# PROJECT MANUAL & SPECIFICATIONS

Project:

## Greenwich Condominiums

### EXTERIOR WALL REPAIR PROJECT

**1470 NE 123rd Street**
**North Miami, FL 33161**


O&S ASSOCIATES
ENGINEERS & ARCHITECTS
CONSULTING ENGINEERS

145 Main St. 2nd Floor
Hackensack, NJ 07601
201.488.7144
www.OandSassociates.com

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SECTION 00 11 16 - INVITATION TO BID

## INVITATION TO BID

Greenwich Condominiums is inviting interested parties to bid on the prime contract related to the Exterior Envelope Repair Project

**Project**: Greenwich Condominiums Exterior Envelope Repair Project

**Scope:**

1. Stucco Patch Repairs @ Exterior Wall
2. Stucco Patch Repairs @ Balcony Slab Overhead
3. Stucco Crack Repairs
4. Concrete Balcony Slab Edge Repairs
5. Vertical Concrete Repairs
6. Guardrail Post Repairs @ Base
7. Guardrail Fastener Repairs
8. Exterior Wall Coating

**Bid Due Date**: September 05, 2022.

**Mandatory Pre-Bid Walk Through**: August 18,2022 at 3:00PM

**BIDDER'S NAME _____**

SECTION 00 20 00 - BID FORM

# GREENWICH CONDOMINIUMS
# EXTERIOR ENVELOPE REPAIR PROJECT

1470 NE 123rd St.
North Miami, FL 33161

TO: Greenwich Condominium Community
1470 NE 123rd St.
North Miami, FL 33161

ATTN: Jorge Hernandez, LCAM (Greenwichmanager@outlook.com)

FROM: (Bidder) _____

(Address) _____

(City, State, Zip) _____

Operating as *(strike out conditions that do not apply)* an individual, a company, a corporation organized and existing under the law of the State of _____, or a proprietorship, a partnership, or joint venture consisting of _____. Bidder (is/is not) registered to do business in the State of Florida.

The undersigned declares that he has successfully completed projects similar in magnitude, conditions and scope under similar conditions throughout the past 5 years as demonstrated in the attached Qualifications Statement.

The undersigned hereby declares that he has carefully examined all bidding and contract documents, and hereby proposes and agrees to provide all supervision, labor, materials, plant, equipment, transportation and other facilities as necessary and/or required to execute all the work described by the aforesaid documents for the restoration of the referred project, for the lump sum consideration of (BASE BID TOTAL):

_____ DOLLARS

($_____ Dollars)

**The sum of work items above includes all applicable taxes.**

**BIDDER'S NAME _____**

COMPLETE TABLE - *Refer to Section 00 43 22 "Unit Quantity Work" for specific requirements.*

| W.I. # | Description | Contract Quantity | Units | Unit Price | | Extension |
|---|---|---|---|---|---|---|
| | | | | | | |
| | **GENERAL CONDITIONS:** | | | | | |
| 1.1 | Mobilization/Demobilization/Generation Conditions (Maximum 6%) | 1 | LS | | = | $ |
| 1.2 | Permits/Expediter | - | - | | = | Direct Cost |
| 1.3 | Sidewalk Shedding, scaffolding, and Work Area Protection | 1 | LS | | = | $ |
| 1.4 | Payment and Performance Bonds | 1 | LS | | = | $ |
| | | | | ***SUBTOTAL*** | **=** | ***$*** |
| | **EXTERIOR FAÇADE & BALCONIES:** | | | | | $ |
| 2.1 | Stucco Patch Repairs @ Exterior Wall | 1,000 | SF | | = | $ |
| 2.2 | Stucco Patch Repairs @ Balcony Slab Soffit | 2,000 | SF | | = | $ |
| 2.3 | Stucco Crack Repairs | 550 | LF | | = | $ |
| 2.4 | Concrete Repair Around Rail Posts Base | 35 | EA | | = | $ |
| 2.5 | Misc. Guardrail Fastener Repairs | 50 | EA | | = | $ |
| 2.6 | Concrete Balcony Slab Edge Repairs | 15 | LF | | = | $ |
| 2.7 | Partial Depth Concrete Repairs | 600 | SF | | = | $ |
| 2.8 | Elastomeric Coating | 6,000 | SF | | = | $ |
| | | | | | | |
| | | | | | | |
| | | | | ***SUBTOTAL*** | **=** | ***$*** |
| | | | | | | |
| | | | | **TOTAL COST OF BASE BID** | **=** | ***$*** |

*Approximate quantities for Lump Sum work items are NOT guaranteed as not to exceed. Contractor is responsible for full scope of work as described in Section 00 43 22 and/or shown on drawings. All work items include furnishing and installation. Contractor is responsible for confirming any quantities prior to Bid Execution.*

**CONSTRUCTION TIME**

The undersigned agrees to commence work under this Contract on or before a date to be specified in a written "Notice to Proceed", and proposes to substantially complete all work in:

_____ Calendar Days

**BIDDER'S NAME _____**

_____ Anticipated Construction Start Date

GENERAL REQUIREMENTS

The bidder shall, before submitting his Proposal, carefully examine the Contract Documents. He shall inspect in detail the site of the proposed work and familiarize himself with all the local conditions affecting The Work and the detailed requirements of construction. If his Proposal is accepted, he will be responsible for all errors in his Proposal resulting from his failure or neglect to comply with these instructions or errors in judgment arising from said inspections of the work site and examination of the Contract Documents. The Engineer and/or the Owner will, in no case, be responsible for any losses or change in Contractor's anticipated profits resulting from such failure or neglect.

If the bidder finds any language in the Contract inconsistent, vague or difficult to understand or interpret, for any reason, he shall request clarification in writing from the Engineer or Owner not less than 7 working days prior to the scheduled dates for response thereto in writing to all bidders known to the Owner. Unless the bidder seeks clarification in accordance with this paragraph, he will be deemed to have waived his rights, if any he had, to object to said Contract language as vague or misleading for any reason.

When the plans and Special Provisions include information pertaining to surface observations, material testing and other preliminary investigations, such information represents only the opinion of the Engineer as to the location, character, or quantity of the materials encountered and is only included for the convenience of the bidder. The Owner/Engineer assumes no responsibility whatever in respect to the sufficiency or accuracy of the information, and there is no guarantee, either expressed or implied, that the conditions indicated are accurate or that unanticipated developments may not occur. Said information shall not be considered by the parties as a basis for the Contract award amount.

The Bidder agrees that adequate time was allowed the bidder to inspect all work sites and, unless express written request has been made, the Engineer/Owner will be presumed to have supplied the bidder all the information and access required to adequately complete the Proposal.

The estimated quantities of work to be done and materials to be furnished under these Specifications are given in the Proposal. All quantities are to be considered as approximate and are to be used only for comparison of bids and as a basis for computing amounts of bid bonds, payments bonds and performance bonds to be furnished. The unit and lump sum prices to be tendered by the bidders are to be for the scheduled quantities as they may be increased or decreased. Payments will be made to the Contractor only for the actual quantities of work performed and materials furnished in accordance with the Plans and Specifications. The scheduled quantities may each be increased or diminished or entirely deleted. Such changes may become necessary for the best interest of the project due to circumstances not known at the time the Contract was entered into or arising thereafter. In the event, in the sole judgment of the Owner or its representative such changes become necessary, the lump sum and unit prices set forth in the Proposal and embodied in the Contract shall remain valid.

Work acceptance is to be made by the Engineer. Any extra work beyond the scheduled quantities requiring additional cost to the Owner shall be approved by the Owner prior to taking such action. Claims for extra work which have not been authorized in writing by the Owner and approved by the Engineer will be rejected and the Contractor shall not be entitled to payment thereof.

Bidders must submit a copy of their GAF Master Elite Certificate along with this bid form.

RIGHT TO REJECT BIDS AND SIGNING CONTRACTS

In submitting this Proposal, it is understood that the right is reserved by the Owner to reject any and all bids. If written notice of acceptance of this bid is mailed, telegraphed or delivered to the undersigned within ninety (90) days after the opening thereof, or at any time thereafter before this bid is withdrawn by written notification, the undersigned agrees to execute and deliver a Contract in the prescribed form.

**BIDDER'S NAME** _____

## CONTRACTOR'S QUALIFICATION STATEMENT

SUBMITTED TO:

| |
|---|
| |
| |
| |
| |

SUBMITTED BY:

Firm: _____

Address: _____

City: _____

State: _____

Zip: _____

Phone: _____

PROJECT: _____

_____

HAS FIRM EVER WORKED FOR THIS OWNER ON OTHER PROJECTS? Yes ☐ No ☐

TYPE OF FIRM:

☐ Corporation ☐ Partnership ☐ Individual ☐ Other (provide explanation)
☐ Closed Shop ☐ Open Shop ☐ Minority Business Enterprise
☐ Woman Owned Business Enterprise

Type of MBEWBE certification: _____

If your organization is a corporation, answer the following:

Date of incorporation: _____

State of incorporation: _____

President's name: _____

Vice-president's name(s): _____

Secretary's name: _____

Treasurer's name: _____

If your organization is a partnership, answer the following:

Date of organization: _____

Type of partnership (if applicable): _____

Name(s) of general partner(s): _____

If your organization is individually owned, answer the following:

Date of organization: _____

Name of Owner: _____

Years in business as Contractor under present firm name: _____

Under what other or former names has your organization operated?

_____

_____

Number of Employees: _____ Office: _____ Field: _____

TYPE OF WORK:

**BIDDER'S NAME** _____

| | | | |
|---|---|---|---|
| Structural Restoration | ☐ | Masonry Restoration | ☐ |
| Waterproofing/Roofing | ☐ | Other | ☐ |
| General Construction | ☐ | | |

_____
(Please specify)

PROJECT MANAGERS, FIELD SUPERINTENDENTS AND CONSTRUCTION EXPERIENCE:

| Name: | Title | Yrs w/ Firm | Yrs Experience |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
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| | | | |
| | | | |
| | | | |
| | | | |

(use explanations section for additional space if needed)

OFFICERS, PARTNERS OR OWNERS AND CONSTRUCTION EXPERIENCE:

| Name: | Title | Yrs w/ Firm | Yrs Experience |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

FIVE LARGEST STRUCTURAL RESTORATION AND WATERPOOFING PROJECTS COMPLETED IN LAST FIVE YEARS:

| Project | Owner's Representative & Phone Number | Contract Amount |
|---|---|---|
| | | $ |
| | | $ |
| | | $ |
| | | $ |
| | | $ |

FIVE LARGEST PROJECTS COMPLETED IN LAST FIVE YEARS:

| Project | Owner's Representative & Phone Number | Contract Amount |
|---|---|---|
| | | $ |
| | | $ |
| | | $ |
| | | $ |
| | | $ |

| | | |
|---|---|---|
| Average annual billing for last five years: | $ | |
| Last year's billing: | $ | |
| Last year's billing for structural concrete repairs and waterproofing: | $ | |

**BIDDER'S NAME** _____

Average annual billing for structural concrete repairs and waterproofing: $ _____

MAJOR PROJECTS UNDER CONTRACT:

| Project | % Complete & Completion Date | Arch/Engr | Contract Amount |
|---|---|---|---|
| | | | $ |
| | | | $ |
| | | | $ |
| | | | $ |
| | | | $ |
| | | | $ |
| | | | $ |
| Total projects under contract: (including those not listed above) | | | $ |

CURRENT PROJECTS ON WHICH FIRM IS A CANDIDATE FOR CONTRACT AWARD:

_____

_____

_____

_____

_____

_____

HAS FIRM EVER FAILED TO COMPLETE A CONTRACT? Yes ☐ No ☐

HAS ANY OFFICER, PARTNER OR OWNER OF FIRM EVER BEEN AN OFFICER, PARTNER OR OWNER OF ANOTHER FIRM WHEN IT FAILED TO COMPLETE A CONTRACT? Yes ☐ No ☐

HAS FIRM HAD ANY SUB-CONTRACTOR FAIL TO COMPLETE A CONTRACT IN LAST FIVE YEARS? Y No ☐

ARE THERE ANY JUDGMENTS, CLAIMS, ARBITRATION PROCEEDING OR SUITS PENDING OR OUTSTANDING AGAINST FIRM OR ITS OFFICERS? Yes ☐ No ☐

HAS FIRM BEEN A PARTY TO ANY LAWSUITS IN LAST FIVE YEARS? Yes ☐ No ☐

(if answer to any of above questions is yes, provide explanation)

REFERENCES:

**BIDDER'S NAME** _____

Banks: Account Numbers:

Agent Phone Number

Insurance Company:

Bonding Company:

Suppliers:

Other:

FINANCIAL STATEMENT:

C.P.A. Firm:

Attach a financial statement, preferably audited, including your organization's latest balance sheet and income statement showing the following items: assets, debts, and unencumbered net worth.

Is the attached financial statement for the identical organization named on page one? Yes ☐ No ☐

If not, explain the relationship and financial responsibility of the organization whose financial statement is provided (e.g., parent-subsidiary).

THE ANSWERS TO THE FOREGOING QUESTIONS AND ALL STATEMENTS HEREIN CONTAINED ARE TRUE AND CORRECT

Firm:

By: Signature:

**BIDDER'S NAME** _____

Title: Date:

_____ _____

(corporate seal) Attest: _____

EXPLANATIONS: _____

**BIDDER'S NAME _____**

The undersigned hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the Owner in verification of the recitals comprising this Statement of Bidder's Qualifications.

State of _____County of _____

_____ being duly sworn, deposes and says that he is_____ of _____ and that the answers to the foregoing questions and all statements therein are true and correct.

Subscribed and sworn to before me this _____ day of _____, 20____.

_____
(Notary Public)

_____

My commission expires: _____

**BIDDER'S NAME _____**

BID GUARANTEE

The information in this proposal is correct to the best information, knowledge and belief of the undersigned.

_____
Contractor

_____
Signature

_____
Title

_____
Witness

_____
Address

State of _____, County of_____.

On this _____ day of _____, 20__ before me personally known who did depose and say that he of_____, The Corporation/Partnership/Individual described in and which executed the foregoing instrument and that such instrument is duly on behalf of

_____
Notary Public

END OF FORM OF BID

Owner: Greenwich Condominium Community
1470 NE 123rd St.
North Miami, FL 33161

Engineer: O&S Associates, Inc.
2500 Hollywood Blvd
Suite 212
Hollywood, FL 33020

Project: Greenwich Condominiums
Exterior Envelope Repair Project

GENERAL

1.1 RELATED DOCUMENTS

A. The following list composes the Contract Documents:
1. Invitation to Bid (Section 00 11 16)
2. Instructions to Bidders (Section 00 21 13)
3. Bid Form (Section 00 41 13)
4. Agreement Form (AIA A101)
5. General Conditions (AIA A201)
6. General Requirements (01 00 00)
7. Technical Specifications
8. Drawings

B. Proposals to be entitled to consideration must be made in accordance with the following instructions:
1. Owner reserves right to award contract in his best interests; to reject any and all Bids; to waive any informalities in Bidding when such waiver is in the best interest of the Owner; and to hold Bids, which shall remain in force and effect, not less than ninety (90) days after date for receipt of Bids.
2. By submitting a Bid, Contractor acknowledges that he has visited the site, examined work areas, understands site constraints, project permit requirements, scope of work and specifications for the project. Any deviations, discrepancies and omissions from drawings and specifications or site conditions found during bidding different from those described in the contract documents (Drawings and Specifications) shall be brought to the attention of the Engineer for immediate resolution and to send written instructions to all bidders. Neither Owner nor Engineer will be responsible for any oral instructions. Lack of such notification to the Engineer will indicate that the bidder considers the documents to be sufficiently complete to prepare a bid for complete installation including all necessary accessory parts.
3. The drawings and specifications shall be considered to be cooperative and anything appearing in the specifications which may not be indicated on the plans, or vice versa, shall be considered as part of the contract and must be executed by the contractor the same as though indicated by both.
4. Before submitting a proposal, bidders should carefully examine the drawings and specifications: Check all schedules, visit the site, fully inform themselves as to all

existing conditions and limitations and shall include in the proposal a sum to cover the cost of all items included in that part.

5. Any addenda issued during the time of bidding shall be taken into account in preparing proposals, and shall become a part of the contract documents.
6. Wherever in the contract documents, a particular article, material, device, form of construction, fixtures, etc., is shown or specified, such article, material, device, form of construction, fixture, etc., shall be known as standard. All PROPOSALS SHALL BE BASED ON STANDARDS SPECIFIED, and where two or more are named, bidders may bid on any so named. The Contractor is responsible for any extra cost due to changes required by substitutions or selection of any other than the first named product. Alternates for bid items are not allowed unless approved by the Engineer prior to Bidding.
7. The Bid Form shall contain a construction sequence conforming to contract documents identifying beginning and completion of construction activities. The sequence shall indicate winter mobilization and spring mobilization, as required.
8. The Contractor shall obtain Bonds and Permits as required by the contract documents.
9. Bidders should be aware time, as well as money, are of the essence and both shall be considered during bid evaluation.

1.2 BID SUBMITTALS:

A. BID Forms shall be made upon the form provided in the Project Manual, and all blank spaces shall be fully filled; numbers shall be stated both in writing and figures; the signature shall be in long hand; and the completed form shall be without interlineations, alteration or erasure.

B. Submission

1. Single hard copy of bid forms shall be addressed to and delivered to in care of

   Greenwich Condominiums
   1470 NE 123rd St.
   North Miami, FL 33161

   ATTN: Jorge Hernandez (Greenwichmanager@outlook.com)

   no later than the date specified in the invitation to bid correspondence. The following shall be noted on the outside of the sealed envelope.

   " Greenwich Condominiums Exterior Envelope Repair Project"

2. Electronic copy shall be submitted to the following, no later than the date and time stated above.

   TO: Jorge Hernandez (Greenwichmanager@outlook.com)

   CC: Alma Liriano (aliriano@oandsassociates.com)

Proposal shall be properly signed as follows:

3. When a CORPORATION, with the name of the corporation, signature of an officer or other person properly authorized to enter into obligations for it and his title.
4. When a PARTNERSHIP, with name of partnership and signature of one of the partners.
5. When SOLE PROPRIETORSHIP, with his signature.

1.3 PRE-BID MEETING:

A. A mandatory Pre-bid conference will be held at:
1. Date: August 18,2022.
2. Time: 3:00 PM
Location: Greenwich Condominiums
1470 NE 123rd St.
North Miami, FL 33161

1.4 SCHEDULE OF CONSTRUCTION:

A. The successful Contractor, prior to start of work, shall submit a schedule of activities for each day during the entire repair period for approval by Owner and Engineer.

1.5 STARTING AND COMPLETION TIME:

A. Work shall start within ten days after the notification of the award of the Contract.

B. Bid Proposal shall include estimate of number of consecutive calendar days needed to complete the project.

1.6 MISCELLANEOUS:

A. All (local, state, and federal) laws, codes, ordinances, and regulations pertaining to this class or type of construction shall be obeyed in regard to preparation of bids, letting of contracts, and complete installation of work.

1.7 CONSTRUCTION CONTRACT ADMINISTRATION:

A. Successful bidders shall furnish to the Engineer, at the time of signing the Contract, the following:
1. List of Sub-Contractors
a. Division of Work
b. Amount of Sub-Contract
c. Firm Name
d. Address
e. Telephone Number
f. Representative
2. List of Major Material Suppliers:
a. Division of Work

b. Amount of Material Purchase Order
c. Firm Name
d. Address
e. Telephone Number
f. Representative

3. Contract Cost Breakdown:
   a. Shall be provided on AIA Form G-702A.

B. Indemnity and Insurance by the Contractor:
1. The Contractor shall provide insurance to completely indemnify, defend, protect, and save harmless to the full extent of the law, the Owner, the Engineer, and agents and employees of any of them, from any and all losses, liens, claims, suits, judgments, and proceedings of whatever nature arising out of the conduct of the work or performance of this contract.
2. All insurance that will be required to be maintained by the Contractor shall be in the minimum amounts and for the coverage specified herein and with such insurance companies as approved by the Owner. Insurance companies must be licensed to do business in the state of New Jersey.
3. All insurances shall protect the Owner, the Engineer, agents and employees of any of them and the Contractor, and any sub-contractors, from any losses, claims, suits and judgments, from claims set forth below which may arise out of or result from the operations of the Contractor under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor, or by a sub- contractor, by anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable:
   a. Claims under worker's compensation, disability benefit, and other similar employee benefit, acts which are applicable to the work to be performed;
   b. Claims for damages because of bodily injury, sickness, or disease, or death of the employees of the Contractor;
   c. Claims for damages because of bodily injury, sickness, or disease, or death of any person other than the employee of the Contractor;
   d. Claims for damages insured by usual personal liability coverage which are sustained (1) by a person as a result of an offense directly or indirectly related to employment of such person by the Contractor, or (2) by another person;
   e. Claims for damages, other than to the work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
   f. Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance, or use of a motor vehicle; and
   g. Claims involving contractual liability insurance applicable to the obligations of the Contractor under indemnity provisions.
4. The Contractor shall furnish acceptable endorsements for the Following:
   a. Worker's or Workmen's Compensation:
      1) State: Statutory
      2) Applicable Federal: Statutory
      3) Employer's Liability: One million ($1,000,000) Dollars.
   b. Comprehensive General Liability (including Premises-Operations; Independent Contractor's Protective; Products and Completed Operations; Broad Form Property Damage; Blanket Contractual Liability; and Personal Injury):

1) Bodily Injury and Property Damage: Single Limit - One Million ($1,000,000) Dollars.

2) Property Damage Liability Insurance shall provide explosion (X), collapse (C), and underground (U) coverage, as applicable.

c. Comprehensive Automobile Liability:

1) Bodily Injury and Property Damage: Single Limit - One Million ($1,000,000) Dollars.

d. Umbrella excess Liability: Four million ($4,000,000) Dollars over Primary Insurance.

5. Certificate of Insurance shall state that they are Primary Insurance, where applicable, and shall name the Owner, Engineer, and agents and employees of any of them, as additional insured. Certificates of Insurance shall state that they shall not be canceled, modified, or changed in status except upon (60) days written notice to all named insured. NO CONTRACT SHALL BE BINDING UPON THE OWNER, OR WORK COMMENCED, UNTIL ALL INSURANCE CERTIFICATES HAVE BEEN FILED WITH AND APPROVED BY THE OWNER, INCLUDING INSURANCE CERTIFICATES FROM ALL SUB-CONTRACTORS.

C. Application for Payment:

1. The Contractor shall furnish, free of charge, the necessary blank copies of AIA Form G-702 and G-702A for his applications for Payment.
2. Partial payments made as the work progresses shall in no way be considered as an acceptance of any portion of the labor or material embraced in the contract.
3. Material delivered at the site and approved by the Engineer and included in a certified estimate for partial payment shall become the property of the Owner and in no case shall such materials be removed from the site. However, if such material is stolen, destroyed or damaged by casualty before being used, the contractor will be required to replace it at his own expense. Storage of materials shall comply with the manufacturer's instructions or recommendations.
4. The Contractor, upon receipt of payment, shall reimburse each sub-contractor for labor and materials for which the contractor has received payment from the Owner. The contractor, upon receipt of payment, shall pay each material supplier for materials for which the contractor has received payment from the Owner.
5. Contractor's requests for payment shall normally be submitted by the Contractor once a month.
6. During the course of work, a retainage of ten (10%) percent will be withheld from work performed, until the satisfactory completion of all work in the Contract.
7. All materials delivered on the site shall be paid for at the rate of 90 percent of the invoiced value of the material.
8. During the course of construction, payment on estimates approved by the Engineer and filed with the Owner shall be made within 30 days.
9. Evidence, satisfactory to the Owner, may be required to show that all current obligations relating to the work are satisfied before releasing any payment due on the work. Before payment of the final estimate, each contractor shall file an affidavit with the Owner, stating that monetary obligations relating to lienable items in connection with this work have been fulfilled. When the major portion of the project is substantially completed and occupied, or in use, or otherwise accepted and there exists no other reasons to withhold retainage, the retained percentages held in connection with such portion will be released from escrow and paid to the Contractor, withholding only that amount necessary to assure

completion. The balance of funds will be paid to the Contractor within thirty days from the date of completion and after acceptance by the Engineer and Owner. Provided, however, that nothing in this Contract shall be construed to create an obligation or incur a liability against the Owner in excess of the encumbrances issued to support this Contract.

10. Payment for materials stored, but not installed, may require the Engineer to visit the Contractors place of storage for verification of all items on the Contractor's certificate. He shall certify that the items are in agreement with the specifications, and approved their incorporation into the project.

D. Progress Schedule:

1. The Progress Schedule required by the Owner shall be based on starting construction within 10 days after the notification of the award of the contract and completion of the Project as stipulated in the Contract. After contract is awarded, a meeting shall be held, to be attended by representatives of the General Contractor and all affected Subcontractors, the Engineer, and the Owner's Representative, to work out a definite schedule to be followed for starting and completing each Phase of the work.

1.8 CONTACTS:

A. In order to assist those invited to submit a proposal and their prospective subcontractors, the following sources are available for consultation:

1. Jason Borden Jborden@oandsassociates.com (239) 294-1944

END OF SECTION

SECTION 00 43 22 - UNIT QUANTITY WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Contract Documents, including General and Supplementary Conditions included in the contract and Division 1 Specification Sections, apply to work of this Section.

1.2 SECTION INCLUDES

A. Measurement and payment criteria applicable to portions of the Work performed under a unit price payment method.

B. Defect assessment and non-payment for rejected work.

1.3 AUTHORITY

A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.

B. The Engineer will verify measurements and quantities and will have final authority in the event of conflict.

1.4 MEASUREMENT OF QUANTITIES

A. The Contractor shall assist the Engineer by providing any and all necessary equipment, workers, and survey personnel as required to lay out or measure the unit quantity work at no additional cost.

B. Measurement Devices:
   1. Weigh Scales: Inspected, tested and certified by the applicable State Weights and Measures department within the past year.
   2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.
   3. Metering Devices: Inspected, tested and certified by the applicable State department within the past year.

C. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.

D. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.

E. Measurement by Area: Measured by square dimension using mean length and width or radius.

F. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

G. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

## 1.5 PAYMENT

A. Payment Includes: Full compensation for all required labor, Products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

B. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Engineer multiplied by the unit sum/price for Work which is incorporated in or made necessary by the Work.

## 1.6 NON-PAYMENT FOR REJECTED PRODUCTS

A. Payment will not be made for any of the following:
   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from the transporting vehicle.
   4. Products placed beyond the lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   6. Loading, hauling, and disposing of rejected Products.

## 1.7 UNIT QUANTITIES SPECIFIED

A. Contract Sum will be deemed to include for all Unit Quantity Work amount equal to sum of established unit prices for each separately identified item of Unit Price Work times estimated quantity of each item as indicated in the Bid Form and/or Schedule of Values.

B. Estimated quantities of items of Unit Price Work are not guaranteed and are solely for purpose of comparison of Bids and determining initial Contract Sum. Owner reserves right to increase or decrease quantities at same unit cost, as required by job conditions. Review and approval of actual quantities and classifications of Unit Price Work performed by Contractor will be by The Engineer.

C. The Engineer shall have right under contract to make increases and decreases in quantities and changes in plans, as may be necessary to ensure completion of contemplated work.

1.8 UNIT PRICES

A. Contractor shall provide a Unit Price for each work item, based on the unit of measurement specified.

B. Lump Sum Work Items designated by the method of payment on Bid Form shall include the extent of work shown on, or reasonably inferred by, the drawings or the following "Work Item Descriptions". Contractor shall be responsible to field verify the location and extent of work.

1. Quantities for Lump Sum work items shown on drawings are approximate and shall be field verified by Contractor prior to placing bid.

C. Each Unit Price shall include cost of all labor, materials, tools, equipment and incidentals necessary to complete the work. These costs include, without limitation, layout, shop drawings and submittals, sundries, scaffolding and protection, trucking, disposal of waste, mobilization, cleaning, supervision, insurances, taxes, overhead, profit, permits, and any and all other costs directly or indirectly associated with the work.

1.9 PAYMENT

A. Progress payments on account of Unit Price Work will be based on number of units completed

B. The Engineer will review and approve actual quantities and determine classification of Unit Price Work performed by Contractor. The Engineer will review Contractor's preliminary determinations on such matters before rendering written decision thereon (by recommendation of Application for Payment or otherwise). The Engineer's written decisions thereon will be final and binding upon Owner and Contractor, unless, within ten days after date of any such decision, either Owner or Contractor delivers to other party to Agreement and to The Engineer written notice of intention to appeal from such decision.

C. Each unit price will be deemed to include amount considered by Contractor to be adequate to cover Contractor's general conditions, supervision, overhead and profit for each separately identified item.

1.10 SUBMITTALS

A. The contractor shall prepare a record drawing to document all Unit Quantity work, including Lump Sum work items monthly as a basis of evaluating the applications for payment. The record drawing shall include the following:

1. The location and extent of each unit quantity work item completed.
    a. Each location of unit quantity work shall be labeled with a sequential number unique to that location.
2. A legend to designate each work item shown on drawing.
3. A tabular "Work Item Log" that provides a breakdown and sum of all completed unit quantity work. The Work Item Log shall include:
    a. Measurements and sums for each repair location itemized by Work Item and labeled with its unique sequentially numbered location.
4. A signature block including both the Contractor's certification and the Engineer's review of the completed quantities.

1.11 PROCEDURE

A. The contractor is responsible to coordinate the layout of all unit quantity work in the field in the presence of the Engineer.

1. The areas and locations shown on drawings are approximate and are shown diagrammatically for bidding purposes only. The actual extent of work shall only be as laid out in the field in the presence of the Engineer.
2. Work provided by Contractor in advance of agreement in the field by Engineer shall be at Contractor's own risk and may be subject to rejection.

B. The contractor shall only proceed with work to the extent that is laid out and marked in field.

C. For patching and other selective demolition, the Contractor shall begin removals at the geometric center of each area, and work outward towards the repair boundaries marked in field.

1. The boundaries marked out in the field shall be initially considered by the contractor to be the outside maximum extent of work item and shall not demolish or remove materials beyond the extent required by the specifications and details regardless of the extent initially marked in field.
2. Contractor shall endeavor to leave layout marks visible.

D. The Contractor shall notify the Engineer if it believes, upon execution of demolition or surface preparation, that work is required beyond the extent marked in the field.

1. The contractor shall not proceed with any additional removals until authorized by Engineer.

E. The Contractor shall determine the quantity of work marked in field prior to any removals and shall report quantities to Engineer.

1. The contractor shall not proceed with any work marked in field that would exceed the contract quantities without a written change order authorized by Owner.

1.12 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. The authority of the Engineer to assess the defect and identify payment adjustment is final.

1.13 SCHEDULE OF UNIT PRICES

A. Refer to Bid Form.

PART 2 - PRODUCTS – NOT USED

PART 3 - WORK ITEM DESCRIPTION

Note: Complete all work items, in regard to demolition, removal, installation etc., with proper care to ensure no consequential damage to or marring of the nearby elements, structural or other. Complete the work in a manner acceptable to the owners in order to allow for utilization of the entrances as needed by the owners. Approximate quantities are NOT guaranteed as not to exceed (for Lump Sum work items). Contractor is responsible for reviewing site conditions, and for performing full scope of work as shown on drawings and described within the Work Item Descriptions.

Payment for Lump Sum Work Items: A Percentage of the Schedule Value of Work Will be Released/Authorized Based on Approximate Percentage of Work Completed as Agreed Upon by the Engineer of Record and Contractor.

**General Conditions:**

**1.1: Mobilization/Demobilization/General Conditions:**

For setting up all necessary general conditions, insurance, overhead, and maintaining protection and facilities required by State laws and City Ordinances. This work item shall not include any overhead or profit for unit quantity or lump sum contract work included or incidental to other work items.

This work shall include all coordination and procurement of all necessary building permits, excluding actual cost of Building Permits. This work also includes the cost of a municipal consultant, if required, to expedite procurement of permits. Actual cost of building permit will be separately reimbursed to Contractor via Work Item #1.2.

Where required, contractor is responsible for temporary partitions and barricades around work area, perimeter netting or fencing to meet OSHA safety requirements, temporary shoring/bracing for safe prosecution of work, protection of adjacent building walls, doors, and windows and all labor, materials, equipment and incidentals necessary to complete the work as shown on plans and directed by the Engineer.

Method of Payment:

Payment for this work item will be according to the following schedule based on the value of work totally completed and stored to date.

| Completed Work | Payment |
|---|---|
| At execution of agreement by all parties | 25% |
| 25% Complete | 50% |
| 75% Complete | 75% |
| 100% Complete | 100% |

The value of this work is limited to the value shown on the bid form.

**1.2: Permits/Expediter:**

For payment of all permits required by State laws and City Ordinances required to complete Contract Work. This work will be reimbursed to Contractor at direct cost of permit. Cost of manpower to obtain all permits, ccoordination, overhead, and profit for this work shall be included in work item 1.01. Contractor shall provide electronic or hard copies of the permit to the engineer.

Method of Payment: Direct Cost of Permit

**1.3: Sidewalk Shedding, Scaffolding and Work Area Protection:**

This work consists of installing and setting up and maintaining necessary sidewalk protection around the building as shown on plans and as required by governing codes and as required to provide protection to tenants and the public. The work shall consist of providing sidewalk sheds, fencing and other signage and protection required to protect the public from construction hazards, prevent access to work areas and to keep the public out of the "Overhead hazard zone."

This work includes:

1. Providing sidewalk shedding with plywood or similar walking surface to metal deck. Approximately layout on Sheet G-002
2. Providing toe boards or similar closure at the gap between the bridging and the walls, particularly over entrances.
3. Providing outriggers and netting beyond the bridging parapet walls over the unprotected extent of the sidewalk.
4. Providing and maintaining barrels, cones, and fencing as required to direct pedestrian traffic under bridging.
5. Bridging shall be designed by licensed engineer and shall be designed for a 150 PSF live load, and code required uplift due to wind.
6. Provide fencing around area of work to close area during work
7. Providing suspended scaffolding, pipe scaffolding or lift as required to access all work area locations of all Buildings

This work also includes installation of temporary partitions and barricades around work area, perimeter netting or fencing to meet OSHA safety requirements, temporary shoring/bracing as required for safe prosecution of work, protection of adjacent building walls, doors, and windows and all labor, materials, equipment and incidentals necessary to complete the work as shown on plans and directed by the Engineer.

Method of Payment: Lump Sum

## 1.4: Payment and Performance Bond:

Payment and Performance Bonds: This work consists of furnishing a Payment and Performance Bond for 100% of the contract amount.

Provide Name of Bonding Company: _____ and

Contact Person: _____ and

Tel# _____.

Method of Payment: Lump Sum

## Exterior Façade & Balconies:

### 2.1 : Stucco Patch Repairs @ Exterior Wall:

This work item consists of removing and replacing deteriorated or missing stucco coating on exterior wall.

This work includes, but is not limited to, the following:

1. Sound and mark out repair area with Engineer/Architect in field.
2. Carefully saw cut a square edge along the perimeter of the repair area down to substrate concrete slab. Chip out and remove existing stucco coating system to provide level uniform repair cavity with square shoulders. Do not damage concrete slab surface.
3. Contractor shall coordinate work with Work Item 2.5 – Partial Depth Concrete Repairs for deteriorated substrate concrete.
4. Clean and prepare all surfaces so that it is free of dust, contaminated material, oil, paint, grease or corrosion deposits as manufacturer recommendation.
5. Install primer over bare concrete surfaces and onto existing stucco assembly where new finish coat will overlap. Confirm primer compatibility with manufacturer prior to application.
6. Install new synthetic stucco assembly (base coat and finish coat) to match existing thickness, type, and texture. Extend finish coat over adjacent stucco areas at least 6". Color to match existing.

The contractor shall remove and replace any existing joint sealants (windows, doors, railings, etc.) that are disturbed as part of stucco coating repair scope. This work also includes installation of temporary partitions and barricades around work area, perimeter netting or fencing to meet OSHA safety requirements, temporary shoring/bracing as required for safe prosecution of work, protection of adjacent building walls, doors, and windows and all labor, materials, equipment and incidentals necessary to complete the work as shown on plans and directed by the Engineer.

Method of Payment: Square Foot of Stucco System Replaced

**2.2 : Stucco Patch Repairs @ Balcony Slab Soffit:**

This work item consists of removing and replacing deteriorated or missing stucco coating on balcony soffit.

This work includes, but is not limited to, the following:

1. Sound and mark out repair area with Engineer/Architect in field.
2. Carefully saw cut a square edge along the perimeter of the repair area down to substrate concrete slab. Chip out and remove existing stucco coating system to provide level uniform repair cavity with square shoulders. Do not damage concrete slab surface.
3. Contractor shall coordinate work with Work Item 2.5 – Partial Depth Concrete Repairs for deteriorated substrate concrete.
4. Clean and prepare all surfaces so that it is free of dust, contaminated material, oil, paint, grease or corrosion deposits as manufacturer recommendation.
5. Install primer over bare concrete surfaces and onto existing stucco assembly where new finish coat will overlap. Confirm primer compatibility with manufacturer prior to application.
6. Install new synthetic stucco assembly (base coat and finish coat) to match existing thickness, type, and texture. Extend finish coat over adjacent stucco areas at least 6". Color to match existing.

The contractor shall remove and replace any existing joint sealants (windows, doors, railings, etc.) that are disturbed as part of stucco coating repair scope. This work also includes installation of temporary partitions and barricades around work area, perimeter netting or fencing to meet OSHA safety requirements, temporary shoring/bracing as required for safe prosecution of work, protection of adjacent building walls, doors, and windows and all labor, materials, equipment and incidentals necessary to complete the work as shown on plans and directed by the Engineer.

Method of Payment: Square Foot of Stucco System Replaced

**2.3: Stucco Crack Repairs:**

This work item consists of repairing cracked stucco that is still bonded to the substrate. For cracks up to 1/32" wide this work item includes carefully cleaning the stucco along the length of the crack, and treating the crack as recommended by the selected coating manufacturer in a neat and workmanship manner.

For cracks greater than 1/32" wide this work item includes routing the crack to a depth of ¼", carefully cleaning the stucco along the length of the crack and filling the cracks with approved urethane sealant, and tooling to a smooth and uniform finish. Broadcast fine aggregate silica sand into the tooled joint to blend the repair into the adjacent wall.

This work also includes installation of temporary partitions and barricades around work area, perimeter netting or fencing to meet OSHA safety requirements, temporary shoring/bracing as required for safe prosecution of work, protection of adjacent building walls, doors, and windows and all labor, materials, equipment and incidentals necessary to complete the work as shown on plans and directed by the Engineer.

Method of Payment: Linear foot of crack repaired.

**2.4: Concrete Repair Around Rail Posts Base:**

This work consists of repairing deteriorated concrete around the post.

This work includes, but is not limited to, the following:

1. Sound and mark out repair area with Engineer/Architect in field.
2. Carefully saw cut deteriorated concrete around the railing post minimum 4" deep and square edge along the perimeter of the repair area down to substrate concrete slab.
3. Install ¼" dia. stainless pins @4" o.c.
4. Install new pocket with concrete & non shrink grout around post and pitch away
5. Install new cove joint sealant around post.

.

This work also includes installation of temporary partitions and barricades around work area, perimeter netting or fencing to meet OSHA safety requirements, temporary shoring/bracing as required for safe prosecution of work, protection of adjacent building walls, doors, and windows and all labor, materials, equipment and incidentals necessary to complete the work as shown on plans and directed by the Engineer.

Method of Payment: Each Railing Post Pocket Repaired

**2.5: Guardrail Fastener Repair:**

This work consists of replacing aluminum railing bracket & fasteners with adjacent concrete walls. This work item is for the existing balcony railing system with missing brackets and fasteners by engineer's field verify. New bracket and fasteners shall match existing or approval prior installation.

This work also includes installation of temporary partitions and barricades around work area, perimeter netting or fencing to meet OSHA safety requirements, temporary shoring/bracing as required for safe prosecution of work, protection of adjacent building walls, doors, and windows and all labor, materials, equipment and incidentals necessary to complete the work as shown on plans and directed by the Engineer.

Method of Payment: Each Railing Bracket Installed

**2.6: Concrete Balcony Slab Edge Repairs:**

This work item consists of removing delaminated concrete from the concrete slab edges and patching the area using polymer modified concrete.

This work includes, but is not limited to, the following:

1. Hammer sound and mark out repair area with Engineer/Architect in field. Reinforcement layout and locations must be verified in field prior to any demolition.
2. Carefully saw cut a square edge along the perimeter of the repair area to a depth of at least ½", removing of unsound concrete as directed by the Engineer to a minimum depth

of 3” (or until concrete is sound) to expose reinforcement and detail chipping under bars ¾” minimum to provide level uniform repair cavity of constant depth with square shoulders.

3. Cleaning the repair area surface so that it is free of dust, contaminated material, oil, paint, grease or corrosion deposits. Wire brush clean all exposed reinforcement free of rust. Reporting condition of reinforcement steel to Engineer to determine need for additional or supplemental epoxy coated reinforcement. Provide corrosion inhibitor coating to all existing reinforcement.
4. Installation of 1/4” diameter stainless steel pins with a minimum embedment of 4” in epoxy at 6” O.C. (minimum of 2 per repair area) to bond repair and secure reinforcing.
5. Saturating substrate surface and scrubbing a thin coat of mixed material thoroughly into the surface to ensure sufficient bonding.
6. Before bond coat dries, apply approved repair mortar to match the existing slab edge profile. If the material sags during the application or the profile does not match, completely remove the repair mortar and reapply. Fill repair cavity with approved polymer modified concrete flush and smooth with the adjacent existing surfaces. Provide new drip edge to match existing where applicable.
7. Protecting repair area while curing in accordance with good concrete practices.
8. Successfully completed repair areas to match existing including architectural finish, texture, drip edge, shape, and elevations.

This work also includes installation of temporary partitions and barricades around work area, perimeter netting or fencing to meet OSHA safety requirements, temporary shoring/bracing as required for safe prosecution of work, protection of adjacent building walls, doors, and windows and all labor, materials, equipment and incidentals necessary to complete the work as shown on plans and directed by the Engineer.

Method of Payment: Linear Foot of Concrete Repair At Slab Edge

**2.7: Partial Depth Concrete Repair:**

This work consists of removal of deteriorated and contaminated concrete from vertical and overhead surfaces and patching the area using polymer modified concrete as marked on drawings and as directed by the Engineer in field.

This work includes:

1. Determining repair areas with Engineer by checking vertical surface or overhead soffit with hammer sounding.
2. Providing shoring as directed by Engineer for overhead repair area.
3. Using chipping hammers to remove unsound concrete to a depth of 2” or as required to reach a minimum of ¾” behind exposed reinforcing, whichever is greater.
4. Sandblasting clean all exposed reinforcing bars, and supplement with new reinforcing as directed by engineer.
5. Drilling in and epoxy grouting ¼” diameter stainless steel pins at 6” o.c.

6. Saturating substrate surface for 2 hours prior to application of repair mortar and scrubbing a thin coat of mixed material thoroughly into the surface to ensure sufficient bonding.
7. Patching with approved polymer modified repair mortar.
8. Protecting repair area while curing in accordance with good concrete practices.
9. Successfully complete repair areas to match existing including architectural finish, texture, shape, and elevations.

This work also includes installation of temporary shoring and barricades around work area, perimeter netting or fencing to meet OSHA safety requirements, temporary shoring/bracing as required for safe prosecution of work, protection of adjacent building walls, doors, and windows and all labor, materials, equipment and incidentals necessary to complete the work as shown on plans and directed by the Engineer.

Method of Payment: Square Foot of Concrete Slab Repaired

**2.8: Elastomeric Coating:**

This work consists of installing a new elastomeric coating at the exterior stucco wall of the building.

The work includes:

1. Pressure wash cleaning and preparing the surface of existing stucco walls, as per manufacturer's recommendations.
2. Installing a primer and two finish coats of a elastomeric coating.

Approved Product: STO Corp. or approved equal.

This work also includes installation of temporary partitions and barricades around work area, perimeter netting or fencing to meet OSHA safety requirements, temporary shoring/bracing as required for safe prosecution of work, protection of adjacent building walls, doors, and windows and all labor, materials, equipment and incidentals necessary to complete the work as shown on plans and directed by the Engineer.

Method of Payment: Per Square Foot of Stucco wall Coating

END OF SECTION

SECTION 00 60 00 - PROJECT FORMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Division 1 – General Requirements

1.2 FORM OF AGREEMENT

A. Agreement form shall be "Standard Form of Agreement between Owner and Contractor where the basis, of payment is a Stipulated Sum" AlA A101-2017 Edition, Electronic Format.

B. General Conditions of the contract “General Conditions of the Contract” - AIA Document A20I, 2017 Edition, Electronic Format.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01 11 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and Contract Documents, including General and Supplementary Conditions included in the contract and Division 1 Specification Sections, apply to work of this Section.

1.2 SECTION INCLUDES

A. Contract Description.

B. Contractor use of site and premises.

C. Future work.

D. Work Sequence.

E. Owner occupancy.

1.3 CONTRACT DESCRIPTION

A. Contract Type: Stipulated Price and Unit Prices

B. AGREEMENT FORM: As per Section 00 60 00

C. INTENT OF PLANS AND SPECIFICATIONS: The intent of the Drawings and Specifications is to describe The Work which the Contractor undertakes to do, in full compliance with the Contract, and it is understood that the Contractor will furnish all materials, machinery, equipment, tools, supplies, transportation, labor, and all other incidentals necessary to the satisfactory prosecution and completion of the Work. The Plans and Specifications are complementary, and what is called for by either is as binding as if called for by both.

D. The Special Conditions shall control where in conflict with the Standard Specifications. However, such portions of the Standard Specifications not in conflict or not rendered meaningless by the Special provisions shall remain in full force and effect and be binding on the parties hereto.

E. In the event the Contractor discovers any error or discrepancy in the Contract Documents, he shall immediately call upon the Engineer for his decision. The Engineer shall then make such corrections and interpretations as may be deemed necessary for the fulfillment of the intent of the Specifications, Special Provisions, Plans and other Contract Documents, as construed by him and his decision shall be final.

1.4 SCOPE OF WORK:

- Stucco Patch Repairs
- Stucco Crack Repairs
- Concrete Balcony Slab Edge Repairs
- Vertical Concrete Slab Repairs
- Guardrail Post Base Repairs
- Guardrail Fastener Repairs
- Exterior Wall coating

A. Base Bid (Summary Only/See 00 20 00 Bid Form and 00 43 22 Unit Quantity Work for Details)

1.5 CONTRACTOR USE OF SITE AND PREMISES

A. Limit use of site and premises to allow:
   1. Owner occupancy.
   2. Tenant occupancy.
   3. Work by Others and Work by Owner.

B. Existing Emergency Building Exits shall be usable all times during Construction.

C. Construction Operations: Limited to areas noted on Drawings or directed by the Engineer.

1.6 ALTERATIONS, CANCELLATIONS AND DEDUCTIONS

A. In the event, in the sole judgment of the Engineer or his representative, a change becomes necessary in the best interest of the project, due to circumstances not known at the time the Contract was entered into or arising thereafter, the Engineer may, during the course of the Work, alter the Scope of work, add such work as may be necessary and increase or decrease the quantities of work to be performed in accordance with such changes, including addition to, the deduction from, or cancellation of any one or more of the unit price items or lump sum items. Such changes shall not be considered as a waiver of any conditions of the Contract nor invalidate any of the provision thereof.

B. Where the added work and materials do not appear as specific items in the Contract, accompanied by unit prices, and which, of themselves, or in conjunction with other changes, constitute a major change, and the parties cannot agree on the compensation to be paid for said work and materials, the work may be designated by the Engineer as Extra Work and paid for as specified in section 01 26 00 of this Specifications.

C. All alterations, cancellations and deductions shall be authorized in writing by the Engineer before work is started, subject to the approval of the Owner. Such authorizations shall set up the items of work involved and the method of payment for each item.

D. Claims for Extra Work which have not been authorized in writing by the Engineer and approved by the Owner will be rejected and the Contractor shall not be entitled to payment therefore.

1.7 EXTRA WORK

A. If, during the course of construction, it becomes necessary to have work performed of a nature or scope related to but not clearly covered by the Contract, the Contractor shall perform the work at the request of the Engineer. The engineer shall advise the Contractor of the character and extent of such work in such sufficient detail as to enable the Contractor and the Owner to mutually agree upon terms for performing the contemplated additional work.

B. The Engineer may, during an emergency, require the performance of Extra Work by oral direction in order to save life or property. Such oral direction shall be promptly confirmed in writing by the Engineer. The Contractor shall perform the emergency work immediately upon receipt of oral direction from the Engineer and shall not delay performance thereof pending agreement between the Contractor and the Owner as to price or prices and basis for payment.

1.8 UNAUTHORIZED WORK

A. Work performed which is not provided for in the Contract, and work done beyond limits shown on the Plans or as directed, or Extra work done without written authorization will be considered as unauthorized, shall be at the expense of the Contractor and will not be measured or paid for by the Owner. Work so done may be ordered removed and replaced at the Contractor's expenses, at the sole discretion of the Engineer.

1.9 WORK SEQUENCE

A. Construct Work in stages to accommodate Owner's occupancy requirements during the construction period, coordinate construction schedule and operations with Engineer. Alternate sequencing of work may be submitted by the contractor for consideration after award of contract and approved at the discretion of the owner.

1.10 OWNER OCCUPANCY

A. The Owner will occupy the premises (Building) during the entire period of construction. Contractor shall become familiar with the premises hours of occupancy.

B. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.

C. Schedule the Work to accommodate owner occupancy.

1.11 RESTORATION AND CLEAN-UP

A. During the construction period the Contractor shall, on a daily basis, place all of his waste materials and "non-broomable" debris into containers.

B. Upon completion of the Work and before acceptance and final payment is made, the Work shall be cleaned of all rubbish, excess materials, false work, temporary structures, and equipment; and all parts of the Work shall be left in a neat presentable condition, satisfactory to the Owner. This work shall be considered incidental to the overall project and no additional compensation will be allowed.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01 20 00 - MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Contract Documents, including General and Supplementary Conditions included in the contract and Division 1 Specification Sections, apply to work of this Section.

1.2 SECTION INCLUDES

A. Measurement and payment criteria applicable to portions of the Work performed under a unit price payment method.

B. Defect assessment and non-payment for rejected work.

1.3 AUTHORITY

A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.

B. Take all measurements and compute quantities. The Engineer will verify measurements and quantities.

C. Assist the Engineer by providing necessary equipment, workers, and survey personnel as required.

1.4 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Proposal Form are for bidding and contract purposes only. Quantities and measurements supplied or placed in the Work and verified by the Engineer determine payment.

B. If the actual Work requires more or fewer quantities than those quantities indicated, provide the required quantities at the unit sum/prices contracted.

1.5 MEASUREMENT OF QUANTITIES

A. Measurement Devices:

1. Weigh Scales: Inspected, tested and certified by the applicable State Weights and Measures department within the past year.
2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.
3. Metering Devices: Inspected, tested and certified by the applicable State department within the past year.

B. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.

C. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.

D. Measurement by Area: Measured by square dimension using mean length and width or radius.

E. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.

F. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

## 1.6 PAYMENT

A. Payment Includes: Full compensation for all required labor, Products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

B. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Architect/Engineer multiplied by the unit sum/price for Work which is incorporated in or made necessary by the Work.

## 1.7 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of the Engineer, it is not practical to remove and replace the Work, the Engineer will direct one of the following remedies:
1. The defective Work may remain, but the unit sum/price will be adjusted to a new sum/price the discretion of the Engineer.
2. The defective Work will be partially repaired to the instructions of the Engineer, and the unit sum/price will be adjusted to a new sum/price at the discretion of the Engineer.

C. The individual specification sections may modify these options or may identify a specific formula or percentage sum/price reduction.

D. The authority of the Engineer to assess the defect and identify payment adjustment, is final.

## 1.8 NON-PAYMENT FOR REJECTED PRODUCTS

A. Payment will not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from the transporting vehicle.
4. Products placed beyond the lines and levels of the required Work.
5. Products remaining on hand after completion of the Work.
6. Loading, hauling, and disposing of rejected Products.

1.9 SCHEDULE OF UNIT PRICES

A. Refer to Proposal Form.

PART 2 - PRODUCTS

A. Not Used

PART 3 - EXECUTION

A. Not Used.

END OF SECTION

SECTION 01 26 00 - CONTRACT MODIFICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Contract Documents, including General and Supplementary Conditions included in the contract and Division 1 Specification Sections, apply to work of this section.

1.2 SECTION INCLUDES

A. Submittals.

B. Documentation of change in Contract Sum/Price and Contract Time.

C. Change procedures.

D. Work Directive Change.

E. Stipulated Price change order.

F. Unit price change order.

G. Time and material change order.

H. Execution of change orders.

I. Correlation of Contractor submittals.

1.3 SUBMITTALS

A. Submit name of the individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. Change Order Forms: AIA G701 Change Order.

1.4 DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

A. Maintain detailed records of work done on a time and material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work.

B. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation.

C. On request, provide additional data to support computations:
   1. Quantities of products, labor, and equipment.
   2. Taxes, insurance, and bonds.

3. Overhead and profit.
4. Justification for any change in Contract Time.
5. Credit for deletions from Contract, similarly documented.

D. Support each claim for additional costs, and for work done on a time and material basis, with additional information:

1. Origin and date of claim.
2. Dates and times work was performed, and by whom.
3. Time records and wage rates paid.
4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

## 1.5 CHANGE PROCEDURES

A. The Engineer will advise of minor changes in the Work not involving an adjustment to Contract Sum/Price or Contract Time as authorized by AIA A201.

B. The Engineer may issue a Proposal Request OR Notice of Change which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor will prepare and submit an estimate within 7 DAYS.

C. The Contractor may propose a change by submitting a request for change to the Engineer, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation. Requested substitutions in accordance with Section 01 60 00.

## 1.6 WORK DIRECTIVE CHANGE

A. Engineer may issue a document, signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

B. The document will describe changes in the Work, and will designate method of determining any change in Contract Sum/Price or Contract Time.

C. Promptly execute the change in Work.

## 1.7 STIPULATED PRICE CHANGE ORDER

A. Based on Proposal Request or Notice of Change and Contractor's fixed price quotation or Contractor's request for a Change Order as approved by Engineer.

## 1.8 UNIT PRICE CHANGE ORDER

A. For pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis.

B. For unit costs or quantities of units of work which are not pre-determined, execute Work under a Work Directive Change.

C. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.

1.9 TIME AND MATERIAL CHANGE ORDER

A. Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

B. Engineer will determine the change allowable in Contract Sum/Price and Contract Time as provided in the Contract Documents.

C. Maintain detailed records of work done on Time and Material basis.

D. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.

1.10 EXECUTION OF CHANGE ORDERS

A. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1.11 CORRELATION OF CONTRACTOR SUBMITTALS

A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum/Price.

B. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

C. Promptly enter changes in Project Record Documents.

PART 2 - PRODUCTS

A. Not Used.

PART 3 - EXECUTION

A. Not Used.

END OF SECTION

SECTION 01 29 76 - APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Contract Documents, including General and Supplementary Conditions included in the contract and Division 1 Specification Sections, apply to work of this Section.

1.2 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for payment.

1.3 FORMAT

A. AIA G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet.

B. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values based on Unit Price Schedule.
   4. Previous Applications including previous unit quantities completed
   5. Work in place including stored materials including current unit quantities completed.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
   9. Balance to Finish.
   10. Retainage.

1.4 PREPARATION OF APPLICATIONS

A. Present required information in typewritten form OR on electronic media printout.

B. Execute certification by signature of authorized officer.

C. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.

D. List each authorized Change Order as an extension on AIA G703 - Continuation Sheet, listing Change Order number and dollar amount as for an original item of Work.

E. Prepare Application for Final Payment as specified in Section 01 77 00.

1.5 SUBMITTAL PROCEDURES

A. Submit three copies of each Application for Payment.

B. Submit an updated construction schedule with each Application for Payment.

C. Payment Period: Submit at intervals stipulated in the Agreement.

D. Submit with transmittal letter as specified for Submittals in Section 01 33 00.

E. Submit lien waivers.

1.6 SUBSTANTIATING DATA

A. When Engineer requires substantiating information, submit data justifying dollar amounts in question.

B. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

C. Include the following with the application:
   1. Current construction photographs specified in Section 01 33 00.
   2. Partial release of liens from major subcontractors and vendors.
   3. Record documents as specified, for review by the owner which will be returned to the contractor.
   4. Affidavits attesting to off-site stored products.
   5. Construction progress schedules revised and current as specified.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01 31 13 – PROJECT COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Contract Documents, including General and Supplementary Conditions included in the contract and Division 1 Specification Sections, apply to work of this section.

1.2 SECTION INCLUDES

A. Coordination and project conditions.

B. Field engineering.

C. Pre-construction meeting.

D. Site mobilization meeting.

E. Progress meetings.

F. Pre-installation meetings.

G. Examination.

H. Preparation.

I. Cutting and Patching.

J. Alteration project procedures.

1.3 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements with provisions for accommodating items installed later.

B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements, supports, and installation Electrical Work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

1.4 PRECONSTRUCTION MEETING

A. The Engineer will schedule a meeting after Notice of Award.

B. Attendance Required: Owner or his representative Engineer and Contractor.

C. Agenda:

1. Execution of Owner-Contractor Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
5. Designation of personnel representing the parties in Contract, and the Engineer.
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract close-out procedures.
7. Scheduling of Work.

D. Record minutes and distribute copies within three days after meeting to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

## 1.5 SITE MOBILIZATION MEETING

A. Engineer will schedule a meeting at the Project site prior to Contractor occupancy.

B. Attendance Required: Owner or Owners' Representative Engineer, Contractor, Contractor's Superintendent, and major Subcontractors.

C. Agenda:

1. Use of premises by Owner and Contractor.
2. Owner's requirements.
3. Construction facilities and controls provided by Owner.
4. Temporary utilities provided by Owner.
5. Condition Survey layout.
6. Security and housekeeping procedures.
7. Schedules.
8. Application for payment procedures.
9. Procedures for testing.
10. Procedures for maintaining record documents.

D. Record minutes and distribute copies within three days after meeting to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

## 1.6 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at bi-weekly intervals.

B. Engineer will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Engineer, as appropriate to agenda topics for each meeting.

D. Agenda:

1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems which impede planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to Work.

E. Record minutes and distribute copies within three days after meeting to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION

SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes administrative and procedural requirements for the following in digital media only:
   1. Preconstruction photographs.
   2. Periodic construction photographs.
   3. Preconstruction videotapes.
   4. Periodic construction videotapes.
   5. Final completion construction photographs and videotapes.

B. Related Sections include the following:
   1. Division 1 Section "Submittals" for submitting construction photographs.
   2. Division 1 Section "Closeout Procedures" for submitting Project Record Documents at Project closeout.

### 1.3 SUBMITTALS

A. Construction Photographs: Submit a complete set of digital image electronic files as a Project Record Document. Identify electronic media with date photographs were taken. Submit images that have the same aspect ratio as the sensor, uncropped.

B. Videotapes: Submit each digital videotape as a Project Record Document. Identify electronic media with date videos were taken.

## PART 2 - PRODUCTS

### 2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPEG format, with minimum sensor size of 8.0 megapixels.

B. Videotape Format: Provide high-quality digital recording on a DVD or USB flash drive.

PART 3 - EXECUTION

3.1 GENERAL

A. Photographer: Engage a management or supervisor level contractor employee, familiar with the project and contract documents to properly document Work Items and conditions of importance.

B. Date Stamp: Date and time stamp each photograph or video as it is being taken so stamp is integral to photograph.

3.2 CONSTRUCTION PHOTOGRAPHS

A. Preconstruction Photographs: Before starting construction, take color photographs of Project site and surrounding properties from different vantage points, as directed by Engineer.

B. Unit Quantity Photographs: Take color photographs of portions of work that will be obstructed from view by other Work Items. Photographs should show scope and quantity of work prior to completion.

C. Hidden Condition Photographs: Take color photographs to document existing conditions of Work Items in progress that will be obstructed from view after completion of work, such as Surface Preparation, Reinforcing Conditions, and differing conditions from contract Drawings.

1. Requests for Change Orders resulting from hidden conditions not shown on the Contract Drawings will not be considered unless photographically documented for proof of existing condition.

D. Final Completion Construction Photographs: Take color photographs after date of Substantial Completion for submission as Project Record Documents. Engineer will direct photographer for desired vantage points.

3.3 CONSTRUCTION VIDEOTAPES

A. Narration: Describe scenes on videotape by dubbing audio narration off-site after videotape is recorded. Include description of items being viewed, recent events, and planned activities. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

B. Preconstruction Videotape: Before starting construction, record videotape of Project site and surrounding properties from different vantage points, as directed by Engineer.

1. Show existing conditions adjacent to Project site before starting the Work.
2. Show existing buildings either on or adjoining Project site to accurately record the physical conditions at the start of demolition.
3. Show protection efforts by Contractor.

C. Final Completion Construction Videotapes: Take color video after date of Substantial Completion for submission as Project Record Documents. Engineer will direct photographer for desired vantage points.

END OF SECTION

SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and Contract Documents, including General and Supplementary Conditions included in the contract and Division 1 Specification Sections, apply to work of this section.

1.2 SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedules.

C. Proposed Products list.

D. Product Data.

E. Shop Drawings.

F. Samples.

G. Design data.

H. Test reports.

I. Certificates.

J. Manufacturer's instructions.

K. Manufacturer's field reports.

L. Erection drawings.

M. Construction photographs.

1.3 REFERENCES

A. AGC (Associated General Contractors of America) publication "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

1.4 SUBMITTAL PROCEDURES

A. Transmit each submittal with AIA Form G810.

B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

C. Identify Project, Contractor, Subcontractor or supplier, pertinent drawing and detail number, and specification section number, as appropriate.

D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

E. Schedule submittals to expedite the Project, and deliver to Engineer at:

O & S Associates, Inc.
2500 Hollywood Blvd
Suite 212
Hollywood, FL 33020

Coordinate submission of related items.

F. For each submittal for review, allow 15 days excluding delivery time to and from the contractor.

G. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

H. Provide space for Contractor and Architect/Engineer review stamps.

I. When revised for resubmission, identify all changes made since previous submission.

J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

K. Submittals not requested will not be recognized or processed.

## 1.5 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedule in duplicate within 15 days after date of Owner-Contractor Agreement.

B. Revise and resubmit as required.

C. Submit revised schedules with each Application for Payment, identifying changes since previous version.

D. Submit a horizontal bar chart with separate line for each major portion of Work or operation, identifying first workday of each week.

E. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

F. Indicate estimated percentage of completion for each item of Work at each submission.

G. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and required by Allowances.

1.6 PROPOSED PRODUCTS LIST

A. Within 15 days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.7 PRODUCT DATA

A. Product Data for Review:
   1. Submitted to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
   2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.

B. Product Data for Information:
   1. Submitted for the Engineer's knowledge as contract administrator or for the Owner.

C. Product Data for Project Close-out:
   1. Submitted for the Owner's benefit during and after project completion.

D. Submit the number of copies which the Contractor requires, plus two copies which will be retained by the Engineer.

E. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

F. Indicate Product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

G. After review distribute in accordance with the Submittal Procedures article above and provide copies for record documents described in Section 01 77 00 – Closeout Procedures.

1.8 SHOP DRAWINGS

A. Shop Drawings for Review:
   1. Submitted to Architect/Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

2. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01 77 00 – CLOSEOUT PROCEDURES.

B. Shop Drawings for Information:
   1. Submitted for the Architect/Engineer's knowledge as contract administrator or for the Owner.

C. Shop Drawings for Project Close-out:
   1. Submitted for the Owner's benefit during and after project completion.

D. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

E. Submit in the form of one reproducible transparency.

1.9 SAMPLES

A. Samples For Review:
   1. Submitted to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
   2. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01 77 00 – CLOSEOUT PROCEDURES.

B. Samples For Information:
   1. Submitted for the Engineer's knowledge as contract administrator or for the Owner.

C. Samples For Selection:
   1. Submitted to Engineer for aesthetic, color, or finish selection. Submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for Engineer’s selection.
   2. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01 77 00 – CLOSEOUT PROCEDURES.

D. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

E. Include identification on each sample, with full Project information.

F. Submit the number of samples specified in individual specification sections; one of which will be retained by Engineer.

G. Reviewed samples which may be used in the Work are indicated in individual specification sections.

H. Samples will not be used for testing purposes unless specifically stated in the specification section.

1.10 DESIGN DATA

A. Submit for the Engineer's knowledge as contract administrator or for the Owner.

B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.11 TEST REPORTS

A. Submit for the Architect/Engineer's knowledge as contract administrator or for the Owner.

B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.12 CERTIFICATES

A. When specified in individual specification sections, submit certification by the manufacturer, installation/application subcontractor, or the Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product but must be acceptable to Engineer.

1.13 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, [start-up,] adjusting, and finishing, to Architect/Engineer for delivery to owner in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.14 MANUFACTURER'S FIELD REPORTS

A. Submit reports for the Architect/Engineer's benefit as contract administrator or for the Owner.

B. Submit report in duplicate within 30 days of observation to Architect/Engineer for information.

C. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.15 ERECTION DRAWINGS

A. Submit drawings for the Architect/Engineer's benefit as contract administrator or for the Owner.

B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

C. Data indicating inappropriate or unacceptable Work may be subject to action by the Architect/Engineer or Owner.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01 42 19 - REFERENCE STANDARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Contract Documents, including General and Supplementary Conditions included in the contract and Division 1 Specification Sections, apply to work of this section.

1.2 SECTION INCLUDES

A. Quality assurance.

1.3 QUALITY ASSURANCE

A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Contract Documents.

C. Obtain copies of standards when required by the Contract Documents.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from the Architect/Engineer before proceeding.

F. Neither the contractual relationship, duties, and responsibilities of the parties in Contract nor those of the Engineer shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01 45 00 - QUALITY CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Contract Documents, including General and Supplementary Conditions included in the contract and Division 1 Specification Sections, apply to work of this Section.

1.2 SECTION INCLUDES

A. Quality assurance - control of installation.

B. Tolerances

C. References and standards.

D. Mock-up.

E. Inspecting and testing laboratory services.

F. Manufacturers' field services.

1.3 QUALITY ASSURANCE - CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Perform Work by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.4 TOLERANCES

A. Monitor fabrication and installation tolerance control of Products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

C. Adjust Products to appropriate dimensions; position before securing Products in place.

## 1.5 REFERENCES AND STANDARDS

A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Contract Documents, except where a specific date is established by code.

C. Obtain copies of standards where required by product specification sections.

D. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect/Engineer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

## 1.6 MOCK-UP

A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be a comparison standard for the remaining Work.

D. Where mock-up has been accepted by Architect/Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so.

## 1.7 TESTING SERVICES

A. Owner will appoint, employ, and pay for specified services of an independent firm to perform testing.

B. The independent firm will perform tests and other services specified in individual specification sections and as required by the Engineer.

C. Testing and source quality control may occur on or off the project site. Perform off-site testing as required by the Engineer or the Owner.

D. Reports will be submitted by the independent firm to the Engineer and Contractor, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
   1. Notify Engineer and independent firm 72 hours prior to expected time for operations requiring services.
   2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.

F. Testing does not relieve Contractor to perform Work to contract requirements.

G. Re-testing required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Engineer. Payment for re-testing will be charged to the Contractor by deducting testing charges from the Contract Sum/Price.

## 1.8 INSPECTION SERVICES

A. Owner will appoint, employ, and pay for specified services of an independent firm to perform inspection.

B. The independent firm will perform inspections and other services specified in individual specification sections and as required by the Engineer.

C. Inspecting may occur on or off the project site. Perform off-site inspecting as required by the Engineer or the Owner.

D. Reports will be submitted by the independent firm to the Engineer and Contractor, in duplicate, indicating inspection observations and indicating compliance or non- compliance with Contract Documents.

E. Cooperate with independent firm; furnish safe access and assistance by incidental labor as requested.
   1. Notify Engineer and independent firm 24 hours prior to expected time for operations requiring services.

F. Inspecting does not relieve Contractor to perform Work to contract requirements.

## 1.9 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Engineer 7 days in advance of required observations. Observer subject to approval of Engineer.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

D. Refer to Section 01 33 00 – Submittal Procedures, MANUFACTURERS' FIELD REPORTS article.

## PART 2 - PRODUCTS

Not Used.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

### 3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION

SECTION 01 45 23 - TESTING SERVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Contract Documents, including General and Supplementary Conditions included in the contract and Division 1 Specification Sections, apply to work of this Section.

1.2 SECTION INCLUDES

A. Selection and payment.

B. Contractor responsibilities.

C. Schedule of tests.

1.3 SELECTION AND PAYMENT

A. Owner will employ and pay for services of an independent testing agency or laboratory to perform specified testing.

B. Contractor shall coordinate testing lab with construction operations as needed.

C. Employment of testing agency or laboratory in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

1.4 CONTRACTOR RESPONSIBILITIES

A. Deliver to agency or laboratory at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.

B. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.

C. Provide incidental labor and facilities:
   1. To provide access to Work to be tested.
   2. To obtain and handle samples at the site or at source of Products to be tested.
   3. To facilitate tests.
   4. To provide storage and curing of test samples.

D. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring testing services.

1.5 SCHEDULE OF TESTS

A. Individual Specification Sections: Tests required and standards for testing.

PRODUCTS

Not Used.

EXECUTION

Not Used.

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

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

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Payment as per contact for sewer-service use charges for sewer usage by all entities for construction operations.

C. Water Service: Payment as per contact for water-service use charges for water used by all entities for construction operations.

D. Electric Power Service: Payment as per contact for electric-power-service use charges for electricity used by all entities for construction operations.

E. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

F. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

G. Sewer, Water, and Electric Power Service: Use charges are specified in Section 011200 "Multiple Contract Summary."

1.4 INFORMATIONAL SUBMITTALS

A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

B. Implementation and Termination Schedule: Within (15) days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.

C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.

F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste-handling procedures.
5. Other dust-control measures.

1.5 QUALITY ASSURANCE

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

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

C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails, with galvanized barbed-wire top strand.

B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide galvanized-steel bases for supporting posts.

C. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.

D. Wood Enclosure Fence: Plywood, 6 feet (1.8 m) high, framed with four 2-by-4-inch (50-by-100-mm) rails, with preservative-treated wood posts spaced not more than 8 feet (2.4 m) apart.

E. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

F. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats minimum 36 by 60 inches (914 by 1524 mm).

G. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

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

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, Construction Manager, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
3. Drinking water and private toilet.

4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
5. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

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

1. Store combustible materials apart from building.

## 2.3 EQUIPMENT

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

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

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of (8) at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures."

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

# PART 3 - EXECUTION

## 3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

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

1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

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

D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

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

1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

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

1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.

G. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.

a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

I. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service as indicated.
2. Connect temporary service to Owner's existing power source, as directed by Owner.

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

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

K. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel, upon request of owner.

1. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Contractor's emergency after-hours telephone number.
e. Architect's office.
f. Engineers' offices.
g. Owner's office.
h. Principal subcontractors' field and home offices.

L. Electronic Communication Service: Provide a desktop or laptop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications throughout the course of the project, at any time. Equip computer with not less than the following:

1. Processor: Intel Core i5 or i7.
2. Memory: 4 gigabyte.
3. Disk Storage: 500 gigabyte hard-disk drive and combination DVD-RW/CD-RW drive.
4. Display: 24-inch (610-mm) LCD monitor with 256-Mb dedicated video RAM.

5. Full-size keyboard and mouse.
6. Network Connectivity: 10/100BaseT Ethernet.
7. Operating System: Microsoft Windows 7 or 10 Professional.
8. Productivity Software:

    a. Microsoft Office Professional, 2010 or higher, including Word, Excel, and Outlook.
    b. Adobe Reader 11.0 or higher.
    c. WinZip 7.0 or higher.
    d. CAD File Viewer

9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, and scanning, or separate units for each of these three functions.
10. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum 1.0 Mbps upload and 15 Mbps download speeds at each computer.
11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.
12. Backup: External hard drive, minimum 1 terabyte, with automated backup software providing daily backups.

## 3.4 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits and as indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 312000 "Earth Moving."

3. Recondition base after temporary use, including removing contaminated material, regrading, proof-rolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 321216 "Asphalt Paving."
5. Do not block main roads with construction vehicles and materials.
6. Provide and maintain access to fire hydrants, free of obstructions.
7. Provide means of removing mud from vehicle wheels before entering streets.
8. Existing on-site roads may be used for construction traffic.

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Provide temporary parking areas for construction personnel or use designated areas of Owner's existing upon authorization.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

    a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touch up signs so they are legible at all times.

H. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

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

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

2. All cranes and hoists etc. must be designed, used, maintained according to the safety code.

K. Temporary Elevator Use: Use of elevators is not permitted.

L. Existing Elevator Use: Use of Owner's existing elevators will be permitted with written authorization from the owner, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

1. Do not load elevators beyond their rated weight capacity.
2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

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

N. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

O. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

## 3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 311000 "Site Clearing."

D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways according to requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

F. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection." Work must be in strict adherence to the drawings and scope of work, contractor will be held liable for any damage to the property.

G. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

H. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

I. Site Enclosure Fence: Before construction operations furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations or as indicated on Drawings.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

J. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

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

L. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

M. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction and requirements indicated on Drawings.

1. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
2. Paint and maintain appearance of walkway for duration of the Work.

N. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

O. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
2. Construct dustproof partitions with two layers of 6-mil (0.14-mm) polyethylene sheet on each side. Cover floor with two layers of 6-mil (0.14-mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.

    a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.

3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
4. Insulate partitions to control noise transmission to occupied areas.
5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
6. Protect air-handling equipment.
7. Provide walk-off mats at each entrance through temporary partition.

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

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

4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

## 3.6 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
3. Indicate methods to be used to avoid trapping water in finished work.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.
d. Removal and replacement of materials is required if Architect or Project Engineer deems the material to be defective

## 3.7 OPERATION, TERMINATION, AND REMOVAL

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

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

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

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

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION

SECTION 01 60 00 – PRODUCT REQUIREMENTS

## PART 1 - PART 1 GENERAL

### 1.1 RELATED DOCUMENTS:

A. Drawings and Contract Documents, including General and Supplementary Conditions included in the contract and Division 1 Specification Sections, apply to work of this section.

### 1.2 SECTION INCLUDES

A. Products.

B. Transportation and handling.

C. Storage and protection.

D. Product options.

E. Substitutions.

### 1.3 PRODUCTS

A. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

B. Provide interchangeable components of the same manufacture for components being replaced.

### 1.4 TRANSPORTATION AND HANDLING

A. Transport and handle Products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.

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

### 1.5 STORAGE AND PROTECTION

A. Store and protect Products in accordance with manufacturers' instructions.

B. Store with seals and labels intact and legible.

C. Store sensitive Products in weather tight, climate controlled, enclosures in an environment favorable to Product.

D. For exterior storage of fabricated Products, place on sloped supports above ground.

E. Provide off-site storage and protection when site does not permit on-site storage or protection.

F. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.

G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

## 1.6 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named in accordance with the following article.

## 1.7 SUBSTITUTIONS

A. Instructions to Bidders specify time restrictions for submitting requests for Substitutions during the bidding period to requirements specified in this section.

B. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. A request constitutes a representation that the Bidder.
   1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
   2. Will provide the same warranty for the Substitution as for the specified Product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.
   5. Will reimburse Owner and Engineer for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:
   1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
   2. Submit shop drawings, product data, and certified test results attesting to the proposed Product equivalence. Burden of proof is on proposer.
   3. The Engineer will notify Contractor in writing of decision to accept or reject request.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 013300 "Submittal Procedures" for submitting surveys.
3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
4. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 PREINSTALLATION MEETINGS

A. Cutting and Patching Conference: Conduct conference at Project site.

1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting

and patching work. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:

a. Contractor's superintendent.
b. Trade supervisor responsible for cutting operations.
c. Trade supervisor(s) responsible for patching of each type of substrate.
d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affecting by cutting and patching operations.

2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: If the intended work of cutting and patching is not designed by the Project Engineer, provide qualification data for land surveyor and or professional engineer, dependent upon the scope of work.

B. Certificates: Submit certificate signed by land surveyor and or professional engineer certifying that location and elevation of improvements comply with requirements.

C. Cutting and Patching Plan: Consult with the engineer and if required by the Engineer, submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

E. Certified Surveys: Submit two copies signed by land surveyor and or professional engineer.

F. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

G. Submit written request in advance of cutting or any alteration which affects:

1. Structural integrity of any element of Project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance or safety of any operation element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate contractor.

H. Include in request:
1. Identification of Project.
2. Location and description of affected Work.
3. Necessity for cutting or alteration.
4. Description of proposed Work and Products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.
7. Written permission of affected separate contractor.
8. Date and time work will be executed.

## 1.6 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:

a. Primary operational systems and equipment.
b. Fire separation assemblies.
c. Air or smoke barriers.
d. Fire-suppression systems.
e. Plumbing piping systems.
f. Mechanical systems piping and ducts.
g. Control systems.
h. Communication systems.
i. Fire-detection and -alarm systems.
j. Conveying systems.
k. Electrical wiring systems.
l. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in

reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

a. Water, moisture, or vapor barriers.
b. Membranes and flashings.
c. Exterior curtain-wall construction.
d. Sprayed fire-resistive material.
e. Equipment supports.
f. Piping, ductwork, vessels, and equipment.
g. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

## 3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

## 3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager promptly.

B. General: Engage a professional engineer to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Construction Manager.

## 3.4 FIELD ENGINEERING

A. Identification: Engage the owner in order to identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect and Construction Manager. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect and Construction Manager before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of (2) permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

## 3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of [96 inches (2440 mm)] in occupied spaces and [90 inches (2300 mm)] in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Repair or remove and replace damaged, defective, or nonconforming Work.

1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.

## 3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
6. Promptly repair damage to adjacent construction caused by selective demolition operations.
7. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
8. Execute patching to complement adjacent Work.
9. Fit Products together to integrate with other Work.
10. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
11. Employ original installer to perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.
12. Restore work with new Products in accordance with requirements of Contract Documents.
13. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
14. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.
15. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

## 3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

## 3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.
4. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
5. Remove debris and rubbish remote spaces, prior to enclosing the space.
6. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
7. Collect and remove waste materials, debris, and rubbish from site periodically or daily as required by owner to maintain utility and dispose the materials off-site.
8. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

9. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls." Section 017419 "Construction Waste Management and Disposal."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

## 3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

## 3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and Contract Documents, including General and Supplementary Conditions included in the contract and Division 1 Specification Sections, apply to work of this section.

B. Individual Product Specification Sections:
   1. Cutting and patching incidental to work of the section.
   2. Advance notification to other sections of openings required in work of those sections.
   3. Limitations on cutting structural members.

1.2 SECTION INCLUDES

A. Requirements and limitations for cutting and patching of Work.

1.3 SUBMITTALS

A. Submit written request in advance of cutting or alteration which affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance or safety of any operation element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate contractor.

B. Include in request:
   1. Identification of Project.
   2. Location and description of affected Work.
   3. Necessity for cutting or alteration.
   4. Description of proposed Work and Products to be used.
   5. Alternatives to cutting and patching.
   6. Effect on work of Owner or separate contractor.
   7. Written permission of affected separate contractor.
   8. Date and time work will be executed.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Primary Products: Those required for original installation.

B. Product substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

B. After uncovering existing Work, assess conditions affecting performance of work.

C. Beginning of cutting or patching means acceptance of existing conditions.

### 3.2 PREPARATION

A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

B. Provide protection from elements for areas which may be exposed by uncovering work.

C. Maintain excavations free of water.

### 3.3 CUTTING

A. Execute cutting and fitting including excavation and fill to complete the Work.

B. Uncover work to install improperly sequenced work.

C. Remove and replace defective or non-conforming work.

D. Remove samples of installed work for testing.

E. Provide openings in the Work for penetration of mechanical and electrical work.

F. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

G. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

### 3.4 PATCHING

A. Execute patching to complement adjacent Work.

B. Fit Products together to integrate with other Work.

C. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

D. Employ original installer to perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.

E. Restore work with new Products in accordance with requirements of Contract Documents.

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

G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material, to full thickness of the penetrated element.

H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

END OF SECTION

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
2. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at final completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 30 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's or Owner's signature for receipt of submittals.

5. Submit testing, adjusting, and balancing records.
6. Submit sustainable design submittals not previously submitted.
7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 20 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."

6. Advise Owner of changeover in utility services.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements.
10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 20 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

## 1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.
5. Submit final completion photographic documentation.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

a. Project name.
b. Date.
c. Name of Architect
d. Name of Contractor.
e. Page number.

4. Submit list of incomplete items in the following format:

a. PDF electronic file. Architect will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1. Submit on digital media acceptable to Architect or by email to Architect.

E. Warranties in Paper Form:

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or

installation, including the name of the product and the name, address, and telephone number of Installer.

3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

F. Provide additional copies of each warranty to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural

weathering of exterior surfaces. Restore reflective surfaces to their original condition.

g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

    1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.

p. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
q. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls." Section 017419 "Construction Waste Management and Disposal."

## 3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 01 78 36 - WARRANTIES

PART 1 - GENERAL:

1.1 RELATED DOCUMENTS:

A. Drawings and Contract Documents, the Contract and General and Supplementary Conditions included in the Contract and Division-1 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers' standard warranties on products and special warranties.
   1. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.
   2. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Divisions 2 through 9.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 DEFINITIONS:

A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.4 WARRANTY REQUIREMENTS:

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace work that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Owner's Recourse: Written warranties made to the Owner, they shall not limit the duties, obligations, rights and remedies otherwise available under the law.

D. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.5 SUBMITTALS:

A. Submit written warranties to the Owner prior to the date certified for Substantial Completion. When a designated portion of the Work is completed and occupied or used by the Owner, submit properly executed warranties to the Owner within fifteen days of completion of that designated portion of the Work.

B. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner for approval prior to final execution.

C. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer.

D. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.

E. Provide warranties and bonds in full color electronic format (“PDF”).

PART 2 - PRODUCTS:

Not used

PART 3 - EXECUTION:

3.1 SCHEDULE OF WARRANTIES

A. The General Contractor shall provide a 5-year warranty for all work performed under contract to conform with the specifications, applicable codes and industry standards in addition to specific warranties for individual products.

B. Concrete (Division 3)

1. The contractor shall provide a single source materials and performance warranty for all concrete work performed to conform with the contract documents, applicable codes and industry standards and against premature deterioration for a period of five years.

2. Completed concrete repairs shall be guaranteed jointly and severally by the installation (concrete repair) contractor and by the patching material manufacturer against defects in material and application, for a period of five years from the completion of application. Defects shall include cracking in and around the patch perimeter, scaling, delamination, spalling and rust staining from underlying reinforcing steel.

C. Metals (Division 5)

1. Section 05 52 00 – Handrails and Railings

a. The manufacturer shall provide a surface finish warranty for a period of ten years minimum from the date of substantial completion. The guarantee shall include any fading and/or loss of marking due to abrasion, peeling, and/or delamination.

b. The manufacturer shall provide a system warranty for the entire railing, guardrail, and handrail systems for a period of five years. This shall include, but not be limited to, the railing assembly, all fasteners and securements, and sealants.

D. Painting (Division 9)

1. Section 09 24 00- Stucco: Completed installation of the Stucco Veneer System shall be guaranteed jointly and separately, on a single document, by the Stucco manufacturer and the installation contractor for a period of ten years starting from the date of substantial completion. The guarantee shall include any failure of the stucco system including leakage, cracking, or any other types of failure to the stucco veneer system.

E.

END OF SECTION

SECTION 01 78 39 – PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
   1. Record Drawings.
   2. Record Specifications.
   3. Record Product Data.

B. Related Sections include the following:
   1. Division 1 Section "Summary of Multiple Contracts" for coordinating Project Record Documents covering the Work of multiple contracts.
   2. Division 1 Section "Closeout Procedures" for general closeout procedures
   3. Divisions 2 through 16 Sections for specific requirements for Project Record Documents of products in those Sections.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit two sets of marked-up Record Prints.

B. Record Specifications: Submit two copies of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit two copies of each Product Data submittal.
   1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in the manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an understandable drawing technique.
    c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
2. Content: Types of items requiring marking include, but are not limited to, the following:
    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Revisions to mechanical, electrical, plumbing, heating, ventilation or air conditioning equipment or appurtenances.
    d. Changes made by Change Order or Construction Change Directive.
    e. Changes made following Architect's written orders.
    f. Details not on the original Contract Drawings.
    g. Field records for variable and concealed conditions.
    h. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record CAD Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect. When authorized, prepare a full set of corrected CAD Drawings of the Contract Drawings, as follows:
1. Format: Same CAD program, version, and operating system as the original Contract Drawings.
2. Format: DWG and PDF.
3. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.
4. Refer instances of uncertainty to Architect for resolution.
5. Architect will furnish Contractor one set of CAD Drawings of the Contract Drawings for use in recording information.
    a. Architect makes no representations as to the accuracy or completeness of CAD Drawings as they relate to the Contract Drawings.
    b. CAD Software Program: The Contract Drawings are available in AutoCad 2019.

C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

D. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
3. Identification: As follows:
    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect
    e. Name of Contractor.

## 2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of the manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Drawings, and Product Data where applicable.

## 2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Drawings, and Product Data where applicable.

## 2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.
4. Selective Demolition Schedule (Section 3.9)

B. Related Requirements:

1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 017300 "Execution" for cutting and patching procedures.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse or to store.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

## 1.5 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.
3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

## 1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Engineering Survey: Submit engineering survey of condition of building.

C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

D. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's, building manager's and other tenants' on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

E. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.

F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

G. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

H. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

I. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

## 1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

## 1.8 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

## 1.9 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

B. Owner assumes no responsibility for condition of areas to be selectively demolished.

1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.

1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.

D. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

E. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

F. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.

G. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches (300 mm) or more.

H. Storage or sale of removed items or materials on-site is not permitted.

I. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

J. Weather-Tightness: Contractor shall ensure weather-tightness during the repairs of the building's occupants. Temporary waterproofing shall be installed as required to ensure the weather-tightness during inclement weather. Any damage to the unit owner interiors is the responsibility of the contractor.

## 1.10 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

## 1.11 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

D. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

E. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

F. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Engineer.

G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

H. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

I. Survey of Existing Conditions: Record existing conditions by use of measured drawings preconstruction photographs or video and templates.

1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

## 3.2 PREPARATION

A. Refrigerant: Where applicable, before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

B. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations. Use legal and code compliant means and methods.

## 3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

## 3.4 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

D. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
2. Erect temporary protection, such as walks, fences, railings, canopies, covered passageways and vehicular barriers, where required by authorities having jurisdiction. Temporary barriers and controls shall meet the occupancy requirements of each side of the barrier.
3. Protect existing site improvements, appurtenances, and landscaping to remain.

## 3.5 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction.

Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Work in Historic Areas: Selective demolition may be performed only in areas of Project that are not designated as historic. In historic spaces, areas, and rooms, or on historic surfaces, the terms "demolish" or "remove" shall mean historic "removal" or "dismantling" as specified in Section 024296 "Historic Removal and Dismantling."

D. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area as designated by Owner or indicated on Drawings.
5. Protect items from damage during transport and storage.

E. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

F. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

## 3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

B. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

## 3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

## 3.8 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

## 3.9 SELECTIVE DEMOLITION SCHEDULE

A. The following is an itemized list included in the selective demolition scope of work (other work may be required as per drawings). Complete all work with strict adherence to the drawings and specifications.
1. Remove
    a. Existing elements of the building exterior wall and roof assemblies (and any related items) associated with the scope of work shown on the drawings and specifications.
2. Remove and Reuse
    a. Existing elements of the building exterior wall and roof assemblies (and any related items) associated with the scope of work shown on the drawings and specifications.

END OF SECTION 024119

SECTION 03 01 30.71 - CONCRETE REHABILITATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following Repair Items:
   1. Selective Floor, Overhead, and Vertical Concrete Repairs.
   2. Concrete and Reinforcement Surface Preparation
   3. Concrete Patch Repairs: Application, Placement, and Finishing.

B. Related Sections include the following:
   1. Division 1 Section “Unit Quantity Work Items”
   2. Division 1 Section “Record Documents”
   3. Division 2 Section "Selective Demolition."
   4. Division 3 Section "Cast-in-Place Concrete."

C. References:
   1. "Specifications for Structural Concrete for Buildings" (ACI 301) by American Concrete Institute, herein referred to as ACI 301, is included in total as specification for this structure except as otherwise specified herein.
   2. Comply with provisions of following codes, specifications and standards except where more stringent requirements are shown on Drawings or specified herein:
   3. "Guide for Repair of Concrete Bridge Superstructures" (ACI 546.1), American Concrete Institute.
   4. ACI 546R-96 - Concrete Repair Guide
   5. ASTM C33 - Concrete Aggregates.
   6. ASTM C143 - Standard Test Method for Slump.
   7. ASTM C138 - Test method for unit weight, yield, and air content of concrete.
   8. ASTM C150 - Portland Cement.
   9. ASTM C231 - Test for Air Content of Freshly Mixed Concrete.
   10. ASTM C260 - Air Entraining Admixtures for Concrete.
   11. ASTM C387 - Specifications for High Strength Mortars.
   12. ASTM C494 - Chemical Admixtures in Concrete.
   13. ACI 305R - Recommended Practice for Hot Weather Concreting.
   14. ACI 306R - Recommended Practice for Cold Weather Concreting.
   15. ACI 318 - Building Code Requirements for Reinforced Concrete.

1.3 UNIT PRICES

A. Unit prices include costs of field quality-control testing required by the Work for which the unit price applies.

B. Concrete Removal and Patching or Rebuilding: Work will be paid for by the square foot computed on the basis of rectangular shapes removed and replaced with average depths, widths, and lengths, measured to the nearest half.

1. Reinforcing bar replacement will be paid for separately by the pound of replacement steel with welded and mechanical splices paid for by the unit, only if specified as an item in the proposal form only.

C. Polymer Overlays: Work, which includes surface preparation, will be paid for by the square foot of exposed overlay surface.

D. Contractor shall maintain record documents of Unit Quantity work items per section “Record Documents”.

## 1.4 SUBMITTALS

A. Product Data For Proprietary Materials: Include material descriptions, chemical composition, physical properties, test data, and mixing and application instructions.

1. Include Material Safety Data Sheets, if applicable.
2. Polymer- modified concrete manufacturer’s literature, including installation instructions
3. Polymer-modified patching mortar manufacturer’s literature, including installation instructions
4. Cementitious grout manufacturer’s literature, including installation instructions
5. Sieve Analysis of aggregate for polymer-modified concrete

B. Shop Drawings: For formwork and temporary shoring and supports, prepared by or under the supervision of a qualified professional engineer. Design and engineering of formwork and temporary shoring and supports are Contractor's responsibility.

C. Qualification Data: For installers, manufacturers, and testing agency to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1. For products required to be installed by workers approved by product manufacturers, include letters of acceptance by product manufacturers certifying that installers are approved to apply their products. All applicators and installers must have minimum three years of documented experience specializing in concrete repair regardless of manufacturer’s certification.

D. Rehabilitation program for each phase of the rehabilitation process, including protection of surrounding materials and Project site during operations. Describe in detail the materials, methods, equipment, and sequence of operations to be used for each phase of the Work.

1. If alternative materials and methods to those indicated are proposed for any phase of rehabilitation work, submit substitution request complying with Division 1, and provide a written description of proposed materials and methods, including evidence of successful use on other comparable projects, and a testing program to demonstrate their effectiveness for this Project.

E. Project Closeout Manual

1. Section 01 77 00 – Closeout Procedures; 01 78 36 Warranties; 01 78 33 – Bonds; Procedures for submittals.
2. Accurately record actual locations and areas of all repairs to scale on a drawing with calculations supporting requisitioned quantities for each work item.

## 1.5 QUALITY ASSURANCE

A. Installer Qualifications: In addition to other requirements in Division 1, retain installers that employ workers trained and approved by manufacturer to apply corrosion-inhibiting treatments, concrete patching and rebuilding materials, epoxy crack injection materials, polymer overlays, polymer sealers, and composite structural reinforcement. An on-site supervisor shall be provided by the Contractor for the duration of the work. This supervisor shall have had two years of documented experience with the products to be used.

B. Manufacturer Qualifications: In addition to other requirements in Division 1, manufacturers shall have factory-trained representatives who are available for consultation and Project site inspection at no additional cost.

C. Source Limitations: Obtain concrete patching and rebuilding materials through one source from a single manufacturer:

D. Mockups: Build mockups for concrete removal and patching, floor joint repair, epoxy crack injection, polymer overlays, polymer sealers, and composite structural reinforcement to demonstrate qualities of materials and execution.

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original and unopened containers, labeled with type and name of products and manufacturers.

B. Comply with manufacturer's written instructions for minimum and maximum temperature requirements and other conditions for storage.

C. Store cementitious materials off the ground, under cover, and in a dry location.

D. Store aggregates covered and in a dry location, where grading and other required characteristics can be maintained, and contamination avoided. All aggregates used for extending patching materials shall be pre-washed prior to use in mix to remove latent impurities.

## 1.7 PROJECT CONDITIONS

A. Do not apply unless air temperature is between 40 and 80 deg F and will remain so for at least 48 hours after completion of Work. Alternate Cold-Weather practices may be submitted to Engineer for approval.

B. Cold-Weather Requirements for Cementitious Materials:

1. When above conditions are not met, concrete may be placed only if insulation or heating enclosures are provided in accordance with ACI 306, "Recommended Practice for Cold Weather Concreting." Submit proposed protective measures in writing for Engineer/Architect's review prior to concrete placement.
2. Cost for precautionary measures required shall be borne by Contractor.

C. Hot-Weather Requirements for Cementitious Materials:

1. Hot weather is defined as air temperature which exceeds 80° F. or any combination of high temperature, low humidity and high wind velocity which causes evaporation rates in excess of 0.10 psf per hr as determined by ACI 305R, Figure 2.1.5.
2. Protect repair work when temperature and humidity conditions produce excessive evaporation of water from patching materials. Provide artificial shade and wind breaks, and use cooled materials as required.
3. Do not apply to substrates with temperatures of 90 deg F (32 deg C) and above, unless approved by Engineer.

1.8 WARRANTIES:

A. Completed concrete repairs shall be guaranteed jointly and separately by the installation contractor and by material manufacturer against defects in material and application, for a period of five years from the date of substantial completion.

1. Defects shall include cracking in and around the patch perimeter, scaling, delamination, spalling and rust staining from underlying reinforcing steel.

B. All defects in concrete repair areas shall be repaired by replacing the defective concrete at no cost to the Owner. Repair work shall include removal and replacement of any coatings (elastomeric, traffic bearing, waterproofing, etc), as required, at no cost to the owner.

PART 2 - PRODUCTS

2.1 CAST-IN-PLACE READY MIXED CONCRETE

A. Concrete Materials and Admixtures: Comply with Division 3 Section "Cast-in-Place Concrete."

B. Steel and Fiber Reinforcement and Reinforcement Accessories: Comply with Division 3 Section "Cast-in-Place Concrete."

C. Form-Facing Materials: Comply with Division 3 Section "Cast-in-Place Concrete."

2.2 CONCRETE PATCH REPAIRS (BAG MATERIALS)

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

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

1. Epoxy-Modified, Cementitious Bonding and Anticorrosion Agent:

a. Sika Corporation; Armatec 110 EpoCem

2. Partial Depth Horizontal Repairs (Depth = >1") – Polymer Modified, Cementitious Patching Mortar:
   a. BASF; Master Emaco S440, Master Emaco S440 MC, Master Emaco T310CI (Extended).
   b. Sika Corporation; SikaTop 111 Plus (Extended).
3. Rapid Setting Horizontal Repairs, Cementitious Patching Mortar (NOT FOR GENERAL USE):
   a. BASF; Master Emaco T430, T1060, T1061.
   b. Sika Corporation; SikaQuick 1000.
   c. Sika Corporation; Sikacrete 211 SCC Plus (for 1” or greater)
4. Shallow Depth Scaling Repairs (1/2" –1") Cementitious Patching Mortar
   a. Sika Corporation; SikaTop 111 Plus, Neat (Use 122 Plus, Neat for less than ½")
   b. BASF; Master Emaco T310 CI, Master EmacoN300 CI, Master Emaco T302
5. Vertical and Overhead Trowel Applied, Polymer Modified Patching Mortar
   a. Sika Corporation; SikaRepair SHB, SHA with Latex R.
   b. BASF; Master Emaco N425, Master Emaco N400RS
6. Form and Pour Concrete Repair
   a. BASF; Master EmacoS440, Master Emaco S440 MC, Master Emaco S466 CI
   b. Sika Corporation; SikaTop 111 Plus, Extended
   c. Sika Corporation; Sikacrete 211 SCC Plus (self-consolidating)
7. Coarse Aggregate for Extending Patching Mortar: Washed aggregate complying with ASTM C 33, Size No. 8, Class 5S. Add only as permitted by patching mortar manufacturer.
8. Alternative products may be used only with Engineer/Architect's approval in writing prior to bidding.

2.3 AGGREGATES (ACI 301, ARTICLE 4.2.1):

1. Normal weight concrete aggregates:
   a. Coarse aggregate: Crushed and graded limestone or approved equivalent conforming to ASTM C33, Class Designation 5S.
   b. Fine aggregate: Natural sand conforming to ASTM C33 and having preferred grading shown for normal weight aggregate in ACI 302.1R, Table 4.2.1.
2. Coarse aggregate: Nominal sizes indicated below, conforming to ASTM C33, Table 2:
   a. 0.375 in. for patch cavities 0.75 to 1.5 in. deep.
   b. 0.5 in. for patch cavities greater than 1.5 in. deep and overlay work. For overlays limit maximum size of aggregates to one-third nominal thickness of overlay.

2.4 GENERAL CONCRETE MIX DESIGN

A. Selection of concrete proportions shall be in accordance with ACI 301, 4.2.3.1. Mix design shall meet following minimum requirements:

| | |
|---|---|
| Compressive Strength | 5,000 psi @ 28 days (2500 psi @ 3 days) |
| Water-Cement Ratio | 0.38 maximum |

| | |
|---|---|
| Latex Content Per Sack of Cement | 3.5 gal. |
| Slump* | 4 in. ± 2 in. |
| Cement Content | 658-800 lb./c.y. |
| Air Content | 6% - 7.5% |

*For concrete placed by vibratory screeds, slump shall not exceed 4 in. at point of deposit.

B. Bonding Grout: Bonding grout shall consist of sand, cement, and latex emulsion in proportions similar to mortar in concrete with sufficient water to form stiff slurry to achieve consistency of "pancake batter."

C. Mortar Scrub-Coat: Mix with enough water to provide a consistency of thick cream.

## 2.5 TESTING OF MORTAR MIX DESIGN

A. At least 3 weeks prior to start of patching work, the contractor shall manufacture two separately mixed test batches of patching mortar under job conditions in quantities large enough to accommodate the following:

1. Eight 2 in. cube specimens for testing to determine the compressive strength of the mortar, in accordance with ASSTM C109-86.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Notify Architect seven days in advance of dates when areas of delaminated concrete and deteriorated reinforcing bars will be located.

B. Locate areas of delamination using hammer or chain drag sounding and mark boundaries. Mark areas for removal by simplifying and squaring off boundaries of delaminated areas under supervision of the Engineer.

C. After concrete removals and surface preparation of repairs are complete, but prior to final cleaning, cavity and exposed reinforcement shall be inspected by Contractor and verified by Engineer/Architect for compliance with requirements of this Section. Where Engineer/Architect finds unsatisfactory cavity preparation, Engineer/Architect shall direct Contractor to perform additional removals. Engineer/Architect shall verify areas after additional removals.

## 3.2 PREPARATION

A. Protect people, motor vehicles, equipment, surrounding construction, Project site, plants, and surrounding buildings from injury resulting from concrete rehabilitation work.

1. Erect temporary protective covers over pedestrian walkways and at points of entrance and exit for people and vehicles that must remain in operation during course of concrete rehabilitation work.

2. Protect adjacent equipment and surfaces by covering them with heavy polyethylene film and waterproof masking tape. If practical, remove items, store, and reinstall after potentially damaging operations are complete.
3. Dispose of runoff from wet 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.

B. Shoring: Temporary shoring will be required at concrete floor repair areas and at any beam, joist, or column repair. Install temporary supports before beginning concrete removal capable of supporting all dead loads and construction loads. Review all marked removal and preparation areas and request clarification by Engineer/Architect of shoring requirements in all areas. Shores shall be in place prior to concrete removal and cavity preparation in any area requiring shores.

1. Shoring shall be carried through two levels.

C. Concrete Removal: Saw-cut perimeter of areas indicated for removal to a depth of at least 1/2 inch. Make cuts perpendicular to concrete surfaces and no deeper than cover on reinforcing. Remove loose and deteriorated concrete by breaking up and dislodging from reinforcing.

1. All concrete shall be removed from within marked boundary to minimum depth shown using 15 to 30 lb chipping hammers equipped with chisel point bits. When directed by Engineer/Architect, chipping hammers less than 15 lb shall be used to minimize damage to sound concrete. If delaminations exist beyond minimum removal depth, chipping shall continue until all unsound and delaminated concrete has been removed from cavity.
2. For scaling or scour repairs, remove (scarify or chip) concrete between cuts to a depth of at least 1/2 inch or as per drawings.
3. Where half or more of the perimeter of reinforcing bar is exposed, bond between reinforcing bar and surrounding concrete is broken, or reinforcing bar is corroded, remove concrete from entire perimeter of bar to provide at least a 3/4-inch clearance.
4. Test areas where concrete has been removed by tapping with hammer, and remove additional concrete until unsound concrete is completely removed.
5. Provide fractured aggregate surfaces with a profile of at least 1/8 inch that are approximately perpendicular or parallel to original concrete surfaces. At columns and walls, make top and bottom surfaces level.
6. Thoroughly clean removal areas of loose concrete, dust, and debris via abrasive blasting and compressed air, or high-pressure water.

D. Embedded Reinforcement and Conduit

1. Where embedded reinforcement or electrical conduit is exposed by concrete removal, exercise extra caution to avoid damaging it during removal of unsound concrete. If bond between exposed embedded reinforcement and adjacent concrete is impaired by Contractor's removal operations, Contractor shall perform additional removal around and beyond perimeter of reinforcement for minimum of 0.75 in. along entire length affected at no cost to Owner.
2. Embedded materials including, but not limited to, electrical conduit, corrosion protection systems and snow/ice melting equipment shall be protected by Contractor during removal operations. Damage due to removal operations shall be repaired by Contractor in accordance with national code requirements at no cost to Owner. Embedded materials which are defective due to pre-existing conditions may be repaired or replaced by Contractor or abandoned at Owner's option and cost.

E. Reinforcing Bar Preparation: Remove loose and flaking rust from reinforcing bars by abrasive blast cleaning, or wire brushing until only tightly bonded light rust remains.

1. All exposed steel shall be cleaned of rust to bare metal by sandblasting. Cleaning shall be completed immediately before patch placement to insure that base metal is not exposed to elements and further rusting for extended periods of time. Engineer/Architect may require entire bar diameter be cleaned.
2. After all sandblasting operations and cleanup are completed, paint all exposed steel with an approved epoxy. Protect prepared surfaces from damage prior to and during patch placement.
3. Where section loss of reinforcing bar is more than 15 percent, or 10 percent in 2 or more adjacent bars, cut bars and remove and replace, or supplement as directed by the Engineer. Remove additional concrete as necessary to provide at least a 3/4-inch (19-mm) clearance at existing and replacement bars. Splice replacement bars to existing bars according to ACI 318 Class “B” splice or greater, by lapping, or using mechanical couplings.
4. Install additional new epoxy coated steel rebars and stainless-steel pins as shown in details. Supplement defective or damaged embedded reinforcement by addition of reinforcement of equal diameter with Class "B" minimum splice per ACI 318 beyond damaged portion of reinforcement. Secure new reinforcement to existing reinforcement with wire ties and/or approved anchors. Supplemental reinforcement shall be ASTM A615 Grade 60 steel installed in accordance with Section “Cast In Place Concrete and/or “Concrete Reinforcement”.
5. Loose reinforcement exposed during surface preparation shall be securely anchored prior to patch placement. Loose reinforcement shall be adequately secured by wire ties to bonded reinforcement or shall have drilled-in anchors installed to original deck. Drilled-in anchors shall be Hilti HKT 14 "Kwik Tie" anchors, ITW Ramset/Red Head WT-1400 anchors, or approved equivalent. Engineer/Architect will determine adequacy of wire ties and approve other anchoring devices prior to their use. Securing loose reinforcement is incidental work to concrete repair surface preparation.

F. Surface Preparation for Overlays: Remove delaminated material and deteriorated concrete surface material. Roughen surface of concrete by abrasive blasting, shot blasting, scarifying, scabbling, or milling to produce a surface profile as per ICRI 03732. Sweep and vacuum roughened surface to remove debris followed by low-pressure water cleaning.

G. After removals are complete, but prior to final cleaning, cavity and exposed reinforcement shall be inspected by Contractor and verified by Engineer for compliance with requirements of this Section. Where Engineer finds unsatisfactory cavity preparation, Engineer shall direct Contractor to perform additional removals. Engineer shall verify areas after additional removals.

## 3.3 PRODUCTION OF LATEX MODIFIED CONCRETE WITH MOBILE MIXER

A. Production of latex modified mortar or concrete shall be in accordance with requirements of ACI 301, 4.3.1, except as otherwise specified herein.

B. Concrete or mortar, mixed at site, shall be proportioned by continuous mixer used in conjunction with volumetric proportioning. Volumetric batching/continuous mixers shall

conform to ASTM C685. In addition, self-contained, mobile, continuous type mixing equipment shall comply with following:

1. Mixer shall be capable of producing batches of not less than 6 cu yds.
2. Mixer shall be capable of positive measurement of cement being introduced into mix. Recording meter visible at all times and equipped with ticket printout shall indicate this quantity.
3. Mixer shall provide positive control of flow of water into mixing chamber. Water flow shall be indicated by flowmeter and shall be readily adjustable to provide for minor variations in aggregate moisture.
4. Mixer shall be capable of being calibrated to automatically proportion and blend all components of indicated composition on continuous or intermittent basis, as required by finishing operation, and shall discharge mixed material through conventional chute into transporting device or directly in front of finishing machine. Sufficient mixing capacity of mixers shall be provided to permit intended pour to be placed without interruption.
5. Mixer shall be calibrated to accurately proportion specified mix. Yield is required to be within tolerance of 1.0 %.

## 3.4 PRODUCTION OF CONCRETE PATCH MATERIAL (BAG MIX)

A. Production of latex modified mortar or concrete shall be in accordance with requirements of ACI 301, 4.3.1, except as otherwise specified herein.

B. Mix products in clean containers according to manufacturer's written instructions.

C. Add clean silica sand and coarse aggregates to products only as recommended by manufacturer.

D. Do not add water, thinners, or additives unless recommended by manufacturer.

E. When practical, use manufacturer's premeasured packages to ensure that materials are mixed in proper proportions. When premeasured packages are not used, measure ingredients using graduated measuring containers; do not estimate quantities or use shovel or trowel as unit of measure.

F. If materials are to be mixed at each repair location, crews shall be provided with quantities of partially combined ingredients, such that all materials will be used up at the same time using the design mix proportions. Crews shall be fully instructed and trained in the specific mix design proportions and in approved methods of batching materials.

G. Do not mix more materials than can be used within recommended open time. Discard materials that have begun to set.

H. Mechanically mix with a low speed drill (400 to 600 rpm) and paddle or in appropriate sized mortar mixer. Use manufacturers recommended mortar paddles.

## 3.5 PREPARATION (ACI 301, 5.3.1)

A. Bonding Grout:

1. Bonding grout shall be applied to damp (but not saturated) concrete surface in uniform thickness of 0.0625 in. to 0.125 in. over all surfaces to receive patching or overlay.

2. Grout shall not be allowed to dry or dust prior to placement of patch or overlay material. If concrete placement is delayed and the coating dries, cavity or surface shall not be patched or overlaid until it has been recleaned and prepared as specified. Grout shall not be applied to more area than can be patched or overlaid within 0.5 hr by available manpower.

## 3.6 APPLICATION

A. Epoxy-Modified, Cementitious Anticorrosion Agent: Apply to reinforcing bars by stiff brush or hopper spray according to manufacturer's written instructions. Apply to reinforcing bars in two coats, allowing first coat to dry two to three hours before applying second coat. Allow to dry before placing patching mortar or concrete.

B. Mortar Scrub-Coat: Dampen repair area and surrounding concrete 6 inches beyond repair area. Remove standing water and apply scrub-coat with a brush, scrubbing it into surface and thoroughly coating repair area. If scrub-coat dries, recoat before applying patching mortar or concrete.

C. Patching Mortar: Unless otherwise recommended by manufacturer, apply as follows:

1. Wet substrate thoroughly and then remove standing water (Saturated Surface Dry). Scrub a slurry of neat patching mortar mixed with latex bonding agent into substrate, filling pores and voids.
2. Place patching mortar by troweling toward edges of patch to force intimate contact with edge surfaces. For large patches, fill edges first and then work toward center, always troweling toward edges of patch. At fully exposed reinforcing bars, force patching mortar to fill space behind bars by compacting with trowel from sides of bars.
3. For vertical patching, place material in lifts no greater than manufacturer's recommendations. Do not feather edge.
4. For overhead patching, place material in lifts no greater than manufacturer's recommendations. Do not feather edge.
5. After each lift is placed, consolidate material and screed surface.
6. Where multiple lifts are used, score surface of lifts to provide a rough surface for application of subsequent lifts. Allow each lift to reach final set before placing subsequent lifts.
7. Allow surfaces of lifts that are to remain exposed to become firm and then finish to a smooth surface with a wood or sponge float or broom or burlap drag.
8. Wet-cure cementitious patching materials, including polymer-modified, cementitious patching materials, for not less than seven days by water-fog spray or water-saturated absorptive cover.
9. Use water based curing compound for overhead and vertical repairs where wet cure is not feasible. Curing compound must then be removed after seven days at surfaces that are to receive coatings.

D. Dry-Pack Mortar: Use for deep cavities and where indicated. Place according to manufacturer's written instructions and as follows:

1. Provide forms where necessary to confine patch to required shape.
2. Wet substrate and forms thoroughly and then remove standing water.
3. Place dry-pack mortar into cavity by hand, and compact into place with a hardwood drive stick and mallet or hammer. Do not place more material at a time than can be properly

compacted. Continue placing and compacting until patch is approximately level with surrounding surface.

4. After cavity is filled and patch is compacted, trowel surface to match profile and finish of surrounding concrete. A thin coat of patching mortar may be troweled into the surface of patch to help obtain required finish.
5. Wet-cure patch for not less than seven days by water-fog spray or water-saturated absorptive cover.

E. Concrete: Place according to Division 3 Section "Cast-in-Place Concrete" and as follows:

F. Form and Pour/Pump Repairs: Use where indicated. Place as follows:

1. Design and construct forms to resist pumping pressure in addition to weight of wet grout. Seal joints and seams in forms and junctions of forms with existing concrete.
2. Apply epoxy-modified, cementitious bonding and anticorrosion agent to reinforcing and concrete substrate.
3. Wet-cure concrete for not less than seven days by leaving forms in place or keeping surfaces continuously wet by water-fog spray or water-saturated absorptive cover.
4. Repair voids with patching mortar and finish to match surrounding concrete.

## 3.7 PLACING AND FINISHING

A. Placing (ACI 301, 5.3.2)

1. Concrete shall be deposited as close to its final position as possible. All concrete placement shall be continuous and terminated only at bulkheads and designated construction joints.
2. Concrete shall be manipulated and struck off slightly above final grade. Concrete shall then be consolidated and finished to final grade with internal and surface vibration devices.
3. On ramps with greater than 5 percent slope, all concreting shall begin at the low point and end at high point. Contractor shall make necessary adjustments to slump or equipment without any irregularities or roughness.
4. Partial Depth Placement: After the bonding grout has been applied, concrete shall be placed, consolidated by vibration, and shall be finished. Placing of concrete shall be such that it shall be deposited as nearly as possible in its final position to avoid segregation, due to rehandling or flowing. Placing shall be such that at all times concrete shall be plastic and flow readily into corners of forms and into spaces between rebars.
5. No concrete that is partially hardened or that has been contaminated by foreign material shall be deposited.
6. When being deposited, concrete shall not be allowed to fall a vertical distance greater than four ft. from point of discharge to point of deposit. Pencil vibrators shall be used, as appropriate, to ensure that proper consolidation is achieved. The concrete shall be continuously rodded or vibrated with pencil vibrators during placement to consolidate the pour and fill all corners of the repair.
7. External vibration of the formwork may also used, by placing the pencil vibrators against the forms.
8. All overhead polymer-modified concrete repair locations, air holes shall be provided at opposite ends of concrete installation ports to avoid entrapping air pockets. These holes shall be packed with the patching mortar at the conclusion of concrete placement.

9. For overlays concrete consolidation shall be by vibrating screeds meeting following requirements:
    a. Placing and finishing equipment shall not exceed maximum weight of 6,000 lbs or 3,000 lbs per axle.
    b. Screed shall be designed to consolidate concrete to 98% of unit weight determined in Section 2.04.A in accordance with ASTM C138. Sufficient number of identical vibrators shall be effectively installed such that at least 1 vibrator is provided for each 5 ft of screed length.
    c. Bottom face of screeds shall not be less than 4 in. wide and shall be metal covered with turned-up or rounded leading edge to minimize tearing of surface of plastic concrete.
    d. Screed shall be capable of forward and reverse movement under positive control. Screed shall be provided with positive control of vertical position and angle of tilt.
    e. Screed shall be capable of vibrating at controlled rate, adjustable to between 3,000 and 6,000 vpm.

B. Finishing (ACI 301, Chapters 10 and 11)
1. All flatwork finishers shall hold current ACI Flatwork Finishers Certification.
2. The concrete shall be finished with hand held trowels to specified elevation.
    a. Finishing tolerance: ACI 301, 5.3.4.2; Class B tolerance.
    b. Finish all concrete surfaces to proper elevations to insure that all surface moisture will drain freely to floor drains, and that no puddle areas exist. Contractor shall bear cost of any corrections to provide for positive drainage.
3. The surface shall then receive a light broom finish.
4. The reinforcing steel shall have a minimum concrete cover as shown on plans.
5. The finished concrete shall be protected by barricades with lights, until the completion of the required curing period.

C. Joints in Concrete (ACI 301, 2.2.2.5):
1. Construction, control and isolation joints are located and detailed on Drawings:
    a. Tool joints at time of finishing. Sawcut joints are prohibited.
    b. Isolation joints - interrupt structural continuity resulting from bond, reinforcement or keyway.
    c. Coordinate configuration of tooled joints with control joint sealants.

D. Curing:
1. Latex modified mortar and concrete shall be cured according to latex manufacturer's recommendations and according to following minimum requirements:
    a. Surface shall be covered with single layer of clean, wet burlap as soon as surface will support it without deformation. Cover burlap with continuous single thickness of polyethylene film for 24 hrs.
    b. After 24 hrs remove polyethylene film and allow burlap to dry slowly for an additional 24 to 48 hrs.
    c. Remove burlap and allow concrete to air dry for an additional 48 hrs.
    d. Curing time shall be extended, as Engineer/Architect directs, when curing temperature falls below 50° F.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to sample materials and perform tests specified in Division 3 Section "Cast-in-Place Concrete" and as follows:

1. Patching Mortar, Packaged Mixes: Eight 3" randomly selected samples tested according to ASTM C 928.
2. Patching Mortar, Field Mixed: Eight 3" randomly selected samples tested for compressive strength according to ASTM C 109/C 109M.

END OF SECTION

SECTION 03200 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The extent of concrete reinforcement is shown on the drawings and in schedules.

B. The work includes furnishing, fabrication and placement of reinforcement for cast-in-place concrete, including bars, welded wire fabric, ties and supports.

1.02 QUALITY ASSURANCE

A. Codes and Standards: Comply with requirements of the following codes and standards, except as herein modified:

1. American Welding Society, AWS D12.1 "Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction".

2. American Concrete Institute, ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures.

3. American Concrete Institute, ACI 318 "Building Code Requirements for Reinforced Concrete".

1.03 SUBMITTALS

A. Manufacturer's Data:

1. Submit copies of manufacturer's specifications and installation instructions for all proprietary materials and reinforcement accessories.

B. Mill Certificates:

1. Contractor shall furnish the Architect 5 copies of the manufacturer's records of chemical and physical properties of all heats of billet steel bars and, 5 copies of an affidavit for all material stating that the respective material furnished meets the requirements for the steel reinforcement specified. Manufacturers records shall include certificates of mill analysis, tensile and bend tests.

C. Shop Drawings:

1. Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with the ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures". Show bar schedules, stirrup spacing, diagrams of bent bars, arrangements and assemblies, as required for the fabrication and placement of concrete reinforcement.

1.04 DELIVERY, HANDLING & STORAGE

A. Deliver reinforcement to the project site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

B. Store concrete reinforcement materials at the site to prevent damage and accumulation of dirt or excessive rust.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Reinforcing Bars: ASTM A615, deformed billet-steel bars and as follows:

1. Provide Grade 60 for bars No. 3 to 18, ties and stirrups.

B. Welded Wire Fabric: ASTM A185.

1. Furnish in flat sheets, not rolls, unless rolls are acceptable to the Architect.

2. Furnish epoxy coated wire mesh in pour strips over precast concrete members.

C. Supports for Reinforcement: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcement in place.

1. Use wire bar type supports complying with CRSI recommendations, unless otherwise indicated. Do not use wood, brick, and other unacceptable materials.

2. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

3. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with either hot-dip galvanized, stainless steel or plastic tip protected legs, at Contractor's option.

a. Chairs and metal accessories supporting epoxy coated rebar shall also be epoxy coated.

4. Over waterproof membranes, use precast concrete chairs to prevent penetration of the membrane.

D. Epoxy Coated Reinforcing Bars: Provide fusion bonded epoxy coated reinforcing bars conforming to the requirements of ASTM A775, where indicated on the drawings and specified herein.

Provide epoxy coated rebar at the following locations:

1. Top and bottom steel in slabs, curbs on supported deck, beams and girders including stirrups and support steel for reinforcing steel and post-tensioning cables and anchors.

a. Tie wire for epoxy coated bars: Minimum 16 gauge annealed wire, epoxy coated or PVC coated.

2. Pour Strips

E. Epoxy Patching Compound: ASTM A775-88a.

F. Welded Reinforcing Bars: ASTM A706, Grade 60.

2.02 FABRICATION

A. General: Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI "Manual of Standard Practice". In case of fabricating errors, do not re-bend or straighten reinforcement in a manner that will injure or weaken the material.

B. Unacceptable Materials: Reinforcement with any of the following defects will not be permitted in the work:

1. Bar lengths, depths and bends exceeding specified fabrication tolerances.

2. Bend or kinks not indicated on drawings or final shop drawings.

3. Bars with reduced cross-section due to excessive rusting or other cause.

4. Bars heated for bending unless so indicated on the plans.

PART 3 - EXECUTION

3.01 INSTALLATION

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

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

C. 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.

1. Place reinforcement to obtain the minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports together with 16 gauge wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.

D. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with 16-gauge wire. Do not make end laps midway between supporting beams, or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps.

E. Provide sufficient numbers of supports and of strength to carry reinforcement. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

F. Splices:

1. Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying. Comply with requirements of ACI 318 for minimum lap of spliced bars.

2. Do not make splices at points of maximum stress if possible.

3. Stagger top splices, and in horizontal wall reinforcement separate at least five (5) ft. longitudinally in alternate bars of opposite tiers.

4. Stubs and dowels required to receive and engage subsequent work shall extend a sufficient length to develop the strength of the bar. Place dowel and stub bars in the forms and secure against displacement during the placing of concrete. Where stub steel

and dowels extend through construction joints in walls, they shall be thoroughly cleaned of adhering particles of concrete, before continuing the placing of any subsequent concrete.

3.02 PLACING EPOXY-COATED BARS

A. Handle epoxy-coated bars with equipment having protected contact areas. Lift bundles of coated bars at multiple pick-up points to minimize bar-to-bar abrasion from sags in the bundles. Do not drop or drag bars or bundles. Store on protected cribbing.

B. Place epoxy-coated bars in the same general manner as required for uncoated bars. Use only supports, ties, spacers, clips, tie wire, and miscellaneous accessories with epoxy or other protected coating compatible with the epoxy protection.

C. Tack welding of crossing bars to assemble coated reinforcement will not be permitted.

D. Do not field bend epoxy-coated bars partially embedded in concrete, unless specifically approved for each case. Repair damage to coating of field bent bars with the epoxy-patching compound.

E. Do not field cut epoxy-coated bars, unless specifically approved. When cutting is allowed, coat the cut ends with the same epoxy patching material used to repair the epoxy coating.

F. Repair all damage to the epoxy coating with epoxy patching compound.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 032000 "Concrete Reinforcement"

1.3 Unit Price – Measurement and Payment

1. Concrete Slab on fill or Grade: By the square foot or as described in the bid form.
2. Concrete Vertical in Forms: By the square foot or as described in the bid form.
3. Concrete - Includes concrete, reinforcement, placement accessories, consolidating and leveling, troweling, climate protection and curing.
4. Bar Reinforcement: By the pound or as described in the bid form. Includes reinforcement, placement, and accessories.
5. Wire Mesh Reinforcement: By the square foot or as described in the bid form. Includes wire mesh reinforcement, placement and accessories.
6. Formwork: Paid for as part of concrete work as specified in bid form

1.4 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.5 References

A. ACI 211.1 - Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

B. ACI 211.2 - Selecting Proportions for Structural Lightweight Concrete.

C. ACI 301 - Structural Concrete for Buildings.

D. ACI 302 - Guide for Concrete Floor and Slab Construction.

E. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

F. ACI 305R - Hot Weather Concreting.

G. ACI 306R - Cold Weather Concreting.

H. ACI 308 - Standard Practice for Curing Concrete.

I. ACI 318 - Building Code Requirements for Reinforced Concrete.

J. ACI 347 – Recommended Practice for Concrete Formwork

K. ACI SP 66 – American Concrete Institute Detailing Manual

L. ASTM C33 - Concrete Aggregates.

M. ASTM C94 - Ready-Mixed Concrete.

N. ASTM C138 - Test method for unit weight, yield, and air content of concrete.

O. ASTM C150 - Portland Cement.

P. ASTM C260 - Air Entraining Admixtures for Concrete.

Q. ASTM C330 - Light Weight Aggregates For Structural Concrete.

R. ASTM C494 - Chemical Admixtures for Concrete.

S. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

T. AWS D1.4 - Structural Welding Code for Reinforcing Steel

U. AWS D12.1 – Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete Subcontractor.
e. Special concrete finish Subcontractor.

f. Owner's Independent testing agency responsible for field quality control
g. Primary admixture manufacturers and color admixture manufacturer
h. Architect or Owner's representative

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications.

## 1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Indicate pertinent dimensions, materials, bracing and arrangement of joints and ties.

C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

D. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

E. Epoxy Coating for Reinforcement:
1. Written certification from coating manufacture that coating resin for reinforcement has been approved by National Bureau of Standards.
2. Written information from coating manufacture on proper us and application of coating resin.
3. Coating applicator's written certification of results of quality control program.

F. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

G. Samples: For waterstops, vapor retarder, or any other item as required by Architect or Engineer

## 1.8 INFORMATIONAL SUBMITTALS

A. General: Submit the following in accordance with Section 013300

B. Product data for proprietary materials and items, including forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others as requested by Engineer.

C. The Contractor shall submit trial mix proportion with compressive strength test results to the Engineer for approval. Proportion design mixes as defined in ACI 301 Article 3.9. Include the following information for each concrete mix design submission:
   1. Method used for mix design
   2. Gradation of fine and coarse aggregates (ASTM C33).
   3. Proportions of all admixtures added at the plant or at job site.
   4. Water/cement ratio.
   5. Slump (ASTM C143).
   6. Certification of chloride content of admixtures.
   7. Air Content of freshly mixed concrete (ASTM C31 and ASTM C173)
   8. Unit weight of concrete (ASTM C138).
   9. Strength at 3, 7, 28 days.

D. The Owner's Testing Agency shall submit test results of cylinders for each day's testing, information shall include the following:
   1. Slump (ASTM C143).
   2. Air Content of freshly mixed concrete (ASTM C31 and ASTM C173)
   3. Unit weight of concrete (ASTM C138).
   4. Strength at 3, 7, 28 days.
   5. Concrete temperature at placement time.
   6. Air temperature at placement time.

E. The contractor shall submit the proposed pouring sequence and construction joint layout for approval by the Engineer.

F. Qualification Data: For Installer, manufacturer, and testing agency.

G. Welding certificates.

H. Material Certificates: For each of the following, signed by manufacturers:

   1. Cementitious materials.
   2. Admixtures.
   3. Form materials and form-release agents.
   4. Steel reinforcement and accessories.
   5. Fiber reinforcement.
   6. Waterstops.
   7. Curing compounds.
   8. Floor and slab treatments.
   9. Bonding agents.
   10. Adhesives.
   11. Vapor retarders.
   12. Semirigid joint filler.
   13. Joint-filler strips.
   14. Repair materials.

I. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

J. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

K. Field quality-control reports.

L. Minutes of preinstallation conference.

1.9 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of codes, specifications, standards, except where more stringent requirements are shown or specified.

B. The General Contractor, concrete sub-contractors shall have a minimum of five years of experience in performing work similar to that shown on the drawings and specifications. A statement of qualification should be submitted at the time of bidding.
1. The contractor shall submit a list of five projects at the time of bidding, in which similar work to that specified was successfully completed. This list shall contain the following for each of the five projects.
    a. Project Name
    b. Owner of Project
    c. Owner’s Representative, Address and Telephone Number
    d. Brief Description of Work
    e. Cost of Portion of Work Similar to that Specified in this Section
    f. Total Restoration Cost of Project
    g. Date of Completion

C. Materials and installed work may require testing and retesting at any time during progress of work. Retesting of rejected materials for installed work, shall be done at Contractor’s expense.

D. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

E. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

F. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

G. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.

H. Mockups: Cast concrete slab-on-grade and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.

1. Build panel approximately 200 sq. ft. (18.6 sq. m) for slab-on-grade and 200 sq. ft. (9.3 sq. m) for formed surface in the location indicated or, if not indicated, as directed by Architect.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

I. Provide Engineer with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.

J. Welders and Welding procedures shall conform to requirements of AWS D1.4. Except where shown on drawings welding of rebars is prohibited unless accepted by the Engineer in writing. Submit under provisions of Section 01400 Manufacturer's Certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months.

K. Microsilica Modified Concrete:
1. Technical Support: The microsilica admixture manufacturer shall make available a qualified individual to assist the Contractor and Consultantas specified in this Section. The manufacturer's representative shall be experienced in the placement of microsilica concrete. The manufacturer's representative must be approved by the Consultant before any work under this item can begin.
2. Microsilica Concrete Mixture Proportions: Contractor shall submit microsilica concrete mixture proportions to the Consultant two weeks prior to placing microsilica concrete. Proportion mixture as defined in ACI 301 Article 3.9, except that microsilica concrete proportions shall only be established on the basis of laboratory or field trial batches. Required average compressive strength shall be determined in accordance with Table 3.9.2.2 of ACI 301. Mixture proportions shall be reviewed by the microsilica admixture manufacturer's representative prior to submittal to the Consultant. Include the following information for each microsilica concrete mixture:
    a. Grading of fine and coarse aggregates
    b. Proportions of all ingredients including all admixtures added either at the time of batching or at the job site
    c. Water-cement ratio and water (cement + silica fume) ratio.
    d. Slump – ASTM C143
    e. Air content of freshly mixed microsilica concrete by the pressure method, ASTM C231, or the volumetric method, ASTM C173.
    f. Unit weight of microsilica concrete – ASTM C138
    g. Compressive strength at 3,7, and 28 days – ASTM C39
3. Contractor shall submit the following at the preconstruction meeting:

a. Proposed procedures for placing, finishing, and curing microsilica concrete
b. Proposed procedures for protecting microsilica concrete from drying and plastic shrinkage cracking during the placing and finishing process
c. Proposed procedures for protecting fresh microsilica concrete from rain or other adverse weather

4. In addition to the requirements of Section 3.02, two 4 x 8 inch cylinders of the desired concrete mix shall be prepared. These cylinders shall be water cured for 28 days and air cured from 28 days and shall be tested for rapid chloride permeability in accordance with Test Method AASHTO T277-83. Specimens shall be tested at an age of 35-56 days. Acceptable test results are as follows: All specimens must be in the "Very Low Permeability" range. Test results shall be reported to the Consultant. Note that these test results shall be used to determine acceptability of proposed mixture proportions only and not as an acceptance criterion for production concrete.
   a. The contractor shall prepare 2-4x8 inch cylinders for every 100 cu. yds. of concrete poured.
   b. Testing of cylinders for rapid chloride permeability will be performed and paid for by the Contractor.

## 1.10 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

## 1.11 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement:
   1. Deliver reinforcement to the Project Site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.
   2. Protection: Use all means necessary to protect concrete reinforcement before, during, and after installation and to protect the materials and installed work of all trades. Take all necessary precautions to maintain identification of fabricated bars after bundles are broken.
   3. Storage: Store concrete reinforcement materials at the site to prevent damage and accumulation of dirt or excessive rust.
   4. Epoxy-coated reinforcing bars: Epoxy-coated reinforcing bars shall be stored on protective cribbing. Use spreader bars to lift bundles of coated steel to prevent bar-to bar abration. Do not drag coated steel bars. After placement restrict traffic on coated steel to prevent damage. Coating damage due to handling, shipment and placing need not be repaired where the damaged area is 0.1 square inches or smaller; damaged areas larger than 0.1 square inches shall be repaired as instructed in the specification; the maximum amount of damage including repaired and unrepaired areas shall not exceed 2 percent of the surface area of each bar.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

1.12 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures. Methods and means must be approved by Project Engineer.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M), and as follows:
1. Methods and means must be approved by Project Engineer.

2. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 (ACI 301M).
2. ACI 117 (ACI 117M).

2.2 FORM-FACING MATERIALS

A. Deliver void forms and installation instructions in manufacturer’s packaging.

B. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

C. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.

b. Medium-density overlay, Class 1 or better; mill-release agent treated, and edge sealed.
c. Structural 1, B-B or better; mill oiled, and edge sealed.
d. B-B (Concrete Form), Class 1 or better; mill oiled, and edge sealed.

3. Overlaid Finnish birch plywood.

D. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit; sound undamaged sheets with clean, true edges.

E. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

F. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

G. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

H. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

I. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

J. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

K. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive damp proofing or waterproofing.

## 2.3 STEEL REINFORCEMENT

A. All reinforcing rebars and wire mesh used in this project shall be epoxy coated, unless noted otherwise on drawings.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

D. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M epoxy coated, with less than 2 percent damaged coating in each 12-inch (300-mm) bar length.

E. Plain-Steel Wire: ASTM A 1064/A 1064M

F. Deformed-Steel Wire: ASTM A 1064/A 1064M.

G. Epoxy-Coated Wire: ASTM A 884/A 884M, Class A, Type 1 coated, with less than 2 percent damaged coating in each 12-inch (300-mm) wire length.

H. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets. Yield strength 65 ksi. Mats only, roll stock is prohibited.

I. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet. Yield strength 65 ksi. Mats only, roll stock is prohibited.

J. Galvanized-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from galvanized-steel wire into flat sheets.

K. Epoxy-Coated Welded-Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1.

## 2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

B. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, ASTM A 775/A 775M epoxy coated.

C. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.

D. Zinc Repair Material: ASTM A 780/A 780M.

E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

F. Tie Wire: Wire shall be 16 gauge or heavier, black-annealed. Epoxy-coated reinforcing bars shall be tied with plastic coated, epoxy coated, or nylon-coated tie wire or other acceptable materials.

G. For epoxy grouting reinforcing steel use the "Hilti; HIT Dowelling (C-100) Adhesive" supplied by Hilti Fastening Systems, 4115 South 100th East Avenue, Tulsa, OK 74146. Follow manufacturer's directions for installation and required surface preparation.

## 2.5 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I or Type III.
2. Fly Ash: Use is not permitted unless with written permission from engineer. According to ASTM C 618.
3. Slag Cement: Use is not permitted, unless instructed by engineer. According to ASTM C 989/C 989M, Grade 100 or 120.
4. Blended Hydraulic Cement: Use is not permitted, unless instructed by engineer. According to ASTM C 595/C 595M.
5. Silica Fume: ASTM C 1240, amorphous silica.
    a. W.R..Grace Co. – Force 10,000
    b. Or approved equal
    c. Microsilica shall come from the same source throughout the project. If a single primary source of microsilica cannot be maintained throughout a project, then laboratory testing of proposed sources shall be conducted before a change in the primary source shall be approved. This laboratory testing shall demonstrate to the satisfaction of the Consultant that use of microsilica from the proposed source will cause no detrimental changes in microsilica concrete performance. Such testing shall be at no cost to the owner.

C. Normal-Weight Aggregates: ASTM C 33/C 33M, coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal. Conforming to ASTM C33, Table 2
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
3. Chloride ion level in aggregate shall be tested by laboratory making trial mixes. Test shall conform to FHA Report No. FHWA-RD-77-85, “Sampling and Testing for Chloride Ion in Concrete” or AASHTO Method T260. Water soluble chloride ion content of mix from all constituents shall not exceed 0.1% by weight of cement.

D. Air-Entraining Admixture: ASTM C 260/C 260M. Certified by manufacturers to be compatible with other required admixtures.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    a. "Air-Mix" Euclid Chemical Co.
    b. "Darex AEA" or "Daravair," W.R. Grace & Co.
    c. "MasterAir VR10" or "MasterAir AE 200" BASF Master Builders Solutions.

d. "Sika AER," Sika Corp.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

F. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
   a. "Eucon WR-75 or Eucon MR" Euclid Chemical Co.
   b. "WRDA with Hycol," W.R. Grace & Co.
   c. "MasterPozzolith 322 or MasterPolyheed 997," BASF Master Builders Solutions.
   d. "Plastocrete 161," Sika Corp.

G. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
   a. "Eucon Retarder 75," Euclid Chemical Co.
   b. "Daratard-17," W.R. Grace & Co.
   c. "MasterSet R," BASF Master Builders Solutions.
   d. "Plastiment," Sika Corporation.

H. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F or G.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
   a. "Eucon 37, Eucon 1037 or Plastol 5000" Euclid Chemical Co.
   b. "Daracem," W.R. Grace & Co.
   c. "MasterRheobuild 1000" BASF Master Builders Solutions.
   d. "Sikament 300," Sika Corp.

I. Calcium Nitrite-Based Corrosion Inhibitor.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
   a. “DCI” or “DCI-s Corrosion Inhibitor”, WR Grace & Co.
   b. “MasterLife CI 30”, BASF Master Builders Solutions
   c. “Eucon CIA”, The Euclid Chemical Company

J. Admixtures for Colored Concrete:
1. For colored concrete, use L. M. Scofield “color Admixtures” in strict accordance with manufacturer’s recommendations. Provide color as shown on plans. Dosage of color depends on the amount of cement used in the mix. Contractor to coordinate with ready mix supplier and color manufacturer for dosage.
2. For stamped concrete, use L. M. Scofield “Lithochrome Color Hardner”. Provide color as shown on plans and in strict accordance with manufacturer’s recommendations.

K. Water: ASTM C 94/C 94M and potable.

## 2.6 FIBER REINFORCEMENT

A. Synthetic Micro-Fiber: Fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1 to 2-1/4 inches (25 to 57 mm) long.
   1. Acceptable Manufacturers
      a. FORTA Corporation, 100 FORTA Drive, Grove City, PA 16127
      b. FIBERMESH COMPANY, 4019 Industry Drive, Chattanooga TN 37416
   2. Mixing
      a. Fibermesh shall be added at a rate of 1.6 lbs./cu.yd. minimum
   3. Physical Properties
      a. Chemical: Fibrous reinforcement shall be chemically and alkali inert, virgin polypropylene.
      b. Configuration: Fibrous reinforcement shall be in collated fibrillated (connected screen) form and also in twisted bundle form.
      c. Length: The fibrous bundle length shall be a minimum of 1.0".
      d. Specific Gravity: 0.91
      e. Modulus of Elasticity: 0.70 x 10 to the 6th p.s.i.
      f. Tensile Strength: 70,000 p.s.i. minimum

## 2.7 WATERSTOPS

A. Flexible Rubber Waterstops: CE CRD-C 513,[ with factory-installed metal eyelets,] for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
   1. Profile: Flat dumbbell with center bulb
   2. Dimensions: 4 inches by 3/16 inch thick (100 mm by 4.75 mm thick); nontapered.

B. Chemically Resistant Flexible Waterstops: Thermoplastic elastomer rubber waterstops with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints; resistant to oils, solvents, and chemicals. Factory fabricate corners, intersections, and directional changes.
   1. Profile: Flat dumbbell with center bulb
   2. Dimensions: 4 inches by 3/16 inch thick (100 mm by 4.75 mm thick); nontapered.

C. Flexible PVC Waterstops: CE CRD-C 572,[ with factory-installed metal eyelets,] for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
   1. Profile: Flat dumbbell with center
   2. Dimensions: 4 inches by 3/16 inch thick (100 mm by 4.75 mm thick; nontapered.

D. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).

E. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer-modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch (10 by 19 mm).

## 2.8 VAPOR RETARDERS

A. Vapor Barrier: A flexible, preformed sheer membrane having a water-vapor permeance rate no greater than 0.012 perms when tested in accordance with ASTM E154, Section 7 and otherwise conforming to ASTM E1475, Class B or higher. Vapor barrier shall be no less than 10 mils thick in accordance with ACI 302.1R-96.
   1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following: a. b.
      a. "Griffolyn Vaporguard," Reef Industries.
      b. "Stego Wrap (15 mils) Vapor Barrier," Stego Industries L.L.C., San Juan Capistrano, CA, PH: 877-464-7834.
      c. "Premoulded membrane with PLASMATIC CORE," W.R. Meadows.

## 2.9 FLOOR AND SLAB TREATMENTS

A. Slip-Resistive Emery Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive, crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials with 100 percent passing No. 8 (2.36-mm) sieve.

B. Slip-Resistive Aluminum Granule Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of not less than 95 percent fused aluminum-oxide granules.

C. Emery Dry-Shake Floor Hardener: Unpigmented, factory-packaged, dry combination of portland cement, graded emery aggregate, and plasticizing admixture; with emery aggregate consisting of no less than 60 percent of total aggregate content.

   1. Color: As selected by Architect from manufacturer's full range.

D. Metallic Dry-Shake Floor Hardener: Unpigmented, factory-packaged, dry combination of portland cement, graded metallic aggregate, rust inhibitors, and plasticizing admixture; with metallic aggregate consisting of no less than 65 percent of total aggregate content.

   1. Color: As selected by Architect from manufacturer's full range.

E. Unpigmented Mineral Dry-Shake Floor Hardener: Factory-packaged dry combination of portland cement, graded quartz aggregate, and plasticizing admixture.

## 2.10 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

## 2.11 CURING MATERIALS

A. Clear Curing and Sealing Compound (A.I.M. Regulations – VOC Complaint, 350 g/l): Liquid-type membrane-forming curing compound, clear styrene acrylate type, complying with ASTM

C1315, Type I, Class A, 25% solid contents minimum. Moisture loss not more than 0.4 Kg./sq.m. when applied at 300 sq. ft./gal.

1. Available Products for normal concrete: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    a. "Super Diamond Clear VOX, or Super Rez Seal Vox" Euclid Chemical Company.
    b. "Masterkure100WB," BASF Master Builders Solutions.

B. Curing Compound (Strippable) – VOC Complaint, 350 g/l): The water based compound shall conform to ASTM C 309. Use strippable curing compound on surfaces to be covered with finish or coating material applied directly to concrete, such as liquid densifier/sealer, waterproofing, dampproofing, membrane roofing, flooring, painting, and other coatings and finish materials.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    a. "Kurez DR VOX" Euclid Chemical Company

C. For colored concrete use “Lithochrome Colorwax” by L.M. Scofield Company.

D. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

E. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

F. Water: Potable.

## 2.12 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 according to ASTM D 2240.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

## 2.13 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 5000 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

## 2.14 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

C. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

## 2.15 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Prepare design mixes for concrete by laboratory trial batch or field experience methods as specified in ACI 301. Use an independent testing facility acceptable to the Engineer for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.

B. Submit written reports to the Engineer of each proposed mix at least 15 days prior to start of work. Do not begin concrete production until proposed mix designs have been reviewed and approved by the Engineer.

C. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:
   1. Except where otherwise indicated, concrete types and minimum 28-day compressive strengths shall be as follows:
      a. Slab-on-grade: 5000 psi regular weight
      b. Drilled piers, footings, foundation walls, pads, grade beams: 4000 psi regular weight
      c. Elevated slabs, toppings, beams, girders: 5000 psi regular weight
      d. Parapets and knee walls: 5000 psi regular weight
      e. Columns and corbels: 5000 psi regular weight
      f. Stairs and elevator tower walls: 5000 psi regular weight
      g. All other: 4000 psi regular weight
   2. Maximum water-to-cement ratio is as follows:
      a. Elevated Deck: 0.38
      b. Foundation and columns: 0.40
      c. Slab-on-grade and toppings: 0.45
   3. All concrete exposed to weather and/or freeze-thaw shall be air entrained with 6.0 ± 1.5 % air content. (Including interior structural elements which may be subject to weathering elements due to a construction schedule – consult the engineer.)
   4. Fiber reinforcement – 1.6 lb/cu.yd.
   5. Use high-range water-reducing admixture (Superplasticizer) in concrete for placement and workability.
   6. Use admixtures for water reduction and set control in strict compliance with manufacturer's directions.
   7. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
      a. Not more than 3 inches initial slump.
      b. Not more than 8 inches final slump after the addition of plasticizing agent.
   8. Add microsilica as required

## 2.16 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## 2.17 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

2. When using Fibrous Reinforcement
   a. The fibrous reinforcement shall be used at the rate of 1.6 pounds (minimum) per cubic yard of concrete.
   b. The fibrous reinforcement shall be added directly into the concrete either at the batch plant or at the job site. If added at the batch plant with the aggregates, typically no additional site mixing time is required. If a superplasticizer is used, the fibrous reinforcement shall be added first. If the mixing drum contains less than 50% of capacity (i.e. 4 cubic yards in a 10 cubic yard capacity drum), back the concrete up to the top of discharge and empty the fibrous reinforcement directly on top of the concrete before mixing.
   c. Fibrous reinforced concrete shall be moved and placed per standard A.C.I. recommendations. Tined rakes are prohibited as a means of moving the fibrous concrete. If pumping or shooting fibrous concrete, elevate ready mix discharge chute approximately 12" (or higher) above the pump grate or screen to improve the fibrous concrete flow into the pump.
   d. Standard A.C.I. recommended finishing practices apply for fibrous concrete with the following additional considerations:
      1) Hard-Trowel Finish - Avoid Wood trowels and floats which are abrasive to the surface - use steel/magnesium tools.
      2) Textured Finish - use stiff-bristled broom (bristles stiffer than the fibers themselves) and brush in only one direction.
      3) Cure and joint properly per A.C.I. standard recommendations.
   e. It should be noted that fibrous reinforced concrete bleeds less and slightly slower than unreinforced concrete which should be considered during the finishing process.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

## PART 3 - EXECUTION

### 3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), ACI 318, and local code standards, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

1. Shop Drawings: Indicate pertinent dimensions, materials, bracing and arrangement of joints and ties.
2. Product Data: Provide data on void form materials and installation requirements
3. Design formwork under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State(s) of construction.
4. Provide material certifications signed by the manufacturer and contractor certifying that components used meet or exceed specified requirements.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch (3.2 mm for smooth-formed finished surfaces.
2. Class B, 1/4 inch (6 mm) for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

M. Obtain approval before framing openings in structural members which are not indicated on Drawings.

N. Provide fillet and chamfer strips on external corners of beams, joists, columns and at other locations shown on drawings.

O. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

P. Coordinate this section with other sections of work which require attachment of components to formwork.

Q. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

R. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

S. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

T. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

## 3.2 EMBEDDED ITEM INSTALLATION

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

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.
4. Install waterstops in accordance with manufacturer's instructions continuous without displacing reinforcement. [Heat seal joints watertight.]
5. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
6. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

## 3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

D. Clean formed cavities of debris prior to placing concrete

E. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

F. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

## 3.4 SHORING AND RESHORING INSTALLATION

A. Comply with ACI 318 (ACI 318M) and ACI 301 (ACI 301M) for design, installation, and removal of shoring and reshoring.

1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
1. Extend shoring at least one floor under floor being repaired.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

D. Shoring shall be protected using barricades the entire time shoring is in place

## 3.5 VAPOR-RETARDER INSTALLATION

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder according to manufacturer's written instructions.

## 3.6 STEEL REINFORCEMENT INSTALLATION

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

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

G. Zinc-Coated Reinforcement: Repair cut and damaged zinc coatings with zinc repair material according to ASTM A 780/A 780M. Use galvanized-steel wire ties to fasten zinc-coated steel reinforcement.

## 3.7 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

## 3.8 WATERSTOP INSTALLATION

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

## 3.9 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

## 3.10 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

## 3.11 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in one direction.

1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated
2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:

    a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
    b. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
    c. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.
    d. Specified overall values of flatness, F(F) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

G. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate or aluminum granule finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:

1. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) of dampened slip-resistive aggregate or aluminum granules over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
2. After broadcasting and tamping, apply float finish.
3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate or aluminum granules.

H. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions and as follows:

1. Uniformly apply dry-shake floor hardener at a rate of 100 lb/100 sq. ft. (49 kg/10 sq. m) unless greater amount is recommended by manufacturer.
2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
3. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

## 3.12 MISCELLANEOUS CONCRETE ITEM INSTALLATION

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 6 inches (150 mm) high unless otherwise indicated, and extend base not less than 6 inches (150 mm) in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
3. Minimum Compressive Strength: 5000 psi (34.5 MPa) at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

## 3.13 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Wet Curing: All normal concrete is to be cured using water only, unless approved by Engineer otherwise. When water is required to wet the surface of the newly placed concrete, it shall be applied as a fine spray so that it will not mark or pond on the surface. Except where otherwise specified, the curing period shall be at least 72 hours. If high early strength Portland Cement is approved by the Engineer, the curing period may be reduced as directed by the Engineer. Curing shall be accomplished by wet curing only. The curing membrane shall only be used in floor areas approved by the Engineer.

1. The surface of the newly poured concrete shall be covered with wetted burlap as soon as the concrete has hardened sufficiently to prevent marring of the surface. The burlap shall overlap six inches. At least two layers of wetted burlap shall be placed on the finished surface. The burlap shall be kept saturated by means of a mechanically operated sprinkling system. In place of the sprinkling system, two layers of burlap may be substituted for one layer of burlap and impermeable covering.
2. The burlap sheets shall be placed so that they are in contact with the vertical faces of concrete slabs after removal of slab forms, and that portion of the material in contact with those faces shall be kept saturated with water.

F. Membrane Curing Method: Membrane curing will not be permitted unless approved in writing by the Engineer. Colored and stamped concrete shall be cured by membrane curing method as specified below.

1. After the concrete has been finished and immediately after the final texture has been achieved and the water sheen has disappeared from the surface of the concrete, the surface shall be sealed with specified curing and sealing compound or the strippable curing compound. The seal shall be maintained for the specified curing period. The vertical faces of concrete slabs shall, likewise, be sealed immediately after the forms are removed. Two separate applications, applied at least one minute apart each at the rate of not less than one gallon per 300 square feet, will be required upon all surfaces of the concrete. These applications shall be made with mechanical equipment.
2. At locations where the coating is discontinuous or where pin holes show or where the coating is damaged due to any cause and on areas adjacent to sawed joints, immediately after sawing is completed, an additional coating of membrane curing compound shall be applied at the rate of one gallon per 250 square feet.
3. The Engineer may order curing by another method specified herein if unsatisfactory results are obtained with membrane curing compound. Prior to starting The Work, the Contractor shall have available, at the site of The Work, a supply of one of the other approved curing materials sufficient for curing one day's production.
4. The Contractor's construction operations including the management of traffic, shall be such as to avoid damage to the coatings of curing compound for period of not less than the curing period specified. Any curing membrane that is damaged or that peels from the concrete surface within the curing period specified, shall be repaired by the Contractor without delay and in an approved manner. No additional compensation will be allowed to the Contractor for performance of this work.

G. Cure concrete according to ACI 308.1

3.14 PLASTIC SHRINKAGE CRACKING PREVENTION:

A. Note that microsilica reduces the bleeding of fresh concrete. Several precautions have been successfully used finishing slabs with microsilica concrete.
   1. Use of fog sprays, windbreaks, sun shields, night placements, or an evaporation retardant may be necessary when rapid drying conditions occur.
   2. No microsilica concrete shall be placed until the protection plan has been approved by the Consultant.
   3. Protect freshly-placed microsilica concrete from premature drying and excessive cold or hot temperatures.
   4. Begin curing as soon as microsilica concrete is finished. Keep continuously moist for not less than 7 days at a minimum concrete temperature of 50 degrees F.
   5. A curing compound may be used to cure microsilica concrete providing the material used is acceptable to the manufacturer of the microsilica and the material demonstrates that it prevents shrinkage cracks from occurring in freshly poured concrete.

B. Unless otherwise accepted by the microsilica manufacturer, the curing compound shall be equal to:
   1. Protex Industries, Triple Seal (chlorinated rubber base curing compound) applied at a rate of 200 to 250 square feet per gallon.

C. Finishing Microsilica Concrete
   1. A representative of the microsilica admixture supplier shall be present for the placement of the first microsilica concrete. The finishing contractor shall use, as much as possible, the same finishing crew throughout the duration of the project.
   2. Place, vibrate, and screed microsilica concrete to approximate finish grade.
   3. Do not finish if there is a film of water on the microsilica concrete surfaces
   4. Do not allow slab to dry prior to any finishing operations. Incorporate protective measures as specified earlier until microsilica concrete is finished and curing has been initiated.
   5. Begin curing within 15 minutes of final finishing.

3.15 LIQUID FLOOR TREATMENT APPLICATION

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

   1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
   2. Do not apply to concrete that is less than 14 days' old.
   3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

## 3.16 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

## 3.17 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

## 3.18 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 50 cu. yd. (38 cu. m) or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567/C 567M, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C 31/C 31M.

    a. Cast and laboratory cure 12 4x8 cylinders for each composite sample.

7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of three laboratory-cured specimens at 3 days, one set at 7-days, one set at 28-days and hold three specimens.

    a. A compressive-strength test shall be the average compressive strength from a set of three specimens obtained from same composite sample and tested at age indicated.

8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing.

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

## 3.19 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 033000

SECTION 03 30 00.01 – POLYMER-MODIFIED CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Contract Documents, the Contract and General and Supplementary Conditions included in the Contract and Division-1 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Polymer-modified concrete for repairs to balcony concrete slabs.

B. Additional miscellaneous concrete work as specified in Supplementary General Requirements, the Form of Bid, or elsewhere in the Contract Documents.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Concrete: As described in the bid form.

B. Concrete - Includes concrete, placement accessories, consolidating and leveling, troweling, climate protection and curing.

1.4 REFERENCES

A. ASTM C33 - Concrete Aggregates.

B. ASTM C143 - Standard Test Method for Slump.

C. ASTM C138 - Test method for unit weight, yield, and air content of concrete.

D. ASTM C150 - Portland Cement.

E. ASTM C231 - Test for Air Content of Freshly Mixed Concrete.

F. ASTM C260 - Air Entraining Admixtures for Concrete.

G. ASTM C387 - Specifications for High Strength Mortars.

H. ASTM C494 - Chemical Admixtures in Concrete.

I. ACI 305R - Recommended Practice for Hot Weather Concreting.

J. ACI 306R - Recommended Practice for Cold Weather Concreting.

K. ACI 318 - Building Code Requirements for Reinforced Concrete.

1.5 SUBMITTALS

A. General: Submit the following in accordance with Section 01300 of this specifications and conditions of Contract.

B. Product data for proprietary materials and items, including forming accessories, admixtures, patching compounds, curing compounds, and others as requested by Engineer.

C. The Contractor shall submit the following Data for all proposed materials:
   1. Polymer- modified concrete manufacturer's literature, including installation instructions
   2. Polymer-modified patching mortar manufacturer's literature, including installation instructions
   3. Cementitious grout manufacturer's literature, including installation instructions
   4. Sieve Analysis of aggregate for polymer-modified concrete
   5. Certification of chloride content of admixtures.

1.6 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
   1. ACI 301, "Specifications for structural concrete for buildings", ACI 318, "Building Code Requirements for Reinforced Concrete", OR AASHTO specifications.
   2. Independent testing agency employed by Owner and acceptable to the Engineer.

B. Materials and installed work may require testing and retesting at any time during progress of work. Retesting of rejected materials for installed work, shall be done at Contractor's expense.

C. Pre-Construction Conference: Conduct conference at Project site to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

D. At least 7 days prior to submittal of design mixes, conduct a meeting to review detailed requirements for preparing design mixes and to determine procedures for satisfactory concrete operations. Review requirements for submittals, status of coordinating work, and availability of materials. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Request that representatives of each entity directly concerned with polymer-modified concrete attend conference, including, but not limited to, the following:
   1. Contractor's superintendent.
   2. Laboratory responsible for field quality control.
   3. Polymer-modified material Manufacturer's representative.
   4. Engineer or Owner's representative.

1.7 CONTRACTOR'S QUALIFICATIONS

A. The Contractor shall have a minimum of five years of experience in performing work similar to that shown in the drawings and specifications. A statement of qualification should be submitted at time of bidding.

B. The Contractor shall submit a list of five projects at the time of biding, in which similar work to that specified was successfully completed. This list shall contain the following for each of the five projects.

1. Project Name
2. Owner of Project
3. Owner's Representative, Address and Telephone Number
4. Brief Description of Work
5. Cost of Portion of Work Similar to that Specified in this Section
6. Total Restoration Cost of Project
7. Date of Completion

C. An on-site supervisor shall be provided by the Contractor for the duration of the work. This supervisor shall have had two years of documented experience with the products to be used and shall have been in involved in at least one of the projects listed in "B" above.

1.8 WARRANTIES:

A. Completed concrete repairs shall be guaranteed jointly and separately by the installation (concrete repair) contractor and by the patching material manufacturer against defects in material and application, for a period of five years from the completion of application. Defects shall include cracking in and around the patch perimeter, scaling, delamination, spalling and rust staining from underlying reinforcing steel.

B. All defects in concrete repair areas shall be repaired by replacing the defective concrete at no cost to the Owner. Repair work shall include removal and replacement of the elastomeric coating or the traffic bearing membrane, as required, at no cost to the Owner.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Strength: 5,000 psi minimum at 28 days.

B. The primary requirements for the polymer-modified concrete are a minimum compressive strength as specified above, and workability that facilitates placement to achieve the desired finish. For isolated patches, the contractor shall use a mix of 3/8" coarse aggregate and one of the polymer-modified Portland cement mortars specified below at the proportions recommended by the manufacturer of the mortar to produce the polymer-modified cement mix. The contractor must submit test data on aggregate for Engineer's approval.
1. Materials:
    a. Sika Corporation; SikaTop 111 Plus (extended)
    b. BASF; Master Emaco S440, Master Emaco S440 MC
    c. Approved Equal.

C. The contractor in-lieu of the manufactured Polymer-modified cement concrete mix is allowed to use polymer modified concrete with Dow Modifier "A" at 22 gallons per cubic yard from a ready-mix plant. Add fiber reinforcement at 1.6 lbs/Cu.Yd.

## 2.2 TESTING OF POLYMER-MODIFIED CONCRETE MIX DESIGNS

A. At least three weeks before the start of concrete placement, the contractor shall manufacture two separately mixed test batches of concrete under job conditions, in quantities large enough for the production of following samples and tests:
   1. Four sets of 3 in. x 6 in. test cylinders for use in determining compressive strength of the concrete
   2. Two slump tests
   3. Two air content tests

B. All samples and tests will be conducted by the Engineer or the Owner's testing agency. The contractor is responsible for providing the labor and materials to manufacture the required concrete samples, and for disposal and cleanup of surplus materials.

C. The Owner and the Engineer reserve the right to request production of additional test batches of polymer-modified concrete if the material produced does not comply with these specifications. This shall be done by the contractor at no additional cost to the Owner.

# PART 3 - EXECUTION

## 3.1 BATCHING AND MIXING

A. All mixing operations shall be developed in a manner such that quality control is guaranteed. All ingredients are combined and mixed to a uniform consistency. Manually mix in a wheelbarrow or mortar box. Mechanically mix with a low-speed drill (400 to 600 rpm) and paddle or in appropriately sized mortar mixer.
   1. Polymer-modified concrete mix - Mix mortar in strict accordance with manufacturer's requirements. Extend concrete with 3/8" aggregates as recommended by the manufacturer.
   2. If materials are to be mixed at a central location and then transported to repair location for placement, the contractor shall designate select one or two individuals familiar with this type of materials as qualified to batch and mix the concrete. These individuals shall be trained and approved by the material manufacturer. These individuals shall have full responsibility for achieving the design mix. No other persons shall batch or mix concrete without prior notification to Engineer and material manufacturer.

## 3.2 PREPARATION

A. Demolition and surface preparation shall be performed as shown on details and as per Section 02 41 19 of this specification at locations shown on plans and selected by the Engineer.

B. The delaminated and unsound concrete areas shall be marked in the presence of the Engineer. Any delaminated areas shall be removed and replaced full depth as shown on plans.

## 3.3 PLACING, FINISHING AND CURING

A. Bonding Grout:

1. After the surface has been cleaned and immediately before placing concrete, a thin coating of bonding grout shall be scrubbed into the saturated, prepared surface of the existing concrete as approved by the material manufacturer. The existing concrete

surface shall be saturated (surface dry with no standing water) by pre-wetting for 1 hour (min.) prior to concrete placing. Proper workmanship shall be exercised to insure that all existing surfaces receive a thorough, even coating and that no excess grout permitted to collect in pockets. The rate of progress in applying grout shall be limited so that the grout does not become dry before it is covered with new concrete.

2. Bonding grout for patching concrete to existing concrete shall be liquid polymer or SIKA Armatec, 110 EpoCem or approved equal.

3. Should the bonding grout dry before the concrete is placed, the Contractor will remove the dried grout and sandblast clean the grouted surface, at his expense, before placing fresh bonding grout.

B. Placing and Finishing:

1. Receive Engineer's written approval of surface finish used on flatwork before beginning work.

2. Do not place concrete when temperature of air is less than 50 degrees F. unless the following conditions are met:
   a. Place concrete only when temperature of surrounding air is expected to be above 40 degrees F. and rising and expected to be above 45degrees F. for at least 36 hours after the pour.
   b. When above conditions are not met, concrete may be placed only if insulation or heating enclosures are provided in accordance with ACI 306 (Recommended practice for cold weather concreting). Submit proposed protective measures for Engineer's approval.
   c. Cost of precautionary measures shall be borne by the Contractor.

3. For hot weather concrete placement, the following conditions shall apply:
   a. Do not place concrete if concrete mix temperatures exceed 90 degrees F.
   b. Do not place concrete under hot weather conditions.
      1) Hot weather is defined as air temperature which exceeds 80 degrees F. or any combination of high temperature, low humidity and high wind velocity which causes evaporation rate in excess of 0.10 pounds per square foot per hour as determined by ACI 305R, Figure 2.1.5.
4. Concrete shall be deposited as close to its final position as possible. All concrete placements shall be continuous and terminated only at bulkheads and designated construction joints.
5. On ramps with greater than 5 percent slope, all concreting shall begin at the low point and end at high point. Contractor shall make necessary adjustments to slump or equipment without any irregularities or roughness.

C. Finishing (ACI 301, Chapters 10 and 11)
1. All flatwork finishers shall hold current ACI Flatwork Finishers Certification.
2. Partial Depth Placement: After the bonding grout has been applied, concrete shall be placed, consolidated by vibration, and shall be finished. Placing of concrete shall be such that it shall be deposited as nearly as possible in its final position to avoid segregation, due to rehandling or flowing. Placing shall be such that at all times concrete shall be

plastic and flow readily into corners of forms and into spaces between rebars. No concrete that is partially hardened or that has been contaminated by foreign material shall

be deposited. When being deposited, concrete shall not be allowed to fall a vertical distance greater than four ft. from point of discharge to point of deposit. Pencil vibrators shall be used, as appropriate, to ensure that proper consolidation is achieved. The concrete shall be continuously rodded or vibrated with pencil vibrators during placement to consolidate the pour and fill all corners of the repair. External vibration of the formwork may also use, by placing the pencil vibrators against the forms.

3. The concrete shall be finished with handheld trowels to specified elevation. The surface shall then receive a light broom finish. The reinforcing steel shall have a minimum concrete cover as shown on plans. The finished concrete shall be protected by barricades with lights, until the completion of the required curing period.
4. Placement of polymer-modified concrete shall be a continuous operation at each repair location. Materials sufficient to complete a repair shall be available prior to commencing a repair.

D. Curing:
   1. Cure proprietary polymer-modified concrete and mortar materials per manufacturer's instructions.
   2. Formwork must remain in place a minimum of 72 hours for curing purposes.
   3. Cover all top horizontal patches, all exposed concrete in forms, all unformed patch surfaces, with wet burlap in accordance with manufacturer's recommendations and keep damp for a minimum of 72 hours.
   4. Cure 72 hours minimum after removal of forms or wet burlap material prior to application with any coating material.

## 3.4 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. General: The Owner will employ a testing laboratory to perform tests and to submit test reports.

B. Sampling and testing for quality control during placement of concrete may include the following, as directed by Architect.

C. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
   1. Slump: ASTM C 143; one test at point of discharge for each truck delivering the concrete; additional tests when concrete consistency seems to have changed.
   2. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each truck of air-entrained concrete.
   3. Concrete Temperature: Test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and each time a set of compression test specimens is made.
   4. Compression Test Specimen: ASTM C 31; Four sets of 3 in. x 6in. test cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cure test specimens are required.
   5. Compressive Strength Tests: ASTM C 39; one specimen tested at 3 days, one specimen tested at 7 days, and 2 specimens tested at 28 days.
   6. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no

individual strength test result falls below specified compressive strength by more than 500 psi.

D. Test results will be reported in writing to the Engineer, Ready-Mix Producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for 7-day tests and 28-day tests.

E. Nondestructive 3-day Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

F. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests when unacceptable concrete is verified.

END OF SECTION

SECTION 05 50 00 - MISCELLANEOUS METALS (METAL FABRICATIONS)

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The extent of Miscellaneous Metal items is shown on the drawings and called for in the specifications.

1. Carefully read all Sections of this specification and examine all Drawings to determine the extent and nature of Miscellaneous Metal Items that are required. These items are to be supplied whether or not specified in this Section.

1.2 QUALITY ASSURANCE

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting wherever taking field measurements before fabrication might delay work.

B. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.

1.3 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's specifications, anchor details and installation instruction for products to be used in the fabrication of miscellaneous metal work, including painting products.

B. Shop Drawings: Submit shop drawings for fabrication and erection of miscellaneous metal fabrications. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items. Provide templates for anchor bolt installation.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

A. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

B. Steel Plates, Shapes and Bars: ASTM A36.

C. Steel Plates to be Bent or Cold Formed: ASTM A283, Grade C.

D. Steel Bars and Bar-Size Shapes: ASTM A663 or A675, Grade 65, or ASTM A36.

E. Steel Tubing: ASTM A500 or 501, hot or cold rolled.

F. Gray Iron Castings: ASTM A48, Class 30.

G. Malleable Iron Castings: ASTM A47, grade as selected.

H. Steel Pipe: ASTM A53, type as selected; Grade A, black finish unless galvanizing is required; standard weight (Schedule 40).

I. Concrete Inserts: Threaded type, galvanized ferrous castings, either malleable iron ASTM A47 or cast steel ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.

J. Wedge Inserts: Malleable iron insert with stainless steel askew-head 2" bolts, nuts, washers, and horseshoe shims; by Dayton Superior or Gateway or Hohmann & Barnard.

K. Nonshrink Nonferrous Grout: Por-Rok Anchoring Cement, Lehn & Fink Industrial Products, or equal.

2.2 FASTENERS

A. General: Provide zinc-coated fasteners unless otherwise noted. Select fasteners for the type, grade and class required.

B. Bolts and Nuts: Regular hexagon head type, ASTM A307-86a, Grade A.

C. Lag Bolts: Square head type, FS FF-B-561C-70.

D. Machine Screws: Cadmium plated steel, FS FF-S-92B-75B-75.

E. Plain Washers: Round, carbon steel, FS FF-W-92B-74B-74.

F. Masonry Anchorage Devices: Expansion shields, FS FF-S-325-57.

G. Toggle Bolts: Tumble-wing type, FS FF-B-588C-74, type, class and style as required.

H. Lock Washers: Helical spring type carbon steel, FS FF-W-84A-69.

2.3 PAINT

A. Metal Primer Paint: Tnemec No. 50-330 Poly-Ura - Prime or approved equal.

1. Primer selected must be compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Division 9.

B. Galvanizing Repair and Primer Paint: Zinc dust, zinc oxide, alkyd paint conforming to FS TT-P-641, Type II.

2.4 FABRICATION, GENERAL

A. Workmanship:

1. Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in finished product. Work to dimensions shown or accepted

on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.

2. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32 inch unless otherwise shown. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

3. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections grind exposed welds smooth and flush to match and blend with adjoining surfaces.

4. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head (countersunk) screws or bolts.

    a. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

    b. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

B. Galvanizing:

1. Provide a zinc coating for those items shown or specified to be galvanized, as follows:

    a. ASTM A153 for galvanizing iron and steel hardware.

    b. ASTM 123 for galvanizing rolled, pressed and forged steel shapes, plates, bars and strip 1/8 thick and heavier.

    c. ASTM A386 for galvanizing assembled steel products.

C. Shop Painting:

1. Shop paint miscellaneous metal work except surfaces and edges to be field welded and members or portions of members to be embedded in concrete or masonry which are galvanized, unless otherwise specified.

2. Remove scale, rust and other deleterious materials before applying shop coat. Clean in accordance with SSPC SP-3-63 "Power Tool Cleaning: to remove all scale, rust, and foreign matter after first solvent cleaning to remove all oil and grease.

3. Remove oil, grease and similar contaminants in accordance with SSPC SP-1 63 "Solvent Cleaning".

4. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions, and at a rate to provide uniform dry film thickness of 2 to 4 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.

5. Apply one shop coat to fabricated metal items, except apply two coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

## 2.5 MISCELLANEOUS METAL FABRICATIONS

A. Rough Hardware:

1. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required.

2. Manufacture or fabricate items of sizes, shapes and dimensions required.

B. Miscellaneous Steel Trim:
SCHEDULE 1 - Provide shapes and sizes for profiles shown. Except as otherwise noted, fabricate units from structural steel shapes and plates and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other work.

1. Galvanize miscellaneous steel trim which is embedded in concrete and cannot be field painted.

2. Shop prime all miscellaneous steel which is not required to be galvanized.

B. Thresholds:

1. Fabricate of material type, sizes and configurations as shown. Furnish in lengths as required to accurately fit each opening or conditions.

   a. Fill units with an abrasive grit consisting of aluminum oxide, silicon carbide, or a combination of both.

2. Drill thresholds for mechanical anchors, with countersunk holes located not more than 4 inches from ends and not more than 12 inches on center, evenly spaced between ends, unless otherwise shown. Provide closer spacing if recommended by the manufacturer.

3. Apply black asphaltic coating to concealed bottoms, sides, and edges of units set into concrete.

C. Steel Pipe Railings: Design and fabricate handrails and guardrails to meet all applicable codes and to support 50 lbs. per linear foot uniform load and 200 lbs. concentrated load at location to cause greatest stress. These two loading conditions do not act concurrently.

1. Fabricate pipe railings to dimensions and details shown, with smooth bends and welded joints ground smooth and flush.

2. Adjust railings prior to anchoring to ensure proper alignment.

3. Secure handrails to walls with end fittings. Provide brackets with not less than 1-1/2 inches clearance from inside face of handrail to the finish wall surface. Drill wall plate portion of bracket to receive bolt. Secure wall return fittings to building construction with expansion shields and lag bolts.

4. Anchor posts in concrete by means of galvanized pipe sleeves set and anchored into the concrete. After the posts have been inserted into the sleeves, fill the annular space between post and sleeve solid with nonshrink, nonferrous grout. Do not allow water to remain in sleeves for long periods of time.

D. Pipe Bollards:

1. Fabricate steel pipe bollards to dimensions and details shown. Provide Acorn cap nuts for pipe bollards expansion bolted to concrete, where nuts are left exposed.

2. Ensure proper alignment of bollards set in footings while placing concrete.

3. Fill pipe solid with air-entrained Portland cement or grout, having a 28-day minimum compressive strength of 3000 psi.

E. Ladders:

1. Fabricate ladders for the locations shown, with dimensions, spacings, details and anchorages as indicated. Comply with the requirements of ANSI A14.3, except as otherwise indicated.

2. Unless otherwise shown, provide 1/2 inch x 2 1/2 inches continuous structural steel flat bar side rails with eased edges, spaced 18 inches apart. Provide 3/4-inch diameter solid structural steel bar rungs, spaced 12 inches on center.

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

4. Support each ladder at top and bottom. Use welded or bolted steel brackets, designed for adequate support and anchorage, and to hold the ladder clear of the wall surface with a minimum of 7-inch clearance from wall to centerline of rung. Extend rails 42 inches above top rung and return rails to wall or structure unless other secure handholds are provided.

5. Provide non-slip surface on the top of each rung, either by coating the rung with aluminum oxide granules set in epoxy resin adhesive, or by using a type of manufacturer rung which is filled with aluminum oxide grout.

F. Louvers:

1. Furnish extruded aluminum louvers 4 inches wide unless otherwise noted. Minimum thickness of frames and blades is .125 inches. frame to have integral caulking slot and retaining bead.

2. Provide removable bird screen in aluminum frame.

3. Fasteners to be aluminum or stainless steel.

4. Louvers shall receive a anodized finish unless otherwise noted.

G. Elevator Beams: Fabricate elevator beams from standard ASTM A36 rolled wide flange shapes to support all loads as directed by elevator manufacturer.

H. Elevator Subsill Fabrication: Provide continuous, concealed support angle for elevator sill. Coordinate requirements for size, load and anchorage with Elevator Supplier. Provide anchors spaced not more than 2' on center.

I. Lintel Fabrication: Fabricate lintels for openings and recesses in walls and partitions where shown and elsewhere as needed. Provide at least 8" bearing at each end, unless otherwise detailed. Weld together individual members of composite lintels made up of more than one member.

J. Miscellaneous Shelf Angle Fabrication: Fabricate to sizes shown or indicated on approved shop drawings. For anchoring to structure, provide slotted holes for 3/4" bolts not more than 6" from ends and not more than 3 feet on center. Coordinate anchorage with framing drawings to ensure proper location of bolts and fasteners.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

### 3.2 INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, and other connectors as required.

B. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.

C. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrications, and are intended for bolted or screwed field connections.

D. Field Welding: Comply with AWS Code for procedures of manual shielded metal arc-welding, appearance and quality of welds made, and methods used in correcting welding work.

E. Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections and abraded areas of the shop paint on miscellaneous metal is specified in Section 09 90 00 of these specifications.

END OF SECTION

SECTION 05 52 00 – HANDRAILS AND RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Contract Documents, including General and Supplementary Conditions included in the contract and Division 1 Specification Sections, apply to work of this Section.

1.2 SECTION INCLUDES

A. Balcony Metal Railing Assembly.

1.3 REFERENCES

A. ASTM E935 - Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.

B. ASTM E894 - Test Methods for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.

C. ASTM E985 – Standard Specification for Permanent Metal Railing Systems and Rails for Buildings

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

1.4 DESIGN REQUIREMENTS

A. Design railing assembly, wall rails, and attachments to resist 1) A concentrated lateral force of 200 lbs at any point without damage or permanent set; 2) A uniform load of 50 lb per linear foot applied horizontally and concurrently with a 100 lb per linear foot applied vertically. Test in accordance with ASTM A935.

B. Fabricate railing assembly, wall rails, and attachments to ASTM E985.

1.5 SUBMITTALS FOR REVIEW

A. Section 01 33 00 - Submittals: Procedures for submittals.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

C. Samples: Submit two samples of handrail. Submit two samples of elbow, Tee, wall bracket, escutcheon and end stop.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
   1. Hollaender Manufacturing, Ph: 800.772.8800 www.hollaender.com Cincinnati, Ohio
   2. Or approved equal

2.2 MATERIALS

A. Alloy and temper recommended by producer and finisher for type of use and finish indicated, with not less than the strength and durability properties of the alloy and temper designated below for each required:

B. Grout and Anchoring Cement:
   1. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD-C 621. Provide grout specifically recommended by manufacturer for exterior applications.

C. Finishes:
   1. All railings are to receive an electrostatically baked on kynar finish.
   2. Finishes: E.S.P. applied thermosetting Kynar 500 Floropolymer Resin Coating with inhibitive flash primer over conversion coating. Paint shall be baked to at least 450 degrees F. Finish shall meet or exceed A.A.M.A 605 specification.
   3. Color: Shall be selected by owner.

D. Sizes (Verify in field)
   1. Height of railing over concrete finish grade: 42”
   2. Maximum spacing between any two rails: 3-15/16”
   3. Maximum spacing between posts: 4’-0”
   4. Picket rails: ¾” square. Wall Gauge 16.
   5. Top Rail: 3” diameter, circular. Wall gauge 16.

2.3 FABRICATION

A. Fit and shop assemble components in largest practical sizes for delivery to site.

B. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

C. Provide anchors, plates and angles required for connecting railings to structure.

D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

F. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.

G. Interior Components: Continuously seal joined pieces by continuous welds.

H. Accommodate for expansion and contraction of members and building movement without damage to connections or members.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

### 3.2 PREPARATION

A. Supply items required to be cast into concrete and or embedded in masonry with setting templates, to appropriate sections.

### 3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects.

C. Anchor railings to the existing topping slab. All penetrations from existing railing assembly shall be filled with epoxy and sand.

D. Field weld anchors as indicated on shop drawings. Touch-up welds with primer. Grind welds smooth.

E. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

F. Assemble with spigots and sleeves to accommodate tight joints and secure installation.

G. All dissimilar metals shall be insulated.

### 3.4 ERECTION TOLERANCES

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

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

C. Maximum Out-of-Position: 1/4 inch .

END OF SECTION

SECTION 07 90 00 – JOINT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Single installer shall be responsible for providing all sealants and waterproofing system designed to minimize occurrence of common sealant, waterproofing, and concrete deterioration problems. All measures called for in these Specifications will be rigorously enforced.

B. This Section includes the following:
   1. Concrete control and construction joint sealant system in these surfaces:
      a. Garage Floors - Supported concrete floor surfaces including curbs, walks, islands and pour strips and joints between elements subjected to traffic. Also includes sealant work at random cracks where required.
      b. Exterior Walls – All vertical joints between elements and between the window frame and elements, as well as select random vertical cracks.

C. Materials shall be compatible with materials or related Work with which they come into contact, and with materials covered by this Section.

D. Related Sections: Following Sections contain requirements that relate to this Section.
   1. Division 7 “Traffic Bearing Membrane”

1.2 SUBMITTALS

A. Make submittals in accordance with requirements of Division 1 and as specified in this Section.

B. Contractor's experience record for past 5 yrs.
   1. Experience shall include verification of 5 years experience with submitted system.
   2. Information shall be included with bid submission.

C. Superintendent qualifications.
   1. List Superintendent’s specific training/qualification.

D. Evidence of applicator's being certified by manufacturer. Evidence shall include complete copy of manufacturer’s licensing/certification document, spelling out repair responsibility for warranty claims.

E. Reviewed Shop Drawings distributed to all others whose Work is related.

F. Manufacturer shall submit a resume of minimum 20 independently verified projects completed with submitted system, to include:
   1. Name and location of project.
   2. Type of system applied.
   3. On-Site contact with phone number.

G. Certification that products and installation comply with applicable EPA, OSHA and VOC requirements regarding health and safety hazards.

H. Two copies each of manufacturer's technical representative's log for each visit.

I. Signed statement from this Section applicator certifying that applicator has read, understood, and shall comply with all requirements of this Section.

J. Submit 3 copies of System Maintenance Manual.

K. Material samples.

L. Installation plans and large scale details.

M. Any other information necessary to show placement of control joint system.

1.3 QUALITY ASSURANCE

A. Testing Agency: Independent testing laboratory employed by Owner and acceptable to Engineer/Architect.

B. Prequalification of Bidders:
   1. With Bid, submit proposed subcontractor qualifications. Engineer/Architect shall notify General Contractor whether or not subcontractor is acceptable within 10 working days of Bid.
   2. Prequalification Criteria, all in writing:
      a. Evidence of compliance with paragraph "General," below and with Summary paragraph "Single Installer."
      b. Engineer/Architect retains absolutely, right to reject any prequalification statement.
      c. Evidence of financial stability acceptable to Engineer/Architect.

C. General:
   1. Provide a complete copy, with bid submission, of licensing/certification document for each system manufacturer to Engineer/Architect that confirms system installer is licensed applicator.
   2. Licensing/certification agreement must provide following information:
      a. Applicator’s financial responsibility for warranty burden under agreement terms.
      b. Manufacturer’s financial responsibility for warranty burden under agreement terms.
      c. Process for dispute settlement between manufacturer and applicator in case of system failures where cause is not evident or cannot be assigned.
      d. Officers’ signatures for both Applicator Company and Manufacturer.
      e. Commencement date of agreement and expiration date (if applicable).
   3. All Work under this section shall be performed by organizations which have successfully performed at least 5 verifiable yrs of installations similar to those involved in this Contract, and minimum 10 projects with submitted system. In addition, system installer shall submit listing of 5 or more prior installations in climate and size similar to that for this Project.

4. Final selection of installer shall be subject to acceptance of Engineer/Architect. Engineer/Architect retains right to reject any installer.
5. All work under this section shall be under immediate control of person experienced in this type Work. Exercise close check and rigid control of all operations as necessary for full compliance with all requirements. Contractor's superintendent assigned to Project shall have supervised 5 prior projects of similar magnitude and design, and shall be present during all operations. Superintendent shall be acceptable to Engineer/Architect. Engineer/Architect retains right to remove superintendent from project if superintendent fails to ensure full compliance with Specification.
6. Information Statement: Annually Engineer/Architect evaluates manufacturer/applicator performance based on Owner satisfaction. Ratings of Below Expected Performance, At Expected Performance, and Above Expected Performance are assigned. Manufacturers/applicators receiving Below Expected Performance rating will be deleted from Specification for 1 year, minimum.

D. Review and approve joint details before construction.

E. Coordinate layout of joint system and approve methods for providing joints with precast concrete and concrete contractors.

F. Inspect site and precast to insure proper joint configuration.

G. Testing Agency:
1. Check shore hardness per ASTM standard specified in sealant manufacturer's printed data.

## 1.4 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM C642, "Test for Specific Gravity, Absorption and Voids in Hardened Concrete."
2. ASTM D2240, "Test for Indentation Hardness of Rubber and Plastics by Means of a Durometer."
3. ASTM E119, "Fire Tests of Building Construction and Materials."

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver all materials to site in original, unopened containers, bearing following information:
1. Name of product.
2. Name of manufacturer.
3. Date of preparation.
4. Lot or batch number.

B. Store materials under cover and protect from weather. Replace packages or materials showing any signs of damage with new material at no additional cost to Owner.

## 1.6 PROJECT CONDITIONS

A. Weather and Substrate Conditions for Sealers: Do not proceed with application (except with written recommendation of manufacturer) under any of the following conditions:

1. Ambient temperature is less than 40º F.
2. Substrate surfaces have cured for less than 1 month.
3. Rain or temperatures below 40º F predicted for a period of 24 hrs.
4. Earlier than 24 hrs after surfaces became wet.
5. Substrate is frozen or surface temperature is less than 40º F.
6. Windy condition such that repellent may be blown to vegetation or substrates not intended.

B. Weather and Substrate Conditions for Other Materials: Proceed with work only when existing and forecast weather and temperature of concrete substrate will permit work in accordance with manufacturer's recommendations.

1.7 WARRANTY

A. This article applies to all materials covered in this Section.

B. System Manufacturer (New Application): Furnish Owner with written total responsibility Joint and Several guarantee, detailing responsibilities of manufacturer and applicator with regard to warranty requirements (Joint and Several), as outlined in the Manufacturer's Licensing/Certification document. Submit a copy of the Licensing/Certification Agreement. The guarantee shall provide that system will be free of defects, water penetration and chemical damage related to system design, workmanship or material deficiency, consisting of:

1. Any adhesive or cohesive failures.
2. Spalling surfaces
3. Weathering.
4. Surface crazing
5. Abrasion or tear failure resulting from normal traffic use.
6. Failure to bridge cracks less than 0.0625 in. or cracks existing at time of traffic topping installation on double tees only.

C. If material surface shows any of defects listed above, supply labor and material to repair all defective areas and to repaint all damaged line stripes.

D. Guarantee period shall be a 5 year Joint and Several Warranty commencing with date of acceptance of work, jointly executed by Manufacturer and Applicator.

E. Perform any repair under this guarantee at no cost to Owner.

F. With bid submittal, provide Engineer/Architect with sample of final Joint and Several 5 Year Warranty and copy (as previously noted) of Manufacturer's Licensing/Certification Agreement, detailing joint responsibilities of manufacturer and applicator with regard to warranty claim resolution.

G. Snowplows, vandalism, abnormally abrasive maintenance equipment, and studded snow tires are not normal traffic use and are exempted from warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products of 1 of following, only where specifically named in product category:
   1. Pecora Corporation, Harleysville, PA (Pecora).
   2. Sika Corporation, North Canton, OH (Sikaflex).
   3. BASF Construction Chemicals, Shakopee, MN (BASF).
   4. Tremco, Cleveland, OH (Tremco).
   5. Lymtal
   6. Dow Corning

2.2 MATERIALS, CONCRETE CONTROL AND CONSTRUCTION JOINT SEALANT SYSTEM

A. In addition to locations and extent of sealant shown on Drawings, provide sealant at following conditions:
   1. At all control joints in slabs on grade, pour strips, (cast-in-place) slabs, topping, and in joints.
   2. Around perimeter of all floor drains.
   3. At all exterior horizontal joints between precast and cast-in-place concrete. Color to match precast concrete.
   4. At all vertical and horizontal joints between precast beams and columns at tiers exposed directly to weather. Color to match precast concrete.

B. Provide complete system of compatible materials designed by manufacturer to produce waterproof, traffic-bearing control joints as detailed on Drawings.

C. Compounds used for sealants shall not stain masonry or concrete. Aluminum pigmented compounds not acceptable.

D. Color of sealants shall match adjacent surfaces.

E. Backer rods: Acceptable products:
   1. “Sof Rod,” Nomaco Inc., 501 NMC Drive, Zebulon, NC 27597. (800) 345-7279 ext. 341.
   2. “ITP Soft Type Backer Rod,” Industrial Thermo Polymers Limited, 2316 Delaware Ave., Suite 216, Buffalo, NY 14216. (800) 387-3847.
   3. “BASF Soft Type Backer Rod,” BASF, Minneapolis, MN.

F. Bond breakers and fillers: as recommended by system manufacturer.

G. Primers: Prepare surfaces as recommended by sealant manufacturer and install primer in accordance with manufacturer's printed instructions.

H. Acceptable sealants are listed below. Sealants shall be compatible with all other materials in this Section and related work.

I. Acceptable Horizontal joint sealants:
   1. MasterSeal SL-2, BASF.

2. Iso-flex 880GB/881, Lymtal.
3. Dynatrol II-SG, Pecora.
4. Sikaflex-2c SL, Sika.

J. Acceptable Sealant for Vertical Joints and Cove Joints:
1. Sikaflex-2c NS, Sika.
2. MasterSeal NP-2, BASF.
3. Dynatrol II, Pecora.

## 2.3 CELLULAR FOAM EXPANSION JOINT FILLERS

A. Expanded Polyethylene Joint Filler:
1. Provide flexible, compressible, closed-cell polyethylene of not less than 10 psi compression deflection (25%); except provide higher compression deflection strength as may be necessary to withstand installation forces and provide proper support for sealants; surface water absorption of not more than 0.1 lbs. per sq. ft.

B. Products offered by manufactured to comply with the requirements include the following:
1. MasterSeal; BASF.
2. Expand-O-Foam; Williams Products, Inc.

## 2.4 CONCRETE CONTROL-EXPANSION JOINT FILLERS

A. Bituminous and Fiber Joint Filler:
1. Provide resilient and non-extruding type premolded bituminous impregnated fiberboard units complying with ASTM D1751-73(78), FS HH-F-341-F-77, Type I and AASHTO M213-74.

B. Products offered by manufacturers to comply with the requirements include the following:
1. Fibre; W. R. Meadows, Inc.
2. Or approved equal

C. Proposed Substitutions: None for this project. Contact Engineer/Architect for consideration for future projects.

# PART 3 - EXECUTION

## 3.1 INSPECTION

A. Inspect surfaces to receive Work and report immediately in writing to Engineer/Architect any deficiencies in surface which render it unsuitable for proper execution of Work.

B. Coordinate and verify that related Work meets following requirements:
1. Concrete surfaces are finished as acceptable for system to be installed.
2. Curing compounds used on concrete surfaces are compatible with Work to be installed.
3. Concrete surfaces have completed proper curing period for system selected.

4. Joint Sealants are compatible with traffic toppings.

C. Acid etching: Prohibited.

D. All openings to occupied space shall be sealed to prevent cleaning materials, solvents and fumes from infiltration. All protective measures and/or ventilating systems required to prevent infiltration are incidental to this Work.

## 3.2 PREPARATION, CONCRETE CONTROL AND CONSTRUCTION JOINT SEALANT SYSTEM

A. Correct unsatisfactory conditions in manner acceptable to installer before installing sealant system.

B. Remove existing sealants for joints requiring joint sealant replacement

C. Clean joint surfaces immediately before installation of sealant or caulking compound. Remove dirt, insecure coatings, moisture and other substances which would interfere with bond of sealant or caulking compound.

D. Grind joint edges smooth and straight with beveled grinding wheel before sealing. All surfaces to receive sealant shall be dry and thoroughly cleaned of all loose particles, laitance, dirt, dust, oil, grease or other foreign matter. Obtain written approval of method from system manufacturer before beginning cleaning.

E. Check preparation of substrate for adhesion of sealant.

F. For elastomeric sealants, do not proceed with installation of sealant over joint surfaces which have been painted, lacquered, waterproofed or treated with water repellent or other treatment or coating unless a laboratory test for durability (adhesion), in compliance with Paragraph 4.3.9 of FS TT-S-00227E-70 has successfully demonstrated that sealant bond is not impaired by the coating or treatment. If laboratory test has not been performed, or shows bond interference, remove coating or treatment from joint surfaces before installing sealant.

G. Prime and seal joints and protect as required until sealant is fully cured. No exceptions.

## 3.3 INSTALLATION/APPLICATION

A. Do all Work in strict accordance with manufacturer's written instructions and specifications including, but not limited to, moisture content of substrate, atmospheric conditions (including relative humidity and temperature), coverages, mil thicknesses and texture, and as shown on Drawings.

B. Manufacturer's technical representative, acceptable to Engineer/Architect, shall be on site during surface preparation and installation.

C. Cease material installation under adverse weather conditions, or when temperatures are outside manufacturer's recommended limitations for installation, or when temperature of work area or substrate are below 40ºF.

D. Install sealant backer rod for liquid elastomeric sealants, except where recommended to be omitted by sealant manufacturer for the application shown.

E. Install bond breaker tape wherever required by manufacturer's recommendations to ensure that elastomeric sealants will perform properly.

F. Provide compatible primer at all joint surfaces, regardless of whether or not it is specifically required. Do not allow primer/sealer to spill or migrate onto adjoining surfaces.

G. Completely fill joint without sagging or smearing onto adjacent surfaces.

H. Fill horizontal joints slightly recessed to avoid direct contact with wheel traffic.

I. Contractor and Engineer/Architect shall determine 1 of following 2 methods of sealant testing to verify sealant profile:

1. Contractor, at Engineer/Architect's direction, shall cut out lesser of 1% of total lineal footage placed or total of 100 lineal ft of joint sealant at isolated/random locations (varying from in. to ft of material) for Engineer/Architect and Manufacturer's Representative inspection of sealant profile.
2. Contractor, at Engineer/Architect's direction, shall install 3 trial joint sections of 20 ft each. Contractor shall cut out joint sections, as selected by Engineer/Architect, for Engineer/Architect and Manufacturer's Representative inspection. Additional isolated/random removals may be required where sealant appears deficient. Total cut out sealant shall not exceed lesser of 1% of total lineal footage placed or total of 100 lineal ft of joint sealant at isolated/random locations (varying from in. to ft of material) for Engineer/Architect and Manufacturer's Representative inspection of sealant profile.

J. Contractor to repair all random joint sealant "cut out" sections at no cost to Owner.

K. Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of the joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and a vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.

L. Install sealants to depths as recommended by the sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead.

1. For pavements and similar joints sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75% of joint width, but not more than 5/8 inch deep or less than 3/8 inch deep.
2. For normal moving joints sealed with elastomeric sealants, but not subject to traffic, fill joints to a depth equal to 50% of joint width, but not more than 2 inch deep or less than 1/4 inch deep.

3.4 CURE AND PROTECTION:

A. Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations to obtain high early bond strength, internal cohesive strength and surface durability.

B. Provide all procedures required for the protection of sealants and caulking compounds during the construction period, so that they will be without deterioration or damage (other than normal wear and weathering) at the time of acceptance.

3.5 CLEANING

A. Spillage: Do not allow sealants or compounds to overflow or spill onto adjoining surfaces. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces, by either the primer/sealer or the sealant/caulking compound.

B. Remove excess and spillage of compounds promptly as the work progresses. Clean the adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage, without damage to the adjoining surfaces or finishes.

END OF SECTION

SECTION 09 24 00 – STUCCO

PART 1- GENERAL

1.01 SUMMARY

A. Section Includes: Work includes all labor, materials, and equipment necessary to install all aspects of a Portland cement plaster assembly.

B. Related Sections

1. 06 11 20 – Timber Framing
2. 07 90 00 – Joint Protection

1.02 REFERENCES

A. ASTM C150 – Portland Cement
B. ASTM C847 – Standard Specification for Metal Lath
C. ASTM C1032 - Woven Wire Plaster Base
D. ASTM C933 - Welded Wire Lath
E. ASTM C144/C897 – Aggregate for Job-Mixed Portland Cement-Based Plaster
F. ASTM C926 – Application of Portland Cement-Based Plaster
G. ASTM C1063 – Installation of Lathing and Furring for Portland Cement Based Plaster
H. PCA (Portland Cement Association) – Plaster (Stucco) Manual
I. ICC-ES Acceptance Criteria for Weather-resistive Barriers (AC38)
J. SMA Details and Bulletins

1.03 ASSEMBLY DESCRIPTION

A. General: Portland cement plaster is comprised of a water-resistive barrier, optional sheathing, lath, scratch, brown coats, and a finish coat. Minimum nominal ¾ inch cement thickness.
B. Application Methods: The plaster may be applied by hand tools or machine pumps but must have sufficient force to adhere to the substrate.
C. Framing shall have a deflection of L/360 or stiffer.
D. Fire Rated assemblies shall be per the test report or special instructions.

1.04 SUBMITTALS

A. Product Data: All product data sheets, evaluation reports, details, and warranty information that pertain to the project in accordance with Section 01 30 00 Submittal Procedures.
B. Samples: Submitted upon request.

C. Samples of the finish coat shall be of an adequate size as required to represent each color and texture to be utilized on the project and produced using the same techniques and tools required to complete the project. No sample shall be less than 12” by 12”.
D. Retain approved samples at the construction site throughout the application process.

## 1.05 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer: All component materials shall be SMA approved and shall be distributed by authorized dealers.
   2. Plastering Contractor:
      a. Shall specialize in lath and plaster contracting, document experience of at least 5 years, and follow SMA published recommendations or provide certificates to demonstrate stucco knowledge.
      b. Provide proof of current contractor’s license and bond where required.
B. On-Site Mock-Ups: Produced upon request.
C. Prior to commencement of work, provide an on- site mock-up.
D. Mock-up shall represent construction using the same quality/techniques to be utilized on the project.
E. Retain approved mock-up at job site throughout the application process.
   1. Where acceptable to the Architect, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
   2. Contractor shall acknowledge the SMA technical Bulletins and agree to follow same
   3. Submit letter at completion that the lath and plaster is installed per SMA recommendations.

## 1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver all materials to the construction site in their original, unopened packaging with labels intact.
B. Inspection: Inspect the materials upon delivery to assure that specified products have been received. Report defects or discrepancies to the responsible party according to the construction documents; do not use reported material for application.
C. Storage: Store all products per manufacturer’s recommendations. Generally, store materials in a cool, dry location; away from direct contact with the ground and/or concrete; out of direct sunlight; and protect from weather and other damage.

1.07 PROJECT CONDITIONS

A. Environmental Requirements: Follow product manufacturer's recommendations for environmental conditions and surface preparation.
B. Temperatures: Before, during and following the application of the Portland cement plaster, the ambient and surface temperatures must remain above 40 degrees F for a minimum period of 24 hours. Protect stucco from uneven and excessive evaporation, especially during hot, dry and/or windy weather. Protect the Portland cement plaster from freezing for a period of not less than 24-hours after set has occurred.
C. Substrates: Prior to installation, inspect the wall for surface contamination or other defects that may adversely affect the performance of the materials, and shall be free of residual moisture. Do not apply the Portland cement plaster to substrates whose temperature are less than 40 degrees F ( 4 C) or contain frost or ice.
D. All wood based products covered shall be dry and have a moisture content below 19%. DO NOT COVER WET FRAMING.
E. Inclement Weather: Protect applied material from deleterious effects until cured or dry.
F. Existing Conditions:
    1. Contractor shall walk the project prior to starting work and notify the architect or owner’s representative of any deficiencies that will negatively impact the plaster assembly. Do NOT proceed until remedied.
G. Contractor shall advise architect of any horizontal surfaces with inadequate slope.
H. Jobsite Resources: Notify architect if General Contractor fails to provide access to electrical outlets, clean, potable water, and a suitable and safe work area at the construction site throughout the application of the lath and Portland cement plaster.
I. Good Practice: During the rainy season, colored plaster can be damaged if the gutters and downspouts are not in place. It is recommended to have gutters and downspouts installed as soon as possible after plastering is complete.

1.08 SEQUENCING AND SCHEDULING

A. Sequencing: Coordinate the installation of the lath and Portland cement plaster with all other construction trades. To reduce stucco cracking, apply plaster only after the building is 90 percent dead loaded and the interior gypsum has been installed.

B. Plastering contractor shall request and attend a pre-installation meeting with general contractor and architect prior to the framing being completed. Plastering contractor shall advise architect of control/expansion joint layout concerns. There shall be no cost to the owner for moving one-piece control joints prior and up to this meeting date, additional lineal footage of control joints from plans shall warrant a change order.

C. Staffing: Provide sufficient manpower and proper supervision to ensure continuous operation, free of cold joints, scaffolding lines, curing, variations in texture, etc.

1.09 WARRANTY

A. Warranty: Submit documentation on all products. At completion of work, contractor shall provide a written warranty documentation for the assembly and products used.

B. Warranty Length: Shall start at the time of substantial completion and be for a term of 5 years minimum.

1.10 MAINTENANCE

A. The following materials shall be presented to the owner following the application of the work:
   1. One container of finish for each color and texture utilized on the project.
   2. Supply a maintenance program for Owners O&M manual as required.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Approved System Manufacturers:
   1. Dryvit
   2. Sto Corp.
   3. Parex
   4. Approved Equal

2.02 SCRATCH AND BROWN COAT (BASECOAT)

A. Cement: An engineered Portland cement performance mix by an SMA manufacturer with ASTM C1328.

B. Sand: An “engineered performance mix” by an SMA manufacturer

C. Water: Clean and potable without foreign matter.

D. SMA Approved Admixtures **Required** in Stucco Mix
   1. Acrylic Admixture

2.03 WATER-RESISTIVE BARRIER

A. Over Wood-based Sheathing: (2) layers of 15-lb paper in compliance with prevailing building code requirements. Confirm compliance with existing assembly and modify approved system as required.
B. The contractor shall submit alternative products for the Engineer/Architect's review and approval.

2.04 LATH

A. Woven-Wire Lath: Nominal No. 17 gauge (0.058 inch), 1.5-inch opening, furred galvanized steel complying with ASTM C1032.

2.05 SHEATHING

A. Wood-based Structural Panels: ½" plywood sheathing. Plywood must be exterior or Exposure 1 and comply with DOC PS-1 or UBC Standard 23-2, or APA recommendations. OSB must be Exposure 1 and comply with DOC PS-2, or UBC Standard 23-3, as applicable. Use fire-retardant or pressure treated plywood to match existing.

2.06 ACCESSORIES

A. Sealants: See section 07 90 00.
B. Flashing (by others): Flashing complying with IBC Section 1405.4 (2013) or IRC Section R703.8, as applicable, WRB must integrate in a "Shingle Fashion" with flashings.
C. Fasteners: Nails, staples, or screws used to rigidly secure lath and associated accessories shall be corrosion-resistant and meet the minimum requirements of ASTM C1063.
D. Zinc and Zinc-Coated (Galvanized) Accessories: The following accessories shall be fabricated from zinc-coated (galvanized) steel**.**
E. Corner Aid: Minimum 26-gauge thick; expanded flanges shaped to permit complete embedding in plaster; minimum 2 in. wide; Bull-nose style; use unless otherwise indicated.
F. Strip Mesh: Metal Lath, 3.4 lb/yd$^2$ expanded metal; 6 in. wide x 18 in. long. (used as "butterflies" to minimize re-entrant cracking)
G. Vent Screed: Minimum 26-gauge thick; thickness governed by plaster thickness; minimum 4-inch (102 mm) width, double "V" profile, with perforated expanse between "V's" of longest possible lengths.
H. Casing Bead: Minimum 26-gauge thick; thickness governed by plaster thickness; maximum possible lengths; expanded metal flanges, with square edges.
I. Drip Screed: Minimum 26-gauge thick, depth governed by plaster thickness, minimum 3-1/2 in. high flange, maximum possible lengths.
J. Control and Expansion Joints: Depth to conform to plaster thickness; use maximum practical lengths.

1. Control Joints: One-piece-type, folded pair of unperforated screeds in **double V** configuration; removable protective tape on plaster face of control joint.
2. Expansion Joints: Pair of casing beads with sealant between.

K. Plastic Trim: Fabricated from high-impact PVC.
1. Cornerbeads: With perforated flanges. **Bull-nose** style; use unless otherwise indicated.
2. Casing Beads: With perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated.
3. Control Joints: One-piece-type, folded pair of unperforated screeds in double "V" profile configuration; removable protective tape on plaster face of control joint.

2.07 PRIMER

A. Primer required. Select per manufacturer's recommendations.

2.08 FINISHES

A. Acrylic-based finishes manufactured by approved manufacturer.
B. Color and Texture: Color and finish texture shall be as selected by the Owner/Engineer.
C. See Section 09 90 00 for re-coating information.

2.09 MIXES

A. Portland Cement Plaster Basecoats:
1. Engineered Method: Pre-mix blends.

B. Finish Coats: Mixing and tinting instructions are contained in the appropriate product data sheets by the approved manufacturer.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Prior to the application of the Portland cement plaster basecoat the plastering contractor shall ensure that:
1. Surface and site conditions are ready to receive work.
2. Grounds and Blocking: Verify that the items within the walls for other sections of work have been installed.
3. Notify architect/owner of any defects that may impact the finished assembly. Proceed as directed.

B. Substrates:
1. Acceptable substrates must be sound, secure and suitable for lath and plaster.

2. Substrates and adjacent materials must be dry and clean. Substrate surface must be flat, free of protrusions or planar irregularities greater than ¼-nch in 10-feet (6mm in 3m).

C. Flashings: All flashing around windows, at deck attachments, utility penetrations, roof lines, etc. and all kick-out flashing must be properly installed prior to application of Portland cement plaster. Notify owner if flashings are missing, proceed as directed.

D. Unsatisfactory conditions or concerns shall be reported to the general contractor and/or builder and/or architect and/or owner. Do not proceed until directed in writing by architect or general contractor.

3.02 PREPARATION

A. Substrate/Framing: inspect all work prior to starting lath and plastering. Notify architect of any issues impacting performance, proceed as directed.

B. Surrounding Areas: Protect surfaces near the work of this section from damage, disfiguration, and overspray. Mask off all dissimilar materials.

3.03 INSTALLATION, GENERAL

A. General Installation: Refer to **Florida Building Code, 7th Edition, 2020.** ASTM C926, ASTM C1063, and/or the appropriate manufacturer's product data sheet for additional installation requirements and recommendations of the SMA.

3.04 INSTALLING WEATHER PROTECTION

A. Water-Resistive Barrier: Apply water-resistive barrier complying with Section 1404.2 of the IBC or Section R703.2 of the IRC. Start at base of wall and overlap flashing flanges and in a "shingle-fashion" by a minimum of two (2) inches horizontal and six (6) inches vertical. Integrate with flashings to insure incidental moisture drains down and weeps out. Reverse laps shall not be allowed.

B. Window Flashing: Contractor shall inspect and verify the flashing between the window/door and the cement plaster is appropriate for the condition. Notify architect of any concerns. Refer to SMA flashing guidelines for nail flange style windows.

C. Flashing: Install flashing and trim per current Building Code and as shown on details.

3.05 INSTALLING LATH/TRIMS

A. General: Installed per ASTM C1063 or per Architect's direction. Trims shall be full length and installed plumb/level to within 1/8 inch in eight (8) feet.

B. Weep screed shall be installed at the base of all framed walls.

C. Trims shall be attached per the trim manufacturer's instructions; however do not exceed 24 inches on center spacing.
D. Apply lath per manufacturers recommendations. Laps shall occur at horizontal and vertical joints. Attach lath six (6) to seven (7) inches on center along framing supports (studs). Fastener shall penetrate wood by a minimum ¾ inch, penetration of wood-based sheathing shall count as 50% of dimensional lumber. Metal framing by a minimum of three (3) full threads and engage the lath.
E. Lath shall lap the flange of accessories by more than 50%.
F. Control Joints: Installed per Architects direction. Single-piece control joint may be installed over continuous lath if approved by Building Official and/or Architect. If lath is discontinuous, framing shall support lath terminations. Notify architect of issues or changes.
G. Expansion Joints: Install per Architect's direction. Two piece joints (expansion) must have lath terminate each side.
H. Contractor shall honor control or expansion joints in substrates.
I. Do not mix lath products on same wall.
J. Avoid excessive laps with expanded metal lath
K. Do not use rib lath on walls
L. Use wire nose corner for cement finish, PVC nose for acrylic finish
M. Lath shall cover more than 75% of solid flanges.

3.06 INSTALLING PORTLAND CEMENT PLASTER

A. Per ASTM C926, apply Portland cement plaster by hand-troweling or machine-spraying to a nominal thickness of 3/8-inch (9.5mm) for scratch coat. Then apply a second coat to a nominal thickness of 3/8-inch (9.5 mm) brown coat. Total basecoat shall be a nominal ¾ inch thickness.
B. Scratch coat shall substantially cover the lath and be applied with sufficient pressure to encase the lath in cement. Slickers to apply cement plaster are prohibited. Score in a horizontal pattern.
C. Allow to cure 48 hours, or until sufficiently rigid to accept a brown coat.
D. Apply brown coat to fill and complete basecoat. Nominal ¾ inch thickness. Rod to a flat plane. Do not apply to frozen or soft scratch coat. When excess moisture leaves brown coat, hard float to provide densification per ATSM. Hard floating procedure may be omitted if the "Base coat and Mesh or Stucco crack reduction system" is selected.
E. Moist Curing: Provide sufficient moisture by fog or moist curing to permit proper hydration of the cementitious materials. The length of time and most effective procedure for curing will depend on climatic and job conditions. Refer to SMA curing guidelines.

3.07 INSTALLING BASE AND MESH (CRACK REDUCTION SYSTEM)

A. After brown (basecoat) coat has cured, apply approved polymer enriched cement skim coat to basecoat, then trowel in to fully embed the mesh into skim coat. Insure skim coat and finish coat are compatible products. A minimum two-inch (51 mm) overlap is required at all mesh joints. This method is highly recommended for smooth trowel finish plaster.

3.09 INSTALLING FINISH COAT

A. General: Mix and apply per manufacturer's product data sheet.
B. Do not apply to soft, contaminated or frozen basecoat.
C. Avoid applying to excessively hot walls.
D. [(OPTION) a primer for acrylic finish coats will provide better coverage and most uniform color. This is optional and has a slight cost upcharge.]
E. Verification: Verify the desired color, material and texture to match the approved sample and/or mock-up prior to installation.
F. Avoid scaffold lines and cold joints
G. Fog coat (cement finish only) as needed to blend color variations
H. Finish coat shall be free of eye-catching imperfections.

3.10 CLEANING/PATCHING/TOLERANCE

A. Cleaning: Remove any and all materials used, overspray from adjacent surfaces, and all protective masking.

B. Patch and repair as needed, including but not limited to fog coating, imperfections and blisters.

C. Cracks shall be repaired per the most current SMA Crack Policy (Technical Bulletin 4)
D. The basecoat of plaster shall be in tolerance:
   1. Residential: Not to exceed ¼ inch in eight (8) feet
   2. Commercial: Not to exceed ¼ inch in ten (10) feet
E. Eye catching variations in color or texture pattern will not be accepted.

3.11 PROTECTION

A. Protection: Protect applied material from inclement weather until dry and prevent it from freezing for a minimum of 24-hours after set and/or until dry. Refer to manufacturer's product data sheet for additional requirements.

END OF SECTION

SECTION 09 96 53

ELASTOMERIC COATINGS (STUCCO)

## PART 1: GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

A. Materials and installation of exterior stucco wall covering and water-resistive barrier.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Section 02 4116 “Selective Demolition”.
   2. Section 07 92 00 “Joint Sealants”

### 1.3 REFERENCES

A. A 641 Standard Specification for Zinc-Coated (Galvanized ) Carbon Steel Wire

B. A 653 Specification for Sheet Steel Zinc coated (Galvanized) by the Hot-Dip Process, Commercial Quality

C. C 297 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions

D. C 847 Standard Specification for Metal Lath

E. C 897 Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters

F. C 926 Standard Specification for Application of Portland Cement-Based Plaster

G. C 1063 Standard Specification for Installation of Lathing and Furring for Portland Cement Plaster

H. D 4541 Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

I. E 96 Standard Test Methods for Water Vapor Transmission of Materials

J. E 330 Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference

K. E 331 Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

### 1.4 SUBMITTALS

A. Manufacturer's specifications, details, installation instructions and product data

B. Manufacturer’s code compliance report for stucco where ICC listed one coat stucco is used

C. Manufacturer's standard warranty

D. Samples for approval as directed by architect or owner

E. Fastener manufacturer’s pull-out or withdrawal capacity testing for frame and solid substrates

F. Prepare and submit project-specific details (when required by contract documents)

G. Shop Drawings for stucco installation

## 1.5 MOCKUPS/TEST PANELS

A. Fully prepare, flash, lath and install stucco on a full height section of wall within Courtyard 1 for verification and approval. Mockup location will be chosen in field and will include pilasters, windows, a door and wall appurtenances.

## 1.6 QUALITY ASSURANCE

A. Manufacturer requirements

1. Stucco products manufacturer for a minimum of twenty (20) years.
2. Stucco finish products manufactured under ISO 9001:2008 Quality System and 14001:2004 Environmental Management System.

B. Contractor requirements

1. Licensed, insured and engaged in application of portland cement stucco for a minimum of three (3) years.
2. Knowledgeable in the proper use and handling of Stucco materials.
3. Employ skilled mechanics who are experienced and knowledgeable in portland cement stucco application, and familiar with the requirements of the specified work.
4. Successful completion of minimum of three (3) projects of similar size and complexity to the specified project.
5. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with Sto's published specifications and details and the project plans and specifications.

C. Testing

1. Construct Mock-up of color and texture of final product. Where mock-up is tested at job site maintain approved mock-up at site as reference standard.
2. Verify adequacy of pull-out or withdrawal capacity of fasteners used for frame construction with manufacturer in relation to negative design wind pressures.
3. Conduct pH testing to check stucco surface alkalinity before application of primer or finish materials. Where alkaline resistant primer is used pH testing may be waived.

4. Conduct wet sealant adhesion testing in accordance with sealant manufacturer's field quality control test procedure.
5. Notify design professional minimum 7 days prior to testing.

E. Inspections

1. Provide independent third party inspection where required by code or contract documents.
2. Conduct inspections in accordance with code requirements and contract documents.

1.7 PERFORMANCEE REQUIREMENTS

A. Stucco Base
1. Stucco scratch and brown coat material in compliance with ASTM C 926

B. Primers

1. Alkaline Resistant Primer for freshly placed (minimum 4 day old) stucco surfaces:
   a. Resistant to alkaline surfaces with pH of 13 or less
   b. Surface Burning, ASTM E 84: Flame Spread less than 25, Smoke Developed less than 450, Class A building material
   c. VOC: less than 50 g/L, compliant with South Coast AQMD Rule 1113 for architectural coatings

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product.

B. Protect insulation materials from prolonged UV exposure, keep away from sources of heat, sparks, flame, flammable or volatile materials. Store on a clean, flat surface, off the ground in a dry area.

C. Protect coatings (pail products) from freezing and temperatures in excess of 90°F (32° C). Store away from direct sunlight.

D. Protect portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.

E. Handle all products as directed on labeling.

1.9 PROJECT CONDITIONS

A. Maintain ambient and surface temperatures above 40°F (4°C) during application and for 24 hours after set of stucco, and after application of primers and finish materials.

B. Provide supplementary heat for installation in temperatures less than 40°F (4°C) such that temperatures are maintained as in 1.09A. Prevent concentration of heat on uncured

stucco materials and vent fumes and other products of combustion to the outside to prevent contact with stucco.

C. Prevent uneven or excessive evaporation of moisture from stucco during hot, dry or windy weather. For installation under any of these conditions provide special measures to properly moist cure the stucco. Do not install stucco if ambient temperature is expected to rise above 100ºF (38ºC) within a 24 hour period.

D. Provide protection of surrounding areas and adjacent surfaces from application of materials.

1.10 WARRANTY

A. Provide manufactures 5 year limited warranty on all materials.

PART 2: PRODUCTS

2.1 WATER RESISTIVE BARRIER

A. Tvvek Stucco Wrap.
   1. Two-layers of Tyvek stucco wrap overlapping existing building wrap by a mininimum of four inches horizontally and six inches vertically.

2.2 LATH

A. Minimum 2.5 lb./yd$^2$ (1.4 kg/m$^2$) self-furred galvanized steel diamond mesh metal lath in compliance with ASTM C 847.
B. Maintain minimum 1 inch of overlap between existing metal lath and new metal lath and mechanically attached together.

2.3 MECHANICAL FASTENERS

A. Appropriate non-corroding fasteners, depending on the type framing or substrate:
   1. Wood Framing--minimum 11 gauge, 7/16 inch (11 mm) diameter head galvanized roofing nails with minimum ¾ inch (19mm) penetration into studs or minimum #8 Type S wafer head fully threaded corrosion resistant screws with minimum ¾ inch (19 mm) penetration into studs.
      a. Note fastener capacity must comply with all code requirements. Contractor required to verify fastener capacity through field testing
      b. Minimum installation frequency: 16” O.C. horizontally and 7” O.C. Vertically or in accordance with code and manufacturer requirements.

B. Tie Wire—18 gauge galvanized and annealed low-carbon steel in compliance with ASTM A 641 with Class I coating.

2.4 JOB MIXED INGREDIENTS

A. Water—clean and potable.

B. Portland Cement: ASTM C150 Type I or Type I/II

C. Hydrated Lime: ASTM C 206 Type S

D. Sand - Clean, well graded sand free of deleterious materials in compliance with ASTM C 897.

E. Stucco Admixture Fibers: ½" long complying with ASTM C 1116, for use in basecoat mix only, not finish coats and of polypropylene, nylon or alkali-resistant glass fibers, manufactured specifically for stucco uses per manufacturer's recommendations

F. Coloring Compounds: ASTM C979, pre packaged and manufactured for job-site stucco.

G. Mix Proportions: Follow established standards, complying with ASTM C 926.

2.5 ACCESSORIES

A. Weep screed, casing bead, corner bead, corner lath, expansion and control joint accessories. All accessories shall meet the requirements of ASTM C 1063 and its referenced documents:

B. Galvanized metal in compliance with ASTM A 653 with G60 coating.

C. All accessories shall have perforated or expanded flanges and shall be designed with grounds for the specified thickness of stucco.

2.6 STUCCO

A. Manufacturers: Provide stucco, primer and finish from single source manufacturer.

B. Scratch and Brown Coat Stucco — factory proportioned, fiber reinforced portland cement based stucco for trowel or pump application, field mixed with graded sand (ASTM C 897) and water. Acceptable Product: Sto Powerwall or approved equal.

C. Finish Coat

1. Integrally colored, factory blended, flexible acrylic textured wall finish with graded marble aggregate – Sto Powerwall Finish.

2. All surfaces should be coated after finish coat has cured and finished with elastomeric acrylic protective coating wall finish. Acceptable Product: SikaGard 550W or approved equal. Prime all uncoated stucco with SikaGard 552W

3. Approved stucco color: Eggshell Cream

PART 3: EXECUTION

3.1 EXAMINATION

A. Inspect surfaces for:
   1. Contamination—algae, chalkiness, dirt, dust, efflorescence, form oil, fungus, grease, laitance, mildew or other foreign substances.
   2. Surface absorption and chalkiness.
   3. Cracks—measure crack width and record location of cracks.
   4. Damage and deterioration.
   5. Moisture damage–-record any areas of moisture damage.

B. Inspect sheathing application for compliance with applicable requirement:

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1. Exterior Grade and Exposure 1 wood based sheathing—APA Engineered Wood Association E 30.

C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the waterproof air barrier or stucco installation to the General Contractor. Do not proceed with air barrier or stucco installation until deviations are corrected

## 3.2 SURFACE PREPARATION

A. Sheathing:
1. Remove surface contaminants and replace damaged sheathing.
2. All sheathing must be handled and installed in compliance with applicable code and/or manufacturer requirements. Installed sheathing must be clean, dry and free from damage and frost. Abut gypsum sheathing joints. Gap wood sheathing 1/8 inch (3 mm) at joints

## 3.3 STUCCO INSTALLATION

A. Scratch Coat:

1. Apply stucco with sufficient pressure to key into and embed the metal lath.

2. Apply sufficient material, 3/8—1/2 inch (9—13mm), to cover the metal lath and to permit scoring the surface.

3. Score the stucco upon completion of each panel in preparation for a second coat. Score horizontally.

B. Brown Coat:

1. As soon as the first coat is firm enough to receive the second coat without damage, apply the second coat.

   a. Alternatively, moist cure the first coat up to 48 hours and dampen the scratched surface with water immediately before applying the second coat.

2. Apply the second coat with sufficient pressure to ensure intimate contact with the first coat and as needed to bring the stucco to a uniform thickness that matches the grounds of the accessories.

3. Use a rod or straight edge to bring the surface to a true, even plane. Fill depressions in plane with stucco.

4. Final thickness of stucco shall be minimum 3/4 inch (19 mm), maximum 7/8 inch (22 mm

5. After the stucco has become slightly firm float the surface lightly with a darby or wood float to densify the surface and to provide a smooth, even surface.

6. Moist cure after the stucco has set by lightly fogging for at least 48 hours. Fog as frequently as required during the 48 hour period to prevent loss of moisture from the stucco. Avoid eroding the stucco surface with excess moisture. If relative humidity exceeds 75% the frequency of moist curing can be diminished.

C. Finish Coat:

1. Apply finish directly over the stucco following full cure of underlying brown coat. Apply finish via spraying or troweling with a stainless steel trowel depending on the specified finish.

2. Apply finish in a continuous application, and work a wet edge towards the unfinished wall area. Work to an architectural break in the wall before stopping to avoid cold joints.

3. Weather conditions affect application final color and drying time. Avoid overly hot, dry, or sunny conditions that may limit working time and accelerate drying. Additionally, overly cool or damp conditions may extend working time and require additional protection measures against wind bourn dust and debris.

   a. Adjustment in scheduling of work may be required to achieve desired results.

4. Follow manufacturer's instructions for priming.

5. Do not install separate batches of finish side-by-side.

6. Do not apply finish into or over joints or accessories, Apply finish to outside face of wall only

3.4 PROTECTION

A. Provide protection of installed materials from water infiltration into or behind them.

B. Provide protection of installed stucco from dust, dirt, precipitation, and freezing.

C. Provide protection of installed primer and finish from dust, dirt, precipitation, freezing and continuous high humidity until fully dry.

D. Provide sealant and backer material at stucco terminations to protect against air, water and insect infiltration. Provide weeps at floor lines, window and door heads, and other areas to conduct water to the exterior.

3.5 CLEANING, REPAIR AND MAINTENANCE

A. Clean and maintain the stucco finish for a fresh appearance and to prevent water entry into and behind the stucco. Repair cracks, impact damage, spalls or delamination promptly.

B. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into the wall assembly.

**END OF SECTION**