on Drawings.
b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
   1) Load Duration: 60 seconds or less.
c. Maximum Lateral Deflection: For the following types of glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch (25 mm), whichever is less.
   1) For monolithic-glass lites heat treated to resist wind loads.
   2) For insulating glass.

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.04 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples: For the following products, in the form of 12-inch- (300-mm-) square Samples for glass.
   1. Wired glass.
   2. Insulating glass for each designation indicated.

C. Glazing Schedule: Use same designations indicated in this section for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

E. Warranties: Special warranties specified in this Section.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations for Insulating Glass: Obtain insulating-glass units from one manufacturer using the same type of glass and other components for each type of unit indicated.

C. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

D. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.
   1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

E. 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.

F. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
   1. GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."

H. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency:
   1. Insulating Glass Certification Council.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
   1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F (4.4 deg C).

1.08 WARRANTY

A. General Warranty: Special warranties 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. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass manufacturer agreeing to furnish replacements for insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
   1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following products:
   1. Float and Heat Treated Glass:
      a. Ford Motor Co., Glass Div.
      b. Globe Amerada Glass Co.
      c. Guardian Industries Corp.
      d. Interpane Glass Company
      e. Pilkington Sales (North America) Limited.
      f. Southwall Technologies.
      g. Viracon, Inc.
   2. Wire Glass:
      a. Ashai Glass Co./Ama Glass Corp.
      b. Central Glass Co., Ltd.
      c. Nippon Sheet Glass Co., Ltd.
      d. Pilkington Glass Ltd.

2.02 PRIMARY FLOAT GLASS

A. Clear Float Glass: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select); Class 1 (clear), 1/4 inch (6 mm) thick.

2.03 HEAT-TREATED FLOAT GLASS

A. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

B. Clear Tempered Float Glass: ASTM C 1048; Type I (transparent glass, flat); Quality q3 (glazing select); Class 1 (clear), Kind FT (fully tempered), 1/4 inch (6 mm) thick.

C. Tempered Patterned Glass: ASTM C 1048, Kind FT (fully tempered), Type II (patterned flat glass), Class 1 (clear), Form 3 (patterned); and of quality, finish, and pattern specified.
   1. Provide medium sand blast pattern for Obscure Glass.

2.04 WIRED GLASS

A. Wired Glass: ASTM C 1036, Type II (patterned and wired glass, flat), Class 1 (clear), Quality q8 (glazing); 6.4 mm thick; of form and mesh pattern indicated below:
   1. Polished Wired Glass: Form 1 (wired, polished both sides), and as follows:
      a. Mesh m1 (diamond).

2.05 INSULATING GLASS

A. Insulating-Glass Units: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article.
   1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article.
   2. Provide Kind FT (fully tempered) where safety glass or tinted glass is indicated.

B. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated in the this article are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.

C. Sealing System: Dual seal, with primary and secondary sealants as follows:
   1. Polyisobutylene and silicone.

D. Spacer Specifications: Manufacturer's standard spacer material and construction.

E. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
   1. Aluminum with mill or clear-anodized finish.
   2. Desiccant: Molecular sieve or silica gel, or blend of both.
   3. Corner Construction: Manufacturer's standard corner construction.

F. Insulating Glass: Where glass of this designation is indicated, provide uncoated insulating-glass units complying with the following:
   1. Overall Unit Thickness and Thickness of Each Lite: 16 and 3 mm; 25 and 6 mm.
   2. Interspace Content: Air.
   3. Indoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.
   4. Outdoor Lite: Type I (transparent glass, flat) float glass.
      a. Class 1 (clear).

2.06 ELASTOMERIC GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:
   1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
   2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range for this characteristic.

B. Elastomeric Glazing Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied, chemically curing sealant, including those referencing ASTM C 920 classifications for type, grade, class, and uses.
1. Additional Movement Capability: Where additional movement capability is specified in the Glazing Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements in ASTM C 920 for uses indicated.

C. Low-Modulus Nonacid-Curing Silicone Glazing Sealant: Where glazing sealants of this designation are indicated, provide products complying with the following:
1. Products: Available products include the following:
a. 790; Dow Corning.
b. Silpruf; GE Silicones.
c. 864; Pecora Corporation.
d. Omniseal; Sonneborn, Div of ChemRex, Inc.
e. Spectrem 1; Tremco.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Additional Movement Capability: 50 percent movement in extension and 50 percent movement in compression for a total of 100 percent movement.
5. Applications: Wet sealant installations.

2.07 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

2.08 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:

1. Neoprene.
2. EPDM.
3. Silicone.
4. Thermoplastic polyolefin rubber.
5. Any material indicated above.

2.09 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.10 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:
1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

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

3.02 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.03 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where the length plus width is larger than 50 inches (1270 mm) as follows:
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
   2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.04 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until just before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.05 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.06 PROTECTION AND CLEANING

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION

DIVISION 9

FINISHES

SECTION 09900

PAINTS AND COATINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK

A. Work included: Provide labor, materials, and equipment necessary to complete the work of this Section and, without limiting the generality thereof, furnish and include the following:

1. Cleaning and painting the following areas:

a. Concrete and CMU walls and floors.

b. Steel plates, angles, stair framing, railings and lintels and misc steel.

1.03 RELATED SECTIONS

A. Section 03310 – Concrete Repair

B. Section 03370 – Shotcrete

C. Section 04230 – Reinforced Unit Masonry

D. Section 05120 – Structural Steel

1.04 REFERENCES

A. SSPC-SP 1 - Solvent Cleaning

B. SSPC-SP 2 - Hand Tool Cleaning

C. SSPC-SP 3 - Power Tool Cleaning

D. SSPC-SP 6 – Commercial Blast Cleaning

E. EPA-Method 24

F. OTC-Regulation No. 41

1.05 SUBMITTAL

A. Submit under provisions of Section 01300, Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each paint and coating product should include:

1. Product characteristics

2. Surface preparation instructions and recommendations

3. Primer requirements and finish specification

4. Storage and handling requirements and recommendations

5. Application methods

C. Selection Samples: Submit a complete set of color chips that represent the full range of manufacturer's color samples available.

D. Verification Samples: For each finish product specified, submit samples that represent actual product, color, and sheen.

1.06 MOCKUP

A. Finish surfaces for verification of products, colors, & sheens

B. Finish area designated by Engineer.

C. Provide samples that designate prime & finish coats

D. Do not proceed with remaining work until the Engineer approves the mock-up samples.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufacturer’s name, label, and the following list of information:

1. Product name, and type (description)

2. Application & use instructions

3. Surface preparation
4. VOC content
5. Environmental issues
6. Batch date
7. Color number

B. Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.

C. Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

1.08 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not apply coatings under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. PPG Pittsburgh Paint, www.ppgpaints.com

B. The Sherwin-Williams Company, www.sherwin-williams.com

2.02 SCHEDULE

A. Concrete and CMU

1. Semi-Gloss Finish

a. 1st Coat: Primer: Loxon Conditioner Clear by Sherwin Williams or 3210 Gripper by PPG Pittsburgh Paints

b. 2nd Coat: Pro Industrial High Performance Acrylic by Sherwin Williams or Breakthrough by PPG Pittsburgh Paints.

c. 3rd Coat: Pro Industrial High Performance Acrylic by Sherwin Williams or Breakthrough by PPG Pittsburgh Paints.

B. Interior/Exposed Steel

1. High Gloss Finish

a. 1st Coat: Macropoxy 646 Fast Cure Epoxy by Sherwin Williams or Amerlock Sealer by PPG Pittsburgh Paints

b. 2nd Coat: Macropoxy 646 Fast Cure Epoxy by Sherwin Williams or Amercoat 235 by PPG Pittsburgh Paints

c. 3rd Coat: Hi-Solids Polyurethane by Sherwin Williams or Amercoat 450H Polyurethane Gloss Aliphatic by PPG Pittsburgh Paints

2.03 ACCESSORIES:

A. Coating Application Accessories:

1. Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required, per manufacturer's specifications.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of coatings until substrates have been properly prepared. Notify Engineer of unsatisfactory conditions before proceeding.

B. If substrate preparation is the responsibility of another installer, notify Engineer of unsatisfactory preparation before proceeding.

C. Proceed with work only after conditions have been corrected, and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.

3.02 SURFACE PREPARATION

A. The surface must be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint or other contamination to ensure good adhesion. Concrete and mortar must be cured at least 30 days at 75 degrees F. The pH of the surface should be between 6 and 9 unless the products are designed to be used in high pH environments.

B. Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow the surface to dry 48 hours before painting. Wear protective glasses or goggles, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.

C. Sand blast all existing coatings from the surface to be prepared including CMU walls and existing steel. Reference paint manufacturer technical date for required surface profile.

D. No exterior painting should be done immediately after a rain, during foggy weather, when rain is predicted, or when the temperature is below 50°F, unless products are designed specifically for these conditions.

E. Methods:

1. Steel: Smart Strip paint remover by Dumond Chemicals, Inc. (212-869-6350), www.dumondchemicals.com or Engineer approved equal. Follow Manufacturer's requirements for preparation, application, removal, and clean up.

3.03 INSTALLATION

A. Prior to paint application, provide a 2 square foot test area at three separate locations as determined by the owner or their representative. Test area to determine compativliity and adhesion between existing surface and new fresh paint. Allow paint to fully cure prior to adhesion testing.

B. Apply all coatings and materials in accordance with manufacturer's specifications. Mix and thin coatings according to manufacturer's recommendation.

C. Do not apply to wet or damp surfaces.

D. Apply coatings using methods and at rates recommended by manufacturer.

E. Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.

F. Apply coatings at spreading rate required to achieve the manufacturer's recommended dry film thickness.

G. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

H. Inspection: The coated surface must be inspected and approved by the Engineer just prior to each coat.

3.04 PROTECTION

A. Protect finished coatings from damage until completion of project.

B. Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

END OF SECTION

END OF PACKAGE