PERSIGO WASTE WATER TREATMENT PLANT
Anaerobic Digester Repairs
Project Specific Specifications

2145 River Road
Grand Junction, Colorado 81505

April 7, 2021
WJE No. 2019.3776

Prepared for:
City of Grand Junction
Public Works
333 West Avenue, Bldg C
Grand Junction, Colorado 81501

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END OF SECTION

INSTALLER'S WARRANTY FOR CONCRETE AND CONCRETE REBUILD

Installer: _____

Address: _____

Owner: _____

Owner Address: _____

Project Address: _____

Building Name: _____

Area of Work: _____

Substantial Completion Date: _____

Warranty Period: ___ years

Expiration Date: _____

AND WHEREAS Concrete Installer has contracted, either directly with Owner or indirectly as subcontractor, to warrant said Work against faulty or defective materials and workmanship for designated Warranty Period,

NOW THEREFORE Concrete Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period it will, at its own cost and expense, make or cause to be made such repairs to or replacement of said Work as are necessary to correct faulty and defective Work and warrants against the following.

1. Components of the concrete that does not comply with requirements; that do not maintain general durability; or that deteriorate in a manner not clearly specified as an inherent quality of the material for the application indicated, regardless of whether the Work was previously accepted by Owner.
2. Delamination of the cementitious material from the substrate concrete or delamination within the material itself.
3. Surface defects, including but not limited to: blisters; curling; delamination; dusting; popouts; scaling (including mortar flaking); spalling.
4. Cracking. Including, but not limited to, those due to inadequate thickness or improperly cut or placed control joints.
5. Damage by exposure to foreseeable weather.

Warranty is made subject to the following terms and conditions:

1. Specifically excluded from Warranty are damages to Work and other parts of the building, and to building contents, caused by:
   a. lightning;
   b. fire;
   c. activity adjacent to Work by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner's Representative.
2. When Work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Concrete Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Concrete Installer is responsible for damage to Work covered by Warranty but is not liable for consequential damages to building, pedestrians or vehicles using the Work.

4. During Warranty Period, if Owner allows alteration of Work by anyone other than Concrete Installer, including cutting, patching, and maintenance, Warranty shall become null and void on date of said alterations, but only to extent said alterations affect Work covered by Warranty. If Owner engages Concrete Installer to perform said alterations, Warranty shall not become null and void unless Concrete Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate Work, thereby reasonably justifying limitation or termination of Warranty.
5. Owner will promptly notify Concrete Installer of observed, known, defects, or deterioration and will afford reasonable opportunity for Concrete Installer to inspect Work and to examine evidence of such defects, or deterioration. Concrete Installer shall inspect defect, or deterioration within 72 hours of notification.
6. If permanent repair or replacement of warranted condition cannot be made immediately, due to weather conditions, availability of appropriate labor or materials, building occupancy, etc., Concrete Installer must make, or cause to be made, immediate temporary repairs to prevent any further damage, deterioration, or unsafe conditions. Permanent repair or replacement of warranted condition shall be scheduled as soon thereafter as practical, and with Owner's consent and approval.
7. If Owner notifies Concrete Installer of warranted condition that requires immediate attention to prevent potential injury or damage, and Concrete Installer cannot or does not promptly inspect and repair same, either permanently or temporarily, then Owner may make, or cause to be made, such temporary repairs as may be essential and Concrete Installer will reimburse Owner for cost of such repairs. Such action will not relieve Concrete Installer of its obligation to perform any necessary permanent repairs, and Warranty shall remain in full force and effect for remaining portion of its original term.
9. Concrete Installer shall provide equipment, labor, and material required to remedy warranted conditions, including repair or replacement of damage to other work resulting therefrom, and removal and replacement of other work required to access warranted condition. Additional required work will be at Concrete Installer’s sole expense for full term of Warranty. Warranty includes removal and replacement of concrete and sealants.
10. Warranty is recognized to be only Warranty of Concrete Installer on said Work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of Concrete failure. Specifically, Warranty shall not operate to relieve Concrete Installer of responsibility for performance of original Work according to requirements of Contract Documents, regardless of whether Contract was directly with Owner or with Owner’s General Contractor.

IN WITNESS THEREOF, and intending to be legally bound hereby, Concrete Installer has caused this document to be executed by undersigned, duly-authorized officer.

By: _____ Corporate Seal:
(Signature of Concrete Installer)

_____
(Name)

_____
(Date)

Notary Public Seal:

Subscribed and sworn before me this _____day of _____, _____

My commission expires _____

INSTALLER'S WARRANTY FOR JOINT SEALANT

Sealant Installer: _____

Sealant Installer Address: _____

Owner: _____

Owner Address: _____

Project Address: _____

Building Name: _____

Area of Work: _____

Substantial Completion Date: _____

Warranty Period: _____years

Expiration Date: _____

AND WHEREAS Sealant Installer has contracted, either directly with Owner or indirectly as subcontractor, to warrant said Work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

NOW THEREFORE Sealant Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period it will, at its own cost and expense, make or cause to be made such repairs to or replacement of said Work as are necessary to correct faulty and defective Work and as are necessary to maintain said Work in watertight condition, and warrants against the following.

1. Components of sealant system that do not comply with requirements; that do not remain watertight; that fail in adhesion, cohesion, or general durability; or that deteriorate in a manner not clearly specified by submitted sealant manufacturer's data as an inherent quality of the material for the application indicated, regardless of whether the Work was previously accepted by Owner.
2. Damage by exposure to foreseeable weather; and damage by intrusion of foreseeable wind-borne moisture.

Warranty is made subject to the following terms and conditions:

1. Specifically excluded from Warranty are damages to Work and other parts of the building, and to building contents, caused by:
    a. lightning;
    b. fire;
    c. failure of sealant substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    d. activity adjacent to sealant Work by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner's Representative.
    e. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.
    f. Excessive joint movement caused by structural settlement or errors attributable to design or construction, resulting in stresses in sealant exceeding sealant manufacturer's written specifications for sealant elongation or compression.

2. When Work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Sealant Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Sealant Installer is responsible for damage to Work covered by Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of Work.
4. During Warranty Period, if Owner allows alteration of Work by anyone other than Sealant Installer, including cutting, patching, and maintenance, Warranty shall become null and void on date of said alterations, but only to extent said alterations affect Work covered by Warranty. If Owner engages Sealant Installer to perform said alterations, Warranty shall not become null and void unless Sealant Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate Work, thereby reasonably justifying limitation or termination of Warranty.
5. Owner will promptly notify Sealant Installer of observed, known, or suspected leaks, defects, or deterioration and will afford reasonable opportunity for Sealant Installer to inspect Work and to examine evidence of such leaks, defects, or deterioration. Sealant Installer shall inspect leak, defect, or deterioration within 24 hours of notification.
6. If permanent repair or replacement of warranted condition cannot be made immediately, due to weather conditions, availability of appropriate labor or materials, building occupancy, etc., Sealant Installer must make, or cause to be made, immediate temporary repairs to prevent any further damage, deterioration, or unsafe conditions. Permanent repair or replacement of warranted condition shall be scheduled as soon thereafter as practical, and with Owner's consent and approval.
7. If Owner notifies Sealant Installer of warranted condition that requires immediate attention to prevent potential injury or damage, and Sealant Installer cannot or does not promptly inspect and repair same, either permanently or temporarily, then Owner may make, or cause to be made, such temporary repairs as may be essential and Sealant Installer will reimburse Owner for cost of such repairs. Such action will not relieve Sealant Installer of its obligation to perform any necessary permanent repairs, and Warranty shall remain in full force and effect for remaining portion of its original term.
9. Sealant Installer shall provide equipment, labor, and material required to remedy warranted conditions, including repair or replacement of damage to other work resulting therefrom, and removal and replacement of other work required to access warranted condition. Additional required work will be at Sealant Installer’s sole expense for full term of Warranty. Warranty includes removal and replacement of sealant-backer material and sealant.
10. Warranty is recognized to be only Warranty of Sealant Installer on said Work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of sealant failure. Specifically, Warranty shall not operate to relieve Sealant Installer of responsibility for performance of original Work according to requirements of Contract Documents, regardless of whether Contract was directly with Owner or with Owner’s General Contractor.

IN WITNESS THEREOF, and intending to be legally bound hereby, Sealant Installer has caused this document to be executed by undersigned, duly-authorized officer.

By: _____ Corporate Seal:
(Signature of Sealant Installer)

_____
(Name)

_____
(Date)

Notary Public Seal:

Subscribed and sworn before me this _____day of _____, _____

My commission expires _____

SECTION 01 00 00

GENERAL

PART 1 GENERAL

1.1 PROJECT SPECIFIC REQUIREMENTS

A. The Standard Specifications for Road and Bridge Construction, as well as the Standard Specifications for Construction of Underground Utilities Water Lines, Sanitary Sewers, Storm Drains, Underdrains and Irrigation Systems do not apply to this project. Any references to those documents in the contract shall be replaced by the requirements of the project specific documents.

B. Standard Details for Construction of Streets, Trails, Storm Drains and Utilities do not apply to this project. Any references to those documents in the contract shall be replaced by the requirements of the project specific documents.

C. Project specific requirements shall take precedence over general conditions or standard documents.

D. Warranty period for specific Work items are not intended to supplement the general Contractor's Warranty and Guarantee.

1.2 DEFINITIONS

A. The definitions here shall supplement, or replace, those found in the City of Grand Junction General Contract Conditions.
   1. As-Built Documents: See Project Record Documents.
   2. Owner: See City.
   3. Project Record Documents: Contract documents marked by the Contractor to identify changes that were made during construction.
   4. Request for Information (also known as RFI): A question or inquiry about the Work submitted by the Contractor for clarification by the Owner or Engineer.

1.3 REFERENCES

A. References to industry standards shall refer to the latest edition or version of each as of the date of the first specification publish date, unless otherwise noted.

1.4 ADMINISTRATIVE

A. Requests for Information (RFI): Contractor shall submit RFIs to the Engineer for any condition which is believed to be at variance with the Contract Documents, or for situations where it is unclear what the Contract Documents are implementing. RFIs shall be submitted in writing to the Engineer and shall include a location, date requested, date required and indicate which repair item or item(s) are impacted by the request. Allow a minimum of 3 working days for review by Engineer.

B. Maintain at least one copy of each referenced standard, this Project Manual (Specifications), Drawings and/or Figures at the job site. In addition, maintain copies of all site visit reports (SVR) and Sketches (SKs) issued by the Engineer during Construction.

C. Provide a project superintendent at the Site a minimum of eight hours per day during the progress of the Work. The superintendent shall be literate and fluent in English.

D. Photograph existing conditions that are important to the construction or that deviate substantially from the Contract Documents; significant conditions that will be concealed by the Work; finish surfaces that might be misconstrued as damage caused by removal or other Work operations; and immediate follow-up when on-site events result in construction damage or loss. Photographs shall be of sufficient quality as to depict the condition being photographed. Provide photographs to Owner or Engineer upon request, either during project or after completion.

1.5 TEMPORARY FACILITIES AND CONTROLS

A. Contractor to furnish and pay for all temporary facilities and controls listed below which are not explicitly designated as responsibility of Owner.

B. Comply with Owner's limitations and restrictions for Site use and accessibility.
   1. Comply with all security procedures.

C. Project has special requirements for coordinating Work because of the following conditions:
   1. Owner will occupy premises outside of Work area during construction period.
      a. Cooperate with Owner to minimize conflicts and facilitate Owner usage.
      b. Perform Work to avoid interference with Owner's day-to-day operations. Notify Owner's Representative at least 72 hours in advance of activities that will affect Owner's operations.
      c. Maintain vehicular, pedestrian, and emergency and normal access to portions of facility that are in use. Keep entrances and exits clear of stored materials and construction equipment.
      d. Short interruptions in access may be permitted if approved in advance in writing by the Owner's Representative.
      e. Schedule deliveries to minimize interruptions.
      f. Do not disturb Site outside of Work area.
      g. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted and then only after arranging to provide temporary utility services according to requirements indicated.
      h. Notify Owner not less than 7 days in advance of proposed utility interruptions.
      i. Do not proceed with utility interruptions without Owner's written permission.

D. Staging:
   1. Staging areas must be coordinated with Owner prior to mobilization.
   2. Confine materials and equipment to the staging and work areas. Contractor assumes full responsibility for the protection and safekeeping of items stored on site.
   3. Do not unreasonably encumber Site with materials or equipment.
   4. Do not load Project structure with weight that will endanger Project structure.

E. Parking: Construction personnel shall park on-site in areas designated by the Owner's Representative.

F. Water Service: Use of Owner's existing water service will be permitted.

1. Provide connections and extensions of service as required for construction operations.
2. Provide additional water as necessary.

G. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel at location designated by Owner's Representative.
   1. Provide disposable supplies, including toilet tissue, paper towels, and paper cups. Maintain adequate supply. Provide covered waste containers for disposal of used material.
   2. Service toilets at least twice weekly.
   3. Provide wash facilities supplied with potable water at convenient locations for personnel who handle materials that require clean up. Supply cleaning compounds appropriate for each type of material handled. Dispose of drainage properly.
      a. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
   4. Comply with public authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

H. Electric Power Service: Use of Owner's existing electric 120V electric outlets will be permitted. Any power requirements above existing 120V outlets will need to be provided.
   1. As necessary, provide additional electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Do not overload Owner's service.
   2. Comply with NECA 200 and NFPA 70.
   3. Maintain temporary service in safe condition and utilize in safe manner.

I. Use of Existing Stairs and Elevators: Use of Owner's existing stairs and elevators will be permitted, as long as stairs and elevators are cleaned and maintained in condition acceptable to Owner's Representative.
   1. Coordinate daily usage with Owner's Representative and with requirements for facility operations.
   2. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs, elevator cars, and entrance doors and frame, and to maintain means of egress.
   3. At Substantial Completion, restore stairs and elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

J. Lighting: Owner will provide existing lighting at existing locations.
   1. Provide additional lighting, as necessary, with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   2. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

K. Provide insulation or temporary heating as necessary for curing, drying, and protection of installed construction.
   1. Select equipment that will not have harmful effect on completed installations or elements being installed.
   2. Maintain temporary heating on 24-hour basis until no longer needed.
   3. Unless noted otherwise, insulation is considered incidental to construction and will not be paid for separately.
   4. Unless otherwise specified, temporary heating will not be considered part of Work and will be paid as additional Work item. Notify Owner's Representative in advance of need for temporary heating and estimated added cost. Do not proceed with temporary heating until authorized in writing by Owner's Representative.

L. Snow removal: The contractor shall be required to remove snow from the work area.

M. Equipment:
1. Direct equipment exhaust away from occupied spaces and vent equipment operating within structure to outside.
2. Operate equipment at noise levels conforming to requirements of city, state, and federal laws and codes, and Owner limitations.

N. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of public authorities having jurisdiction. Construction debris shall be removed in a manner that avoids overloading adjacent structural members.

O. Protection:
1. Limit access to work areas.
2. Contractor shall provide protective barriers, fences, etc. to ensure the safety of pedestrians and vehicular traffic during the Work. All barriers and fences shall comply with local, state, and federal regulations and laws.
3. Provide adequate signage to direct pedestrian and vehicular traffic around the area under construction.
4. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, building, and other surfaces that could be harmed by such contact.
5. Existing Drains:
    a. Verify that drains in or near Work area are open and free flowing prior to start of Work.
    b. Lawfully remove construction effluent from Site. Do not allow construction debris to flow into existing drains or sewer systems.
    c. Rout or replace clogged drain lines at completion of Work.
6. Confine dust, debris and fumes to Work area and prevent from entering areas outside of the Work area.
7. Protect finished surfaces against damage.
8. Contractor shall be responsible for maintaining the water tightness of the areas of the structure being worked on during the course of the work. Providing temporary protection of the existing construction or structure from the weather until removed portions are completely replaced with new construction. The costs of damage and repairs shall be made at no cost to the Owner.
9. Maintain all protection in operable condition for the full duration of the project.

P. Temporary Fencing:
1. Tree and Plant Protection: Install temporary fencing located as indicated or outside drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
2. Site Enclosure Fence: Before construction operations begin, provide Site enclosure fence in manner that will prevent people and animals from easily entering Site except by entrance gates.

Q. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241. Coordinate with Owner's safety team.
1. Provide portable, UL-rated fire extinguishers with class and extinguishing agent as required by locations and classes of fire exposures.

2. Prohibit smoking on Site.
3. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of public authorities having jurisdiction.
4. Store combustible materials in approved safety containers and enclosures, away from building if possible.
5. Develop and supervise overall fire-prevention and -protection program for personnel at Site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

PART 2 PRODUCTS

2.1 GENERAL

A. The products specified are believed to have properties adequate for successful completion of the Work. If the Contractor has found these products to be unacceptable or has had difficulty using these materials, the Contractor shall notify the Engineer in writing, and provide a request for substitution of material for which the Contractor has had successful experience.

B. No product substitutions will be allowed unless otherwise noted. Engineer's approval must be obtained for all substitutions prior to being awarded the project. Submit requested substitutions with bid form.

2.2 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in original containers and packaging with seals unbroken, labeled with manufacturer’s name, product brand name and type, date of manufacture, lot number, directions for storing, and complete manufacturer’s written instructions.

B. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, or installation. Reject and remove from Site new materials which have been exposed to moisture to their detriment.

C. Store and handle materials in accordance with manufacturer’s written instructions, safety requirements, and all applicable laws and regulations. Remove from Site, and replace at no cost to Owner, any materials that are damaged or otherwise negatively affected by not being stored or handled in accordance with manufacturer’s written instructions.

D. Store materials in original, undamaged containers and packaging in clean, dry, location on raised platforms and protected from weather, within temperature range required by manufacturer. Protect stored materials from direct sunlight and sources of ignition. Manufacturer’s standard packaging and covering alone is not considered adequate weather protection.

E. Locate materials in a secure location approved by Owner’s Representative.

F. Conspicuously mark damaged or opened containers, containers with contaminated materials, damaged materials, and materials that cannot be used within stated shelf life and remove from Site as soon as possible. Replace discarded materials in a timely manner at no cost to Owner.

G. Limit stored materials on structures so as to preclude damage to materials and structures.

H. Maintain copies of all applicable Safety Data Sheets (SDS) with materials in storage area, such that they are available for ready reference on Site.

PART 3 EXECUTION

3.1 DISCOVERY, FIELD VERIFICATION AND CHANGES IN WORK

A. Contractor shall verify all quantities. Quantities shown are for estimating purposes only.

B. Do not scale drawings. The Contractor shall field verify the existing dimensions and existing conditions prior to starting the work. Dimensions of the new construction shall be adjusted as necessary to fit the existing conditions. The Engineer shall be notified in writing of any significant deviations from the dimensions or conditions shown on these drawings.

C. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials or mislocation of embedded elements such as reinforcing steel, which may interfere with proper execution of the Work. Promptly report to Engineer as a request for information any of these conditions.

3.2 EXAMINATION FOR MATERIAL COMPLIANCE

A. Examine substrates and conditions with installer and manufacturer's representative, where appropriate, for compliance with requirements and for other conditions affecting installation or performance of the material.
   1. Verify dimensions so that proper installation of material for optimal performance is maintained.
   2. Ensure that work done by other trades is complete.
   3. Verify that areas and conditions under which Work is to be performed permit proper and timely completion of Work.
   4. Notify Engineer in writing of conditions which may adversely affect installation or performance of the material and recommend corrections.
   5. Do not proceed with Work until adverse conditions have been corrected and reviewed by Engineer.
   6. Commencing Work constitutes acceptance of Work surfaces and conditions.

3.3 CLEANING

A. Immediately clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

B. At the end of each workday, broom-clean Site and Work areas and place all items to be discarded in appropriate containers.

C. After completing Work:
   1. Clean all materials resulting from Work that are not intended to be part of the finished Work using appropriate cleaning agents and procedures. Exercise care to avoid damaging surfaces.
   2. Repair at no cost to Owner all items damaged during the Work.
   3. Remove and legally dispose of debris and surplus materials from Site.

3.4 PROTECTION

A. Take precautions to ensure safety of people (including building users, passers-by, and workers) and protection of property (including adjacent building elements, landscaping, and motor vehicles).
   1. Erect temporary protective canopies and walls, as necessary, at walkways and at points of pedestrian and vehicular access that must remain in service during Work.

B. Cover adjacent surfaces with materials that may be damaged.

C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.

D. Prevent dust, debris, coating overspray/spatter, and other construction materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

E. Limit access to Work areas.

F. Comply with manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products.

G. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

H. Protect from damage, all elements of completed work and original construction to remain.

I. Protect Work during and after completion from contact with contaminating substances and from damage, so materials are without deterioration or damage at time of Substantial Completion.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Administrative and procedural requirements for submitting shop drawings, product data, samples, and other submittals.

B. Reference the Schedule of Submittals for a summary of required submittals.

1.2 SUBMITTALS

A. General:
   1. Identification: Include a permanent label or title block on the submittal or cover sheet, with the following information.
      a. Project name.
      b. Date.
      c. Names of Engineer, Contractor, subcontractor, manufacturer, supplier, and firm or entity that prepared submittal, as appropriate.
      d. Identification information, such as the number and title of the appropriate Specification section, Drawing number and detail references, location(s) where product is to be installed, or other necessary information.
      e. Label each submittal with Specification section number followed by decimal point and then sequential number (e.g., 06100.01). On resubmittals, include alphabetic suffix after another decimal point (e.g., 06100.01.A).
      f. Provide space approximately 6 by 8 inches on or beside the label or title block for the Contractor's approval stamp and the action stamp of the Engineer.
   2. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
   3. Submit one electronic copy of prints in PDF format. Prints shall have white background and dark lettering and line work. Prints will be returned electronically.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not use reproductions of the Contract Documents or standard printed data.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Dimensions, including notation of those established by field measurement.
      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. Notation of coordination requirements.
      i. Relationship to adjoining construction clearly indicated.
      j. Seal and signature of professional Engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8 1/2 by 11 inches but no larger than 30 by 42 inches.
3. Submit one electronic copy of prints in PDF format. Prints shall have white background and dark lettering and line work. Prints will be returned electronically.

C. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. Clearly mark each copy of the submittal to show which products and options are applicable. Delete information which is not applicable. Supplement standard information with project-specific information.
   2. Include the following information, as applicable:
      a. Manufacturer's catalog cuts, product specifications, schematic drawings, installation instructions, and written recommendations.
      b. Compliance with referenced standards.
      c. Testing by recognized testing agency.
      d. Include manufacturer's literature including written instructions for evaluating, preparing, and treating substrate.
      e. Technical data including tested physical and performance properties
      f. Mixing and application or placement instructions.
   3. Include temperature ranges for storage and application of materials, and special cold-weather application requirements or limitations.
   4. Include Globally Harmonized System (GHS) Safety Data Sheets or, if not yet available, Material Safety Data Sheets. For information only.

D. Samples: Submit physical samples to illustrate functional and aesthetic characteristics of the product, for review of materials and workmanship, for compatibility with other elements, and for comparison with the actual installed elements.
   1. Samples shall be of sufficient size to show the general visual effect.
   2. Include sets of at least three samples that show the full range of color, pattern, texture, graining, and finish.
   3. Transmit samples that contain multiple, related components, such as accessories, together in one submittal package.
   4. Identification: Attach a label on an unexposed side of each sample that includes the following:
      a. Generic description of sample.
      b. Product name, name of manufacturer, and sample source.
      c. Number and title of appropriate Specification section.
   5. Samples for Initial Selection: Submit two full sets of units or sections of units from the supplier's product line, showing the full range of colors, textures, and patterns available. Engineer will retain one set and return one set with the options selected.
   6. Samples for Verification: Submit full-size units or samples of the size indicated, prepared from the same material to be used for the Work, cured and finished in the manner specified, and physically identical with material or product proposed for use, and that show the full range of color and texture variations expected.
      a. Submit the number of samples required by the Contractor plus one that will be retained by the Engineer. Mark up and retain one returned sample as a Project Record Document.
   7. Maintain approved samples at the Site, available for quality-control comparisons during construction. Samples may be used to determine final acceptance of construction associated with the sample.

E. Delegated Design:
   1. Where required by the Contract Documents, in addition to shop drawings, product data, and other required submittals, submit a statement, signed and sealed by responsible design professional, for each product and system specifically assigned to the Contractor to be designed or certified by a design professional.
      a. Indicate that products and systems comply with performance and design criteria in the Contract Documents.
      b. Include a list of codes, loads, and other factors used in performing these services, and signed and sealed design calculations where required.
      c. Electronic submittals in PDF format are preferred; however, print copies will be accepted. Submit number of prints needed by contractor plus two for retention by the Owner and Engineer.

1.3 SUBMITTAL PROCEDURE

A. Coordinate the preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals requiring concurrent review, and related activities that require sequential activity.
   2. Allow sufficient time for submittal and resubmittal review. Failure to provide sufficient time for submittal and resubmittal reviews will not be a basis for extension of the Contract Time.

B. Review Time:
   1. Allow five working days for the review of each submittal and resubmittal.
   2. Allow additional time if coordination with subsequent submittals is required. The Engineer will advise the Contractor when the submittal being processed must be delayed for coordination.
   3. Time for review shall commence when the Engineer receives the submittal.

C. Contractor Review:
   1. Review each submittal, coordinate with other Work, and check for compliance with the Contract Documents. Verify field dimensions and conditions. Identify variations from the Contract Documents and product or system limitations that may be detrimental to the successful performance of completed Work. Note corrections.
   2. Before submitting to the Engineer, stamp with a uniform approval stamp including the reviewer's name; the date of Contractor's approval; and a statement certifying that the submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
   3. Submittal Log: Maintain submittal log that lists submitted items per specification section. Record dates submitted, dates returned, and disposition of each item based on Engineer's review. Submit final log showing approved materials at Substantial Completion.

D. Transmittal: Package each submittal individually and appropriately for transmittal and handling.

E. Engineer Action:
   1. Engineer will not review submittals that are received from sources other than the Contractor or that do not bear the Contractor's approval stamp, and will return them without action to the Contractor.
   2. Engineer will not return submittals requested for information only.

3. Engineer will review each submittal for conformance with the design concept of the Project and compliance with the Contract Documents. Engineer will make marks to indicate corrections or modifications required, and stamp with an action stamp. The action stamp will include the reviewer's name, date of review, and required Contractor action. Contractor actions may include making corrections or modifications to the submittal or resubmitting the submittal, or both.

F. Resubmittals: Make resubmittals in the same form and number of copies as the initial submittal.
   1. Note the date and content of previous submittal.
   2. Note the date and content of the revision in the label or title block and clearly indicate the extent of the revision and changes made.
   3. Resubmit until the Engineer indicates that no resubmittal is required.
      a. No resubmittal is required when submittal is marked "No Exceptions Taken" or "Make Corrections Indicated".

G. Distribution: Furnish copies of the final submittals to the Site file, the record documents file, manufacturers, subcontractors, suppliers, fabricators, installers, public authorities having jurisdiction, and others as necessary for performance of construction activities. Show the distribution on the transmittal forms.

H. Use only the final submittals with the Engineer's action stamp, for construction.
   1. Only items marked "No Exceptions Taken" or "Make Corrections Indicated" shall be used for construction.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Administrative and procedural requirements for quality assurance and quality control, testing, special inspections and mockups.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated, and do not relieve the Contractor of responsibility for compliance with requirements of the Contract Documents.
   1. Specified tests, inspections, and related actions performed by others do not limit the Contractor's other quality assurance and quality control procedures that facilitate compliance with requirements of the Contract Documents.
   2. Requirements for the Contractor to provide quality assurance and quality control services required by the Engineer, Owner, or public authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections:
   1. See sections in Divisions 02 through 07, and Drawings sheets for specific test and inspection requirements.

1.2 DEFINITIONS

A. Quality Assurance Services: Activities, actions, and procedures performed before and during the execution of the Work to guard against defects and deficiencies and substantiate that the proposed construction will comply with requirements.

B. Quality Control Services: Tests, inspections, procedures, and related actions during and after the execution of the Work to evaluate that the actual products incorporated into the Work and the completed construction comply with requirements.
   1. Services do not include contract enforcement activities performed by the Engineer, such as observations.

C. Testing Agency (also known as Third Party Testing Agency): Entity responsible for performing specified testing or special inspections in Divisions 02 through 07 and on the Construction Drawings.

D. Special Inspector: A qualified person employed or retained by an approved agency (such as the testing agency), and approved by the building official as having competence necessary to insect a particular type of construction requiring special inspection.

E. Special Inspection: Review of completed work or work in progress performed by the Special Inspector, or where specifically identified, by the Engineer. Items typically required by the governing building code.

1.3 COMPLIANCE CRITERIA

A. General: If compliance with two or more standards is specified and standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement.

B. Minimum Quantity or Quality Level: 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.

C. Refer uncertainties to the Engineer for a decision before proceeding.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 QUALITY CONTROL

A. Reference the Special Inspection Schedule on the Construction Drawings for special inspection requirements for this section.

B. Owner Responsibilities: The Owner will engage a qualified testing agency to perform all special inspections and select testing as explicitly identified in the Contract Documents.
   1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and descriptions of types of testing and inspecting they are engaged to perform.
   2. 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 the Contractor.

C. Testing Agency/Special Inspector Responsibilities: Cooperate with the Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Determine location from which test samples will be taken and in which in-situ tests are conducted.
   2. Notify the Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   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 of each test, inspection, and similar quality control service.
   5. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
   6. Do not perform any duties of the Contractor.

D. Engineer Responsibilities: Engineer may perform some testing on completed on in-process work as noted in the Contract Documents.

E. Tests and inspections not explicitly assigned to the Owner or Engineer, and testing and inspecting requested by the Contractor and not required by the Contract Documents, are the

Contractor's responsibility. Unless otherwise indicated, provide quality control services specified and those required by public authorities having jurisdiction, whether specified or not.

F. Coordination: Coordinate the sequence of activities to accommodate the required quality assurance and quality control services with a minimum of delay and to avoid the necessity of removing and replacing construction to accommodate testing and inspecting.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.
   2. Notify the testing agency sufficiently in advance of operations to permit assignment of personnel.

G. Associated Services: Cooperate with the Engineer and testing agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Provide the following:
   1. Submittals of concrete mix designs and other materials and products necessary for the testing agency to test and evaluate field work.
   2. Access to the Work.
   3. Incidental labor and facilities necessary to facilitate tests and inspections.
   4. Adequate quantities of representative samples of materials that require testing and inspecting. Assist the testing agency in obtaining samples.
   5. Facilities for storage and field curing of test samples.
   6. Security and protection for samples and for testing and inspecting equipment at Site.

H. Repair and Protection:
   1. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   2. Provide materials and comply with installation requirements specified in other sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
   3. Protect construction exposed by or for quality control services.
   4. Repair and protection are the Contractor's responsibility, regardless of assignment of responsibility for quality control services.

END OF SECTION

SECTION 01 70 20

PROJECT CLOSEOUT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Administrative and procedural requirements for contract closeout, including final cleaning; Substantial Completion and final completion procedures.

B. Related Sections:
   1. Divisions 02 through 07 sections for special cleaning and specific closeout requirements for Work in those sections, including warranties.

PART 2 PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by 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

3.1 PROJECT RECORD DOCUMENTS

A. During Work, maintain one set of Drawings and reviewed shop drawings, Specifications, WJE site visit reports, and product data for recording deviations of as-built construction from design information. Include addenda and Contract modifications.
   1. Accurately document and record changes and modifications as soon as possible after they occur, in understandable manner.
   2. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later. Record and check markup before enclosing concealed installations.
   3. Include:
      a. Dimensional changes.
      b. Revisions to Drawing details and details not on Drawings.
      c. Changes made by Change Order or Engineer's written orders or direction based on Site Visit Reports or Construction Observation Reports. Note Change Order numbers, Site Visit Report Item numbers or similar identification.
      d. Field records for variable and concealed conditions.
      e. Record information on Work that is shown only schematically or omitted from Drawings.
      f. Actual products and materials used.
         1) Include product data, specifically marked for Project, and cross-referenced to Specifications, Drawings, and Change Orders.
         2) Include names of manufacturer and Installer, and other information necessary to provide record of selections made.

3) Include significant changes in product delivered to Site and changes in manufacturer's written instructions for installation.

4. Mark record document most capable of showing actual physical conditions completely and accurately. Cross-reference on other record documents.
5. Mark record documents with erasable, red-colored media. Use other colors to distinguish between changes for different categories of Work at the same location.

B. Store Record Documents and samples in field apart from Contract Documents used for construction. Do not use Record Documents for construction purposes. Maintain Record Documents in good order and in clean, dry, legible condition, protected from deterioration and loss. Provide access to Record Documents for Engineer's reference during normal working hours.

C. Prepare final document markup in digital format for submission.
1. Incorporate changes and additional information previously marked on record prints. Erase, redraw, and add details and notations where applicable.
2. Refer questions to Engineer for resolution.
3. For new details and drawings, bind new sheets as necessary to appropriate document.
4. Identify and date each Record Drawing. Include names of project, Engineer, and Contractor, and designation "PROJECT RECORD DOCUMENT" in prominent location.
5. Organize PDF information into separate electronic files that correspond to each sheet of Drawings, report or item. Name each file with identification of item contained.

3.2 FINAL CLEANING

A. General: Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations. Return adjacent surfaces and areas to condition existing before Work began.

B. In areas disturbed by construction activities, complete the following cleaning operations before requesting inspection for certification of Substantial Completion. Clean each surface or unit to the condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions. Employ experienced workers or professional cleaners.
1. Remove tools, construction equipment, machinery, and surplus material from Site.
2. Clean Site, yard, and grounds, including landscaped areas, of rubbish, waste materials, litter, and other foreign substances.
   a. Broom clean paved areas. Remove petrochemical spills, stains, and other foreign deposits.
   b. Rake grounds that are neither planted nor paved to smooth, even-textured surface.
3. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of stains, films, and similar foreign substances. Polish surfaces to achieve specified finish. Avoid disturbing natural weathering of exterior surfaces.
   a. Touchup 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.
      1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
4. Clean and restore transparent and reflective surfaces, such as mirrors and glass in doors and windows, to their original condition. Remove glazing compounds and other noticeable,

vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

5. Remove labels that are not permanent.
6. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
7. Sweep floors broom clean.
8. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove paint and mortar droppings and other foreign substances.
9. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    a. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
10. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
11. Leave Project clean and ready for reuse.

END OF SECTION

SECTION 03 01 01

SHORING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Supply, installation, and removal of temporary shoring.

1.2 PRICES

A. Shoring shall be included in the overall cost to perfrom the Work and not paid for separately.

1.3 COORDINATION

A. Coordinate with Owner's Representative and with other trades to ensure that shoring does not interfere with Owner use of Site or Work of other trades.

1.4 SUBMITTALS

A. Shop Drawings: Shop drawings showing locations, distribution, and quantity of shoring. Include connection and bearing details. Incude loads for which shoring was designed. Shop drawings shall be prepared by or under supervision of qualified, licensed professional engineer and shall be sealed by engineer.

B. Product Data (for information only): Manufacturer's literature and technical data indicating type of shoring proposed for use and safe load-carrying capacity of shoring for heights and lengths of shoring components to be used.

C. Design Calculations (for information only): Calculations prepared by or under supervision of a qualified, licensed professional engineer, and sealed by engineer, indicating that shoring meets design criteria.

1.5 PROJECT CONDITIONS

A. Comply with Owner's limitations and restrictions for Site use and accessibility as well as restricitons indicated on the construction documents pertaining to temporary anchorages.

PART 2 PRODUCTS

2.1 MANUFACTURED ASSEMBLIES

A. Design Criteria:
   1. Structure dead load per dimensions provided on original drawings prepared by Henningson, Durham and Richardson, and verified in field by contractor.
   2. All loads shall be accounted for in accordance with ASCE 37, including but not limited to dead, construction, and live.
      a. Live loads shall be coordinated by the contractor to reflect their selected means, methods and equipment.

3. Provide a minimum factor of safety of 2.0.
4. Consider removal of loads from member and transfer of loads into structure below, without overloading structural members.
5. Detail shoring to avoid interference with Owner operations and completion of the Work.
6. Consider shoring stiffness relative to stiffness of members being shored.

B. Shoring: Steel posts, steel frames, or other steel assemblies with sufficient capacity to support calculated shoring loads at spacing and positioning shown on shop drawings.
1. Adjustable through positive means, such as screw jacks, to achieve tight fit to structure above and below and to compensate for elastic shortening of shores during loading and service.
2. Use undamaged components, including bracing, supplied by shoring manufacturer.

2.2 ACCESSORIES

A. Attachment: provide connections to existing members and structure which will not leave embedded items after removal.

B. Spreaders:
1. At bottom of shores: 4x4 timber cribbing, 2x wood bearing pads, or other material; with sufficient bearing area and length to distribute shoring reactions into supporting structural element below.
2. At top of shores: Timber or steel spreader beams or wood bearing pads; to fully support member being shored without damage to member surface.

C. Shims: Wood or steel; at bearing points above shores to ensure tight contact with shored member.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements and other conditions affecting installation or performance of shoring Work.
1. Notify Engineer in writing of conditions which may adversely affect installation or performance of shoring Work, and recommend corrections.
2. Do not proceed with shoring Work until adverse conditions have been corrected and reviewed by Engineer.
3. Commencing shoring Work constitutes acceptance of Work surfaces and conditions.

3.2 INSTALLATION

A. Install shoring to brace elements as required prior to beginning Work.

B. Install shoring in accordance with manufacturer’s recommendations and approved shop drawings. Installed assembly shall be of such quality that assembly will support imposed loads without excessive settlement or deflection.
1. Position to avoid interference with Owner operations.
2. Install plumb and square. Install cross-bracing recommended by shoring manufacturer and shoring designer to prevent buckling failure of individual members and overall shoring stability failure.

3. Install spreader beams or bearing pads and shims as necessary, and adjust shores to ensure tight, uniform fit against structural element to be supported. Minimize differential loading of vertical shoring members.
4. Install timber cribbing wood or wood bearing pads as necessary to distribute loads into supporting elements. If more than one layer of cribbing is required, install each successive layer perpendicular to preceding layer.
5. If shoring is to be placed on coated or finished surface, protect surface from damage with plywood, plastic sheets, or other means.
6. Do not provide permenant corrosive connections into members to remain.

C. All shoring shall be installed snug-tight.

D. Protect shores from damage from construction activities, Owner use of facility, and other causes.

E. Check shores daily and adjust as necessary to maintain snug condition or design preload, plumbness, and full effectiveness.

F. Modify and adjust shoring as required to meet conditions of work and to ensure Project safety.

3.3 REMOVAL OF SHORES

A. Remove shores when compressive strength of rebuild concrete reaches 75 percent of its specified 28-day required strength. Contractor may elect to have additional concrete strength tests performed at their own expense, to confirm when rebuild material meets removal requirements.

B. Store shoring materials in approved storage area at Site, such that materials do not interfere with Owner’s continued use of facility. Promptly remove shoring materials from Site when no longer needed for work.

END OF SECTION

Project

Project Name:

Project Number:

Date:

Mixer/Batching Team Name(s):

Repair Application (Form-and-pump overhead, top surface, top surface rapid-set, etc.):

Mixer Type:

Prepackaged Repair Material Information

Name:

Lot #:

Minimum WT or Volume of Water:

Maximum WT or Volume of Water

Admix volume required:

Aggregate

Name/Description:

Manufacturer or Supplier:

Size (in):

Batch #	Time	Ambient Air Temp	Prepackaged Material Temp	Prepackaged Material Weight (bag wt.)	Prepackaged Material Admixture Volume	Aggregate Weight	Aggregate Moisture Condition (SSD, etc.)	Water Weight or Volume	Mixing Time	Final Mixture Temp	Notes (batch where testing was performed, etc.)

SECTION 03 01 34

CONCRETE REPAIRS - PREPACKAGED MATERIALS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Supply and placement of prepackaged concrete repair materials, including formwork, batching procedures, placement procedures, finishes, curing and protection.

1.2 PRICES

A. Perform Work on unit price basis. Unit prices below include concrete removal, surface preparation of steel and concrete surfaces, and installation of supplemental reinforcing, prior to placement:
   1. Vertical-surface repair, full depth. Payment based on surface area of removal area from one surface and average depth of 4 inches.
   2. Top-surface coping repair, full depth. Payment based on surface area of removal area, and average height of 12 inches.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of fly ash, silica fume, and other pozzolans, or slag cement.

B. Testing Agency: Third party testing agency qualified to perform the testing specified. Refer to Specification Section 01 40 00 for additional requirements.

C. Batch: Either of the following:
   1. A quantity of material mixed at one time or in one continuous process;
   2. To weigh or volumetrically measure and introduce into the mixer the ingredients for a quantity of material.

D. Mixture: The assembled, blended comingled ingredients of the concrete repair material or the proportions of its assembly.

1.4 QUALITY ASSURANCE

A. Contractor Qualifications: Experienced firm that has successfully completed concrete repair work similar in material, design, and extent to that indicated for the Project. Must have successful construction with specified materials in local area in use for minimum of five years.
   1. Employ foreman with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during the Work. Do not change foremen during the course of the Project except for reasons beyond the control of Contractor; inform Owner and Engineer in advance of any changes.

B. Mockups: Construct mockups to demonstrate construction procedures, quality of Work, and aesthetic effects.
   1. Mockup and Quality Testing shall be completed in full prior to proceeding with Work. If the Contractor wishes to proceed with Work prior to completion, they may proceed at their

own risk. Any revisions or additional Work as a result of proceeding shall be the sole responsibility of the Contractor and no other party.

2. Construct mockups with at least:
   a. Vertical-surface: 2 adjacent corner spall repairs
3. Mockup locations will be selected by Engineer after schedule and work sequence is submitted by contractor.
4. Use personnel, equipment, materials, and procedures proposed for use on Project.
5. Construct mockups on existing members under same weather conditions expected during Work.
6. Provide access to mockup locations during work and after to allow for completion of observations and testing.
7. Engineer will observe the following conditions prior to the Contractors work proceeding on mockup (hold points). Provide Owner and Engineer with a schedule for mockup activities at least one week prior to start of mockup work. Clearly define sequence of work including required Engineer hold point observations. **Mockup shall be coordinated and staffed to allow for hold point observations to be completed during back to back work days, afternoon of one day to morning of next.** Group all mockups such that visits for different repair types are prepared and ready for review during the same visits. Additional visits to review hold points may be charged to the Contractor, or withheld from payment. Allow Engineer 24 hours to observe work at each hold point, complete all work indicated prior to Engineer Visit.
   a. Engineer Hold Point Visit 1:
      1) Concrete and steel surface preparation work.
      2) Prepared and cleaned concrete removal areas including prepared concrete and steel surfaces (prior to coating)
      3) Steel coating application.
   b. Engineer Hold Point Visit 2:
      1) Completed concrete and steel surface preparation, including completed steel coating installation.
      2) Installation of concrete repair material
         a) Batching
         b) Testing
         c) Finishing
      3) Installation of curing and protection measures
8. Coordinate performance of, or perform, quality control measures and testing as required by this section; including, but not limited to (see Quality Control for Responsible Entity):
   a. Reinforcing inspections
   b. Fresh or plastic concrete repair material testing
   c. Compressive strength testing
9. If Engineer or Owner determines mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved. Remove and replace mockups that are not approved.
10. Approved mockups shall be maintained in undisturbed condition throughout Project as basis for acceptance of completed work and may become part of completed Work if undisturbed at time of Substantial Completion.
11. Do not proceed with repair Work until mockups have been approved by Engineer and Owner.

1.5 SUBMITTALS

A. Formed vertical and overhead repair material product data.

B. Aggregate compliance with C33.

C. Batch Logs.

1.6 WARRANTY

A. Installer's Warranty:
   1. Completed warranty form signed by Installer. Warranty form included in section 00 65 36.
   2. Warranty Period: 2 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Form Panels: Plywood, lumber, metal, plastic, or another material capable of producing final product as specified here-in.
   1. Use panels that will provide continuous, true, and smooth repair surfaces.
   2. Furnish panels in largest practicable sizes to minimize number of joints.
   3. Do not use rust-stained, steel, form-facing material.
   4. Use form-facing material capable of producing smooth, uniform texture on concrete. Do not use form-facing materials with raised grain, torn surfaces, worn edges, dents, or other defects that will impair texture of concrete surface.

B. Accessories:
   1. Chamfer Strips: Wood, metal, PVC, or rubber strips.
   2. Form-Release Agent: Commercially-formulated form-release agent that will not bond with, stain, or adversely affect the concrete repair surface and will not impair subsequent treatments of the surface. Form-release agent shall have a rust inhibitor for steel form-facing materials.

2.2 PREPACKAGED CONCRETE REPAIR MATERIALS

A. Formed Vertical and Overhead Repairs
   1. Pour pre-blended aggregate and mortar or neat mortar extended with aggregate per manufacturer's recommendations during batching: Use product specifically intended for this application, for which the Contractor has had proven successful experience installing. Use one of the following, or approved equal:
      a. MasterEmaco S 440 manufactured by BASF Construction Chemicals, LLC.
      b. Sikacrete 211 SCC Plus manufactured by Sika Corporation.

B. Do not use materials that contain added gypsum.

C. Provide all like materials with the same manufacturers lot number.

D. Testing of concrete repair material(s), in final batched project condition, shall confirm the following properties:
   1. 28-day Compressive Strength (ASTM C39).
      a. 5,000 pounds per square inch, minimum. This strength shall be considered the minimum specified compressive strength, regardless of the proprietary repair material manufacturers published compressive strength data.

2.3 CURING MATERIALS

A. Membrane-Forming Curing Compound (vertical and overhead repairs only): ASTM C309, Type 2; VOCs less than legal limits. Silicate materials shall not be used.

B. Water: Potable.

PART 3 EXECUTION

3.1 GENERAL

A. Follow the requirements of these specifications and the prepackaged repair material manufacturer's written instructions, whichever is more stringent as determined by the Engineer. If a conflict is identified between these specifications and the manufacturer's written instructions, notify the Engineer prior to performing Work and Engineer will determine which requirements apply.

3.2 FORMWORK

A. Design, erect, shore, brace, and maintain formwork to support vertical, lateral, static, dynamic, and construction loads that might be applied prior concrete repair reaching 75 percent of their specified minimum compressive strength.

B. Construct formwork so concrete repairs are of size, shape, alignment, elevation, and position indicated and tight enough to prevent loss of material.
   1. Ensure flatness and smoothness as required for finish type per Section 3.6.
   2. Chamfer exterior corners and edges of permanently exposed concrete to match existing, if chamfered.

C. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

D. Provide temporary openings for cleanouts, venting, and inspection ports (witness holes) where the interior area of the formwork is inaccessible. Close openings with panels or dowels tightly fitted to forms and securely braced to prevent loss of material.

3.3 BATCHING AND MIXING

A. Ensure that all materials have been stored and pre-conditioned to proper temperatures as required by the prepackaged repair material manufacturer.

B. Batch materials by weight on basis of whole bags of prepackaged repair material, NEVER USE PARTIAL BAGS.

C. Mix materials in appropriate mixer (drum or paddle type) as specifically required by the prepackaged repair material manufacturer. Provide sufficient number or size of mixer(s) so that placement operations will proceed uninterrupted at each placement location.

D. Ensure that all mixer elements are cleaned of all materials from previous batch, and mixer components have been pre-wetted or charged prior to batching.

E. Mix ingredients to uniform consistency with mixing times per the manufacturer's recommendations or instructions.

F. Compile a Batch Log for each batch of material. A sample batch log containing the minimum information required is attached to this Section.

G. Cold-Weather: Protect material from physical damage or reduced strength due to frost, freezing, or low temperatures.
   1. When the air temperature has fallen or is expected to fall below 40 degrees F, uniformly heat water, aggregates, and cement (prepackaged materials) before mixing to obtain a mixture temperature of not less than 50 degrees F and not more than 80 degrees F at the point of placement; no single component shall be less than 40 degrees F or more than 90 degrees F prior to mixing. Mix water and aggregates together before adding cement. Do not add cement if the temperature of the water/aggregate mixture exceeds 70 degrees F.
   2. Do not use frozen materials or materials containing ice or snow.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators.

3.4 PLACEMENT (GENERAL)

A. For repair areas where material will be cast against, and bonded to, existing concrete surfaces, wet existing surface to saturated surface-dry condition at least 1 hour prior to placement. Maintain surfaces at this condition until placement. If forms are filled with water prior to placement to achieve this condition, ensure that standing or flowing water is removed and surfaces are allowed to dry to saturated, surface-dry condition.

B. Do not allow material to fall a vertical distance greater than 4 feet from the point of discharge to final position.

C. Do not allow material to disturb or displace reinforcing bars or other embedded items.

D. Place material at a rate so that the material is plastic and flows readily into corners of forms or openings and into spaces fully around reinforcing bars.

E. Place material continuously until the repair volume or section is completed, with no cold or construction joints unless explicitly approved in writing by Engineer prior to placement.

F. Dispose of material that has partially set prior to placement or that has been contaminated by foreign material.

G. Cold-Weather Placement: Protect material from physical damage or reduced strength due to frost, freezing, or low temperatures.

H. Hot-Weather Placement: Protect material from physical damage or reduced strength due to rapid evaporation or overheating of concrete. Do not allow the temperature of the material at the time of placement to exceed 90 degrees F, or as required by the concrete repair material manufacturer. When hot-weather conditions exist, use one or more of the following procedures:
   1. Place material at night or early in morning when ambient air temperatures are lower.
   2. Cool ingredients before mixing to maintain the material temperature below required at the time of placement. Chilled mixing water or chopped ice may be used to control the temperature; include the water equivalent of the ice in the mixing water quantity.

3. Cover repair areas with water-soaked burlap so the formwork, concrete substrate and steel temperature does not exceed the ambient air temperature.
4. Provide windbreaks or sunshades, or both.

3.5 FORM AND POUR PLACEMENT

A. Place material as near as possible to its final position to avoid segregation due to re-handling or flowing.

B. If conventional repair materials are used (non-SCC), consolidate material with mechanical vibrating equipment, so that the material is thoroughly worked around reinforcement and other embedded items and into corners.
1. Use internal vibrators with a minimum speed of 7,000 vibrations per minute and that are sufficiently narrow to fit into spaces between reinforcing bars, formwork, and existing concrete. Have extra vibrators at the Site in case a vibrator does not work.
2. Do not use vibrators to transport repair material.
3. Insert and withdraw vibrators vertically at uniformly spaced locations no farther apart than the visible effectiveness of the vibrator.
4. At each insertion, limit the duration of the vibration to the time necessary to consolidate the material without causing constituents to segregate.

3.6 FINISHING FORMED SURFACES

A. Provide surface finish 2.0 (SF-2.0) unless otherwise specified, at concrete surfaces exposed to public view.

B. Edge of repair shall be flush with adjacent concrete surface with 1/8-inch tolerance.

C. Do not apply a rubbed finish.

D. Surface Finish Type Definitions:
1. Surface Finish-2.0 (SF-2.0): Repair voids larger than 3/4-inch wide or 1/2-inch deep. Repair or patch all form tie holes and similar construction related blemishes. Limit abrupt (over 1-inch or less) or gradual (5-foot straight edge) concrete repair surface irregularities to 1/4-inch (ACI 117 Class B).

3.7 CURING AND PROTECTION

A. General:
1. Curing method shall be applied within 30 minutes of material finishing.
2. Curing period shall be seven days. Maintain material in a moist condition for at least seven days after placing.
3. Curing method shall be as noted below:
   a. Unformed Vertical and Overhead Surfaces: Curing compound
   b. Formed surfaces: Formwork, as specified in Section 2.1, shall meet requirements of curing for these elements. If formwork is removed prior to full curing period, install curing compound within 30 minutes of removing formwork.

B. Curing Methods:
1. Curing compound
   a. Apply curing compound uniformly in a continuous operation by power spray or roller according to manufacturer's written instructions and recommended coverage rate.

b. Recoat areas subjected to heavy rainfall within three hours after initial application.
c. Maintain continuity of compound and repair damage during curing period.

C. Cold Weather Protection: Provide protection such as blankets, heated blankets, insulation, enclosures, and/or heaters to keep concrete protected from cold temperatures and frost.
1. Protection methods shall be installed immediately following installation of curing method.
2. Maintain concrete repair material above 55 degrees F until it has reached 3,500 psi based on field cured concrete cylinders, manufacturer's test data (if testing is for cubes, value shall be 4,250 psi), or seven days, whichever is less.

3.8 REMOVAL OF FORMWORK

A. Non-structural elements: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support the weight of the structure or concrete, may be removed after curing at not less than 24 hours, provided concrete is hard enough not to be damaged by form-removal operations.

B. Structural Elements: Leave formwork for beam soffits, joists, slabs, and other structural elements that support the weight of concrete in place for seven days, or until concrete repair material has achieved at least 75 percent of specified 28-day compressive strength based on filed cured cylinders. Remove forms only if shoring has been arranged to permit removal of forms without loosening or disturbing shoring.

3.9 QUALITY CONTROL

A. Sampling and testing of fresh repair material shall be performed by the Testing Agency retained by the Owner according to the following requirements:
1. Take test sample from point of discharge onto final structure according to ASTM C172. Take additional samples at other locations only if directed by Engineer.
2. Fresh repair material tests shall include:
a. Unit weight (ASTM C138)
b. Slump (ASTM C143) or Spread (ASTM C1611)
c. Temperature (ASTM C1064)
d. Fabrication of compressive strength specimens (as defined below)
3. Fabrication of compressive strength specimens shall be 4 by 8-inch cylinders.

B. Material Compressive Strength Testing.
1. Testing shall be performed by Testing Agency retained by Owner.
2. A strength test shall be considered three 4 by 8-inch cylinders.
3. Compressive strength sample fabrication shall include adequate numbers of samples such that testing can be performed as noted blow.

Compressive Strength Testing Ages and Quantity

Curing Method	Standard Cured	Field Cured	TOTAL
Strength Test Age(s)	28 days	3 days	
Total Number of Cylinders to be cast and tested	3	3	**6**

a. Additional strength tests at earlier ages may be performed at the Contractors' option.
b. All confirmations of in-situ strength for stripping of forms or removal of shoring shall be based on field-cured specimens cast at the Contractors discretion/option and shall be in addition to those minimums shown.

c. Standard-cured (lab-cured):
   1) Store specimens at the Site for at least 16 hours at a temperature of 60 to 80 degrees F. Provide a temperature-controlled box or other enclosure if necessary.
   2) After at least 16 hours, but not more than 30 hours, transport the specimens to the laboratory and air cure at 73 degrees F and 100 percent relative humidity.
d. Field-cured: Cure in the vicinity of the area that they represent and in the same manner as the repair material.

4. Conformance Requirements: Material testing is satisfactory if the average of the 28-day standard-cured compressive-strength tests equals, or exceeds, the specified 28-day compressive strength and no test value is more than 500 pounds per square inch less than the specified 28-day strength. Strength tests confirming 28-day strength are acceptable at earlier ages.
   a. If the Contractor has elected to reduce lap lengths based on using a higher compressive strength material, test results shall be provided confirming that the strength meets the strength shown for lap lengths used. i.e. if lap lengths for 8,000 psi material are used, strength tests must confirm that 8,000 psi is achieved for the material

C. The Contractor shall visually review, and mechanically sound using a chain or hammer, each repair area for defects after curing and protection. In addition to the requirements of this document, the following additional items shall constitute non-conformance of the repair Work or material:
   1. Delaminations.
   2. Voids, spalls, air bubbles, honeycomb, rock pockets, and form-tie voids, more than 2 percent of the repair surface area, or those which compromise strength.
   3. Crazing and cracks in excess of 0.010 inch wide, and any that penetrate to the depth of reinforcement or completely through section. Notify Engineer immediately of cracks that penetrate completely thought the cross section.
   4. Latent defects or those not on exposed surfaces that affect concrete's durability and structural performance as determined by Engineer.
   5. Surface finish meets specified requirements.
   6. Offsets at perimeter exceeding those specified.

3.10 NON-CONFORMING WORK OR MATERIALS:

A. If tests or observations indicate that the material, or Work, is not in conformance with the Construction Documents, at no cost to Owner, or Engineer, either:
   1. Perform additional testing acceptable to Engineer to verify conformance with the Construction Documents.
   2. Remove and replace material or Work.
   3. Repair or replace non-conforming Work or materials using alternate repair approved by Owner and Engineer.
   4. Provide an extended warranty for the repairs as deemed acceptable to the Owner and Engineer.

B. Perform additional inspection and testing, at no cost to the Owner, to determine compliance of replaced, or additional corrective Work.

C. Additional time and expenses for Engineer resulting from non-conforming Work or material may be back-charged to the Contractor, or withheld from payment to the Contractor at the Owners option.

END OF SECTION

SECTION 03 21 00

REINFORCING STEEL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Coating existing reinforcing bars and embedded steel with corrosion-inhibiting material.
   2. Supply, fabrication, and installation of new supplemental mechanical anchors.

1.2 PRICES

A. Perform the following Work on unit price basis:
   1. Supply, fabrication, and installation of new supplemental mechanical anchors. Payment shall be included in concrete replacement cost.
   2. Coating of existing reinforcing bars shall be included in concrete replacement cost.

1.3 QUALITY ASSURANCE

A. Contractor Qualifications: Experienced firm that has successfully completed concrete repair work and installation of helical anchors similar in material, design, and extent to that indicated for the Project. Must have successful construction with specified materials in local area in use for minimum of five years.
   1. Employ foreman with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during the Work. Do not change foremen during the course of the Project except for reasons beyond the control of Contractor; inform Owner and Engineer in advance of any changes.

B. Mockups: Construct mockups to demonstrate construction procedures, quality of Work, and aesthetic effects.
   1. Installation of new helical anchors at one panel where supplemental mechanical anchorage is designated.
   2. Mockup locations will be selected by Engineer after schedule and work sequence is submitted by contractor.
   3. Use personnel, equipment, materials, and procedures proposed for use on Project.
   4. Construct mockups on existing members under same weather conditions expected during Work.
   5. Provide access to mockup locations during work and after to allow for completion of observations and testing.
   6. If Engineer or Owner determines mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved. Remove and replace mockups that are not approved.
   7. Approved mockups shall be maintained in undisturbed condition throughout Project as basis for acceptance of completed work and may become part of completed Work if undisturbed at time of Substantial Completion.
   8. Do not proceed with repair Work until mockups have been approved by Engineer and Owner.

C. Mockup for surface preparation of embedded reinforcing shall be in accordance with Section 03 01 34, including demonstrating adequacy of concrete removal and surface preparation procedures.

1.4 SUBMITTALS

A. Corrosion inhibiting coating material product data.

B. Mechanical anchor product data.

PART 2 PRODUCTS

2.1 MATERIALS

A. Corrosion-Inhibiting Coating Materials: Use material specifically intended for reinforcing steel embedded in concrete. Use one of the following or approved equal:
   1. Cementitious Coating: Sika Armatec 110 EpoCem supplied by Sika Corporation.
   2. Epoxy: Sikadur 32 Hi-Mod supplied by Sika Corporation.
   3. Zinc-rich Steel Primer: MasterProtect P 8100 AP supplied by BASF Construction Chemicals, LLC.

B. Reinforcing Bars: ASTM A615, Grade 60. Sizes as shown on Drawings.

C. Supplemental mechanical anchors
   1. Helical anchors shall be stainless steel, between 8mm and 10mm in diameter. Use one of the following, or approved equal:
      a. DryFix anchors manufactured by Helifix.
      b. Stitch Tie manufactured by CTP Anchors
      c. Heli-Tie manufactured by Simpson Strong-Tie.

PART 3 EXECUTION

3.1 EXISTING STEEL PREPARATION (REINFORCING AND EMBEDMENTS)

A. Leave existing reinforcing in place unless otherwise directed by Engineer.

B. Notify Engineer of reinforcing bars that are incorrectly located or have less than 1/2 inch of concrete cover; are damaged or fractured; or have lost more than ten percent of their original cross-sectional area at any point. Engineer will determine remedial action.

C. Measure reinforcing section loss in accordance with ACI 364.14T.

D. Prepare exposed steel surfaces to SSPC-SP 6/NACE No. 3 finish, commercial blast cleaning, including exposed reinforcement and steel embedments. Exercise care to prepare undersides of reinforcing bars.

E. Clean steel surfaces with dry, oil-free compressed-air jet.

F. Inspect prepared steel surfaces and clean remaining contaminants.

G. Apply **two** coats of corrosion-inhibiting material on exposed steel surfaces.

1. Batch, mix, and apply material according to recommendations of material supplier.
   a. Minimum dry film thickness: 10 to 12 mils.
2. Exercise care to coat difficult-to-reach surfaces, such as undersides of reinforcing bars.
3. Minimize spillage on concrete surfaces. Remove materials that will act as bond breaker by chipping or other means.
4. Inspect coated steel surfaces and apply additional coats to uncoated or thinly-coated areas.

3.2 PLACING REINFORCEMENT

A. General: Comply with CRSI Manual of Standard Practice and Drawings for placement of reinforcement.

B. Bar spacing, concrete cover, and bar splices shall conform to Drawings and CRSI Manual of Standard Practice, unless otherwise noted on drawings.

C. Accurately position, support, and secure reinforcement to prevent displacement during concrete placement. Locate and support reinforcement with bar supports to maintain specified minimum concrete cover. Wire dowels securely in place before depositing concrete.

D. Unless permitted by Engineer, do not bend reinforcing bars embedded in hardened concrete.

E. Bend tie wires and turn ends toward inside of concrete section, away from exposed concrete surfaces.

F. During concrete placement, protect reinforcement from damage from transporting or pumping equipment with runways or other means.

G. Before placing concrete, clean reinforcement of loose rust and mill scale, earth, ice, dust, and other foreign materials that would reduce bond to concrete.

H. Allow Engineer at least 24 hours to inspect condition and placement of reinforcing prior to completing formwork and ordering concrete.

I. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.

J. Do not weld reinforcement unless specifically approved by Engineer.

K. Coat new bars in accordance with the requirements for existing reinforcing.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Surface preparation and installation of sealant in joints.

B. Payment to be based on linear feet of sealant installed.

1.2 PRICES

A. Perform work on a unit price basis based on lineal feet of sealant removed and replaced.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Experienced firm that has successfully completed sealant work similar in material, design, and extent to that indicated for Project; that is approved, authorized, or licensed by sealant manufacturer to install sealant; and that is eligible to receive sealant manufacturer's warranty. Must have successful installations of specified materials in local area in use for minimum of five years.
   1. Employ foreman with minimum five years of experience as foreman on similar projects, to be on Site at all times during Work. Do not change foremen during the course of the Project except for reasons beyond the control of the Installer; inform Engineer in advance of any changes.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Install sealant when existing and forecast weather conditions permit sealant to be installed according to sealant manufacturer's written instructions and warranty requirements.
   1. Do not install sealant when ambient or substrate temperatures are below 40 degrees F or are expected to fall below 40 degrees F in next 12 hours.
   2. Do not proceed with installation during inclement weather except for temporary work necessary to protect building interior and installed materials. Remove temporary work and Work that becomes moisture damaged.

1.5 SUBMITTALS

A. Sealant product data.

B. Warranties.

C. Field adhesion testing.

1.6 WARRANTY

A. Manufacturer's Warranty:
   1. Written warranty, signed by sealant manufacturer.

2. Warranty Period: 5 years from date of Substantial Completion.

B. Installer's Warranty:
   1. Completed warranty form signed by sealant Installer. Warranty form included in section 00 65 36.
   2. Warranty Period: 5 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 ELASTOMERIC JOINT SEALANTS

A. General:
   1. Comply with ASTM C920 and other requirements indicated.
   2. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing on similar projects, mockups and preconstruction testing for Project, and field experience.
   3. Select products based on mockups, preconstruction testing, and sealant manufacturer's previous testing and experience.
   4. Source Limitations: Obtain each type of joint sealant through one source from single manufacturer.
   5. Colors of Exposed Joint Sealants: Selected and approved in writing by Owner's Representative, from sealant manufacturer's full range.

B. Single-Component, Non-sag, Silicone Sealants:
   1. 756 SMS Building Sealant manufactured by Dow Corning Corporation.
   2. SCS9000 SilPruf NB manufactured by Momentive Performance Materials Inc.
   3. Spectrem 3 manufactured by Tremco Commercial Sealants & Waterproofing.

2.2 AUXILIARY MATERIALS

A. General: Sealant-backer materials, primers, surface cleaners, masking tape, and other materials recommended by sealant manufacturer, that are non-staining and compatible with substrates; based on mockups, preconstruction testing, and sealant manufacturer's previous testing and experience.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. Remove existing sealant and other foreign material from joints.

B. Repair damaged or deteriorated substrate surfaces according to sealant manufacturer's written instructions, as detailed and as approved by Engineer.

C. Clean joint substrates immediately before installing sealant, to comply with sealant manufacturer's written instructions based on mockups and preconstruction testing.
   1. Remove from substrate foreign material that could interfere with adhesion of sealant, including dirt, dust, existing sealant, oil, grease, and surface coatings.
   2. Provide dry substrate; prevent wetting of substrate prior to sealant installation.

3. Clean porous substrates, such as concrete, masonry, stone, wood, by brushing, grinding, blast-cleaning, mechanical-abrading, or combination of methods to produce clean, sound substrate capable of developing optimum bond with sealant. Remove laitance and form-release agents from concrete. Remove loose particles remaining after cleaning operations by vacuuming or blowing out joints with oil-free, compressed air.
4. Clean nonporous surfaces, such as metal, with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of sealant.

3.2 INSTALLATION OF SEALANT

A. General: Comply with these documents and sealant manufacturer's written installation instructions for products and applications indicated, based on mockups and preconstruction testing. Notify Engineer of discrepancies between these documents and manufacturers typical details, written recommendations or instructions. Engineer shall determine which apply.

B. Joint Priming: Prime all porous joint substrates. Prime additional substrates where recommended in writing by sealant manufacturer, based on mockups and preconstruction testing. Apply primer to comply with sealant manufacturer's written instructions.
1. Confine primer to areas of sealant bond; do not allow spillage or migration onto adjoining surfaces.
2. Limit priming to areas that will be covered with sealant in same day. Unless recommended otherwise by sealant manufacturer, reprime areas exposed for more than 24 hours.

C. Install sealant backer and position to produce cross-sectional shape and proper depth of installed sealant.
1. Use properly-sized backer. Do not use multiple-backer units or braided-backer units to accommodate wide joints.
2. Install backer with device that will provide consistent depth between substrate surface and outer surface of backer.
3. Do not leave gaps between ends of sealant backers.
4. Do not stretch, twist, puncture, or tear sealant backers.
5. Remove wet backers and replace with dry materials.

D. Install bond-breaker tape at back of designated joints.

E. Install sealant immediately after installing backer material; to produce uniform, cross-sectional shape and depth; to directly contact and fully wet joint sides and backer material; and to completely fill recesses in joint configuration.
1. Non-sag sealants
    a. Install sealant with the recess specified on the details.
    b. Immediately after sealant application and before skinning or curing begins, tool joint with slightly concave surface, compressing sealant into joint to form smooth, uniform sealant bead; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Do not use tooling agent.

3.3 QUALITY CONTROL

A. At completion of Project, observe installed sealant for damage or deterioration. If damage or deterioration occurs, neatly cut out and remove damaged or deteriorated sealant, prepare and

prime surfaces, and install new sealant. Replace sealant immediately so new sealant is indistinguishable from original Work.

B. Field-Adhesion Testing: Testing and Inspection Agency shall perform non-destructive and destructive field adhesion tests on sealant in accordance with ASTM C1521.
   1. Destructive testing (Method A):
      a. Cut 6-inch-long tail of sealant loose from substrate.
      b. Mark tail 1 inch from adhesive bond.
      c. Grasp tail 1 inch from adhesive bond and pull until tail extends to 2x the published movement capability of sealant. If sealant has not failed, continue pulling to failure.
      d. Record elongation at failure and if failure was adhesive or cohesive.
      e. Observe sealant for complete filling of joint with absence of voids, and for joint configuration in compliance with requirements. Record observations and sealant dimensions
      f. Perform test every 250 feet.
   2. Test reports shall include date when sealant was installed, name of person who installed sealant, test date, test location, and whether primer was used.
   3. Immediately after testing, Contractor shall replace failed sealant in test areas. Neatly cut out and remove failed sealant, prepare and prime surfaces, and install new sealant. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
   4. Sealant not evidencing adhesive failure from testing or noncompliance with requirements will be considered satisfactory.
   5. Where Engineer determines that sealant has failed adhesively from testing or does not comply with requirements, additional testing will be performed to determine extent of non-conforming sealant. Neatly cut out and remove non-conforming sealant, prepare and prime surfaces, and install new sealant. Perform field adhesion tests on new sealant. Additional testing and replacement of non-conforming sealant shall be at Contractor's expense.

END OF SECTION

PERSIGO WASTE WATER TREATMENT PLANT
Flow Equalization Basin Rebuild
Project Specific Specifications

2145 River Road
Grand Junction, Colorado 81505

April 7, 2021
WJE No. 2019.3776

Prepared for:
City of Grand Junction
Public Works
333 West Avenue, Bldg C
Grand Junction, Colorado 81501

Prepared by:
Wiss, Janney, Elstner Associates, Inc.
3609 South Wadsworth Boulevard, Suite 400
Lakewood, Colorado 80235
303.914.4300 tel | 303.914.3000 fax

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SECTION 00 01 10

TABLE OF CONTENTS

END OF SECTION

INSTALLER'S WARRANTY FOR CONCRETE AND CONCRETE REBUILD

Installer: _____

Address: _____

Owner: _____

Owner Address: _____

Project Address: _____

Building Name: _____

Area of Work: _____

Substantial Completion Date: _____

Warranty Period: ___ years

Expiration Date: _____

AND WHEREAS Concrete Installer has contracted, either directly with Owner or indirectly as subcontractor, to warrant said Work against faulty or defective materials and workmanship for designated Warranty Period,

NOW THEREFORE Concrete Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period it will, at its own cost and expense, make or cause to be made such repairs to or replacement of said Work as are necessary to correct faulty and defective Work and warrants against the following.

1. Components of the concrete that does not comply with requirements; that do not maintain general durability; or that deteriorate in a manner not clearly specified as an inherent quality of the material for the application indicated, regardless of whether the Work was previously accepted by Owner.

2. Delamination of the cementitious material from the substrate concrete or delamination within the material itself.

3. Surface defects, including but not limited to: blisters; curling; delamination; dusting; popouts; scaling (including mortar flaking); spalling.

4. Cracking. Including, but not limited to, those due to inadequate thickness or improperly cut or placed control joints.

5. Damage by exposure to foreseeable weather.

Warranty is made subject to the following terms and conditions:

1. Specifically excluded from Warranty are damages to Work and other parts of the building, and to building contents, caused by:
   a. lightning;
   b. fire;
   c. activity adjacent to Work by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner's Representative.

2. When Work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Concrete Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Concrete Installer is responsible for damage to Work covered by Warranty but is not liable for consequential damages to building, pedestrians or vehicles using the Work.
4. During Warranty Period, if Owner allows alteration of Work by anyone other than Concrete Installer, including cutting, patching, and maintenance, Warranty shall become null and void on date of said alterations, but only to extent said alterations affect Work covered by Warranty. If Owner engages Concrete Installer to perform said alterations, Warranty shall not become null and void unless Concrete Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate Work, thereby reasonably justifying limitation or termination of Warranty.
5. Owner will promptly notify Concrete Installer of observed, known, defects, or deterioration and will afford reasonable opportunity for Concrete Installer to inspect Work and to examine evidence of such defects, or deterioration. Concrete Installer shall inspect defect, or deterioration within 72 hours of notification.
6. If permanent repair or replacement of warranted condition cannot be made immediately, due to weather conditions, availability of appropriate labor or materials, building occupancy, etc., Concrete Installer must make, or cause to be made, immediate temporary repairs to prevent any further damage, deterioration, or unsafe conditions. Permanent repair or replacement of warranted condition shall be scheduled as soon thereafter as practical, and with Owner's consent and approval.
7. If Owner notifies Concrete Installer of warranted condition that requires immediate attention to prevent potential injury or damage, and Concrete Installer cannot or does not promptly inspect and repair same, either permanently or temporarily, then Owner may make, or cause to be made, such temporary repairs as may be essential and Concrete Installer will reimburse Owner for cost of such repairs. Such action will not relieve Concrete Installer of its obligation to perform any necessary permanent repairs, and Warranty shall remain in full force and effect for remaining portion of its original term.
9. Concrete Installer shall provide equipment, labor, and material required to remedy warranted conditions, including repair or replacement of damage to other work resulting therefrom, and removal and replacement of other work required to access warranted condition. Additional required work will be at Concrete Installer’s sole expense for full term of Warranty. Warranty includes removal and replacement of concrete and sealants.
10. Warranty is recognized to be only Warranty of Concrete Installer on said Work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of Concrete failure. Specifically, Warranty shall not operate to relieve Concrete Installer of responsibility for performance of original Work according to requirements of Contract Documents, regardless of whether Contract was directly with Owner or with Owner’s General Contractor.

IN WITNESS THEREOF, and intending to be legally bound hereby, Concrete Installer has caused this document to be executed by undersigned, duly-authorized officer.

By: _____ Corporate Seal:
(Signature of Concrete Installer)

_____
(Name)

_____
(Date)

Notary Public Seal:

Subscribed and sworn before me this _____day of _____, _____

My commission expires _____

INSTALLER'S WARRANTY FOR JOINT SEALANT

Sealant Installer: _____

Sealant Installer Address: _____

Owner: _____

Owner Address: _____

Project Address: _____

Building Name: _____

Area of Work: _____

Substantial Completion Date: _____

Warranty Period: _____years

Expiration Date: _____

AND WHEREAS Sealant Installer has contracted, either directly with Owner or indirectly as subcontractor, to warrant said Work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

NOW THEREFORE Sealant Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period it will, at its own cost and expense, make or cause to be made such repairs to or replacement of said Work as are necessary to correct faulty and defective Work and as are necessary to maintain said Work in watertight condition, and warrants against the following.

1. Components of sealant system that do not comply with requirements; that do not remain watertight; that fail in adhesion, cohesion, or general durability; or that deteriorate in a manner not clearly specified by submitted sealant manufacturer's data as an inherent quality of the material for the application indicated, regardless of whether the Work was previously accepted by Owner.
2. Damage by exposure to foreseeable weather; and damage by intrusion of foreseeable wind-borne moisture.

Warranty is made subject to the following terms and conditions:

1. Specifically excluded from Warranty are damages to Work and other parts of the building, and to building contents, caused by:
    a. lightning;
    b. fire;
    c. failure of sealant substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    d. activity adjacent to sealant Work by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner's Representative.
    e. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.
    f. Excessive joint movement caused by structural settlement or errors attributable to design or construction, resulting in stresses in sealant exceeding sealant manufacturer's written specifications for sealant elongation or compression.

2. When Work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Sealant Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Sealant Installer is responsible for damage to Work covered by Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of Work.
4. During Warranty Period, if Owner allows alteration of Work by anyone other than Sealant Installer, including cutting, patching, and maintenance, Warranty shall become null and void on date of said alterations, but only to extent said alterations affect Work covered by Warranty. If Owner engages Sealant Installer to perform said alterations, Warranty shall not become null and void unless Sealant Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate Work, thereby reasonably justifying limitation or termination of Warranty.
5. Owner will promptly notify Sealant Installer of observed, known, or suspected leaks, defects, or deterioration and will afford reasonable opportunity for Sealant Installer to inspect Work and to examine evidence of such leaks, defects, or deterioration. Sealant Installer shall inspect leak, defect, or deterioration within 24 hours of notification.
6. If permanent repair or replacement of warranted condition cannot be made immediately, due to weather conditions, availability of appropriate labor or materials, building occupancy, etc., Sealant Installer must make, or cause to be made, immediate temporary repairs to prevent any further damage, deterioration, or unsafe conditions. Permanent repair or replacement of warranted condition shall be scheduled as soon thereafter as practical, and with Owner's consent and approval.
7. If Owner notifies Sealant Installer of warranted condition that requires immediate attention to prevent potential injury or damage, and Sealant Installer cannot or does not promptly inspect and repair same, either permanently or temporarily, then Owner may make, or cause to be made, such temporary repairs as may be essential and Sealant Installer will reimburse Owner for cost of such repairs. Such action will not relieve Sealant Installer of its obligation to perform any necessary permanent repairs, and Warranty shall remain in full force and effect for remaining portion of its original term.
9. Sealant Installer shall provide equipment, labor, and material required to remedy warranted conditions, including repair or replacement of damage to other work resulting therefrom, and removal and replacement of other work required to access warranted condition. Additional required work will be at Sealant Installer’s sole expense for full term of Warranty. Warranty includes removal and replacement of sealant-backer material and sealant.
10. Warranty is recognized to be only Warranty of Sealant Installer on said Work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of sealant failure. Specifically, Warranty shall not operate to relieve Sealant Installer of responsibility for performance of original Work according to requirements of Contract Documents, regardless of whether Contract was directly with Owner or with Owner’s General Contractor.

IN WITNESS THEREOF, and intending to be legally bound hereby, Sealant Installer has caused this document to be executed by undersigned, duly-authorized officer.

By: _____ Corporate Seal:
(Signature of Sealant Installer)

_____
(Name)

_____
(Date)

Notary Public Seal:

Subscribed and sworn before me this _____day of _____, _____

My commission expires _____

SECTION 01 00 00

GENERAL

PART 1 GENERAL

1.1 PROJECT SPECIFIC REQUIREMENTS

A. The Standard Specifications for Road and Bridge Construction, as well as the Standard Specifications for Construction of Underground Utilities Water Lines, Sanitary Sewers, Storm Drains, Underdrains and Irrigation Systems do not apply to this project. Any references to those documents in the contract shall be replaced by the requirements of the project specific documents.

B. Standard Details for Construction of Streets, Trails, Storm Drains and Utilities do not apply to this project. Any references to those documents in the contract shall be replaced by the requirements of the project specific documents.

C. Project specific requirements shall take precedence over general conditions or standard documents.

D. Warranty period for specific Work items are not intended to supplement the general Contractor's Warranty and Guarantee.

1.2 DEFINITIONS

A. The definitions here shall supplement, or replace, those found in the City of Grand Junction General Contract Conditions.
   1. As-Built Documents: See Project Record Documents.
   2. Owner: See City.
   3. Project Record Documents: Contract documents marked by the Contractor to identify changes that were made during construction.
   4. Request for Information (also known as RFI): A question or inquiry about the Work submitted by the Contractor for clarification by the Owner or Engineer.

1.3 REFERENCES

A. References to industry standards shall refer to the latest edition or version of each as of the date of the first specification publish date, unless otherwise noted.

1.4 ADMINISTRATIVE

A. Requests for Information (RFI): Contractor shall submit RFIs to the Engineer for any condition which is believed to be at variance with the Contract Documents, or for situations where it is unclear what the Contract Documents are implementing. RFIs shall be submitted in writing to the Engineer and shall include a location, date requested, date required and indicate which repair item or item(s) are impacted by the request. Allow a minimum of 3 working days for review by Engineer.

B. Maintain at least one copy of each referenced standard, this Project Manual (Specifications), Drawings and/or Figures at the job site. In addition, maintain copies of all site visit reports (SVR) and Sketches (SKs) issued by the Engineer during Construction.

C. Provide a project superintendent at the Site a minimum of eight hours per day during the progress of the Work. The superintendent shall be literate and fluent in English.

D. Photograph existing conditions that are important to the construction or that deviate substantially from the Contract Documents; significant conditions that will be concealed by the Work; finish surfaces that might be misconstrued as damage caused by removal or other Work operations; and immediate follow-up when on-site events result in construction damage or loss. Photographs shall be of sufficient quality as to depict the condition being photographed. Provide photographs to Owner or Engineer upon request, either during project or after completion.

1.5 TEMPORARY FACILITIES AND CONTROLS

A. Contractor to furnish and pay for all temporary facilities and controls listed below which are not explicitly designated as responsibility of Owner.

B. Comply with Owner's limitations and restrictions for Site use and accessibility.
   1. Comply with all security procedures.

C. Project has special requirements for coordinating Work because of the following conditions:
   1. Owner will occupy premises outside of Work area during construction period.
      a. Cooperate with Owner to minimize conflicts and facilitate Owner usage.
      b. Perform Work to avoid interference with Owner's day-to-day operations. Notify Owner's Representative at least 72 hours in advance of activities that will affect Owner's operations.
      c. Maintain vehicular, pedestrian, and emergency and normal access to portions of facility that are in use. Keep entrances and exits clear of stored materials and construction equipment.
      d. Short interruptions in access may be permitted if approved in advance in writing by the Owner's Representative.
      e. Schedule deliveries to minimize interruptions.
      f. Do not disturb Site outside of Work area.
      g. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted and then only after arranging to provide temporary utility services according to requirements indicated.
      h. Notify Owner not less than 7 days in advance of proposed utility interruptions.
      i. Do not proceed with utility interruptions without Owner's written permission.

D. Staging:
   1. Staging areas must be coordinated with Owner prior to mobilization.
   2. Confine materials and equipment to the staging and work areas. Contractor assumes full responsibility for the protection and safekeeping of items stored on site.
   3. Do not unreasonably encumber Site with materials or equipment.
   4. Do not load Project structure with weight that will endanger Project structure.

E. Parking: Construction personnel shall park on-site in areas designated by the Owner's Representative.

F. Water Service: Use of Owner's existing water service will be permitted.
   1. Provide connections and extensions of service as required for construction operations.
   2. Provide additional water as necessary.

G. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel at location designated by Owner's Representative.
   1. Provide disposable supplies, including toilet tissue, paper towels, and paper cups. Maintain adequate supply. Provide covered waste containers for disposal of used material.
   2. Service toilets at least twice weekly.
   3. Provide wash facilities supplied with potable water at convenient locations for personnel who handle materials that require clean up. Supply cleaning compounds appropriate for each type of material handled. Dispose of drainage properly.
      a. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
   4. Comply with public authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

H. Electric Power Service: Use of Owner's existing electric 120V electric outlets will be permitted. Any power requirements above existing 120V outlets will need to be provided.
   1. As necessary, provide additional electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Do not overload Owner's service.
   2. Comply with NECA 200 and NFPA 70.
   3. Maintain temporary service in safe condition and utilize in safe manner.

I. Use of Existing Stairs: Use of Owner's existing stairs will be permitted, as long as stairs and elevators are cleaned and maintained in condition acceptable to Owner's Representative.
   1. Coordinate daily usage with Owner's Representative and with requirements for facility operations.
   2. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs, elevator cars, and entrance doors and frame, and to maintain means of egress.
   3. At Substantial Completion, restore stairs and elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

J. Lighting: Owner will provide existing lighting at existing locations.
   1. Provide additional lighting, as necessary, with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   2. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

K. Provide insulation or temporary heating as necessary for curing, drying, and protection of installed construction.
   1. Select equipment that will not have harmful effect on completed installations or elements being installed.
   2. Maintain temporary heating on 24-hour basis until no longer needed.
   3. Unless noted otherwise, insulation is considered incidental to construction and will not be paid for separately.
   4. Unless otherwise specified, temporary heating will not be considered part of Work and will be paid as additional Work item. Notify Owner's Representative in advance of need for temporary heating and estimated added cost. Do not proceed with temporary heating until authorized in writing by Owner's Representative.

L. Snow removal: The contractor shall be required to remove snow from the work area.

M. Equipment:

1. Direct equipment exhaust away from occupied spaces and vent equipment operating within structure to outside.
2. Operate equipment at noise levels conforming to requirements of city, state, and federal laws and codes, and Owner limitations.

N. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of public authorities having jurisdiction. Construction debris shall be removed in a manner that avoids overloading adjacent structural members.

O. Protection:
1. Limit access to work areas.
2. Contractor shall provide protective barriers, fences, etc. to ensure the safety of pedestrians and vehicular traffic during the Work. All barriers and fences shall comply with local, state, and federal regulations and laws.
3. Provide adequate signage to direct pedestrian and vehicular traffic around the area under construction.
4. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, building, and other surfaces that could be harmed by such contact.
5. Existing Drains:
   a. Verify that drains in or near Work area are open and free flowing prior to start of Work.
   b. Lawfully remove construction effluent from Site. Do not allow construction debris to flow into existing drains or sewer systems.
   c. Rout or replace clogged drain lines at completion of Work.
6. Confine dust, debris and fumes to Work area and prevent from entering areas outside of the Work area.
7. Protect finished surfaces against damage.
8. Contractor shall be responsible for maintaining the water tightness of the areas of the structure being worked on during the course of the work. Providing temporary protection of the existing construction or structure from the weather until removed portions are completely replaced with new construction. The costs of damage and repairs shall be made at no cost to the Owner.
9. Maintain all protection in operable condition for the full duration of the project.

P. Temporary Fencing:
1. Tree and Plant Protection: Install temporary fencing located as indicated or outside drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
2. Site Enclosure Fence: Before construction operations begin, provide Site enclosure fence in manner that will prevent people and animals from easily entering Site except by entrance gates.

Q. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241. Coordinate with Owner's safety team.
1. Provide portable, UL-rated fire extinguishers with class and extinguishing agent as required by locations and classes of fire exposures.
2. Prohibit smoking on Site.
3. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of public authorities having jurisdiction.

4. Store combustible materials in approved safety containers and enclosures, away from building if possible.
5. Develop and supervise overall fire-prevention and -protection program for personnel at Site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

PART 2 PRODUCTS

2.1 GENERAL

A. The products specified are believed to have properties adequate for successful completion of the Work. If the Contractor has found these products to be unacceptable or has had difficulty using these materials, the Contractor shall notify the Engineer in writing, and provide a request for substitution of material for which the Contractor has had successful experience.

B. No product substitutions will be allowed unless otherwise noted. Engineer's approval must be obtained for all substitutions prior to being awarded the project. Submit requested substitutions with bid form.

2.2 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in original containers and packaging with seals unbroken, labeled with manufacturer’s name, product brand name and type, date of manufacture, lot number, directions for storing, and complete manufacturer’s written instructions.

B. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, or installation. Reject and remove from Site new materials which have been exposed to moisture to their detriment.

C. Store and handle materials in accordance with manufacturer’s written instructions, safety requirements, and all applicable laws and regulations. Remove from Site, and replace at no cost to Owner, any materials that are damaged or otherwise negatively affected by not being stored or handled in accordance with manufacturer’s written instructions.

D. Store materials in original, undamaged containers and packaging in clean, dry, location on raised platforms and protected from weather, within temperature range required by manufacturer. Protect stored materials from direct sunlight and sources of ignition. Manufacturer’s standard packaging and covering alone is not considered adequate weather protection.

E. Locate materials in a secure location approved by Owner’s Representative.

F. Conspicuously mark damaged or opened containers, containers with contaminated materials, damaged materials, and materials that cannot be used within stated shelf life and remove from Site as soon as possible. Replace discarded materials in a timely manner at no cost to Owner.

G. Limit stored materials on structures so as to preclude damage to materials and structures.

H. Maintain copies of all applicable Safety Data Sheets (SDS) with materials in storage area, such that they are available for ready reference on Site.

PART 3 EXECUTION

3.1 DISCOVERY, FIELD VERIFICATION AND CHANGES IN WORK

A. Contractor shall verify all quantities. Quantities shown are for estimating purposes only.

B. Do not scale drawings. The Contractor shall field verify the existing dimensions and existing conditions prior to starting the work. Dimensions of the new construction shall be adjusted as necessary to fit the existing conditions. The Engineer shall be notified in writing of any significant deviations from the dimensions or conditions shown on these drawings.

C. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials or mislocation of embedded elements such as reinforcing steel, which may interfere with proper execution of the Work. Promptly report to Engineer as a request for information any of these conditions.

3.2 EXAMINATION FOR MATERIAL COMPLIANCE

A. Examine substrates and conditions with installer and manufacturer's representative, where appropriate, for compliance with requirements and for other conditions affecting installation or performance of the material.
   1. Verify dimensions so that proper installation of material for optimal performance is maintained.
   2. Ensure that work done by other trades is complete.
   3. Verify that areas and conditions under which Work is to be performed permit proper and timely completion of Work.
   4. Notify Engineer in writing of conditions which may adversely affect installation or performance of the material and recommend corrections.
   5. Do not proceed with Work until adverse conditions have been corrected and reviewed by Engineer.
   6. Commencing Work constitutes acceptance of Work surfaces and conditions.

3.3 CLEANING

A. Immediately clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

B. At the end of each workday, broom-clean Site and Work areas and place all items to be discarded in appropriate containers.

C. After completing Work:
   1. Clean all materials resulting from Work that are not intended to be part of the finished Work using appropriate cleaning agents and procedures. Exercise care to avoid damaging surfaces.
   2. Repair at no cost to Owner all items damaged during the Work.
   3. Remove and legally dispose of debris and surplus materials from Site.

3.4 PROTECTION

A. Take precautions to ensure safety of people (including building users, passers-by, and workers) and protection of property (including adjacent building elements, landscaping, and motor vehicles).
   1. Erect temporary protective canopies and walls, as necessary, at walkways and at points of pedestrian and vehicular access that must remain in service during Work.

B. Cover adjacent surfaces with materials that may be damaged.

C. Protect paving and adjacent areas from mechanical damage due to construction equipment.

D. Prevent dust, debris, coating overspray/spatter, and other construction materials from coming into contact with surfaces that could be harmed by such contact.

E. Limit access to Work areas.

F. Comply with manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products.

G. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

H. Protect from damage, all elements of completed work and original construction to remain.

I. Protect Work during and after completion from contact with contaminating substances and from damage, so materials are without deterioration or damage at time of Substantial Completion.

END OF SECTION

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Contractor's bids shall be based on providing products or methods exactly as specified.

B. For products or methods specified only by reference or performance standards, select a product that meets or exceeds standards according to manufacturer's information. Product selection will be subject to Engineer's approval.

C. For products or methods specified by naming several products or manufacturers, select product and manufacturer named.

D. Where the phrase "or equal" occurs in the Contract Documents, do not assume that the materials, equipment, or methods will be approved as equal unless the item has been specifically approved for this Work by Engineer. The decision of Engineer shall be final.

1.2 SUBSTITUTIONS, CONTRACTOR OPTIONS

A. No substitutions will be considered after Notice of Award except under one or more of the following conditions:
   1. Substitutions for compliance with final interpretations of code requirements or insurance regulations.
   2. Unavailability of specified products or methods, through no fault of Contractor.
   3. Subsequent information discloses inability of specified products or methods to perform properly or to fit in designated space.
   4. Manufacturer/fabricator refusal to certify or guarantee performance of specified products or methods as specified.
   5. When a substitution would be substantially to Owner's best interests.

1.3 SUBSTITUTION REQUIREMENTS

A. Submit four copies of each request for substitution. Include in request:
   1. Complete data substantiating compliance of proposed substitution with Contract Documents.
   2. For products:
      a. Product identification, including manufacturer's name and address.
      b. Manufacturer's literature, including product description; performance and test data, and reference standards; samples; and name and address of similar projects on which product was used and date of installation.
   3. For construction methods:
      a. Detailed description of proposed method.
      b. Drawings illustrating methods.
   4. Itemized comparison of proposed substitution with products or methods specified.
   5. Data relating to changes in construction schedule.
   6. Identify other contracts affected and changes or coordination required.

7. Accurate cost data on proposed substitution in comparison with products or methods specified.

B. In making requests for substitutions, Contractor represents:
   1. They have personally investigated proposed product or method and determined that it is equal or superior to that specified in every respect.
   2. They will provide the same guarantee for substitution as for products or methods specified.
   3. They will coordinate installation of accepted substitutions into Work, making changes for Work to be complete in every respect.
   4. Cost data is complete and includes related costs under their contract, but excludes:
      a. Costs under separate contracts
      b. Engineer's redesign
      c. Administrative costs of Engineer
   5. They will assume full responsibility for all additional costs and expenses for Owner, Engineer, and other Contractors.

C. Substitutions will not be considered when:
   1. They are indicated or implied on Shop Drawings or product data submittals without formal request submitted in accordance with the Specifications.
   2. Acceptance will require substantial revision of Contract Documents.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Administrative and procedural requirements for submitting shop drawings, product data, samples, and other submittals.

B. Reference the Schedule of Submittals for a summary of required submittals.

1.2 SUBMITTALS

A. General:
   1. Identification: Include a permanent label or title block on the submittal or cover sheet, with the following information.
      a. Project name.
      b. Date.
      c. Names of Engineer, Contractor, subcontractor, manufacturer, supplier, and firm or entity that prepared submittal, as appropriate.
      d. Identification information, such as the number and title of the appropriate Specification section, Drawing number and detail references, location(s) where product is to be installed, or other necessary information.
      e. Label each submittal with Specification section number followed by decimal point and then sequential number (e.g., 06100.01). On resubmittals, include alphabetic suffix after another decimal point (e.g., 06100.01.A).
      f. Provide space approximately 6 by 8 inches on or beside the label or title block for the Contractor's approval stamp and the action stamp of the Engineer.
   2. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
   3. Submit one electronic copy of prints in PDF format. Prints shall have white background and dark lettering and line work. Prints will be returned electronically.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not use reproductions of the Contract Documents or standard printed data.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Dimensions, including notation of those established by field measurement.
      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. Notation of coordination requirements.
      i. Relationship to adjoining construction clearly indicated.
      j. Seal and signature of professional Engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8 1/2 by 11 inches but no larger than 30 by 42 inches.
3. Submit one electronic copy of prints in PDF format. Prints shall have white background and dark lettering and line work. Prints will be returned electronically.

C. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. Clearly mark each copy of the submittal to show which products and options are applicable. Delete information which is not applicable. Supplement standard information with project-specific information.
   2. Include the following information, as applicable:
      a. Manufacturer's catalog cuts, product specifications, schematic drawings, installation instructions, and written recommendations.
      b. Compliance with referenced standards.
      c. Testing by recognized testing agency.
      d. Include manufacturer's literature including written instructions for evaluating, preparing, and treating substrate.
      e. Technical data including tested physical and performance properties
      f. Mixing and application or placement instructions.
   3. Include temperature ranges for storage and application of materials, and special cold-weather application requirements or limitations.
   4. Include Globally Harmonized System (GHS) Safety Data Sheets or, if not yet available, Material Safety Data Sheets. For information only.

D. Samples: Submit physical samples to illustrate functional and aesthetic characteristics of the product, for review of materials and workmanship, for compatibility with other elements, and for comparison with the actual installed elements.
   1. Samples shall be of sufficient size to show the general visual effect.
   2. Include sets of at least three samples that show the full range of color, pattern, texture, graining, and finish.
   3. Transmit samples that contain multiple, related components, such as accessories, together in one submittal package.
   4. Identification: Attach a label on an unexposed side of each sample that includes the following:
      a. Generic description of sample.
      b. Product name, name of manufacturer, and sample source.
      c. Number and title of appropriate Specification section.
   5. Samples for Initial Selection: Submit two full sets of units or sections of units from the supplier's product line, showing the full range of colors, textures, and patterns available. Engineer will retain one set and return one set with the options selected.
   6. Samples for Verification: Submit full-size units or samples of the size indicated, prepared from the same material to be used for the Work, cured and finished in the manner specified, and physically identical with material or product proposed for use, and that show the full range of color and texture variations expected.
      a. Submit the number of samples required by the Contractor plus one that will be retained by the Engineer. Mark up and retain one returned sample as a Project Record Document.
   7. Maintain approved samples at the Site, available for quality-control comparisons during construction. Samples may be used to determine final acceptance of construction associated with the sample.

E. Delegated Design:
   1. Where required by the Contract Documents, in addition to shop drawings, product data, and other required submittals, submit a statement, signed and sealed by responsible design professional, for each product and system specifically assigned to the Contractor to be designed or certified by a design professional.
      a. Indicate that products and systems comply with performance and design criteria in the Contract Documents.
      b. Include a list of codes, loads, and other factors used in performing these services, and signed and sealed design calculations where required.
      c. Electronic submittals in PDF format are preferred; however, print copies will be accepted. Submit number of prints needed by contractor plus two for retention by the Owner and Engineer.

1.3 SUBMITTAL PROCEDURE

A. Coordinate the preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals requiring concurrent review, and related activities that require sequential activity.
   2. Allow sufficient time for submittal and resubmittal review. Failure to provide sufficient time for submittal and resubmittal reviews will not be a basis for extension of the Contract Time.

B. Review Time:
   1. Allow five working days for the review of each submittal and resubmittal.
   2. Allow additional time if coordination with subsequent submittals is required. The Engineer will advise the Contractor when the submittal being processed must be delayed for coordination.
   3. Time for review shall commence when the Engineer receives the submittal.

C. Contractor Review:
   1. Review each submittal, coordinate with other Work, and check for compliance with the Contract Documents. Verify field dimensions and conditions. Identify variations from the Contract Documents and product or system limitations that may be detrimental to the successful performance of completed Work. Note corrections.
   2. Before submitting to the Engineer, stamp with a uniform approval stamp including the reviewer's name; the date of Contractor's approval; and a statement certifying that the submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
   3. Submittal Log: Maintain submittal log that lists submitted items per specification section. Record dates submitted, dates returned, and disposition of each item based on Engineer's review. Submit final log showing approved materials at Substantial Completion.

D. Transmittal: Package each submittal individually and appropriately for transmittal and handling.

E. Engineer Action:
   1. Engineer will not review submittals that are received from sources other than the Contractor or that do not bear the Contractor's approval stamp, and will return them without action to the Contractor.
   2. Engineer will not return submittals requested for information only.
   3. Engineer will review each submittal for conformance with the design concept of the Project and compliance with the Contract Documents. Engineer will make marks to

indicate corrections or modifications required, and stamp with an action stamp. The action stamp will include the reviewer's name, date of review, and required Contractor action. Contractor actions may include making corrections or modifications to the submittal or resubmitting the submittal, or both.

F. Resubmittals: Make resubmittals in the same form and number of copies as the initial submittal.
   1. Note the date and content of previous submittal.
   2. Note the date and content of the revision in the label or title block and clearly indicate the extent of the revision and changes made.
   3. Resubmit until the Engineer indicates that no resubmittal is required.
      a. No resubmittal is required when submittal is marked "No Exceptions Taken" or "Make Corrections Indicated".

G. Distribution: Furnish copies of the final submittals to the Site file, the record documents file, manufacturers, subcontractors, suppliers, fabricators, installers, public authorities having jurisdiction, and others as necessary for performance of construction activities. Show the distribution on the transmittal forms.

H. Use only the final submittals with the Engineer's action stamp, for construction.
   1. Only items marked "No Exceptions Taken" or "Make Corrections Indicated" shall be used for construction.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Administrative and procedural requirements for quality assurance and quality control, testing, special inspections and mockups.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated, and do not relieve the Contractor of responsibility for compliance with requirements of the Contract Documents.
   1. Specified tests, inspections, and related actions performed by others do not limit the Contractor's other quality assurance and quality control procedures that facilitate compliance with requirements of the Contract Documents.
   2. Requirements for the Contractor to provide quality assurance and quality control services required by the Engineer, Owner, or public authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections:
   1. See sections in Divisions 02 through 09, and Drawings sheets for specific test and inspection requirements.

1.2 DEFINITIONS

A. Quality Assurance Services: Activities, actions, and procedures performed before and during the execution of the Work to guard against defects and deficiencies and substantiate that the proposed construction will comply with requirements.

B. Quality Control Services: Tests, inspections, procedures, and related actions during and after the execution of the Work to evaluate that the actual products incorporated into the Work and the completed construction comply with requirements.
   1. Services do not include contract enforcement activities performed by the Engineer, such as observations.

C. Testing Agency (also known as Third Party Testing Agency): Entity responsible for performing specified testing or special inspections in Divisions 02 through 09 and on the Construction Drawings.

D. Special Inspector: A qualified person employed or retained by an approved agency (such as the testing agency), and approved by the building official as having competence necessary to insect a particular type of construction requiring special inspection.

E. Special Inspection: Review of completed work or work in progress performed by the Special Inspector, or where specifically identified, by the Engineer. Items typically required by the governing building code.

1.3 COMPLIANCE CRITERIA

A. General: If compliance with two or more standards is specified and standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement.

B. Minimum Quantity or Quality Level: 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.

C. Refer uncertainties to the Engineer for a decision before proceeding.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 QUALITY CONTROL

A. Reference the Special Inspection Schedule on the Construction Drawings for special inspection requirements for this section.

B. Owner Responsibilities: The Owner will engage a qualified testing agency to perform all special inspections and select testing as explicitly identified in the Contract Documents.
   1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and descriptions of types of testing and inspecting they are engaged to perform.
   2. 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 the Contractor.

C. Testing Agency/Special Inspector Responsibilities: Cooperate with the Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Determine location from which test samples will be taken and in which in-situ tests are conducted.
   2. Notify the Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   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 of each test, inspection, and similar quality control service.
   5. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
   6. Do not perform any duties of the Contractor.

D. Engineer Responsibilities: Engineer may perform some testing on completed on in-process work as noted in the Contract Documents.

E. Tests and inspections not explicitly assigned to the Owner or Engineer, and testing and inspecting requested by the Contractor and not required by the Contract Documents, are the Contractor's

responsibility. Unless otherwise indicated, provide quality control services specified and those required by public authorities having jurisdiction, whether specified or not.

F. Coordination: Coordinate the sequence of activities to accommodate the required quality assurance and quality control services with a minimum of delay and to avoid the necessity of removing and replacing construction to accommodate testing and inspecting.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.
   2. Notify the testing agency sufficiently in advance of operations to permit assignment of personnel.

G. Associated Services: Cooperate with the Engineer and testing agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Provide the following:
   1. Submittals of concrete mix designs and other materials and products necessary for the testing agency to test and evaluate field work.
   2. Access to the Work.
   3. Incidental labor and facilities necessary to facilitate tests and inspections.
   4. Adequate quantities of representative samples of materials that require testing and inspecting. Assist the testing agency in obtaining samples.
   5. Facilities for storage and field curing of test samples.
   6. Security and protection for samples and for testing and inspecting equipment at Site.

H. Repair and Protection:
   1. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   2. Provide materials and comply with installation requirements specified in other sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
   3. Protect construction exposed by or for quality control services.
   4. Repair and protection are the Contractor's responsibility, regardless of assignment of responsibility for quality control services.

END OF SECTION

SECTION 01 70 20

PROJECT CLOSEOUT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Administrative and procedural requirements for contract closeout, including final cleaning; Substantial Completion and final completion procedures.

B. Related Sections:
   1. Divisions 02 through 09 sections for special cleaning and specific closeout requirements for Work in those sections, including warranties.

PART 2 PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by 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

3.1 PROJECT RECORD DOCUMENTS

A. During Work, maintain one set of Drawings and reviewed shop drawings, Specifications, WJE site visit reports, and product data for recording deviations of as-built construction from design information. Include addenda and Contract modifications.
   1. Accurately document and record changes and modifications as soon as possible after they occur, in understandable manner.
   2. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later. Record and check markup before enclosing concealed installations.
   3. Include:
      a. Dimensional changes.
      b. Revisions to Drawing details and details not on Drawings.
      c. Changes made by Change Order or Engineer's written orders or direction based on Site Visit Reports or Construction Observation Reports. Note Change Order numbers, Site Visit Report Item numbers or similar identification.
      d. Field records for variable and concealed conditions.
      e. Record information on Work that is shown only schematically or omitted from Drawings.
      f. Actual products and materials used.
         1) Include product data, specifically marked for Project, and cross-referenced to Specifications, Drawings, and Change Orders.
         2) Include names of manufacturer and Installer, and other information necessary to provide record of selections made.

3) Include significant changes in product delivered to Site and changes in manufacturer's written instructions for installation.

4. Mark record document most capable of showing actual physical conditions completely and accurately. Cross-reference on other record documents.
5. Mark record documents with erasable, red-colored media. Use other colors to distinguish between changes for different categories of Work at the same location.

B. Store Record Documents and samples in field apart from Contract Documents used for construction. Do not use Record Documents for construction purposes. Maintain Record Documents in good order and in clean, dry, legible condition, protected from deterioration and loss. Provide access to Record Documents for Engineer's reference during normal working hours.

C. Prepare final document markup in digital format for submission.
1. Incorporate changes and additional information previously marked on record prints. Erase, redraw, and add details and notations where applicable.
2. Refer questions to Engineer for resolution.
3. For new details and drawings, bind new sheets as necessary to appropriate document.
4. Identify and date each Record Drawing. Include names of project, Engineer, and Contractor, and designation "PROJECT RECORD DOCUMENT" in prominent location.
5. Organize PDF information into separate electronic files that correspond to each sheet of Drawings, report or item. Name each file with identification of item contained.

3.2 FINAL CLEANING

A. General: Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations. Return adjacent surfaces and areas to condition existing before Work began.

B. In areas disturbed by construction activities, complete the following cleaning operations before requesting inspection for certification of Substantial Completion. Clean each surface or unit to the condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions. Employ experienced workers or professional cleaners.
1. Remove tools, construction equipment, machinery, and surplus material from Site.
2. Clean Site, yard, and grounds, including landscaped areas, of rubbish, waste materials, litter, and other foreign substances.
   a. Broom clean paved areas. Remove petrochemical spills, stains, and other foreign deposits.
   b. Rake grounds that are neither planted nor paved to smooth, even-textured surface.
3. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of stains, films, and similar foreign substances. Polish surfaces to achieve specified finish. Avoid disturbing natural weathering of exterior surfaces.
   a. Touchup 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.
      1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
4. Clean and restore transparent and reflective surfaces, such as mirrors and glass in doors and windows, to their original condition. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

5. Remove labels that are not permanent.
6. Remove debris and surface dust from limited access spaces, including plenums, shafts, trenches, equipment vaults, manholes, and similar spaces.
7. Sweep floors broom clean.
8. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove paint and mortar droppings and other foreign substances.
9. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    a. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
10. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
11. Leave Project clean and ready for reuse.

END OF SECTION

SECTION 02 22 00

EXISTING CONDITIONS ASSESSMENT

PART 1 GENERAL

1.1 SCOPE

A. This Section covers observations of existing conditions made by the Engineer at the site as well as additional documentation of site conditions.

1.2 OBSERVATIONS

A. The following figures and captions are provided for reference by the Contractor.

B. The remaining concrete at the north dividing wall has numerous vertical cracks spaced between 0 and 10 feet on-center. In addition, there is a large horizontal crack roughly 3 feet up from the slab on this wall.

C. The south dividing wall has partially collapsed. The collapsed portions of the wall, which are to be removed and properly disposed of, are within Cell 3.

D. The Observations presented in this section do not eliminate the need for the Contractor to visit the site and confirm existing conditions prior to submitting a bid or commencing with Work.

1.3 ADDITIONAL DOCUMENTATION

A. The WJE Geotechnical Report dated October 22, 2019 is available from the Owner and shall be referenced for completion of the Work.

B. The Original Construction Documents are available from the Owner and shall be referenced for completion of the Work.

Figure 1. Overall view of north dividing wall (January 2020).

Figure 2. Closeup of the west end of the north dividing wall showing slope down (June 2020).

Figure 3. Overall view of the south dividing wall (January 2020).

Figure 4. Overall view of the south dividing wall (June 2020)

Figure 5. Remaining roughly 3'-0" tall portion of the south dividing wall where collapsed.

Figure 6. Typical condition of bent #6 reinforcing, at 5 1/2" on-center, from the slab to be repaired.

Figure 7. Chlorine contract area/chamber adjacent to south wall which has been filled with soil.

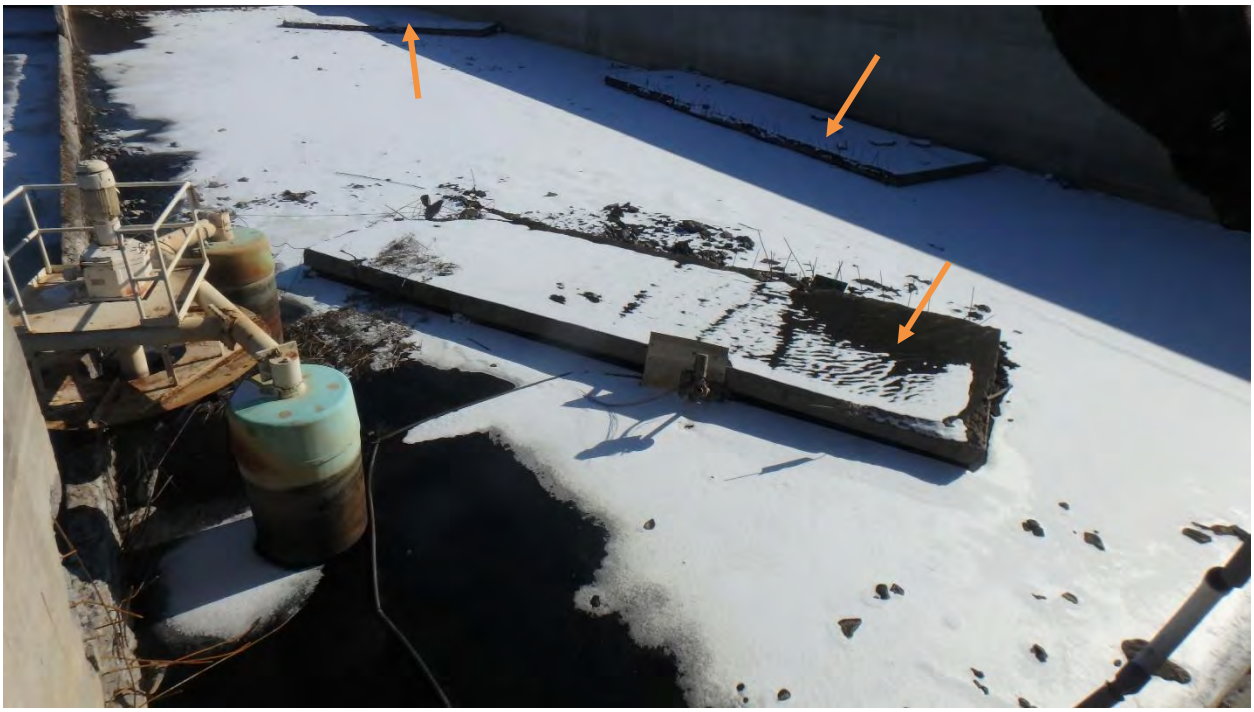

Figure 8. Portions of collapsed wall in Cell 3.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment, and supervision to perform all Work necessary for and incidental to selective demolition in preparation for other Work specified in the Contract Documents. Demolition includes the following:
   1. Remove distressed concrete from rebuild areas indicated on plans as required to perform the Work.
   2. Install and Remove temporary shoring upon completion and curing of rebuild.

1.2 PRICES

A. All Work shall be performed as a lump sum as identified in the bid form.

1.3 REFERENCES

A. American National Standards Institute (ANSI)
   1. ANSI/ASSE A10.6-2006: Safety Requirements for Demolition Operations – American National Standard for Construction and Demolition Operations

B. National Fire Protection Association (NFPA)
   1. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; latest edition

1.4 SUBMITTALS

A. Demolition and disposal plan (information only).
   1. Include equipment and processes proposed for the removal and disposal of material from the project site.

1.5 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

C. Remove and salvage: Detach items from existing construction and securely store away from work area.

D. Existing to remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.6 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition Work similar in material and extent to that indicated for this Project. Submit list of 3 projects of similar size and scope completed over the previous 5 years.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

D. Pre-demolition Meeting: Prior to demolition of various elements, schedule a meeting at the site with Owner and Engineer to verify areas of demolition.

1.7 PROJECT CONDITIONS

A. Conduct selective demolition so that Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner to the extent practical.

C. Notify Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Engineer and Owner. Owner will remove hazardous materials under a separate contract.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1.8 WARRANTY

A. Existing Warranties: Remove, replace, repair, and rebuild materials and surfaces cut or damaged during selective demolition with appropriate methods and materials to maintain existing warranties.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 EXAMINATION

A. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

B. Survey existing concrete element conditions for embedded items, including conduits and embedded anchors, bearing plates, etc.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged, where applicable.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended functions or designs are encountered, investigate and measure the nature and extent of conflict. Notify and promptly submit a written report to Owner and Engineer.

E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities. Promptly notify Owner and Engineer if hazards are encountered.

3.2 PROTECTION

A. Protect existing elements from damage including, but not limited to, railings, concrete, and aluminum members.
   1. Provide temporary controls and barriers.
   2. Protect existing surfaces and features that are to remain from damage that could result from selective demolition Work.
   3. Damage to existing surfaces and features that are a result of selective demolition shall be repaired to the satisfaction of Owner at no cost to Owner.
   4. Monitoring points (elevation and horizontal control) shall be installed prior to removing lower portion of North Wall (if partial demolition option selected). Monitoring points to be monitored during the course of the project for satisfactory performance. Coordinate with Engineer.

3.3 PREPARATION

A. Examine existing conditions of Work, including elements subject to movement or damage during cutting, patching and selective demolition.

B. After uncovering Work, examine conditions affecting installation of new products or performance of Work.

C. Provide protection for other portions of Project.

D. Provide protection from elements.

E. Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walkways, existing utility services, and surrounding site and water.

3.4 SELECTIVE DEMOLITION

A. General: Demolish and remove existing elements only to the extent required by the Work and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction.
   2. Cut or drill into concealed surfaces from the exposed or finished side to avoid marring existing finished surfaces.
   3. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on structure.
   4. Dispose of demolished items and materials promptly and daily.

B. Concrete
   1. Remove concrete from areas as indicated on plans or as required to perform the required Work.

C. Steel
   1. Remove exposed and embedded steel elements indicated on plans or as required to perform the required Work.

D. Upon completion of rebuild, temporary shoring shall be removed. Temporary shoring may not be removed until structure is fully self-supporting and concrete rebuilds meet strength as specified in Section 03 31 00. Contractor to rebuild concrete areas related to temporary shoring.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition.

3.5 ALUMINUM

A. Remove aluminum handrails where indicated.

3.6 CUTTING AND PATCHING

A. Execute cutting required to:
   1. Interface new and existing Work.
   2. Make several parts fit properly.
   3. Uncover Work to provide for installation of ill-timed Work.
   4. Remove and replace defective Work.
   5. Remove and replace Work not conforming to requirements of Contract Documents.

B. Do not cut structural members without coordination with and approval by Engineer.

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

D. Execute cutting and demolition by methods that will prevent damage to other Work, and will provide proper surfaces to receive installation of rebuild and new Work.

E. Restore Work that has been cut or removed; install new products to provide completed Work in accordance with requirements of Contract Documents.

F. Refinish entire surfaces as necessary to provide an even finish:
   1. Continuous surfaces: To nearest intersections.
   2. Assembly: Refinish entirely.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

A. Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project Site and legally dispose of them at the end of each Workday.

B. Do not burn demolished materials.

3.8 CLEAN UP

A. Regulated clean-up procedures are to be followed if any of the site is affected. Contact Owner immediately if the site is disturbed by Work.

B. Clean adjacent sites and buildings of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

C. Conduct post-demolition assessment of adjacent structures with Owner and Engineer. Compare with pre-demolition assessment to identify damage.

END OF SECTION

SECTION 03 01 01

SHORING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Supply, installation, and removal of temporary shoring.

1.2 PRICES

A. All Work shall be performed as a lump sum in accordance with the Option selected for each wall, as applicable and identified in the bid form.

1.3 COORDINATION

A. Coordinate with Owner's Representative and with other trades to ensure that shoring does not interfere with Owner use of Site or Work of other trades.

1.4 SUBMITTALS

A. Shop Drawings: Shop drawings showing locations, distribution, and quantity of shoring. Include connection and bearing details. Incude loads for which shoring was designed. Shop drawings shall be prepared by or under supervision of qualified, licensed professional engineer and shall be sealed by engineer.

B. Product Data (for information only): Manufacturer's literature and technical data indicating type of shoring proposed for use and safe load-carrying capacity of shoring for heights and lengths of shoring components to be used.

C. Design Calculations (for information only): Calculations prepared by or under supervision of a qualified, licensed professional engineer, and sealed by engineer, indicating that shoring meets design criteria.

1.5 PROJECT CONDITIONS

A. Comply with Owner's limitations and restrictions for Site use and accessibility as well as restricitons indicated on the construction documents pertaining to temporary anchorages.

PART 2 PRODUCTS

2.1 MANUFACTURED ASSEMBLIES

A. Design Criteria:
   1. Structure dead load per dimensions provided on original drawings prepared by Henningson, Durham and Richardson, and verified in field by contractor.
   2. All loads shall be accounted for in accordance with ASCE 37, including but not limited to dead, construction, and live.

a. Live loads shall be coordinated by the contractor to reflect their selected means, methods and equipment.

3. Provide a minimum factor of safety of 2.0.
4. Consider removal of loads from member and transfer of loads into structure below, without overloading structural members.
5. Detail shoring to avoid interference with Owner operations and completion of the Work.
6. Consider shoring stiffness relative to stiffness of members being shored.

B. Shoring: Steel posts, steel frames, or other steel assemblies with sufficient capacity to support calculated shoring loads at spacing and positioning shown on shop drawings.
1. Adjustable through positive means, such as screw jacks, to achieve tight fit to structure above and below and to compensate for elastic shortening of shores during loading and service.
2. Use undamaged components, including bracing, supplied by shoring manufacturer.

2.2 ACCESSORIES

A. Attachment: provide connections to existing members and structure which will not leave embedded items after removal.

B. Spreaders:
1. At bottom of shores: 4x4 timber cribbing, 2x wood bearing pads, or other material; with sufficient bearing area and length to distribute shoring reactions into supporting structural element below.
2. At top of shores: Timber or steel spreader beams or wood bearing pads; to fully support member being shored without damage to member surface.

C. Shims: Wood or steel; at bearing points above shores to ensure tight contact with shored member.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements and other conditions affecting installation or performance of shoring Work.
1. Notify Engineer in writing of conditions which may adversely affect installation or performance of shoring Work, and recommend corrections.
2. Do not proceed with shoring Work until adverse conditions have been corrected and reviewed by Engineer.
3. Commencing shoring Work constitutes acceptance of Work surfaces and conditions.

3.2 INSTALLATION

A. Install shoring to brace elements as required prior to beginning Work.

B. Install shoring in accordance with manufacturer’s recommendations and approved shop drawings. Installed assembly shall be of such quality that assembly will support imposed loads without excessive settlement or deflection.
1. Position to avoid interference with Owner operations.

2. Install plumb and square. Install cross-bracing recommended by shoring manufacturer and shoring designer to prevent buckling failure of individual members and overall shoring stability failure.
3. Install spreader beams or bearing pads and shims as necessary, and adjust shores to ensure tight, uniform fit against structural element to be supported. Minimize differential loading of vertical shoring members.
4. Install timber cribbing wood or wood bearing pads as necessary to distribute loads into supporting elements. If more than one layer of cribbing is required, install each successive layer perpendicular to preceding layer.
5. If shoring is to be placed on coated or finished surface, protect surface from damage with plywood, plastic sheets, or other means.
6. Do not provide permenant corrosive connections into members to remain.

C. All shoring shall be installed snug-tight.

D. Protect shores from damage from construction activities, Owner use of facility, and other causes.

E. Check shores daily and adjust as necessary to maintain snug condition or design preload, plumbness, and full effectiveness.

F. Modify and adjust shoring as required to meet conditions of work and to ensure Project safety.

3.3 REMOVAL OF SHORES

A. Remove shores when compressive strength of rebuild concrete reaches 75 percent of its specified 28-day required strength. Contractor may elect to have additional concrete strength tests performed at their own expense, to confirm when rebuild material meets removal requirements.

B. Store shoring materials in approved storage area at Site, such that materials do not interfere with Owner’s continued use of facility. Promptly remove shoring materials from Site when no longer needed for work.

END OF SECTION

SECTION 03 01 32

DISCRETE GALVANIC ANODES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Supply and installation of discrete galvanic anodes embedded in concrete rebuilds or encapsulated in concrete encasements.

1.2 PRICES

A. Cost of installation of anodes shall be included in the concrete rebuild cost for each element.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Certified by anode manufacturer as trained and approved for anode installation.

1.4 SUBMITTALS

A. Product Data.

B. Manufacturer's letter of recommended spacing.

C. Product samples.

D. Manufacturer report for installation.

E. Contractor certificate.

PART 2 PRODUCTS

2.1 MATERIALS

A. Source Limitations: Obtain materials through one source from single manufacturer.

B. Discrete Galvanic Anodes in Concrete Rebuilds: Alkali activated, Type IA, consisting of zinc in compliance with ASTM B418, Type I, with at least 100 g of zinc metal; encased in highly alkaline cementitious shell with pH of 14 or greater; specifically intended for application. Unit shall contain no added sulfate, chloride, bromide, or other constituents that are corrosive to reinforcing steel per ACI Guideline 222R-01. Anodes shall be supplied with integral tie wires for tying to reinforcing steel.
   1. Anode shall provide minimum ten-year service life in similar environment.
   2. Use one of the following or approved equal:
      a. Galvashield XP4 (zinc mass = 160g) by Vector Corrosion Technologies.
      b. Sentinel Gold Galvanic Anodes (zinc mass = 200g) by Euclid Chemical Company.

C. Conductive embedding mortar: Use one of the following low resistivity embedding mortar products, or approved equal:

1. Galvashield Embedding Mortar by Vector Corrosion Technologies.
2. Eucopatch by Euclid Chemical Company.
3. Sika Galvashield Embedding mortar by Sika Corporation.

PART 3 EXECUTION

3.1 INSTALLATION OF DISCRETE GALVANIC ANODES

A. Remove unsound concrete and prepare concrete and steel surfaces as specified.
   1. Remove sufficient concrete at anode locations to permit anode installation.
   2. Leave 2 inches of uncoated steel at anode connections, or as recommended by anode manufacturer.

B. Install anodes in accordance with recommendations of anode manufacturer.
   1. Install anodes along the perimeter of the concrete removal area at spacing recommended by anode manufacturer. Notify Engineer of required anode spacing in letter from manufacturer.
   2. Position anodes as close to perimeter of concrete removal area as possible. Locate at intersections of bars if possible.
   3. Position anodes to provide at least 1 inch of clear cover. If necessary, position anodes next to or underneath reinforcing bars.
   4. Provide sufficient clearance between anodes and existing concrete substrate to allow rebuild material to encase anode.
   5. Electrically connect anodes to clean reinforcing bars as close as possible to edge of removal area.
      a. Wrap anode wires around reinforcing bar and twist tight to allow little or no free movement.
      b. At bar intersections, secure to both bars.
      c. Position tie wires at least 1 inch from surfaces.

C. Confirm electrical continuity of reinforcing steel in removal area and of anodes with reinforcing steel by measuring DC resistance.
   1. Resistance shall be less than 1 ohm.
   2. If continuity of reinforcing steel is not acceptable, add additional steel tie wires until continuity is acceptable.
   3. If continuity of anode to reinforcing steel is not acceptable, modify wrapping of anode tie wires until acceptable.

D. Encapsulate anodes in conductive mortar and fill gaps between anodes and concrete substrate with conductive mortar as recommended by anode manufacturer.
   1. Completely encapsulate anode with at least 1/2 inch of mortar.
   2. Fill gap between anode and concrete substrate over area with minimum diameter of 4 inches.

E. Take care not to disturb anodes when installing concrete.

END OF SECTION

SECTION 03 15 13

WATERSTOPS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes requirements for installation of new and retrofit waterstops between new and existing concrete sections.

1.2 PRICES

A. Costs for waterstops shall be included in rebuild cost and not paid for separately.

1.3 REFERENCES

A. United States Army Corps of Engineers: CRD-C 572-74, Corps of Engineers Specifications for Polyvinylchloride Waterstop

B. ASTM International (formerly American Society for Testing and Materials)
   1. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
   2. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
   3. ASTM D2240 - Standard Test Method for Rubber Property—Durometer Hardness

1.4 SUBMITTALS

A. Product Data (for each application)
   1. Waterstops for each installation.
   2. Accessory materials.
   3. Installation procedures to be followed on project (information only).

B. Letter from waterstop manufacturer stating that materials submitted are appropriate for application as shown on the Construction Drawings to provide a watertight joint.

1.5 QUALITY ASSURANCE

A. Contractor Qualifications: Contractor to have a minimum of five years of installation of concrete waterstops. Demonstrate that firm has completed work similar in material, design, scope, size, and extent to that indicated for this Project with a record of successful in-service performance.
   1. Field Supervision: maintain experienced full-time supervisors on Project site during times that removal, preparation, and installation work is in progress. Supervisor shall have minimum of three years of experience in installation of waterstops.

B. Waterstop manufacturer shall demonstrate five years continuous experience in production of waterstops.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials according to the manufacturer's recommendations and in such a manner as to prevent damage to materials and structure.
   1. Store materials to protect from oil, dirt, and sunlight.

PART 2 PRODUCTS

2.1 MATERIALS

A. Waterstops at New to Existing Concrete Elements
   1. Prime virgin polyvinyl chloride (PVC) waterstops:
      a. Sika Greenstreak Style Number 655. Waterstop shall be installed with Sika stainless steel batten bars and Epoxy 7300 in accordance with Sika product literature.
      b. Approved equal.

B. Waterstops at New Joints (new vertical joints):
   1. Dumbell waterstops at expansion joints: prime virgin polyvinyl chloride (PVC) with center bulb and corresponding ribbed or dumbbell shape;
      a. Sika Greenstreak Style Number 698 or 705.
      b. Approved equal.

2.2 ACCESSORIES

A. Provide epoxy, or similar as recommended by waterstop manufacturer, to secure waterstop to rough, damp or dry concrete.
   1. Sika Epoxy 7300 two component epoxy gel
   2. Approved equal

B. Provide single-component hydrophilic sealant to secure waterstop to rough, dry concrete.
   1. Sika Leakmaster LV-Z sealant.
   2. Approved equal.

C. Provide cyanacrylate adhesive (super glue) for all splices.
   1. As recommended by manufacturer.

D. Waterstop filler at splices.
   1. As recommended by manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

A. Follow approved manufacturer installation instructions and details.
   1. Notify Engineer of any discrepancies between Drawings and manufacturer recommendations.

B. Cut coil ends square (or at proper angle for mitered corners) with shears or sharp blade to fit splices together without overlaps.

C. Splice ends of non-hydrophilic waterstops with cyanacrylate adhesive (super glue) or other material as recommended by waterstop manufacturer to provide a watertight splice.
   1. Seal watertight any exposed cells of waterstop using Leakmaster sealant, or manufacturer approved alternate, prior to splicing and super glue application.

D. Ensure that waterstop materials are secured in place and will not move or shift during concrete installation.

E. Do not damage waterstop during concrete installation.

3.2 QUALITY CONTROL

A. Water tightness testing as indicated on the drawing shall be used to evaluate joint performance.

END OF SECTION

SECTION 03 21 00

REINFORCING STEEL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Supply, fabrication, and installation of new reinforcement.
   2. Supply, fabrication, and installation of new adhesive anchored (epoxy or other) reinforcement.
   3. Supply and installation of mechanical reinforcing couplers.
   4. Welding of reinforcing.

1.2 PRICES

A. Perform the following Work on unit price basis:
   1. Splicing of new to existing reinforcing bars.
      a. Supply and installation of mechanical couplers for steel reinforcing.
      b. Welding of new reinforcing bars to existing reinforcing bars/

B. All other work shall be performed on a lump-sum basis and included in the repair/rebuild cost.

1.3 SUBMITTALS

A. Shop Drawings: Placement drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, schedules, bending diagrams, and arrangements; material grades; stirrup, tie, and hoop spacing; splices and laps; mechanical connections; and supports.

B. Certifications:
   1. For installer of adhesive anchored items: ACI-CRSI Certification as Adhesive Anchor Installer.

C. Product data.
   1. Corrosion inhibiting coating.
   2. Adhesive for adhesive anchors.

D. Material Test Reports:
   1. Mill test reports for steel reinforcement, including adequate information on chemical and physical properties to demonstrate conformance with specified standard.
   2. ICBO, ICC-ES or IAMPO-ES reports for reinforcing bar couplers and other mechanical splices.
   3. Carbon Equivalence Testing results for existing reinforcing steel if specified to be welded. Test shall clearly show the Carbon Equivalence (CE) as calculated in accordance with AWS D1.4.

E. Welding: The following items shall be submitted prior to welding for each size and type of weld specified on the drawings. Please note that qualifications shall be performed on reinforcing bar with the same or higher CE.
   1. Welder Qualification Records, submit for each welder.

2. Welding Procedure Specifications (WPS)
3. Procedure Qualification Record (PQR)

F. Submit the following as available during the work:
1. Special Inspection Reports (for information only)

1.4 QUALITY ASSURANCE

A. Qualifications for Installer of Adhesive Anchored Items: Experienced individual with current ACI-CRSI certification as Adhesive Anchor Installer.

B. Welding:
1. Welders shall be certified and poses current welder qualification records for the welds specified.

PART 2 PRODUCTS

2.1 MATERIALS

A. Corrosion-Inhibiting Coating Materials: Use material specifically intended for reinforcing steel embedded in concrete. Use one of the following or approved equal:
1. Cementitious Coating:
a. Sika Armatec 110 EpoCem supplied by Sika Corporation.
b. MasterEmaco P 124 supplied by BASF Construction Chemicals, LLC.
c. Duralprep A.C. by Euclid Chemical Company.
2. Epoxy: Sikadur 32 Hi-Mod supplied by Sika Corporation.
3. Zinc-rich Steel Primer:
a. Sika Armatec -10 ZR supplied by Sika Corporation
b. MasterProtect P 8100 AP supplied by BASF Construction Chemicals, LLC.

B. Reinforcing Bars: ASTM A615, Grade 60;. Sizes as shown on Drawings.

C. Reinforcing Bars to be welded: ASTM A706, Grade 60; Sizes as shown on Drawings.

D. Adhesive for Anchors and Reinforcing Bars (Adhesive Anchors):
1. Adhesive: Use one of the following or approved equal:
a. HIT-RE 500 V3 epoxy adhesive supplied by Hilti, Inc.

2.2 REINFORCEMENT ACCESSORIES

A. Bar Supports: CRSI Manual of Standard Practice; Steel wire, plastic, or precast concrete.
1. Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcing in place. Support welded wire fabric with slab bolsters.
2. For concrete surfaces exposed to view, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports where legs of wire bar supports contact forms.

B. Tie Wire: 16 gauge minimum:
1. Corrosion resistant.

C. Mechanical Bar Couplers/Splices: Shall be capable of developing 125% of yield strength of reinforcing being coupled as demonstrated through ICBO, ICC-ES or IAMPO-ES testing. Finish to match reinforcing finish. Use one of the following or approved equal:
   1. Bar-lock by Dayton Superior.
   2. Lenton Lock B-series by Erico International Corporation

2.3 FABRICATION

A. Fabricate and detail steel reinforcement to shapes and dimensions shown on Drawings, in accordance with and within fabricating tolerances shown in CRSI Manual of Standard Practice.

B. Bends and hooks shall conform to standard hook dimensions in CRSI Manual of Standard Practice unless otherwise shown on Drawings.

2.4 WELDING

A. Welding electrodes shall 70 ksi minimum ultimate strength low-hydrogen filler metal.

B. Touch up Primer: Corrosion inhibiting coating.

PART 3 EXECUTION

3.1 EXISTING STEEL PREPARATION (REINFORCING AND EMBEDMENTS)

A. Leave existing reinforcing in place unless otherwise directed by Engineer.

B. Notify Engineer of reinforcing bars that are incorrectly located or have less than 1/2 inch of concrete cover; are damaged or fractured; or have lost more than ten percent of their original cross-sectional area at any point. Engineer will determine remedial action.
   1. Measure reinforcing section loss in accordance with ACI 364.14T.

C. Prepare exposed steel surfaces to SSPC-SP 6/NACE No. 3 finish, commercial blast cleaning, including exposed reinforcement and steel embedments. Exercise care to prepare undersides of reinforcing bars and to prevent application of coating to the concrete substrate.

D. Clean steel surfaces with dry, oil-free compressed-air jet.

E. Inspect prepared steel surfaces and clean remaining contaminants.

F. Apply a minimum of **two** coats of corrosion-inhibiting material on exposed steel surfaces.
   1. Batch, mix, and apply material according to recommendations of material supplier for thickness per coat.
   2. Exercise care to coat difficult-to-reach surfaces, such as undersides of reinforcing bars.
   3. Minimize spillage on concrete surfaces. Remove materials that will act as bond breaker by chipping or other means.
   4. Inspect coated steel surfaces and apply additional coats to uncoated or thinly-coated areas.

3.2 INSTALLATION OF ADHESIVE ANCHORED ITEMS

A. Remove unsound concrete at new reinforcing locations prior to installation.

B. Drill, clean and install adhesive and reinforcing in accordance with adhesive material manufacturer's requirements, and those listed below. If a conflict exists between the requirements of these specifications and the adhesive manufacturer, notify Engineer and request direction.

C. Drill holes as required by adhesive manufacturer for application shown on drawings.
   1. Locate existing reinforcement using non-destructive methods and position holes to avoid existing reinforcement.
   2. Do not damage existing reinforcement.
   3. Make hole diameter as recommended by adhesive manufacturer for application shown on drawings.

D. Clean holes as required by adhesive manufacturer for application shown on drawings.

E. Inject adhesive into hole based on adhesive manufacturers requirements for application shown on drawings. The method of installation is intended to achieve 100 percent filling of the annular space between the embedded item and the drilled hole.

F. Promptly remove excess adhesive.

3.3 PLACING REINFORCEMENT

A. General: Comply with CRSI Manual of Standard Practice and Drawings for placement of reinforcement.

B. Bar spacing, concrete cover, and bar splices shall conform to Drawings and CRSI Manual of Standard Practice, unless otherwise noted on drawings.

C. Accurately position, support, and secure reinforcement to prevent displacement during concrete placement. Locate and support reinforcement with bar supports to maintain specified minimum concrete cover. Wire dowels securely in place before depositing concrete.

D. Place reinforcement continuous between expansion and control joints. Stop reinforcement at expansion joints.

E. Unless permitted by Engineer, do not bend reinforcing bars embedded in hardened concrete.

F. Bend tie wires and turn ends toward inside of concrete section, away from exposed concrete surfaces.

G. During concrete placement, protect reinforcement from damage from transporting or pumping equipment with runways or other means.

H. Before placing concrete, clean reinforcement of loose rust and mill scale, earth, ice, dust, and other foreign materials that would reduce bond to concrete.

I. Allow Engineer at least 24 hours to inspect condition and placement of reinforcing prior to completing formwork and ordering concrete.

J. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.

K. Do not weld reinforcement unless specifically approved by Engineer.

3.4 WELDING OF REINFORCING

A. All welding shall comply with the requirements of AWS D1.4.

B. Welds shall be the size, type and length specified on the drawings. All welds shall be continuous unless otherwise specified.

C. Remove coatings and corrosion from existing surfaces to be welded by grinding or abrasive blasting. At a minimum the steel surfaces shall be prepared in accordance with SSPC-SP 3: Power tool cleaning.

D. After welding is complete, clean surfaces of reinforcing to remove slag and other contaminants to achieve a minimum surface consistent with SSPC-SP 3: Power tool cleaning.

3.5 QUALITY CONTROL

A. Reference the Special Inspection Schedule on the Construction Drawings for special inspection requirements for this section.

END OF SECTION

SECTION 03 31 00

STRUCTURAL CONCRETE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Supply and placement of ready-mix concrete for wall rebuilds, including formwork, concrete materials, mix design, batching procedures, placement procedures, finishes, and curing.

1.2 PRICES

A. Costs for concrete shall be included in rebuild cost and not paid for separately.

1.3 DEFINITIONS:

A. Cementitious Materials: Portland cement alone or in combination with one or more of fly ash, silica fume, slag cement, or other pozzolans..

B. Concrete Mixture: A single combination of materials as specified including cement, pozzolans, coarse aggregate(s), fine aggregate(s), water, and chemical admixtures. Changes to material sources or proportions shall constitute a new concrete mixture unless otherwise approved by the Engineer

C. Testing Agency: Third party testing agency qualified to perform the testing specified.

D. The term concrete, ready-mix, material, replacement material, repair material, and rebuild material shall generally refer to the ready-mix concrete mix used to perform the work.

1.4 SUBMITTALS

A. Design Mixes: For each concrete mixture, include:
   1. Proportions of materials.
   2. Mill tests and certification for cement, fly ash, and slag cement. Certification for silica fume.
   3. Macro-synthetic (and micro-synthetic if used) fibers: Manufacturer's product and test data for fiber reinforcement based on selected dosage rate.
   4. Aggregate documentation indicating compliance to all of the requirements of ASTM C33, **including gradation, deleterious substance, and alkali silica reactivity**.
   5. Slump
   6. Air content
   7. Unit Weight
   8. Strength
      a. 28-day laboratory compression test results. Minimum three cylinders at each test age.
      b. Maturity Method test data to be used for estimating in-situ concrete strength, a maturity curve shall be submitted with mix design.
   9. Amount of mix water to be withheld for later addition at Site.

10. Range of high-range, water-reducing admixture dosage that may be added at Site without adversely affecting hardened concrete.
11. **Shrinkage testing**

B. Joint Layout: Proposed construction, control, and isolation joint layout required to Work, subject to approval by Engineer.

C. Product data for moisture retaining cover.

D. Submit the following as available:
1. Quality Control (for information only):
   a. Batch tickets for ready-mix concrete. Include amount of held water which was added at the project site and all actual batched material weights.
   b. Fresh material testing
   c. Compressive strength testing

E. Warranties: Submit warranties after substantial completion and prior to application for final completion (for information only).

1.5 QUALITY ASSURANCE

A. Contractor Qualifications: Experienced firm that has successfully completed concrete repair work similar in material, design, and extent to that indicated for the Project. Must have successful construction with specified materials in local area in use for a minimum of five years.
1. Employ foreman with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during the Work. Do not change foremen during the course of the Project except for reasons beyond the control of Contractor; inform Engineer in advance of any changes.

B. Ready-Mix Supplier Qualifications: ASTM C94/C94M; Certification of Production Facilities and Delivery Vehicles by National Ready Mixed Concrete Association.

C. Concrete testing laboratories that perform testing services on concrete mixes shall meet the requirements of ASTM C1077.

D. Mockups: Construct mockups to demonstrate construction procedures, quality of Work, and aesthetic effects.
1. North Wall and South Wall: A mockup demonstrating the following items as hold points shall be performed on the first placement:
   a. Waterstop installation
   b. Reinforcing steel placement/installation.
   c. Concrete placement.

E. ACI Publications: Comply with the following, unless more stringent provisions are indicated.
1. ACI 117-10 - Standard Specifications for Tolerances for Concrete Construction and Materials
2. ACI 301-16 - Standard Specification for Structural Concrete
3. ACI 318-14 - Building Code Requirements for Structural Concrete
4. ACI 350-06 - Code Requirements for Environmental Engineering Concrete Structures.

1.6 WARRANTY

A. Installer's Warranty:
   1. Written warranty, signed by Applicator. See warranty form in Section 00 65 36.
   2. Warranty Period: two years after Substantial Completion date.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Form Panels: Plywood, lumber, metal, plastic, or another material capable of producing final product as specified here-in.
   1. Use panels that will provide continuous, true, and smooth rebuild surfaces.
   2. Furnish panels in largest practicable sizes to minimize number of joints.
   3. Do not use rust-stained steel form-facing material.
   4. Use form-facing material capable of producing smooth, uniform texture on concrete. Do not use form-facing materials with raised grain, torn surfaces, worn edges, dents, or other defects that will impair texture of concrete surface.

B. Accessories:
   1. Chamfer Strips: Wood, metal, PVC, or rubber strips.
   2. Form Ties: Factory-fabricated; removable or snap-off metal or glass-fiber-reinforced plastic form ties; designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
      a. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of the exposed concrete rebuild surface.
      b. Furnish ties that, when removed, will leave holes not larger than 1 inch in diameter in the concrete rebuild surface.
      c. Furnish ties with integral water-barrier plates for walls indicated to receive dampproofing, waterproofing or coating.
   3. Form-Release Agent: Commercially-formulated form-release agent that will not bond with, stain, or adversely affect the concrete rebuild surface and will not impair subsequent treatments of the surface. Form-release agent shall have a rust inhibitor for steel form-facing materials.

2.2 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of same brand from same manufacturer's plant, each aggregate from one source, and admixtures through one source from single manufacturer.

B. Portland Cement: ASTM C150, type per exposure.

C. Fly Ash: ASTM C618, Class F or C.

D. Silica Fume: ASTM C1240, amorphous silica.

E. Slag Cement: ASTM C989 Class 100 or 120.

F. Fibers
   1. Microsynthetic/Macrosynthetic Fibers: ASTM C1116, Type III.

2. 1 inch maximum length.
3. Synthetic fiber shown to have long-term resistance to deterioration when exposed to moisture and alkalis.

G. Aggregates: Fine and coarse aggregates for normal weight concrete shall conform to ASTM C33 (coarse aggregate to meet requirements of Class 4S) and shall consist of natural or manufactured sand and gravel or crushed stone. Aggregate particles shall be clean, hard, tough, durable, of uniform quality, and free from soft, thin elongated pieces, disintegrated stone, dirt, organic, or other injurious materials occurring in either free or as coating. Aggregates shall be from a single source with documented record of at least ten years of satisfactory service using similar aggregates and cementitious materials in similar applications and service conditions. Aggregate gradation shall conform to ASTM C33 with the following limitations:
1. Coarse Aggregates: Uniformly graded; size per table; Class 4S.
2. Alkali Reactivity: Coarse and fine aggregates shall have expansion indicative of innocuous behavior; that is, less than 0.08 percent expansion after 16 days when tested according to C1260. If one or more of the aggregate expansions exceed 0.08 percent at 16 days, then perform ASTM C1567 testing of that aggregate including SCM type and replacement percent showing mitigation of ASR per ASTM C1778. The expansion of the test specimens, tested in accordance with ASTM C1567 as required, shall not exceed 0.08 percent at 16 days. If ASTM C1567 testing is required, the concrete mixtures containing that aggregate must contain at least the same SCM type and minimum proportion showing mitigation in the ASTM C1567 testing.
    a. Testing must be performed within one year of proposed placement date.

H. Water: Potable.

I. Admixtures:
1. General: Admixtures certified by manufacturer to contain no more than 0.1 percent chloride ions and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.
    a. Air-Entraining Admixture: ASTM C260.
    b. Water-Reducing Admixture: ASTM C494, Type A.
    c. High-Range, Water-Reducing Admixture: ASTM C494, Type F.
    d. Water-Reducing and Accelerating Admixture: ASTM C494, Type E.
    e. Water-Reducing and Retarding Admixture: ASTM C494, Type D
    f. Special -Use Admixture: ASTM C494, Type S, only if approved by the Engineer.

2.3 CONCRETE MIXES

A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mixes or field-test data, according to ACI 350-06, ACI 318-14 and ACI 301-16 as recommended by ACI 211.1.
1. Mix designs for normal weight concrete used for this project shall be proportioned in accordance with ACI 211.1 and this specification. Mix designs proposed for use, when tested in a laboratory, shall have an average 28-day compressive strength in excess of design strength as required in Article 4.2.3 of ACI 301-16.
2. Use qualified independent testing agency conforming to requirements of ASTM C1077 for preparing, testing, and reporting proposed mix designs for laboratory trial mix basis.
3. Mix designs shall be for a cohesive mix which can be easily placed without segregating.

B. No chlorides shall be intentionally introduced into concrete mix.

1. In hardened concrete, limit acid-soluble chloride ion content to 0.10 percent by weight of cement when tested according to ASTM C1152, or water-soluble chloride ion content to 0.08 percent by weight of cement when tested according to ASTM C1218.
2. If hardened concrete exceeds chloride ion limits above, limit water-extractable chloride ion content to 0.08 percent by weight of cement when tested according to ASTM C1524.
3. Provide test results necessary to demonstrate concrete and aggregates do not exceed chloride ion limits, unless waived by Engineer.

C. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing admixture. Alternately use high-range, water-reducing admixture (superplasticizer), as required, for placement and workability.
2. Use retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Adjust for free water in high-dosage admixtures, including shrinkage reducing admixtures, when utilizing in concrete. Slump of concrete shall be 6 inches to 9 inches at the time the concrete is discharged at the job site. Further, the slump of concrete shall not exceed 10 inches at the time of batching. Job-site water addition shall not be allowed, and high-range water reducer (superplasticizer) is to be used to increase slump of concrete at the job-site prior to discharge.
4. Incorporate calcium nitrite-based corrosion inhibiting admixture where requires, such as Grace DCI or approved equivalent, at a minimum dosage of 2 gallons per cubic yard, or as noted on drawings.

D. The concrete shrinkage shall not exceed values listed in Table 1 after 28 days of drying, in accordance with ASTM C157 except as modified herein:
1. Cast three, 3-inch by 3-inch by 11-inch, concrete test specimens for shrinkage, and leave in molds covered with plastic in standard laboratory conditions for first 24 hours.
2. De-mold specimens and move to wet cure (>95 percent relative humidity) until a total age of 7 days.
3. Obtain zero-age reading at this time and move specimens to controlled environment per ASTM C157.
4. Perform length-change measurements at 0, 4, 7, 14, 21, and 28 days of drying following wet-cure period and use the 7-day wet-cure reading as the initial comparator reading.

E. Provide concrete mixes shown in Table 1. (see notes below)

Table 1. Concrete Mix Design Requirement Summary

	Full Wall Rebuild	Catwalk and Stairs
Exposure Categories (per ACI 318)	F2, S3, W1, C1	F2, S0, W0, C1
Density	Normal Wt.	Normal Wt.
Compressive Strength, psi (28-day)	5,000 min 8,000 max	5,000 min 8,000 max
w/c	0.45 max	0.45 max
Cementitious Content	600 lb max	600 lb max
Agg Size (nom. max.)	67, 3/4-inch	67, 3/4-inch
Macro Fibers	Optional	Optional
Micro Fibers	No	Optional
Air Content	6.0%	6.0%
Shrinkage	0.4 % @ 28 days max	No Testing Required
Corrosion Inhibitor	Not Required	Not Required

1. w/c = water-to-cementitious materials Ratio, by weight
2. Where two values are present, minimum/maximum are shown,
3. If allowed or required, Micro-synthetic fibers may (shall) be provided in addition based on Manufacturer recommendations to aid in the control of plastic shrinkage cracking.
4. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having air content shown. Tolerance for air content shall be plus 1.5 percent and minus 1.5 percent of value shown, no additional tolerance allowed.

2.4 CURING MATERIALS

A. Formwork.

B. Moisture-Retaining Cover: ASTM C171, white burlap-polyethylene sheet. 4 mil minimum thickness.

C. Water: Potable.

PART 3 EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork to support vertical, lateral, static, dynamic, and construction loads that might be applied prior concrete rebuild reaching 75 percent of their specified minimum compressive strength.

B. Construct formwork so concrete rebuild are of size, shape, alignment, elevation, and position indicated and tight enough to prevent loss of material.
   1. Ensure flatness and smoothness as required for finish type per Section 3.4.
   2. Chamfer exterior corners and edges of permanently exposed concrete to match existing, if chamfered.

C. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement. Do not use form release agents containing waxes, oils, silicones or other resins that may inhibit adhesion of coatings.

D. Provide temporary openings for cleanouts, venting, and inspection ports (witness holes) where the interior area of the formwork is inaccessible. Close openings with panels or dowels tightly fitted to forms and securely braced to prevent loss of material.

3.2 CONCRETE BATCHING AND MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M, and furnish batch ticket information. The following exceptions and/or specific requirements shall be included:
   1. Aggregate moisture contents shall be accounted for in the batch water and aggregate batch weights.
   2. After introduction of mix water, deliver concrete to Site and discharge within 90 minutes or before 300 revolutions of mixer drum, whichever comes first, unless otherwise approved by the Engineer. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes. Concrete that exceeds the specified time limits shall be rejected, unless approved by the Engineer.
   3. High range water-reducing admixtures may be added on site to increase slump, but only at the guidance of the ready-mix producer. Introduce high-range, water-reducing admixture at the Site with additional mixing per the manufacturer’s recommendations. If unspecified, 70 revolutions of the drum shall be required to ensure proper mixing.
   4. Reject concrete that arrives at the Site with a slump exceeding the maximum specified slump.
   5. Site added water, beyond the amount withheld during initial batching as “trim water”, is not allowed. Do not add water to adjust slump. Do not exceed design w/cm.
   6. No air adjustments may be made at the site after initial discharge of material. This prohibits the addition of either liquid air entraining admixtures, Fritz air entrainment, and Air Minus products.
   7. Fibers: All fibers shall be added at the batch plant in accordance with the manufacturer’s recommendations and ASTM C1116 Type III. Exclude the use of “shredable”, “dissolvable”, “degradable”, or other similar packaging. All fibers shall be removed from packaging when added to the concrete mix.
   8. All tests of record shall be performed after any and all changes or additions to the concrete batch have occurred.

B. Air-entraining and chemical admixtures, when used, shall be incorporated into the mix in amounts and manner recommended by the manufacturer and approved by the Engineer. Accuracy of measurement of any admixture shall be within ± 3 percent. Two or more admixtures may be used in the same concrete provided such admixtures are added separately and that the combination is compatible and has no deleterious effect on the concrete.

C. The temperature of the concrete, when discharged, shall be not less than 65ºF when the air temperature is below 40ºF. If heated water or aggregates are used, the water shall be combined with the aggregates in the mixer before cement is added. Cement shall not be added to mixtures of water and aggregate when the temperature of the mixture exceeds 70ºF.

D. The temperature of the concrete, when discharged, shall not exceed 90ºF. The Contractor is cautioned that difficulty may be encountered with concrete at temperatures approaching 90ºF and every effort should be made to maintain it at lower temperatures.

3.3 CONCRETE PLACEMENT

A. Allow Engineer at least 24 hours to observe forms, screed rails or guides, prepared concrete surfaces, reinforcement, and embedments.

B. Before placing concrete, verify the following:
   1. Surface preparation has been completed in accordance with applicable Specifications and/or Drawings.
   2. Installation of formwork, reinforcement, and embedded items is complete.
   3. Concrete surfaces and forms are clean of frost, ice, mud, debris, and water.
   4. Difference between substrate and concrete temperatures is no more than 20 degrees F.
   5. Forms are thoroughly wetted or oiled.
   6. Reinforcement is securely tied in place and thoroughly cleaned of ice and other coatings that may reduce or destroy bond with concrete.
   7. Required inspections have been performed.
   8. Equipment for mixing and transporting concrete is clean.
   9. Vibrators are operational.

C. For rebuild areas where material will be cast against, and bonded to, existing concrete surfaces, wet existing surface to saturated surface-dry condition at least 1 hour prior to placement. Maintain surfaces at this condition until placement. If forms are filled with water prior to placement to achieve this condition, ensure that standing or flowing water is removed and surfaces are allowed to dry to saturated, surface-dry condition.

D. Convey concrete from the mixer to the place of deposit in a manner such that no segregation or loss of materials occurs.

E. Deposit concrete:
   1. Place concrete as near as possible to its final position to avoid segregation due to re-handling or flowing.
   2. Do not allow concrete to fall a vertical distance greater than 4 feet from the point of discharge to the point of deposit.
   3. Do not allow concrete to disturb or displace reinforcing bars or other embedments.
   4. Place concrete at a rate so that the concrete is plastic and flows readily into corners of forms and into spaces around reinforcing bars.
   5. Place concrete continuously until the member or section is completed, with no cold joints.
   6. Dispose of concrete that has partially set prior to placement or that has been contaminated by foreign material.

F. Consolidate concrete with mechanical vibrating equipment, so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
   1. Use internal vibrators with minimum speed of 7,000 vibrations per minute and that are sufficiently narrow to fit into spaces between reinforcing bars, formwork, and existing concrete. Have extra vibrators at the Site in case a vibrator does not work.
   2. Do not use vibrators to transport concrete.
   3. Insert and withdraw vibrators vertically at uniformly spaced locations no farther apart than the visible effectiveness of the vibrator, to rapidly penetrate layer being placed and

at least 6 inches into preceding layer. Do not insert vibrators into lower concrete layers that have begun to lose plasticity.

4. At each insertion, limit the duration of the vibration to the time necessary to consolidate the concrete without causing mix constituents to segregate.

G. Cold-Weather Placement: Protect concrete from physical damage or reduced strength due to frost, freezing, or low temperatures. Comply with ACI 306R and as follows.

1. When the air temperature has fallen or is expected to fall below 40 degrees F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at the point of placement. Mix water and aggregates together before adding cement. Do not add cement if the temperature of the water/aggregate mixture exceeds 70 degrees F.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix design.

H. Hot-Weather Placement: Protect material from physical damage or reduced strength due to rapid evaporation or overheating of concrete. Do not allow the temperature of the material at the time of placement to exceed 90 degrees F, or as required by the concrete rebuild material manufacturer. When hot-weather conditions exist, use one or more of the following procedures:

1. Place material at night or early in morning when ambient air temperatures are lower.
2. Cool ingredients before mixing to maintain the material temperature below required at the time of placement. Chilled mixing water or chopped ice may be used to control the temperature; include the water equivalent of the ice in the mixing water quantity.
3. Cover rebuild areas with water-soaked burlap so the formwork, concrete substrate and steel temperature does not exceed the ambient air temperature.
4. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.
5. Provide windbreaks or sunshades, or both.

3.4 FINISHING TOP SURFACES

A. Do not wet concrete surfaces or add cement prior to or during finishing.

B. Do not use finishing aids of any kind, or any other product added during finishing.

C. Do not apply a trowel finish on concrete rebuild in non-conditioned spaces, or on any rebuild material with air content greater than 3 percent.

D. Default finish types shall be as follows, unless otherwise noted on the construction documents:

1. Float finish: all surfaces to receive a waterproofing or coating. Any surface not otherwise described.
2. Broom finish: all exterior surfaces subject to vehicular and pedestrian traffic.

E. Finish Type Definitions:

1. Float finish: Consolidate the surface with a power-driven float or by hand floating if the area is small or inaccessible to a power driven float (troweling machines with float blades or pans slipped over trowel blades may be used; trowel machines with normal trowel blades or combination blades shall not be used). Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until the surface is left with uniform, smooth, granular texture.

2. Broom Finish: After applying float finish, apply broom finish by drawing a broom across the surface to give the surface a coarse-scored texture. Broom Finish shall be applied perpendicular to traffic flow on top surfaces subjected to pedestrian traffic.

F. The finished surface flatness shall be such that the measured gaps between the surface and a 10-foot-long straightedge resting on two high spots anywhere on the surface does not exceed 1/2 inch.

G. Edge of rebuild shall be flush with adjacent concrete surface with 1/2-inch tolerance.

H. At the tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. DO NOT USE STEEL TROWEL FINISH ON EXTERIOR CONCRETE. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

I. Hot-Weather Conditions: Fog the surface with water if hot, dry, or windy conditions cause moisture loss approaching 0.2 pounds per square foot per hour (estimated per ACI 305R chart) before or during finishing operations.

3.5 FINISHING FORMED SURFACES

A. Provide surface finish 2.0 (SF-2.0) unless otherwise specified, at concrete surfaces exposed to public view, or those to be covered with another material applied to the concrete.
1. Note that coating application may require additional preparation beyond this default. Contractor shall coordinate with coating requirements.

B. Edge of rebuild shall be flush with adjacent concrete surface with 1/2-inch tolerance.

C. Surface Finish Type Definitions:
1. Surface Finish-2.0 (SF-2.0): Rebuild voids larger than 3/4-inch wide or 1/2-inch deep. Rebuild or patch all form tie holes and similar construction related blemishes. Limit abrupt (over 1-inch or less) or gradual (5-foot straight edge) concrete rebuild surface irregularities to 1/4-inch (ACI 117 Class B).
2. Surface Finish-3.0 (SF-3.0): Rebuild voids larger than 3/4-inch wide or 1/2-inch deep. Rebuild or patch all form tie holes and similar construction related blemishes. Limit abrupt (over 1-inch or less) or gradual (5-foot straight edge) concrete rebuild surface irregularities to 1/8-inch (ACI 117 Class A).

3.6 JOINTS

A. Construction Joints:
1. Construct joints true to line with faces perpendicular to the surface plane of the concrete rebuild.
2. Place joints perpendicular to the main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
3. Provide sufficient joints so that members or sections can be cast continuously.
4. Form keyed joints as indicated on drawings. Embed keys at least 1 1/2 inches into concrete.
5. Locate joints in slabs, beams, joists, and girders in middle third of spans. Offset joints in girders a minimum distance of twice the beam width from beam-girder intersection.

6. Locate horizontal joints in walls and columns at the underside of slabs, beams, and girders and at the top of footings. Do not allow inclined joints.
7. Space vertical joints in walls as shown on the construction drawings. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

B. Control Joints:
1. Construct joints true to line with faces perpendicular to the surface plane of the rebuild.
2. Provide tooled control joints, as default unless adjacent construction uses sawcut joints.
3. If sawcut joints are necessary, sawcut as soon as possible without damaging surface of rebuild. In no instance shall this occur after the rebuild material is expected to reach 1,500 psi. Sawcut joints at least 1/3 of slab depth or 1 inch, whichever is greater. Do not damage reinforcing with sawcut.

3.7 REMOVAL OF FORMWORK

A. Structural Elements: Leave formwork for beam soffits, joists, slabs, and other structural elements that support the weight of concrete in place for seven days, or until concrete rebuild/repair material has achieved at least 75 percent of specified 28-day compressive strength based on filed cured cylinders. Remove forms only if shoring has been arranged to permit removal of forms without loosening or disturbing shoring.

3.8 CURING AND PROTECTION

A. General:
1. Curing method shall be applied within 30 minutes of material finishing.
2. Curing period shall be seven days. Maintain material in a moist condition for at least seven days after placing.
3. Curing method shall be as noted below:
   a. Unformed Top Surfaces: Moisture retaining cover (first three days minimum), curing compound acceptable thereafter, install within 30 minutes of removing cover.
   b. Unformed Vertical and Overhead Surfaces: Curing compound
   c. Formed surfaces: Formwork, as specified in Section 2.1, shall meet requirements of curing for these elements. If formwork is removed prior to full curing period, install curing compound within 30 minutes of removing formwork.

B. Curing Methods:
1. Moisture-retaining cover
   a. Place cover in widest practicable width, with sides and ends lapped at least 12 inches.
   b. Seal sides and ends of cover by holding down with soil, concrete pieces, or some other weight, or by using waterproof tape or adhesive.
   c. Immediately repair holes or tears in cover during curing period, using cover material and waterproof tape.
   d. Re-wet rebuild surface as necessary to maintain in moist condition.
2. Curing compound
   a. Apply curing compound uniformly in a continuous operation by power spray or roller according to manufacturer's written instructions and recommended coverage rate.
   b. Recoat areas subjected to heavy rainfall within three hours after initial application.
   c. Maintain continuity of compound and repair damage during curing period.

C. Cold Weather Protection: Provide protection such as blankets, heated blankets, insulation, enclosures, and/or heaters to keep concrete protected from cold temperatures and frost.
   1. Protection methods shall be installed immediately following installation of curing method.
   2. Maintain concrete rebuild material above 55 degrees F until it has reached 3,500 psi based on maturity data, or seven days, whichever is less.

3.9 QUALITY CONTROL

A. Review and submit batch tickets to engineer for ready-mix concrete within 48 hours of placement.

B. Hammer tap concrete replacements to locate delaminations. Remove and recast delaminated replacements at no cost to Owner.

C. Test results shall be reported in writing DIRECTLY to Owner's Representative, Engineer, concrete supplier, and Contractor within 48 hours of testing.

D. Fresh cementitious material testing shall include:
   1. Plastic air content per ASTM C231
   2. Slump or spread per ASTM C143 or ASTM C1611, respectively. Spread shall be for all self-consolidating concretes.
   3. Unit weight per ASTM C138
   4. Test frequency shall be first truck and every 4th truck thereafter.

E. Sampling and testing of fresh rebuild material for compressive strength shall be performed by the testing agency according ASTM C39 and the following requirements:
   1. Fabrication of compressive strength specimens shall be 4 by 8-inch cylinders based on the following:
      a. Cylinders shall be fabricated for aggregate extended mortars, or concrete, and rebuild locations which include the use of pre-placed aggregate. Pre-placed aggregate samples shall be fabricated in a manner similar to the concrete rebuild placement.
   2. Take test sample from point of discharge onto final structure according to ASTM C172. Take additional samples at other locations only if directed by Engineer.
   3. Frequency of testing shall be a minimum of once per placement on the first truck, and once every 4th truck thereafter.

F. Material Compressive Strength Testing.
   1. Testing shall be performed by testing agency ONLY.
   2. Testing shall be in conformance with ASTM C39.
   3. A strength test shall be considered three 4 by 8-inch cylinders.
   4. Compressive strength sample fabrication shall include adequate numbers of samples such that testing can be performed as noted blow.

Compressive Strength Testing Ages and Quantity

Curing Method	Standard Cured	Field Cured	TOTAL
Strength Test Age(s)	3@3 days 3@7 days 3@28 days	None.	
Total Number of Cylinders to be cast and tested	9	None.	**9**

a. Additional strength tests at earlier ages may be performed at the Contractors option.
b. All confirmations of in-situ strength for stripping of forms or removal of shoring shall be based on maturity data.
c. Standard-cured (lab-cured):
   1) Store specimens at the Site for at least 16 hours at a temperature of 60 to 80 degrees F. Provide a temperature-controlled box or other enclosure if necessary.
   2) After at least 16 hours, but not more than 30 hours, transport the specimens to the laboratory and air cure at 73 degrees F and 100 percent relative humidity.
d. Field-cured: Cure in the vicinity of the area that they represent and in the same manner as the rebuild material.

G. Conformance Requirements:
1. Air content test requirements: Air content shall be within the tolerance of this specification. Concrete with an air content outside of the tolerance listed shall not be placed and shall be rejected.
2. Compressive strength requirements: Compressive strength is satisfactory if the average of the 28-day standard-cured compressive-strength tests equals, or exceeds, the specified 28-day compressive strength and no test value is more than 500 pounds per square inch less than the specified 28-day strength.

H. Non-Conforming Materials: If tests indicate that the material or preparation is not in conformance with the Contract Documents, remove and replace non-conforming concrete or perform additional testing, acceptable to Engineer, to verify conformance with the Contract Documents, at no cost to Owner. Additional testing may include:
1. If tests indicate that the slump, air entrainment, or other requirements have not been met, examine core samples petrographically, according to ASTM C856, to evaluate hardened concrete characteristics. If petrographic study indicates that acceptance criteria are not met, remove and replace non-conforming concrete areas at no cost to Owner.
2. If compressive strength test results do not meet the acceptance requirements, procure core, test and submit results for three core samples in accordance with ASTM C42 from each portion of the structure represented by the unsatisfactory test results. Material shall be considered acceptable if the average of three cores is equal to 85 percent of the design strength, and no single test is less than 75 percent of the design strength. If strength acceptance criteria are not met, remove and replace non-conforming concrete areas at no cost to Owner.

I. The Contractor shall visually review, and mechanically sound using a chain or hammer, each rebuild/repair area for defects after curing and protection. In addition to the requirements of this document, the following additional items shall constitute non-conformance of the Work or material:
1. Voids, spalls, bugholes, honeycomb, rock pockets, and form-tie voids, more than 2 percent of the rebuild surface area, or those which compromise strength.
2. Cracks greater than 0.010-inch-wide (or in large numbers) which appear in concrete during the curing period, and any that penetrate to the depth of reinforcement or completely through section. Notify Engineer immediately of cracks that penetrate completely thought the cross section.
3. Latent defects or those not on exposed surfaces that affect concrete's durability and structural performance as determined by Engineer.

4. Surface finish that does not meet specified requirements.
5. Offsets at perimeter exceeding those specified.

J. Perform additional inspection and testing, at no cost to the Owner, to determine the compliance of replaced or additional work with the specified requirements.

3.10 NON-CONFORMING WORK OR MATERIALS:

A. If tests or observations indicate that the material, or Work, is not in conformance with the Construction Documents, at no cost to Owner, or Engineer, either:
   1. Perform additional testing acceptable to Engineer to verify conformance with the Construction Documents.
   2. Repair or remove and replace material or Work.
   3. Repair or replace non-conforming Work or materials using alternate repair approved by Owner and Engineer.

B. Perform additional inspection and testing, at no cost to the Owner, to determine compliance of replaced, or additional corrective Work.

C. Additional time and expenses for Engineer resulting from non-conforming Work or material may be back-charged to the Contractor, or withheld from payment to the Contractor at the Owners option.

END OF SECTION

05 52 00

ALUMINUM GUARDRAILS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes guardrails, handrails and kick plates along with all necessary mounting and installation hardware.

B. Furnish all labor, materials, tools, equipment, and supervision necessary for installation of aluminum guardrails.

1.2 PRICES

A. Perform work on a cost per linear foot basis.

1.3 REFERENCES

A. Aluminum Association, Inc. (AA):
   1. SAS-30: Specifications for Aluminum Structures

B. Aluminum Welding Society (AWS):
   1. D1.2/D1.2M: Structural Welding Code - Aluminum

C. ASTM International (ASTM), most recent edition:
   1. B209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
   2. B211: Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, Wire.
   3. B221: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
   4. B247: Standard Specification for Aluminum and Aluminum Die Forgings, Hand Forgings and rolled Ring Forgings.
   5. B429: Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
   6. E985: Standard Specification for Permanent Metal Railing Systems and Rails for Buildings

D. International Code Council (ICC):
   1. 2018 International Building Code (IBC)

1.4 SUBMITTALS

A. Product Data: Provide product data for all system components indicating compliance with this section.

B. Calculations or Load Tests: Submit test results from ASTM E935 conducted on the manufacturer’s supplied system indicating compliance with required design and performance requirements.

C. Shop Drawings: Shop drawings for fabrication and installation of pipe and tube railings. Include plans, elevations and detail sections. Indicate materials, methods, finishes and types of joinery, fasteners, anchorages and accessory items.

D. Installation Instructions (segmental systems only): Complete procedures for proper installation of the guardrail system, including all necessary components and required steps.

E. Maintenance Data: Submit for finished aluminum components including cleaning materials, methods, and precautions.

1.5 DESIGN AND PERFORMANCE REQUIREMENTS

A. Comply with requirements of building authorities having jurisdiction in Project location and the following:
   1. Handrail Standard: ANSI A1264.1
   2. Occupational Safety and Health Administration - 29 CFR 1910.23 - Guarding floor and wall openings.
   3. 2010 ADA Standards for Accessible Design.

B. Top of guardrail shall be installed at 42 inches above adjacent walking surface and designed to meet the requirements to serve as a handrail, and match the existing handrails present at the stairs in front of the clarifier entrances. At tank perimeter where no walking surface is adjacent, guardrail shall be 42 inches above top of tank.

C. Provide 4-inch-tall kickplate at base of all components adjacent to walking surfaces.

D. All components and connections to the concrete structure shall be designed by an Engineer licensed in the State of Colorado to withstand the effects of gravity loads as well as a live load on handrails and intermediate rails within allowable stress limits in accordance with appropriate material building code as referenced in IBC 2018 (i.e. concrete anchors per ACI 318). Live loads on handrails and intermediate rails shall be:
   1. Uniform load of 50 lbf/ft. applied in any direction.
   2. Concentrated load of 200 lbf applied in any direction.
   3. Uniform and concentrated loads need not be assumed to act concurrently.

E. Load testing to demonstrate compliance of system is acceptable if performed in accordance with ASTM E935 with no failure of any component and no permeant deflection (full rebound of system after removal of loading). System testing shall include connection hardware in similar configuration as to contemplated.

F. Provide expansion joints for horizontal elements as necessary to accommodate thermal movement without distress to the system.

1.6 QUALITY ASSURANCE

A. Field Measurements: Take field measurements prior to preparation for guardrail installation. Verify dimensions on site prior to shop fabrication for proper connection to structure.

B. Sequence: Coordinate guardrail installation with coating work.

C. Mockup: Install mockup consisting of one section adjacent to west end to verify selection and adequacy of railing system and to set quality standards for installation.

1.7 WARRANTY

A. The completed installation of guardrail system shall be guaranteed jointly and severally by the product Manufacturer and Contractor against defects in material and application, for a period of five (5) years from the completion of the application.

B. Any work proving defective within five (5) years from the date of acceptance shall be corrected at no cost to the Owner.

PART 2 PRODUCTS

2.1 APPROVED PRODUCTS

A. Use one of the following systems, or approved equal:
   1. Series 500 Aluminum Pipe Railing System by Superior Aluminum Products, Inc.
   2. Kee Lite Smooth Railing System by Kee Safety, Inc.
   3. TABCO Aluminum Railing by Tuttle.
   4. Smooth Aluminum Handrail by Modular Railing Systems.

B. Alternate systems must meet the requirements of this Specification and shall not be used without prior approval by Owner and Engineer.

2.2 RAILING MATERIALS

A. Shapes, configurations, and sizes: As shown in the product data.

B. Horizontal Pipe Rail Guard Railing:1.9-inch outer diameter, schedule 40 pipe (inner diameter 1.5 inches)

C. All fasteners shall be in accordance with the railing manufacturer's requirements such that final system meets the design and performance requirements of this section.
   1. Concealed fasteners on all handrails.

D. All components shall be of compatible metals to prevent galvanic corrosion.

E. Do not embed railing in concrete or cementitious materials (grout), use mounting bases only.

2.3 FABRICATION

A. Components or railing sections shall be fabricated at the manufacturing facility in largest practical site delivery sizes.

B. Pipe cuts shall be square and accurate for minimum joint-gap. Cuts shall be clean and free of chamfer, from deburring, nicks and burrs.

C. For railings that are angled horizontally, machine castings shall be incorporated to provide proper angle.

PART 3 EXECUTION

3.1 INSTALLATION

A. Assemble railing sections in accordance with manufacturer's installation instructions, current code requirements, Drawings, and requirements provided in this Specification.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form work true to line and level with accurate angles and surfaces.

D. Do not allow any gaps larger than 4-inches between adjacent guardrails.

E. Securely anchor to structure in accordance with manufacturer's instructions to meet the performance requirements of this Specification.

F. Install all fasteners in accordance with manufacturer's installation instructions and requirements provided in this Specification.

G. Tighten all fasteners so that completed railing is rigid and free of play at joints and component attachments.

H. Install concealed fasteners for interconnecting railing components and for attaching them to other Work, unless exposed fasteners are unavoidable or are standard fastening method for handrail and railing indicated.

I. Provide and install washers as required to allow proper fastener bearing.

J. Install gates and adjust hardware for smooth operation. After installation, test gate. Open and close a minimum of five times. Correct any deficiencies and adjust.

K. Expansion Joints: Provide expansion joints for continuous spans in excess of 40 feet. Construct joints by deleting structural attachment from one end of the spliced joint so that it is free to move in or out of the pipe (longitudinal movement only). If a joint is provided every 30 feet, the width of the gap should allow 1/8 inch expansion for each 40 degrees F of expected temperature rise from material installation temperature. Correct for other lengths.

3.2 ERECTION TOLERANCES

A. Install railings plumb and level, securely fastened, with vertical members plumb.
   1. Maximum variation from plumb: 1/4 inch.
   2. Maximum misalignment from true position: 1/4 inch.
   3. Maximum misalignment between adjacent separated members: 1/8 inch.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Surface preparation and installation of sealant in joints.

1.2 PRICING

A. Joint sealant shall be paid for a on a cost per linear foot basis.

1.3 SUBMITTALS

A. Product data.

B. Field testing report.

C. Warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Experienced firm that has successfully completed sealant work similar in material, design, and extent to that indicated for Project; that is approved, authorized, or licensed by sealant manufacturer to install sealant; and that is eligible to receive sealant manufacturer's warranty. Must have successful installations of specified materials in local area in use for minimum of five years.
   1. Employ foreman with minimum five years of experience as foreman on similar projects, to be on Site at all times during Work. Do not change foremen during the course of the Project except for reasons beyond the control of the Installer; inform Engineer in advance of any changes.

B. Compatibility Tests: Include sealant and sealers or coatings that may come into contact with sealant following sealant installation.

1.5 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside below 40 degrees F (5 degrees C), or expected to be below 40 degrees F within 12 hours, or are above or below sealant manufacturer's recommended limitations.
   2. When joint substrates are wet.
   3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
   4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.
   5. When joint preparation, which may include cleaning substrate surfaces, removing inclusions, and repairing substrate surfaces have not been performed or performed adequately.

1.6 WARRANTY

A. Manufacturer's Warranty:
   1. Written warranty, signed by sealant manufacturer. Manufacturer's standard form in which sealant manufacturer agrees to furnish the specified joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
   2. Defective sealant includes leakage through sealed cracks, debonded sealant, loss of cohesion, or other distress associated with material deficiencies.
   3. Warranty may exclude deterioration or failure of elastomeric joint sealants from the following:
      a. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
      b. Disintegration of joint substrates from natural causes exceeding design specifications.
      c. Mechanical damage caused by individuals, tools, or other outside agents.
      d. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.
   4. Warranty Period: 5 years from date of Substantial Completion.

B. Installer's Warranty:
   1. Completed warranty form signed by sealant Installer. Warranty form included in section 00 65 36.
   2. Warranty Period: 5 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 ELASTOMERIC JOINT SEALANTS

A. Comply with ASTM C920 and other requirements indicated.

B. Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing on similar projects, mockups and preconstruction testing for Project, and field experience.

C. Select products based on mockups, preconstruction testing, and sealant manufacturer's previous testing and experience.

D. Source Limitations: Obtain each type of joint sealant through one source from single manufacturer.

E. Colors of Exposed Joint Sealants: Selected and approved in writing by Owner's Representative, from sealant manufacturer's full range.

A. For immersion conditions beneath coating system: Non-sag, two-component polyurethane or polysulfide sealant:
   1. Sikaflex-2c NS EZ, by Sika Corporation
   2. Thiokol 2235M, by PolySpec LP.
   3. Approved equal.

2.2 AUXILIARY MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote adhesion of sealants to joint substrates.

C. Backer Rod: Closed cell polyethylene.

D. Bond Breaker: As recommended by sealant manufacturer.

E. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. Remove existing sealant and other foreign material from joints.

B. Repair damaged or deteriorated substrate surfaces according to sealant manufacturer's written instructions, as detailed and as approved by Engineer.

C. Clean joint substrates immediately before installing sealant, to comply with sealant manufacturer's written instructions based on mockups and preconstruction testing.
   1. Remove from substrate foreign material that could interfere with adhesion of sealant, including dirt, dust, existing sealant, oil, grease, and surface coatings.
   2. Provide dry substrate; prevent wetting of substrate prior to sealant installation.
   3. Clean porous substrates, such as concrete, masonry, stone, wood, by brushing, grinding, blast-cleaning, mechanical-abrading, or combination of methods to produce clean, sound substrate capable of developing optimum bond with sealant. Remove laitance and form-release agents from concrete. Remove loose particles remaining after cleaning operations by vacuuming or blowing out joints with oil-free, compressed air.
   4. Clean nonporous surfaces, such as metal, with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of sealant.

3.2 INSTALLATION OF SEALANT

A. General: Comply with these documents and sealant manufacturer's written installation instructions for products and applications indicated, based on mockups and preconstruction testing. Notify Engineer of discrepancies between these documents and manufacturers typical details, written recommendations or instructions. Engineer shall determine which apply.

B. Joint Priming: Prime all porous joint substrates. Prime additional substrates where recommended in writing by sealant manufacturer, based on mockups and preconstruction testing. Apply primer to comply with sealant manufacturer's written instructions.

1. Confine primer to areas of sealant bond; do not allow spillage or migration onto adjoining surfaces.
2. Limit priming to areas that will be covered with sealant in same day. Unless recommended otherwise by sealant manufacturer, reprime areas exposed for more than 24 hours.

C. Install sealant backer and position to produce cross-sectional shape and proper depth of installed sealant.
1. Use properly-sized backer. Do not use multiple-backer units or braided-backer units to accommodate wide joints.
2. Install backer with device that will provide consistent depth between substrate surface and outer surface of backer.
3. Do not leave gaps between ends of sealant backers.
4. Do not stretch, twist, puncture, or tear sealant backers.
5. Remove wet backers and replace with dry materials.

D. Install bond-breaker tape at back of designated joints.

E. Install sealant immediately after installing backer material; to produce uniform, cross-sectional shape and depth; to directly contact and fully wet joint sides and backer material; and to completely fill recesses in joint configuration.
1. Install sealant flush with surface.
2. Immediately after sealant application and before skinning or curing begins, tool joint with slightly concave surface, compressing sealant into joint to form smooth, uniform sealant bead; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Do not use tooling agent.
    a. Remove excess sealant from surfaces adjacent to joints.
    b. Provide concave joint configuration per contract documents and Figure 5A in ASTM C 1193, unless otherwise indicated.

3.3 QUALITY CONTROL

A. At completion of Project, observe installed sealant for damage or deterioration. If damage or deterioration occurs, neatly cut out and remove damaged or deteriorated sealant, prepare and prime surfaces, and install new sealant. Replace sealant immediately so new sealant is indistinguishable from original Work.

B. Field-Adhesion Testing: Contractor to perform the following testing and submit log of test results to Owner and Engineer. Notify Owner of testing schedule and provide access to test locations for Owner/Engineer review Contractor to perform non-destructive and destructive field adhesion tests on sealant in accordance with ASTM C1521
1. Non-destructive testing per ASTM C1521, possible procedures:
    a. Depress center of sealant bead with probing tool to depth of 50 percent of bead width; or
    b. Depress sealant bead near substrate bond-line until it appears visually that sealant is about to fail in cohesive; or
    c. Apply uniform pressure with roller no more than one-half sealant bead in width, to create depression that represents approximately 50 percent of sealant deflection; advance roller along centerline of sealant bead; and note anomalies in sealant performance.
    d. Record anomalies in sealant performance, if failures are adhesive or cohesive, and maximum surface depression as percent of joint or crack width.

e. Perform test every 24 inches for first 100 linear feet of joint or crack; if no test failure is observed, test every 5 feet thereafter.

2. Destructive testing, Method A:
   a. Cut 6-inch-long tail of sealant loose from substrate.
   b. Mark tail 1 inch from adhesive bond.
   c. Grasp tail 1 inch from adhesive bond and pull until tail extends to 2 times published movement capability of sealant. If sealant has not failed, continue pulling to failure.
   d. Record elongation at failure and if failure was adhesive or cohesive.
   e. Observe sealant for complete filling of joint or crack with absence of voids, and for joint or crack configuration in compliance with requirements. Record observations and sealant dimensions
   f. Perform test every 100 feet for first 1,000 linear feet of joints and cracks; if no test failure at 2 times movement capability occurs, test every 400 feet thereafter.
   g. Test reports will include date when sealant was installed, name of person who installed sealant, test date, test location, and whether primer was used.
   h. Immediately after testing, replace failed sealant in test areas. Neatly cut out and remove failed sealant, prepare and prime surfaces, and install new sealant. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
   i. Sealant not evidencing adhesive failure from testing or noncompliance with requirements will be considered satisfactory.

3. If testing determines that sealant has failed adhesively from testing or does not comply with requirements, additional testing will be performed to determine extent of non-conforming sealant. Neatly cut out and remove non-conforming sealant, prepare and prime surfaces, and install new sealant. Perform field adhesion tests on new sealant. Additional testing and replacement of non-conforming sealant shall be at Contractor's expense.

END OF SECTION

PERSIGO WASTE WATER TREATMENT PLANT
Primary Clarifier Repairs
Project Specific Specifications

2145 River Road
Grand Junction, Colorado 81505

April 7, 2021
WJE No. 2019.3776

Prepared for:
City of Grand Junction
Public Works
333 West Avenue, Bldg C
Grand Junction, Colorado 81501

Prepared by:
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SECTION 00 01 10

TABLE OF CONTENTS

END OF SECTION

INSTALLER'S WARRANTY FOR JOINT SEALANT

Sealant Installer: _____

Sealant Installer Address: _____

Owner: _____

Owner Address: _____

Project Address: _____

Building Name: _____

Area of Work: _____

Substantial Completion Date: _____

Warranty Period: _____years

Expiration Date: _____

AND WHEREAS Sealant Installer has contracted, either directly with Owner or indirectly as subcontractor, to warrant said Work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

NOW THEREFORE Sealant Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period it will, at its own cost and expense, make or cause to be made such repairs to or replacement of said Work as are necessary to correct faulty and defective Work and as are necessary to maintain said Work in watertight condition, and warrants against the following.

1. Components of sealant system that do not comply with requirements; that do not remain watertight; that fail in adhesion, cohesion, or general durability; or that deteriorate in a manner not clearly specified by submitted sealant manufacturer's data as an inherent quality of the material for the application indicated, regardless of whether the Work was previously accepted by Owner.
2. Damage by exposure to foreseeable weather; and damage by intrusion of foreseeable wind-borne moisture.

Warranty is made subject to the following terms and conditions:

1. Specifically excluded from Warranty are damages to Work and other parts of the building, and to building contents, caused by:
    a. lightning;
    b. fire;
    c. failure of sealant substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    d. activity adjacent to sealant Work by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner's Representative.
    e. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.
    f. Excessive joint movement caused by structural settlement or errors attributable to design or construction, resulting in stresses in sealant exceeding sealant manufacturer's written specifications for sealant elongation or compression.

2. When Work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Sealant Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Sealant Installer is responsible for damage to Work covered by Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of Work.
4. During Warranty Period, if Owner allows alteration of Work by anyone other than Sealant Installer, including cutting, patching, and maintenance, Warranty shall become null and void on date of said alterations, but only to extent said alterations affect Work covered by Warranty. If Owner engages Sealant Installer to perform said alterations, Warranty shall not become null and void unless Sealant Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate Work, thereby reasonably justifying limitation or termination of Warranty.
5. Owner will promptly notify Sealant Installer of observed, known, or suspected leaks, defects, or deterioration and will afford reasonable opportunity for Sealant Installer to inspect Work and to examine evidence of such leaks, defects, or deterioration. Sealant Installer shall inspect leak, defect, or deterioration within 24 hours of notification.
6. If permanent repair or replacement of warranted condition cannot be made immediately, due to weather conditions, availability of appropriate labor or materials, building occupancy, etc., Sealant Installer must make, or cause to be made, immediate temporary repairs to prevent any further damage, deterioration, or unsafe conditions. Permanent repair or replacement of warranted condition shall be scheduled as soon thereafter as practical, and with Owner's consent and approval.
7. If Owner notifies Sealant Installer of warranted condition that requires immediate attention to prevent potential injury or damage, and Sealant Installer cannot or does not promptly inspect and repair same, either permanently or temporarily, then Owner may make, or cause to be made, such temporary repairs as may be essential and Sealant Installer will reimburse Owner for cost of such repairs. Such action will not relieve Sealant Installer of its obligation to perform any necessary permanent repairs, and Warranty shall remain in full force and effect for remaining portion of its original term.
9. Sealant Installer shall provide equipment, labor, and material required to remedy warranted conditions, including repair or replacement of damage to other work resulting therefrom, and removal and replacement of other work required to access warranted condition. Additional required work will be at Sealant Installer’s sole expense for full term of Warranty. Warranty includes removal and replacement of sealant-backer material and sealant.
10. Warranty is recognized to be only Warranty of Sealant Installer on said Work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of sealant failure. Specifically, Warranty shall not operate to relieve Sealant Installer of responsibility for performance of original Work according to requirements of Contract Documents, regardless of whether Contract was directly with Owner or with Owner’s General Contractor.

IN WITNESS THEREOF, and intending to be legally bound hereby, Sealant Installer has caused this document to be executed by undersigned, duly-authorized officer.

By: _____ Corporate Seal:
(Signature of Sealant Installer)

_____
(Name)

_____
(Date)

Notary Public Seal:

Subscribed and sworn before me this _____day of _____, _____

My commission expires _____

INSTALLER'S WARRANTY FOR COATING

Installer: _____

Address: _____

Owner: _____

Owner Address: _____

Project Address: _____

Building Name: _____

Area of Work: _____

Substantial Completion Date: _____

Warranty Period: ___ years

Expiration Date: _____

We (Applicator) hereby warrant materials and workmanship of Work which we have installed at above-referenced Project for the period noted above from date of substantial completion. We agree to repair or replace coating (material and labor) which fails to remain watertight; or fails in adhesion, cohesion, or general durability; or experiences surface crazing, fading or chalking; or deteriorates in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the application indicated. Warranty does not include deterioration or failure of coating due to failure of substrate prepared according to requirements, formation of new substrate cracks exceeding 1/16 inch in width, fire, or vandalism.

In event of our failure to repair, or make plans for repair of foregoing conditions, and notify Owner of such plans, within seven days after being notified in writing by Owner, we collectively or separately do hereby authorize Owner or his successor in interest to proceed to have said defects repaired and made good at our expense and we will honor and pay costs and charges therefore upon demand.

IN WITNESS THEREOF, and intending to be legally bound hereby, Concrete Installer has caused this document to be executed by undersigned, duly-authorized officer.

By: _____ Corporate Seal:
(Signature of Installer)

_____
(Name)

_____
(Date)

Notary Public Seal:

Subscribed and sworn before me this _____day of _____, _____

My commission expires _____

SECTION 01 00 00

GENERAL

PART 1 GENERAL

1.1 PROJECT SPECIFIC REQUIREMENTS

A. The Standard Specifications for Road and Bridge Construction, as well as the Standard Specifications for Construction of Underground Utilities Water Lines, Sanitary Sewers, Storm Drains, Underdrains and Irrigation Systems do not apply to this project. Any references to those documents in the contract shall be replaced by the requirements of the project specific documents.

B. Standard Details for Construction of Streets, Trails, Storm Drains and Utilities do not apply to this project. Any references to those documents in the contract shall be replaced by the requirements of the project specific documents.

C. Project specific requirements shall take precedence over general conditions or standard documents.

D. Warranty period for specific Work items are intended to supplement the general Contractor's Warranty and Guarantee.

1.2 REFERENCES

A. References to applicable standards shall be the latest edition of each unless otherwise noted.

1.3 DEFINITIONS

A. The definitions here shall supplement, or replace, those found in the City of Grand Junction General Contract Conditions.
   1. As-Built Documents: See Project Record Documents.
   2. Owner: See City.
   3. Project Record Documents: Contract documents marked by the Contractor to identify changes that were made during construction.
   4. Request for Information (also known as RFI): A question or inquiry about the Work submitted by the Contractor for clarification by the Owner or Engineer.

1.4 ADMINISTRATIVE

A. Requests for Information (RFI): Contractor shall submit RFIs to the Engineer for any condition which is believed to be at variance with the Construction Documents, or for situations where it is unclear what the Construction Documents are implementing. RFIs shall be submitted in writing to the Engineer and shall include a location, date requested, date required and indicate which repair item or item(s) are impacted by the request. Allow a minimum of 3 working days for review by Engineer.

B. Maintain at least one copy of each referenced standard, this Project Manual (Specifications), Drawings and/or Figures at the job site. In addition, maintain copies of all site visit reports (SVR) and Sketches (SKs) issued by the Engineer during Construction.

C. Provide a project superintendent at the Site a minimum of eight hours per day during the progress of the Work. The superintendent shall be literate and fluent in English.

D. Photograph existing conditions that are important to the construction or that deviate substantially from the Contract Documents; significant conditions that will be concealed by the Work; finish surfaces that might be misconstrued as damage caused by removal or other Work operations; and immediate follow-up when on-site events result in construction damage or loss. Photographs shall be of sufficient quality as to depict the condition being photographed. Provide photographs to Owner or Engineer upon request, either during project or after completion.

1.5 TEMPORARY FACILITIES AND CONTROLS

A. Contractor to furnish and pay for all temporary facilities and controls listed below which are not explicitly designated as responsibility of Owner.

B. Comply with Owner's limitations and restrictions for Site use and accessibility.
   1. Comply with all security procedures.

C. Project has special requirements for coordinating Work because of the following conditions:
   1. Owner will occupy premises outside of Work area during construction period.
      a. Cooperate with Owner to minimize conflicts and facilitate Owner usage.
      b. Perform Work to avoid interference with Owner's day-to-day operations. Notify Owner's Representative at least 72 hours in advance of activities that will affect Owner's operations.
      c. Maintain vehicular, pedestrian, and emergency and normal access to portions of facility that are in use. Keep entrances and exits clear of stored materials and construction equipment.
      d. Short interruptions in access may be permitted if approved in advance in writing by the Owner's Representative.
      e. Schedule deliveries to minimize interruptions.
      f. Do not disturb Site outside of Work area.
      g. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted and then only after arranging to provide temporary utility services according to requirements indicated.
      h. Notify Owner not less than 7 days in advance of proposed utility interruptions.
      i. Do not proceed with utility interruptions without Owner's written permission.
   2. Residential nature of building and neighborhood.
   3. Office tenant needs.

D. Staging:
   1. Staging areas must be coordinated with Owner prior to mobilization.
   2. Confine materials and equipment to the staging and work areas. Contractor assumes full responsibility for the protection and safekeeping of items stored on site.
   3. Do not unreasonably encumber Site with materials or equipment.
   4. Do not load Project structure with weight that will endanger Project structure.

E. Parking: Construction personnel shall park on-site in areas designated by the Owner's Representative.

F. Water Service: Use of Owner's existing water service will be permitted.
   1. Provide connections and extensions of service as required for construction operations.
   2. Provide additional water as necessary.

G. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel at location designated by Owner's Representative.
   1. Provide disposable supplies, including toilet tissue, paper towels, and paper cups. Maintain adequate supply. Provide covered waste containers for disposal of used material.
   2. Service toilets at least twice weekly.
   3. Provide wash facilities supplied with potable water at convenient locations for personnel who handle materials that require clean up. Supply cleaning compounds appropriate for each type of material handled. Dispose of drainage properly.
      a. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
   4. Comply with public authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

H. Electric Power Service: Use of Owner's existing electric 120V electric outlets will be permitted. Any power requirements above existing 120V outlets will need to be provided.
   1. As necessary, provide additional electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Do not overload Owner's service.
   2. Comply with NECA 200 and NFPA 70.
   3. Maintain temporary service in safe condition and utilize in safe manner.

I. Use of Existing Stairs and Elevators: Use of Owner's existing stairs will be permitted, as long as stairs are cleaned and maintained in condition acceptable to Owner's Representative.
   1. Coordinate daily usage with Owner's Representative and with requirements for facility operations.
   2. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs, and entrance doors and frame, and to maintain means of egress.
   3. At Substantial Completion, restore stairs to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

J. Lighting: Owner will provide existing lighting at existing locations.
   1. Provide additional lighting, as necessary, with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   2. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

K. Provide insulation or temporary heating as necessary for curing, drying, and protection of installed construction.
   1. Select equipment that will not have harmful effect on completed installations or elements being installed.
   2. Maintain temporary heating on 24-hour basis until no longer needed.
   3. Unless noted otherwise, insulation is considered incidental to construction and will not be paid for separately.
   4. Unless otherwise specified, temporary heating will not be considered part of Work and will be paid as additional Work item. Notify Owner's Representative in advance of need for temporary heating and estimated added cost. Do not proceed with temporary heating until authorized in writing by Owner's Representative.

L. Snow removal: The contractor shall be required to remove snow from the work area.

M. Equipment:
   1. Direct equipment exhaust away from occupied spaces and vent equipment operating within structure to outside.
   2. Operate equipment at noise levels conforming to requirements of city, state, and federal laws and codes, and Owner limitations.

N. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of public authorities having jurisdiction. Construction debris shall be removed in a manner that avoids overloading adjacent structural members.

O. Protection:
   1. Limit access to work areas.
   2. Contractor shall provide protective barriers, fences, etc. to ensure the safety of pedestrians and vehicular traffic during the Work. All barriers and fences shall comply with local, state, and federal regulations and laws.
   3. Provide adequate signage to direct pedestrian and vehicular traffic around the area under construction.
   4. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, building, and other surfaces that could be harmed by such contact.
   5. Existing Drains:
      a. Verify that drains in or near Work area are open and free flowing prior to start of Work.
      b. Lawfully remove construction effluent from Site. Do not allow construction debris to flow into existing drains or sewer systems.
      c. Rout or replace clogged drain lines at completion of Work.
   6. Confine dust, debris and fumes to Work area and prevent from entering areas outside of the Work area.
   7. Protect finished surfaces against damage. Minimize traffic on finished roof surfaces and do not use for material storage.
   8. Contractor shall be responsible for maintaining the water tightness of the areas of the structure being worked on during the course of the work. Providing temporary protection of the existing construction or structure from the weather until removed portions are completely replaced with new construction. The costs of damage and repairs shall be made at no cost to the Owner.
   9. Maintain all protection in operable condition for the full duration of the project.

P. Temporary Fencing:
   1. Tree and Plant Protection: Install temporary fencing located as indicated or outside drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
   2. Site Enclosure Fence: Before construction operations begin, provide Site enclosure fence in manner that will prevent people and animals from easily entering Site except by entrance gates.

Q. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241. Coordinate with Owner's safety team.
   1. Provide portable, UL-rated fire extinguishers with class and extinguishing agent as required by locations and classes of fire exposures.
   2. Prohibit smoking on Site.

3. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of public authorities having jurisdiction.
4. Store combustible materials in approved safety containers and enclosures, away from building if possible.
5. Develop and supervise overall fire-prevention and -protection program for personnel at Site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

PART 2 PRODUCTS

2.1 GENERAL

A. The products specified are believed to have properties adequate for successful completion of the Work. If the Contractor has found these products to be unacceptable or has had difficulty using these materials, the Contractor shall notify the Architect/Engineer in writing, and provide a request for substitution of material for which the Contractor has had successful experience.

B. No product substitutions will be allowed unless otherwise noted. Engineer's approval must be obtained for all substitutions prior to being awarded the project. Submit requested substitutions with bid form.

2.2 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in original containers and packaging with seals unbroken, labeled with manufacturer’s name, product brand name and type, date of manufacture, lot number, directions for storing, and complete manufacturer’s written instructions.

B. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, or installation. Reject and remove from Site new materials which have been exposed to moisture to their detriment.

C. Store and handle materials in accordance with manufacturer’s written instructions, safety requirements, and all applicable laws and regulations. Remove from Site, and replace at no cost to Owner, any materials that are damaged or otherwise negatively affected by not being stored or handled in accordance with manufacturer’s written instructions.

D. Store materials in original, undamaged containers and packaging in clean, dry, location on raised platforms and protected from weather, within temperature range required by manufacturer. Protect stored materials from direct sunlight and sources of ignition. Manufacturer’s standard packaging and covering alone is not considered adequate weather protection.

E. Locate materials in a secure location approved by Owner’s Representative

F. Conspicuously mark damaged or opened containers, containers with contaminated materials, damaged materials, and materials that cannot be used within stated shelf life and remove from Site as soon as possible. Replace discarded materials in a timely manner at no cost to Owner.

G. Limit stored materials on structures so as to preclude damage to materials and structures.

H. Maintain copies of all applicable Safety Data Sheets (SDS) with materials in storage area, such that they are available for ready reference on Site.

PART 3 EXECUTION

3.1 DISCOVERY, FIELD VERIFICATION AND CHANGES IN WORK

A. Contractor shall verify all quantities. Quantities shown are for estimating purposes only.

B. Do not scale drawings. The Contractor shall field verify the existing dimensions and existing conditions prior to starting the work. Dimensions of the new construction shall be adjusted as necessary to fit the existing conditions. The Engineer shall be notified in writing of any significant deviations from the dimensions or conditions shown on these drawings.

C. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials or mislocation of embedded elements such as reinforcing steel, which may interfere with proper execution of the Work. Promptly report to Engineer as a request for information any of these conditions.

3.2 EXAMINATION FOR MATERIAL COMPLIANCE

A. Examine substrates and conditions with Installer and manufacturer's representative, where appropriate, for compliance with requirements and for other conditions affecting installation or performance of the material.
   1. Verify dimensions so that proper installation of material for optimal performance is maintained.
   2. Ensure that work done by other trades is complete.
   3. Verify that areas and conditions under which Work is to be performed permit proper and timely completion of Work.
   4. Notify Engineer in writing of conditions which may adversely affect installation or performance of the material and recommend corrections.
   5. Do not proceed with Work until adverse conditions have been corrected and reviewed by Engineer.
   6. Commencing Work constitutes acceptance of Work surfaces and conditions.

3.3 CLEANING

A. Immediately clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

B. At the end of each workday, broom-clean Site and Work areas and place all items to be discarded in appropriate containers.

C. After completing Work:
   1. Clean all materials resulting from Work that are not intended to be part of the finished Work using appropriate cleaning agents and procedures. Exercise care to avoid damaging surfaces.
   2. Repair at no cost to Owner all items damaged during the Work.
   3. Remove and legally dispose of debris and surplus materials from Site.

3.4 PROTECTION

A. Take precautions to ensure safety of people (including building users, passers-by, and workers) and protection of property (including adjacent building elements, landscaping, and motor vehicles).
   1. Erect temporary protective canopies and walls, as necessary, at walkways and at points of pedestrian and vehicular access that must remain in service during Work.

B. Cover adjacent surfaces with materials that may be damaged.

C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.

D. Prevent dust, debris, coating overspray/spatter, and other construction materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

E. Limit access to Work areas.

F. Comply with manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products.

G. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

H. Protect from damage, all elements of completed work and original construction to remain.

I. Protect Work during and after completion from contact with contaminating substances and from damage, so materials are without deterioration or damage at time of Substantial Completion.

END OF SECTION

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Contractor's bids shall be based on providing products or methods exactly as specified.

B. For products or methods specified only by reference or performance standards, select a product that meets or exceeds standards according to manufacturer's information. Product selection will be subject to Engineer's approval.

C. For products or methods specified by naming several products or manufacturers, select product and manufacturer named.

D. Where the phrase "or equal" occurs in the Contract Documents, do not assume that the materials, equipment, or methods will be approved as equal unless the item has been specifically approved for this Work by Engineer. The decision of Engineer shall be final.

1.2 SUBSTITUTIONS, CONTRACTOR OPTIONS

A. No substitutions will be considered after Notice of Award except under one or more of the following conditions:
   1. Substitutions for compliance with final interpretations of code requirements or insurance regulations.
   2. Unavailability of specified products or methods, through no fault of Contractor.
   3. Subsequent information discloses inability of specified products or methods to perform properly or to fit in designated space.
   4. Manufacturer/fabricator refusal to certify or guarantee performance of specified products or methods as specified.
   5. When a substitution would be substantially to Owner's best interests.

1.3 SUBSTITUTION REQUIREMENTS

A. Submit four copies of each request for substitution. Include in request:
   1. Complete data substantiating compliance of proposed substitution with Contract Documents.
   2. For products:
      a. Product identification, including manufacturer's name and address.
      b. Manufacturer's literature, including product description; performance and test data, and reference standards; samples; and name and address of similar projects on which product was used and date of installation.
   3. For construction methods:
      a. Detailed description of proposed method.
      b. Drawings illustrating methods.
   4. Itemized comparison of proposed substitution with products or methods specified.
   5. Data relating to changes in construction schedule.
   6. Identify other contracts affected and changes or coordination required.

7. Accurate cost data on proposed substitution in comparison with products or methods specified.

B. In making requests for substitutions, Contractor represents:
   1. They have personally investigated proposed product or method and determined that it is equal or superior to that specified in every respect.
   2. They will provide the same guarantee for substitution as for products or methods specified.
   3. They will coordinate installation of accepted substitutions into Work, making changes for Work to be complete in every respect.
   4. Cost data is complete and includes related costs under their contract, but excludes:
      a. Costs under separate contracts
      b. Engineer's redesign
      c. Administrative costs of Engineer
   5. They will assume full responsibility for all additional costs and expenses for Owner, Engineer, and other Contractors.

C. Substitutions will not be considered when:
   1. They are indicated or implied on Shop Drawings or product data submittals without formal request submitted in accordance with the Specifications.
   2. Acceptance will require substantial revision of Contract Documents.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Administrative and procedural requirements for submitting shop drawings, product data, samples, and other submittals.

B. Reference the Schedule of Submittals for a summary of required submittals.

1.2 SUBMITTALS

A. General:
   1. Identification: Include a permanent label or title block on the submittal or cover sheet, with the following information.
      a. Project name.
      b. Date.
      c. Names of Engineer, Contractor, subcontractor, manufacturer, supplier, and firm or entity that prepared submittal, as appropriate.
      d. Identification information, such as the number and title of the appropriate Specification section, Drawing number and detail references, location(s) where product is to be installed, or other necessary information.
      e. Label each submittal with Specification section number followed by decimal point and then sequential number (e.g., 06100.01). On resubmittals, include alphabetic suffix after another decimal point (e.g., 06100.01.A).
      f. Provide space approximately 6 by 8 inches on or beside the label or title block for the Contractor's approval stamp and the action stamp of the Engineer.
   2. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
   3. Submit one electronic copy of prints in PDF format. Prints shall have white background and dark lettering and line work. Prints will be returned electronically.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not use reproductions of the Contract Documents or standard printed data.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Dimensions, including notation of those established by field measurement.
      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. Notation of coordination requirements.
      i. Relationship to adjoining construction clearly indicated.
      j. Seal and signature of professional Engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8 1/2 by 11 inches but no larger than 30 by 42 inches.
3. Submit one electronic copy of prints in PDF format. Prints shall have white background and dark lettering and line work. Prints will be returned electronically.

C. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. Clearly mark each copy of the submittal to show which products and options are applicable. Delete information which is not applicable. Supplement standard information with project-specific information.
   2. Include the following information, as applicable:
      a. Manufacturer's catalog cuts, product specifications, schematic drawings, installation instructions, and written recommendations.
      b. Compliance with referenced standards.
      c. Testing by recognized testing agency.
      d. Include manufacturer's literature including written instructions for evaluating, preparing, and treating substrate.
      e. Technical data including tested physical and performance properties
      f. Mixing and application or placement instructions.
   3. Include temperature ranges for storage and application of materials, and special cold-weather application requirements or limitations.
   4. Include Globally Harmonized System (GHS) Safety Data Sheets or, if not yet available, Material Safety Data Sheets. For information only.

D. Samples: Submit physical samples to illustrate functional and aesthetic characteristics of the product, for review of materials and workmanship, for compatibility with other elements, and for comparison with the actual installed elements.
   1. Samples shall be of sufficient size to show the general visual effect.
   2. Include sets of at least three samples that show the full range of color, pattern, texture, graining, and finish.
   3. Transmit samples that contain multiple, related components, such as accessories, together in one submittal package.
   4. Identification: Attach a label on an unexposed side of each sample that includes the following:
      a. Generic description of sample.
      b. Product name, name of manufacturer, and sample source.
      c. Number and title of appropriate Specification section.
   5. Samples for Initial Selection: Submit two full sets of units or sections of units from the supplier's product line, showing the full range of colors, textures, and patterns available. Engineer will retain one set and return one set with the options selected.
   6. Samples for Verification: Submit full-size units or samples of the size indicated, prepared from the same material to be used for the Work, cured and finished in the manner specified, and physically identical with material or product proposed for use, and that show the full range of color and texture variations expected.
      a. Submit the number of samples required by the Contractor plus one that will be retained by the Engineer. Mark up and retain one returned sample as a Project Record Document.
   7. Maintain approved samples at the Site, available for quality-control comparisons during construction. Samples may be used to determine final acceptance of construction associated with the sample.

E. Delegated Design:
   1. Where required by the Contract Documents, in addition to shop drawings, product data, and other required submittals, submit a statement, signed and sealed by responsible design professional, for each product and system specifically assigned to the Contractor to be designed or certified by a design professional.
      a. Indicate that products and systems comply with performance and design criteria in the Contract Documents.
      b. Include a list of codes, loads, and other factors used in performing these services, and signed and sealed design calculations where required.
      c. Electronic submittals in PDF format are preferred; however, print copies will be accepted. Submit number of prints needed by contractor plus two for retention by the Owner and Engineer.

1.3 SUBMITTAL PROCEDURE

A. Coordinate the preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals requiring concurrent review, and related activities that require sequential activity.
   2. Allow sufficient time for submittal and resubmittal review. Failure to provide sufficient time for submittal and resubmittal reviews will not be a basis for extension of the Contract Time.

B. Review Time:
   1. Allow five working days for the review of each submittal and resubmittal.
   2. Allow additional time if coordination with subsequent submittals is required. The Engineer will advise the Contractor when the submittal being processed must be delayed for coordination.
   3. Time for review shall commence when the Engineer receives the submittal.

C. Contractor Review:
   1. Review each submittal, coordinate with other Work, and check for compliance with the Contract Documents. Verify field dimensions and conditions. Identify variations from the Contract Documents and product or system limitations that may be detrimental to the successful performance of completed Work. Note corrections.
   2. Before submitting to the Engineer, stamp with a uniform approval stamp including the reviewer's name; the date of Contractor's approval; and a statement certifying that the submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
   3. Submittal Log: Maintain submittal log that lists submitted items per specification section. Record dates submitted, dates returned, and disposition of each item based on Engineer's review. Submit final log showing approved materials at Substantial Completion.

D. Transmittal: Package each submittal individually and appropriately for transmittal and handling.

E. Engineer Action:
   1. Engineer will not review submittals that are received from sources other than the Contractor or that do not bear the Contractor's approval stamp, and will return them without action to the Contractor.
   2. Engineer will not return submittals requested for information only.
   3. Engineer will review each submittal for conformance with the design concept of the Project and compliance with the Contract Documents. Engineer will make marks to

indicate corrections or modifications required, and stamp with an action stamp. The action stamp will include the reviewer's name, date of review, and required Contractor action. Contractor actions may include making corrections or modifications to the submittal or resubmitting the submittal, or both.

F. Resubmittals: Make resubmittals in the same form and number of copies as the initial submittal.
   1. Note the date and content of previous submittal.
   2. Note the date and content of the revision in the label or title block and clearly indicate the extent of the revision and changes made.
   3. Resubmit until the Engineer indicates that no resubmittal is required.
      a. No resubmittal is required when submittal is marked "No Exceptions Taken" or "Make Corrections Indicated".

G. Distribution: Furnish copies of the final submittals to the Site file, the record documents file, manufacturers, subcontractors, suppliers, fabricators, installers, public authorities having jurisdiction, and others as necessary for performance of construction activities. Show the distribution on the transmittal forms.

H. Use only the final submittals with the Engineer's action stamp, for construction.
   1. Only items marked "No Exceptions Taken" or "Make Corrections Indicated" shall be used for construction.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Administrative and procedural requirements for quality assurance and quality control, testing, special inspections and mockups.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated, and do not relieve the Contractor of responsibility for compliance with requirements of the Contract Documents.
   1. Specified tests, inspections, and related actions performed by others do not limit the Contractor's other quality assurance and quality control procedures that facilitate compliance with requirements of the Contract Documents.
   2. Requirements for the Contractor to provide quality assurance and quality control services required by the Engineer, Owner, or public authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections:
   1. See sections in Divisions 02 through 09, and Drawings sheets for specific test and inspection requirements.

1.2 DEFINITIONS

A. Quality Assurance Services: Activities, actions, and procedures performed before and during the execution of the Work to guard against defects and deficiencies and substantiate that the proposed construction will comply with requirements.

B. Quality Control Services: Tests, inspections, procedures, and related actions during and after the execution of the Work to evaluate that the actual products incorporated into the Work and the completed construction comply with requirements.
   1. Services do not include contract enforcement activities performed by the Engineer, such as observations.

C. Testing Agency (also known as Third Party Testing Agency): Entity responsible for performing specified testing or special inspections in Divisions 02 through 09 and on the Contract Drawings.

D. Special Inspector: A qualified person employed or retained by an approved agency (such as the testing agency), and approved by the building official as having competence necessary to insect a particular type of construction requiring special inspection.

E. Special Inspection: Review of completed work or work in progress performed by the Special Inspector, or where specifically identified, by the Engineer. Items typically required by the governing building code.

1.3 COMPLIANCE CRITERIA

A. General: If compliance with two or more standards is specified and standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement.

B. Minimum Quantity or Quality Level: 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.

C. Refer uncertainties to the Engineer for a decision before proceeding.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 QUALITY CONTROL

A. Reference the Special Inspection Schedule on the Construction Drawings for special inspection requirements for this section.

B. Owner Responsibilities: The Owner will engage a qualified testing agency to perform all special inspections and select testing as explicitly identified in the Contract Documents.
   1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and descriptions of types of testing and inspecting they are engaged to perform.
   2. 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 the Contractor.

C. Testing Agency/Special Inspector Responsibilities: Cooperate with the Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Determine location from which test samples will be taken and in which in-situ tests are conducted.
   2. Notify the Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   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 of each test, inspection, and similar quality control service.
   5. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
   6. Do not perform any duties of the Contractor.

D. Engineer Responsibilities: Engineer may perform some testing on completed on in-process work as noted in the Contract Documents.

E. Tests and inspections not explicitly assigned to the Owner or Engineer, and testing and inspecting requested by the Contractor and not required by the Contract Documents, are the Contractor's

responsibility. Unless otherwise indicated, provide quality control services specified and those required by public authorities having jurisdiction, whether specified or not.

F. Coordination: Coordinate the sequence of activities to accommodate the required quality assurance and quality control services with a minimum of delay and to avoid the necessity of removing and replacing construction to accommodate testing and inspecting.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.
   2. Notify the testing agency sufficiently in advance of operations to permit assignment of personnel.

G. Associated Services: Cooperate with the Engineer and testing agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Provide the following:
   1. Submittals of concrete mix designs and other materials and products necessary for the testing agency to test and evaluate field work.
   2. Access to the Work.
   3. Incidental labor and facilities necessary to facilitate tests and inspections.
   4. Adequate quantities of representative samples of materials that require testing and inspecting. Assist the testing agency in obtaining samples.
   5. Facilities for storage and field curing of test samples.
   6. Security and protection for samples and for testing and inspecting equipment at Site.

H. Repair and Protection:
   1. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   2. Provide materials and comply with installation requirements specified in other sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
   3. Protect construction exposed by or for quality control services.
   4. Repair and protection are the Contractor’s responsibility, regardless of assignment of responsibility for quality control services.

END OF SECTION

SECTION 01 70 20

PROJECT CLOSEOUT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Administrative and procedural requirements for contract closeout, including final cleaning; Substantial Completion and final completion procedures.

B. Related Sections:
   1. Divisions 02 through 09 sections for special cleaning and specific closeout requirements for Work in those sections, including warranties.

PART 2 PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by 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

3.1 PROJECT RECORD DOCUMENTS

A. During Work, maintain one set of Drawings and reviewed shop drawings, Specifications, WJE site visit reports, and product data for recording deviations of as-built construction from design information. Include addenda and Contract modifications.
   1. Accurately document and record changes and modifications as soon as possible after they occur, in understandable manner.
   2. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later. Record and check markup before enclosing concealed installations.
   3. Include:
      a. Dimensional changes.
      b. Revisions to Drawing details and details not on Drawings.
      c. Changes made by Change Order or Engineer's written orders or direction based on Site Visit Reports or Construction Observation Reports. Note Change Order numbers, Site Visit Report Item numbers or similar identification.
      d. Field records for variable and concealed conditions.
      e. Record information on Work that is shown only schematically or omitted from Drawings.
      f. Actual products and materials used.
         1) Include product data, specifically marked for Project, and cross-referenced to Specifications, Drawings, and Change Orders.
         2) Include names of manufacturer and Installer, and other information necessary to provide record of selections made.

3) Include significant changes in product delivered to Site and changes in manufacturer's written instructions for installation.

4. Mark record document most capable of showing actual physical conditions completely and accurately. Cross-reference on other record documents.
5. Mark record documents with erasable, red-colored media. Use other colors to distinguish between changes for different categories of Work at the same location.

B. Store Record Documents and samples in field apart from Contract Documents used for construction. Do not use Record Documents for construction purposes. Maintain Record Documents in good order and in clean, dry, legible condition, protected from deterioration and loss. Provide access to Record Documents for Engineer's reference during normal working hours.

C. Prepare final document markup in digital format for submission.
1. Incorporate changes and additional information previously marked on record prints. Erase, redraw, and add details and notations where applicable.
2. Refer questions to Engineer for resolution.
3. For new details and drawings, bind new sheets as necessary to appropriate document.
4. Identify and date each Record Drawing. Include names of project, Engineer, and Contractor, and designation "PROJECT RECORD DOCUMENT" in prominent location.
5. Organize PDF information into separate electronic files that correspond to each sheet of Drawings, report or item. Name each file with identification of item contained.

3.2 FINAL CLEANING

A. General: Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations. Return adjacent surfaces and areas to condition existing before Work began.

B. In areas disturbed by construction activities, complete the following cleaning operations before requesting inspection for certification of Substantial Completion. Clean each surface or unit to the condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions. Employ experienced workers or professional cleaners.
1. Remove tools, construction equipment, machinery, and surplus material from Site.
2. Clean Site, yard, and grounds, including landscaped areas, of rubbish, waste materials, litter, and other foreign substances.
   a. Broom clean paved areas. Remove petrochemical spills, stains, and other foreign deposits.
   b. Rake grounds that are neither planted nor paved to smooth, even-textured surface.
3. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of stains, films, and similar foreign substances. Polish surfaces to achieve specified finish. Avoid disturbing natural weathering of exterior surfaces.
   a. Touchup 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.
      1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
4. Clean and restore transparent and reflective surfaces, such as mirrors and glass in doors and windows, to their original condition. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

5. Remove labels that are not permanent.
6. Clean light fixtures and lamps to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
7. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
8. Sweep floors broom clean.
9. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove paint and mortar droppings and other foreign substances.
10. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    a. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
11. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
12. Leave Project clean and ready for reuse.

END OF SECTION

SECTION 02 22 00

EXISTING CONDITIONS ASSESSMENT

PART 1 GENERAL

1.1 SCOPE

A. This Section covers observations of existing conditions made by the Engineer at the site.

1.2 OBSERVATIONS

A. The following figures and captions are provided for reference by the Contractor.

B. Observations of the conditions of the drained Primary Clarifier were made in Clarifier No. 1 (north clarifier) when it was drained and cleaned for concrete investigative work. Even after cleaning, there was a scum or grime layer still present, limiting observations.

C. The surface of the concrete has been eroded within the trough and adjacent to the dome connection nodes.

D. Laboratory review of the concrete indicates that the top 1/4-inch has been weakened by chemical attack within the trough. Below this area, the chemical attack distress is only on the order of 1/16-inch thick.

E. No concrete spalls or delaminations were identified.

F. Macro concrete cracking was noted only at isolated locations.

G. Conditions in Clarifier No. 2 (south clarifier) are presumed to be similar.

H. The observations presented in this section do not eliminate the need for the Contractor to visit the site and confirm existing conditions prior to submitting their bid or commencing with Work.

Figure 1. View of Primary Clarifiers from above, north is up (photo from Pictometry, taken 3/26/2018).

Figure 2. View of Primary Clarifiers looking east (photo from Pictometry, taken 3/26/2018).

Figure 3. View of Primary Clarifiers looking south (photo from Pictometry, taken 3/26/2018).

Figure 4. View of Primary Clarifiers looking west (photo from Pictometry, taken 3/26/2018).

Figure 5. View of Primary Clarifiers looking north (photo from Pictometry, taken 3/26/2018).

Figure 6. Clarifier No. 2 as viewed from the east side looking west.

Figure 7. Overall view of clarifier interior.

Figure 8. Overall view of clarifier interior.

Figure 9. Overall view of clarifier interior.

Figure 10. View from catwalk bridge, showing ventilation pipe and dome.

Figure 11. Overall view of clarifier interior.

Figure 12. Interior view of exterior clarifier wall and trough.

Figure 13. Interior view of exterior clarifier wall and trough.

Figure 14. Scum box viewed from below.

Figure 15. Scum box connection to exterior wall of trough.

Figure 16. Scum box drain.

Figure 17. Overall view of weir plate and scum baffle at exterior side of trough.

Figure 18. Close-up view of weir plate to scum baffle connection.

Figure 19. Trough access ladder as viewed from above, standing in entrance enclosure.

Figure 20. Ladder at entry viewed from trough.

Figure 21. Catwalk bridge support pier.

Figure 22. Catwalk bridge and central mechanical equipment.

Figure 23. Sludge pit at center of clarifier adjacent to mechanical equipment.

Figure 24. Scum and bottom screed at base of clarifier.

Figure 25. Bottom screed and blades at exterior wall.

Figure 26. Close-up of bottom screed plate. Blade height will be adjusted by Owner.

Figure 27. Typical depressions in concrete topping.

Figure 28. Overall view of trough and weir plate.

Figure 29. Overall view of trough.

Figure 30. Erosion of concrete surface at trough underneath dome connection nodes.

Figure 31. Typical dome-to-clarifier wall connection node.

Figure 32. Close-up view of underside of dome node connection hardware.

Figure 33. Close-up view of underside of dome node connection hardware.

Figure 34. Close-up view of underside of dome node connection hardware.

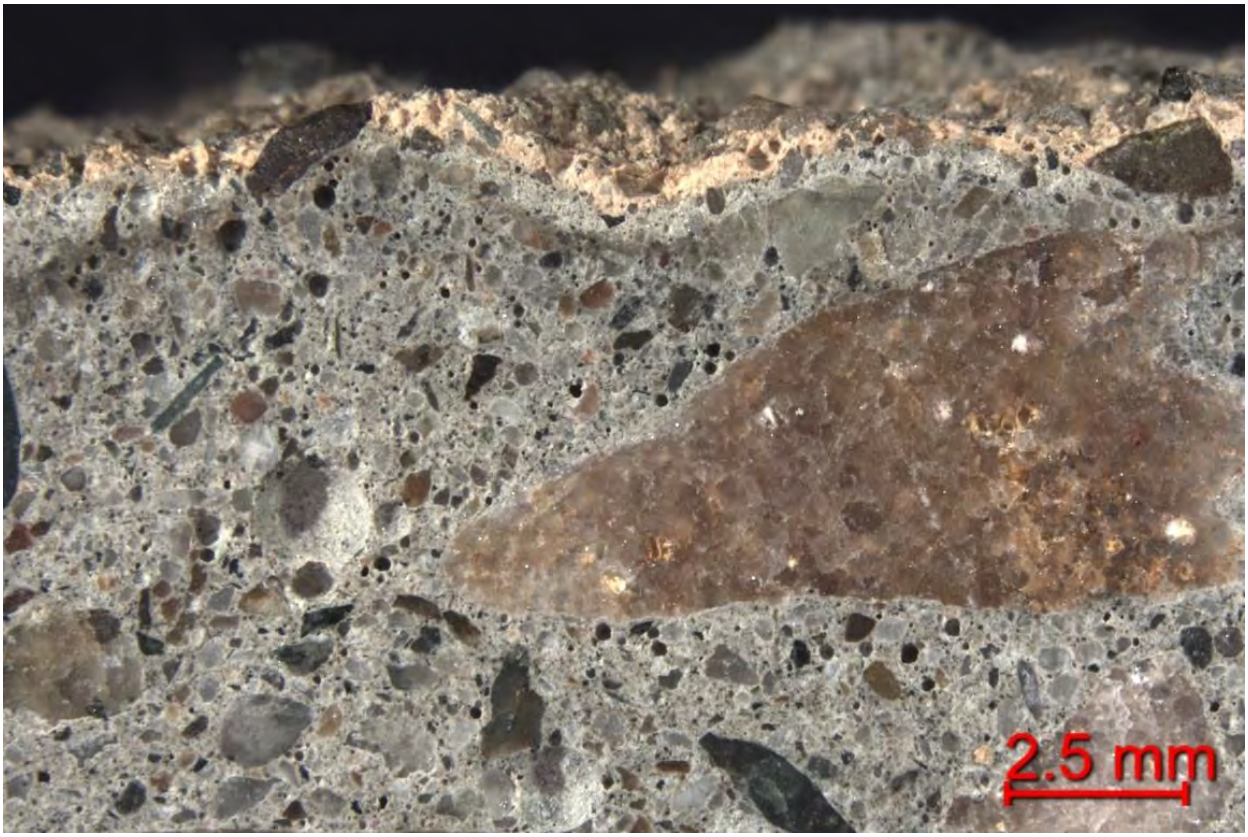

Figure 35. Near surface showing discoloration (Core 1) taken from within trough.

Figure 36. Near surface showing discoloration (Core 3) taken from within lower portion of basin.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment, and supervision to perform all Work necessary for and incidental to selective demolition in preparation for other Work specified in the Contract Documents. Demolition includes the following:
   1. Demolition and removal of existing clarifier domes and clarifier entrance enclosures, and proper termination of mechanical and electrical items connected to the roof.

1.2 REFERENCES

A. American National Standards Institute (ANSI)
   1. ANSI/ASSE A10.6-2006: Safety Requirements for Demolition Operations – American National Standard for Construction and Demolition Operations

B. National Fire Protection Association (NFPA)
   1. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; latest edition

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

C. Remove and salvage: Detach items from existing construction and securely store away from work area.

D. Existing to remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 SUBMITTALS

A. Documentation of existing conditions which might be misconstrued as damage caused by demolition activities.

B. Contractor proposed demolition plan, including minimum setbacks for heavy equipment. Reference Sheet 5.1 and 5.2. See also Section 3.3.

1.5 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition Work similar in material and extent to that indicated for this Project. Three (3) projects of similar size and scope completed over the previous 5 years.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Standards: Comply with ANSI A10.6 and NFPA 241.

D. Pre-demolition Meeting: Prior to demolition of various elements, schedule a meeting at the site with Owner and Engineer to verify areas of demolition and elements to remain.

1.6 PROJECT CONDITIONS

A. Conduct selective demolition so that Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner to the extent practical.

C. Notify Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Engineer and Owner. Owner will remove hazardous materials under a separate contract.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 EXAMINATION

A. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

B. Survey existing dome element and clarifier entrance enclosure conditions for attached items, including conduits and other mechanical equipment.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended functions or designs are encountered, investigate and measure the nature and extent of conflict. Notify and promptly submit a written report to Owner and Engineer.

D. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities. Promptly notify Owner and Engineer if hazards are encountered.

3.2 PROTECTION

A. Protect existing elements from damage including, but not limited to, railings, concrete, and steel members.
   1. Provide temporary controls and barriers.

2. Protect existing surfaces and features that are to remain from damage that could result from selective demolition Work.
3. Damage to existing surfaces and features that are a result of selective demolition shall be repaired to the satisfaction of Owner at no cost to Owner.

3.3 PREPARATION

A. Examine existing conditions of Work, including verifying slopes around the site which may impact access of demolition equipment, and identify elements subject to movement or damage during cutting, patching and selective demolition.

B. After uncovering Work, examine conditions affecting installation of new products or performance of Work.

C. Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walkways, existing utility services, and surrounding site and water.

D. Develop demolition plan which accounts for sequencing of removal and clearly identifies any structural members which are to be cut, and at what time. Plan shall be developed by a licensed Professional Engineer in the State of Colorado and submitted for review. Include:
1. Drawings including plan, detail and section views as necessary to identify sequence of demolition, location of equipment and debris.
2. Calculations
3. Surcharge loading which may impact structure and adjacent structures and/or extensive underground utilities.

3.4 SELECTIVE DEMOLITION

A. General: Demolish and remove existing elements only to the extent required by the Work and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Use hand tools or small power tools designed for sawing, grinding or chipping, not hammering and chopping, to minimize disturbance of adjacent surfaces.
2. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on structure, adjacent structures, and utilities.
3. Dispose of demolished items and materials promptly and daily.

B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition.

3.5 CUTTING

A. Do not cut structural members without coordination with the approved demolition plan.

B. Execute cutting and demolition by methods that will prevent damage to other Work and items to remain, and will provide proper surfaces to receive installation of rebuild and new Work.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project Site and legally dispose of them at the end of each Workday.

B. Do not burn demolished materials.

3.7 CLEAN UP

A. Regulated clean-up procedures are to be followed if any of the site is affected. Contact Owner immediately if the site is disturbed by Work.

B. Clean adjacent sites and buildings of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.
   1. Areas immediately adjacent to Clarifiers are landscaped with irrigation. Contractor shall seed any areas of damaged landscaping, and repair all damage to irrigation after completion of the Work.

C. Conduct post-demolition assessment of adjacent structures with Owner and Engineer. Compare with pre-demolition assessment to identify damage.

END OF SECTION

SECTION 05 52 00

ALUMINUM GUARDRAILS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes guardrails, handrails and kick plates along with all necessary mounting and installation hardware.

B. Furnish all labor, materials, tools, equipment, and supervision necessary for installation of aluminum guardrails.

1.2 PRICES

A. Perform work on a cost per linear foot basis.

1.3 REFERENCES

A. Aluminum Association, Inc. (AA):
   1. SAS-30: Specifications for Aluminum Structures

B. Aluminum Welding Society (AWS):
   1. D1.2/D1.2M: Structural Welding Code - Aluminum

C. ASTM International (ASTM), most recent edition:
   1. B209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
   2. B211: Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, Wire.
   3. B221: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
   4. B247: Standard Specification for Aluminum and Aluminum Die Forgings, Hand Forgings and rolled Ring Forgings.
   5. B429: Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
   6. E985: Standard Specification for Permanent Metal Railing Systems and Rails for Buildings

D. International Code Council (ICC):
   1. 2018 International Building Code (IBC)

1.4 SUBMITTALS

A. Product Data: Provide product data for all system components indicating compliance with this section.

B. Calculations or Load Tests: Submit test results from ASTM E935 conducted on the manufacturer’s supplied system indicating compliance with required design and performance requirements.

C. Shop Drawings: Shop drawings for fabrication and installation of pipe and tube railings. Include plans, elevations and detail sections. Indicate materials, methods, finishes and types of joinery, fasteners, anchorages and accessory items.

D. Installation Instructions (segmental systems only): Complete procedures for proper installation of the guardrail system, including all necessary components and required steps.

E. Maintenance Data: Submit for finished aluminum components including cleaning materials, methods, and precautions.

1.5 DESIGN AND PERFORMANCE REQUIREMENTS

A. Comply with requirements of building authorities having jurisdiction in Project location and the following:
   1. Handrail Standard: ANSI A1264.1
   2. Occupational Safety and Health Administration - 29 CFR 1910.23 - Guarding floor and wall openings.
   3. 2010 ADA Standards for Accessible Design.

B. Top of guardrail shall be installed at 42 inches above adjacent walking surface and designed to meet the requirements to serve as a handrail, and match the existing handrails present at the stairs in front of the clarifier entrances. At tank perimeter where no walking surface is adjacent, guardrail shall be 42 inches above top of tank.

C. Provide 4-inch-tall kickplate at base of all components adjacent to walking surfaces.

D. All components and connections to the concrete structure shall be designed by an Engineer licensed in the State of Colorado to withstand the effects of gravity loads as well as a live load on handrails and intermediate rails within allowable stress limits in accordance with appropriate material building code as referenced in IBC 2018 (i.e. concrete anchors per ACI 318). Live loads on handrails and intermediate rails shall be:
   1. Uniform load of 50 lbf/ft. applied in any direction.
   2. Concentrated load of 200 lbf applied in any direction.
   3. Uniform and concentrated loads need not be assumed to act concurrently.

E. Load testing to demonstrate compliance of system is acceptable if performed in accordance with ASTM E935 with no failure of any component and no permeant deflection (full rebound of system after removal of loading). System testing shall include connection hardware in similar configuration as to contemplated.

F. Provide expansion joints for horizontal elements as necessary to accommodate thermal movement without distress to the system.

1.6 QUALITY ASSURANCE

A. Field Measurements: Take field measurements prior to preparation for guardrail installation. Verify dimensions on site prior to shop fabrication for proper connection to structure.

B. Sequence: Coordinate guardrail installation with coating work.

C. Mockup: Install mockup consisting of one section adjacent to Pump Station to verify selection and adequacy of railing system and to set quality standards for installation.

1.7 WARRANTY

A. The completed installation of guardrail system shall be guaranteed jointly and severally by the product Manufacturer and Contractor against defects in material and application, for a period of five (5) years from the completion of the application.

B. Any work proving defective within five (5) years from the date of acceptance shall be corrected at no cost to the Owner.

PART 2 PRODUCTS

2.1 APPROVED PRODUCTS

A. Use one of the following systems, or approved equal:
   1. Series 500 Aluminum Pipe Railing System by Superior Aluminum Products, Inc.
   2. Kee Lite Smooth Railing System by Kee Safety, Inc.
   3. TABCO Aluminum Railing by Tuttle.
   4. Smooth Aluminum Handrail by Modular Railing Systems.

B. Alternate systems must meet the requirements of this Specification and shall not be used without prior approval by Owner and Engineer.

2.2 RAILING MATERIALS

A. Shapes, configurations, and sizes: As shown in the product data.

B. Horizontal Pipe Rail Guard Railing:1.9-inch outer diameter, schedule 40 pipe (inner diameter 1.5 inches)

C. All fasteners shall be in accordance with the railing manufacturer's requirements such that final system meets the design and performance requirements of this section.
   1. Concealed fasteners on all handrails.

D. All components shall be of compatible metals to prevent galvanic corrosion.

E. Do not embed railing in concrete or cementitious materials (grout), use mounting bases only.

2.3 FABRICATION

A. Components or railing sections shall be fabricated at the manufacturing facility in largest practical site delivery sizes.

B. Pipe cuts shall be square and accurate for minimum joint-gap. Cuts shall be clean and free of chamfer, from deburring, nicks and burrs.

C. For railings that are angled horizontally, machine castings shall be incorporated to provide proper angle.

PART 3 EXECUTION

3.1 INSTALLATION

A. Assemble railing sections in accordance with manufacturer's installation instructions, current code requirements, Drawings, and requirements provided in this Specification.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form work true to line and level with accurate angles and surfaces.

D. Do not allow any gaps larger than 4-inches between adjacent guardrails.

E. Securely anchor to structure in accordance with manufacturer's instructions to meet the performance requirements of this Specification.

F. Install all fasteners in accordance with manufacturer's installation instructions and requirements provided in this Specification.

G. Tighten all fasteners so that completed railing is rigid and free of play at joints and component attachments.

H. Install concealed fasteners for interconnecting railing components and for attaching them to other Work, unless exposed fasteners are unavoidable or are standard fastening method for handrail and railing indicated.

I. Provide and install washers as required to allow proper fastener bearing.

J. Install gates and adjust hardware for smooth operation. After installation, test gate. Open and close a minimum of five times. Correct any deficiencies and adjust.

K. Expansion Joints: Provide expansion joints for continuous spans in excess of 40 feet. Construct joints by deleting structural attachment from one end of the spliced joint so that it is free to move in or out of the pipe (longitudinal movement only). If a joint is provided every 30 feet, the width of the gap should allow 1/8 inch expansion for each 40 degrees F of expected temperature rise from material installation temperature. Correct for other lengths.

3.2 ERECTION TOLERANCES

A. Install railings plumb and level, securely fastened, with vertical members plumb.
   1. Maximum variation from plumb: 1/4 inch.
   2. Maximum misalignment from true position: 1/4 inch.
   3. Maximum misalignment between adjacent separated members: 1/8 inch.

END OF SECTION

SECTION 05 53 00

METAL GRATINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes new metal gratings at entrance to clarifiers, to replace existing gratings, and to match existing. Includes all necessary mounting and installation hardware.

B. Furnish all labor, materials, tools, equipment, and supervision necessary for installation of new grating.

1.2 PRICES

A. Perform work on a cost per square foot basis.

1.3 SUBMITTALS

A. Product Data: Provide product data for all system components indicating compliance with this section, including gratings, and clips and anchoring devices.

B. Shop Drawings: Detail fabrication and installation of gratings.
   1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

A. Delegated Design: Design metal stairs and walkways including treads and gratings. Include comprehensive engineering analysis by a qualified professional engineer licensed in the state of Colorado, using performance requirements and design criteria indicated.

B. Structural Performance of Gratings: Provide gratings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Walkway and Elevated Platform (Exit Ways): Uniform Load: 100 lbf/sq. ft.
   2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
   3. Uniform and concentrated loads need not be assumed to act concurrently.
   4. Walkway Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
   5. Limit deflection of treads, platforms, and framing members to L/240.

C. Layout Requirements
   1. Layout of walkways shall comply with the following:
      a. OSHA 1910 Subpart D, Walking-Working Surfaces
      b. ANSI/ASSE A1254.1-2007, Safety Requirements for Workplace Walking/Working Surfaces and their Access; Workplace Floor, Wall and Roof Openings; Stairs and Guardrails Systems

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M: Structural Welding Code - Steel
   2. AWS D1.3/D1.3M: Structural Welding Code - Sheet Steel

B. Field Measurements: Take field measurements prior to preparation for guardrail installation. Verify dimensions on site prior to shop fabrication for proper connection to structure.

C. Sequence: Coordinate installation of new grates with coating work.

PART 2 PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

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

B. Steel Tubing: ASTM A 500 or ASTM A 513.

2.3 FORMED-METAL PLANK GRATINGS

A. Material: Steel sheet, hot-dipped galvanized after fabrication, thickness as required to comply with structural performance requirements.

B. Size and opening layout to match existing.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Brown-Campbell Company; Bar Grating
      b. Fisher & Ludlow, Division of Harris Steel Limited; Tru-Weld Bar Grating.
      c. Grating Pacific; Metal Bar Grating
      d. McNichols; Bar Grating

2.4 FASTENERS

A. General: Provide hot-dipped galvanized steel fasteners. Select fasteners for type, grade, and class as required to meet performance requirements.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy that is welded.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with ASTM A 780.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

B. Field Welding: Comply with the following requirements:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.

3.2 INSTALLING METAL PLANK GRATINGS

A. General: Comply with manufacturer's written instructions for installing gratings.

B. Attach non-removable units to supporting members by welding unless otherwise indicated.

3.3 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Surface preparation and installation of sealant in joints.

1.2 PRICES

A. Include cost of sealant work with coating cost.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Experienced firm that has successfully completed sealant work similar in material, design, and extent to that indicated for Project; that is approved, authorized, or licensed by sealant manufacturer to install sealant; and that is eligible to receive sealant manufacturer's warranty. Must have successful installations of specified materials in local area in use for minimum of five years.
   1. Employ foreman with minimum five years of experience as foreman on similar projects, to be on Site at all times during Work. Do not change foremen during the course of the Project except for reasons beyond the control of the Installer; inform Engineer in advance of any changes.

B. Compatibility Tests: Include sealant and sealers or coatings that may come into contact with sealant following sealant installation.

1.4 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside below 40 degrees F (5 degrees C), or expected to be below 40 degrees F within 12 hours, or are above or below sealant manufacturer's recommended limitations.
   2. When joint substrates are wet.
   3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
   4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.
   5. When joint preparation, which may include cleaning substrate surfaces, removing inclusions, and repairing substrate surfaces have not been performed or performed adequately.

1.5 SUBMITTALS

A. Product Data

B. Field Test Reports

1.6 WARRANTY

A. Manufacturer's Warranty:
   1. Written warranty, signed by sealant manufacturer. Manufacturer's standard form in which sealant manufacturer agrees to furnish the specified joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
   2. Warranty Period: 5 years from date of Substantial Completion.
   3. Defective sealant includes leakage through sealed cracks, debonded sealant, loss of cohesion, or other distress associated with material deficiencies.
   4. Warranty may exclude deterioration or failure of elastomeric joint sealants from the following:
      a. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
      b. Disintegration of joint substrates from natural causes exceeding design specifications.
      c. Mechanical damage caused by individuals, tools, or other outside agents.
      d. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

B. Installer's Warranty:
   1. Completed warranty form signed by sealant Installer. Warranty form included in section 00 65 36.
   2. Warranty Period: 5 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 ELASTOMERIC JOINT SEALANTS

A. Comply with ASTM C920 and other requirements indicated.

B. Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing on similar projects, mockups and preconstruction testing for Project, and field experience.

C. Select products based on mockups, preconstruction testing, and sealant manufacturer's previous testing and experience.

D. Source Limitations: Obtain each type of joint sealant through one source from single manufacturer.

E. Colors of Exposed Joint Sealants: Selected and approved in writing by Owner's Representative, from sealant manufacturer's full range.

F. For immersion conditions beneath coating system: Non-sag, two-component polyurethane or polysulfide sealant:
   1. Sikaflex-2c NS EZ, by Sika Corporation
   2. Thiokol 2235M, by PolySpec LP.
   3. Approved equal.

2.2 AUXILIARY MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote adhesion of sealants to joint substrates.

C. Backer Rod: Closed cell polyethylene.

D. Bond Breaker: As recommended by sealant manufacturer.

E. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. Remove existing sealant and other foreign material from joints.

B. Repair damaged or deteriorated substrate surfaces according to sealant manufacturer's written instructions, as detailed and as approved by Engineer.

C. Clean joint substrates immediately before installing sealant, to comply with sealant manufacturer's written instructions based on mockups and preconstruction testing.
   1. Remove from substrate foreign material that could interfere with adhesion of sealant, including dirt, dust, existing sealant, oil, grease, and surface coatings.
   2. Provide dry substrate; prevent wetting of substrate prior to sealant installation.
   3. Clean porous substrates, such as concrete, masonry, stone, wood, by brushing, grinding, blast-cleaning, mechanical-abrading, or combination of methods to produce clean, sound substrate capable of developing optimum bond with sealant. Remove laitance and form-release agents from concrete. Remove loose particles remaining after cleaning operations by vacuuming or blowing out joints with oil-free, compressed air.
   4. Clean nonporous surfaces, such as metal, with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of sealant.

3.2 INSTALLATION OF SEALANT

A. General: Comply with these documents and sealant manufacturer's written installation instructions for products and applications indicated, based on mockups and preconstruction testing. Notify Engineer of discrepancies between these documents and manufacturers typical details, written recommendations or instructions. Engineer shall determine which apply.

B. Joint Priming: Prime all porous joint substrates. Prime additional substrates where recommended in writing by sealant manufacturer, based on mockups and preconstruction testing. Apply primer to comply with sealant manufacturer's written instructions.

1. Confine primer to areas of sealant bond; do not allow spillage or migration onto adjoining surfaces.
2. Limit priming to areas that will be covered with sealant in same day. Unless recommended otherwise by sealant manufacturer, reprime areas exposed for more than 24 hours.

C. Install sealant backer and position to produce cross-sectional shape and proper depth of installed sealant.
1. Use properly-sized backer. Do not use multiple-backer units or braided-backer units to accommodate wide joints.
2. Install backer with device that will provide consistent depth between substrate surface and outer surface of backer.
3. Do not leave gaps between ends of sealant backers.
4. Do not stretch, twist, puncture, or tear sealant backers.
5. Remove wet backers and replace with dry materials.

D. Install bond-breaker tape at back of designated joints.

E. Install sealant immediately after installing backer material; to produce uniform, cross-sectional shape and depth; to directly contact and fully wet joint sides and backer material; and to completely fill recesses in joint configuration.
1. Install sealant flush with surface.
2. Immediately after sealant application and before skinning or curing begins, tool joint with slightly concave surface, compressing sealant into joint to form smooth, uniform sealant bead; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Do not use tooling agent.
    a. Remove excess sealant from surfaces adjacent to joints.
    b. Provide concave joint configuration per contract documents and Figure 5A in ASTM C 1193, unless otherwise indicated.

3.3 QUALITY CONTROL

A. At completion of Project, observe installed sealant for damage or deterioration. If damage or deterioration occurs, neatly cut out and remove damaged or deteriorated sealant, prepare and prime surfaces, and install new sealant. Replace sealant immediately so new sealant is indistinguishable from original Work.

B. Field-Adhesion Testing: Contractor to perform the following testing and submit log of test results to Owner and Engineer. Notify Owner of testing schedule and provide access to test locations for Owner/Engineer review Contractor to perform non-destructive and destructive field adhesion tests on sealant in accordance with ASTM C1521
1. Non-destructive testing per ASTM C1521, possible procedures:
    a. Depress center of sealant bead with probing tool to depth of 50 percent of bead width; or
    b. Depress sealant bead near substrate bond-line until it appears visually that sealant is about to fail in cohesive; or
    c. Apply uniform pressure with roller no more than one-half sealant bead in width, to create depression that represents approximately 50 percent of sealant deflection; advance roller along centerline of sealant bead; and note anomalies in sealant performance.
    d. Record anomalies in sealant performance, if failures are adhesive or cohesive, and maximum surface depression as percent of joint or crack width.

e. Perform test every 24 inches for first 100 linear feet of joint or crack; if no test failure is observed, test every 5 feet thereafter.

2. Destructive testing, Method A:
   a. Cut 6-inch-long tail of sealant loose from substrate.
   b. Mark tail 1 inch from adhesive bond.
   c. Grasp tail 1 inch from adhesive bond and pull until tail extends to 2 times published movement capability of sealant. If sealant has not failed, continue pulling to failure.
   d. Record elongation at failure and if failure was adhesive or cohesive.
   e. Observe sealant for complete filling of joint or crack with absence of voids, and for joint or crack configuration in compliance with requirements. Record observations and sealant dimensions
   f. Perform test every 100 feet for first 1,000 linear feet of joints and cracks; if no test failure at 2 times movement capability occurs, test every 400 feet thereafter.
   g. Test reports will include date when sealant was installed, name of person who installed sealant, test date, test location, and whether primer was used.
   h. Immediately after testing, replace failed sealant in test areas. Neatly cut out and remove failed sealant, prepare and prime surfaces, and install new sealant. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
   i. Sealant not evidencing adhesive failure from testing or noncompliance with requirements will be considered satisfactory.

3. If testing determines that sealant has failed adhesively from testing or does not comply with requirements, additional testing will be performed to determine extent of non-conforming sealant. Neatly cut out and remove non-conforming sealant, prepare and prime surfaces, and install new sealant. Perform field adhesion tests on new sealant. Additional testing and replacement of non-conforming sealant shall be at Contractor's expense.

END OF SECTION

SECTION 09 97 23

IMMERSION-GRADE CONCRETE COATINGS

PART 1 GENERAL

1.1 SUMMARY

A. This section includes providing and installing an Immersion-Grade Concrete Coating.

B. Coating is intended to be in contact and immersed in un-treated, and partially treated waste water.

1.2 PRICES

A. Perform work on a cost per square foot basis.

1.3 SUBMITTALS

A. Letter from manufacturer stating that system is appropriate for use in this service environment and the requested warranty can be provided.

B. Product Data.

C. Installation instructions (information only).

D. Installation field logs and reports.

1.4 QUALITY ASSURANCE

A. Pre-installation Meeting:
   1. Conduct meeting at Site.
   2. Review requirements for coating Work, including:
      a. Construction schedule.
      b. Availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
      c. Site use, access, staging, and set-up location limitations.
      d. Forecast weather conditions.
      e. Surface preparation and substrate condition and pretreatment.
      f. Application procedures.
      g. Special details and condition of other construction that will affect coating Work.
      h. Testing and inspection requirements.
      i. Temporary protection and repairs of coating Work.

B. Site-Specific Installation Plan: Manufacturer to submit site-specific installation plan for each product to be used. Plan must address temperature (ambient and substrate), humidity, and sunlight exposure conditions specific to the project site, as well as application means and methods and proposed quality control methods.

C. Applicator Qualifications: Experienced firm that has successfully completed coating work with similar materials, design, and extent to that indicated for Project. Must have successful applications of specified materials in local area in use for minimum of five years.

1. Employ foreman with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during Work.

D. Mock-ups: Prior to start of Work or purchase of material, apply a mockup area of at least 250 square feet at location determined by the Engineer, to demonstrate surface preparation, perimeter termination, crack treatment, thickness, texture, color, and standard of workmanship.
   1. Demonstrate surface preparation technique for treating exposed concrete and leveling rough surfaces.
   2. Each consecutive treatment/coating will be layered back 1 foot on the perimeter in a manner that the complete section can be reviewed.
   3. Include a minimum of 1 mock-up of each of the termination details shown on Drawings.
   4. Coordinate testing with the Engineer and have the Engineer or representative present during testing.
   5. Perform wet mil thickness measurements, adhesion pull-off testing (substrate and intercoat), and dry film thickness measurements. See Field Quality Control Testing, Section 3.6. Repair coating damaged as a result of testing.
   6. Adhesion pull-off testing must be performed for each type of substrate and proposed preparation method. Adhesion testing must achieve a minimum of 250 psi. Failure must occur in the concrete substrate.
   7. If Engineer determines mock-up does not comply with requirements, modify mockup or construct new mock-up until mock-up is approved.
   8. Maintain approved mockups in undisturbed condition during Work as standard for judging complete Work.
   9. Approved mockup may become part of completed Work if undisturbed at time of Substantial Completion.

E. Coating Inspector: Owner, at their discretion may retain a coating inspector to inspect the coating work, including performance of destructive and non-destructive testing.
   1. The coating inspector does not have the authority to modify, change or formally interpret the requirements of the Contract Documents as those or the responsibility of the Engineer and/or Owner.
   2. Provide access to all areas of coating work as are required to be provide to the Owner and Engineer.
   3. Work performed by the coating inspector does not relieve the Contractor from performance of any quality assurance or quality control activities outlined herein, or generally required to complete the Work.

1.5 WARRANTY

A. Manufacturer's Warranty:
   1. Written warranty, signed by coating manufacturer, including:
      a. Repair or replace of coating that does not comply with requirements; that fails in adhesion, cohesion, or general durability; that experiences abrasion or tearing failure not due to misuse; that experiences surface crazing, fading or chalking; or that deteriorates in a manner not clearly specified by submitted coating manufacturer's data as an inherent quality of the material for the application indicated.
      b. Warranty Period: 10 years base bid, 5 years alternate bid after Substantial Completion date.

B. Contractor's Warranty:
   1. Written warranty, signed by Applicator, included in section 00 65 36.

2. Warranty Period: 3 years after Substantial Completion date.

PART 2 PRODUCTS

2.1 COATING MATERIALS, GENERAL

A. Material Compatibility: Provide fillers, primers, finish-coat materials, and related materials that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Coordinate tie-ins and laps with other coatings not specified in this Section per the recommendations of the manufacturer of the coating specified herein. Confirm compatibility of materials prior to installation.

2.2 IMMERSION-GRADE COATING

A. Provide coating specifically intended for immersion exposure to waste water, as recommended by the coating manufacturer.
   1. Must have history of four successfully similar projects installed within the last two to six years.

B. **BASE BID:** Two-component, 100% solids pure polyurea elastomer coating, with manufacturer approved primer suitable for concrete substrate with the following minimum properties.
   1. Surfacing compound: epoxy or modified urethane mortar, as recommended by epoxy primer coating manufacturer.
   2. Primer: epoxy or modified urethane, as recommended by polyurea coating manufacturer.
      a. Tensile Strength (ASTM D412), 4500 psi
      b. Solids by volume: 89 percent or greater at install.
      c. Viscosity: 25 cps or less.
      d. Adhesion to Concrete: 350 psi or greater.
      e. Color: Different than polyurea coating.
      f. Thickness: Dry film thickness (DFT) of 5 to 10 mils. Final thickness based on selected coating manufacturer.
      g. Basis of Design: Raven 175 by Raven Lining Systems.
   3. Polyurea Coating:
      a. Tensile Strength (ASTM D412 or D638): 1,800 psi or greater.
      b. Elongation (ASTM D412 or ASTM D638): 70% or greater.
      c. Hardness, Shore D (ASTM D2240) 40 to 52.
      d. Gel Time: 5 to 20 seconds.
      e. Tack-free Time: 20 to 120 seconds.
      f. Solids by volume: 100 percent.
      g. Adhesion to primer: 350 psi or greater.
      h. Color: Different than primer and finish coat.
      i. Thickness: 100 to 120 mils, DFT. Final thickness based on selected coating manufacturer.
      j. Basis of Design: AquataFlex 506 by Raven Lining Systems.
   4. Finish Coat (Where specified only): Provide aliphatic finish coat recommended by polyurea coating manufacturer.
      a. Will not fade, chalk or degrade when exposed to UV.
      b. Appropriate for waste water service environment.
      c. Adhesion to polyurea: 350 psi or greater.

d. Color: Grey or tan to match concrete surface.
e. Thickness: Dry film thickness (DFT) of 3 to 8 mils. Final thickness based on selected coating manufacturer.

C. **ALTERNATE:** Elastomer immersion grade coating, with manufacturer approved surfacer and primer suitable for concrete substrate with the following minimum properties.
1. Surfacing compound: epoxy or modified urethane mortar, as recommended by epoxy primer coating manufacturer.
2. Primer: epoxy or modified urethane, as recommended by immersion coating manufacturer.
a. Solids by volume: 89 percent or greater.
b. Adhesion to Concrete: 350 psi or greater.
c. Color: Different than liner coating.
d. Thickness: Dry film thickness (DFT) of 5 to 10 mils. Final thickness based on selected coating manufacturer recommendations.
3. Liner Coating:
a. Adhesion to primer: 350 psi or greater.
b. Color: Different than primer and finish coat.
c. Thickness: 60 to 80 mils, DFT. Final thickness based on selected coating manufacturer.
d. Basis of design:
1) CIM 1000 manufactred by C.I.M. Industries Inc.
2) Poly-Cote 115 Elastomer Polyurethane by Sherwin Williams.
4. Finish Coat or Top Coat: Provide aliphatic finish coat recommended by liner coating manufacturer.
a. Will not fade, chalk or degrade when exposed to UV.
b. Approporate for waste water service environment.
c. Adhesion to immersion coating: 350 psi or greater.
d. Color: Grey or tan to closely match concrete surface.
e. Thickness: Dry film thickness (DFT) of 3 to 8 mils. Final thickness based on selected coating manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions with Applicator and coating manufacturer's representative for compliance with requirements and other conditions affecting application or performance of coating.
1. Ensure that work done by other trades is complete and ready for coating Work.
2. Proceed with coating application only after unsatisfactory conditions have been corrected and surfaces are thoroughly dry.
3. Start of coating application will be construed as Applicator's acceptance of surface conditions.

3.2 SURFACE PREPARATION

A. Cleaning: Before applying coatings or other surface treatments, clean substrates of substances that could impair bond of coating systems. Remove dirt, oil, and grease before cleaning.
1. All mineral build-up on the exposed surfaces of the concrete elements must be removed to expose sound structural concrete.
2. Do not micro-fracture or otherwise damage concrete substrate with removal operations.

3. Schedule cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.

B. All concrete surfaces, existing and repaired areas, shall have been cured a minimum of 14 days prior to coating application. Additional cure may be required if surfaces do not meet moisture requirements in sub-section K, below.

C. Substrate: Clean and prepare substrate according to coating manufacturer's written instructions. Provide clean, dust-free, dry, and sound substrate for coating application.
1. Verify that substrate has cured and aged for minimum time period recommended by coating manufacturer.
2. Remove fins and projections, splatter, and other irregularities which would prevent monolithic, continuous application of coating.
3. Properly patch substrate defects (such as voids, form tie holes, honeycombing, and cracks) with latex-modified concrete or another material acceptable to coating manufacturer and Engineer.
4. Remove grease, oil, asphalt solids, form-release agents, curing compounds, and other contaminants or film-forming coatings that might impair bond of coating. If chemical removal is necessary, rinse with clean water.
5. Clean and prepare surfaces to be coated according to manufacturer's written instructions for particular substrate conditions and as specified.

D. Abrasive blasting: Abrasive blast all surfaces of the existing substrate to remove surface contaminants, such as laitance, sealers, oils, grease, coating, loose surface material, etc., from the concrete surface. Exposed concrete surfaces shall be prepared in accordance with ASTM D4259 and SSPC-SP 13, and shall conform to CSP 3 to 4 as defined in ICRI Guideline No. 310.2R.

E. Bugholes and excessive cavities shall be filled with specified surface filler prior to coating application. The surface of all cured surface fillers shall be abrasively blasted before applying coatings.

F. Follow abrasive blast activities by cleaning with a compressed air jet. Concentrate the air jet at cracks, control and construction joints, and repair perimeter interfaces to ensure that abrasive particles and other contaminants are removed from these crevices.

G. If prepared surfaces become contaminated after first cleaning, they shall be cleaned again at no additional expense to Owner prior to applying the coating.

H. Corner radius cove to be installed prior to coating application.

I. Surfaces other than concrete shall be prepared as required by the coating manufacturer's recommendations for immersion surface.

J. Prepare, treat, rout, and fill joints and cracks in substrates in accordance with coating manufacturer's written recommendations and as indicated in Drawings.

K. Tests: Do not apply primer or high-performance coating to concrete surface unless two or more of the flowing moisture tests confirm appropriate moisture levels for properly prepared substrates:
1. Plastic Sheet Method (ASTM D4263): Pass/Fail. No visible moisture should be present after testing.
2. Relative Humidity Test (ASTM F2170): Less than 90 percent relative humidity at a depth of 1-1/2 inches.

3. Moisture vapor emission rate testing, calcium chloride test (ASTM F1869): Less than 5 pounds per 1,000 square feet per 24 hours.
4. Radio Frequency Test (ASTM F2659): Less than 5 percent moisture.

3.3 APPLICATION

A. General: Prepare and apply materials according to coating manufacturer's written instructions, at recommended rates and coverages.
   1. Test prepared surfaces for alkalinity, moisture, and other conditions as recommended by coating manufacturer.

B. Scheduling Coating: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for coating as soon as practicable after preparation and before subsequent surface contamination or deterioration. Apply primer to concrete surface with brush or roller. If spray is used, backroll primer to achieve a Uniform coating free of holidays or pinholes to minimize outgassing. Apply second coat of primer if needed to obtain a pinhole free finish.

C. Allow primer to cure in accordance with manufacturer's instructions before top coating with the high-performance coating

D. Apply high-performance coating in accordance with manufacturer's instructions and SSPC PA14.
   1. Keep material containers tightly closed until ready for use.
   2. Keep equipment, air supplies, and application surfaces dry and clean
   3. Blend and mix 2-component materials in accordance with manufacturer's instructions

E. Maintain air supply for material spray application free of oil and water in accordance with ASTM D4285.

F. Apply sufficient high-performance coating to achieve final dry film thickness for containment of potable water.

G. Joint Lines:
   1. Prepare for joint lines should rain or other conditions require work stoppage or extended delay.
   2. Install joint lines clean and straight. Install overlap 6-inches minimum to ensure an impervious joint.
   3. Severely abrade with wire brush or sandpaper and apply bonding agent to all areas where the high-performance coating has cured beyond its recoat window

H. Recoating:
   1. Recoat the coating system within the recoat window to obtain maximum interlayer adhesion to build specific thickness.
   2. Immersion Service: Minimize areas to be recoated outside the recoat window, except at joint lines.

3.4 CURING

A. Cure high-performance coating in accordance with manufacturer's instructions.

B. Curing Time: Allow sufficient time for solvents to evaporate from the cured high-performance coating before placing into service or top coating.

3.5 REPAIR PROCEDURE

A. Repairs to coating may become necessary due to exposure or mechanical damage. Perform repairs as specified herein, or as otherwise required by the coating manufacturer.

B. Clean the areas in accordance within accordance with ASTM D4258, using an appropriate and effective detergent, then to abrade the damage area to sound primer, or in the case of damaged primer, to sound substrate in accordance with ASTM D4259.

C. The area immediately adjacent to the repair should also cleaned in accordance with ASTM D4258 and feather-edge abraded in accordance with ASTM D4259 and blended into the repair area; extending into the sound coating 6 inches. Ensure all areas to be coated are contaminant/chemical free.

D. The application of the coating(s) should begin in the repair area and extend into the feather-edged margin, with care being taken to keep the application within the abraded area(s).

3.6 FIELD QUALITY CONTROL

A. Contractor shall record expiration date, batch, and lot number of sealant and coating materials prior to installation.

B. Contractor to maintain a log of weather and substrate conditions (temperature, relative humidity, etc.) and time period of day for each day and area when coating is installed.

C. Contractor to perform the following testing and submit log of test results to Owner and Engineer. Notify Owner of testing schedule and provide access to test locations for Owner/Engineer review.
   1. Perform moisture content testing of prepared surfaces. Tests shall be completed within 8 hours of commencement of coating operation at a frequency not less than one test per 1,000 sq. ft. or one test for each unique structure (wall/slab) of coating application. Retest when moisture conditions in surface have substantially changed, such as after a precipitation event.
   2. Adhesion pull-off testing in accordance with ASTM D7234. Test frequency will be not less than one measurement location (average of three tests) per 1,000 sq. ft. of coating application.
      a. Minimum adhesion of 250 psi with failure at or within substrate.
      b. Repair coating at location of testing in accordance with repair procedure specified above.
   3. Verify dry film thickness of the coating using method and frequency according to ASTM D6132 and SSPC PA9.
      a. Measured dry film thickness must be in accordance with SSPC PA9 Level 2.
      b. If dry film thickness is too thin, apply additional material at no cost to Owner, or perform other remedial action recommended by coating manufacturer or Engineer.
   4. Perform holiday detection at surfaces in accordance with ASTM D4787 and in accordance with manufacturer's instructions. If pinholes or holidays are identified, apply additional material at no cost to Owner, or perform other remedial action recommended by coating manufacturer or Engineer.
   5. Contractor shall reapply coating in areas disturbed by testing.

D. Prepare adhesion test locations to be performed by engineer or coating inspector (grinding and coreing). Repair test locations performed by Engineer or coating inspector.

3.7 CLEANING

A. At end of each workday, clean Site and Work areas and place rubbish, empty cans, rags, and other discarded materials in appropriate containers.

B. After completing coating Work:
   1. Clean spillage and soiling from adjacent surfaces using cleaning agents and procedures recommended by manufacturer of affected surface. Exercise care to avoid scratching or damage to surfaces.
   2. Repair surfaces stained, marred, or otherwise damaged during coating Work.
   3. Clean up debris and surplus materials and remove from Site.

C. Waste Management:
   1. Collect surplus coating materials that cannot be reused and deliver to recycling or disposal facility.
   2. Treat materials that cannot be reused as hazardous waste and dispose of in appropriate manner.

3.8 PROTECTION

A. Protect work of other trades from damage whether being coated or not. Correct damage by cleaning, repairing, replacing, and recoating as approved by Engineer. Leave in an undamaged condition.

B. Provide “Wet Paint” signs to protect newly coated finishes. Remove temporary protective wrappings provided by others to protect their work after completing coating operations.
   1. After construction activities of other trades are complete, touch up and restore damaged or defaced coated surfaces.

END OF SECTION

PERSIGO WASTE WATER TREATMENT PLANT
Sludge Processing Unit Repairs
Project Specific Specifications

2145 River Road
Grand Junction, Colorado 81505

April 7, 2021
WJE No. 2019.3776

Prepared for:
City of Grand Junction
Public Works
333 West Avenue, Bldg C
Grand Junction, Colorado 81501

Prepared by:
Wiss, Janney, Elstner Associates, Inc.
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303.914.4300 tel | 303.914.3000 fax

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SECTION 00 01 10

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END OF SECTION

INSTALLER'S WARRANTY FOR JOINT SEALANT

Sealant Installer: _____

Sealant Installer Address: _____

Owner: _____

Owner Address: _____

Project Address: _____

Building Name: _____

Area of Work: _____

Substantial Completion Date: _____

Warranty Period: _____years

Expiration Date: _____

AND WHEREAS Sealant Installer has contracted, either directly with Owner or indirectly as subcontractor, to warrant said Work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

NOW THEREFORE Sealant Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period it will, at its own cost and expense, make or cause to be made such repairs to or replacement of said Work as are necessary to correct faulty and defective Work and as are necessary to maintain said Work in watertight condition, and warrants against the following.

1. Components of sealant system that do not comply with requirements; that do not remain watertight; that fail in adhesion, cohesion, or general durability; or that deteriorate in a manner not clearly specified by submitted sealant manufacturer's data as an inherent quality of the material for the application indicated, regardless of whether the Work was previously accepted by Owner.
2. Damage by exposure to foreseeable weather; and damage by intrusion of foreseeable wind-borne moisture.

Warranty is made subject to the following terms and conditions:

1. Specifically excluded from Warranty are damages to Work and other parts of the building, and to building contents, caused by:
    a. lightning;
    b. fire;
    c. failure of sealant substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    d. activity adjacent to sealant Work by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner's Representative.
    e. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.
    f. Excessive joint movement caused by structural settlement or errors attributable to design or construction, resulting in stresses in sealant exceeding sealant manufacturer's written specifications for sealant elongation or compression.

2. When Work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Sealant Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Sealant Installer is responsible for damage to Work covered by Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of Work.
4. During Warranty Period, if Owner allows alteration of Work by anyone other than Sealant Installer, including cutting, patching, and maintenance, Warranty shall become null and void on date of said alterations, but only to extent said alterations affect Work covered by Warranty. If Owner engages Sealant Installer to perform said alterations, Warranty shall not become null and void unless Sealant Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate Work, thereby reasonably justifying limitation or termination of Warranty.
5. Owner will promptly notify Sealant Installer of observed, known, or suspected leaks, defects, or deterioration and will afford reasonable opportunity for Sealant Installer to inspect Work and to examine evidence of such leaks, defects, or deterioration. Sealant Installer shall inspect leak, defect, or deterioration within 24 hours of notification.
6. If permanent repair or replacement of warranted condition cannot be made immediately, due to weather conditions, availability of appropriate labor or materials, building occupancy, etc., Sealant Installer must make, or cause to be made, immediate temporary repairs to prevent any further damage, deterioration, or unsafe conditions. Permanent repair or replacement of warranted condition shall be scheduled as soon thereafter as practical, and with Owner's consent and approval.
7. If Owner notifies Sealant Installer of warranted condition that requires immediate attention to prevent potential injury or damage, and Sealant Installer cannot or does not promptly inspect and repair same, either permanently or temporarily, then Owner may make, or cause to be made, such temporary repairs as may be essential and Sealant Installer will reimburse Owner for cost of such repairs. Such action will not relieve Sealant Installer of its obligation to perform any necessary permanent repairs, and Warranty shall remain in full force and effect for remaining portion of its original term.
9. Sealant Installer shall provide equipment, labor, and material required to remedy warranted conditions, including repair or replacement of damage to other work resulting therefrom, and removal and replacement of other work required to access warranted condition. Additional required work will be at Sealant Installer’s sole expense for full term of Warranty. Warranty includes removal and replacement of sealant-backer material and sealant.
10. Warranty is recognized to be only Warranty of Sealant Installer on said Work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of sealant failure. Specifically, Warranty shall not operate to relieve Sealant Installer of responsibility for performance of original Work according to requirements of Contract Documents, regardless of whether Contract was directly with Owner or with Owner’s General Contractor.

IN WITNESS THEREOF, and intending to be legally bound hereby, Sealant Installer has caused this document to be executed by undersigned, duly-authorized officer.

By: _____ Corporate Seal:
(Signature of Sealant Installer)

_____
(Name)

_____
(Date)

Notary Public Seal:

Subscribed and sworn before me this _____day of _____, _____

My commission expires _____

APPLICATOR'S WARRANTY FOR STEEL COATING

Applicator: _____

Applicators Address: _____

Owner: _____

Owner Address: _____

Project Address: _____

Building Name: _____

Area of Work: _____

Substantial Completion Date: _____

Warranty Period: _____years

Expiration Date: _____

We (Applicator) hereby warrant materials and workmanship of Work which we have installed at the above-referenced Project for the period noted above from date of substantial completion. We agree to repair or replace coating (including access, surface preparation, material and labor) which:

1. Does not comply with the specification requirements;
2. Fails in adhesion, cohesion, or general durability;
3. Blisters
    a. Blisters shall be evaluated using ASTM D714. Blisters with a rating of No 10 shall be considered a defect
4. Cracks, checks, fades or excessively chalks; or that deteriorates in manner not clearly specified by submitted coating manufacturer's data as inherent quality of material for application indicated.
    a. Evaluate chalking in accordance with ASTM D4214. Chalking less than a rating of No. 8 shall be considered a defect.
5. Allows corrosion of the substrate.
    a. The substrate shall not corrode in excess of Rust Grade 6 (greater than 0.3 percent and up to 1.0 percent) of the surface area being coating as measured in accordance with ASTM D610.

Warranty does not include deterioration or failure of coating due to failure of substrate prepared according to requirements, fire, vandalism, or damage from snow removal or washing operations.

In event of our failure to reply within seven days after being notified in writing by the Owner, or their successor, or failing to repair or replace the subject work within 21 days, we collectively or separately do hereby authorize Owner or his successor in interest to proceed to have said defects repaired and made good at our expense and we will honor and pay costs and charges therefore upon demand.

IN WITNESS THEREOF, and intending to be legally bound hereby, Applicator has caused this document to be executed by undersigned, duly-authorized officer.

By: _____ Corporate Seal:
(Signature of Applicator)

_____
(Name)

_____
(Date)

Notary Public Seal:

Subscribed and sworn before me this _____day of _____, _____

My commission expires _____

SECTION 01 00 00

GENERAL

PART 1 GENERAL

1.1 PROJECT SPECIFIC REQUIREMENTS

A. The Standard Specifications for Road and Bridge Construction, as well as the Standard Specifications for Construction of Underground Utilities Water Lines, Sanitary Sewers, Storm Drains, Underdrains and Irrigation Systems do not apply to this project. Any references to those documents in the contract shall be replaced by the requirements of the project specific documents.

B. Standard Details for Construction of Streets, Trails, Storm Drains and Utilities do not apply to this project. Any references to those documents in the contract shall be replaced by the requirements of the project specific documents.

C. Project specific requirements shall take precedence over general conditions or standard documents.

D. Warranty period for specific Work items are intended to supplement the general Contractor's Warranty and Guarantee.

1.2 REFERENCES

A. References to applicable standards shall be the latest edition of each unless otherwise noted.

1.3 DEFINITIONS

A. The definitions here shall supplement, or replace, those found in the City of Grand Junction General Contract Conditions.
   1. As-Built Documents: See Project Record Documents.
   2. Owner: See City.
   3. Project Record Documents: Contract documents marked by the Contractor to identify changes that were made during construction.
   4. Request for Information (also known as RFI): A question or inquiry about the Work submitted by the Contractor for clarification by the Owner or Engineer.

1.4 ADMINISTRATIVE

A. Requests for Information (RFI): Contractor shall submit RFIs to the Engineer for any condition which is believed to be at variance with the Construction Documents, or for situations where it is unclear what the Construction Documents are implementing. RFIs shall be submitted in writing to the Engineer and shall include a location, date requested, date required and indicate which repair item or item(s) are impacted by the request. Allow a minimum of 3 working days for review by Engineer.

B. Maintain at least one copy of each referenced standard, this Project Manual (Specifications), Drawings and/or Figures at the job site. In addition, maintain copies of all site visit reports (SVR) and Sketches (SKs) issued by the Engineer during Construction.

C. Provide a project superintendent at the Site a minimum of eight hours per day during the progress of the Work. The superintendent shall be literate and fluent in English.

D. Photograph existing conditions that are important to the construction or that deviate substantially from the Contract Documents; significant conditions that will be concealed by the Work; finish surfaces that might be misconstrued as damage caused by removal or other Work operations; and immediate follow-up when on-site events result in construction damage or loss. Photographs shall be of sufficient quality as to depict the condition being photographed. Provide photographs to Owner or Engineer upon request, either during project or after completion.

1.5 TEMPORARY FACILITIES AND CONTROLS

A. Contractor to furnish and pay for all temporary facilities and controls listed below which are not explicitly designated as responsibility of Owner.

B. Comply with Owner's limitations and restrictions for Site use and accessibility.
   1. Comply with all security procedures.

C. Project has special requirements for coordinating Work because of the following conditions:
   1. Owner will occupy premises outside of Work area during construction period.
      a. Cooperate with Owner to minimize conflicts and facilitate Owner usage.
      b. Perform Work to avoid interference with Owner's day-to-day operations. Notify Owner's Representative at least 72 hours in advance of activities that will affect Owner's operations.
      c. Maintain vehicular, pedestrian, and emergency and normal access to portions of facility that are in use. Keep entrances and exits clear of stored materials and construction equipment.
      d. Short interruptions in access may be permitted if approved in advance in writing by the Owner's Representative.
      e. Schedule deliveries to minimize interruptions.
      f. Do not disturb Site outside of Work area.
      g. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted and then only after arranging to provide temporary utility services according to requirements indicated.
      h. Notify Owner not less than 7 days in advance of proposed utility interruptions.
      i. Do not proceed with utility interruptions without Owner's written permission.
   2. Residential nature of building and neighborhood.
   3. Office tenant needs.

D. Staging:
   1. Staging areas must be coordinated with Owner prior to mobilization.
   2. Confine materials and equipment to the staging and work areas. Contractor assumes full responsibility for the protection and safekeeping of items stored on site.
   3. Do not unreasonably encumber Site with materials or equipment.
   4. Do not load Project structure with weight that will endanger Project structure.

E. Parking: Construction personnel shall park on-site in areas designated by the Owner's Representative.

F. Water Service: Use of Owner's existing water service will be permitted.
   1. Provide connections and extensions of service as required for construction operations.
   2. Provide additional water as necessary.

G. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel at location designated by Owner's Representative.
   1. Provide disposable supplies, including toilet tissue, paper towels, and paper cups. Maintain adequate supply. Provide covered waste containers for disposal of used material.
   2. Service toilets at least twice weekly.
   3. Provide wash facilities supplied with potable water at convenient locations for personnel who handle materials that require clean up. Supply cleaning compounds appropriate for each type of material handled. Dispose of drainage properly.
      a. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
   4. Comply with public authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

H. Electric Power Service: Use of Owner's existing electric 120V electric outlets will be permitted. Any power requirements above existing 120V outlets will need to be provided.
   1. As necessary, provide additional electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. Do not overload Owner's service.
   2. Comply with NECA 200 and NFPA 70.
   3. Maintain temporary service in safe condition and utilize in safe manner.

I. Use of Existing Stairs and Elevators: Use of Owner's existing stairs and elevators will be permitted, as long as stairs and elevators are cleaned and maintained in condition acceptable to Owner's Representative.
   1. Coordinate daily usage with Owner's Representative and with requirements for facility operations.
   2. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs, elevator cars, and entrance doors and frame, and to maintain means of egress.
   3. At Substantial Completion, restore stairs and elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

J. Lighting: Owner will provide existing lighting at existing locations.
   1. Provide additional lighting, as necessary, with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   2. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

K. Provide insulation or temporary heating as necessary for curing, drying, and protection of installed construction.
   1. Select equipment that will not have harmful effect on completed installations or elements being installed.
   2. Maintain temporary heating on 24-hour basis until no longer needed.
   3. Unless noted otherwise, insulation is considered incidental to construction and will not be paid for separately.
   4. Unless otherwise specified, temporary heating will not be considered part of Work and will be paid as additional Work item. Notify Owner's Representative in advance of need for temporary heating and estimated added cost. Do not proceed with temporary heating until authorized in writing by Owner's Representative.

L. Snow removal: The contractor shall be required to remove snow from the work area.

M. Equipment:

1. Direct equipment exhaust away from occupied spaces and vent equipment operating within structure to outside.
2. Operate equipment at noise levels conforming to requirements of city, state, and federal laws and codes, and Owner limitations.

N. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of public authorities having jurisdiction. Construction debris shall be removed in a manner that avoids overloading adjacent structural members.

O. Protection:
1. Limit access to work areas.
2. Contractor shall provide protective barriers, fences, etc. to ensure the safety of pedestrians and vehicular traffic during the Work. All barriers and fences shall comply with local, state, and federal regulations and laws.
3. Provide adequate signage to direct pedestrian and vehicular traffic around the area under construction.
4. Prevent construction debris and other materials from coming into contact with pedestrians, motor vehicles, building, and other surfaces that could be harmed by such contact.
5. Existing Drains:
   a. Verify that drains in or near Work area are open and free flowing prior to start of Work.
   b. Lawfully remove construction effluent from Site. Do not allow construction debris to flow into existing drains or sewer systems.
   c. Rout or replace clogged drain lines at completion of Work.
6. Confine dust, debris and fumes to Work area and prevent from entering areas outside of the Work area.
7. Protect finished surfaces against damage. Minimize traffic on finished roof surfaces and do not use for material storage.
8. Contractor shall be responsible for maintaining the water tightness of the areas of the structure being worked on during the course of the work. Providing temporary protection of the existing construction or structure from the weather until removed portions are completely replaced with new construction. The costs of damage and repairs shall be made at no cost to the Owner.
9. Maintain all protection in operable condition for the full duration of the project.

P. Temporary Fencing:
1. Tree and Plant Protection: Install temporary fencing located as indicated or outside drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
2. Site Enclosure Fence: Before construction operations begin, provide Site enclosure fence in manner that will prevent people and animals from easily entering Site except by entrance gates.

Q. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241. Coordinate with Owner's safety team.
1. Provide portable, UL-rated fire extinguishers with class and extinguishing agent as required by locations and classes of fire exposures.
2. Prohibit smoking on Site.

3. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of public authorities having jurisdiction.
4. Store combustible materials in approved safety containers and enclosures, away from building if possible.
5. Develop and supervise overall fire-prevention and -protection program for personnel at Site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

PART 2 PRODUCTS

2.1 GENERAL

A. The products specified are believed to have properties adequate for successful completion of the Work. If the Contractor has found these products to be unacceptable or has had difficulty using these materials, the Contractor shall notify the Architect/Engineer in writing, and provide a request for substitution of material for which the Contractor has had successful experience.

B. No product substitutions will be allowed unless otherwise noted. Engineer's approval must be obtained for all substitutions prior to being awarded the project. Submit requested substitutions with bid form.

2.2 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in original containers and packaging with seals unbroken, labeled with manufacturer’s name, product brand name and type, date of manufacture, lot number, directions for storing, and complete manufacturer’s written instructions.

B. Keep materials dry and do not allow materials to be exposed to moisture during transportation, storage, handling, or installation. Reject and remove from Site new materials which have been exposed to moisture to their detriment.

C. Store and handle materials in accordance with manufacturer’s written instructions, safety requirements, and all applicable laws and regulations. Remove from Site, and replace at no cost to Owner, any materials that are damaged or otherwise negatively affected by not being stored or handled in accordance with manufacturer’s written instructions.

D. Store materials in original, undamaged containers and packaging in clean, dry, location on raised platforms and protected from weather, within temperature range required by manufacturer. Protect stored materials from direct sunlight and sources of ignition. Manufacturer’s standard packaging and covering alone is not considered adequate weather protection.

E. Locate materials in a secure location approved by Owner’s Representative

F. Conspicuously mark damaged or opened containers, containers with contaminated materials, damaged materials, and materials that cannot be used within stated shelf life and remove from Site as soon as possible. Replace discarded materials in a timely manner at no cost to Owner.

G. Limit stored materials on structures so as to preclude damage to materials and structures.

H. Maintain copies of all applicable Safety Data Sheets (SDS) with materials in storage area, such that they are available for ready reference on Site.

PART 3 EXECUTION

3.1 DISCOVERY, FIELD VERIFICATION AND CHANGES IN WORK

A. Contractor shall verify all quantities. Quantities shown are for estimating purposes only.

B. Do not scale drawings. The Contractor shall field verify the existing dimensions and existing conditions prior to starting the work. Dimensions of the new construction shall be adjusted as necessary to fit the existing conditions. The Engineer shall be notified in writing of any significant deviations from the dimensions or conditions shown on these drawings.

C. During rehabilitation work, existing conditions may be encountered which are not known or are at variance with the Contract Documents. Such conditions may interfere with the Work and may consist of damage or deterioration of the substrate or surrounding materials or mislocation of embedded elements such as reinforcing steel, which may interfere with proper execution of the Work. Promptly report to Engineer as a request for information any of these conditions.

3.2 EXAMINATION FOR MATERIAL COMPLIANCE

A. Examine substrates and conditions with Installer and manufacturer's representative, where appropriate, for compliance with requirements and for other conditions affecting installation or performance of the material.
   1. Verify dimensions so that proper installation of material for optimal performance is maintained.
   2. Ensure that work done by other trades is complete.
   3. Verify that areas and conditions under which Work is to be performed permit proper and timely completion of Work.
   4. Notify Engineer in writing of conditions which may adversely affect installation or performance of the material and recommend corrections.
   5. Do not proceed with Work until adverse conditions have been corrected and reviewed by Engineer.
   6. Commencing Work constitutes acceptance of Work surfaces and conditions.

3.3 CLEANING

A. Immediately clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

B. At the end of each workday, broom-clean Site and Work areas and place all items to be discarded in appropriate containers.

C. After completing Work:
   1. Clean all materials resulting from Work that are not intended to be part of the finished Work using appropriate cleaning agents and procedures. Exercise care to avoid damaging surfaces.
   2. Repair at no cost to Owner all items damaged during the Work.
   3. Remove and legally dispose of debris and surplus materials from Site.

3.4 PROTECTION

A. Take precautions to ensure safety of people (including building users, passers-by, and workers) and protection of property (including adjacent building elements, landscaping, and motor vehicles).
   1. Erect temporary protective canopies and walls, as necessary, at walkways and at points of pedestrian and vehicular access that must remain in service during Work.

B. Cover adjacent surfaces with materials that may be damaged.

C. Protect paving and sidewalks, and adjacent building areas from mechanical damage due to scaffolding and other equipment.

D. Prevent dust, debris, coating overspray/spatter, and other construction materials from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

E. Limit access to Work areas.

F. Comply with manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products.

G. Assume responsibility for injury to persons or damage to property due to Work, and remedy at no cost to Owner.

H. Protect from damage, all elements of completed work and original construction to remain.

I. Protect Work during and after completion from contact with contaminating substances and from damage, so materials are without deterioration or damage at time of Substantial Completion.

END OF SECTION

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Contractor's bids shall be based on providing products or methods exactly as specified.

B. For products or methods specified only by reference or performance standards, select a product that meets or exceeds standards according to manufacturer's information. Product selection will be subject to Engineer's approval.

C. For products or methods specified by naming several products or manufacturers, select product and manufacturer named.

D. Where the phrase "or equal" occurs in the Contract Documents, do not assume that the materials, equipment, or methods will be approved as equal unless the item has been specifically approved for this Work by Engineer. The decision of Engineer shall be final.

1.2 SUBSTITUTIONS, CONTRACTOR OPTIONS

A. No substitutions will be considered after Notice of Award except under one or more of the following conditions:
   1. Substitutions for compliance with final interpretations of code requirements or insurance regulations.
   2. Unavailability of specified products or methods, through no fault of Contractor.
   3. Subsequent information discloses inability of specified products or methods to perform properly or to fit in designated space.
   4. Manufacturer/fabricator refusal to certify or guarantee performance of specified products or methods as specified.
   5. When a substitution would be substantially to Owner's best interests.

1.3 SUBSTITUTION REQUIREMENTS

A. Submit four copies of each request for substitution. Include in request:
   1. Complete data substantiating compliance of proposed substitution with Contract Documents.
   2. For products:
      a. Product identification, including manufacturer's name and address.
      b. Manufacturer's literature, including product description; performance and test data, and reference standards; samples; and name and address of similar projects on which product was used and date of installation.
   3. For construction methods:
      a. Detailed description of proposed method.
      b. Drawings illustrating methods.
   4. Itemized comparison of proposed substitution with products or methods specified.
   5. Data relating to changes in construction schedule.
   6. Identify other contracts affected and changes or coordination required.

7. Accurate cost data on proposed substitution in comparison with products or methods specified.

B. In making requests for substitutions, Contractor represents:
   1. They have personally investigated proposed product or method and determined that it is equal or superior to that specified in every respect.
   2. They will provide the same guarantee for substitution as for products or methods specified.
   3. They will coordinate installation of accepted substitutions into Work, making changes for Work to be complete in every respect.
   4. Cost data is complete and includes related costs under their contract, but excludes:
      a. Costs under separate contracts
      b. Engineer's redesign
      c. Administrative costs of Engineer
   5. They will assume full responsibility for all additional costs and expenses for Owner, Engineer, and other Contractors.

C. Substitutions will not be considered when:
   1. They are indicated or implied on Shop Drawings or product data submittals without formal request submitted in accordance with the Specifications.
   2. Acceptance will require substantial revision of Contract Documents.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Administrative and procedural requirements for submitting shop drawings, product data, samples, and other submittals.

B. Reference the Schedule of Submittals for a summary of required submittals.

1.2 SUBMITTALS

A. General:
   1. Identification: Include a permanent label or title block on the submittal or cover sheet, with the following information.
      a. Project name.
      b. Date.
      c. Names of Engineer, Contractor, subcontractor, manufacturer, supplier, and firm or entity that prepared submittal, as appropriate.
      d. Identification information, such as the number and title of the appropriate Specification section, Drawing number and detail references, location(s) where product is to be installed, or other necessary information.
      e. Label each submittal with Specification section number followed by decimal point and then sequential number (e.g., 06100.01). On resubmittals, include alphabetic suffix after another decimal point (e.g., 06100.01.A).
      f. Provide space approximately 6 by 8 inches on or beside the label or title block for the Contractor's approval stamp and the action stamp of the Engineer.
   2. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
   3. Submit one electronic copy of prints in PDF format. Prints shall have white background and dark lettering and line work. Prints will be returned electronically.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not use reproductions of the Contract Documents or standard printed data.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Dimensions, including notation of those established by field measurement.
      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. Notation of coordination requirements.
      i. Relationship to adjoining construction clearly indicated.
      j. Seal and signature of professional Engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8 1/2 by 11 inches but no larger than 30 by 42 inches.
3. Submit one electronic copy of prints in PDF format. Prints shall have white background and dark lettering and line work. Prints will be returned electronically.

C. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
   1. Clearly mark each copy of the submittal to show which products and options are applicable. Delete information which is not applicable. Supplement standard information with project-specific information.
   2. Include the following information, as applicable:
      a. Manufacturer's catalog cuts, product specifications, schematic drawings, installation instructions, and written recommendations.
      b. Compliance with referenced standards.
      c. Testing by recognized testing agency.
      d. Include manufacturer's literature including written instructions for evaluating, preparing, and treating substrate.
      e. Technical data including tested physical and performance properties
      f. Mixing and application or placement instructions.
   3. Include temperature ranges for storage and application of materials, and special cold-weather application requirements or limitations.
   4. Include Globally Harmonized System (GHS) Safety Data Sheets or, if not yet available, Material Safety Data Sheets. For information only.

D. Samples: Submit physical samples to illustrate functional and aesthetic characteristics of the product, for review of materials and workmanship, for compatibility with other elements, and for comparison with the actual installed elements.
   1. Samples shall be of sufficient size to show the general visual effect.
   2. Include sets of at least three samples that show the full range of color, pattern, texture, graining, and finish.
   3. Transmit samples that contain multiple, related components, such as accessories, together in one submittal package.
   4. Identification: Attach a label on an unexposed side of each sample that includes the following:
      a. Generic description of sample.
      b. Product name, name of manufacturer, and sample source.
      c. Number and title of appropriate Specification section.
   5. Samples for Initial Selection: Submit two full sets of units or sections of units from the supplier's product line, showing the full range of colors, textures, and patterns available. Engineer will retain one set and return one set with the options selected.
   6. Samples for Verification: Submit full-size units or samples of the size indicated, prepared from the same material to be used for the Work, cured and finished in the manner specified, and physically identical with material or product proposed for use, and that show the full range of color and texture variations expected.
      a. Submit the number of samples required by the Contractor plus one that will be retained by the Engineer. Mark up and retain one returned sample as a Project Record Document.
   7. Maintain approved samples at the Site, available for quality-control comparisons during construction. Samples may be used to determine final acceptance of construction associated with the sample.

E. Delegated Design:
   1. Where required by the Contract Documents, in addition to shop drawings, product data, and other required submittals, submit a statement, signed and sealed by responsible design professional, for each product and system specifically assigned to the Contractor to be designed or certified by a design professional.
      a. Indicate that products and systems comply with performance and design criteria in the Contract Documents.
      b. Include a list of codes, loads, and other factors used in performing these services, and signed and sealed design calculations where required.
      c. Electronic submittals in PDF format are preferred; however, print copies will be accepted. Submit number of prints needed by contractor plus two for retention by the Owner and Engineer.

1.3 SUBMITTAL PROCEDURE

A. Coordinate the preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals requiring concurrent review, and related activities that require sequential activity.
   2. Allow sufficient time for submittal and resubmittal review. Failure to provide sufficient time for submittal and resubmittal reviews will not be a basis for extension of the Contract Time.

B. Review Time:
   1. Allow five working days for the review of each submittal and resubmittal.
   2. Allow additional time if coordination with subsequent submittals is required. The Engineer will advise the Contractor when the submittal being processed must be delayed for coordination.
   3. Time for review shall commence when the Engineer receives the submittal.

C. Contractor Review:
   1. Review each submittal, coordinate with other Work, and check for compliance with the Contract Documents. Verify field dimensions and conditions. Identify variations from the Contract Documents and product or system limitations that may be detrimental to the successful performance of completed Work. Note corrections.
   2. Before submitting to the Engineer, stamp with a uniform approval stamp including the reviewer's name; the date of Contractor's approval; and a statement certifying that the submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
   3. Submittal Log: Maintain submittal log that lists submitted items per specification section. Record dates submitted, dates returned, and disposition of each item based on Engineer's review. Submit final log showing approved materials at Substantial Completion.

D. Transmittal: Package each submittal individually and appropriately for transmittal and handling.

E. Engineer Action:
   1. Engineer will not review submittals that are received from sources other than the Contractor or that do not bear the Contractor's approval stamp, and will return them without action to the Contractor.
   2. Engineer will not return submittals requested for information only.
   3. Engineer will review each submittal for conformance with the design concept of the Project and compliance with the Contract Documents. Engineer will make marks to

indicate corrections or modifications required, and stamp with an action stamp. The action stamp will include the reviewer's name, date of review, and required Contractor action. Contractor actions may include making corrections or modifications to the submittal or resubmitting the submittal, or both.

F. Resubmittals: Make resubmittals in the same form and number of copies as the initial submittal.
   1. Note the date and content of previous submittal.
   2. Note the date and content of the revision in the label or title block and clearly indicate the extent of the revision and changes made.
   3. Resubmit until the Engineer indicates that no resubmittal is required.
      a. No resubmittal is required when submittal is marked "No Exceptions Taken" or "Make Corrections Indicated".

G. Distribution: Furnish copies of the final submittals to the Site file, the record documents file, manufacturers, subcontractors, suppliers, fabricators, installers, public authorities having jurisdiction, and others as necessary for performance of construction activities. Show the distribution on the transmittal forms.

H. Use only the final submittals with the Engineer's action stamp, for construction.
   1. Only items marked "No Exceptions Taken" or "Make Corrections Indicated" shall be used for construction.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Administrative and procedural requirements for quality assurance and quality control, testing, special inspections and mockups.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated, and do not relieve the Contractor of responsibility for compliance with requirements of the Contract Documents.
   1. Specified tests, inspections, and related actions performed by others do not limit the Contractor's other quality assurance and quality control procedures that facilitate compliance with requirements of the Contract Documents.
   2. Requirements for the Contractor to provide quality assurance and quality control services required by the Engineer, Owner, or public authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections:
   1. See sections in Divisions 02 through 09, and Drawings sheets for specific test and inspection requirements.

1.2 DEFINITIONS

A. Quality Assurance Services: Activities, actions, and procedures performed before and during the execution of the Work to guard against defects and deficiencies and substantiate that the proposed construction will comply with requirements.

B. Quality Control Services: Tests, inspections, procedures, and related actions during and after the execution of the Work to evaluate that the actual products incorporated into the Work and the completed construction comply with requirements.
   1. Services do not include contract enforcement activities performed by the Engineer, such as observations.

C. Testing Agency (also known as Third Party Testing Agency): Entity responsible for performing specified testing or special inspections in Divisions 02 through 09 and on the Contract Drawings.

D. Special Inspector: A qualified person employed or retained by an approved agency (such as the testing agency), and approved by the building official as having competence necessary to insect a particular type of construction requiring special inspection.

E. Special Inspection: Review of completed work or work in progress performed by the Special Inspector, or where specifically identified, by the Engineer. Items typically required by the governing building code.

1.3 COMPLIANCE CRITERIA

A. General: If compliance with two or more standards is specified and standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement.

B. Minimum Quantity or Quality Level: 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.

C. Refer uncertainties to the Engineer for a decision before proceeding.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 QUALITY CONTROL

A. Reference the Special Inspection Schedule on the Construction Drawings for special inspection requirements for this section.

B. Owner Responsibilities: The Owner will engage a qualified testing agency to perform all special inspections and select testing as explicitly identified in the Contract Documents.
   1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and descriptions of types of testing and inspecting they are engaged to perform.
   2. 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 the Contractor.

C. Testing Agency/Special Inspector Responsibilities: Cooperate with the Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Determine location from which test samples will be taken and in which in-situ tests are conducted.
   2. Notify the Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   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 of each test, inspection, and similar quality control service.
   5. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
   6. Do not perform any duties of the Contractor.

D. Engineer Responsibilities: Engineer may perform some testing on completed on in-process work as noted in the Contract Documents.

E. Tests and inspections not explicitly assigned to the Owner or Engineer, and testing and inspecting requested by the Contractor and not required by the Contract Documents, are the Contractor's

responsibility. Unless otherwise indicated, provide quality control services specified and those required by public authorities having jurisdiction, whether specified or not.

F. Coordination: Coordinate the sequence of activities to accommodate the required quality assurance and quality control services with a minimum of delay and to avoid the necessity of removing and replacing construction to accommodate testing and inspecting.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.
   2. Notify the testing agency sufficiently in advance of operations to permit assignment of personnel.

G. Associated Services: Cooperate with the Engineer and testing agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Provide the following:
   1. Submittals of concrete mix designs and other materials and products necessary for the testing agency to test and evaluate field work.
   2. Access to the Work.
   3. Incidental labor and facilities necessary to facilitate tests and inspections.
   4. Adequate quantities of representative samples of materials that require testing and inspecting. Assist the testing agency in obtaining samples.
   5. Facilities for storage and field curing of test samples.
   6. Security and protection for samples and for testing and inspecting equipment at Site.

H. Repair and Protection:
   1. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   2. Provide materials and comply with installation requirements specified in other sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
   3. Protect construction exposed by or for quality control services.
   4. Repair and protection are the Contractor’s responsibility, regardless of assignment of responsibility for quality control services.

END OF SECTION

SECTION 01 70 20

PROJECT CLOSEOUT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Administrative and procedural requirements for contract closeout, including final cleaning; Substantial Completion and final completion procedures.

B. Related Sections:
   1. Divisions 02 through 09 sections for special cleaning and specific closeout requirements for Work in those sections, including warranties.

PART 2 PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by 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

3.1 PROJECT RECORD DOCUMENTS

A. During Work, maintain one set of Drawings and reviewed shop drawings, Specifications, WJE site visit reports, and product data for recording deviations of as-built construction from design information. Include addenda and Contract modifications.
   1. Accurately document and record changes and modifications as soon as possible after they occur, in understandable manner.
   2. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later. Record and check markup before enclosing concealed installations.
   3. Include:
      a. Dimensional changes.
      b. Revisions to Drawing details and details not on Drawings.
      c. Changes made by Change Order or Engineer's written orders or direction based on Site Visit Reports or Construction Observation Reports. Note Change Order numbers, Site Visit Report Item numbers or similar identification.
      d. Field records for variable and concealed conditions.
      e. Record information on Work that is shown only schematically or omitted from Drawings.
      f. Actual products and materials used.
         1) Include product data, specifically marked for Project, and cross-referenced to Specifications, Drawings, and Change Orders.
         2) Include names of manufacturer and Installer, and other information necessary to provide record of selections made.

3) Include significant changes in product delivered to Site and changes in manufacturer's written instructions for installation.

4. Mark record document most capable of showing actual physical conditions completely and accurately. Cross-reference on other record documents.
5. Mark record documents with erasable, red-colored media. Use other colors to distinguish between changes for different categories of Work at the same location.

B. Store Record Documents and samples in field apart from Contract Documents used for construction. Do not use Record Documents for construction purposes. Maintain Record Documents in good order and in clean, dry, legible condition, protected from deterioration and loss. Provide access to Record Documents for Engineer's reference during normal working hours.

C. Prepare final document markup in digital format for submission.
1. Incorporate changes and additional information previously marked on record prints. Erase, redraw, and add details and notations where applicable.
2. Refer questions to Engineer for resolution.
3. For new details and drawings, bind new sheets as necessary to appropriate document.
4. Identify and date each Record Drawing. Include names of project, Engineer, and Contractor, and designation "PROJECT RECORD DOCUMENT" in prominent location.
5. Organize PDF information into separate electronic files that correspond to each sheet of Drawings, report or item. Name each file with identification of item contained.

3.2 FINAL CLEANING

A. General: Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations. Return adjacent surfaces and areas to condition existing before Work began.

B. In areas disturbed by construction activities, complete the following cleaning operations before requesting inspection for certification of Substantial Completion. Clean each surface or unit to the condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions. Employ experienced workers or professional cleaners.
1. Remove tools, construction equipment, machinery, and surplus material from Site.
2. Clean Site, yard, and grounds, including landscaped areas, of rubbish, waste materials, litter, and other foreign substances.
   a. Broom clean paved areas. Remove petrochemical spills, stains, and other foreign deposits.
   b. Rake grounds that are neither planted nor paved to smooth, even-textured surface.
3. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of stains, films, and similar foreign substances. Polish surfaces to achieve specified finish. Avoid disturbing natural weathering of exterior surfaces.
   a. Touchup 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.
      1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
4. Clean and restore transparent and reflective surfaces, such as mirrors and glass in doors and windows, to their original condition. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

5. Remove labels that are not permanent.
6. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
7. Sweep floors broom clean.
8. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove paint and mortar droppings and other foreign substances.
9. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    a. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
10. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
11. Leave Project clean and ready for reuse.

END OF SECTION

SECTION 05 04 00

MISCELLANEOUS STEEL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fabrication and installation of structural steel connection hardware.

1.2 REFERENCES

A. Definitions:
   1. Installer: Used interchangeably for installer or erector.

1.3 QUALITY ASSURANCE

A. Fabricator Qualification: Experienced firm that has successfully completed steel fabrication work similar in material, design, and extent to that indicated for Project. Must have successful fabrication with specified materials in local area in use for minimum of five years.

B. Installer Qualifications: Experienced firm that has successfully completed miscellaneous steel installation work similar in material, design, and extent to that indicated for Project. Must have successful construction with specified materials in local area in use for minimum of five years.
   1. Employ foreman with minimum five years of experience as foreman on similar projects, who is fluent in English, to be on Site at all times during the Work. Do not change foremen during the course of the Project except for reasons beyond control of Contractor; inform Architect/Engineer in advance of any changes.

1.4 SUBMITTALS

A. Submittals
   1. Material Test Reports: For steel and stainless steel elements; signed by steel manufacturer certifying compliance with appropriate specification; include physical properties and chemical analysis.

PART 2 PRODUCTS

2.1 STEEL ELEMENTS

A. Plates and Bars:
   1. Finish: Hot-dip Galvanized in accordance with ASTM A143
   2. Unless noted otherwise on the drawings: ASTM A36, Grade 36.
   3. If noted as 50 ksi on drawings: ASTM A572, Grade 50.

2.2 AUXILIARY MATERIALS

A. High-Strength Bolts and Accessories:
   1. Finish: Hot-dip galvanized in accordance with ASTM A153

2. Bolt: ASTM A325, Type 1, heavy hex.
3. Nuts: ASTM A563, Grade C, heavy hex.
4. Washers: ASTM F436, Type 1.

B. Threaded Rods and Accessories:
1. Finish: Hot-dip galvanized in accordance with ASTM A153
2. Rod: ASTM A36.
3. Nuts: ASTM A563, Grade C, heavy hex.
4. Washers: ASTM F436, Type 1.

2.3 FABRICATION

A. Fabricate and assemble in shop to greatest extent possible. Comply with requirements of AISC 303, including tolerances.
1. Cut, drill, and punch elements cleanly and accurately.
a. Remove burrs.
2. Holes: Fabricate bolt holes, holes required for securing other work to steel elements, and holes for other work to pass through steel elements.
a. Cut, drill, or punch holes cleanly and accurately, perpendicular to steel surfaces. Do not thermally cut holes or enlarge holes by burning.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions with Installer for compliance with requirements and other conditions affecting installation or performance of miscellaneous steel elements.
1. Verify elevations of bearing surfaces and locations of anchor rods, bearing plates, and other embedments.
2. Ensure that Work done by other trades is complete and ready for steel installation.
3. Verify that areas and conditions under which Work is to be performed permit proper and timely completion of Work.
4. Notify Architect/Engineer in writing of conditions which may adversely affect installation or performance of steel elements. Do not proceed with steel installation until adverse conditions have been corrected and reviewed by Architect/Engineer. Commencing miscellaneous steel Work constitutes acceptance of Work surfaces and conditions.

3.2 INSTALLATION, GENERAL

A. Install miscellaneous steel elements in accordance with requirements of AISC 303.

B. Provide temporary support for elements during installation to keep elements secure, plumb, and in alignment. Do not remove temporary supports until the installation is complete.

C. Do not use thermal cutting during installation unless approved by Architect/Engineer. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

D. Do not enlarge holes unless approved by Architect/Engineer. If approved, ream holes to enlarge.

E. Bolted Connections: Install high-strength bolts according to the RCSC Specification for joint conditions indicated on Drawings. Use snug-tight requirements unless noted otherwise.

1. Snug-Tight Joints:
   a. Faying surfaces and surfaces adjacent to bolt head and nut shall be free of dirt and other foreign material.
   b. Install snug-tight joints such that connected plies are brought into firm contact by the bolts in the joint and bolts have been sufficiently tightened to prevent removal of nuts without the use of a wrench.

3.3 QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified special inspector to verify and inspect aspects of the steel installation.
   1. Welding inspection and welding inspector qualifications shall be in accordance with AWS D1.1/D1.1M.
   2. Contractor to provide testing agency with access to places where Work is being installed to perform inspections.
   3. Contractor to provide notice to testing agency of installation schedule.

B. Bolted Connections: Bolted connections will be inspected and tested according to RCSC Specification Section 9 and the requirements of the applicable building code.
   1. Prior to the start of Work, verify that fastener components meet the requirements of RCSC Specification Section 2 and connected plies meet the requirements of RCSC Specification Section 3.
   2. Visually verify that connected plies are in firm contact and that washers are used as required in RCSC Specification Section 6.
   3. For snug-tight connections verify that bolts have been tightened sufficiently to prevent turning of the nut without the use of a wrench, per RCSC Specification Section 9.1.
   4. For pretensioned and slip-critical joints, perform preinstallation verification testing in the presence of the inspector, as required by RCSC Specification Section 8 and inspect installed fasteners per RCSC Specification Section 9.2.
   5. For slip-critical joints, prior to assembly verify in the presence of the inspector that faying surfaces meet the requirements of RCSC Specification Section 3.2.2.

C. Correct deficiencies in Work that inspection and testing indicate do not comply with Contract Documents at no cost to the Owner. Costs of additional testing or inspection resulting from non-confirming tests, inspections or observations shall be paid for by the Contractor, regardless of who was originally responsible for initial testing.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Surface preparation and installation of sealant in joints.

B. Payment to be based on linear feet of sealant installed.

1.2 QUALITY ASSURANCE

A. Installer Qualifications: Experienced firm that has successfully completed sealant work similar in material, design, and extent to that indicated for Project; that is approved, authorized, or licensed by sealant manufacturer to install sealant; and that is eligible to receive sealant manufacturer's warranty. Must have successful installations of specified materials in local area in use for minimum of five years.
   1. Employ foreman with minimum five years of experience as foreman on similar projects, to be on Site at all times during Work. Do not change foremen during the course of the Project except for reasons beyond the control of the Installer; inform Engineer in advance of any changes.

1.3 PROJECT CONDITIONS

A. Environmental Limitations: Install sealant when existing and forecast weather conditions permit sealant to be installed according to sealant manufacturer's written instructions and warranty requirements.
   1. Do not install sealant when ambient or substrate temperatures are below 40 degrees F or are expected to fall below 40 degrees F in next 12 hours.
   2. Do not proceed with installation during inclement weather except for temporary work necessary to protect building interior and installed materials. Remove temporary work and Work that becomes moisture damaged.

1.4 SUBMITTALS

A. Product Data

B. Field Test Data

1.5 WARRANTY

A. Manufacturer's Warranty:
   1. Written warranty, signed by sealant manufacturer.
   2. Warranty Period: 5 years from date of Substantial Completion.

B. Installer's Warranty:
   1. Completed warranty form signed by sealant Installer. Warranty form included in section 00 65 36.
   2. Warranty Period: 5 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 ELASTOMERIC JOINT SEALANTS

A. General:
   1. Comply with ASTM C920 and other requirements indicated.
   2. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing on similar projects, mockups and preconstruction testing for Project, and field experience.
   3. Select products based on mockups, preconstruction testing, and sealant manufacturer's previous testing and experience.
   4. Source Limitations: Obtain each type of joint sealant through one source from single manufacturer.
   5. Colors of Exposed Joint Sealants: Selected and approved in writing by Owner's Representative, from sealant manufacturer's full range.

B. Single-Component, Non-sag, Silicone Sealants:
   1. 756 SMS Building Sealant manufactured by Dow Corning Corporation.
   2. SCS9000 SilPruf NB manufactured by Momentive Performance Materials Inc.
   3. Spectrem 3 manufactured by Tremco Commercial Sealants & Waterproofing.

2.2 AUXILIARY MATERIALS

A. General: Sealant-backer materials, primers, surface cleaners, masking tape, and other materials recommended by sealant manufacturer, that are non-staining and compatible with substrates; based on mockups, preconstruction testing, and sealant manufacturer's previous testing and experience.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. Remove existing sealant and other foreign material from joints.

B. Repair damaged or deteriorated substrate surfaces according to sealant manufacturer's written instructions, as detailed and as approved by Engineer.

C. Clean joint substrates immediately before installing sealant, to comply with sealant manufacturer's written instructions based on mockups and preconstruction testing.
   1. Remove from substrate foreign material that could interfere with adhesion of sealant, including dirt, dust, existing sealant, oil, grease, and surface coatings.
   2. Provide dry substrate; prevent wetting of substrate prior to sealant installation.
   3. Clean porous substrates, such as concrete, masonry, stone, wood, by brushing, grinding, blast-cleaning, mechanical-abrading, or combination of methods to produce clean, sound substrate capable of developing optimum bond with sealant. Remove laitance and form-release agents from concrete. Remove loose particles remaining after cleaning operations by vacuuming or blowing out joints with oil-free, compressed air.
   4. Clean nonporous surfaces, such as metal, with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of sealant.

3.2 INSTALLATION OF SEALANT

A. General: Comply with these documents and sealant manufacturer's written installation instructions for products and applications indicated, based on mockups and preconstruction testing. Notify Engineer of discrepancies between these documents and manufacturers typical details, written recommendations or instructions. Engineer shall determine which apply.

B. Joint Priming: Prime all porous joint substrates. Prime additional substrates where recommended in writing by sealant manufacturer, based on mockups and preconstruction testing. Apply primer to comply with sealant manufacturer's written instructions.
   1. Confine primer to areas of sealant bond; do not allow spillage or migration onto adjoining surfaces.
   2. Limit priming to areas that will be covered with sealant in same day. Unless recommended otherwise by sealant manufacturer, reprime areas exposed for more than 24 hours.

C. Install sealant backer and position to produce cross-sectional shape and proper depth of installed sealant.
   1. Use properly-sized backer. Do not use multiple-backer units or braided-backer units to accommodate wide joints.
   2. Install backer with device that will provide consistent depth between substrate surface and outer surface of backer.
   3. Do not leave gaps between ends of sealant backers.
   4. Do not stretch, twist, puncture, or tear sealant backers.
   5. Remove wet backers and replace with dry materials.

D. Install bond-breaker tape at back of designated joints.

E. Install sealant immediately after installing backer material; to produce uniform, cross-sectional shape and depth; to directly contact and fully wet joint sides and backer material; and to completely fill recesses in joint configuration.
   1. Non-sag sealants
      a. Install sealant with the recess specified on the details.
      b. Immediately after sealant application and before skinning or curing begins, tool joint with slightly concave surface, compressing sealant into joint to form smooth, uniform sealant bead; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Do not use tooling agent.

3.3 QUALITY CONTROL

A. At completion of Project, observe installed sealant for damage or deterioration. If damage or deterioration occurs, neatly cut out and remove damaged or deteriorated sealant, prepare and prime surfaces, and install new sealant. Replace sealant immediately so new sealant is indistinguishable from original Work.

B. Field-Adhesion Testing: Testing and Inspection Agency shall perform non-destructive and destructive field adhesion tests on sealant in accordance with ASTM C1521.
   1. Destructive testing (Method A):
      a. Cut 6-inch-long tail of sealant loose from substrate.
      b. Mark tail 1 inch from adhesive bond.
      c. Grasp tail 1 inch from adhesive bond and pull until tail extends to 2x the published movement capability of sealant. If sealant has not failed, continue pulling to failure.

d. Record elongation at failure and if failure was adhesive or cohesive.
e. Observe sealant for complete filling of joint with absence of voids, and for joint configuration in compliance with requirements. Record observations and sealant dimensions
f. Perform test every 200 feet.

2. Test reports shall include date when sealant was installed, name of person who installed sealant, test date, test location, and whether primer was used.
3. Immediately after testing, Contractor shall replace failed sealant in test areas. Neatly cut out and remove failed sealant, prepare and prime surfaces, and install new sealant. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
4. Sealant not evidencing adhesive failure from testing or noncompliance with requirements will be considered satisfactory.
5. Where Engineer determines that sealant has failed adhesively from testing or does not comply with requirements, additional testing will be performed to determine extent of non-conforming sealant. Neatly cut out and remove non-conforming sealant, prepare and prime surfaces, and install new sealant. Perform field adhesion tests on new sealant. Additional testing and replacement of non-conforming sealant shall be at Contractor's expense.

END OF SECTION

SECTION 09 97 13

STEEL COATING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Removal of surface contaminants, preparation of steel substrates, and the application of new coating system.

1.2 DEFINITIONS

A. Contractor Supervisor: The on-site person in charge for the Contractor.

B. Painter: Refers to the individual workers conducting the work.

C. Inspector (Coating Inspector): Coatings inspector hired by the Owner or Owners Representative. If no entity is retained, Engineer may perform some duties listed for the Inspector.

D. Kit: All coating components (part A, B, etc.) mixed together to from final complete product as packaged in original containers from Coating Manufacturer.

1.3 SUBMITTALS

A. Letter from manufacturer stating that system is appropriate for use in this service environment and the requested warranty can be provided.

B. Product Data.

C. Installation instructions (information only).

D. Installation field logs and reports.

1.4 PROJECT CONDITIONS

A. The Work will be taking place above a concrete tank with associated plumbing and blending equipment. Take care not to damage adjacent equipment during work or with debris.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading: Deliver materials to job site in original, new, and unopened packages and containers bearing the manufacturer's name and label and batch numbers.
   1. The Contractor shall be on-site and sign for all deliveries made to the project site. The Owner will not sign for or receive shipments for the Contractor.
   2. Contractor shall employ persons to meet quality control requirements below.

B. Acceptance at Site: Damaged or deteriorated materials shall be clearly identified and not used on this Project. Promptly remove rejected and non-complying materials from the premises. Owner will not pay for damaged or deteriorated materials.

C. Storage and Protection: Store materials in tightly closed containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 40 degrees Fahrenheit and not more than 95 degrees Fahrenheit, unless required otherwise by manufacturer's instructions. Storage area shall be protected from exposure to direct sunlight, heat, sparks, flames, and weather.
   1. Maintain containers in clean condition, free of foreign materials and residue.
   2. Store containers so manufacturer's labels are clearly displayed.
   3. Remove rags and waste from storage areas daily.
   4. The Contractor is solely responsible for the storage and protection of materials.
   5. Materials may not be stored on-site when work is not being performed.

1.6 SEQUENCING AND SCHEDULING

A. Work shall be completed in accordance with the specifications as soon as reasonably possible.

B. Coordinate schedule with Engineer and ensure that all submittals have been returned final per Section 01 33 00 a minimum of one week prior to beginning work. Delays resulting from failure to submit materials on-time are solely the responsibility of the Contractor.

C. Engineer shall be given 24 hour notification prior to starting any coating.

D. Schedule steel preparation and painting so that dust and other contaminants from the preparation process and present in the stadium will not fall onto uncured, newly painted surfaces.

E. Protect areas not to be coated.

F. Prepare substrate as required (including pre-surface preparation)

G. Apply coating as required
   1. Conduct necessary quality control tests and inspections at hold points.
   2. Document surface preparation and coating application in daily inspection log.

H. Remove protection upon completion of work.

1.7 QUALITY ASSURANCE

A. Applicator Qualifications: Qualified firm that is approved by coating manufacturer to install coating. Must have installations of specified materials in local area in use for minimum of 5 years.
   1. Employ foreman trained with minimum of 5-years of experience as foreman on similar projects, who is fluent in English, to be on site at all times during Work.

B. Owner, Engineer and Coating Inspector will periodically observe progress, evaluate quality, and perform tests of the coatings. All direction or modification with regard to the specification or performance of the work shall be made by the Engineer or Owner. While representatives of the coating manufacturer may be present at the site, they do not have the authority to modify or dictate changes to the contract documents or performance of the work.

C. Mockups: Prepare surface and apply coating system to representative area (connection and 3-foot minimum beam length) to demonstrate aesthetic affects and quality of materials and execution. Leave portion of prepared surface and each coating layer exposed to view.
   1. Coating manufacturer's representative shall observe mockup and approve in writing surface preparation and coating application.
   2. Contractor to perform pull -off adhesion testing in accordance with ASTM D4541. Coating application is acceptable if test results are at least 350 pounds per square inch. If Engineer determines mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved. Do not proceed with Work until mockup is approved.
   3. Approved mockup will be acceptance standard for remainder of Work.
   4. Approved mockup may become part of completed Work if undisturbed at time of Substantial Completion.

D. Permit Engineer and Coating Inspector to perform field testing of coatings and Contractor shall repair test areas damaged by testing.

E. Coating manufacturer may review surface preparation and coating applications on site during installation. Coating manufacturer may also perform or observe tests of the coatings. Contractor shall repair test areas damaged by testing.

F. General:
   1. Review specifications for requirements affecting Work. Conflict between these specifications and coating manufacturer's requirements or specifications, or other pertinent specifications, shall be immediately brought to the attention of the Engineer during the submittal process. The more stringent requirement shall govern the work unless approved by the Owner and Engineer.
   2. Work in-place shall be subject to inspection testing. Work found to be unacceptable shall be replaced with new, acceptable work, at no cost to the Owner.
   3. If a temporary enclosure around the work area is needed, provide lighting or enclosures which allow for equivalent of at least 25 foot candles on the surface to be coated.
   4. The Contractor is solely responsible for quality regardless of whether or not an independent Coating Inspector is present.

G. Manufacturer:
   1. Manufacturer's technical representatives may perform site visits throughout the project including:
      a. To make observations for conformance with requirements may include:
         1) Surface preparation.
         2) Surface profile or observation of surface profile measurement.
         3) Coating application.
         4) Measuring wet film thickness or performing measurement.
         5) Measuring dry film thickness of cured coating.
         6) Measuring adhesion of cured coating.
      b. As necessary to advise the Contractor of procedures and precautions for use of the materials.
   2. Manufacturer's representatives may perform a final inspection of completed work.

H. Contractor:
   1. Contractor shall have a dedicated Field Quality Control Representative on site during all stages of the work.

a. Contractor Field Quality Control Representative shall be on site at all times during final surface preparation and coating.
2. Contractor Supervisor shall be on site during all preparation and coating work.
3. Contractor shall have experience with similar projects for the successful field application of coating to structural steel.
4. Contractor shall be qualified, in writing, for application of the coating system by the coating manufacturer.
5. Contractor Field Quality Control Representative Qualifications:
   a. A minimum of 10 years of experience in the quality control of preparation and coating of structural steel.
   b. Shall be NACE Level 1 Certified Coating Inspector or equivalent SSPC certification.
6. Contractor Supervisor Qualifications:
   a. A minimum of 10 years of experience in the preparation and coating of structural steel.
   b. A minimum of three (3) years of experience in supervising this type of Work. Apprentices shall be under direct supervision of an experienced supervisor.
7. Coating Installer Qualifications:
   a. A minimum of 5 years of experience in the preparation and coating of structural steel.

I. Coating Inspector: Owner, at their discretion may retain a coating inspector to inspect the coating work, including performance of destructive and non-destructive testing.
1. The coating inspector does not have the authority to modify, change or formally interpret the requirements of the Contract Documents as those or the responsibility of the Engineer and/or Owner.
2. Provide access to all areas of coating work as are required to be provide to the Owner and Engineer.
3. Work performed by the coating inspector does not relieve the Contractor from performance of any quality assurance or quality control activities outlined herein, or generally required to complete the Work.

1.8 WARRANTY

A. Contractor's Warranty:
1. Warranty form in Section 00 65 36, signed by Applicator.
2. Warranty Period: 5 years after Substantial Completion date.

B. Manufacturer's Warranty: Written warranty, signed by coating manufacturer, including:
1. Materials and labor to replace coating that fails within the specified warranty period, including coating that:
   a. Fails in adhesion, cohesion, or general durability
   b. Blisters.
      1) Blisters shall be evaluated using ASTM D714. Blisters with a rating of No 10 shall be considered a defect.
   c. Cracks, checks, fades, or chalks; or that deteriorates in manner not clearly specified by submitted coating manufacturer's data as inherent quality of material for application indicated.
      1) Evaluate chalking in accordance with ASTM D4214. Chalking less than a rating of No. 7 shall be considered a defect.
   d. Allows corrosion of the substrate.
      1) The substrate shall not corrode in excess of Rust Grade 4 per SSPC -VIS 2 (greater than 3.0 percent and up to 10.0 percent) of the surface area being coating as measured in accordance with ASTM D610.

2. Warranty does not include deterioration or failure of coating due to Contractor error or omission, fire, vandalism, snow removal abuse or failure of the substrate prepared according to the specification requirements.
3. New coating shall closely match color of existing coating.
4. Warranty Period: 5 years after Substantial Completion date.

PART 2 PRODUCTS

2.1 STEEL COATINGS, GENERAL

A. Material Compatibility:
   1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. Provide products of same manufacturer for each coat in coating system.
   3. Provide products from same batch for each component.

2.2 COATING SYSTEMS (AND SURFACE PREPARATION BELOW COATING)

A. Apply coating systems in accordance with manufacturer's directions. Follow additional requirements of this specification.

B. Provide coating system recommended by manufacturer specifically for intended use.

C. Approved Coating Manufacturers
   1. The Sherwin Williams Company, 15484 College Boulevard, Lenexa, Kansas 66219.
   2. Tnemec Company, Inc., 6800 Corporate Drive, Kansas City, Missouri 64120.

D. Coating System
   1. Surface preparation: SSPC SP-10 Near-white Metal Blast Cleaning and the requirements of this specification.
   2. Basis of Design (Sherwin Williams Company)
      a. Primer Coat: Zinc-Clad 4100, 3.0 - 5.0 mils DFT
      b. Intermediate Coat: Macropoxy 646, 8.0 – 10.0 mils DFT
      c. Finish Coat: Hi-Solids Polyurethane 250, 4.0 – 6.0 mils DFT
      d. Filler Material: Steel Seam FT910 applied after primer in accordance with recommendations of product manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, for compliance with requirements and conditions affecting performance of work.
   1. Atmospheric Conditions: Follow manufacturer's directions for allowable atmospheric conditions. Do not apply coatings if the following variables are likely to exceed or fall short of manufacturer's parameters.
      a. Measure dew point with a psychrometer or other suitable instrument prior to application. Do not apply if dew point is outside specification requirements.

b. Perform surface temperature readings on substrate to receive coating prior to application. Do not apply if surface temperature of steel is outside specification requirements.
c. Measure ambient air temperature and relative humidity in area of work prior to coating application. Do not apply if ambient air temperature and relative humidity is outside manufacturer's parameters.

2. Verify compatibility with and suitability of substrates, including compatibility with and durability of existing finishes or primers.
3. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
4. Coating application indicates acceptance of surfaces and conditions by the Contractor.

3.2 PROTECTION

A. Protect existing construction and work in place from damage resulting from operations related to the Work including removals, reinstallation, and the storage, preparation, handling, and application of coating materials. Work required in this Section includes use of chemicals that can harm workers and other persons, animals, plants, and damage vehicles, other property. Take care to protect these items. Damage to adjacent property, buildings, vehicles, site features, etc., caused by coating operations shall result in no additional cost or liability to the Owner, Engineer, or Coating Inspector.

B. Exercise caution in performing Work so as not to damage other Owner and site elements. Protect the building and site elements from damage. Materials and items damaged by coating process shall be repaired to the satisfaction of the Owner without additional cost to the Owner.

C. Protection materials shall be carefully and thoroughly removed upon completion of Work.

D. Work required in this Section includes use of chemicals that can harm workers and other persons, animals, plants, and damage vehicles, other property. Take care to protect these items.

E. The wind velocity and direction shall be considered as having a major impact on blasting and spraying operations. Use necessary precautions to prevent undue dispersing of material. Use wind screen/overspray nets to minimize the spillage impact on the buildings and Site. Contractor is responsible for any damage to adjacent surfaces, environment, vehicles, etc.

3.3 SURFACE PREPARATION

A. Complete steel connection review and replacement prior to starting surface preparation.

B. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and coatings.

C. Pre-surface Preparation
1. Remove all fins, tears, slivers, burs, and welds on any steel surface to receive coating as described in NACE SP0178, Condition C.
2. All weld spatter should be removed and all surface imperfections of welds repaired as necessary as described in NACE SP0178, Condition D utilizing SSPC SP2, SP3, SP15 and/or SP11.

D. Surface Preparation

1. Do not prepare steel when the surface temperature is less than 5 degrees Fahrenheit above the dew point, or when the relative humidity exceeds 85 percent. Surface areas exposed to condensation or moisture prior to receiving primer coat shall be re-prepared.
2. Remove grease, oil, dirt, and other surface contaminants from areas to be painted, in accordance with SSPC-SP 1, prior to preforming the required surface preparation.
3. Prepare surfaces to standards reference in the coating material section above.
4. Remove all dust, and paint residue from steel surfaces. Surfaces shall be compliant with ISO 8502-3 Level 1 or better.
5. Control environmental conditions and apply primer before rusting of the surface that could limit adhesion occurs. Only prepare enough surface area that can meet the surface preparation requirements and be coated same day.
    a. Coatings consisting of more than one part shall be used in their entirety, or discarded (do not split kits).
6. Select areas of transition as shown on the construction documents will be repaired by the Contractor with the use of an approved filler material. This repair shall be performed prior to installing primer.

E. Conduct quality control testing prior to, during, and after surface preparation and coating application.
    1. SSPC-Vis-1 shall be used as a guide to judge prepared surfaces.
    2. Final approval of surface preparation shall be based on approved mockup.

F. Applicator and coating manufacturer's representative shall examine substrate to ensure that it is properly prepared and ready to receive coating.
    1. Coating manufacturer's representative shall report in writing to Applicator and Engineer conditions which may adversely affect coating system installation or performance.
    2. Do not proceed with coating application until unsatisfactory conditions have been corrected and reviewed by Engineer.
    3. Commencing application constitutes acceptance of Work surfaces and conditions.

3.4 COATING APPLICATION

A. Apply coatings according to manufacturer's written instructions and these specifications. Follow manufacturer's written instructions for recoat times for all products.

B. Mix materials thoroughly to achieve uniform, smooth consistency. Do not thin or dilute unless permitted by coating manufacturer; use recommended thinners within recommended limits.
    1. Stir as required during application.
    2. If surface film forms, do not stir film into material. Remove film and strain coating material before using.
    3. Maintain containers used for mixing and applying coating in clean condition, free of foreign materials and residue.

C. Apply coating by roller, spray, or brush. Use applicator and technique best suited for substrate and type of material being applied.
    1. Apply materials as soon as practicable after completion of surface preparation or full curing of previous material application.
    2. Do not coat over conditions detrimental to formation of durable coating film, such as dirt, rust, scale, grease, or moist or scuffed surfaces.
    3. Stripe Coat: Apply brush-applied stripe coat during each coating application (i.e. primer, intermediate, and finish coat) to all welds, bolts, threads, corners, and edges.

4. Prime exposed steel surfaces to provide specified thickness or as recommended by coating manufacturer, whichever is greater.
5. After the steel is primed, it shall be cleaned as needed to ensure no surface contaminants are present before subsequent coating. If more than 3 weeks has elapsed since the steel was primed, or if in the opinion of the Engineer the surface is unfit for top coating, the surface shall be scrubbed with a mild detergent solution (any commercial laundry detergent), thoroughly rinsed with water, and allowed to dry for 24 hours before the surface is coated.
6. Apply finish coat to provide specified thickness. Do not apply second coat until first coat has fully cured. Select application method to avoid excessive coating thickness.
    a. If undercoats or other conditions show through final coat, apply additional coats until coating film is of uniform finish, color, and appearance, if approved by Engineer.
    b. Ensure that edges, corners, and crevices receive minimum dry film thickness.
    c. Brush Application: Work material into surface in even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw lines at edges and color breaks.
    d. Roller Application: Keep cover wet; do not dry roll. Apply material in sections. Lay on required amount of material, working material into grooves and rough areas. Then level material, working it into surface.
    e. Spray Application: Use spray application only when permitted by manufacturer's written instructions and authorities having jurisdiction. Apply material to provide equivalent hiding of brush-applied coat. Do not double back, building up film thickness of two coats in one application.
    f. All dry spray shall be removed, by sanding if necessary. In areas of deficient primer thickness, the area shall be thoroughly cleaned with power washing equipment, as necessary to remove all dirt; the area shall then be wire brushed, vacuumed and recoated.
    g. All metal coated with impure, unsatisfactory or unauthorized coating material, or coated in an unworkmanlike or objectionable manner, shall be thoroughly cleaned and recoated or otherwise corrected as directed by the Engineer.
7. Do not coat over UL, FMG, or other labels.

D. Conditions for coating: Apply coating when existing and forecast weather conditions permit coating to be installed according to coating manufacturer's written instructions.
    1. *Temperature* - Unless otherwise specified by the coating manufacturer, do not apply when substrate and ambient temperatures are less than 50 degrees F or more than 95 degrees F. Coatings shall not be applied if the temperature is high enough to cause blistering.
    2. *Humidity* - The coating shall not be applied when the relative humidity is greater than 90 percent nor when a combination of temperature and humidity conditions are such that moisture condenses on the surface being coated. The surface temperature shall be at least 5°F higher than the dew point, as determined in accordance with ASTM E337.
    3. *Spray painting* - Spray painting shall not be permitted when wind velocities are greater than 20 MPH.
    4. These conditions will be determined by the Engineer at locations representative of the surfaces to be cleaned and painted. Work accomplished under unfavorable weather conditions will be considered unacceptable and complete recleaning and repainting of these areas will be required at the Contractor's expense.

E. Coating system application shall be pinhole-free for each coat. If test confirms the presence of pinholes, repair pinholes and retest. Pinhole and holiday detection tests shall be conducted after final cure of the finish coat.

F. If undercoats or other conditions are visible through final coat, apply additional touch-ups until cured film has a uniform coating finish, color, and appearance.

G. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

H. All runs and sags should be brushed out immediately. If not, and the coating has cured, the runs and sags shall be removed by sanding and the affected area repainted.

I. Minor coating defects, handling damage and other occasional nonconforming conditions, and destructive test sites shall be repaired such that the final product meets the requirements of these specifications. The Engineer shall have final authority concerning the coating's uniformity and acceptable appearance.

3.5 REPAIR PROCEDURE

A. Repairs to coating may become necessary due to chemical exposure or mechanical damage. Perform repairs as specified herein, or as otherwise required by the coating manufacturer.

B. Solvent clean the areas in accordance with SSPC SP1 using an appropriate and effective solvent, then to abrade the damage area to sound primer, or in the case of damaged primer, to sound substrate by whatever means feasible.

C. The area immediately adjacent to the repair should also be SP 1 cleaned and feather-edge abraded and blended into the repair area; extending into the sound coating 2 to 4 inches. Ensure all areas to be coated are contaminant/chemical free.

D. The abraded prepared area should then be again solvent wiped with an appropriate solvent and the coating then applied to a clean, dry, and contaminant free surface.

E. The application of the coating(s) should begin in the repair area and extend into the feather-edged margin, with care being taken to keep the application within the abraded area(s).

3.6 FIELD QUALITY CONTROL

A. Maintain quality control log including all specified quality control information.

B. Do not apply any coatings when measurements, observations, readings, etc. are not in conformance with manufacturer's written instructions or these specifications.

C. The Contractor shall submit daily inspection reports which include day, time, and location of all quality control tests specified. Reports shall include:
   1. Project Name
   2. Location of structure
   3. Description of work performed
   4. Name of Person Performing Tests (Contractor Field Quality Control Representative)
   5. Contractor Project Number
   6. Paint removal method and times of paint removal
   7. Coatings used
   8. Batch numbers of coatings
   9. Batch number of thinners

10. Hold point inspections completed
11. Non-conformance and corrective actions
12. Inspection equipment calibration dates.

D. Quality control testing and procedures to be performed by the Contractor shall include, but are not limited to the following:
   1. Pre-surface preparation for obvious defects and contamination to be removed in accordance with the specified preparation requirements.
   2. Test compressed air to ensure no moisture or oil contamination. Use a clean white piece of blotter paper held approximately 18 inches from the air supply downstream of the moisture and oil separators. The air is permitted to blow on the blotter paper for 3 minutes and is then inspected for signs of detrimental amounts of moisture or oil contamination. If there is no discoloration, the air is acceptable. If moisture or oil is visible, the air shall not be used. Check air at least once every four hours.
   3. Surface Profile:
      a. The profile shall be measured using replica tape and measured with a spring micrometer, ASTM D4417.
      b. Frequency of measuring profile shall be once per day of surface preparation, or once per aisle, whichever is more frequent.
   4. Evaluate compliance of surface preparation as required by each individual mockup requirements.
   5. Remove all dust, and paint residue from steel surfaces. Test steel surfaces prepared for painting for cleanliness per ISO 8502-3 immediately prior to coating application. Dust quantity rating shall be 1 or better. Use Scotch Transparent 3/4-inch Tape Cat. 600 for performance of the ISO 8502-3 test. Apply pressure to the tape in accordance with ISO 8502-3 Paragraph 6.2 a). Frequency of testing shall be as follows:
      a. Perform surface cleanliness tests (ISO 8502-3) on each mockup area that has been prepared, blown-down, vacuumed, etc.
      b. Tests shall be performed in at least triplicate on representations of the surface as a whole, including pitted areas.
      c. When any one (1) cleanliness test is not in compliance with the requirements of the specification, it shall be cause for temporary non-compliance of that area. Re-clean the surfaces of the entire non-compliant test area and areas that have yet to be tested.
      d. Do not always test the same steps; make assurances that random steps are tested through the course of the work.
   6. Surface temperature shall be taken using a surface thermometer prior to the application of any coating and at least once every two (2) hours during application. No coating shall be applied if temperature is outside the range provided in the manufacturer's written instructions.
   7. Air temperature, relative humidity, and dew point before application of any coating and at least once every two (2) hours during application. If readings are not in conformance to manufacturer's written instruction, no coating shall be conducted.
   8. Observation of coating mixing and application for conformance to manufacturer's instructions.
   9. Painter shall confirm wet film thickness of each coating application taken randomly using a notched gage.
   10. Measure dry film thickness in accordance with SSPC PA-2, electronic method.
      a. Verify dry film thickness of the coating using method and frequency recommended by manufacturer or according to ASTM D7091 and SSPC PA-2 Procedure for Determining Conformance to Dry Coating Thickness Requirements but not less than one measurement per 50 sq. ft. of coating application.

b. The dry film thickness measured must be in accordance with SSPC PA-2 Level 1. If the coating thickness is not satisfactory, coatings shall be installed at no added cost to the Owner.

11. Perform adhesion testing in accordance with ASTM D4541.
    a. Testing frequency shall be one test at the mockup, and one additional random test at a location selected by the Engineer.
    b. Each test location shall consist of three pull-off adhesion tests.
    c. Minimum passing average value for a test location shall be 350 psi, with no individual test less than 300 psi.
12. Conduct pinhole and holiday detection tests after final cure of the finish coating. Use low voltage wet sponge detector or other apparatus approved by the coating manufacturer.

E. The Contractor Field Quality Representative shall, at a minimum, have the following inspection equipment on site and in good working order:
    1. Blotter paper
    2. Replica tape in a range for the required profile and spring micrometer
    3. SSPC-Vis 3
    4. Pressure sensitive tape for testing in accordance with ISO 8502-3
    5. Surface temperature thermometers (laser thermometers are acceptable)
    6. Air temperature, relative humidity, and dew point meter(s)
    7. Nordson Wet film coating thickness gages
    8. Electronic dry film thickness gage capable of measuring thickness in accordance with SSPC PA-2.
    9. Portable adhesion tester.
    10. Camera

F. Schedule hold points between all major operations for inspection. All hold points shall be coordinated and reviewed with Coating Inspector, or Engineer, prior to proceeding. Document the following in daily inspection reports:
    1. Surface preparation
    2. Primer coat inspection
    3. Intermediate coat inspection
    4. Finish coat inspection
    5. Any corrective action required at any step

G. Allow Owner, Engineer and Coating Inspector access, as needed, to observe progress and quality of portion of completed and ongoing Work.

H. Owner reserves the right to invoke the following procedure at any time and as often as the Owner deems necessary during the period when coatings are being applied:
    1. Owner may engage services of a qualified testing agency to sample coating material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
        a. Testing agency may perform tests for compliance with specified requirements.
    2. Owner may direct that coating application stop if test results show that materials being used do not comply with specified requirements. Contractor will recoat and tint rejected work at no additional cost to the Owner. If new coating application is incompatible with rejected coated surfaces, preparation procedures specified in this Section will be performed again at no additional cost to the Owner.

I. Owner may, at its expense, perform the following tests. Contractor shall provide access to test locations determined by Engineer for testing.
   1. Measure surface chloride contamination with Chlor Test Kit from KTA-Tator, Inc. (http://www.ktagage.com) once for every 10 square feet of surface prepared. Surface chloride contamination shall be no more than 2 micrograms per square centimeter.
   2. Measure dry-film thickness of coating. Coating thickness is acceptable if within specified range.
   3. Perform adhesion tests per ASTM C3359, Test Method A, after coating has cured. Coating adhesion is acceptable if no peeling or coating removal occurs (Rating 5A).
   4. Perform pull-off tests per ASTM D4541, after coating has cured. Coating application is acceptable if test results are at least 350 pounds per square inch.
   5. If coating application is acceptable, Owner will pay Contractor to repair substrate and coating as necessary at test locations.
   6. If coating application is unacceptable, Engineer will determine remedy. Contractor shall remove and replace unacceptable coating or perform other remedial actions at no cost to Owner. Contractor shall also repair substrate and coating at test locations with unacceptable results at no cost to Owner. Contractor may, at own expense, perform additional measurements and testing to determine limits of areas with unacceptable coating.

J. Coating Materials:
   1. Permit Owner, Engineer or Coating Inspector to collect samples of coating materials, if determined to be necessary by the Owner. These samples may be laboratory tested to insure that the products used in the coating process are the same as the approved materials.
   2. Provide Owner, Engineer and Coating Inspector with access to mixed solutions of the coating products at the Site when so requested by the Owner.
   3. Failure to maintain approved chemicals, products, concentrations, etc., shall be reason for the immediate termination of the Contract Agreement.

K. Coating Process:
   1. Permit Owner and Engineer to conduct tests on coated surfaces if deemed necessary by Owner. Tests will be performed to determine if coatings are being applied according to manufacturer's instructions and approved field samples.
   2. Recoat rejected area without additional cost to Owner if Owner determines that coated surfaces are noncompliant to manufacturer's instructions and approved field samples.
   3. Recoat affected area without additional cost to Owner if Owner determines that coating has not been satisfactorily applied.

L. Damaged coating adjacent to work shall be touched up and restored before final acceptance.

M. Repair test locations performed by Engineer or Coating Inspector.

3.7 CLEANING

A. Immediately clean up spatter, spillage, and misplaced paint to restore affected area to its original condition. Do not scratch, damage, or deface adjacent finished surfaces.

END OF SECTION