

**SPECIFICATIONS/SCOPE OF WORK**  
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SECTION 01 10 15 – TASK ITEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and Division 01 Specification sections, apply to work of this section.

1.2 TASK ITEM (T.I.) DESCRIPTION

T.I. 0 PROJECT MOBILIZATION AND DEMOBILIZATION

A. Scope of Work

- 1. Work consists of coordinating, scheduling, obtaining, and assembling at construction site all equipment, materials, permits, supplies, manpower and other essentials and incidentals necessary to perform Work defined in this Contract.
- 2. Upon completion of the work and fulfillment of all project requirements to perform Work defined in its Contract the Contractor shall demobilize and make the site ready for Owner's occupancy.

T.I. 1 DEMOLITION

A. Scope of Work

- 1. Work consists of furnishing all labor, materials, equipment, staging, supervision, and incidentals necessary to locate and remove existing precast hollowcore planks and guardrails at the east pedestrian ramp of the existing structure. Refer to drawings and specifications for specific requirements.

B. Materials

- 1. Refer to drawings and specifications.

C. Execution

- 1. Refer to drawings and specifications.

T.I. 2 NEW HOLLOWCORE PLANKS

A. Scope of Work

- 1. Work consists of furnishing all labor, materials, equipment, staging, supervision, and incidentals necessary to design and install new hollowcore planks to replace the existing precast planks currently installed at the ramp.

- B. Materials
  - 1. Refer to drawings and specifications.
- C. Execution
  - 1. Refer to drawings and specifications.
- T.I. 3 NEW CONCRETE TOPPING SLAB
  - A. Scope of Work
    - 1. Work consists of furnishing all labor, materials, equipment, staging, supervision, formwork, and incidentals necessary to install a new bonded concrete topping slab onto the new hollowcore planks at the east pedestrian ramp of the structure.
  - B. Materials
    - 1. Refer to drawings and specifications.
  - C. Execution
    - 1. Refer to drawings and specifications.
- T.I. 4 NEW EDGE BEAM/CURB CLOSURE
  - A. Scope of Work
    - 1. Work consists of furnishing all labor, materials, equipment, staging, supervision, formwork, and incidentals necessary to construct new edge beams/curb closures along the east pedestrian ramp.
  - B. Materials
    - 1. Refer to drawings and specifications.
  - C. Execution
    - 1. Refer to drawings and specifications.
- T.I. 5 NEW GUARDRAILS
  - A. Scope of Work
    - 1. Work consists of furnishing all labor, materials, equipment, supervision, staging, bracing, and incidentals necessary to install new guardrails at the edge of the pedestrian walkway east ramp. Refer to Detail 8/S3.00 for specific requirements. See Plan Sheets for location of work.
  - B. Materials

1. Steel base plates, A36 steel
2. New galvanized steel guardrails to be submitted by contractor

C. Execution

1. Contractor shall submit new guardrail details and design calculations provided by a licensed Engineer in the State of Florida. Details and calculations shall be reviewed and approved by Walter P Moore prior to fabrication and installation of guardrails.
2. Guardrails shall be designed in accordance to the Florida Building Code 2023.
3. New guardrails shall be anchored to existing concrete walls as shown in Detail 8/S3.00.
4. New guardrails shall be powder-coated. Color shall be selected by Owner.

T.I. 6 CONCRETE TOPPING SLAB REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, staging, formwork, supervision, and incidentals necessary to locate existing spalls, locate and remove full delaminated and unsound concrete topping from double tees, prepare cavities, and install repair materials to restore concrete floor topping to original condition and appearance at the west pedestrian walkway of the structure. Refer to Detail 1/S3.20 for specific requirements. Refer to Plan Sheets for location of work.

B. Materials

1. Material for repair areas shall be as specified in Section "Concrete Repair Materials."

C. Execution

1. Contractor shall locate and mark all work areas as specified in Section "Surface Preparation for Patching." Marking will be done with methods approved by Engineer and Owner. Contractor shall identify all critical repair work areas before starting the work.
2. Procedure for delaminated, spalled, and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching."
3. All steel exposed within cavities shall be cleaned to bare metal by abrasive methods or other approved methods as specified in Section "Surface Preparation for Patching."

4. Exposed wire mesh with concrete cover less than 1-inch shall be removed. Consult with Engineer prior to any removal of reinforcement.
5. Exposed steel shall be epoxy coated with an approved epoxy product as specified in Section "Surface Preparation for Patching."
6. Contractor shall prepare cavities for repair placement as specified in Section "Surface Preparation for Patching."
7. Patch installation procedures shall be in accordance with referenced specifications for selected material.
8. Control joints shall be tooled and formed in plastic concrete. Sawcutting joints after concrete sets will not be allowed.
9. Tooled joints shall be of proper dimension in plastic concrete.
10. Joint sealant installation will be in accordance with Task Item "Crack Repair - West Walkway."

T.I. 7 CONCRETE CURB REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, staging, formwork, supervision, and incidentals necessary to locate existing spalls, locate and remove full delaminated and unsound concrete from curbs, prepare cavities, and install repair materials to restore concrete floor slab to original condition and appearance. Refer to Detail 5/S3.10 for specific requirements. Refer to Plan Sheets for location of work.

B. Materials

1. Material for repair areas shall be as specified in Section "Concrete Repair Materials."

C. Execution

1. Contractor shall locate and mark all work areas as specified in Section "Surface Preparation for Patching." Marking will be done with methods approved by Engineer and Owner. Contractor shall identify all critical repair work areas before starting the work.
2. Procedure for delaminated, spalled, and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching."
3. All steel exposed within cavities shall be cleaned to bare metal by abrasive methods or other approved methods as specified in Section "Surface Preparation for Patching."

4. Exposed steel shall be epoxy coated with an approved epoxy product as specified in Section "Surface Preparation for Patching."
5. Contractor shall prepare cavities for repair placement as specified in Section "Surface Preparation for Patching."
6. Patch installation procedures shall be in accordance with referenced specifications for selected material.

T.I. 8 SLAB REPAIR OVERHEAD

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, scaffolding, shoring, and incidentals necessary to locate existing spalls, locate and remove delaminated and unsound concrete, prepare cavities, and install patching materials to restore slab to original condition and appearance at the west pedestrian walkway of the structure. Refer to Detail 2/S3.20. Refer to Plan Sheets for location of work.

B. Materials

1. Material for repairs shall be as specified in Section "Concrete Repair Materials."

C. Execution

1. Contractor shall locate and mark all work areas as specified in Section "Surface Preparation for Patching." Contractor shall identify all critical repair work areas before starting the work.
2. Procedure for delaminated, spalled, and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching."
3. All steel exposed within cavities shall be cleaned to bare metal by abrasive methods as specified in Section "Surface Preparation for Patching."
4. Exposed steel shall be epoxy coated with an approved epoxy product as specified in Section "Surface Preparation for Patching."
5. Contractor shall form concrete with approved materials and prepare cavities for repair placement as specified in Section "Surface Preparation for Patching."
6. Patch installation procedures shall be in accordance with referenced specifications for selected material.

T.I. 9 CONCRETE BEAM REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, scaffolding, shoring, and incidentals necessary to locate and remove delaminated/spalled concrete, prepare cavities, and install patching materials to restore concrete beams to original condition and appearance. Refer to Detail 9/S3.00. Refer to Plan Sheets for location of work.

B. Materials

1. Material for repairs shall be as specified in Section "Concrete Repair Materials."

C. Execution

1. Contractor shall locate and mark all work areas as specified in Section "Surface Preparation for Patching." Contractor shall identify all critical repair work areas before starting the work.
2. Procedure for delaminated, spalled, and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching."
3. All steel exposed within cavities shall be cleaned to bare metal by abrasive methods as specified in Section "Surface Preparation for Patching."
4. Exposed steel shall be epoxy coated with an approved epoxy product as specified in Section "Surface Preparation for Patching."
5. Contractor shall prepare cavities for repair placement as specified in Section "Surface Preparation for Patching."
6. Patch installation procedures shall be in accordance with referenced specifications for selected material.

T.I. 10 CONCRETE PENETRATING SEALER

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to clean the existing and new concrete floor surfaces and install penetrating sealer at the existing west pedestrian walkway floor surfaces and at the new concrete topping slab at the east pedestrian walkway ramp.

B. Materials

1. Material shall be as specified in Section, "Concrete Penetrating Sealers."

C. Execution

1. Contractor shall identify and mark all locations of work.
2. Shotblast existing floor surface. The floor surface shall be porous to penetrate concrete.
3. Clean concrete surface to remove dirt and debris, leaving the concrete surface porous.
4. Install sealer in strict accordance to manufacture's recommendations.

T.I. 11 CRACK REPAIR - WEST WALKWAY

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to locate, prepare, rout and seal random cracks in concrete floor slab at the west pedestrian walkway. Refer to Detail 3/S3.20 for specific requirements. Refer to Plan Sheets for location of work.

B. Materials

1. Approved materials to be used in this Work are specified in Section "Joint Sealants."

C. Execution

1. Contractor shall thoroughly inspect concrete slabs for cracks in the areas shown in the drawings. Those identified as either greater than 1/64 in. wide or showing evidence of water and/or salt staining on ceiling below shall be sealed.
2. All cracks identified for repair shall be marked to aid in precision routing. Obtain depths to top reinforcing bars in area of repair by use of non-destructive methods.
3. Determine depth of electrical conduit (if applicable). Do not exceed 1/2 of this depth of routing where the crack to be repaired crosses the embedded items. Damage to embedded items will require repair or replacement at no cost to the Owner.
4. Cracks shall be ground or saw-cut to an adequate width and depth as required by Detail. Routing shall be performed by mechanized device that has positive mechanical control over depth and alignment of cut.
5. Cavities shall be thoroughly cleaned by either abrasive methods or grinding to remove all laitance, unsound concrete and curing compounds which may interfere with adhesion. Groove shall be vacuumed clean to remove remaining debris.



6. Sealant materials and associated reference specifications are listed in Section "Joint Sealants." Sealant installation procedures shall be in accordance with referenced specifications for selected material.

T.I. 12 CONTRACTION JOINT SEALANT REPLACEMENT - WEST WALKWAY

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to locate, remove, prepare, and re-seal joints in concrete floor slab at the west pedestrian walkway and other concrete members. Refer to Detail 4/S3.20 for specific requirements. Refer to Plan Sheets for location of work.

B. Materials

1. Approved materials to be used in this Work are specified in Section "Joint Sealants."
2. Closed cell backer rod as required.

C. Execution

1. Contractor shall locate and identify all location of work.
2. Remove existing joint sealant with minimal damage to adjacent concrete surfaces.
3. Determine depth of electrical conduit (if applicable). Do not exceed ½ of this depth of routing where the crack to be repaired crosses the embedded items. Damage to embedded items will require repair or replacement at no cost to the Owner.
4. Cavities shall be thoroughly cleaned by either abrasive methods or grinding to remove all laitance, unsound concrete and curing compounds which may interfere with adhesion. Groove shall be vacuumed clean to remove remaining debris.
5. Install backer rod at wide joints in strict accordance with manufacturer's instructions.
6. Sealant materials and associated reference specifications are listed in Section "Joint Sealants." Sealant installation procedures shall be in accordance with referenced specifications for selected material.

T.I. 13 COVE SEALANT @ G/R POSTS

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to prepare surfaces and install cove sealant

around existing guardrail posts at the west pedestrian walkway as shown on Drawings. Refer to the drawings and specifications for specific requirements. Refer to Plan Sheets for location of work.

B. Materials

1. Approved materials to be used in this Work are specified in Section "Joint Sealants."

C. Execution

1. Surfaces to be sealed shall be thoroughly cleaned by abrasive blasting to remove all contaminants, existing sealant, and foreign material.
2. Entire work area shall then be vacuumed cleaned to assure that all loose particles have been removed and that intersection is dry.
3. Properly prepared surfaces shall be coated evenly and completely with joint primer material on each of intersecting faces in accordance with sealant manufacturer's recommendations.
4. After primer has cured, apply cove sealant to intersection such that sealant extends  $\frac{3}{4}$ " onto both the existing guardrail post face and the existing concrete slab face.
5. Work cove sealant into joint so that all air is removed and tool to concave shape such that minimum throat dimension of no less than  $\frac{1}{2}$ " is maintained.
6. Remove excess sealant and allow to cure.

END OF SECTION 01 10 15

SECTION 01 11 00 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including conditions included by Owner.

1.2 GENERAL DESCRIPTION OF WORK:

- A. The Work of this Contract will be performed in the facility as shown on Drawings.
- B. Contractor shall furnish all material, labor, tools, supplies, permits, equipment, transportation, superintendence, barricades, temporary protection, bracing, shoring, temporary construction of every nature, insurance, taxes, contributions and all services and facilities, unless specifically excepted, and install all materials, items, and equipment required to complete the construction of the Project, as set forth in the Contract Documents.
- C. Refer to Section "Task Items" for a description of work. Task Item specifications, details, and drawings shall govern all repair operations. Locations where Task Items apply are shown on Drawings as symbols.
- D. Final Payment shall be made on basis of actual approved Work performed as measured in place.

1.3 MEASUREMENTS:

- A. Before ordering any material or doing any Work, Contractor shall verify all measurements at the Project Site and shall be responsible for correctness of same.
- B. Before proceeding with each Task Item, Contractor shall locate, mark, and measure quantity of each item and report quantities to Engineer. If measured quantities exceed those indicated on the bid form, Contractor shall obtain written authorization to proceed from Owner before executing Work required for that Task Item.
- C. Cost of Work included in each Task Item for quantities as indicated in the Contract Documents shall be included in Base Bid without substitution of materials, construction sequence, or limitations on construction means where indicated.

1.4 WORK SEQUENCE:

- A. Prior to commencement of Work, meet with Engineer and Owner representatives to establish sequence and schedule of Work. Contractor shall give Owner notice of areas to be cleared at least 7 working days in advance of actual Work.
- B. Contractor shall notify Owner's representative at least 24 hours prior to commencing any abrasive blasting such as sandblasting, etc. operations.
- C. Work will be conducted in phases to provide least possible interference to activities of Owner's personnel and facility users.

1. Contractor's work hours shall be limited to comply with noise ordinances. Contractor is allowed to work as necessary to complete work within Owner's time schedule and conditions conducive to temperature sensitive materials.
  - D. Contractor shall remove debris from Work Area on daily basis and dispose of same at authorized sites.
  - E. Contractor shall remove dust and air transported material from remainder of facility at conclusion of operations in Work area.
- 1.5 CONTRACTOR'S USE OF PREMISES:
- A. Contractor shall limit their use of adjacent premises for Work, construction operations and storage to allow for:
    1. Public use, including parking.
    2. Owner Occupancy:
      - a. Where it is necessary for the Contractor to use portions of existing buildings and/or grounds for operations, such use shall be strictly in accordance with requirements and approval of the Owner.
      - b. Contractor shall organize the work in order that inconvenience to the facility patrons is minimized.
      - c. Keep driveways and entrances serving the premises clear and available to the Owner and facility patrons at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
      - d. Unless otherwise indicated or specified, or unless otherwise directed by Owner; water, gas, lighting, power and telephone conduits and wires, sewer lines, and other surface and subsurface structures and lines, shall be maintained by Contractor and shall not be disturbed, disconnected or damaged by the Contractor during progress of Work. Should the Contractor in performance of Work disturb, disconnect or damage any of above, expenses arising from the disturbance replacement or repair shall be borne by Contractor.
      - e. Elevators shall not be used for transfer of materials or equipment unless approved by the Owner's Representative in writing. When permitted by the Owner's Representative the Contractor shall take care not to overload or damage the elevator.
    3. Contractor shall:
      - a. Not unreasonably encumber Site with materials and equipment.
      - b. Not load structure with weight that will endanger the structure.
      - c. Assume full responsibility for protection and safekeeping of stored products.

- d. Move or remove stored products which interfere with operations of Owner.
  - e. Obtain and pay for use of additional storage and work areas needed for operations.
4. Contractor Parking:
- a. Contractor's personal vehicles shall park outside of construction area. Only vehicles equipment or delivering materials should be in the construction area. Coordinate with owner's representative.
- 1.6 OWNER OCCUPANCY:
- A. Cooperate with the Owner's Representative in all construction operations to minimize conflict and to facilitate Owner usage.
  - B. Contractor shall at all times conduct operations to ensure the least inconvenience to the general public.
- 1.7 SURVEY OF EXISTING CONDITIONS:
- A. Contractors acknowledges by submitting a Bid, that they have visited and inspected the Project Site in which the Work is to be performed, that they have satisfied themselves as to the nature and location of the Work, including any obstructions, amount of work, actual levels, the equipment and facilities needed preliminary to and during the prosecution of the Work, and all other matters which can in any way affect the Work or the cost thereof under this Contract.
  - B. Failure by Contractors to have acquainted themselves with available information concerning Site conditions, including factors affecting costs and liabilities, shall not relieve Contractor of responsibility for performance of Work in accordance with requirements of Contract Documents, and for amount of consideration named or otherwise determined.

END OF SECTION 01 11 00

SECTION 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, apply to this Section.
- B. Contractor's Construction Schedule and Schedule of Submittals are included under Section "Submittal Procedures."

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling requests for substitutions made after award of Contract.

1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change or modify meaning of other terms used in Contract Documents.
- B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by Contractor after award of Contract are considered requests for "substitutions." Following are not considered substitutions:
  - 1. Revisions to Contract Documents requested by Owner or Engineer.
  - 2. Specified options of products and construction methods included in Contract Documents.
  - 3. Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS

- A. Substitution Request Submittal: Requests for substitution will be considered if received within 15 days after commencement of Work. Requests received more than 15 days after commencement of Work may be considered or rejected at discretion of Engineer.
  - 1. Submit electronic copies of each request for substitution for consideration. Submit requests on forms included at end of this Section and in accordance with procedures required for Change Order proposals. Engineer will make the Substitution Request Form at the end of this Section available to the Contractor as an electronic file upon request by the Contractor.
  - 2. Identify product, fabrication, and/or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with requirements for substitutions, and the following information, as appropriate:

- a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
- b. Samples, where applicable or requested.
- c. Detailed comparison of significant qualities of proposed substitution with those of Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
- d. Coordination information, including list of changes or modifications needed to other parts of Work and to construction performed by Owner and separate Contractors that will become necessary to accommodate proposed substitution.
- e. Statement indicating substitution's effect on Contractor's Construction Schedule compared to schedule without approval of substitution. Indicate effect of proposed substitution on overall Contract Time.
- f. Cost information, including proposal of net change, if any in Contract Sum.
- g. Certification by Contractor that substitution proposed is equal to or better in every significant respect to that required by Contract Documents, and that it will perform adequately in application indicated. Include Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of substitution to perform adequately.

## 1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Contractor shall investigate and document compatibility of proposed substitution with related products and materials.
- B. For proposed substitution system, products, the Engineer may request the Contractor engage a qualified testing agency to perform compatibility tests recommended by manufacturers, durability test recommended by the Engineer, additional quality assurance testing, and/or additional quality control testing. Additional cost associated with the proposed substitution request shall be paid for by the Contractor.

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTIONS

- A. Conditions: Contractor's substitution request will be received and considered by Engineer when one or more of following conditions are satisfied, as determined by Engineer; otherwise requests will be returned without action except to record noncompliance with these requirements.
  1. Specified products or methods of construction cannot be provided within Contract Time. Specified products or methods of construction cannot receive necessary approval by governing authority, and requested substitution can be approved.
  2. Substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities Owner may be

required to bear. Additional responsibilities for Owner may include additional compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner or separate Contractors, and similar considerations.

3. Specified products or methods of construction cannot be provided in manner that is compatible with other materials, and where Contractor certifies that substitution will overcome incompatibility.
  4. Specified products or methods of construction cannot be coordinated with other materials, and where Contractor certifies that proposed substitution can be coordinated.
  5. Specified products or methods of construction cannot provide warranty required by Contract Documents and where Contractor certifies that proposed substitution provide required warranty.
- B. Contractor's submittal and Engineer's review of Shop Drawings, Product Data and/or Samples that relate to construction activities not complying with Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

END OF SECTION 01 25 13



REQUEST FOR SUBSTITUTION

To: WALTER P MOORE

Attention: Webb Wright, P.E.

From: \_\_\_\_\_  
Name of Company

\_\_\_\_\_  
Address

\_\_\_\_\_  
City, State\Province, Zip Code

\_\_\_\_\_  
Phone

\_\_\_\_\_  
Email

Fully answer all information requested below. Failure to answer any item may cause rejection of request for substitution. If requested by Engineer, submit information about manufacturer and vendor history, financial stability, distribution and support systems. Use one form for each product/assembly requested. Only first product/assembly listed will be considered on forms with more than one product listed.

Specification Section Number: \_\_\_\_\_ Drawing Number: \_\_\_\_\_

Para Number: \_\_\_\_\_ Detail Number: \_\_\_\_\_

Specified Product/Assembly: \_\_\_\_\_

Proposed Substitution: \_\_\_\_\_

Please answer the following questions. Attach an explanation sheet on your company's letterhead when required.

Does the proposed substitution affect dimensions indicated on Drawings?

No \_\_\_\_\_ Yes \_\_\_\_\_ (If yes, explain below).

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Does the proposed substitution require changes in Drawings and/or design or installation changes?

No \_\_\_\_\_ Yes \_\_\_\_\_

If yes, is the cost of these changes included in the proposed amount? No \_\_\_\_\_ Yes \_\_\_\_\_

Does the proposed substitution affect other trades? No \_\_\_\_\_ Yes \_\_\_\_\_

(If yes, explain who and how)

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If the proposed product does affect the work of other trades, has the cost impact on their work been included in the price of the proposed substitution?

No \_\_\_\_\_ Yes \_\_\_\_\_

Does the proposed product's guarantee differ from that of the specified product's?

No \_\_\_\_\_ Yes \_\_\_\_\_ (If yes, explain below).

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Why is this proposal for substitution being submitted? List reasons below.

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Attach a listing of 3 projects using the proposed substitution, completed within the past 5 years in similar to the geographic and climatic region of the Project. At least one of the applications shall have been in service for at least 3 years.

Attach product data/brochures and this Request for Substitution Form for the specified products and proposed substitute product.

Undersigned has examined Construction Documents, is familiar with specified product, understands indicated application of product, and understands design intent of Engineer. Undersigned states that proposed substitution complies with Construction Documents and will perform at least equally to specified product within limitations stated above. Undersigned accepts responsibility for coordinating application and installation of proposed substitution and waives all claims for additional costs resulting from incorporation of proposed substitution into Project or its subsequent failure to perform according to specified requirements.

Submitted By: \_\_\_\_\_  
Typed Name

\_\_\_\_\_  
Signature

Date: \_\_\_\_\_

SECTION 01 29 00 – PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
  - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with Continuation Sheets.
    - b. Submittals Schedule.
  - 2. Submit the Schedule of Values to Engineer at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
  - 3. Sub-schedules: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual Bid Form Task Items as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
  - 1. Identification: Include the following Project identification on the Schedule of Values:
    - a. Project name and location.
    - b. Name of Engineer.
    - c. Engineer's project number.

- d. Contractor's name and address.
  - e. Date of submittal.
2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
    - a. Related Task Item, Specification Section or Division.
    - b. Description of the Work.
    - c. Unit price of the Work
    - d. Name of subcontractor.
    - e. Name of manufacturer or fabricator.
    - f. Name of supplier.
    - g. Change Orders (numbers) that affect value.
    - h. Dollar value as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
  3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
  4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
  5. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
  6. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

#### 1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Engineer and paid for by Owner.
  1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is the 15th day of each month. The period covered by each Application for Payment starts on the day following the end of the preceding period and ends 15 days before the date for each progress payment.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment or Owner's approved forms.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Engineer will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
  2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at the time of Application for Payment.
  3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Stored Materials: Where applicable, include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
  2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  3. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Transmittal: Electronically submit signed and notarized scans of each Application for Payment to Engineer. Include waivers of lien and similar attachments if required by the Owner's Representative.
1. Include a cover page listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item, if applicable.
  2. When an application shows completion of an item, submit final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.

4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  5. Waiver Delays: Submit each Application for Payment with Contractor's waiver of mechanic's lien for construction period covered by the application.
    - a. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  6. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of Values.
  3. Contractor's Construction Schedule (preliminary if not final).
  4. Products list.
  5. Schedule of unit prices.
  6. Submittals Schedule (preliminary if not final).
  7. List of Contractor's staff assignments.
  8. List of Contractor's principal consultants.
  9. Copies of building permits.
  10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  11. Initial progress report.
  12. Report of preconstruction conference.
  13. Certificates of insurance and insurance policies.
  14. Performance and payment bonds.
  15. Initial settlement survey and damage report if required.
- I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing final percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.

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

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 29 00

SECTION 01 31 00 – PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General project coordination procedures.
  - 2. Coordination Submittals.
  - 3. Requests for Information (RFIs).
  - 4. Administrative and supervisory personnel.
  - 5. Project meetings.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 01 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.



- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
  2. Preparation of the Schedule of Values.
  3. Installation and removal of temporary facilities and controls.
  4. Delivery and processing of submittals.
  5. Pre-installation conferences.
  6. Project closeout activities.

1.4 REQUESTS FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Engineer will return RFIs submitted to Engineer by other entities controlled by Contractor with no response.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project Name.
  2. WPM Project number.
  3. Date.
  4. Name of Contractor.
  5. Name of Engineer.
  6. RFI number, numbered sequentially.
  7. RFI subject.
  8. Specification Section number and title and related paragraphs, as appropriate.
  9. Drawing number and detail references, as appropriate.
  10. Field dimensions and conditions, as appropriate.
  11. Where applicable, contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  12. Contractor's signature.
  13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Email the RFI to the Engineer.
1. Title the subject line of the email with: WPM Project number - Project Name - RFI number

2. Attachments shall be electronic files in PDF format.
- D. Engineer's Action: Engineer will review each RFI, determine action required, and respond. Allow seven 7 working days for Engineer's response for each RFI. RFIs received by Engineer after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Engineer's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.
  2. Engineer's action may include a request for additional information, in which case Engineer's time for response will date from time of receipt of additional information.
  3. Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal.
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following in the RFI Log:
1. Project name.
  2. Name of Contractor.
  3. Name of Engineer.
  4. RFI number including RFIs that were returned without action or withdrawn.
  5. RFI summary description.
  6. Date the RFI was submitted.
  7. Date Engineer's response was received.
- F. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within seven 7 days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
- 1.5 OWNERS PROJECT WEB SITE
- A. Use Owner's Project Web Site for purposes of hosting and managing project communication and documentation until Final Completion. Owner's Project Web site may include the following functions:

1. Project directory.
2. Project correspondence.
3. Meeting minutes.
4. Contract modifications forms and logs.
5. RFI forms and logs.
6. Task and issue management.
7. Photo documentation.
8. Schedule and calendar management.
9. Submittals forms and logs.
10. Payment application forms.
11. Drawing and specification document hosting, viewing, and updating.
12. Online document collaboration.
13. Reminder and tracking functions.
14. Archiving functions.

- B. Contractor, subcontractors, and other parties granted access by Contractor to Project Web site shall execute a data licensing agreement in the form of Agreement acceptable to Owner and Engineer.

#### 1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

#### 1.7 PROJECT MEETINGS

- A. General: Coordinate with the Engineer and Owner's Representatives in the scheduling and participation in meetings and conferences at Project site, unless otherwise indicated.
1. Attendees: Inform the Owner's Representative, Engineer, and Contractor of the date and time of each meeting. Contractor and Owner's Representative shall inform others involved, and individuals whose presence is required, of date and time of each meeting.
  2. Agenda: Engineer or Owner's Representative will prepare the meeting agenda and distribute the agenda to all invited attendees.
  3. Minutes: Contractor will record significant discussions and agreements achieved. Minutes will be distributed to everyone concerned, including Owner, Engineer, and Contractor.
- B. Preconstruction Conference: Coordinate with the Engineer and Owner's Representatives in the scheduling of a preconstruction conference before starting construction, at a time acceptable to the Contractor and convenient to Owner and Engineer but no later than 15 days after execution of the Agreement. Hold the conference at the Project site or another convenient location. The Engineer or Owner's Representative will conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Engineer, and their consultants; Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Discuss items of significance that could affect progress, may include the following:
    - a. Tentative construction schedule.
    - b. Phasing.
    - c. Critical work sequencing.
    - d. Designation of responsible personnel.
    - e. Procedures for processing field decisions and Change Orders.
    - f. Procedures for processing Applications for Payment.
    - g. Distribution of the Contract Documents.
    - h. Submittal procedures.
    - i. Preparation of Record Documents.
    - j. Use of the premises.
    - k. Responsibility for temporary facilities and controls.
    - l. Parking availability.
    - m. Office, work, and storage areas.
    - n. Equipment deliveries and priorities.
    - o. First aid.
    - p. Security.
    - q. Progress cleaning.
    - r. Working hours.
- C. Preinstallation Conferences: Contractor shall conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Engineer of scheduled meeting dates.
  2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related Change Orders.
    - d. Deliveries.
    - e. Submittals.
    - f. Compatibility problems.
    - g. Time schedules.
    - h. Weather limitations.
    - i. Manufacturer's written recommendations.
    - j. Warranty requirements.
    - k. Compatibility of materials.
    - l. Acceptability of substrates.
    - m. Temporary facilities and controls.

- n. Space and access limitations.
  - o. Testing and inspecting requirements.
  - p. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements.
4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Engineer or Owner's Representative will conduct progress meetings at weekly intervals. Contractor shall coordinate preparation of payment requests with dates of meetings.
- 1. Attendees: In addition to representatives of Owner and Engineer, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Sequence of operations.
      - 2) Status of submittals.
      - 3) Access.
      - 4) Site utilization.
      - 5) Temporary facilities and controls.
      - 6) Work hours.
      - 7) Hazards and risks.
      - 8) Progress cleaning.
      - 9) Quality and work standards.
      - 10) Change Orders.
      - 11) Documentation of information for payment requests.
  - 3. Reporting: Engineer or Owner's Representative will distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

- a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

END OF SECTION 01 31 00

SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.
- B. Related Sections include the following:
  - 1. Division 01 Section "Payment Procedures."
  - 2. Division 01 Section "Project Management and Coordination" for submitting Coordination Drawings.
  - 3. Division 01 Section "Quality Requirements" for submitting test and inspection reports and Delegated-Design Submittals.
  - 4. Division 01 Section "Closeout Procedures" for submitting warranties.
  - 5. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Engineer's responsive action.
- B. Informational Submittals: Written information that does not require Engineer's approval. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

- A. Resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal data the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including the cost of Engineer's services made necessary to review such additional resubmittals. Owner will in turn reimburse Engineer.
- B. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Engineer for Contractor's use in preparing submittals.

- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal.
  - 1. Initial Review: Allow 7 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
- E. Identification: Precede each submittal with a cover page for identification.
  - 1. Indicate name of firm or entity that prepared each submittal on the cover page.
  - 2. Provide a blank space approximately 4 by 5 inches on cover page to record Contractor's review and approval markings. Provide an additional 5 by 5 inches on the cover page for the Engineer's review.
  - 3. Include the following information on label for processing and recording action taken:
    - a. Project name.
    - b. Date.
    - c. Name and address of Engineer.
    - d. Name and address of Contractor.
    - e. Name and address of Subcontractor.
    - f. Name and address of Supplier.
    - g. Name of Manufacturer.
    - h. Unique identifier, including revision number.
    - i. Number and title of appropriate Specification Section.
    - j. Drawing number and detail references, as appropriate.
    - k. Other necessary identification.
- F. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will return submittals, without review, received from sources other than Contractor.
  - 1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements of the Contract Documents,



- including minor variations and limitations. Include the same label information as the related submittal.
2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
  3. Transmittal Form: Provide locations on form for the following information:
    - a. Project name.
    - b. Date.
    - c. Destination (To:).
    - d. Source (From:).
    - e. Names of subcontractor, manufacturer, and supplier.
    - f. Category and type of submittal.
    - g. Submittal purpose and description.
    - h. Submittal and transmittal distribution record.
    - i. Remarks.
    - j. Signature of transmitter.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Use only final submittals with mark indicating action taken by Engineer in connection with construction.

## PART 2 - PRODUCTS

### 2.1 ACTION SUBMITTALS

- A. General: Prepare and electronically submit Action Submittals required by individual Specification Sections. Engineer will return submittal via email. Reviewed submittal will be stamp and may contain commentary and or redlines thought the submittal where warranted. Engineers review stamps are:
1. No Exceptions Taken: No commentary by the Engineer. No further resubmittal is required.
  2. Exception Noted: Commentary are contained throughout the submittal. No further resubmittal is required as long as the Engineer's comments are addressed.
  3. Revise and Resubmit: Commentary are contained throughout the submittal. Revise the submittal to account for the commentary. Additionally submit additional submittal parts or products not included in the original submittal where noted.
  4. Submit Specified Item(s): One or more submitted products, assemblies, or information does not comply with the project documents. Additionally, commentary may be contained throughout the submittal. Resubmit an acceptable product(s), assemblies, or information. Revise the acceptable portions of the submittal to account for the commentary. Provide additional submittal parts or products not included in the original submittal where noted.

5. Acknowledge Receipt for Records Only: Only acknowledges receipt of information requested by the Contract Documents and does not indicate that the information contained in the submittal has been reviewed for accuracy. The Contractor is responsible for confirming information on the submittal is coordinated and consistent with the Contract Documents.
  6. Reviewed for Reference and Information Only: Reviewed information requested by the Contract Documents but does not indicate that the information contained in the submittal has been reviewed for accuracy. The Contractor is responsible for confirming information on the submittal is coordinated and consistent with the Contract Documents.
  7. Reviewed for Impact to Structure Only: Reviewed information requested by the Contract Documents and whether it has an impact on the existing construction or the Engineer's design but does not indicate that the information contained in the submittal has been reviewed for accuracy. The Contractor is responsible for confirming information on the submittal is coordinated and consistent with the Contract Documents.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each copy of each submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's written recommendations.
    - b. Manufacturer's product specifications.
    - c. Manufacturer's installation instructions.
    - d. Standard color charts.
    - e. Manufacturer's catalog cuts.
    - f. Mill reports.
    - g. Compliance with recognized trade association standards.
    - h. Compliance with recognized testing agency standards.
    - i. Application of testing agency labels and seals.
    - j. Notation of coordination requirements.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Include the following information, as applicable:
    - a. Dimensions.
    - b. Identification of products.
    - c. Fabrication and installation drawings.
    - d. Roughing-in and setting diagrams.
    - e. Shopwork manufacturing instructions.
    - f. Templates and patterns.
    - g. Schedules.
    - h. Design calculations.
    - i. Compliance with specified standards.
    - j. Notation of coordination requirements.

k. Notation of dimensions established by field measurement.

D. Coordination Drawings: Comply with requirements in Division 1 Section "Project Management and Coordination."

## 2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Electronically submit copies of each submittal, unless otherwise indicated.
2. Number of Copies: Submit three copies of each submittal, unless otherwise indicated. Engineer will not return copies.
3. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
4. Test and Inspection Reports: Comply with requirements in Division 1 Section "Quality Requirements."

B. Contractor's Construction Schedule: Provide Level 3 Schedule with progress monitoring and project control level unless Owner has more stringent scheduling requirements.

C. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of Engineers and owners, and other information specified.

D. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.

F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

I. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.

J. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed

before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

- K. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.
- L. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- M. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.
- N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Closeout Procedures."
- O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
  - 1. Preparation of substrates.
  - 2. Required substrate tolerances.
  - 3. Sequence of installation or erection.
  - 4. Required installation tolerances.
  - 5. Required adjustments.
  - 6. Recommendations for cleaning and protection.
- Q. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

### 2.3 REQUESTS FOR INFORMATION

- A. Engineer reserves the right to reject, unprocessed, any RFI that the Engineer, at its sole discretion, deems already answered in the Contract Documents.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

END OF SECTION 01 33 00

SECTION 01 40 00 - QUALITY REQUIREMENTS

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 quality assurance and quality control.
- B. Quality-assurance services and quality-control services include inspections, tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by Engineer.
- C. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and control services required by Engineer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- D. Related Requirements:
  - 1. Division 01 Section "Cutting and Patching" specifies requirements for repair and restoration of construction disturbed by inspection and testing activities.
  - 2. Division 01 Section "Submittal Procedures" specifies requirements for development of a schedule of required tests and inspections.
  - 3. Division 01 Section "Structural Testing and Inspections" specifies required work product testing and inspection for structural assemblies.
  - 4. Technical Specification Sections for specific test and inspection requirements.

### 1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Engineer.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

### 1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Engineer for a decision before proceeding.

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

## 1.5 RESPONSIBILITIES

### A. Contractor Responsibilities:

1. Retesting: Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.
  - a. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.
2. Associated Services: Cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:
  - a. Provide access to the Work.
  - b. Furnish incidental labor and facilities necessary to facilitate inspections and tests.
  - c. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
  - d. Provide facilities for storage and curing of test samples.
  - e. Deliver samples to testing laboratories.
  - f. Provide the agency with a preliminary design mix proposed for use for material mixes that require control by the testing agency.
  - g. Provide security and protection of samples and test equipment at the Project Site.

### B. Owner Responsibilities: Owner will provide inspections, tests and similar quality control services specified to be performed by independent agencies and not by the Contractor, except where they are specifically indicated as the Contractor's responsibility or are provided by another identified entity. Costs for these services are not included in the Contract Sum.

1. Owner will employ and pay for the services of an independent agency, testing laboratory or other qualified firm to perform services which are the Owner's responsibility.

### C. Coordination: Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1. Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.



1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Contractor's quality-control personnel.
- B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.7 ACTION SUBMITTALS

- A. Concrete Shop Drawings: Provide plans, sections, elevations, and details indicating materials, reinforcement, and attachment for the fabrication of new concrete reinforcement.
- B. Shop Drawings: For mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
  - 1. Indicate manufacturer and model number of individual components.
  - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.
- C. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Specification Section number and title.
  - 2. Entity responsible for performing tests and inspections.
  - 3. Description of test and inspection.
  - 4. Identification of applicable standards.
  - 5. Identification of test and inspection methods.
  - 6. Number of tests and inspections required.
  - 7. Time schedule or time span for tests and inspections.
  - 8. Requirements for obtaining samples.
  - 9. Unique characteristics of each quality-control service.

1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than 5 days prior to preconstruction conference. Submit in format acceptable to Engineer. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
  - 1. Project quality-control manager may also serve as a Project superintendent.

- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
  - 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
  - 2. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Engineer has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

#### 1.9 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, and telephone number of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Names of individuals performing tests and inspections.
  - 6. Description of the Work and test and inspection methods.
  - 7. Identification of product and Specification Section.
  - 8. Complete test or inspection data.
  - 9. Test and inspection results and an interpretation of test results.
  - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting when relevant.
  - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  - 12. Name and signature of laboratory inspector.
  - 13. Recommendations on retesting and re-inspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
  - 1. Name, address, and telephone number of technical representative making report.
  - 2. Statement on condition of substrates and their acceptability for installation of product.

3. Statement that products at Project site comply with requirements.
  4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  6. Statement whether conditions, products, and installation will affect warranty.
  7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
  2. Statement that equipment complies with requirements.
  3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  4. Statement whether conditions, products, and installation will affect warranty.
  5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
- E. Submit additional copies of each written report directly to the governing authority, when the authority so directs.

#### 1.10 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

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- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed

for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Testing Agency Qualifications: An NRTL, an A2LA, an NVLAP, a CMET, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. General Requirements:

a. Each independent testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State\Province in which the Project is located.

2. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.

3. A2LA: A testing agency accredited according to the American Association for Laboratory Accreditation.

4. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

5. CMET: A Construction Materials, Engineering & Testing agency which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

G. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Engineer or Owner.
2. Notify Engineer and Owner 7 days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Engineer's and Owner's approval of mockups before starting work, fabrication, or construction.

- a. Allow 7 days for initial review and each re-review of each mockup.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Approved Mockup's may be integrated into final work. Demolish and remove non-approved mockups when directed unless otherwise indicated by the Owner or Engineer.

#### 1.11 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
  1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
  3. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
  1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
  - 1. Notify Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  - 6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
  - 1. Access to the Work.
  - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
  - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  - 4. Facilities for storage and field curing of test samples.
  - 5. Delivery of samples to testing agencies.
  - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Engineer, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ACCEPTABLE TESTING AGENCIES

- A. Intertek, Terracon, Universal Engineering Sciences

3.2 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
  1. Date test or inspection was conducted.
  2. Description of the Work tested or inspected.
  3. Date test or inspection results were transmitted to Engineer.
  4. Identification of testing agency conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Engineer's reference during normal working hours.

3.3 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
- B. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for Section "Cutting and Patching" as well as other the technical specification sections.
- C. Protect construction exposed by or for quality-control service activities.
- D. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 014529 – STRUCTURAL TESTING AND INSPECTIONS

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 requirements for quality assurance and quality control to be completed by the Testing Laboratory, Contractor, and/or the Geotechnical Engineer for the following structural items:
  - 1. Concrete Forming and Accessories.
  - 2. Concrete Reinforcing.
  - 3. Cast-in-Place Concrete.

1.3 PRICE AND PAYMENT PROCEDURES

A. Unit Prices:

- 1. Cost Proposal: The Testing Laboratory's proposal to the Owner shall contain unit price stipulations for specified tests and inspections and on an hourly basis for personnel. A total estimated price shall also be submitted.

B. Measurement and Payment

- 1. Payment of the Testing Laboratory: The Owner will pay for the initial Laboratory services for inspection and testing of materials for compliance with the requirements of the Contract Documents.
- 2. Payment for Substitution Testing: The Contractor shall arrange for and pay for any additional samples and tests above those required by the Contract Documents as requested by the Contractor for his convenience in performing the work.
- 3. Payment for Retesting: When initial tests indicate work does not comply with the requirements of the Contract Documents, the Contractor shall be liable to the Owner for the cost for any additional inspections, sampling, testing, and retesting done by the Testing Laboratory.
- 4. Payment for Tests of Suspected Deficient Work: If, in the opinion of the Building Official, Owner, Architect, or Engineer, any of the work of the Contractor is not satisfactory, the Contractor shall furnish and pay for all tests that the Owner, Architect, or Engineer deem advisable to determine its proper construction. The Owner shall pay all costs if the tests prove the questioned work to be satisfactory.



1.4 OWNER RESPONSIBILITIES

- A. The Owner shall provide a copy of the project plans and specifications to the Testing Laboratory prior to the start of construction and prior to any preinstallation meetings.

1.5 CONTRACTOR RESPONSIBILITIES

- A. **Furnishing Samples and Certificates:** The Contractor shall provide to the laboratory certificates and representative samples of materials proposed for use in the work in quantities sufficient for accurate testing as specified.
- B. **Furnishing Casual Labor, Equipment and Facilities:** The Contractor shall furnish casual labor, equipment, and facilities as required for sampling and testing by the laboratory and otherwise facilitate the required inspections and tests.

1.6 TESTING LABORATORY RESPONSIBILITIES

- A. The Testing Laboratory shall sample and test materials as they are being installed for compliance with specified acceptance criteria. The Testing Laboratory will report and interpret the test results. The Laboratory shall monitor and report on the installation of construction work and shall perform tests on the completed construction as required to indicate Contractor's compliance with the various material specifications governing this work.
- B. The Testing Laboratory shall provide inspections on the following items:
  - 1. Reinforcing steel placement.
  - 2. Concrete work.
- C. **Notification of Deficiencies in the Work:** The Testing Laboratory shall notify the Engineer and Contractor within 24 hours of discovery of observed irregularities and deficiencies of the Work and other conditions not in compliance with the requirements of the Contract Documents. Notification shall be by telephone or e-mail and then in writing (PDF format).
- D. **Accounting:** The Testing Laboratory shall be responsible for separating and billing costs attributed to the Owner and costs attributed to the Contractor.
- E. **Monitoring Product and Material Certifications:** The Testing Laboratory shall be responsible for monitoring the submittals of product and material certifications from manufacturers and suppliers as specified in the Specifications and shall report to the Owner and Engineer when those submittals are not made in a timely manner.
- F. **Limitations of Authority:** The Testing Laboratory is not authorized to revoke, alter, relax, enlarge upon, or release any requirements of the Specifications or to approve or accept any portion of the work or to perform any duties of the General Contractor and his Subcontractors.

1.7 ADMINISTRATIVE REQUIREMENTS

- A. **Coordination:**

1. The Testing Laboratory shall cooperate with the Engineer and Contractor and provide qualified personnel promptly on notice.
  2. The Contractor shall cooperate with Testing Laboratory personnel and provide access to the work and to manufacturers' operations.
  3. Notification of Source Change: The Contractor shall be responsible for notifying the Owner, Engineer, and Testing Laboratory when the source of any material is changed after the original tests or inspections have been made.
- B. Preinstallation Meetings: The Testing Laboratory shall attend preinstallation meetings with the Engineer, Contractor, and material suppliers as required to coordinate materials inspection and testing requirements with the planned construction schedule and shall participate in such meetings throughout the course of the project.
- C. Scheduling:
1. Advance Notice: The Contractor shall be responsible for notifying the Testing Laboratory sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests. Failure to sufficiently notify may result in additional costs incurred by the Testing Laboratory that may be back-charged to the Contractor by the Owner.

#### 1.8 SUBMITTALS

A. Quality Control Reports:

1. Information on Reports: The Testing Laboratory shall submit copies of reports (PDF format) of inspections and tests promptly. The reports shall contain at least the following information:
  - a. Project name.
  - b. Date report issued.
  - c. Testing Laboratory name and address.
  - d. Name and signature of inspector/technician.
  - e. Date of inspection and/or sampling.
  - f. Date of test.
  - g. Identification of product and Specification section.
  - h. Location in the project.
  - i. Identification of inspection or test.
  - j. Record of weather conditions and temperature (if applicable).
  - k. Results of test regarding compliance with Contract Documents.
2. Copies: The Laboratory shall send signed electronic copies (PDF format) of test and inspection reports to the following parties:
  - a. Owner or his/her representative.
  - b. General Contractor.
  - c. Engineer of Record.

- B. Discrepancy Log: The Testing Laboratory shall create and maintain a log of all discrepancies throughout the duration of the project.

1. Information on Log: This log shall include, but is not limited to:
    - a. Discrepancy date.
    - b. Description of discrepancy.
    - c. Drawing and/or detail reference.
    - d. Description of as-built condition.
    - e. Description of any remedial work performed.
    - f. Status of discrepancy.
  2. Submission Schedule: This log shall be submitted to the Architect/Engineer on a periodic basis for review and comment. Upon completion of the Project, this log shall be submitted in its entirety as an attachment to the final signed report described below under Certifications.
- C. Certification: Upon completion of the job, the Laboratory shall furnish to the Owner and Engineer of Record, a statement signed by a licensed professional engineer that, to the best of their knowledge, required tests and inspections were made in accordance with the requirements of the Contract Documents.

#### 1.9 QUALITY ASSURANCE

##### A. Qualifications of Testing Laboratory:

1. The Testing Laboratory shall meet the basic requirements of ASTM E 329 and shall submit to the Owner and Engineer evidence of current accreditation from the American Association for Laboratory Accreditation, the AASHTO Accreditation Program or the "NIST" National Voluntary Laboratory Accreditation Program.
  2. Tests and inspections shall be conducted in accordance with specified requirements, and if not specified, in accordance with the applicable standards of the American Society for Testing and Materials or other recognized and accepted authorities in the field.
- B. The Contractor shall not engage the same testing laboratory for construction services as the Owner has for quality assurance testing, unless agreed to by the Owner.

#### PART 2 - PRODUCTS (Not Used)

#### PART 3 - EXECUTION

##### 3.1 SCOPE OF WORK

- A. The work to be performed by the Testing Laboratory shall be as specified in this Section of the Specification and as determined in meetings with the Owner and Engineer.

##### 3.2 CONCRETE REINFORCING

- A. Field Testing: The following tests shall be completed by the Testing Laboratory:

- B. Field Inspection: The scope of the work to be performed by the inspector on the jobsite shall be as follows:
1. Reinforcing Steel: The Testing Laboratory shall inspect 100% of reinforcement before each concrete pour to verify the information noted below. Inspection reports shall be prepared and distributed in accordance with the local building code and as specified in this specification.
    - a. Primary and secondary longitudinal reinforcement has correct size and number in proper layers.
    - b. Longitudinal reinforcement has correct length and lap.
    - c. Ties and stirrups are of correct size, spacing, and number and have the proper termination hook geometry.
    - d. Unscheduled face reinforcement in beams are provided and are of correct size, number and spacing and have the proper end terminations.
    - e. Proper hooks are provided at bar ends as detailed.
    - f. Reinforcement is properly supported and braced to formwork to prevent movement during concrete placement.
    - g. Reinforcement has proper cover.
    - h. Sufficient spacing between reinforcement for concrete placement.
    - i. Dowel reinforcement is of proper size, at proper spacing, and has proper lap length and embedment length.
    - j. Welded wire reinforcement is composed of flat sheets, has proper wire gage and spacing, is properly supported, and is properly lapped.
    - k. Proper construction/control/expansion joint spacing and reinforcement.
    - l. Reinforcement around embedded items is placed according to details.

### 3.3 CAST-IN-PLACE CONCRETE

- A. Quality Assurance:
1. Concrete Mix Designs: The Testing Laboratory shall review the submitted mix designs for conformance to the specifications and for suitability for use in the project.
- B. Field Testing: The following tests shall be completed by the Testing Laboratory:
1. During Concrete Placement:
    - a. Record the amount of water added and note if it exceeds the amount allowed to be added shown in the approved mix design.
    - b. Mold concrete test cylinders as specified below in Paragraph 3.a.
    - c. Perform tests to determine slump, concrete temperature, unit weight, and air entrainment as specified below.
    - d. Record information for concrete test reports as specified below.
    - e. Pick up and transport to Laboratory cylinders cast the previous day.
  2. After Concrete Placement:

- a. In-situ Concrete Strength Verification for Form Stripping: The Testing Laboratory shall perform the tests necessary to determine the concrete strength prior to form stripping:
    - 1) If concrete strength for form stripping is to be determined using field-cured cylinders, the cylinder shall be broken at the time of form removal as directed by the Contractor.
  - b. Investigation of Low Strength Concrete Test Results:
    - 1) Cost of Investigations for Low Strength Concrete: The Contractor shall reimburse the Owner for the costs of investigations of low strength concrete, as defined in Part I above.
3. Standards for Concrete Tests:
- a. Concrete Test Cylinders: Mold and test concrete cylinders as described below:
    - 1) Cylinder Molding and Testing: Cylinders for strength tests shall be molded and Laboratory cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39. Cylinders may be either 6" in diameter by 12" or 4" in diameter by 8", however, the diameter of the cylinder shall be at least three times the nominal maximum size of the coarse aggregate in the mix tested. All of the cylinders for each class of concrete shall be of the same dimension for all sets of that class.
    - 2) Field Samples: Field samples for strength tests shall be taken in accordance with ASTM C 172 **at the point of placement**.
    - 3) Quantity of Cylinders: Each set of test cylinders shall consist of a minimum of four standard test cylinders. If concrete strength for form stripping is to be determined using field-cured cylinders, one additional cylinder per set will be required for formed slab and pan-formed beam floors for the purpose of evaluating the concrete strength at the time of form stripping. This cylinder shall be stored on the floor where form removal is to occur under the same exposure conditions as the floor concrete. The cylinder shall be cured under field conditions in accordance with ASTM C 31. Field-cured test cylinders shall be molded at the same time and from the same samples as laboratory-cured test specimens. The Contractor shall reimburse the Owner for the cost of making and testing these cylinders.
    - 4) Frequency of Testing: A set of test cylinders shall be made according to the following minimum frequency guidelines:
      - a) One set for each class of concrete taken not less than once a day.
      - b) No more than one set of cylinders at a time shall be made from any single truck.
      - c) If the total volume of concrete is such that the frequency of testing as specified above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.

- d) The above frequencies assume that one batch plant will be used for each pour. If more than one batch plant is used, the frequencies cited above shall apply for each plant used.
- 5) The cylinders shall be numbered, dated, and the point of concrete placement in the building recorded.
- 6) For concrete specified on the drawings to reach the required strength at 28 days, break one cylinder of the set at seven days, two 6" by 12" cylinders or three 4" by 8" cylinders at 28 days, and keep one in reserve for testing at the Engineer's direction.
- 7) Cylinder Storage Box: The Contractor shall be responsible for providing a protected concrete cylinder wooden storage box at a point on the job site mutually agreeable with the Testing Laboratory for the purpose of storing concrete cylinders until they are transported to the Laboratory. The box shall be constructed and equipped to maintain the environment specified for initial curing in ASTM C 31.
- 8) Transporting Cylinders: The Testing Laboratory shall be responsible for transporting the cylinders to the Laboratory in a protected environment such that no damage or ill effect will occur to the concrete cylinders including loss of moisture, freezing temperatures or jarring.
- 9) Information on Concrete Test Reports: The Testing Laboratory shall make and distribute concrete test reports after each job cylinder is broken. Such reports shall contain the following information:
  - a) Truck number and ticket number.
  - b) Concrete Batch Plant.
  - c) Mix design number.
  - d) Accurate location of pour in the structure.
  - e) Strength requirement.
  - f) Date cylinders made and broken.
  - g) Technician making cylinders.
  - h) Concrete temperature at placing.
  - i) Air temperature at point of placement in the structure.
  - j) Amount of water added to the truck at the batch plant and at the site and whether or not it exceeds the amount allowed by the mix design.
  - k) Slump.
  - l) Unit weight.
  - m) Air content.
  - n) Cylinder compressive strengths with type of failure if concrete does not meet Specification requirements. Seven day breaks are to be flagged if they are less than 60% of the required 28 day strength. 28 day breaks are to be brought to the attention of the Architect and Engineer in writing if either cylinder fails to meet specification requirements.
- b. Slump Tests: Slump Tests (ASTM C 143) shall be completed at the beginning of concrete placement for each batch plant and for each set of test cylinders made. The slump test shall be made from concrete taken from the end of the concrete truck chute. The concrete shall be considered acceptable if the slump is within the slump tolerance noted on the mix design submittal form for that class of concrete.
- c. Concrete Temperature: Concrete temperature at placement shall be measured (ASTM C 1064) at the same time slump tests are made as cited above.

4. Evaluation and Acceptance of Concrete:
  - a. Strength Test: A strength test shall be defined as the average strength of two six inch cylinder breaks or three four inch cylinder breaks from each set of cylinders tested at the time indicated above.
  - b. Acceptance Criteria: The strength level of an individual class of concrete shall be considered satisfactory if both of the following requirements are met:
    - 1) The average of all sets of three consecutive strength tests equal or exceed the required  $f'_c$ .
    - 2) No individual strength test falls below the required  $f'_c$  by more than the greater of 10% of  $f'_c$  or 500 PSI.
  - c. If either of the above Acceptance Criteria requirements is not met, the Testing Laboratory shall immediately notify the Engineer by telephone. Steps shall immediately be taken to increase the average of subsequent strength tests.
- C. Field Inspection: The scope of the work to be performed by the inspector on the jobsite shall be as follows:
  1. Before Concrete Placement:
    - a. Inspect concrete reinforcing per Article 3.2.
    - b. Verify that there is no standing water in pour area and that all debris has been removed from the area and from the formwork.
  2. During Concrete Placement: Provide continuous monitoring to:
    - a. Upon arrival of concrete, inspect the concrete to verify that the proper concrete mix number, type of concrete, concrete strength is being placed at the proper location. Verify that the mix meets the project specifications and is not over 90 minutes old at the time of placement. Report concrete not meeting the specified requirements and immediately notify the Contractor, Batch Plant Inspector, Engineer, and Owner.
    - b. Inspect plastic concrete upon arrival at the jobsite to verify proper batching. Observe mix consistency and adding of water as required to achieve target slumps in mix designs. The responsibility for adding water to trucks at the job site shall rest only with the Contractor's designated representative. The Contractor is responsible that all concrete placed in the field is in conformance to the Contract Documents.
    - c. Verify that the Contractor is following appropriate Hot Weather or Cold Weather concreting practices consistent with any extreme environmental conditions at the point of placement in the structure.
    - d. Verify that concrete deposited is uniform and that vertical drop does not exceed six feet and is not permitted to drop freely over reinforcement causing segregation.
    - e. Verify that the formwork has remained stable during the concreting operation.
    - f. Verify that there are no cold joints.
    - g. Verify that the concrete is properly vibrated.
    - h. Verify that the finishing of the concrete surface is done according to specifications.

The Testing Laboratory shall report any irregularities that occur in the concrete at the job site or test results to the Contractor, Owner, and Engineer.

3. After Concrete Placement:
  - a. Verify that the curing process is according to Specifications and that any curing compound used is applied in accordance with the manufacturer's recommendations.
  - b. Post-Installed Anchors in Concrete: Provide inspection of post-installed anchor installations at the frequency noted in the specifications and in accordance with the published, currently valid, Evaluation Service Report (ESR) for each anchor product. Post-installed anchors include anchors and reinforcing steel. Inspection of post-installed anchors shall include but not be limited to the following:
    - 1) Periodic Inspection: Verify initial installation of post-installed anchors in concrete for each individual installer with each individual anchor product in accordance with the requirements stated below for each type of anchor. Periodically inspect anchor installation after the initial verification.
    - 2) Continuous Inspection: Verify each installation of post-installed anchors in concrete in accordance with the requirements stated below for each type of anchor.
    - 3) All Post-Installed Anchors: Verify that the anchor is installed in accordance with manufacturer's printed installation instructions as well as the following design requirements.
      - a) Concrete type, concrete strength and concrete thickness are in accordance with design drawings.
      - b) Anchor manufacturer and product, including material, is in accordance with design drawings or approved substitution.
      - c) Anchor diameter, length and installed embedment depth.
      - d) Drill bit type and diameter.
      - e) Anchor edge distance and spacing.
      - f) Hole diameter and depth.
      - g) Hole cleaning procedure and cleanliness.
      - h) Anchor maximum tightening torque.
    - 4) Adhesive Anchors: In addition to the requirements for All Post-Installed Anchors, verify adhesive identification and expiration date.
      - a) The installation of all adhesive anchors shall be continuously inspected when anchors are subject to sustained tension loads, such as anchors for shelf angles, or when anchors are installed in an upwardly inclined condition.
- D. Causes for Rejection of Concrete: The Contractor shall reject concrete delivered to the site for any of the following reasons:
  1. Wrong class of concrete (incorrect mix design number).
  2. Environmental Conditions: Environmental condition limits shall be as follows unless appropriate provisions in concreting practices have been made for cold or hot weather:



- a. Cold Weather: Air temperature must be 40°F and rising or the average daily temperature cannot have been lower than 40°F for 3 consecutive days unless the temperature rose above 50°F for at least one-half of any of those 24 hour periods.
- b. Hot Weather: Environmental conditions must be such that cause an evaporation rate from the concrete surface of 0.2 lb./sq. ft./hr. or less as determined by Figure 2.1.5 in ACI 305R-91.

Concrete may be placed at other environmental condition ranges only with approval of the job inspector for the Testing Laboratory or other duly appointed representative.

3. Concrete with temperatures exceeding 95°F shall not be placed in the structure.
  4. Air contents outside the limits specified in the mix designs.
  5. Slumps outside the limits specified.
  6. Excessive Age: Concrete shall be discharged within 90 minutes of plant departure or before it begins to set if sooner than 90 minutes unless approved by the Laboratory job inspector or other duly appointed representative.
- E. Concrete Batch Trip Tickets: Concrete batch trip tickets shall be collected and retained by the Contractor. Compressive strength, slump, air, and temperature tests shall be identified by reference to a particular trip ticket. Tickets shall contain the information specified in ASTM C 94. Each ticket shall also show the amount of water that may be added in the field for the entire batch that will not exceed the specified water cement ratio for the design mix. The Contractor and Testing Laboratory shall immediately notify the Architect/Engineer and each other of tickets not meeting the criteria specified.

END OF SECTION 014529

SECTION 01 73 29 – CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
  - 1. Divisions 02 through 16 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
  - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
  - 2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
  - 3. Products: List products to be used and firms or entities that will perform the Work.
  - 4. Dates: Indicate when cutting and patching will be performed.
  - 5. Engineer's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

- B. 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.
- C. Miscellaneous Elements: Do not cut and patch the following elements or related 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.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

#### 1.6 WARRANTY

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

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
  - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
  - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
  - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.

- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

### 3.3 PERFORMANCE

- A. 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 existing 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. Cutting: Cut existing 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 as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Existing 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 Division 31 Sections where required by cutting and patching operations.
  - 5. Proceed with patching after construction operations requiring cutting are complete.
- C. 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 possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
  - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate 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 eliminate evidence of patching and refinishing.

END OF SECTION 01 73 29

SECTION 01 74 23 - PERIODIC AND FINAL CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for final cleaning at Substantial Completion.
  - 1. Special cleaning requirements for specific elements of Work are included in appropriate Sections of Divisions 02 through 16.
- B. General Project closeout requirements are included in Section "Closeout Procedures."
- C. Environmental Requirements: Conduct cleaning and waste disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.
  - 1. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.
  - 2. Burning or burying of debris, rubbish or other waste material on the premises will not be permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

1.1 PERIODIC CLEANING

- A. General: Provide periodic cleaning operations at the following intervals.
  - 1. Publicly Accessible Areas: Clean all surfaces at least daily at the completion of work in each area before returning the area to service.

2. Secured Construction Areas: Clean all surfaces weekly to maintain a clean and safe construction site.
- B. Protection: Provide the following temporary protective measures during construction.
1. 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
  2. Supervise construction operations to assure 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. Contractor shall utilize temporary containment measures to prevent the spread of contaminated air. Contractor shall coordinate all temporary containment measures with the Owner's representative.
- C. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to the condition expected from commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
1. Clean Project site in areas disturbed by construction activities, including landscape areas affected by construction. Remove all waste materials, litter, demolition debris, abrasive blasting agents, and foreign substances. Sweep paved areas broom clean. Remove chemical spills, stains, and other foreign deposits.
    - a. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
    - b. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
  2. Remove tools, construction equipment, machinery and surplus material from the publicly accessible areas.
  3. Clean exposed exterior and interior hard-surfaced finishes affected by construction activities 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.
  4. Broom clean concrete floors in occupiable spaces. Broom clean concrete floors in unoccupied spaces if requested by the Owner.
  5. Vacuum clean carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
  6. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces. Schedule chipped or broken glass and other damaged transparent materials to be replaced in a timely manner.

7. Wipe surfaces of mechanical and electrical equipment, elevator equipment and similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
8. Inspect disposable and permanent air filters. Replace disposable filters and clean permanent air filters if they are contaminated with construction debris beyond a usable limit. Clean exposed surfaces of diffusers, registers, and grills. Clean ducts, blowers, and coils if units were operated without filters during construction.
9. Inspect light fixtures, lamps, globes and reflectors. Clean these elements if they are contaminated with construction debris beyond a usable limit.
10. Leave publicly accessible areas of the Project Site clean and ready for occupancy.

### 3.2 FINAL CLEANING

- A. General: Provide final cleaning operations when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to the condition expected from commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
  1. Clean Project site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances. Sweep paved areas broom clean. Remove petro-chemical spills, stains and other foreign deposits. Rake grounds that are neither planted nor paved, to a smooth even-textured surface.
  2. Remove tools, construction equipment, machinery and surplus material from the site.
  3. 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.
  4. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
  5. Broom clean concrete floors in all construction spaces.
  6. Remove labels that are not permanent labels.
  7. Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored, or that show evidence of repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical name plates.
  8. Wipe surfaces of mechanical and electrical equipment, elevator equipment and similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
  9. Clean light fixtures, lamps, globes and reflectors to function with full efficiency. Replace burned out bulbs, and defective and noisy starters in fluorescent and mercury vapor fixtures.
  10. Leave Project clean and ready for use.
- B. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during remainder of construction period.

- C. Compliances: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of in a lawful manner.
  - I. Where extra materials of value remain after completion of associated construction, that have become Owner's property, relocate or dispose of these materials as directed by the Owner.

END OF SECTION 01 74 23



## SECTION 01 77 00 - CLOSEOUT PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

- 1. Inspection procedures.
- 2. Submittal of warranties.
- 3. Final cleaning.

- B. Related Sections:

- 1. Division 01 Section "Payment Procedures"
- 2. Division 01 Section "Periodic and Final Cleaning".
- 3. Division 01 Section "Project Record Documents"
- 4. Closeout requirements for specific construction activities are included in appropriate Sections 02 through 16. .

#### 1.3 SUBSTANTIAL COMPLETION

- A. Submittals for Substantial Completion: Complete the following a minimum of ten days prior to requesting field review for 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 operating certificates and similar releases.
  - 2. Submit closeout submittals referenced in this and other Sections.
  - 3. Submit as-built drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.
  - 4. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.

5. Obtain and submit releases enabling Owner unrestricted use of Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
  6. Submit an Application for Payment that coincides with, or first follows, date Substantial Completion is claimed, show 100% completion for portion of Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and statement showing an accounting of changes to Contract Sum.
    - a. If 100% completion cannot be shown, include list of incomplete items, value of incomplete construction, and reasons Work is not complete.
- B. Procedures for Substantial Completion: Before requesting field review for Certification of Substantial Completion, complete the following. List exceptions in request.
1. Advise Owner of pending insurance change-over requirements.
  2. Deliver tools, spare parts, extra stock, and similar items.
  3. Make final change-over of permanent locks and transmit keys to Owner. Advise Owner's personnel of change-over in security provisions.
  4. Participate with Owner in conducting inspection and walkthrough.
  5. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  6. Complete final cleaning requirements, including coating touchups.
  7. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- C. Field Review Procedures: On receipt of request for field review, Engineer will either proceed with the review of work or advise Contractor of unfiled requirements. Engineer will prepare Certificate of Substantial Completion following inspection, or advise Contractor of construction that must be completed or corrected before certificate will be issued.
1. Engineer will repeat field review when requested and assured that Work has been substantially completed.
  2. Engineer will provide one repeat inspection under its contract with Owner. Subsequent field reviews shall be at Contractor's expense.
  3. Results of completed field reviews will form basis of requirements for final acceptance.
- 1.4 FINAL COMPLETION PROCEDURES
- A. Submittals for Final Completion: Before requesting final field review for certification of final acceptance and final payment, complete the following. List exceptions in request.
1. Submit final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
  2. Submit an updated final statement, accounting for final additional changes to Contract Sum.
  3. Submit certified copy of Engineer's final field review list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and list has been endorsed and dated by Engineer.

4. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
5. Submit consent of surety to final payment.
6. Submit final liquidated damages settlement statement.
7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

PART 2 - PRODUCTS (NOT APPLICABLE).

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 77 00

SECTION 01 78 36 - PRODUCT WARRANTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for warranties required by Contract Documents, including manufacturers' standard warranties on products and special warranties.

- 1. Refer to General Conditions for terms of Contractor's period for correction of Work.

- B. Related Sections: Following Sections contain requirements that relate to this Section:

- 1. Division 01 Section "Submittal Procedures" specifies procedures for submitting warranties.
  - 2. Division 01 Section "Closeout Procedures" specifies contract closeout procedures.
  - 3. Divisions 02 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.
  - 4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in Contract Documents.

- C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of warranty on Work that incorporates products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as result of such failure or must be removed and replaced to provide access for correction of warranted construction.
- B. Reinstatement of Warranty: When Work covered by warranty has failed and been corrected by replacement or rebuilding, reinstate warranty by written endorsement. Reinstated warranty shall be equal to original warranty with equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by warranty has failed replace or rebuild Work to an acceptable condition complying with requirements of Contract Documents.

Contractor is responsible for cost of replacing or rebuilding defective Work regardless of whether Owner has benefited from use of Work through portion of its anticipated useful service life.

- D. Owner's Recourse: Expressed warranties made to Owner are in addition to implied warranties, and shall not limit duties, obligations, rights and remedies otherwise available under law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: Owner reserves right to reject warranties and to limit selection to products with warranties not in conflict with requirements of Contract Documents.

- E. Where Contract Documents require a special warranty, or similar commitment on Work or part of Work, Owner reserves the right to refuse to accept Work, until Contractor presents evidence that entities required to countersign such commitments are willing to do so.

#### 1.4 SUBMITTALS

- A. Submit written warranties to Engineer prior to date certified for Substantial Completion. If Engineer's Certificate of Substantial Completion designates commencement date for warranties other than date of Substantial Completion for Work, or designated portion of Work, submit written warranties upon request of Engineer.

- B. Prepare written document utilizing appropriate form, ready for execution by Contractor, or by Contractor and subcontractor, supplier or manufacturer. Submit draft to Owner through Engineer for approval prior to final execution.

1. Refer to Divisions 02 through 16 Sections for specific content requirements and particular requirements for submittal of special warranties

- C. Electronically bind warranties, bonds, and operation and maintenance manuals in a PDF documents and electronically submit documents to the Owner's Representative and Engineer.

- D. Hard Copy: If requested by the Owner's Representative bind warranties, bonds, and operation and maintenance manuals in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8.5 inch by 11 inch paper. Hard copy submittal shall be limited to one copy.

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

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

END OF SECTION 01 78 36

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section describes the administrative and procedural requirements of the Contractor for preparation of Project Record Documents.
- B. Store record documents and samples in the field office apart from Contract Documents used for construction. Do not permit Project Record Documents to be used for construction purposes. Maintain record documents in good order, and in a clean, dry, legible condition. Make documents and samples available at all times for inspection by the Engineer.

1.3 RECORD DRAWINGS

- A. During the construction period, maintain a set of Contract Drawings and Shop drawings for Project Record Document purposes. Mark with red erasable colored pencil all deviations from the original drawings. Electronic PDF record documents may be maintained instead of a hardcopy.
- B. Upon Substantial Completion of the project, incorporate all changes into the documents and stamped them "As-Built". Engineer will make original electronic documents available to Contractor. Contractor shall email electronic "As-Built's" to the Owner's Representative and Engineer.

1.4 RECORD SPECIFICATIONS

- A. During the construction period, maintain one copy of the project specifications, including addenda and modifications issued, for Project Record Document purposes. Mark any changes or modifications to the Specifications. Electronic PDF record documents may be maintained instead of a hardcopy.
- B. Upon completion of the Project mark-up, and email record specifications to the Owner's Representative and Engineer for their own records.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 RECORDING

- A. Post changes and modifications to the documents as they occur. Do not wait until the end of the project. The Engineer or Owner's Representative may periodically review record documents to assure compliance with this requirement.

END OF SECTION 01 78 39

SECTION 03 01 01 - SURFACE PREPARATION FOR PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the provisions of all labor, materials, supervision and incidentals required to locate and remove all delaminated and unsound concrete, including preparation of cavities created by removal to receive patching material and preparation of existing surface spalls to receive patching material.
- B. Related Sections include the following:
  - 1. Division 03 Section "Concrete Repair Materials."
- C. Contractor shall become fully acquainted with the existing job site conditions and discuss the accessibility of the work areas with the Owner.
- D. Provide barricades around the work area with appropriate signage to keep non-construction people from entering work area.

1.3 REFERENCES

- A. Applicable Standards:
  - 1. American Concrete Institute (ACI), latest version:
    - a. ACI 301 Specifications for Structural Concrete
    - b. ACI 546.1R Guide for Repair of Concrete Bridge Structures
    - c. ACI 546R Concrete Repair Guide
  - 2. International Concrete Repair Institute (ICRI):
    - a. ICRI 310.1R Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion
    - b. ICRI 310.2R Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair
    - c. ICRI 320.2R Guide for Selecting and Specifying Materials for Repair of Concrete Surfaces



## PART 2 - PRODUCTS AND MANUFACTURERS

### A. Cementitious epoxy coating for existing exposed non-prestressed steel reinforcement:

1. Sika Corporation: MasterEmaco P 124
2. Sika Corporation: Armatec 110 EpoCem
3. Euclid Chemical: Duralprep A.C.
4. MAPEI Corporation: Planibond 3C

## 2.2 SUBSTITUTIONS

- A. Substitutions may be considered provided complete technical information and job references are furnished to the Engineer and approved prior to commencement of work.
- B. Changes in products required to suit temperature and environmental conditions at the time of material application shall be specified as separate line items by the Contractor showing credit or additions to the price for the various tasks.
- C. In using the selected products, follow strictly the manufacturer's specifications and directions for mixing and application. Also heed all label warnings by manufacturer. Make application in accordance with applicable safety laws.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Horizontal Surfaces
  1. Contractor shall sound all designated floor areas for delaminations.
- B. Vertical and Overhead Surfaces
  1. Contractor shall sound only vertical and overhead surfaces in designated areas that show evidence of cracking, staining, or both. Cracks, usually horizontal in orientation along beam faces, and vertical in orientation near column corners are indicators of delaminated concrete.
- C. Delaminated areas: Once located by Contractor, Contractor shall further sound and mark them to define limits.
- D. Spalls: Contractor shall locate spalls by visual inspection, and mark boundaries.
- E. Engineer may mark additional unsound concrete for removal.
- F. Areas to be removed shall be rectangular to provide adequate appearance.
- G. Contractor shall locate and determine the depth of all embedded reinforcement, electrical conduit, post-tensioned tendons, in repair area and mark these locations for reference during concrete removal. Do not cut any embeds unless approved by Engineer.

3.2 REPAIR PREPARATION

- A. Contractor shall review all marked removal and preparation areas and request clarification by Engineer of shoring requirements in questionable areas. Shores shall be in place prior to concrete removal and cavity preparation in any area requiring shores.
- B. All delaminated, spalled and unsound concrete shall be removed from within marked boundary to minimum depth of 3/4 inch using 15 lb to 30 lb air hammers equipped with chisel point bits. When directed by Engineer, 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.
- C. Final concrete surface cleaning after removals and before patching shall be by oil-free abrasive blast cleaning to remove concrete surfaces with potential microcracking or bruising. Alternately high-pressure water blasting using a minimum of 5,000 psi at the tip at a rate of 2 – 5 gallons per minute may be used subject to collection and appropriate disposal of any debris containing water.
- D. Where embedded reinforcement, anchorages, or electrical conduit is exposed by concrete removal, proceed with caution to avoid damaging it during removal of unsound concrete. Contractor shall perform additional removal around and beyond perimeter of reinforcement for minimum of 3/4 inch along entire length affected at no cost to Owner.
- E. If corrosion is present on embedded reinforcement where it enters sound concrete, additional removal of concrete along and beneath reinforcement will be required. Additional removal shall continue until non-corroded reinforcement is exposed, or may be terminated per Engineer's instructions.
- F. Removal of concrete for repair requires saw cutting 3/4 inch into floor slab of the perimeter of the removal, unless a more stringent criteria applies. For vertical and overhead surfaces marked areas shall be saw-cut, ground, or chipped to depth of 1/2 inch to existing concrete, measured from original surface.
- G. Edges of patch areas shall be dressed perpendicular to member face to eliminate feather edges. All edges shall be straight and patch areas square or rectangular-shaped. Do not overcut patch corners during sawcutting, chipping, or grinding.
- H. Contractor shall exercise extra caution during saw cutting to avoid damaging existing reinforcement particularly post-tensioned tendons, sheathing, electrical conduit and any other embedded items near surface of concrete. Any damage to existing embedded items shall be repaired by Contractor with Engineer's approved methods at no additional cost to Owner.

3.3 INSPECTION OF REPAIR PREPARATION

- A. After removals are complete, but prior to final cleaning, cavity and exposed reinforcement shall be inspected by Contractor and subject to verification by Engineer for compliance with requirements of this Section.

- B. Contractor shall inspect embedded reinforcement and conduits exposed within cavity for defects due to corrosion or damage resulting from removal operations. Contractor shall notify Engineer of all defective and damaged reinforcement or conduits. Replacement of damaged or defective reinforcement/conduits shall be performed in accordance to the requirements of this Section.

#### 3.4 CLEANING OF REINFORCEMENT

- A. All exposed reinforcing steel shall be cleaned and free of corrosion and other contaminants. Cleaning shall be accomplished by abrasive methods. Cleaning shall be completed immediately before patch placement to ensure that base metal is not exposed to elements and further corrosion for extended periods of time. Use powered wire brushes in locations where reinforcing steel cannot be cleaned by abrasive-blasting or water-blasting.
- B. All exposed reinforcing steel shall be coated with a corrosion inhibiting product specified in the Section "Products" in this specification prior to mortar application. Protect prepared surfaces from damage prior to and during patch placement.

#### 3.5 REINFORCEMENT IN REPAIR AREAS

- A. All embedded reinforcement exposed during surface preparation that has lost more than 10% of original cross-sectional area due to corrosion shall be considered defective. Defective reinforcement shall be supplemented in accordance to Engineer's instructions and shall be paid for by Owner.
- B. Damaged reinforcement caused during removals made by Contractor shall be supplemented in accordance to Engineer's instructions and shall be paid for by Contractor.
- C. Supplement defective or damaged embedded reinforcement of equal diameter with a Class B splice in accordance to ACI-318 beyond damaged portion of reinforcement. Secure new reinforcement to existing reinforcement with approved anchors. Supplemental steel shall be A615 Grade 60 steel except where more stringent requirements apply in drawings and/or details.
- D. Loose reinforcement exposed during surface preparation shall be securely anchored prior to patch placement. Loose reinforcement shall be adequately secured with wire ties to bonded reinforcement or with drilled-in anchors. Drilled-in anchors shall be TW-1400 anchors by ITW Ramset/Red Head, Tie-Wire Wedge-All anchors by Simpson Strong-Tie, or approved equal. Engineer will determine adequacy of wire ties and anchors. Securing loose reinforcement is incidental to surface preparation.
- E. Minimum of 1-1/2 inch concrete cover shall be provided over all new/existing reinforcement except where more stringent requirements apply in drawings and/or details.

#### 3.6 PREPARATION OF CAVITY FOR PATCH PLACEMENT

- A. Cavities will be examined prior to commencement of patching operations. Sounding surface shall be part of examination. Delaminations noted during sounding shall be removed as specified in this Section.

- B. All debris shall be removed from site prior to commencement of patching.

END OF SECTION 03 01 01

SECTION 03 01 05 – CONCRETE REPAIR MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the provisions of all labor, materials, supervision, and incidentals required to prepare deteriorated or damaged concrete surfaces and install patching materials to restore original surface condition and integrity.
- B. Related Sections include the following:
  - 1. Division 01 Section “Structural Testing and Inspections.”
- C. Contractor shall become fully acquainted with the existing job site conditions and discuss the accessibility of the work areas with the Owner.
- D. Contractor shall provide all traffic cones or barriers to direct traffic during the repair of the facility. This work shall be done in consultation with the Owner.

1.3 REFERENCES

- A. Applicable Standards:
  - 1. American Concrete Institute (ACI):
    - a. ACI 301R Specifications for Structural Concrete
    - b. ACI 305R Hot Weather Concreting
    - c. ACI 306R Cold Weather Concreting
    - d. ACI 308R Guide to Curing Concrete
    - e. ACI 318R Building Code Requirements for Structural Concrete
    - f. ACI 548.1R Guide for Use of Polymers in Concrete
  - 2. International Concrete Repair Institute (ICRI):
    - a. ICRI 310.1R Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion
    - b. ICRI 310.2R Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair
    - c. ICRI 320.2R Guide for Selecting and Specifying Materials for Repair of Concrete Surfaces

3. American Society for Testing and Materials (ASTM):
  - a. ASTM C109 Test Method for Compressive Strength of Hydraulic Cement Mortars
  - b. ASTM C39 Test Method for Compressive Strength of Cylindrical Concrete Specimens
  - c. ASTM C1583 Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension

#### 1.4 INFORMATION SUBMITTALS

- A. Make submittals in accordance with requirements of Division 01 and as specified in this Section.
- B. Product Data: Product data sheets, Material Safety Data Sheets/Safety Data Sheets (MSDS/SDS), and installation instructions for each product selected.
- C. Material Certificates:
  1. Where product data does not indicate material compatibility of independent products that form a system assembly; provide a written statement of material compatibility from the system assembly manufacturer. System assembly shall include:
    - a. Concrete Repair Materials
    - b. Epoxy Coatings for Reinforcement
    - c. Chemical Admixtures

#### 1.5 ACTION SUBMITTALS

- A. Proposed Means and Methods:
  1. Contractor shall submit procedures to protect fresh resurfacing, patches, and concrete from weather and traffic.

#### 1.6 QUALITY ASSURANCE

- A. Work shall conform to requirements of the American Concrete Institute (ACI) and International Concrete Repair Institute (ICRI) as applicable except where more stringent requirements are shown on Drawings or specified in this Section.
- B. Source Limitations: For each independent repair location, use concrete repair materials, epoxy bonding agents, epoxy coatings for reinforcement, galvanic anodes, and repair material admixtures of a single manufacturer.
- C. Qualifications
  1. Manufacturer's Qualifications: Companies furnishing the repair materials shall have a proven track record of at least five years. Furthermore, they shall have in existence a

program of training, certifying, and supporting a nationally organized program of approved contractors. Evidence of this shall be made available to the Engineer/Owner upon request.

2. Contractor's Qualifications: Contractor performing the work shall be an approved contractor by the manufacturer furnishing the repair materials and shall have no less than five years of experience in the various types of concrete repair work required in this project. Upon request by the Engineer, a notarized certification from the manufacturer attesting to the training shall be submitted to the Engineer/Owner.
3. Applicator's Qualifications:
  - a. Concrete repair work shall only be performed by contractors who have successfully used this process on at least three similar structural repairs of equal scope which have performed successfully for a minimum period of five years.
  - b. Only adequately trained and experienced personnel shall be used on the job.

## PART 2 - PRODUCTS

### 2.1 GENERAL REQUIREMENTS FOR CEMENTITIOUS REPAIR MORTARS

- A. Mortar used for bonding, patching, and resurfacing in exposed or exterior environmental conditions with large cyclic temperature changes shall have the following properties:
  1. Repair mortar for unformed vertical and overhead repairs shall be non-sagging.
  2. Acceptable structural repair materials shall have minimum 3-day compressive strength (ASTM C 39 or ASTM C 109) of 3,000, and 5,000 psi at 28 days as certified by manufacturer.
  3. Acceptable structural repair materials shall have minimum 28-day direct tensile bond strength (ASTM C 1583) of 250 psi as certified by manufacturer.
  4. Coefficient of thermal expansion shall be comparable with that of concrete.
  5. Acceptable structural repair materials shall have a maximum 1 year drying shrinkage (ASTM C 157) of 0.05%.
  6. Sand and aggregate extension used in preparing mortar shall be graded oven dry quartzite furnished in bags.
  7. The cured repair mortar material shall match the existing texture and color of existing exposed/cured concrete without giving a blotchy appearance. A test patch shall be applied for approval prior to final acceptance of the mortar. Size of test patch shall be approximately equal to the size of the average mortar patch to be used on the project.

2.2 CONCRETE REPAIR MATERIALS

A. Polymer Modified Mortar for Horizontal Repairs:

1. Sika Corporation; SikaRepair 222 with undiluted Latex R
2. Euclid Chemical Company; Duraltop Flowable Mortar
3. MAPEI Corporation; Mapecem 202

B. Polymer Modified Mortar for Overhead/Vertical Repairs:

1. Sika Corporation; MasterEmaco N 425
2. Euclid Chemical Company; Verticoat
3. MAPEI Corporation; Planitop 23

2.3 ACCESSORY PRODUCTS

A. Bonding Agent:

1. Three-component, cementitious, epoxy-modified bonding agent for bonding new concrete to existing concrete.
  - a. Sika Corporation; MasterEmaco P 124
  - b. Sika Corporation; Armatec 110 EpoCem
  - c. Euclid Chemical Company; Duralprep A.C.
  - d. MAPEI Corporation; Planibond 3C

B. Optional Admixtures: Contractor may elect to add the following optional admixtures to modify or enhance specific properties of specified repair materials. Verify compatibility and adequate dosage rate with the repair material manufacturer.

1. Polymer Modification Admixtures:
  - a. Sika Corporation; MasterEmaco A660
  - b. Sika Corporation; Undiluted Latex R
  - c. Euclid Chemical Company; Flex-Con or SBR Latex
  - d. MAPEI Corporation; Planicrete AC or Planicrete UA
2. Corrosion Inhibitor Admixtures:
  - a. Sika Corporation; Ferrogard 901
  - b. Euclid Chemical Company; Eucon CIA or BCN
  - c. MAPEI Corporation; Polychem CI

C. Aggregate Extension:

1. Aggregate extension for non-architectural repairs shall be round, washed, surface saturated dry aggregate of the size recommended by the repair mortar manufacturer. Aggregates shall conform to ASTM C33.



2.4 SUBSTITUTIONS

- A. Product substitutions may be considered provided complete technical information and job references are furnished to the Engineer and approved prior to commencement of work.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Application Planning
  - 1. In using the specified products of this Section, follow strictly the Manufacturer's specifications and written instructions for mixing and application.
  - 2. Review all Manufacturer warning labels and Material Safety Data Sheets/Safety Data Sheets (MSDS/SDS).
  - 3. Apply all materials in accordance with applicable safety laws.

3.2 SURFACE PREPARATION

- A. Concrete surfaces receiving repair material shall be free of all dust, loose, and unsound materials. Preparation of cavity to receive new repair material shall be in accordance to Section "Surface Preparation for Patching" and manufacturer's instructions.
- B. Concrete Surface Inspection: Ensure compliance with Article 3.2. A, above and that the surface and ambient temperature is at least 45°F and rising at the time of application.

3.3 PATCHING WITH REPAIR MORTAR

- A. Preparation of Bond Surface
  - 1. Prepare the bonding surface per Specification Section "Surface Preparation for Patching."
  - 2. Apply a scrub coat of the repair material in strict accordance with the manufacturer's recommendations unless another bonding agent is required. Where alternate bonding agents are required:
    - a. Apply bonding agent in strict accordance with manufacturer's recommendations.
    - b. All surfaces receiving mortar shall be SSD (Surface Saturated Dry) for minimum 24 hours prior to material application.
    - c. If bonding agent dries, cavity shall not be patched until it has been re-cleaned and prepared as indicated in Section "Surface Preparation for Patching." Bonding agent shall not be applied to more cavities than can be patched within fifteen (15) minutes by available manpower or manufacturer's requirements, whichever are most strict.
  - 3. Patching materials shall be placed immediately following scrub coat application or bonding agent application in strict accordance with manufacturer's instructions.

B. Mortar Application

1. Condition repair mortar material to 65°F-80°F unless otherwise recommended by the manufacturer. Materials beyond this range of temperature shall not be used.
2. Mix the components in a clean container free of contaminants as recommended by the manufacturer.
3. Thoroughly blend components and aggregates with portable mixers to a uniform and homogenous mixture. Small batches of one quart or less may be mixed by spatulas, palette knives or similar devices.
4. Mixing should be accomplished within three (3) minutes when using Jiffy mixer or five (5) minutes when mixed by hand.
5. Apply mortar by means suitable for the consistency of the mortar mix.
6. Use appropriate forms as required for retaining mortar if mixed to a flowable consistency.
7. Consolidate the mortar thoroughly to remove entrapped air.
8. Supplemental wire mesh shall be required for delamination and spall repairs greater than 4 square feet in area and greater than 2-inch depth. Fresh bonding grout is required between successive lifts of patching material.
9. Finish surface of mortar to match the texture and contours of existing concrete.

3.4 CURING

- A. Immediately after finishing, keep patch material continually moist for at least 24 hours. Continue curing for first seven (7) days after patch placement. During initial and final curing periods maintain patch material above 50°F. Contractor shall be responsible for providing and maintaining the environmental conditions during this curing period.
- B. Prevent rapid drying at end of curing period.
- C. Provide additional curing as required by manufacturer's recommendations, if more strict.

3.5 CLEANUP

- A. Protect surfaces surrounding the work areas against spillage.
- B. Material spillage shall be cleaned before it sets and becomes difficult to remove.
- C. Cleanup all portions of the existing structure that are soiled or stained in the process of concrete repair work.

3.6 FIELD QUALITY CONTROL

A. Responsibilities

1. Contractors Responsibility: Contractor is responsible for performing continuous field quality control during the progress of work.

B. Minimum Quality Control Requirements

1. Ensure concrete edges of resurfacing and repairs are saw cut to prevent feather edges. Ensure corners of the repair are not overcut.
2. Review material expiration dates and remove expired materials from the project site.
3. Ensure repair material is placed within the bonding agent open items.
4. Accurately measure and monitor the addition of water and aggregate extension when mixing repair mortar or concrete.
5. Monitor repair material working times and dispose of all materials that have exceeded the manufacturer's published working time.
6. Patched areas shall be sounded by the Contractor after curing. Contractor shall repair all hollowness and unsound locations detected by removing and replacing patch or affected area at no additional cost to Owner.
7. If shrinkage cracks appear in patch area after the initial curing period is concluded, the patch in question shall be considered unacceptable, and it shall be removed and replaced by Contractor at no additional cost to Owner.

C. Acceptance of Work

1. Acceptance of completed concrete repair will be in accordance to ACI 301.

END OF SECTION 03 01 05

SECTION 034100 – STRUCTURAL PRECAST 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 work of this section.

1.2 SUMMARY

- A. Provide labor, material and equipment to produce, deliver and erect hollow-core planks necessary to complete the repairs as described by the Drawings, General Notes and these Specifications.
- B. Related Requirements
  - 1. Specification 014529 “Structural Testing and Inspections” for inspection requirements associated with cast-in-place concrete.

1.3 REFERENCES

- A. Reference Standards:
  - 1. Codes and Standards: Comply with provisions of following, except where more stringent requirements are shown or specified. For codes and standards for which no specific version is referenced, the version that is referenced in the applicable building code shall govern, or, if there is no reference in the building code, the latest version of the code or standard shall govern:
    - a. ACI 301, “Specifications for Structural Concrete.”
    - b. ACI 318, “Building Code Requirements for Structural Concrete.”
    - c. PCI MNL-116, “Manual for Quality Control for Plants and Production of Structural Precast Concrete Products.”
    - d. CRSI, “Manual of Standard Practice.”
    - e. AWS D1.1, “Structural Welding Code – Steel.”
    - f. AWS D1.4, “Structural Welding Code – Reinforcing Steel”
    - g. Local building code, with supplements.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
  - 1. Quality Control: The Contractor is responsible for quality control, including workmanship and materials furnished by subcontractors and suppliers.
  - 2. Document Conflict and Precedence: In case of conflict among documents, including structural drawings and specifications, notify the Engineer prior to submitting proposal.

In case of conflict between and/or among the structural drawings and specifications, the strictest interpretation shall govern, unless specified otherwise in writing by the Engineer.

3. Materials and installed work may require testing and retesting, as directed by the governing building code or the Engineer, at any time during progress of work.
    - a. The Contractor shall provide adequate notification to the Owner's Testing Agency of construction operations including the project schedule to allow the Testing Agency to schedule inspections. Failure to notify sufficiently may result in additional costs incurred by the Testing Laboratory that may be back-charged to the Contractor by the Owner.
    - b. The Contractor shall cooperate with laboratory personnel, provide access to the work, and provide access to manufacturer's operations.
    - c. The Contractor shall make adequate arrangement with the Owner's Testing Agency for inspection of material stockpiles and facilities.
    - d. The Contractor shall provide to the laboratory certificates and representative samples of materials proposed for use in the work in quantities sufficient for accurate testing as specified.
    - e. The Contractor shall furnish casual labor, equipment, and facilities as required for sampling and testing by the laboratory and otherwise facilitate the required inspections and tests.
    - f. Inspection or testing by the Owner does not relieve the Contractor of his responsibility to perform the Work in accordance with the Contract Documents. Tests not specifically indicated to be done at the Owner's expense, including retesting of rejected materials and installed work, shall be done at the Contractor's expense.
  4. Responsibility for Selection and Use of Concrete Admixtures and Chemical Treatments: The Contractor shall be responsible for selecting admixtures and surface treatments that are compatible with the intended use of the concrete including all final surface treatments called for within this or other specifications or on the structural drawings. The Contractor is responsible for following the manufacturer's instructions for the use of their product including abiding by any limitations placed by the manufacturer on the use of any of its products.
- B. Preinstallation Meetings:
1. Pre-Concrete Conference:
    - a. At least seven days prior to beginning concrete work, the Contractor shall conduct a meeting to review the proposed methods of fabrication and erection of structural precast concrete. Also, review requirements for submittals, status of coordinating work and availability of materials. Establish work progress schedule and procedures for materials inspection, testing, and certifications. The contractor shall send a pre-concrete conference agenda to all attendees seven days prior to the scheduled date of the conference.
    - b. The Contractor shall require responsible representatives of every party who is concerned with the concrete work to attend the conference, including but not limited to the following:
      - 1) Contractor's Superintendent.
      - 2) Laboratory responsible for the concrete design mix.
      - 3) Laboratory responsible for field quality control.
      - 4) Precast Concrete Subcontractor.
      - 5) Ready-Mix Concrete Producer.
      - 6) Owner's and Engineer's Representative.

- c. Minutes of the meeting shall be recorded, typed and printed by the Contractor and distributed by him to all parties concerned within five days of the meeting. One copy of the minutes shall be transmitted to the following for information purposes:
  - 1) Owner's Representative.
  - 2) Engineer-of-Record.
- d. The Engineer shall be present at the conference. The Contractor shall notify the Engineer at least seven days prior to the scheduled date of the conference.

## 1.5 SUBMITTALS

- A. Certification and Test Reports: Submit manufacturer's specifications and instructions for manufactured materials and products. Include manufacturer's and plant's certifications and laboratory test reports for the following:

1. PCI Plant Certification.
2. Concrete mix designs, including sources of coarse, fine and lightweight aggregates as well as admixtures.
3. Prestressing strand mill certificates.
4. Mill certificates for reinforcing bars and welded wire mesh.
5. Mill certificates for high strength reinforcing bars.
6. Structural steel mill certificates.
7. Welder and welding operator certifications.
8. Calibrations of prestressing jacks.
9. Calibration of cylinder testing machine.
10. Mill certificates for cement.
11. Cylinder test reports on concrete for all precast units.

- B. Shop Drawings: Submit for review by the Engineer detailed shop drawings as follows:

1. Erection Drawings:
  - a. Dimensioned building plans, elevations and sections showing identification of each precast member. Drawings submitted shall not be reproducible of the contract drawings.
  - b. Complete connection details showing size, type and grade of all plates, inserts and anchors. Show proper welding symbols in accordance with AWS D1.1.
  - c. Description of all loose and cast-in hardware, plates, inserts, etc.
  - d. Field installed anchor location drawings.
  - e. Erection sequence and handling requirements.
  - f. All dead, live and other applicable loads used in the design.
2. Production Drawings for all precast members:
  - a. Member elevations and sections showing all dimensions.
  - b. Finishes.
  - c. Size, type, grade and location of all reinforcing steel including that required for handling and erection.
  - d. Prestress forces and number of strands.
  - e. Concrete strengths at release for prestressed members and 28 day design strength.
  - f. Size, type and location of all cast-in plates, inserts and other hardware.
  - g. Size, type and location of all expansion blockouts.

- h. Size, type and location of all lifting and handling devices.
  - i. Estimated cambers at time of erection.
  - j. Estimated member weights.
  - k. Method of transportation.
3. All shop drawings submitted shall be sealed by a professional engineer who is licensed in the state where the project is located.
- C. Design Calculations:
1. Precast Unit Design: Provide for review by the Engineer complete design calculations for dead loads, live loads, lateral loads, and lifting and erection loads. Calculations shall show design for all connections at the member ends and to each adjoining member.
  2. Details shown on the contract drawings indicate preferred methods and locations for connections. Reinforcing steel, connection materials, and specific connections shall be engineered and increased or modified as required for actual design forces. Refer to General Notes on the structural drawings for design loads. Refer to General Notes on the structural drawings for design loads on the final structure.
  3. Calculations shall be prepared by or under the direct supervision of a Professional Engineer. All members designed by computer shall have calculations that include documentation of the computer program identifying the method of solution, all input data and output for each unit. At least one unit shall be correspondingly designed by hand and submitted with the computer data for verification. All calculations shall be neat, well organized and bound. Partial, incomplete or unstamped calculations will be rejected.
  4. Precast Erection Design: The Erector shall submit installation drawings and engineering calculations of the erection process stamped by a Professional Engineer.
  5. Design Modifications: Design modifications may be made as necessary to meet field conditions and to ensure proper fitting of the work, but only with the prior written approval of the Engineer for each occurrence. Provide complete design calculations and drawings for required or anticipated design modifications in accordance with these specifications.

## 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications:
1. The precast concrete producer shall not have less than 5 years experience in providing structural precast and/or precast prestressed concrete products and services normally associated with the industry.
  2. The precast concrete producer shall be a participant in the PCI Plant Certification Program and, upon request, shall submit written evidence to show experience, qualifications and adequacy of plant capability and facilities for performance of contract requirements. Compliance with this provision is subject to verification by the Engineer.
- B. Erector Qualifications: The precast concrete erector shall not have less than 2 years experience in the erection of precast structural concrete similar to the requirements of this project. Upon request, provide written evidence that equipment and personnel are adequate and qualified for performance of contract requirements.

- C. Welder and Welding Machine Operator Qualifications: All field and plant welders shall be certified in accordance with AWS D1.1 for the type of welding required.
- D. Plant Quality Control: Provide copies of plant quality control program describing procedures for the following:
  - 1. Verifying size and placement of reinforcing steel and prestressing strand.
  - 2. Verifying strength of concrete.
  - 3. Tensioning and de-tensioning operations.
  - 4. Verifying sizes and critical dimensions of members.
  - 5. Verifying position of plates, inserts and other embedded items.
  - 6. Verifying squareness of forms and positioning of blockouts.
  - 7. Final inspecting of products prior to shipment.

If units are produced at locations other than precast concrete production plants, maintain procedures and conditions for quality control that are equivalent to plant production.

- E. Professional Engineer: A professional engineer who is licensed to practice engineering in the state where the project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with precast concrete framing that are similar to that indicated for this Project in material, design, and extent.

#### 1.7 DELIVERY, STORAGE AND HANDLING

- A. Store precast concrete units at manufacturer's plant or project site to prevent cracking, distortion, staining, and other physical damage, and so that markings are visible. Lift and support units at designated lift points. Do not use upper member of stacked tier as storage area for shorter member or heavy equipment. Deliver units to project site in such quantities and at such times to assure continuity of installation.

### PART 2 - PRODUCTS

#### 2.1 FORMWORK

- A. Provide forms and, where required, form facing materials of metal, plastic, wood, or other acceptable material that is non-reactive with concrete and will produce required finished surfaces. Rust-stained or excessively worn forms that would impair the quality of the finished surface are not acceptable. Comply with recommendations set forth in ACI 347, Guide to Formwork for Concrete.
- B. Form-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
- C. Accurately construct forms mortar-tight and of sufficient strength to withstand pressures due to concrete placing operations, temperature changes, and when prestressed, the pretensioning and detensioning operations. Maintain formwork to provide completed precast concrete units of



shapes, lines, and dimensions indicated on the approved shop drawings within specified production tolerances.

- D. Unless forms for plant-produced prestressed concrete units are stripped prior to detensioning, design forms so that stresses are not induced from precast units due to deformation of concrete under prestress or to movement during detensioning.

## 2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60. All reinforcing steel that requires welding shall conform to ASTM A 706.
- B. Welded Wire Fabric: ASTM A 185.
- C. Deformed Steel Wire: ASTM A 1064.
- D. Welded Deformed Steel Wire Fabric: ASTM A 1064.
- E. Prestressing Tendons:
  - 1. ASTM A 416/A 416M, Grade 250 (Grade 1720)
  - 2. Grade 270 (Grade 1860), uncoated, 7-wire, low-relaxation strand
  - 3. ASTM A 886/A 886M, Grade 270 (Grade 1860), indented, 7-wire, low-relaxation strand (including supplement)
  - 4. ASTM A 910 Grade 270 (Grade 1860), uncoated, weldless, 2- and 3-wire, low relaxation strand
- F. Prestressing Bars: ASTM A 722.
- G. Supports for Reinforcement:
  - 1. Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting or fastening reinforcing, complying with CRSI recommendations.
  - 2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are either plastic protected or all plastic (CRSI Class 1) or stainless steel protected (CRSI Class 2).

## 2.3 CONCRETE MATERIALS

- A. Refer to the drawings for classes and strengths of concrete required.
  - 1. Use one brand of cement, for each class of concrete, throughout the project, unless approved otherwise by the Engineer and the Owner's Testing Laboratory. Submit mill certificates certifying conformance to this specification for each brand and type of cement.
  - 2. Testing of cement in lieu of mill certificate submittal will be required if:
    - a. The cement has been in storage at the mixing site for over 30 days.



Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures to be used.

H. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C 494, Type F or Type G. See maximum permissible chloride ion content in concrete specified below.

1. Subject to compliance with requirements, provide one of the following products and manufacturers:

- a. W.R. Grace & Co.; ADVA or Daracem Series.
- b. BASF Construction Chemicals; Rheobuild 1000 or Glenium series.
- c. Sika Chemical Corp.; Sikament.
- d. The Euclid Chemical Company; Eucon 37/1037 or Plastol series.
- e. The Euclid Chemical Company; Eucon SP or Eucon RD2.

Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures to be used.

I. Water-Reducing, Accelerator Admixture (Non-Corrosive, Non-Chloride): ASTM C 494, Type C or E. See maximum permissible chloride ion content in concrete specified below.

1. Subject to compliance with requirements, provide one of the following products and manufacturers:

- a. W.R. Grace & Co.; Polarset, Gilco, Lubricon NCA, or DCI.
- b. BASF Admixtures, Inc.; Pozzutec 20+.
- c. The Euclid Chemical Company; Accelguard 80/90, NCA, or AcN.
- d. Sika Chemical Co.; Plastocrete 161FL.
- e. The Euclid Chemical Company; Eucon AcN.

Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures to be used.

J. Water-Reducing, Retarding Admixture: ASTM C 494, Type D. See maximum permissible chloride ion content in concrete specified below.

1. Subject to compliance with requirements, provide one of the following products and manufacturers:

- a. W.R. Grace & Co.; Daratard series.
- b. BASF Construction Chemicals; Pozzolith series or DELVO series.
- c. Sika Chemical Co.; Plastiment.
- d. The Euclid Chemical Company; Eucon Retarder series.

Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures to be used.

K. Shrinkage Reducing Admixture: An admixture that reduces drying shrinkage by reducing the capillary tension of pore water.

1. Subject to compliance with requirements, provide one of the following products and manufacturers:
  - a. For Air-Entrained Concrete:
    - 1) Grace Construction Products; Eclipse Plus.
    - 2) The Euclid Chemical Company; Eucon SRA.
  - b. For Non Air-Entrained Concrete
    - 1) Grace Construction Products; Eclipse Floor.
    - 2) BASF Construction Chemicals; Tetraguard AS20.

L. Corrosion Inhibitor: 30% calcium nitrite

1. Products: Subject to compliance with requirements, provide the following at dosage rates per Engineer of Record from manufacturer's recommendation based on design life, application, clear cover and other products in concrete mix:
  - a. The Euclid Chemical Company; Eucon CIA or Eucon BCN.
  - b. W.R. Grace & Co.; DCI or DCI-S.
  - c. BASF Construction Chemicals; Rheocrete CNI.
  - d. Sika Chemical Co.; Sika CNI.

M. Corrosion Inhibitor: Amine-Ester type

1. Products: Subject to compliance with requirements, provide the following at dosage rates per manufacturer's recommendation:
  - a. BASF Construction Chemicals; Rheocrete 222+.

N. Calcium Chloride and Chloride Ion Content: Calcium chloride or admixtures containing more than 0.5% chloride ions by weight of the admixture are not permitted. For concrete exposed to sulfate exposure class S2 or S3 as noted on the drawings, admixtures must be completely free of chloride ions.

O. Certification: Written conformance to all the above mentioned requirements and the chloride ion content of the admixture as tested by an accredited laboratory will be required from the admixture manufacturer at the time of mix design review by the Engineer.

2.4 BEARING PADS

A. Elastomeric Pads:

1. Unreinforced: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 Shore A durometer according to ASTM D 2240, minimum tensile strength 2250 psi (15.5 MPa) per ASTM D 412 and having a minimum thickness of 3/8" for tees, 1/2" for beams and 1/4" for slabs, unless otherwise shown on the drawings.
2. Random-Oriented, Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. Surface hardness of 70 to 90 Shore A durometer.

Capable of supporting a compressive stress of 3000 psi (20.7 MPa) with no cracking, splitting or delaminating in the internal portions of the pad. Test one specimen for each 200 pads used in the Project.

3. Design: Design of bearing pads shall conform to the design recommendations in the PCI Design Handbook. Maximum allowable compressive stress shall be limited to values in PCI Design Handbook Figure 6.10.3, unless shown otherwise by approved manufacturer's data. The compressive stress for unreinforced bearing pads shall not exceed 800 psi under total service load, and 500 psi under dead load, unless shown otherwise by approved manufacturer's data
4. Size pads so that both surfaces are in complete contact with the bearing pads.
5. Provide beveled, plain elastomeric bearing pads between non-parallel load surfaces.

## 2.5 EPOXY MORTAR PATCH

- A. General Requirements: Two-component material suitable for use on dry or damp surface, complying with ASTM C881, for use in concrete repairs. The color of the patch shall match the surface color of the precast concrete unit.
- B. Products for Epoxy Mortar Patches:
  1. Sika Chemical Corporation; Sikadur Lo-Mod LV.
  2. The Euclid Chemical Company; Duracrete.
  3. Dayton-Superior; Sure Level Epoxy (J-57).
  4. BASF Building Systems; Epofil.
  5. Unitex; Pro-Poxy 2500.
  6. W.R. Meadows; Rezi-Weld 1000.
  7. US Mix Co.; US Spec EPM 3000.
  8. The Euclid Chemical Company; Duralcrete LV.
  9. SpecChem; SpecPoxo Binder.

## PART 3 - EXECUTION

### 3.1 PRODUCTION

- A. General: Produce precast concrete units complying with manufacturing and testing procedures, quality control recommendations and dimensional tolerances of PCI MNL-116 and MNL-135, unless stricter requirements are specified herein or on the drawings.
- B. Proportioning and Design of Mixes:
  1. Prepare design mixes for each type of concrete required.
  2. Design mixes may be prepared by an independent testing facility or by qualified precast manufacturing personnel, at precast manufacturer's option.
  3. Proportion mixes by either laboratory trial mixture or field experience methods, complying with ACI 301 and ACI 318, using materials to be employed on the project for each type of concrete required.
  4. Submit written reports to Engineer of proposed mix for each type of concrete at least 30 days prior to start of precast unit production. Do not begin concrete production until

mixes and evaluations have been reviewed and approved by Engineer and Owner's testing laboratory.

5. Mix design adjustments may be requested when characteristics of materials, job conditions, weather, test results, or other circumstances warrant. Laboratory test data for revised mix designs and strength results must be submitted to and accepted by Engineer and Owner's testing laboratory before using in the work.
6. The minimum release strength for prestressed units shall be 3500 psi.
7. Produce normal weight concrete consisting of specified materials and meeting requirements of this specification and requirements shown on the drawings.

C. Admixtures:

1. Comply with ACI 212.2R.
2. Use air-entraining admixture in concrete unless otherwise indicated.
3. Use water-reducing admixtures in strict compliance with manufacturer's directions. Admixtures to increase cement dispersion, or provide increased workability for low-slump concrete, may be used subject to Engineer's approval.
4. Use amounts as recommended by admixture manufacturer for climatic conditions prevailing at time of placing. Adjust quantities of admixtures as required to maintain quality control.

D. Embedded Items: Accurately position and secure cast-in anchorage devices. Locate anchorages where they do not affect position of reinforcement or placing of concrete. Do not relocate bearing plates or reinforcing steel in units unless approved in writing by the Engineer. Provide and coordinate the placement of embeds required for equipment or components hung from precast units.

E. Reinforcement Installation:

1. Clean reinforcement of loose rust and mill scale, earth and other materials which reduce or destroy bond with concrete.
2. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers or hangers, as specified by CRSI Manual of Standard Practice.
3. Place reinforcement to obtain at least the minimum coverages for concrete protection as specified in the drawings. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

F. Tensioning: Pretensioning of tendons for prestressed concrete may be accomplished either by single strand tensioning method or multiple-strand tensioning methods.

G. Concrete Placement: Place concrete in a continuous operation to prevent formation of seams or planes of weakness in precast units, complying with requirements of ACI 301. Thoroughly consolidate placed concrete by internal and/or external vibration without dislocation or damage to reinforcement and embedded items.

H. Identification:

1. Provide permanent markings to identify pick-up points and orientation in the structure, complying with markings indicated on final shop drawings. Imprint date of casting on each precast unit on a surface which will not show in finished structure.
  2. Provide additional marking as required by local building codes or ordinances.
- I. Curing:
1. Cover all precast and precast/prestressed concrete members with tarpaulins or other suitable means immediately after casting.
  2. Curing by low-pressure steam, by steam vapor, by radiant heat and moisture, or other similar process may be employed to accelerate concrete hardening and to reduce curing time.
- J. Detensioning:
1. Delay detensioning of prestressed units until concrete has attained design release strength, as established by test cylinders.
  2. If concrete has been heat-cured, perform detensioning while concrete is still warm and moist to avoid dimensional changes which may cause cracking or undesirable stresses in concrete.
  3. Detensioning of prestressed tendons may be accomplished either by gradual release of tensioning jacks or by heat cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.
- K. Finishes:
1. Commercial Structural Finishes
    - a. Standard Grade: Normal plant-run finish produced in forms that impart a smooth finish to concrete. Surface holes smaller than 1/2 inch caused by air bubbles, normal color variations, form joint marks, and minor chips and spalls are acceptable. Fill air holes greater than 1/4 inch in width that occur in high concentration (more than one per 2 in.<sup>2</sup>). Major or unsightly imperfections, honeycombs, or structural defects are not permitted. Allowable joint offset is limited to 1/8 inch.
  2. Unformed Surface: Provide light broom finish to unformed surfaces that are exposed to view, unless otherwise indicated. Provide screedfinish to unformed surfaces that are not exposed to view, unless otherwise indicated. Consolidate concrete, bring to proper level with a straightedge, and apply the finish as specified.
  3. Finish of Top Surface of Composite Members: Top surfaces of double tees, hollow-core plank or other precast members scheduled to receive a topping shall have a rough scratch finish with surface transversely scarified to provide ridges approximately 1/4" deep.
  4. Finish of Exposed Ends of Units: Strands shall be recessed 3/4" minimum and recess shall be filled with non-shrink, non-metallic grout. Sandblast ends to provide a proper surface for sealant adhesion.
  5. Holes: Cast in holes for openings in flanges larger than 10" in diameter or 10" square in accordance with final approved shop drawings. Other smaller holes will be field cut by trades requiring them, as acceptable to Engineer. Do not cut through stems of double tees, or through any prestressed members without Engineer approval.

- L. Joint Widths: Unless shown otherwise on the drawings, provide joint widths in accordance with MNL-135.

### 3.2 QUALITY ASSURANCE

- A. General: The Precast producer shall comply with noted standards and perform tests and inspections as described below to assure the specified quality in the final product.
- B. Production Tolerances:
  - 1. Provide production tolerances in accordance with PCI MNL-135.
  - 2. Precast units having dimensions not conforming to specified tolerances will be rejected if appearance or function of the structure is adversely affected. Repair, or remove and replace rejected units with new units as required to comply with contract documents. The Engineer must approve all repairs.
- C. Concrete Strength Verification: Mold and test concrete cylinders as follows:
  - 1. Cylinders for strength tests shall be molded and cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39.
  - 2. Minimum of two (2) per bed for each pour to verify specified release strength.
  - 3. Minimum of two (2) per 50 cubic yards for each class of concrete to verify 28-day strength but not less than one set per day's operation.
  - 4. Test cylinders shall be cured with and by the same methods as the members they represent.
- D. Acceptance Criteria of Concrete Strength: The compressive strength level of an individual class of concrete shall be considered satisfactory if both the following requirements are met:
  - 1. The average of all sets of three consecutive strength tests equal or exceed the required  $f'c$ .
  - 2. No individual strength test falls below the required  $f'c$  by more than 500 psi.
  - 3. If criteria 1 above is not met but criteria 2 above has been, the Precast Producer shall immediately notify the Engineer by telephone or email and take immediate steps to increase the average of subsequent strength tests.
  - 4. If criteria 2 is not met, the Engineer shall be immediately notified by telephone or email and all units cast from the concrete that is represented by the low strength test shall be considered potentially deficient and subject to further tests or replacement.
- E. Acceptance of Units: Precast units will be considered potentially deficient requiring the unit to be either further tested or replaced if the manufacturing processes fail to comply with any of the requirements which may affect the strength of the precast units, including but not limited to the following conditions:
  - 1. Failure to meet compressive strength tests requirements
  - 2. Reinforcement, reinforcement placing, and pretensioning and detensioning of tendons of prestressed concrete not conforming to specified fabrication requirements.
  - 3. Visual evidence of cracks exceeding .02 inches wide, excessive negative camber, or deflection in excess of calculated anticipated amounts.
  - 4. Concrete curing and protection of precast units not as specified.
  - 5. Precast units damaged during storage, transportation, handling or erection.



- F. Investigation of Low Concrete Strength: When there is evidence that the strength of precast concrete units does not meet specification requirements, the Precast Manufacturer's testing service shall take cores from hardened concrete for compressive strength determination, complying with ASTM C 42 and as follows:
1. Take at least 3 representative cores from precast units of suspect strength from locations directed by the Engineer.
  2. Test cores in a saturated-surface-dry condition in accordance with ACI 318 if concrete will be wet during use of completed structure.
  3. Test cores in an air-dry condition in accordance with ACI 318 if concrete will be dry during use of completed structure.
  4. Strength of concrete for each series of cores will be considered satisfactory if their average compressive strength is at least 85% of 28-day design compressive strength and no individual test is less than 75% of the required  $f'_c$ .
  5. Test results will be reported in PDF format on same day that tests are made, with copies to Owner, Engineer, and General Contractor. Include in test reports the project identification name and number, date, name of precast concrete manufacturer name of concrete testing service, identification letter, number and type of member or members represented by core tests, design compressive strength, compression breaking strength and type of break (corrected for length-diameter ratio), direction of applied load to core with respect to the horizontal plane of concrete as placed, and moisture condition of core at time of testing.
  6. Where core test results are satisfactory and precast units are acceptable for use in work, fill core holes solid with non-shrink patching mortar or epoxy based mortar as directed by Engineer and finish to match adjacent concrete surfaces.
- G. X-Rays: The Engineer may order x-rays or other non-destructive tests taken of any member if there is sufficient doubt about the proper existence or location of reinforcing steel, embedded items, or strands.
- H. Load Tests: The Engineer may order a load test of the member in the plant or in the field if there is sufficient evidence to question the structural integrity of the member.
- I. Repair of Out-of-Tolerance Finishes: Defects exceeding the criteria established in the specified finish, provided the structural capacity is not impaired, shall be cause for repair by patching with a two-part epoxy mortar or rejection of the unit. Patching shall be done only when acceptable to Engineer. The patch shall match the color, texture and finish of the original unit. All concrete surface repairs except those for minor surface blemishes that are less than the specified minimum must be noted in quality control reports and submitted for Engineer review and approval for each occurrence prior to erection. Patches not conforming to these requirements may be a cause for rejection of the unit.
- J. Products Not Meeting Specifications: Precast units that do not conform to all specified requirements including strength, tolerances, both fabrication and erection, and finishes shall be rejected and replaced with units meeting all requirements of the Contract Documents, unless approval by the Engineer is obtained in writing for an authorized repair.
- K. Authorized Repairs: No structural repair shall be made to any precast unit either in the plant or in the field without written documented approval for each occurrence in the form of a letter or drawing from the Engineer. Unauthorized repair details shall not be allowed.

### 3.3 INSTALLATION

#### A. General:

1. Examine supporting structure and conditions under which precast concrete work is to be erected and provide written notification of conditions detrimental to proper and timely completion of work. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Erector.
2. General Contractor shall monitor all phases of erection to ensure the work is in conformance with the contract documents.
3. Erect members by means of suitable lifting devices at points provided by the manufacturer.
4. Provide temporary shoring and bracing as required to ensure stability during erection. The erector shall brace unsymmetrical sections during erection and pouring of topping slabs to prevent rotation and instability regardless of whether it is specified on the erection drawings. The responsibility for bracing such members shall rest solely with the Erector.
5. Properly align, plumb and level precast units. Level out variations between adjacent members by shimming, loading or any other feasible method recommended by the manufacturer and acceptable to the Engineer.
6. Provide accurate placement and alignment of anchor bolts, plates or dowels in supporting structural elements.
7. Provide true, level bearing surfaces on all field placed foundations, bearing walls and other supporting members.
8. Bearing Pads: Install specified bearing pads as precast units are being erected and maintain in correct position until precast units are placed.

B. Erection Tolerances: Erection tolerances shall conform to PCI MNL-135.

C. Powder-Actuated Fasteners and Expansion Anchors: Do not use powder-actuated fasteners or expansion anchors in precast prestressed units except as submitted and approved on shop drawings or other submittal.

D. Damage to Units During Installation: Damage to precast units sustained during installation resulting in spalls deeper than 1/4 inch and cracks exceeding .01 inch in width shall be immediately reported to the Engineer. Units thus damaged shall be subject to repair or replacement as directed by the Engineer. Repairs of spalls shall be done using a two-part epoxy mortar patch that shall match the color, texture, and finish of the original unit. Cracks shall be repaired using an epoxy injection process.

### 3.4 DEFECTIVE WORK

A. Defective Work: Precast concrete units which do not conform to specified requirements, including strength, tolerances, and finishes, shall be repaired or replaced with precast concrete units that meet requirements of this section as directed by the Engineer. The Contractor shall also be responsible for the cost to any other work affected by or resulting from corrections to precast concrete work.

3.5 QUALITY ASSURANCE TESTING AND INSPECTION DURING CONSTRUCTION

- A. The Owner will engage a qualified testing and inspection agency (the Owner's Testing Laboratory) to perform field tests and inspections and prepare test reports.
- B. Inspection After Erection: Inspection of members and connections after erection shall include the following:
  - 1. For precast plank floor members, check the following:
    - a. Proper length and width of bearing at each support end.
    - b. Proper width, length, thickness, and type of bearing pads.
    - c. Proper connection of planks to each other and to support members at each end.
    - d. Proper vertical alignment of planks with respect to each other and to supports.
    - e. Excessive camber or deflection after pouring of topping slabs.
    - f. Any damage of planks sustained during erection or shipping.
    - g. Any flexural cracking sustained in bottom webs after erection and pouring of topping slabs.
  - 2. For structures with poured in place topping slabs, check the following:
    - a. Proper type (normal or lightweight) and strength of concrete.
    - b. Proper thickness of topping.
    - c. Proper slope of topping, if required.
    - d. Proper mesh size and placement including lap between mesh sheets or rolls.
    - e. Proper finish.
    - f. Crack control joints and/or check of waterproofing requirements.

END OF SECTION 034100

SECTION 07 19 16 - CONCRETE PENETRATING SEALERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes concrete penetrating sealers for the following surfaces:
  - 1. Supported concrete floor surfaces including curbs, walks, islands and pour strips.
- B. Contractor shall become fully acquainted with the existing job site conditions and discuss the accessibility of the work areas with the Owner.
- C. Materials shall be compatible with materials or related work with which they come into contact.
- D. Provide barricades around the work area with appropriate signage to keep non-construction people from entering work area.
- E. Related Sections:
  - 1. Division 07 Section "Joint Sealants."

1.3 INFORMATION SUBMITTALS

- A. Make submittals in accordance with requirements of Division 01 and as specified in this Section.
- B. Product Data: Include manufacturer's specifications, surface preparation and application instructions, recommendations for water repellents for each surface to be treated, and protection and cleaning instructions. Include data substantiating that materials are recommended by manufacturer for applications indicated and comply with requirements.
- C. Applicator Certificates: Signed by manufacturer certifying that the applicator complies with requirements. Evidence shall include complete copy of manufacturer's licensing/certification document, spelling out repair responsibility for warranty claims.
- D. Environmental Certification:
  - 1. Certification that products and installation comply with applicable EPA, OSHA, and VOC regarding health and safety hazards.
- E. Material Test Reports: Indicate and interpret test results for compliance of water repellents with requirements indicated.

1. Supplier shall furnish application rate at which following tests were passed:
  - a. NCHRP 244 tests:
    - (1) Four inch cube series II (incorporating 5 days of air drying prior to coating test cubes): Upper limits of average weight gain and net chloride content at completion of cube test series shall be limited to 16% of weight gain and 14% of net chloride gain of untreated control cubes.
    - (2) Southern climate exposure (Series IV): Upper limits of average content at end of 24 weeks shall be limited to 4% of net chloride content of untreated control cubes.
  - b. ASTM C672 test (non-air entrained concrete): Acceptable scaling rating shall be "zero plus."

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project Site in original unopened containers, or bundles with labels informing about manufacturer, product name and designation, expiration period for use, pot life, curing time and mixing instructions for multicomponent materials.
- B. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
- C. Condition the specified product as recommended by the manufacturer.

#### 1.5 PROJECT CONDITIONS

- A. Weather and Substrate Conditions: Do not proceed with application of water repellent under any of the following conditions, except with written instruction of manufacturer:
  1. Ambient temperature is less than 40 deg F.
  2. Concrete surfaces and mortar have cured for less than 28 days.
  3. Rain or temperatures below 40 deg F are predicted within 24 hours.
  4. Application is earlier than 24 hours after surfaces have been wet.
  5. Substrate is frozen or surface temperature is less than 40 deg F.
  6. Windy condition exists that may cause water repellent to be blown onto vegetation or surfaces not intended to be coated.

#### 1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who employs only persons trained and approved by sealer manufacturer for application of manufacturer's products.
  1. Experience shall include 5 years of verifiable experience with submitted system.
  2. Superintendent assigned to project shall have supervised at least 5 previous projects of similar magnitude and design, and shall be present during all operations.
- B. Manufacturer: Sealer shall be compatible with all materials to which it would be applied including, but not limited to, curing compounds, sealants, expansion joint, threshold assemblies, caulking, and concrete.

## 1.7 WARRANTY

- A. **General Warranty:** The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. **Special Warranty:** Submit a written warranty, executed by the applicator and sealer manufacturer, covering materials and labor, agreeing to repair or replace materials that fail to provide water repellency within the specified warranty period. Warranty does not include deterioration due to unusual weather phenomena, failure of prepared and treated substrate, formation of new joints and cracks, fire, vandalism, or abuse by maintenance equipment.
- C. **Warranty Period:** Three years from date of acceptance of work on installation and materials, jointly executed by Manufacturer and Contractor.
- D. If material surface shows any of defects listed above, supply labor and material to repair all defective areas.
- E. Perform any repair under this guarantee at no cost to Owner.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable concrete sealers for horizontal applications are listed below:
  - 1. Silane 100% solids, applied at 200 SF/G coverage rate:
    - a. Sika Corporation: MasterProtect H 1000
    - b. Sika Corporation: Sikagard 705 L by Sika
    - c. Evonik Industries AG: Protectosil BH-N
    - d. WR Meadows: Pentreat 244-100
- B. Proposed substitutions: None for this project. Contact Engineer for consideration for future projects.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean substrate of substances that might interfere with penetration or performance of sealers.
- B. Test for moisture content, according to sealers manufacturer's written instructions, to ensure surface is sufficiently dry.
- C. Test for pH level, according to sealer manufacturer's written instructions, to ensure chemical bond to silicate minerals.

- D. Shot blast or abrasive blast clean all surfaces to be treated as acceptable to sealer manufacturer before sealer application. Prepare by abrasive blasting all surfaces inaccessible to shotblast equipment. Equipment used for concrete surface cleaning shall not exceed height limitation of facility and shall not exceed 3,000 lb axle load or vehicle weight (6,000 lb.).
- E. Coordination with Sealants: Do not apply sealer until sealants for joints adjacent to surfaces receiving sealer treatment have been installed and cured.
- F. Repair or replace all sealant materials damaged by surface preparation operations.
- G. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live plants and grass.

### 3.2 APPLICATION

- A. All concrete to be treated shall be cured above 50 deg F. for at least 14 days before applying sealer.
- B. All concrete to be treated shall be air dried for at least 72 hours following surface wetting at temperatures above 50 deg F.
- C. Ambient and concrete temperatures shall be 50 deg F. or higher during application of sealer.
- D. Sealer work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, sealer, and sealant materials identical to those used in the work.
- E. Apply sealer to concrete surfaces at rates specified using manufacturer approved techniques.

### 3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Provide services of a factory-authorized technical service representative to inspect and approve the substrate before application and to instruct the applicator on the product and application method to be used.

### 3.4 CLEANING

- A. Protective Coverings: Remove protective coverings from adjacent surfaces and other protected areas.
- B. Immediately clean sealer from adjoining surfaces and surfaces soiled or damaged by sealer application as work progresses. Repair damage caused by sealer application. Comply with manufacturer's written cleaning instructions.

END OF SECTION 07 19 16

SECTION 07 92 00- JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the provisions of all labor, materials, supervision and incidentals required to install joint sealants and associated materials.
- B. In addition to locations and extent of sealant shown on Drawings, provide sealant at following locations:
  - 1. Locations:
    - a. At all control/construction joints in topping.
    - b. At all construction joints in edge beams/curbs.
- C. Contractor shall become fully acquainted with the existing job site conditions and discuss the accessibility of the work areas with the Owner.

1.3 REFERENCES

- A. Applicable Standards:
  - 1. American Society for Testing and Materials (ASTM):
    - a. ASTM C 1193 Standard Guide for Use of Joint Sealants

1.4 INFORMATION SUBMITTALS

- A. Make submittals in accordance with requirements of Division 01 and as specified in this Section.
- B. Product Data: Product data sheets, Material Safety Data Sheets/Safety Data Sheets (MSDS/SDS), and installation instructions for each product proposed for use on the project.
- C. Material Certificates: Where product data does not indicate material compatibility of independent products that form a system assembly; provide a written statement of material compatibility from the system assembly manufacturer. System assembly shall include:
  - 1. Substrate Cleaning Solvents



2. Backer Materials
3. Primers
4. Sealant Materials

D. Environmental Certification:

1. Certification that products and installation comply with applicable EPA, OSHA, and VOC requirements regarding health and safety hazards.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project Site in original unopened containers, or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time and mixing instructions for multicomponent materials.
- B. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:
  1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturers.
  2. When joint substrates are wet due to rain, frost, condensation or other causes.
  3. Joint Width Conditions: Do not proceed with installation of joint sealants when joint widths are less than allowed by sealant manufacturer for application indicated.

1.7 QUALITY ASSURANCE

- A. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.
- B. Contractor's Qualifications: Contractor performing the work shall be an approved contractor by the manufacturer furnishing the materials, and shall have no less than three years experience in related work required in this project. Upon request by the Engineer, a notarized certification from the manufacturer attesting to the training shall be submitted to the Engineer/Owner.

1.8 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty: Written warranty, signed by joint sealant manufacturer agreeing to repair or replace sealants that do not comply with requirements or that deteriorate during the specified

warranty period. Warranty does not include deterioration or failure of sealant due to unusual weather phenomena, failure of prepared and treated substrate, or abuse by snowplow and maintenance equipment.

1. Deterioration of sealants includes, but is not limited to, the following:
  - a. Adhesive or cohesive failures.
  - b. Abrasion or tear failure resulting from normal use.
- C. Warranty Period: Five years from date of acceptance of work on installation and materials, jointly executed by Manufacturer and Contractor.
- D. If material surface shows any of defects listed above, supply labor and material to repair all defective areas.
- E. Perform any repair under this guarantee at no cost to Owner.

## PART 2 - PRODUCTS

### 2.1 JOINT SEALANTS

- A. General requirements for traffic grade Polyurethane Sealants
  1. Primer: Provide type recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate and field tests.
  2. Self-leveling polyurethane sealants require tooling in accordance with project details.
  3. Compounds used for sealants shall not stain concrete or masonry. Aluminum pigmented compounds not acceptable.
  4. The color of sealants shall match adjacent surfaces.
- B. Polyurethane Sealant For Horizontal, Non-Cove Joints: Two-component, non-sagging, polyurethane based, elastomeric sealant meeting the requirements of ASTM C920, Type M, Grade P, Class 25, Use T.
  1. Sika Corporation
    - a. Primer: MasterSeal P 173
    - b. Sealant: MasterSeal SL 2
  2. Sika Corporation
    - a. Primer: Sikaflex 260, 429 or 449
    - b. Sealant: Sikaflex-2c NS TG
  3. Sherwin Williams
    - a. Primer: Loxon Quick Dry Primer

- b. Sealant: Loxon SL2
- C. Polyurethane Sealant For Vertical Joints And Cove Joints: Two-component, non-sagging, polyurethane based, elastomeric sealant meeting the requirements of ASTM C920, Type M, Grade NS, Class 25 Use T.
  - 1. Sika Corporation
    - a. Primer: MasterSeal P 173
    - b. Sealant: MasterSeal NP 2
  - 2. Sika Corporation
    - a. Primer: Sikaflex 260, 429 or 449
    - b. Sealant: Sikaflex-2c NS
  - 3. Sherwin Williams
    - a. Primer: Loxon Quick Dry Primer
    - b. Sealant: Loxon NS2

## 2.2 ACCESSORY PRODUCTS

- A. Cleaners for Nonporous Surfaces: Provide non-staining, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials which are not harmful to substrates and adjacent nonporous materials.
- B. Backer Materials
  - 1. General: Provide sealant backings of material and type which are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
  - 2. Plastic Foam Joint-Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of plastic foam of material indicated below, and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
  - 3. Backer Rod: Either flexible, open cell polyurethane foam or non-gassing, closed-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer.
  - 4. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing bond between sealant and joint filler or other materials at back surface of joint. Provide self-adhesive taper where applicable.
- C. Masking Tape: Provide non-staining, non-absorbent type compatible with joint sealants and to surfaces adjacent to joints.

### 2.3 SUBSTITUTIONS

- A. Product substitutions may be considered provided complete technical information and job references are furnished to the Owner/Engineer and approved prior to commencement of work.
- B. Changes in products required to suit temperature, environmental conditions, and local VOC regulations at the time of material application shall be specified as separate line items by the Contractor showing credit or additions to the price for the various tasks.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Require installer to inspect joints indicated to receive joint sealants for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealant performance. Obtain installer's written report listing any condition detrimental to performance of joint sealant work. Do not allow joint sealant work to proceed until unsatisfactory conditions have been corrected.

### 3.2 SURFACE PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturers and the following requirements:
  - 1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealant, including dust; paint, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; oil; grease; waterproofing; water repellants; water; surface dirt and frost.
  - 2. Clean concrete, substrate surfaces, by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
  - 3. Remove laitance from concrete.
- B. Joint Priming: Prime all joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primers to areas of joint sealant bond. Do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
  - 1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.
  - 2. Do not leave gaps between ends of joint-fillers.
  - 3. Do not stretch, twist, puncture or tear joint-fillers.
  - 4. Remove absorbent joint-fillers which have become wet prior to sealant application and replace with dry material.
  - 5. Install bond breaker tape between sealants and joint-fillers, compression seals or back of joint where required to prevent third-side adhesion of sealant to back of joint.
- D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability. Do not smear sealant onto adjacent surfaces.
- E. Tooling of Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants in concave joint configuration per ASTM C 1193, unless otherwise indicated to form smooth, uniform beads of configuration indicated, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

### 3.4 PROTECTION AND CLEANING

- A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and reseal joints with new materials to produce sealant installations with repaired areas indistinguishable from original work.
- B. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by the manufacturer of the sealants and of the products used in the joints.

END OF SECTION 07 92 00