
SECTION 01 01 00**SUMMARY OF WORK****PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

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

1.02 INTENT OF PLANS AND SPECIFICATIONS

- A. The intent of the Plans and Specifications is to describe The Work which the Contractor undertakes to do, in full compliance with the Contract, and it is understood that the Contractor will furnish, unless otherwise provided in the Contract, all materials, machinery, equipment, tools, supplies, transportation, labor, and all other incidentals necessary to the satisfactory prosecution and completion of the Work. The Plans and Specifications are complementary, and what is called for by either is as binding as if called for by both.
- B. The General Conditions and Special Conditions shall control where in conflict with the Standard Specifications. However, such portions of the Standard Specifications not in conflict or not rendered meaningless by the General Conditions or Special Conditions shall remain in full force and effect and be binding on the parties hereto.
- C. In the event the Contractor discovers any error or discrepancy in the Contract Documents, he shall immediately call upon the Engineer for his decision. The Engineer shall then make such corrections and interpretations as may be deemed necessary for the fulfillment of the intent of the Specifications, General Conditions and Special Conditions, Plans and other Contract Documents, as construed by him and his decision shall be final.

1.03 SUMMARY OF WORK

- A. The following items shall be considered as the Base Bid:

BID ITEM 1 - GENERAL PROVISIONS:

- A. General Mobilization/Demobilization.

This line item shall consist of all labor, materials, tools and equipment required for setting-up general plant, storage/staging areas and facilities required to facilitate construction or as otherwise required by applicable Federal, State and Local laws; and the general mobilization of equipment required for the completion of the work as shown within the Bid Documents and all

expenses for de-mobilization off the site upon completion of all work as shown within the Bid Documents. It will be the contractor's responsibility to obtain all necessary permits to perform the work.

Electricity (power) and water required for the completion of the work shall be furnished by the Owner at existing fixtures or outlets (The Owner will not provide any temporary pipes, cables, etc.). If the capacity of existing utilities is insufficient for the contractor's use, the Contractor shall be responsible for supplementing this capacity as required at no cost to the Owner. The contractor shall provide temporary lighting within designated work areas, as required.

The Contractor shall furnish, install, maintain, relocate and remove all signs, barricades, cones, warning lights, and other safety control devices and temporary signage required for the proper execution of the project. The Engineer and the Owner shall review the safety control device placement before work begins and prior to the beginning of work on any subsequent construction stages. Any deficiencies in the location or arrangement of devices shall be corrected by the contractor before starting work or as the work progresses towards completion. **Contractor shall note that while this Bid Item 1.A shall include the procurement and installation of all applicable safety & traffic control devices (i.e. barricades, etc.) as well as the coordination and installation of temporary signage, the material procurement of the temporary signage shall be included in Bid Item 8.**

The Contractor shall note that procurement and installation of all temporary barricades required for closure of stairs shall be included in Bid Item 2D and Bid Item 5A.

The Contractor shall provide and maintain adequate protection of all preexisting architectural, structural, mechanical, electrical, plumbing components and/or features within the confines of the work areas that are to remain in-place. The work shall include the dismantling of any preexisting architectural, structural, mechanical, electrical, plumbing components and/or features within the confines of in the work areas (such as the temporary moving/relocation of tenant furniture, equipment, etc.) which might be required in order to perform the work specified. The temporarily dismantled installations shall be reinstalled as soon as possible to a condition equal to or better than the condition existing prior to the commencement of construction.

Work shall also include the provision of an effective ventilation system to safely remove all dust and hazardous fumes generated from demolition, any surface treatment applications, or other work. Contractor shall provide temporary walls and other controls to protect parked cars throughout the garage outside of the immediate work area including the adjacent surface parking lot. Contractor shall be required to remove any and all loose/spalled overhead or vertical concrete from the structure (concrete framing elements or deck) prior to the start of any demolition activities to prevent any deteriorated concrete from being jarred loose in an uncontrolled fashion. Contractor shall be required to coordinate all aspects of his work with management and operations staff as well as facility security personal throughout construction.

The contractor shall submit to the Owner/Engineer documentation of all pre-existing non-functioning electrical/mechanical systems within the entire work area. This documentation should be based on the contractor's condition survey performed immediately prior to the scheduled mobilization. The contractor shall not start the mobilization until the Owner approves of this submittal.

This work consists of items not otherwise specifically indicated or shown on the plans but which are ancillary to the specified scope of work being performed, or part of the overall Scope of Work or otherwise not noted or assigned to other Bid Items. This bid item will be limited to the work authorized under the current funding limit and subject to negotiated adjustment if additional funding becomes available.

Contractor shall note that payment for these items shall be distributed in proportion to the total amount of all contract work complete in place.

B. Provision of Bonds, Insurance and Road or Sidewalk Closure Permits.

Work shall consist of the costs associated with the procurement of all bonds and permits necessary for this project. Provision of bonds shall include, but not be limited to, Labor & Material Bonds, Performance Bonds, etc. It shall be the contractor's sole responsibility to obtain all necessary permits to perform the work, including, but not limited to, road and sidewalk closure permits from the City of Hartford and Building, Electrical, Mechanical, and Plumbing permits from the Office of State Building Official and Office of State Fire Marshal, if required. This Bid Item shall include all permit costs from the City of Hartford. The Owner shall pay for all other permit costs.

C. Removal of Loose Overhead Spalled/Delaminated Concrete

Upon execution of the Contract, the Contractor shall remove all loose overhead spalled/delaminated concrete throughout the parking garage. The intent of this task is to remove loose concrete that may be at risk of falling on patrons or cars. Remove in a controlled manner so as not to let it expand, identifying it by tapping lightly, such as with a broomstick handle. Notify Owner Engineer and Operator of any areas that appear to be more than just a surface spall. Coordinate this Work with the garage operator.

BID ITEM 2 - CONCRETE REPAIR:

A. Concrete Deck Repair.

Work shall consist of the partial-depth and full-depth repair of spalled/delaminated concrete throughout the parking garage. Work shall include marking out all areas of repair for review by Engineer prior to commencement of demolition activities, saw-cutting around repair areas, partial-depth or full-depth removal of all delaminated/spalled concrete (as directed by the Engineer), debris removal, preparation of concrete substrate, removal and replacement and/or sandblasting clean all exposed reinforcing steel as noted or as directed by the Engineer, placement of concrete repair material, finishing and curing, tooling and sealing of all control/construction joints, along with all other work required for the satisfactory performance of this work item.

Contractor shall note that the provision of and placement of new and/or supplemental reinforcing steel which is required or as otherwise directed to be performed by the Engineer shall be considered as being included within this item of work.

Contractor shall note that all sealant work shall consist of the installation of non-sag polyurethane sealant (use of self-leveling polyurethane sealant shall be prohibited) and shall be incidental to the concrete deck repairs. Contractor shall note that concrete repair work will proceed on a phased basis over multiple years.

Contractor shall note that Levels 6 & 7 (roof) consist of a post-tensioned structural configuration. Therefore, prior to start of demolition affecting a work area on Levels 6 or 7, Contractor shall locate and identify all existing, embedded post-tension tendons, by appropriate methods (ground penetrating radar, or approved method), as approved by Engineer/Owner. Upon locating the tendons, Contractor shall mark the locations for verification by the Engineer. Demolition activities, as required for designated concrete repairs, shall not be started until locations of tendons have been verified by the Engineer.

If demolition activities are started before Engineer verifies the located tendons as identified by the Contractor, Contractor shall proceed at Contractor's own risk. Should post-tension tendons be damaged (or any other applicable unforeseen conditions arise) while Contractor is performing at Contractor's own risk, then Contractor shall repair all damaged tendons or perform other applicable work (inclusive of any costs associated with provision of shoring, traffic control, etc.) at no additional cost to Owner.

1. Locating and Identifying all Embedded Post-Tension Tendons, prior to start of demolition activities,
2. Performance of Partial-Depth Concrete Repairs,
3. Performance of Full-Depth Concrete Repair Including Required Shoring

B. Miscellaneous Vertical/Overhead Concrete Repair.

Work shall include repair of column corbel and vertical/overhead concrete areas throughout the garage. Work shall consist of marking repair areas for review by the Engineer prior to demolition, concrete removal by approved method, surface preparation, debris removal, placement of approved polymer modified concrete repair mortar, finishing, and curing along with all other work required for the satisfactory performance of this work item, including, but not limited to, shoring.

1. Vertical/Overhead Repair of Beams
2. Vertical/Overhead Repair of Slabs

C. Post Tensioning Tendon Repair – ALLOWANCE

This work is indeterminate at this time and shall only be performed as directed by the Engineer as conditions warrant. In the performance of partial depth concrete repairs, specifically associated with the upper floor levels, it is possible that repairs to post tensioning tendons and/or their anchorages may be identified which will need to be addressed, as directed by the Engineer.

Depending on the conditions identified during the implementation of the partial depth concrete deck repairs, Work shall include the provision and installation of required materials for review and approval by the Owner/Engineer. Work shall be performed as a draw on the associated unit pricing:

1. Installation of Twisted Ring Anchors (Dog Bones):
2. Installation of Splices and Couplers:
3. Installation/Replacement of End Anchors:
4. Installation of Tendon/Cable:

D. Miscellaneous Cast-in-Place Concrete Slab Repair in the Stairs.

This work shall include the repair of selected concrete locations throughout the stairs, inclusive of all treads, landings, and other stair surfaces. Work shall consist of marking out repair areas for review by the Engineer prior to demolition, concrete removal by approved method, surface preparation, debris removal, placement of approved polymer-modified concrete repair mortar, finishing and curing, along with all other work required for the satisfactory performance of this work item.

E. Miscellaneous Concrete Curb Repair.

This work shall include the repair of selected concrete curb locations throughout the garage. Work to consist of marking out repair areas for review by the Engineer prior to demolition, concrete removal by approved method, surface preparation, debris removal, placement of approved polymer modified concrete repair mortar, finishing and curing along with all other work required for the satisfactory performance of this work item.

F. Installation of Concrete Aprons at Slab Differentials

Work shall consist of the placement and installation of sloped concrete aprons, as shown, in accordance with Bid Item 5.C. Work shall include marking areas for review by the Engineer prior to demolition, saw-cutting 1/2" deep around perimeter of repair areas as required, concrete removal by approved method, surface preparation, debris removal, placement of new concrete materials, tooling and sealing of all control/construction joints as required, finishing and curing along with all other work required for the satisfactory performance of this work item.

Contractor shall note that work shall include coordination with Bid item 5.C, as well as Bid Items 2.A.2 & 3 as required.

G. Miscellaneous Slab-on-Grade Concrete Repair.

Work shall consist of marking areas for review by Engineer prior to demolition, saw-cutting around repair areas, removal of all deteriorated/spalled concrete, preparation of concrete substrate and sandblasting clean all reinforcing steel prior to placement of new welded-wire fabric as required, placement of approved polymer-modified concrete repair mortar, finishing and curing, tooling and sealing of all control/construction joints, along with all other work required for the satisfactory performance of this work item.

Contractor shall note that the provision of and placement of new and/or supplemental reinforcing steel which is required or as otherwise directed to be performed by the Engineer shall be considered as being included within this item of work.

Contractor shall note that all sealant work shall consist of the installation of non-sag polyurethane sealant (use of self-leveling polyurethane sealant shall be prohibited) and shall be incidental to the concrete deck repairs.

H. Application of Corrosion Inhibitor

This work shall consist of the provision of all labor, material and equipment required for the surface preparation and installation of an approved topically applied corrosion inhibitor over all areas of exposed supported concrete deck. Installation shall be performed by a manufacturer-certified installation contractor and shall be installed in strict accordance with manufacturer's installation instructions as approved by the Engineer.

BID ITEM 3 - WATERPROOFING:

A. Waterproofing Membrane Installation:

Work shall consist of the provision of all labor, material and equipment required for the installation of a new waterproofing membrane system.

Prior to start of Work, Contractor shall review all pre-existing waterproofing membrane, designated to remain, with Engineer to determine those locations (areas) which require repair. Contractor shall be responsible for verifying with membrane manufacturer the compatibility of materials and shall submit manufacturer's recommended preparation and application procedures to the Engineer for review and approval prior to the implementation of the repair.

Traffic bearing waterproofing membrane installation shall be performed by a manufacturer-certified waterproof membrane installation contractor and shall be installed in strict accordance with manufacturer's installation instructions as approved by the Engineer.

Contractor shall note that application of the new traffic bearing membrane shall be based upon the horizontal projection of the work; all vertical surfaces shall be incidental to the work, and therefore, included in the Contract Price. Membrane shall turn up vertical surfaces (i.e. perimeter walls, columns, curbs, etc.) a minimum of 6"; Contractor shall coordinate all terminations in the field with the Engineer.

Contractor shall note that all crack repair, control/construction joint repair, as well as cove joint repair, shall be incidental to the application of the traffic bearing membrane, and shall be included in the contract unit price. Work shall consist of providing 1/2" x 1/2" V-groove along all concrete cracks which are wider than approximately 1/32", or as directed by the Engineer, and application of an approved two (2) component polyurethane sealant material in strict accordance with manufacturer's recommendations as approved by the Engineer; all existing sealant materials (as may be required or as may become exposed) shall be removed from previously sealed cracks prior to installation of new sealant, providing tooled control/construction joints around and through concrete repair areas, as depicted on the drawings or as otherwise directed by the Engineer; joints shall be tooled and/or routed as necessary to provide the profile required for application of an approved two-component polyurethane sealant material in strict accordance with manufacturer's recommendations as approved by the Engineer, as well as removing all existing cove joint sealant (as may be required or as may become exposed) and installing new cove joint sealant throughout the garage, as depicted on the drawings or as otherwise directed by the Engineer; work shall be inclusive of, but not limited to, providing the correct joint profile, removal of all preexisting sealant material, surface cleaning, priming of surfaces and installation of a 3/4" x 3/4" cove joint

using an approved (2) component non-sag polyurethane sealant in strict accordance with manufacturer's recommendations as approved by the Engineer.

Contractor shall note that all sealant work shall consist of the installation of non-sag polyurethane sealant (use of self-leveling polyurethane sealant shall be prohibited) and shall be incidental to the installation of the membrane system.

Contractor shall note that Work shall include addressing any shallow-depth deviations in the concrete surface, not otherwise addressed by Bid Item 2.A. *These shallow-depth repair locations, also including removal of obstructions to the level surface (such as abandoned pieces of conduit, former anchors, etc.) shall typically be considered addressable by installation of a leveling course in accordance with the manufacturer's recommendations and shall be reviewed by the manufacturer and approved by the Engineer prior to start of work (to confirm abandonment as applicable).*

1. Installation of a New Heavy-duty Membrane System in accordance with the "Heavy-Duty" requirements of the Specifications,
2. Installation of Shallow-Depth/Leveling Course.

B. Installation of New Expansion Joint Glands

Work shall consist of the replacement of designated expansion joint glands throughout the Garage. Work shall include the removal of existing expansion joint seals and related sealant materials, concrete demolition/removal as required by approved methods, repair of the concrete blockout as required, as depicted on the drawings (with associated curb modifications as required), and installation of a new expansion joint seal, as shown on drawings and in accordance with manufacturer's recommendations as approved by the Engineer. All transitions of expansion joint seal between vertical and horizontal shall be mitered in accordance with manufacturer's instructions and installation details as well as any bends, turns or vertical surface interfaces as approved by the Engineer.

The joint elements shall be a continuous, factory extruded unit for the entire straight run length of the joint, continuing through curbing as required. The seal element shall not be mitered/jointed. Changes in direction or elevation shall be accomplished by factory splicing and factory molded elbows, tees, crosses and the like, and shall not be performed in the field, unless approved by the Engineer. The seal shall be turned up a minimum of 6 inches (vertically) unless otherwise shown on plans.

Contractor shall note that work shall include all miscellaneous repair to existing portions of the blockouts, as may be required, to accommodate and receive the new glands.

1. Installation of New Epoxy-Adhered Neoprene Expansion Joint Seal,
2. Installation of New Pre-compressed Impregnated Foam Expansion Joint Seal.

C. Pressure Epoxy Injection:

Work shall consist of the provision of all materials, labor and equipment required to pressure inject horizontal and vertical cracks in various concrete surfaces (i.e. precast concrete columns, tee stems, spandrels, ledger beams, etc.) with an approved epoxy adhesive as directed by the Engineer. Work shall include, but not be limited to, locating of cracks to be verified by Engineer, crack preparation, drilling of injection ports, port installation, pressure injection of epoxy repair materials in strict accordance with manufacturer's recommendations as approved by the Engineer, and the cleaning and removal of excess epoxy injection materials from exposed surfaces along with all other work required for the satisfactory performance of the work.

BID ITEM 4 - DRAINAGE IMPROVEMENTS:

A. Flush and Cleaning Drainage System – Initial Clean:

Work shall consist of the removal and proper disposal of all foreign materials from the floor drains and associated piping. Cleaning shall include flushing out (hydro-jet cleaning) the facility's entire deck drainage system. This work shall be inclusive of any and all joint breaking and reconnection as required to properly clean the entire system and to assure unencumbered storm water flow. Cleaning and flushing shall be performed on a floor-by-floor basis over multiple years. Cleaning of the 7th floor shall include cleaning of the risers. Upon completion of the project, the entire system shall be cleaned a second time.

Following initial cleaning of a given floor, work shall include provision of a visual inspection of the drains and piping, along with a written report of the inspection results, along with all other work required for the satisfactory performance of the work on a floor-by-floor basis. The report shall include, but not be limited to, detailed observed conditions throughout the drainage system, a schematic diagram designating locations of damage, breaks and blockages in piping, and points of entry and exit.

B. Flush and Cleaning Drainage System – Final Clean Following Completion:

C. Supplemental Drain Installation.

Work shall consist of installing new floor drains. This work will include modification of concrete deck around drains and placement of new concrete repair mortar, tooling and sealing of all control/construction joints, all as shown on the drawings and directed by the engineer, finishing and curing along with all other work required for the satisfactory performance of this work item.

D. Supplemental Drain Piping Installation.

Work shall consist of providing new drain piping with associated pipe fittings and supports to connect new supplemental drains with the existing drainage system, or replace failed pipe all as shown on the drawings and directed by the Engineer. Contractor shall be responsible for verifying required height clearances.

1. 4" Horizontal Pipe,
2. 6" Horizontal Pipe
3. 8" Vertical Riser

BID ITEM 5 – MISCELLANEOUS METAL REPAIRS AND IMPROVEMENTS:

A. Stair Repairs and Improvements:

Contractor shall note that the Church Street Parking Garage consists of an original/older portion built in 1954 (the lower levels consisting of the basement up through the approximate fifth level) and a newer portion added in 1983 (the upper levels consisting of the approximate fifth level up to the roof). Work shall include provision of labor, materials, and equipment for the replacement of the various stair elements including, but not limited to, designated tread/riser combinations & support angles, stringer and other miscellaneous components all as shown on the drawings or as directed by the Engineer, depending on dimensional conditions and requirements, as follows:

- Regarding stair #1: all stair components throughout the older portion; contractor shall note that work shall include modifications to impacted landings in order to achieve minimum dimensional requirements, as directed by the owner/engineer, and the extent of modifications shall be verified with the owner/engineer prior to start of work.
- Regarding stair #2: all stair components throughout the older portion; contractor shall review the work with the owner/engineer prior to start of work.
- Regarding stair #3: all stair components throughout the older portion; contractor shall review the work with the owner/engineer prior to start of work.
- Regarding stair #4: all stair components throughout both the older and newer portions; contractor shall note that work shall include modifications to impacted landings in order to achieve minimum dimensional requirements, as directed by the owner/engineer, and the extent of modifications shall be verified with the owner/engineer prior to start of work.

Although extent of replacement of treads/risers & stringers vary per stair tower system, Work shall include replacement of the handrail & guardrail systems in their entirety on all levels in the four stairs. Work shall include removal of the existing rail systems, preparation of the components & substrates to receive the new railing systems, followed by the installation of the new handrail/guardrail systems. Contractor shall note that all anchor hardware shall be replaced with new hardware and all welding shall be ground smooth.

Contractor shall note that sections and details shown are graphical in nature and shall not be interpreted to be representative of all conditions. Contractor shall review existing conditions prior to start of work, and Contractor shall note that work shall include the submission of shop drawings for fabrication, installation and erection of metal systems and components prior to start of work; include plans, elevations, and details of sections and connections, show anchorage and accessory items, provide templates for anchor bolt installation. Fabrication shall not proceed until shop drawings have been reviewed. Fabrication, assembly, installation, and

erection shall conform to reviewed and accepted shop drawings. Shop drawings shall be stamped by a professional engineer registered in the state of Connecticut.

All new components shall be hot-dipped galvanized; touch up all field welding to hot dip galvanized elements as recommended by coating manufacturer and approved by engineer.

Contractor shall note that lead paint currently exists throughout the stairs; therefore, contractor shall comply with all applicable requirements for proper containment, removal and disposal.

An Allowance is provided for miscellaneous repair to those components remaining and excluded from replacement, typically associated with the newer portion of the garage. Upon review and direction by the owner/engineer, contractor shall provide applicable pricing for review; following review of the contractor's pricing, owner/engineer shall authorize the repair of designated items. By applicable method, along with all other work required for the satisfactory performance of this work item. All patches and interfaces of existing elements with new elements shall consist of straight and true lines and edges. Contractor shall not proceed with the additional miscellaneous repairs until written authorization is received.

Contractor shall note that fabrication of the handrail/guardrail assembly shall include the hot-dip galvanizing and application of the architectural finish to the assembly, in coordination with Bid Item 6. Although all other pieces are to be hot-dipped galvanized as well, the pieces (due to their miscellaneous nature) are to be field-painted along with the stair system as a whole in its entirety.

The following Lump Sum Bid Items for Stair Improvements shall include installation of plywood partitions with locked access, "bagging" of existing exit signs and temporary exit signage directing people to adjacent stairwells.

1. Improvements to Stair #1:
 - a. Replacement of tread/riser combinations and stringers throughout the older portion of the garage; modifications to applicable landings:
 - b. Replacement/Installation of New Handrails & Guardrails throughout the Stair, from Basement to Roof Level:
2. Improvements to Stair #2:
 - a. Replacement of tread/riser combinations and stringers throughout the older portion of the garage:
 - b. Replacement/Installation of New Handrails & Guardrails throughout the Stair, from Basement to Roof Level:
3. Improvements to Stair #3:
 - a. Replacement of tread/riser combinations and stringers throughout the older portion of the garage:

- b. Replacement/Installation of New Handrails & Guardrails throughout the Stair, from Basement to Roof Level:
- 4. Improvements to Stair #4:
 - a. Replacement of tread/riser combinations and stringers throughout both the older and newer portions of the garage; modifications to applicable landings:
 - b. Replacement/Installation of New Handrails & Guardrails throughout the Stair, from Basement to Roof Level:
- 5. Allowance for Miscellaneous Repairs outside of tread/riser combination and railing replacement.

B. Replacement of Railing System:

Work shall include the removal of existing railing systems followed by the installation of new railing systems, typically associated with the parapets and the openings between bays. Work shall consist of the review of existing conditions prior to start of work, the removal of existing railing systems, the repair of concrete surfaces as required, followed by the installation of new railings systems, all throughout the garage, along with all other work required for the satisfactory performance of the work.

Contractor shall note that conditions vary throughout the garage, and therefore work shall include the submission of shop drawings for fabrication, installation and erection of railing systems and components prior to start of work; include plans, elevations, and details of sections and connections, show anchorage and accessory items, provide templates for anchor bolt installation. Fabrication shall not proceed until shop drawings have been reviewed. Fabrication, assembly, installation and erection shall conform to reviewed and accepted shop drawings. Shop drawings shall be stamped by a Professional Engineer registered in the state of Connecticut.

Contractor shall note that fabrication of the railing systems shall include the hot-dip galvanizing and application of the architectural finish to the assemblies, in coordination with Bid Item 6.

C. Removal of Designated Railing Systems

Work shall include the removal of designated railing systems, typically associated with the tops and bottoms of the vehicular ramps. Work shall consist of the verification with the Owner/Engineer of designated railing systems to be removed, the proper removal of the railing systems including the associated curbing, the proper disposal of the railing systems and related materials, followed by the repair of the concrete surfaces remaining, along with all other work required for the satisfactory performance of the work. Contractor shall reference Bid Item 2.E for subsequent concrete work.

BID ITEM 6 – COATINGS & PAINTING

- A. Application of Coating to Ceiling, Vertical & Framing Surfaces; metal stair/railing systems and other railing systems.

Work shall consist of the application of a coating to designated ceiling, vertical and framing surfaces, as well as the metal stair/railing systems associated with the stair towers and parapet/openings between bays, and ceilings, parapets and designated miscellaneous surfaces throughout the Parking Garage. Work shall include surface preparation as required, followed by the application of a coating to designated surfaces, all as scheduled per the drawings and specifications. Coatings shall be compatible with the substrate encountered. Each coat application shall be contrasting color with final coat color as scheduled or as directed by the Owner/Engineer to be submitted for verification prior to application.

Following completion of coating work, Contractor shall re-paint level designation graphics, matching existing, typically associated with the column surfaces throughout the garage. Prior to start of work, Contractor shall verify all locations, colors, and other related criteria with the Owner/Engineer.

Contractor shall note that existing coatings are currently in place throughout the various surfaces; therefore, Contractor shall be solely responsible for reviewing with the manufacturer (and approved by the Engineer) to confirm the extent necessary for removal of the existing materials. While the intent is to only remove that which is necessary in order to avoid and/or minimize damage to the various substrates, it is critical that all performance requirements (such as, but not limited to, bond/adhesion, moisture transmission, etc.) of the new materials be achieved as required by the manufacturer (as approved by the Engineer). Therefore, as noted above, work shall include any and all surface preparation required for this Work.

1. Stair Tower Surfaces Including Railings.
 2. Railings along Parapets and in Openings between Bays.
 3. Concrete Ceiling and Vertical Surfaces
- B. Steel Framing Elements (Steel Beams)
- C. Level Designation Graphics
- D. Painting of Traffic Markings and Parking Stalls.

Work shall consist of application of new markings for all parking stalls, directional arrows, crosswalks, curbs, centerlines, text and other traffic markings located throughout the Garage. Application of striping shall be performed to match pre-existing conditions or as otherwise directed by the Engineer; however all handicap parking stalls shall be updated accordingly and quantity/location of handicap parking stalls shall be verified prior to start of work; all curbing shall be painted, both those currently painted and those not. Any and all conflicting markings shall be removed in their entirety by approved method. Owner/Engineer shall be required to review striping layout prior to this work being performed.

BID ITEM 7 - REPLACEMENT OF VEHICULAR BUMPER GUARDS

Work shall consist of the provision of all materials, labor and equipment required to install new vehicular bumper guards along the heads of the parking stalls throughout the garage. Work shall include removal of the existing timber boards, repair of the vertical surfaces as required upon removal, installation of the new bumper guards, along with all other work required for the satisfactory performance of the work. Acceptable bumper guards consist of HDPE Series 3020.3 1 ½” x 9 ½”, manufactured by Wallguard.com (color to be determined by Owner) or approved equal; contractor shall provide sample prior to start of work for confirmation of color as accepted by owner.

BID ITEM 8 – PROVISION OF TEMPORARY TRAFFIC CONTROL SIGNAGE AND RELATED GRAPHICS:

Work shall consist of the provision of any and all temporary signage and graphics for use during construction. All temporary signage shall be of a professional nature, as approved by Owner prior to procurement and prior to its installation, and shall consist of specified materials, along with all other work required for the satisfactory performance of this work item. All temporary signage required for the successful execution of the repair work shall become the property of the Owner unless otherwise approved.

Contractor shall note that while this Allowance shall solely pertain to the procurement of the applicable temporary signage, all required coordination with applicable parties to organize the temporary work areas both inside and outside of the facility, followed by the proposing and installation of associated temporary signage, along with the procurement and provision of temporary traffic control devices (i.e. barricades, etc.) shall be included in Bid Item 1.A, General Mobilization/Demobilization.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 01 00

SECTION 01 02 60

UNIT PRICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY:

- A. This Section specifies administrative and procedural requirements for unit prices.
 - 1. A unit price is an amount proposed by Bidders and stated on the Bid Form as a price per unit of measurement for materials and/or services that will be added to or deducted from the Contract Sum by Change Order in the event the estimated quantities of Work required by the Contract Documents are increased or decreased.
 - 2. Unit prices include all necessary labor, materials, equipment and incidentals, overhead, profit and applicable taxes.
 - 3. Refer to individual Specification Sections for construction activities requiring the establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- B. Schedule: A "Unit Price Schedule" is included at the end of this Section; reference Part 3.01. Specification Sections referenced in the Schedule contain requirements for materials and methods described under each unit price.
 - 1. The Owner reserves the right to reject the Contractor's measurement of work-in-place that involves use of established unit prices, and to have this Work measured by an independent surveyor acceptable to the Contractor at the Owner's expense.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

3.01 UNIT PRICE SCHEDULE

- A. Unit prices for all items are as shown in the Bid Forms shall be considered an integral part of this Section.

3.02 PAYMENT FOR EXTRA WORK

- A. Extra work which results from any of the changes as specified and for which no unit price is provided in the Contract, shall not be started until receipt of a written authorization or work order from the Owner, which authorization shall state the items of work to be performed and the method of payment for each item. The Contractor shall not be entitled to payment for work performed without such authorization.
- B. If it is practicable to pay for Extra Work on the unit price, a fair and equitable sum shall be fixed by agreement of the parties and shown in an Extra Work Order Agreement. Work to be performed directly by the Contractor should be submitted showing a detailed breakdown of labor and material costs to which a fifteen percent markup should be added for overhead and profit.
- C. Work to be performed by the subcontractor should be submitted showing a detailed breakdown of labor and materials by the subcontractor to which a five percent markup should be added by the Contractor for overhead and profit.
- D. When the Owner deems it impracticable to handle any Extra Work on the unit price, or if agreement of the parties cannot be reached, the work may be ordered done and paid for on a Force Account basis, as follows:
1. Labor: The Contractor will be paid the actual amount of wages for all labor and foremen who are actually engaged in such work, to which cost shall be added fifteen percent of the sum of such wages. A foreman shall not be used when there are less than three laborers employed, except with the written consent of the Engineer.
 2. Welfare and Pension Fund: The Contractor will receive the actual additional amount of contributions paid for regular and uniform health and welfare benefits, pension fund benefits or other benefits, to which zero percent shall be added, when such amounts are required by collective bargaining agreement or other employment contract generally applicable to the class of labor employed on the Work.

3. Insurance and Tax: The Contractor will receive the actual cost or increase in cost of Contractor's Public Liability and Property Damage insurance, Workmen's Compensation tax, and Social Security tax required for Force Account work. The Contractor shall furnish satisfactory evidence of the cost or rates paid for such insurance and tax.
4. Materials: The Contractor will receive the actual cost for all materials, including freight charges as shown by the original paid invoices, which become an integral part of the finished work, to which shall be added 15 percent of the sum thereof.

The Contractor will be reimbursed for any materials used in the construction of such work as sheeting, false-work, form lumber, etc., which are not an integral part of the finished work. The amount of reimbursement shall be agreed upon in writing before such work is begun, and no percent shall be added. The salvage value of such materials shall be taken into consideration in the reimbursement agreed upon.

5. Equipment: For any machinery or special equipment (other than small tools), the use of which has been authorized by the Engineer, the Contractor will be paid as following:
 - a. For his own equipment, he will be paid by the monthly rate in accordance with the latest edition of Means Construction Cost Data.
 - b. For rental equipment, he will be paid for the actual invoice amount as shown by the original paid invoices.

The equipment shall be of a type and size reasonably required to complete the Extra Work. Compensation will not be allowed for transportation to or from the Work or for the time required for setting up and removing the equipment from the Work or for equipment of a type, size or condition unsuitable for the Work.

3.03 CANCELED ITEMS

- A. It shall be in the sole judgment and sole discretion of the Engineer or its representatives to cancel or alter any or all portions of the Contract due to circumstances either unknown at the time of bidding or arising after the Contract was entered into. Should such actions result in elimination or non-completion of any portion of the Contract, payment shall be made as follows:

1. For the canceled work completed by the Contractor, payment shall be made to the Contractor for the actual number of units or items completed at the Contract unit prices. For canceled work partially completed by the Contractor, payment shall be made to the Contractor for the partially completed units or items as specified in Payment for Extra Work.
2. For materials obtained by the Contractor for the unfinished (uncompleted) portions of the canceled work, that have been inspected, tested and accepted by the Engineer, and that have not been incorporated in the canceled work, payment shall be made to the Contractor for the actual costs for all such materials, including freight charges, as shown by the original paid invoices, to which shall be added 10 percent of the sums thereof. The materials, when so paid for by the Owner, shall become the property of the Owner.

3.04 PARTIAL PAYMENTS

- A. The Engineer shall review the Contractor's pay request for materials in-place and completed, the amount of work performed, and the value thereof, at the Contract Unit Prices. From the amount so determined there shall be deducted five percent to be retained until after the completion of the entire work to the satisfaction of the Engineer, and the balance certified to the Owner for payment. No payment shall be made for stored materials.
- B. If stored matter is lost or damaged prior to incorporation in the Work, the materials shall be replaced or satisfactory repaired at the Contractor's expense. The Contractor shall pay and be responsible for cost of storage, if any, of said materials.

3.05 ADJUSTMENT OF UNIT PRICES BASED ON ACTUAL QUANTITIES PERFORMED

- A. For unit price bid items, the quantities as listed in the schedule of bid items are estimates only. The Contractor will be required to complete the work specified in accordance with the Contract and at the quoted unit prices, whether quantities greater or less than the estimated amounts are involved.

END OF SECTION 01 02 60

SECTION 01 02 70

APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 Related Documents

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

1.02 Summary

This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.

1.03 Application for Payment

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect/Engineer and paid for by the Owner.
 - 1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
- B. Payment Application Times: Each progress payment date is as indicated in the Agreement. The period of construction Work covered by each Application or Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use AIA Document G 702 and Continuation Sheets G 703 as the form for Application for Payment. Contractor shall note that although AIA forms are being utilized for document format, AIA Contract Terms do not apply.
- D. Application Preparation: Complete every entry on the form, inclusive of notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.
 - 1. Entries shall match data on the Bid Form's Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.

2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.
 3. Quantity of “Stored Materials” shall not be submitted for payment. **Contractor shall only be allowed to apply for payment for “Completed Work.”**
 4. Contractor shall include an updated schedule with each payment requisition.
- E. Transmittal: Submit three (3) executed copies of each Application for Payment to the Engineer/Architect by means ensuring receipt within 24 hours; one copy shall be complete, including waivers of lien and similar attachments, when required.
1. Submit one (1) draft copy of each Application to the Engineer/Architect and one (1) to the Owner for purposes of review prior to executing the official submission.
 2. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Engineer/Architect.
- F. Waivers of Mechanics Lien: With each Application for Payment submit waivers of mechanics liens from subcontractors or sub-subcontractors and suppliers for the construction period covered by the current application.
1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full waivers.
 3. The Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Waiver Delays: Submit each Application for Payment with the Contractor's waiver of mechanics lien for the period of construction covered by the application.
 - a. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of Work covered by the application who could lawfully be entitled to a lien.

5. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to Owner.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following in addition to requirements of the General and Special Conditions:
1. List of subcontractors
 2. List of principal suppliers and fabricators
 3. Schedule of Values to match Bid Form
 4. Contractor's Construction Schedule (preliminary if not final)
 5. Schedule of principal products
 6. Schedule of unit prices
 7. Schedule of Submittals (preliminary if not final)
 8. List of Contractor's staff assignments
 9. List of Contractor's principal consultants
 10. Copies of building permits
 11. Copies of authorizations and licenses from governing authorities for performance of the Work
 12. Initial progress report
 13. Report of pre-construction meeting
 14. Certificates of insurance and insurance policies
 15. Performance and payment bonds (if required)
 16. Data needed to acquire Owner's insurance
 17. Initial settlement survey and damage report, if required
- H. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Administrative actions and submittals that shall proceed or coincide with this application include:
1. Occupancy permits and similar approvals
 2. Warranties (guarantees)
 3. Maintenance Agreements
 3. Test/adjust/balance records
 4. Maintenance Instructions
 5. Meter readings
 6. Start-up performance reports
 7. Change Over information related to Owner's occupancy, use, operation and maintenance

8. Final Cleaning
 9. Application for reduction of retainage, and consent of surety
 10. Advice on shifting insurance coverages
 11. Final progress photographs
 12. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion
 13. Requirements of the General and Special Conditions
- J. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final payment Application for Payment include the following:
1. Project Completion closeout requirements
 2. Completion of items specified for completion after Substantial Completion
 3. Transmittal of required Project construction records to Owner
 4. Proof that taxes, fees and similar obligations have been paid
 5. Removal of temporary facilities and services
 6. Removal of surplus materials, rubbish and similar elements
 7. Requirements of the General and Special Conditions

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 02 70

SECTION 01 03 50

MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing contract modifications. Refer to General Conditions for additional information.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division I Section 010260 "Unit Prices"
 - 2. Division I Section 010270 "Applications for Payment" for administrative procedures Governing Applications for Payment
 - 3. Division I Section 013000 "Submittals" for requirements for the Construction Schedule
 - 4. Division I Section 016310 "Product Substitutions" for administrative procedures for handling requests for substitutions made after award of the Contract

1.03 CHANGE ORDER PROPOSAL REQUESTS

- A. Owner Initiated Proposal Requests: The Engineer/Architect will issue a detailed description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal requests issued are for information only. Do not consider them as an instruction either to stop work in progress or to execute the proposed change.

2. Submit an estimate of cost necessary to execute the change to the Engineer/Architect for the Owner's review.
 - a. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.

- B. Contractor Initiated Proposals: When latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Engineer/Architect.
 1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
 2. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 3. Indicate applicable delivery charges, equipment rental, and amounts of trade discounts.
 4. Comply with requirements in Section 01631, Product Substitutions, if the proposed change requires an equal or substitution of one product or system for a product or system specified.

- C. Proposal Request Form: Use "Change Order Request" proposal form as required by Owner for Change Order Proposal Requests.

1.04 CONSTRUCTION CHANGE DIRECTIVE

- A. If the Owner and the Contractor disagree on the terms of a Proposal Request, the Engineer/Architect may issue a Construction Change Directive on a "Construction Change Directive" form as required by the Owner. The Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. The Construction Change Directive contains a complete description of the change in the Work. It also designates the method to be followed to determine change in the Contract Sum or Contract Time.
- B. Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
 2. The final value shall be negotiated based on the supporting data to determine the value of the work.

1.05 CHANGE ORDER PROCEDURES

- A. With the Owner's approval of a Proposal Request, the Engineer/Architect will issue a Change Order for signatures of the Engineer/Architect, Owner and the Contractor on a "Change Order" form as required by the Owner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 03 50

SECTION 01 04 00

PROJECT COORDINATION

PART 1 - GENERAL

1.01 Related Documents

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

1.02 Summary

A. This Section specifies administrative and supervisory requirements necessary for project coordination including, but not necessarily limited to:

1. Coordination
2. Administrative and supervisory personnel
3. General installation provisions
4. Cleaning and protection

B. Progress meetings, coordination meetings and pre-installation conferences are to be determined in consultation with the Owner.

C. Requirements for the Contractor's Construction Schedule are included in Section "Submittals".

1.03 Coordination

A. Coordination: Coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.

1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.

3. Make adequate provisions to accommodate items scheduled for later installation.
- B. When necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
1. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of schedules
 2. Installation and removal of temporary facilities
 3. Delivery and processing of submittals
 4. Progress meetings
 5. Project close out activities
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other sections for disposition of salvaged materials that are designated as Owner's property.

1.04 Submittals

- A. Coordination Drawings: Prepare and submit coordination Drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.
1. Show the interrelationship of components shown on separate Shop Drawings.
 2. Indicate required installation sequences.
 3. Comply with requirements contained in Section "Submittals".

- B. Within 15 calendar days of the Contractor's receipt of the official Notice to Proceed, the Contractor shall submit a listing of principal staff assignments, including the Superintendent and other personnel in attendance at the site. Individuals should be identified, particularly key personnel. The listing of staff should include a brief description of individual duties and responsibilities; addresses, telephone numbers, pager numbers and portable telephone numbers as appropriate so that key personnel can be reached at all times.
1. Post copies of the list in the project meeting room, the temporary field office, and each temporary telephone.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 General Installation Provisions

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's written installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and then again prior to installation. Reject damaged and defective items.
- D. Provide attachment and connection devices and methods necessary for securing work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Provide uniform joint widths in exposed Work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable choices to the Engineer for final decision.
- F. Measurements and dimensions should all be rechecked before starting each and every installation.

- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for the purpose of inspection.
- I. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Engineer for final decision.

3.02 Cleaning and Protection

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
 - 1. Excessive static or dynamic loading
 - 2. Excessively high or low temperatures
 - 3. Air contamination or pollution
 - 4. Water or ice
 - 5. Solvents and chemicals
 - 6. Puncture and abrasion
 - 7. Heavy traffic
 - 8. Soiling, staining and corrosion
 - 9. Bacteria
 - 10. Combustion
 - 11. Electrical current
 - 12. Unusual wear or other misuse
 - 13. Contact between incompatible materials
 - 14. Destructive testing

15. Misalignment
16. Excessive weathering and unprotected storage
17. Improper shipping and handling
18. Theft and vandalism

END OF SECTION 01 04 00

SECTION 01 04 50

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

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

1.02 SUMMARY:

- A. This Section specifies administrative and procedural requirements for cutting and patching.
- B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - 1. Requirements of this Section apply to existing plumbing and electrical installations.
- C. Demolition of selected portions of the building for alterations is included in Section "Selective Demolition."

1.03 SUBMITTALS:

- A. Cutting and Patching Proposal: Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:
 - 1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
 - 2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
 - 3. List products to be used and firms or entities that will perform the Work.
 - 4. Indicate dates when cutting and patching is to be performed.

5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.
7. Approval by the Consultant to proceed with cutting and patching does not waive the Consultant's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

1.04 QUALITY ASSURANCE:

- A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
 1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:
 - a. Foundation construction
 - b. Bearing and retaining walls
 - c. Structural concrete
 - d. Structural steel
 - e. Lintels
 - f. Timber and primary wood framing
 - g. Structural decking
 - h. Stair systems
 - i. Miscellaneous structural metals
 - j. Exterior curtain wall construction
 - k. Equipment supports
 - l. Piping, ductwork, vessels and equipment
- B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.
 1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
 - a. Shoring, bracing, and sheeting
 - b. Primary operational systems and equipment
 - c. Air or smoke barriers

- d. Water, moisture, or vapor barriers
 - e. Membranes and flashings
 - f. Fire protection systems
 - g. Noise and vibration control elements and systems
 - h. Control systems
 - i. Communication systems
 - j. Conveying systems
 - k. Electrical wiring systems
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Consultant's opinion, reduce the building's aesthetic qualities, or results in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.
- 1. If possible retain the original installer or fabricator to cut and patch the following categories of exposed Work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:
 - a. Processed concrete finishes
 - b. Stonework and stone masonry
 - c. Ornamental metal
 - d. Matched-veneer woodwork
 - e. Preformed metal panels
 - f. Window wall system
 - g. Stucco and ornamental plaster
 - h. Acoustical ceilings
 - i. Terrazzo
 - j. Finished wood flooring
 - k. Fluid-applied flooring
 - l. Carpeting
 - m. Aggregate wall coating
 - n. Wall covering
 - o. Swimming pool finishes
 - p. HVAC enclosures, cabinets or covers

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 – EXECUTION

3.01 INSPECTION:

- A. Before cutting existing surfaces examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.
 - 1. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.02 PREPARATION:

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.03 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer and comply with the original installer's recommendations.
1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
 3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
 4. Comply with requirements of applicable Sections of Division-2 where cutting and patching requires excavating and backfilling.
 5. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.
 - a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch, after the patched area has received primer and second coat and in accordance with the manufacturer's written recommendations.
4. Patch, repair or re-hang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.04 CLEANING

- A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 01 04 50

SECTION 01 09 50

REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

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

1.02 DEFINITIONS:

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. Indicated: The term "indicated" refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.
- C. Directed: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean "directed by the Consultant," "requested by the Consultant," and similar phrases.
- D. Approve: The term "approved," where used in conjunction with the Consultant's action on the Contractor's submittals, applications, and requests, is limited to the Consultant's duties and responsibilities as stated in the Conditions of the Contract.
- E. Regulation: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. Furnish: The term "furnish" is used to mean "supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations."
- G. Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."
- H. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."

- I. Installer: An "Installer" is the Contractor or an entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
1. The term "experienced," when used with the term "Installer," means having a minimum of five previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.
 2. Trades: Use of titles such as "carpentry" is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades persons of the corresponding generic name.
 3. Assignment of Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in the operations to be performed. The specialists must be engaged for those activities, and assignments are requirements over which the Contractor has no choice or option. Nevertheless, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.
 - a. This requirement shall not be interpreted to conflict with enforcement of building codes and similar regulations governing the Work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.
- J. Project Site is the space available to the Contractor for performance of construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.
- K. Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.03 SPECIFICATION FORMAT AND CONTENT EXPLANATION:

- A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16-Division format and MASTER FORMAT numbering system.
- B. Specification Content: This Specification uses certain conventions in the use of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
 - 1. Abbreviated Language: Language used in Specifications and other Contract Documents is the abbreviated type. Words and meanings shall be interpreted as appropriate. Words that are implied, but not stated shall be interpolated as the sense required. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and the context of the Contract Documents so indicates.
 - 2. Imperative and streamlined language is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text, for clarity, subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.
 - a. The words "shall be" shall be included by inference wherever a colon (:) is used within a sentence or phrase.

1.04 INDUSTRY STANDARDS

- A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with the standard in effect as of the date of the Contract Documents.
- C. Conflicting Requirements: Where compliance with two or more standards is specified, and the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different, but apparently equal, and uncertainties to the Consultant for a decision before proceeding.

1. **Minimum Quantity or Quality Levels:** The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for the context of the requirements. Refer uncertainties to the Consultant for a decision before proceeding.
- D. **Copies of Standards:** Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed for performance of a required construction activity, the Contractor shall obtain copies directly from the publication source.
- E. **Abbreviations and Names:** Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction, or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.
- F. **Abbreviations and Names:** Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in Contract Documents, are defined to mean the associated names. Names and addresses are subject to change and are believed to be, but are not assured to be, accurate and up to date as of date of Contract Documents.

AA Aluminum Association
900 19th St., NW, Suite 300
Washington, DC 20006 (202) 862-5100

AASHTO American Association of State Highway
and Transportation Officials
444 North Capitol St., Suite 225
Washington, DC 20001 (202) 624-5800

ACI American Concrete Institute
P.O. Box 19150
Detroit, MI 48219 (313) 532-2600

ACIL American Council of Independent Laboratories
1725 K St., NW
Washington, DC 20006 (202) 887-5872

AI Asphalt Institute
P.O. Box 14052
Lexington, KY 40512-4052 (606) 288-4960

AIA American Institute of Architects
1735 New York Ave., NW
Washington, DC 20006 (202) 626-7300

AISC American Institute of Steel Construction
One East Wacker Drive Suite 700
Chicago, IL 60601 (312) 670-2400

APA American Plywood Assoc.
P.O. Box 11700
Tacoma, WA 98411 (206) 565-6600

ARMA Asphalt Roofing Manufacturers Assoc.
6288 Montrose Rd.
Rockville, MD 20852 (301) 231-9050

ASC Adhesive and Sealant Council
1627 K Street, NW, Suite 1000
Washington, DC 20006 (202) 452-1500

ASPE American Society of Plumbing Engineers
3617 Thousand Oaks Blvd., Suite 210
Westlake, CA 91362 (805) 495-7120

ASTM American Society for Testing and Materials
1916 Race St.
Philadelphia, PA 19103 (215) 299-5400

AWS American Welding Society
550 LeJeune Road, NW
P.O. Box 351040
Miami, FL 33135 (305) 443-9353

BANC Brick Association of North Carolina
P.O. Box 13290
Greensboro, NC 27415-3290 (919) 273-5566

BHMA Builders' Hardware Manufacturers Assoc.
355 Lexington Ave., 17th Floor
New York, NY 10017 (212) 661-4261

BIA Brick Institute of America
11490 Commerce Park Drive, Suite 300
Reston, VA 22091 (703) 620-0010

CRSI Concrete Reinforcing Steel Institute
933 Plum Grove Rd.
Schaumburg, IL 60173 (847) 517-1200

EJMA Expansion Joint Manufacturers Assoc.
25 N. Broadway
Tarrytown, NY 10591 (914) 332-0040

HPMA Hardwood Plywood Manufacturers Assoc.
1825 Michael Farraday Drive
P.O. Box 2789
Reston, VA 22090 (703) 435-2900

IEEE Institute of Electrical and
Electronic Engineers
345 E. 47th St.
New York, NY 10017 (212) 705-7900

NAPA National Asphalt Pavement Assoc.
Calvert Building, Suite 620
6811 Kenilworth Ave.
Riverdale, MD 20737 (301) 779-4880

NCMA National Concrete Masonry Assoc.
P.O. Box 781
Herndon, VA 22070 (703) 435-4900

NEC National Electric Code (from NFPA)

NECA National Electrical Contractors Assoc.
7315 Wisconsin Ave.
Bethesda, MD 20814 (301) 657-3110

NFPA National Fire Protection Assoc.
One Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101 (617) 770-3000

NPCA National Paint and Coatings Assoc.
1500 Rhode Island Ave., NW
Washington, DC 20005 (202) 462-6272

NRCA National Roofing Contractors Assoc.
One O'Hare Centre
6250 River Road, Suite 8030
Rosemont, IL 60018 (708) 318-6722

PCA Portland Cement Assoc.
5420 Old Orchard Road
Skokie, IL 60077 (847) 966-6200

PCI Prestressed Concrete Institute
175 W. Jackson Blvd.
Chicago, IL 60604 (312) 786-0300

PDI Plumbing and Drainage Institute
c/o Sol Baker
1106 W. 77th St., South Dr.
Indianapolis, IN 46260 (317) 251-6970

RMA Rubber Manufacturers Assoc.
1400 K St., NW
Washington DC 20005 (202) 682-4800

SSPC Steel Structures Painting Council
4400 Fifth Ave.
Pittsburgh, PA 15213 (412) 268-3327

WRI Wire Reinforcement Institute
1760 Reston Parkway, Suite 403
Reston, VA 22090 (703) 790-9790

- G. Federal Government Agencies: Names and titles of federal government standard or Specification producing agencies are often abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard or Specification producing agencies of the federal government. Names and addresses are subject to change but are believed to be, but are not assured to be, accurate and up to date as of the date of the Contract Documents.

CE Corps of Engineers
(U.S. Department of the Army)
Chief of Engineers - Referral
Washington, DC 20314 (202) 272-0660

CFR Code of Federal Regulations
Available from the Government Printing Office
N. Capitol St. between G and H St. NW
Washington, DC 20402 (202) 783-3238
(Material is usually first published
in the "Federal Register")

CPSC Consumer Product Safety Commission
5401 Westbard Ave.
Bethesda, MD 20816 (800) 638-2772

CS Commercial Standard
(U.S. Department of Commerce)
Government Printing Office
Washington, DC 20402 (202) 377-2000

DOC Department of Commerce
14th St. and Constitution Ave., NW
Washington, DC 20230 (202) 377-2000

DOT Department of Transportation 400 Seventh St., SW Washington, DC 20590	(202) 366-4000
EPA Environmental Protection Agency 401 M St., SW Washington, DC 20460	(202) 382-2090
FAA Federal Aviation Administration (U.S. Department of Transportation) 800 Independence Ave., SW Washington, DC 20590	(202) 366-4000
NIST National Institute of Standards and Technology (U.S. Department of Commerce) Gaithersburg, MD 20899	(301) 975-2000
OSHA Occupational Safety and Health Administration (U.S. Department of Labor) Government Printing Office Washington, DC 20402	(202) 523-6091
PS Product Standard of NBS (U.S. Department of Commerce) Government Printing Office Washington, DC 20402	(202) 783-3238

1.05 GOVERNING REGULATIONS/AUTHORITIES:

- A. The Consultant has contacted authorities having jurisdiction where necessary to obtain information necessary for preparation of Contract Documents. Contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.
- B. Copies of Regulations: Obtain copies of the applicable regulations and retain at the Project Site, available for reference by parties who have a reasonable need for such reference.

1.06 SUBMITTALS:

- A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION 01 09 50

SECTION 01 20 00

PROJECT MEETINGS

PART 1 - GENERAL

1.01 Related Documents

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

1.02 Summary

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

1. Pre-Construction Conference
2. Pre-Installation Conferences
3. Coordination Meetings
4. Progress Meetings

B. Construction schedules are specified in another Division-1 Section.

1.03 Pre-Construction Conference

A. The Owner or his representative shall schedule a pre-construction conference and organizational meeting at the Project Site or other convenient location no later than 15 days after execution of the Agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.

B. Attendees: The Owner, Architect/Engineer and their consultants, the Program Manager, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.

C. Agenda: Discuss items of significance that could affect progress including such topics as:

1. Tentative construction schedule
2. Critical Work sequencing

3. Designation of responsible personnel
4. Procedures for processing field decisions and Change Orders
5. Procedures for processing Applications for Payment
6. Distribution of Contract Documents
7. Submittal of Shop Drawings, Product Data and Samples
8. Preparation of record documents
9. Use of the premises
10. Office, Work and storage areas
11. Equipment deliveries and priorities
12. Safety procedures
13. First-aid
14. Security
15. Housekeeping
16. Working hours

1.04 Pre-Installation Conferences

- A. The Contractor or his representative shall conduct a pre-installation conference at the site before each construction activity that requires coordination with other construction. The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the Architect and owner of scheduled meeting dates.
 1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:
 - a. Contract Documents
 - b. Options
 - c. Related Change Orders
 - d. Purchases
 - e. Deliveries
 - f. Shop Drawings, Product Data and quality control Samples
 - g. Possible conflicts
 - h. Compatibility problems
 - i. Time schedules
 - j. Weather limitations
 - k. Manufacturer's recommendations
 - l. Compatibility of materials
 - m. Acceptability of substrates
 - n. Temporary facilities

- o. Space and access limitations
 - p. Governing regulations
 - q. Safety
 - r. Inspection and testing requirements
 - s. Required performance results
 - t. Recording requirements
 - u. Protection
2. The Contractor or his representative shall record significant discussions and agreements and disagreements of each conference, along with the approved schedule. Distribute the record of the meeting to everyone concerned, promptly, including the Owner and Architect.
3. Do not proceed if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

1.05 Coordination Meetings

- A. The Contractor shall conduct project coordination meetings at regularly scheduled times convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.
- B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.
- C. The Contractor shall record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.06 Progress Meetings

- A. The Owner or his representative shall conduct progress meetings at the Project Site at regularly scheduled intervals.
- B. Attendees: In addition to representatives of the Owner and Engineer/Architect, each subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.

- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.
1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 2. Review the present and future needs of each entity present, including such items as:
 - a. Interface requirements
 - b. Time
 - c. Sequences
 - d. Deliveries
 - e. Off-site fabrication problems
 - f. Access
 - g. Site utilization
 - h. Temporary facilities and services
 - i. Hours of Work
 - j. Hazards and risks
 - k. Housekeeping
 - l. Quality and Work standards
 - m. Change Orders
 - n. Documentation of information for payment requests
 3. Schedule Updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule prior to the next meeting.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 20 00

SECTION 01 30 00

SUBMITTALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

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

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including:
 - 1. Contractor's construction schedule
 - 2. Submittal schedule
 - 3. Daily construction reports
 - 4. Shop Drawings
 - 5. Product Data
 - 6. Samples
- B. Administrative Submittals: Refer to other Division-1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
 - 1. Permits
 - 2. Applications for payment
 - 3. Performance and payment bonds
 - 4. Insurance certificates
 - 5. List of Subcontractors
- C. The Schedule of Values submittal is included in Section "Applications for Payment."
- D. Inspection and test reports are included in Section "Quality Control Services."

1.03 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - a. The Consultant reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
 3. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for re-submittals.
 - a. Allow two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Consultant will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
 - b. If an intermediate submittal is necessary, process the same as the initial submittal.
 - c. Allow two weeks for reprocessing each submittal.
 - d. No extension of Contract Time will be authorized because of failure to transmit submittals to the Consultant sufficiently in advance of the Work to permit processing.
- B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
1. Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
 2. Include the following information on the label for processing and recording action taken.
 - a. Project name
 - b. Date
 - c. Name and address of Consultant
 - d. Name and address of Contractor
 - e. Name and address of subcontractor

- f. Name and address of supplier
 - g. Name of manufacturer
 - h. Number and title of appropriate Specification Section
 - i. Drawing number and detail references, as appropriate
- C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Consultant using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.
- 1. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.
 - 2. Transmittal Form: Use AIA Document G 810.

1.04 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by requirements for phased completion to permit Work by separate Contractors and partial occupancy by the Owner prior to Substantial Completion.
- B. Work Stages: Indicate important stages of construction for each major portion of the Work, including testing and installation.
- C. Distribution: Following response to the initial submittal, print and distribute copies to the Consultant, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.
 - 1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
 - 2. Contractor shall include an updated schedule with each payment requisition.

1.05 SUBMITTAL SCHEDULE

- A. After development and acceptance of the Contractor's construction schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for establishment of the Contractor's construction schedule.

1. Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.
 2. Prepare the schedule in chronological order; include submittals required during the first 90 days of construction. Provide the following information:
 - a. Scheduled date for the first submittal
 - b. Related Section number
 - c. Submittal category
 - d. Name of subcontractor
 - e. Description of the part of the Work covered
 - f. Scheduled date for re-submittal
 - g. Scheduled date the Consultant's final release or approval
- B. Distribution: Following response to initial submittal, print and distribute copies to the Consultant's, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.
1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- C. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.06 DAILY CONSTRUCTION REPORTS

- A. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Consultant at weekly intervals:
1. List of subcontractors at the site
 2. Approximate count of personnel at the site
 3. High and low temperatures, general weather conditions
 4. Accidents and unusual events
 5. Meetings and significant decisions
 6. Stoppages, delays, shortages, losses
 7. Meter readings and similar recordings
 8. Emergency procedures
 9. Orders and requests of governing authorities
 10. Change Orders received, implemented
 11. Services connected, disconnected

12. Equipment or system tests and start-ups
13. Partial Completions, occupancies
14. Substantial Completions authorized

1.07 SHOP DRAWINGS

- A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.
- B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
 1. Dimensions
 2. Identification of products and materials included
 3. Compliance with specified standards
 4. Notation of coordination requirements
 5. Notation of dimensions established by field measurement
 6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 36" x 48"
 7. Initial Submittal: Submit one correctable translucent reproducible print and one blue or black-line print for the Consultant's review; the reproducible print will be returned
 8. Initial Submittal: Submit 2 blue or black-line prints for the Consultant's review; one will be returned
 9. Final Submittal: Submit 5 blue or black-line prints; submit 7 prints where required for maintenance manuals. 1 print will be retained; the remainder will be returned
 10. Final Submittal: Submit 5 blue or black-line prints and 7 additional prints where required for maintenance manuals, plus the number of prints needed by the Consultant for distribution. 2 prints will be retained; the remainder returned
 - a. One of the prints returned shall be marked-up and maintained as a "Record Document."
 11. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.
 12. Submission in electronic format (PDF) may be acceptable as approved by Owner/Engineer.

- C. Coordination drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended.
1. Preparation of coordination Drawings is specified in section "Project Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.
 2. Submit coordination Drawings for integration of different construction elements. Show sequences and relationships of separate components to avoid conflicts in use of space.

1.08 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."
1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
 - a. Manufacturer's printed recommendations
 - b. Compliance with recognized trade association standards
 - c. Compliance with recognized testing agency standards
 - d. Application of testing agency labels and seals
 - e. Notation of dimensions verified by field measurement
 - f. Notation of coordination requirements
 2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
 3. Preliminary Submittal: Submit a preliminary single-copy of Product Data where selection of options is required.

4. Submittals: Submit 5 copies of each required submittal; submit 7 copies where required for maintenance manuals. The Consultant will retain one, and will return the others marked with action taken and corrections or modifications required.
 - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
5. Submission in electronic format (PDF) may be acceptable as approved by Owner/Engineer.
6. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
 - a. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.
 - b. Do not permit use of unmarked copies of Product Data in connection with construction.

1.09 SAMPLES

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
 1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Consultant's Sample. Include the following:
 - a. Generic description of the Sample
 - b. Sample source
 - c. Product name or name of manufacturer
 - d. Compliance with recognized standards
 - e. Availability and delivery time
 2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

- a. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
 - b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
 - c. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
3. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
- a. Preliminary submittals will be reviewed and returned with the Consultant's mark indicating selection and other action.
4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 4 sets; three will be returned marked with the action taken.
5. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.
- a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
 - b. Sample sets may be used to obtain final acceptance of the construction associated with each set.
- B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.
1. Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.

- a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.10 ARCHITECT'S ACTION

- A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Consultant will review each submittal, mark to indicate action taken, and return promptly.
 1. Compliance with specified characteristics is the Contractor's responsibility.
- B. Action Stamp: The Consultant will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:
 1. Final Unrestricted Release: Where submittals are marked "Accepted," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
 2. Final-But-Restricted Release: When submittals are marked "Accepted as Noted," that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
 3. Returned for Re-submittal: When submittal is marked "Not Accepted, Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
 - a. Do not permit submittals marked "Not Accepted, Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.
 4. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Action Not Required."

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 01 30 00

SECTION 01 31 00

PROSECUTION AND PROGRESS

PART 1 - GENERAL

1.01 Related Documents

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

1.02 Date For Completion

- A. The Contractor shall complete the Work on or before the date or within the time specified in the Contract, unless that date or time is duly extended according to the Contract.

1.03 Progress Schedule

- A. The Contractor shall submit to the Engineer for approval by the Owner, within ten (10) calendar days following the award of contract, a progress schedule, showing the order in which the Contractor proposes to carry out the Work, the dates on which he will start controlling items, and the contemplated dates for completing. The Contractor's submission may be a critical path flow chart, bar graph, or other appropriate device of the Contractor's choice, and shall clearly indicate the various types of work to be in progress and show progress of the completed work at any point through the term of the Contract. The Progress Schedule shall show that each of the Stages of the Contract will be substantially completed within the times provided in the Contract Documents.
- B. If the Contractor's progress is materially affected by changes in the Plans or in the amount of the Work, or, in the event, in the sole judgment of the Engineer or its representative such changes become necessary in the best interests of the project due to unforeseen circumstances, or the Contractor has failed to comply with its approved Progress Schedule, Contractor shall submit a revised Progress Schedule if requested by the Engineer, that shall show how he proposes to prosecute the balance of the Work. The Contractor shall make every effort to comply with the Progress Schedule submitted by him consistent with all Contract requirements, including the order of performance of specified portions of the Work. Payment may be withheld to the Contractor while he is delinquent in the submission of any Progress Schedule.

1.04 Temporary Suspension of Work

- A. The Owner shall have the authority to suspend, delay or interrupt all or any part of the work as he may deem necessary, due to conditions that in his opinion warrant such action; or for such time as is necessary by reason of failure on the part of the Contractor to carry out orders given, or to perform in accordance with any or all provisions of the Contract. The Engineer will notify the Contractor in writing of all such suspensions, delays or interruptions.
- B. The Owner reserves the right to recover any incurred damages by deducting the amount thereof out of any monies due or that may become due the Contractor, notwithstanding any liens, notices or liens or actions of subcontractors, and if said monies be insufficient to cover said damages, then the Contractor or the Surety shall promptly pay the amounts due.

1.05 Default on Contract

- A. If the Contractor fails to begin the Work under the Contract within ten (10) days after the date of the Notice to Proceed, or fails to perform the Work with sufficient workmen, equipment or materials to insure completion of the Work within the specified time or times, or shall perform the Work unsuitably, as determined by the Engineer, or shall neglect or refuse to remove materials or perform anew such work as shall be rejected as defective and unsuitable, or shall discontinue the prosecution of the Work, or if the Contractor shall become insolvent to be declared bankrupt, or shall commit any act of bankruptcy or insolvency, or shall make an assignment for the benefit of creditors, or for any other cause whatsoever shall not carry on the Work in a manner approved by the Engineer, the Engineer shall give notice in writing to the Contractor and his surety of such actions or delinquency, said notice to advise of the corrective measures or action required. If the Contractor, within a period of seven (7) days after said notice, shall not proceed in accordance therewith, the Owner shall, upon written certificate from the Engineer of the fact of such delinquency or improper actions and the Contractor's failure to comply with said notice, have full power and authority to forfeit the rights of the Contractor and at its option to call upon the surety to complete the Work in accordance with the terms of the Contract, or it may take over the Work, including any or all materials and equipment within the work area as may be suitable and acceptable, and may complete the Work by entering into a new Agreement, with or without competitive bidding, for the completion of said Contract according to the terms and provisions thereof, or use such other methods as, in its opinion, shall be required for the completion of said Contract according to the terms and provisions thereof in an acceptable manner.

All costs and charges incurred by the Owner, together with the cost of completing the Work under Contract, may be deducted from any monies due or which may become due on such Contract.

1.06 Subletting of Contract

- A. Approval in writing of a subcontractor shall be construed as approval for the Contractor's subletting of that portion of the Work to be done by the subcontractor. Subcontractors must be approved by the Engineer before commencing any work. Subcontractors shall be recognized only in the capacity of employees or workmen of the Contractor and shall be subject to the same requirements as to character and competence as the Contractor. Requests for approval of subcontractors shall show the nature and percentages of the Work to be done by each subcontractor, such percentages to be computed cost of the Work to be subcontracted, based on proposed quantities of Contract work items and unit prices, in relation to the total Contract. The Contractor shall not, under any circumstances, be relieved of his full and complete liability and obligations for the entire work under the contract and the Engineer shall not be required to deal directly with subcontractors.

1.07 Limitations of Operations

- A. The contractor shall contact and coordinate with the Owner for specific requirements of commercial space tenants and scheduling purposes.
- B. The Contractor shall at all times conduct his work so as to minimize the interference with or inconvenience to the normal operations of the spaces not being repaired or worked within. At any time when, in the judgment of the Engineer, the Contractor has obstructed or closed an area of the Site or is carrying on operations causing greater interference or inconvenience than necessary for the proper prosecution of the Work, the Engineer may require the Contractor to finish the section of the Work which is in progress before work is started on any additional section or require the Contractor to take such further actions so as to minimize inconvenience to vehicular or pedestrian traffic or as otherwise necessary.
- C. The Contractor shall arrange his work and his material so as not to interfere with the operations of other contractors engaged upon adjacent work, and to join his work to that of other in a proper manner, and in accordance with Plans and Specifications, and to coordinate the sequence of his work in relation to that of other contractors, and as may be directed by the Engineer from time to time as the Work progresses.

- D. Each Contractor shall be responsible for any damage done by him or his agents to the Work performed by another Contractor.
- E. The Contractor shall coordinate the available staging/storage area, superintendent's office (field office) space, etc. in the Site and the dumpster area with the Owner. The Contractor may be required to establish the space for this purpose outside the Garage. If so, he shall comply with all requirements by the Owner, City of Hartford and State of Connecticut.
- F. The Contractor shall pay special attention to the noise level generated by the selective demolition operation. The use of jackhammers equipment shall only be allowed as indicated in the contract Special Conditions or as otherwise approved in writing by the owner. Scarifying, debris removal, shot blasting and sandblasting shall be performed only as approved by the Owner or its representative so as to not interfere with facility operations, or cause disruptive noise to nearby residential or business uses.
- G. The Contractor may use the electricity (power) at existing fixtures and outlets for the completion of the work. Contractor shall provide additional power as needed for its operation if the existing is insufficient.
- H. The Contractor shall furnish all temporary service connections, wiring, meters, transformers, fixtures, extensions, cords, lamps, etc., and shall remove them upon completion. All temporary light and power shall be in accordance with the local code requirements.
- I. Water shall be furnished by the Owner at existing fixtures and outlets and such water availability is limited. If additional quantity is required than can be obtained from existing fixtures the Contractor shall be responsible.
- J. The Contractor shall furnish all temporary service connections, pumps, hoses, metering equipment, etc., and shall pay all fees associated with temporary service connections to fire hydrants and such, if required.
- K. The Contractor shall verify the adequacy (capacity) of existing drainage within the facility to remove excess water during construction and shall ensure the operation of existing drainage facilities both before construction commences and after the construction work has been completed.

1.08 Workmen, Methods and Equipment

- A. The Contractor shall at all times employ sufficient labor and equipment for prosecuting the several classes of work to full completion in the manner and time required by these Specifications and the Contract.
- B. All workmen shall have sufficient skill and experience to properly perform the work assigned to them. Workmen engaged in special work or skilled work shall have sufficient specialized experience in such work and in the operation of the required equipment to perform all work on time in a proper and safe manner.
- C. Any person employed by the Contractor or by any subcontractor who, in the opinion of the Engineer, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Engineer, be removed forthwith by the Contractor or subcontractor employing such person, and shall not be employed again in any portion of the Work without the approval of the Engineer.
- D. Should the Contractor fail to remove such person or persons as required above, or fail to furnish suitable skilled and sufficient personnel for the proper prosecution of the Work, the Engineer may suspend the Work by written notice until the Contractor employs proper and sufficient personnel for the Work. All equipment that is proposed to be used on the Work shall be of sufficient size and in such mechanical condition as to meet requirement of the Contract and to produce work that meets to exceed the quality of work required by the Contract. Equipment used on any portion of the project shall be such that no damage to adjacent work areas or property will result from its use.
- E. The Contractor shall prosecute the Work for the number of days per week and the number of hours per day as are necessary to complete the Work by the date or dates provided in the Contract. If in the opinion of the Engineer the actual progress on the Work falls behind the estimate progress as outlined in the approved Progress Schedule submitted by the Contractor, or if it becomes apparent that the construction progress is such that the Work will not be completed within the specified time or times, the Contractor shall implement, at the direction and with the approval of the Engineer, any or all of the following at no additional cost to the Owner.
 - 1. Provide additional equipment of the Work
 - 2. Add necessary additional manpower

3. Increase working hours including Saturdays, Sundays, and holidays subject to any restrictions that may be set forth in the Special Conditions. When the methods and equipment to be used by the Contractor in performing the Work are not prescribed in the Contract, the Contractor is free to use any reasonable methods of equipment to perform the Work, as long as he demonstrates to the satisfaction of the Engineer that such methods or equipment will accomplish the Work in conformity with the requirements of the Contract.

- F. When the Contract specifies that the construction be performed by the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Engineer. If the Contractor desires to use a method or type of equipment other than specified in the Contract, he may request authorization from the Engineer to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed to be used and explanation of the reasons for desiring to make the change.

- G. If approval is given, it will be under the condition that the Contractor will be fully responsible for producing construction work in conformity with Contract requirements. If, after use of the substituted methods or equipment, the Engineer determines that the work produced does not meet Contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining construction with the specified methods and equipment. The Contractor shall remove any deficient work and replace it with work of specified quality, or take such other corrective action as the Engineer may direct. No change will be made in basis of payment for the construction items involved nor in Contract time as a result of authorizing any change in methods or equipment under these provisions.

1.09 Termination of Contract Prior to Completion

- A. The performance of the Work under the Contract may be terminated in whole or, in part from time to time, whenever the Engineer shall determine that such termination is in the best interest of the Owner. In the event of termination pursuant to this Section, the Contractor shall be entitled to no damages or compensation except as hereinafter provided.

- B. Termination of performance of the Work under the Contract, in whole or in part, shall be subject to the conditions herein, and it is the intent of these provisions that a settlement equitable to both the Contractor and the Owner be made in connection with a termination according to this Sub-section.

- C. For all Work completed by the Contractor prior to the effective date or dates of termination, payment will be made to the Contractor for the actual number of units or items completed at the Contract unit or percentage of completion for lump sum prices. It is agreed and understood, however, that the Contractor shall, in no event, be entitled to compensation for the loss of anticipated profits, whether for completed, uncompleted work, nor shall any claims therefore by the Contractor be considered.

- D. For all materials obtained by the Contractor for the Work prior to notice of termination, that have been inspected, tested and accepted by the Engineer, and that have not been incorporated in the Work and cannot be returned to the supplier, payment will be made to the Contractor for the actual costs for all such material including freight charges, as shown by original validated bills. The materials, when so paid for by the Owner, shall become the property of the Owner.

- E. Termination of the performance of the Work under the Contract by the Owner, as hereinbefore specified, shall not relieve the Contractor or his surety of the responsibility for the Work performed as required by the Contract.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 31 00

SECTION 01 32 00

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 Related Documents

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

1.02 General Requirements

A. Actual quantities of work completed under the Contract must be reviewed by the Engineer prior to payment. Measurement will be in accordance with United States standards and in compliance with recognized engineering practices. All packaged materials shall be marked plainly, showing the amount and nature of contents and shall be delivered intact.

1.03 Scope of Payment

A. The Contractor agrees to and shall receive and accept the compensation as herein provided, as payment in full for the Work, including but not limited to, furnishing all materials, transportation, labor, tools, and equipment; for performing all work contemplated and embraced under the Contract; for all loss or damage arising out of the nature of the Work or from the action of the elements; for any unforeseen difficulties, obstructions or interferences that may arise or be encountered during the prosecution of the Work until its final acceptance by the Owner as determined by the specifications.

B. In cases where the "Payment" clause in the Specifications related to any unit price cover and be considered compensation for certain work or material essential to the item, the same work or material shall not also be measured or paid for under any other pay item that may appear elsewhere in the Specifications.

C. The partial payment of any portion of the Work certified by the Engineer shall in no way constitute an acknowledgment of the acceptance of the Work, nor in any way prejudice or affect the obligation of the Contractor to repair, correct, renew, or replace at his expense any defects or imperfections in the construction or in the strength or quality of the materials used in or about the construction of the Work under Contract and its appurtenances, nor any damage due to attributable to such defects, which defects, imperfections or damage should have been covered before or after payment for and acceptance of the Work.

- D. **No payment shall be made for stored materials or equipment. Payment shall be made only for materials and equipment in-place and accepted by Owner, less applicable retainage.**

1.04 Payment for Extra Work: Reference General Conditions

1.05 Canceled Items

- A. It shall be in the sole judgment and sole discretion of the Owner or its representatives to cancel or alter any or all portions of the Contract. Should such actions result in elimination or non-completion of any portion of the Contract, payment shall be made commensurate with the work performed.
- B. For the canceled work completed by the Contractor, payment shall be made to the Contractor for the actual number of units or items completed at the Contract unit or percentage of completion for lump sum prices.
- C. For materials obtained by the Contractor for the unfinished (uncompleted) portions of the canceled work, that have been inspected, tested and accepted by the Engineer, and that have not been incorporated in the canceled work, payment shall be made to the Contractor for the actual costs for all such materials, including freight charges, as shown by the original paid invoices. The materials, when so paid for by the Owner, shall become the property of the Owner.

1.06 Acceptance and Final Payment

- A. When the repairs and preventive maintenance measures provided for by the Contract shall have been completely performed by the Contractor according to the Contract and all parts of the Work have been approved and accepted by the Engineer, the final pay request will be prepared by the Contractor and submitted to the Engineer for approval. Along with the final pay request the Contractor must also submit the following:
1. All guarantees and warranties from General Contractor, Sub-contractors and Manufacturers
 2. Final Waiver of Lien from Contractors and Sub-contractors
 3. Complete mark up set of drawings and project manual showing amount and location of all work performed

4. Approved maintenance and operation manuals for all components incorporated into the Work. Manuals shall include spare parts listing, model numbers, serial numbers, manufacturer's addresses and telephone numbers
 5. Contractor's Release and Hold Harmless Agreement
 6. Final reports and other information required in the General and Supplementary Conditions; final daily logs; consent of surety to final payment and release of retainage (also see Section 01700)
- B. The Engineer will review all submittals, perform necessary measurements and computations and give final recommendation to Owner.
- C. The amount of this final estimate, less any sums deductible or retained under the provisions of the Contract, will be paid to the Contractor as soon as practicable after the final acceptance, provided the Contractor has furnished to the Engineer satisfactory evidence that all sums of money due for any labor, materials, apparatus, fixtures or machinery furnished for the purpose of such improvements have been paid, or that the person or persons to whom the same may be due have consented to such final payment.
- D. The Engineer shall determine the amount or quantity of all kinds of work herein contracted to be done and decide every question that can or may arise regarding to the execution and performance of this Contract on the part of said Contractor.
- E. The acceptance by the Contractor of the final payment shall constitute a release and waiver of any and all rights and privileges under the terms of the Contract; further, the acceptance by the Contractor of final payment shall relieve the Owner from any and all claims or liabilities for anything done or furnished relative to the Work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 32 00

SECTION 01 38 00

CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.01 Related Documents

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

1.02 Summary

- A. This Section includes administrative and procedural requirements for construction photographs.
- B. Related Sections: The following Section contains requirements that relate to construction photographs:
 - 1. Division I, Section 013000 "Submittals" specifies general requirements for submitting construction photographs.

1.03 Submittals

- A. Photographs: Note on each photograph taken the date the picture was taken and the project number. Deliver one (1) set each to the Owner, the Property Manager, and to the Architect/Engineer. Hard copies (prints) of all photographs shall be submitted along with electronic (digital) images in common computer readable and editable format (jpeg) for later reuse by both the Client and Engineer.
- B. Extra Sets of Photographs: When requested by the Owner, the photographer shall prepare extra sets of photos. The photographer shall distribute these photos directly to designated parties.

PART 2 - PRODUCTS

2.01 Photographic Copies

- A. On the date the work is begun and every 7 calendar days thereafter (until the work is at least 95 percent complete), the Contractor shall have photos of the construction taken.

- B. Identification: Label each photo on the front in the bottom margin with project name and date the photo was taken. With each slide submittal provide an applied label, rubber-stamped or index sheet with the following information:
1. Name of the Project
 2. Name of the Architect
 3. Name of the Contractor
 4. Date the photograph was taken
 5. Vantage Point: Description of vantage point, in terms of location, direction (by compass point), and elevation or story of construction

PART 3 - EXECUTION

3.01 Preconstruction Photographs

- A. Before starting construction, take photos of the site and surrounding properties from different points of view.
1. Take photos in sufficient number to show existing site conditions before starting Work.
 2. Take photos of existing buildings either on or adjoining the property in sufficient detail to record accurately the physical conditions at the start of construction.

3.02 Photographic Requirements

- A. Take photos monthly, coinciding with the cutoff date associated with each Application for Payment. Vantage points for each shot shall be chosen to best show the status of construction and progress since the last photos were taken.
- B. Photographs shall be provided in electronic format, and accompanying colored hard-copy prints of acceptable quality, presented in an organized binder. Photos of poor-quality (i.e. blurry, not of presentable quality or representative of the work, as determined by the Owner/Engineer) shall be rejected and new photos shall be expected to be submitted.

END OF SECTION 01 38 00

SECTION 01 40 00

QUALITY CONTROL SERVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements for quality control services.
- B. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include contract enforcement activities performed by the Consultant.
- C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.
- D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.
 - 1. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.
 - 2. Inspections, test and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.
 - 3. Requirements for the Contractor to provide quality control services required by the Consultant, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.03 RESPONSIBILITIES

- A. Contractor Responsibilities: The Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification Sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity; these services include those specified to be performed by an independent agency and not by the Contractor. Costs for these services shall be included in the Contract Sum.
1. The Contractor shall employ and pay an independent agency, to perform specified quality control services.
 2. The Owner will engage and pay for the services of an independent agency to perform inspections and tests specified as the Owner's responsibilities.
 - a. Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the Work, and if the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless otherwise agreed in writing with the Owner.
 3. Retesting: The Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.
 - a. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.
 4. Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:
 - a. Providing access to the Work and furnishing labor and facilities necessary to facilitate inspections and tests
 - b. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples

- c. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories
 - d. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency
 - e. Security and protection of samples and test equipment at the Project site
- B. Owner Responsibilities: The Owner will provide inspections, tests and similar quality control services specified to be performed by independent agencies and not by the Contractor, except where they are specifically indicated as the Contractor's responsibility or are provided by another identified entity.
- 1. The Owner will employ and pay for the services of an independent agency, testing laboratory or other qualified firm to perform services which are the Owner's responsibility from the allowance set aside for testing in the contract sum.
- C. Duties of the Testing Agency: The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the Consultant and Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.
- 1. The agency shall notify the Consultant and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.
 - 3. The agency shall not perform any duties of the Contractor.
- D. Coordination: The Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition the Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
- 1. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.04 SUBMITTALS:

- A. The independent testing agency shall submit a certified written report of each inspection, test or similar service, to the Consultant, in duplicate, unless the Contractor is responsible for the service. If the Contractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the Contractor, in duplicate.
1. Submit additional copies of each written report directly to the governing authority, when the authority so directs
 2. Report Data: Written reports of each inspection/test or similar service shall include, but not be limited to:
 - a. Date of issue
 - b. Project title and number
 - c. Name, address and telephone number of testing agency
 - d. Dates and locations of samples and tests or inspections
 - e. Names of individuals making the inspection or test
 - f. Designation of the Work and test method
 - g. Identification of product and Specification Section
 - h. Complete inspection or test data
 - i. Test results and interpretations of test results
 - j. Ambient conditions at the time of sample taking and testing
 - k. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements
 - l. Name and signature of laboratory inspector
 - m. Recommendations on retesting

1.05 QUALITY ASSURANCE

- A. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories that are pre-qualified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and that specialize in the types of inspections and tests to be performed.
1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 REPAIR AND PROTECTION

- A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for "Cutting and Patching."
- B. Protect construction exposed by or for quality control service activities, and protect repaired construction.
- C. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

END OF SECTION 01 40 00

SECTION 01 50 00

TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.
- B. Reference Phasing Plan and Narrative for additional and prioritized requirements. This specification is not intended to replace the requirements noted in the Phasing Plan and Narrative, but rather to supplement them. When a discrepancy is noted, the more strict requirement shall be adhered to.

1.02 SUMMARY

- A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.
- B. Temporary utilities required include but are not limited to:
 - 1. Water service and distribution
 - 2. Temporary electric power and light
 - 3. Telephone service
- C. Temporary construction and support facilities required include but are not limited to:
 - 1. Temporary heat
 - 2. Field offices and storage sheds
 - 3. Sanitary facilities, including drinking water
 - 4. Temporary enclosures
 - 5. Temporary Project identification signs and bulletin boards
 - 6. Waste disposal services
 - 7. Rodent and pest control
 - 8. Construction aids and miscellaneous services and facilities

D. Security and protection facilities required include but are not limited to:

1. Temporary fire protection
2. Barricades, warning signs, lights
3. Sidewalk bridge or enclosure fence for the site
4. Environmental protection

1.03 SUBMITTALS

- A. Temporary Utilities: Submit reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.
- B. Implementation and Termination Schedule: Submit a schedule indicating implementation and termination of each temporary utility within 15 days of the date established for commencement of the Work.

1.04 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to:
1. Building Code requirements
 2. Health and safety regulations
 3. Utility company regulations
 4. Police, Fire Department and Rescue Squad rules
 5. Environmental protection regulations
- B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."
1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.
 2. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.05 PROJECT CONDITIONS

- A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of the permanent service.
- B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Provide new materials; if acceptable to the Architect, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.
- B. Lumber and Plywood:
 - 1. For job-built temporary offices, shops and sheds within the construction area, provide UL labeled, fire treated lumber and plywood for framing, sheathing and siding.
 - 2. For signs and directory boards, provide exterior type, Grade B-B High Density Concrete Form Overlay Plywood conforming to PS-1, of sizes and thickness indicated.
 - 3. For fences and vision barriers, provide exterior type, minimum 3/8" thick plywood.
 - 4. For safety barriers, sidewalk bridges and similar uses provide minimum 5/8" thick exterior plywood.
- C. Paint: Comply with requirements of Division-9 Section "Painting."
 - 1. For job-built temporary offices, shops, sheds, fences and other exposed lumber and plywood, provide exterior grade acrylic-latex emulsion over exterior primer.

2. For sign panels and applying graphics, provide exterior grade alkyd gloss enamel over exterior primer.
 3. For interior walls of temporary offices, provide two coats interior latex flat wall paint.
- D. Tarpaulins: Provide waterproof, fire-resistant, UL labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride fire retardant tarpaulins.
- E. Water: Provide potable water approved by local health authorities.
- F. Open-Mesh Fencing: Provide 11-gage, galvanized 2-inch, chain link fabric fencing 6-feet high with galvanized barbed wire top strand and galvanized steel pipe posts, 1-1/2" I.D. for line posts and 2-1/2" I.D. for corner posts.

2.02 EQUIPMENT

- A. General: Provide new equipment; if acceptable to the Consultant, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.
- B. Water Hoses: Provide 3/4" heavy-duty, abrasion-resistant, flexible rubber hoses 100 ft. long, with pressure rating greater than the maximum pressure of the water distribution system; provide adjustable shut-off nozzles at hose discharge.
- C. Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.
- D. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.
- E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

- F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.
- G. Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.
- H. Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.
- I. First Aid Supplies: Comply with governing regulations.
- J. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.
 - 1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

- A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

1. Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.
 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
 3. Obtain easements to bring temporary utilities to the site, where the Owner's easements cannot be used for that purpose.
 4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Consultant, and will not be accepted as a basis of claims for a Change Order.
- B. Temporary Water Service: The contractor shall make arrangements with the Building Management for temporary water from existing sources at the facility. The Contractor shall be responsible for all hoses, connections, etc., required from the point of water source at the facility.
- C. Temporary Electric Power Service: The Contractor shall make all arrangements for and shall install and pay for the temporary electric service. The Contractor shall furnish, install and maintain all temporary and power facilities required by the work. Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload protected disconnects, automatic ground-fault interrupters and main distribution switch gear.
1. Power Distribution System: Install wiring overhead, and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, AC 20 ampere rating, and lighting circuits may be non-metallic sheathed cable where overhead and exposed for surveillance.
- D. Temporary Lighting:
1. Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction operations and traffic conditions.
- E. Temporary Telephones: Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period. Install telephone on a separate line for each temporary office and first aid station. Where an office has more than two occupants, install a telephone for each additional occupant or pair of occupants.
1. At each telephone, post a list of important telephone numbers.

- F. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off the site in a lawful manner.
1. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.
 2. Connect temporary sewers to the municipal system as directed by the sewer department officials.
 3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.
- G. Provide earthen embankments and similar barriers in and around excavations and sub-grade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

3.03 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

- A. Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities for easy access at locations approved by the Owner.
1. Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.
- B. Provide incombustible construction for offices, shops and sheds located within the construction area, or within 30 feet of building lines. Comply with requirements of NFPA 241.

- C. Temporary Heat: Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
- D. Heating Facilities: Except where use of the permanent system is authorized, provide vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.
1. Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.
- E. Field Offices: Provide insulated, weather-tight temporary offices of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly for use for small progress meetings. Furnish and equip offices as follows:
1. Furnish with a desk and chairs, a 4-drawer file cabinet, plan table and plan rack and a 6-shelf bookcase, as required by the Owner
- F. Storage and Fabrication Sheds: Install storage and fabrication sheds, sized, furnished and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on the site as approved by the Owner.
- G. Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
1. Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.
- H. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.
- I. Drinking Water Facilities: Within temporary office, provide containerized tap-dispenser bottled-water type drinking water units, including paper supply.
- J. Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction

operations and similar activities.

1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.
3. Where temporary wood or plywood enclosure exceeds 100 square feet in area, use UL-labeled fire-retardant treated material for framing and main sheathing.

K. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

3.04 PROTECTION FACILITIES INSTALLATION

A. Temporary Fire Protection:

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell
2. Store combustible materials in containers in fire-safe locations
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas
4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition

- B. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.
- C. Security Enclosure and Lockup:
 - 1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
- D. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment that produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.05 OPERATION, TERMINATION AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on a 24-hour day basis where required to achieve indicated results and to avoid possibility of damage.
 - 2. Protection: Prevent water filled piping from freezing.

- C. Termination and Removal: Unless the Owner requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of the Contractor.
 2. Where the area is intended for landscape development remove soil and aggregate fill that does not comply with requirements for fill or subsoil in the area. Remove materials contaminated with substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs and sidewalks at the temporary entrances, as required by the governing authority.
 3. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:
 - a. Replace air filters and clean inside of ductwork and housings
 - b. Replace significantly worn parts and parts that have been subject to unusual operating conditions

END OF SECTION 01 50 00

SECTION 01 60 00

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. All Contract Documents shall apply to work of this Section.

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
- B. The Contractor's Construction Schedule and the Schedule of Submittals are included under Section "Submittals."
- C. Standards: Refer to Section "Reference Standards and Definitions" for applicability of industry standards to products specified.
- D. Administrative procedures for handling requests for substitutions made after award of the Contract are included under Section "Product Substitutions."

1.03 DEFINITIONS

- A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well recognized meanings in the construction industry.
1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
- a. "Named Products" are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.

2. "Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

1.04 SUBMITTALS

- A. Product List Schedule: Prepare a schedule showing products specified in a tabular form acceptable to the Consulting Engineer. Include generic names of products required. Include the manufacturer's name and proprietary product names for each item listed.
1. Coordinate the product list schedule with the Contractor's Construction Schedule and the Schedule of Submittals.
 2. Form: Prepare the product listing schedule with information on each item tabulated under the following column headings:
 - a. Related Specification Section number
 - b. Generic name used in Contract Documents
 - c. Proprietary name, model number and similar designations
 - d. Manufacturer's name and address
 - e. Supplier's name and address
 - f. Installer's name and address
 - g. Projected delivery date, or time span of delivery period
 3. Initial Submittal: Within seven days after date of commencement of the Work, submit three copies of an initial product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.
 - a. At the Contractor's option, the initial submittal may be limited to product selections and designations that must be established early in the Contract period.
 4. Completed Schedule: Within 15 days after date of commencement of the Work, submit three copies of the completed product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract Documents.

5. Engineer's Action: The Engineer will respond in writing to the Contractor within one (1) week of receipt of the completed product list schedule. No response within this time period constitutes there is no objection to listed manufacturers or products, but does not constitute a waiver of the requirement that products comply with Contract Documents. The Engineer's response will include the following:
 - a. A list of unacceptable product selections, containing a brief explanation of reasons for this action

1.05 QUALITY ASSURANCE

- A. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.
 1. When specified products are available only from sources that do not or cannot produce a quantity adequate to complete project requirements in a timely manner, consult with the Engineer for a determination of the most important product qualities before proceeding. Qualities may include attributes relating to visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources that produce products that possess these qualities, to the fullest extent possible.
- B. Compatibility of Options: When the Contractor is given the option of selecting between two or more products for use on the Project; the product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.
 1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.

3. Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
4. Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected.
5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
7. Store products subject to damage by the elements above ground, under cover in a weather-tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.
8. Progress payments will be made for work complete and in place only. No payment will be made for stored materials.

PART 2 - PRODUCTS

2.01 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with the Contract Documents that are undamaged and, unless otherwise indicated, unused at the time of installation.
 1. Provide products complete with all accessories, trim, finishes, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
 2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- B. Product Selection Procedures: Product selection is governed by the Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include the following:

1. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated or Approved Equal.
2. Semi-proprietary Specification Requirements: Where two or more products or manufacturers are named, provide one of the products indicated. No substitutions will be permitted.
 - a. Where products or manufacturers are specified by name, accompanied by the term "or equal," or "or approved equal" comply with the Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
3. Non-Proprietary Specifications: When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
4. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
5. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated. General overall performance of a product is implied where the product is specified for a specific application.
 - a. Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.
6. Compliance with Standards, Codes and Regulations: Where the Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the codes, standards, and regulations specified.
7. Visual Matching: Where Specifications require matching an established Sample, the Engineer's decision will be final on whether a proposed product matches satisfactorily.

- a. Where no product available within the specified category matches satisfactorily and also complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category, or for noncompliance with specified requirements.
8. Visual Selection: Where specified product requirements include the phrase ". . . as selected from manufacturer's standard colors, patterns, textures . . ." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Consulting Engineer will select the color, pattern and texture from the product line selected.
9. Allowances: Refer to individual Specification Sections and "Allowance" provisions in Division-1 for allowances that control product selection, and for procedures required for processing such selections.

PART 3 - EXECUTION

3.01 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
 1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

3.02 SYSTEMS DEMONSTRATION

- A. Prior to final inspection, the Contractor shall demonstrate the operation of each system to Architect/Engineer or Owner.
- B. The Contractor shall instruct the Owner's personnel in operation, adjustment, and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction.

END OF SECTION 01 60 00

SECTION 01 63 10

PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.01 Related Documents

- A. All Contract Documents shall apply to work of this section.

1.02 Summary

- A. This Section specifies administrative and procedural requirements for handling requests for substitutions made after award to the Contract.
- B. The Contractor's Construction Schedule and the Schedule of Submittals are included under Section "Submittals".
- C. Standards: Refer to Section "Reference Standards and Definitions" applicability of industry standards to products specified.
- D. Procedural requirements governing the Contractor's selection of products and product options are included under section "Materials and Equipment".

1.03 Definitions

- A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions". The following are not considered substitutions:
1. Substitutions requested by Bidders during the bidding period, and accepted prior to award of Contract, are considered as included in the Contract Documents and are not subject to requirements specified in this Section for substitutions
 2. Revisions to Contract Documents requested by the Owner or Architect
 3. Specified options of products and construction methods included in Contract Documents

4. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities

1.04 Submittals

- A. Substitution Request Submittal: Requests for substitution will be considered if they are received within 60 days after the commencement of work. Requests received more than 60 days after commencement of the Work may be considered or rejected at the discretion of the Engineer/Architect.
 1. Submit a minimum of 4 copies of each request for substitution for consideration. Submit requests in the form and in accordance with procedures required for Change Order proposals.
 2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
 - a. Project data, including drawings and descriptions of products, fabrication and installation procedures
 - b. Samples, where applicable or requested
 - c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
 - d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.
 - e. A statement indicating the substitution and its effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
 - f. Cost information, including a proposal of the net change, if any in the Contract Sum.

6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
 7. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Engineer for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.
 8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
 9. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.
 10. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.
- B. The Contractor's submittal and Engineer's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 63 10

SECTION 01 70 00

PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 **RELATED DOCUMENTS:**

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

1.02 **SUMMARY:**

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
1. Inspection procedures
 2. Project record document submittal
 3. Operating and maintenance manual submittal
 4. Submittal of warranties
 5. Final cleaning
- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 9.

1.03 **SUBSTANTIAL COMPLETION:**

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - a. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 2. Advise Owner of pending insurance changeover requirements.

3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
 4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
 5. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.
 6. Deliver tools, spare parts, extra stock, and similar items.
 7. Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of changeover in security provisions.
 8. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
 9. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
- B. Inspection Procedures: On receipt of a request for inspection, the Consultant will either proceed with inspection or advise the Contractor of unfilled requirements. The Consultant will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
1. The Consultant will repeat inspection when requested and assured that the Work has been substantially completed.
 2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.04 **FINAL ACCEPTANCE:**

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
 3. Submit a certified copy of the Consultant's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance and the list has been endorsed and dated by the Consultant.
 4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when the Owner took possession of and responsibility for corresponding elements of the Work.
 5. Submit consent of surety to final payment.
 6. Submit a final liquidated damages settlement statement.
 7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Re-inspection Procedure: The Consultant will re-inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Consultant.
1. Upon completion of re-inspection, the Consultant will prepare a certificate of final acceptance, or inform the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 2. If necessary, re-inspection will be repeated.

1.05 **RECORD DOCUMENT SUBMITTALS:**

- A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Consultant's reference during normal working hours.

- B. Record Drawings: Maintain a clean, undamaged set of blue or black line white prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
 2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
 3. Note related Change Order numbers where applicable.
 4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.
- C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.
1. Upon completion of the Work, submit record Specifications to the Consultant for the Owner's records.
- D. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.
1. Upon completion of mark-up, submit complete set of record Product Data to the Consultant for the Owner's records.

- E. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Consultant and the Owner's personnel to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the Owner for record purposes. Comply with delivery to the Owner's Sample storage area.
- F. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Consultant for the Owner's records.
- G. Maintenance Manuals: Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data into individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:
1. Emergency instructions
 2. Spare parts list
 3. Copies of warranties
 4. Wiring diagrams
 5. Recommended "turn around" cycles
 6. Inspection procedures
 7. Shop Drawings and Product Data
 8. Fixture lamping schedule

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 **CLOSEOUT PROCEDURES**:

- A. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

1. Maintenance manuals
2. Record documents
3. Spare parts and materials
4. Tools
5. Lubricants
6. Fuels
7. Identification systems
8. Control sequences
9. Hazards
10. Cleaning
11. Warranties and bonds
12. Maintenance agreements and similar continuing commitments

B. As part of instruction for operating equipment, demonstrate the following procedures:

1. Start-up
2. Shutdown
3. Emergency operations
4. Noise and vibration adjustments
5. Safety procedures
6. Economy and efficiency adjustments
7. Effective energy utilization

3.02 **FINAL CLEANING:**

- A. General: General cleaning during construction is required by the General Conditions and included in Section "Temporary Facilities".
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
 - a. Remove labels that are not permanent labels.
 - b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

- c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
 - d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 - e. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.
- C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.
- 1. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION 01 70 00

SECTION 01 74 00

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY:

- A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.
 - 1. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.
 - 2. General closeout requirements are included in Section "Project Closeout."
 - 3. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Divisions 2 through 26.
 - 4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
- B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.03 DEFINITIONS

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

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

1.04 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or re-building; reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.
- D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - 1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
- E. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.05 SUBMITTALS

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

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Consultant within fifteen days of completion of that designated portion of the Work.

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

- C. Forms for special warranties are included at the end of this Section. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor, or the Contractor and subcontractor, supplier or manufacturer. Submit a draft to the Owner through the Consultant for approval prior to final execution.
 1. Refer to individual Sections of Divisions 2 through 9 for specific content requirements, and particular requirements for submittal of special warranties.

- D. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

- E. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.
 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.
 2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name of the Contractor.
 3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 SCHEDULE OF WARRANTIES

- A. Schedule: Provide warranties on products and installations as specified, but not limited to, below:
1. The Contractor (and applicable sub-contractors) shall provide a 5-year warranty (minimum) for all work performed to conform to the specifications in addition to specific warranties for individual products.
 2. Concrete Work (Division 3)
 - Section 03210 – Topically Applied Corrosion Inhibitor. The system manufacturer shall furnish the Owner a written performance warranty that the corrosion inhibitor will be free of any material deficiencies and meet or exceed the material performance requirements for a ten (10) year period from the date of substantial completion of the work provided under this section of the specification.
 - Section 03300 - Concrete Work. The Contractor (and applicable sub-contractors) shall provide a 5-year warranty for quality workmanship and materials to conform to the specifications.
 - Section 03340 - Concrete Repair with Trowel Applied Materials. The Contractor (and applicable sub-contractors) shall provide a 5-year warranty for quality workmanship and materials to conform to the specifications
 3. Metal (Division 5)
 - Section 05500 – Miscellaneous Metals. The Contractor (and applicable sub-contractors) shall provide a Certificate for 5-year Corrective Period to cover repairs due to defects in materials and workmanship associated with work covered under this Section of the Technical Specifications.

4. Waterproofing (Division 7)

- Section 07120 – Traffic Bearing Membrane. The Contractor (and applicable sub-contractors) shall reference applicable specifications for appropriate warranties for this product or associated repairs to those preexisting. Materials Manufacturer and Installation Contractor shall be jointly and severally responsible and shall submit an affidavit signed by both parties warranting the installed system and repaired areas for a minimum period of five years from date of final completion.
- Section 07910 - Expansion Joint Seals. The Contractor (and applicable sub-contractors) shall reference applicable specifications for appropriate warranties for this product or associated repairs to those preexisting. The manufacturer and approved applicator shall provide a 5 year guarantee that the joint seal will not leak or fail from normal vehicular traffic. Any type of failure of the new joint seal which occurs within the specified warranty period shall be repaired by the Contractor at no cost to the Owner.
- Section 07920 - Sealants and Caulking. The Contractor (and applicable sub-contractors) shall reference applicable specifications for appropriate warranties for these products.

5. Finishes (Division 9)

- Section 09019 – Acrylic Waterproof Coating: Materials Manufacturer and Special Coating Contractor shall be jointly responsible and shall submit an affidavit signed by both parties warranting the installed system for a period of ten years from date of substantial completion. The Contractor shall repair or replace coating which, deteriorates excessively, wears prematurely or otherwise fails to perform as required within the guarantee period, due to failure of materials or workmanship. The guarantee shall include an agreement to remove and replace other work which has been superimposed on coating work as required to repair or replace the coating system.
- Section 09900 – Painting. The Contractor (and applicable sub-contractors) shall reference applicable specifications for appropriate warranties for these products. At the end of the warranty period specified paint/coating materials shall have full adherence and there shall be no evidence of blisters, running, peeling, scaling, chalking, rusts, streaks, fading or stains.

6. Plumbing (Division 22)

The Contractor (and applicable sub-contractors) shall reference applicable specifications for appropriate warranties for these products.

END OF SECTION 01 74 00

SECTION 02 07 00

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Description

1. Furnish labor, materials, equipment and transportation necessary to do all concrete demolition, as shown on drawings and as specified herein, including but not necessarily limited to the following:
 - a. Removal of existing concrete, masonry, and other materials as noted on plans or directed by the Engineer
 - b. Dust and water control
 - c. Removal and disposal of all debris
 - d. Disconnecting and relocating/reinstalling any existing utility lines on the site which interfere with the repairs
 - e. Protection of all existing electrical systems, mechanical equipment, light fixtures, overhead piping, fire protection system etc. scheduled to remain
2. Contractor shall provide barricades with warning lights, enclose the construction area and take all precautions necessary to ensure public and employee safety.
3. All work shall be done in accordance with the requirements of all local and state agencies.

1.03 QUALITY ASSURANCE

- A. Demolition Contractor's Qualifications: Minimum of 5 years experience on comparable projects.

- B. Comply with all pertinent codes and regulations that apply to this type of work and with requirements of insurance carriers providing coverage for this work. Dispose of debris in a legal manner off site daily. Do not allow to accumulate on site.

1.04 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Schedule indicating proposed sequence of operations for selective demolition work to Owner's Representative for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
 - 1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
 - 2. Coordinate with MGI's on-site staff, schedule and logistics plans and/or with Owner's partial occupancy of completed work.
- C. Photographs of existing conditions of structure's surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. File with Owner's Representative prior to start of work.

1.05 JOB CONDITIONS

- A. Occupancy: Conduct selective demolition work in manner that will minimize need for disruption of other construction activities. Provide minimum of 72 hours advance notice to MGI of demolition activities that will affect other construction activities and/or Owner's operations.
- B. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.
 - 1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur prior to start of selective demolition work.
- C. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.

1. Storage or sale of removed items on site will not be permitted.
- D. Protections: Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work.
1. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to occupied portions of the project.
 2. Erect temporary covered passageways as required by authorities having jurisdiction.
 3. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain.
 4. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
 5. Use all means necessary to protect existing facilities, utilities, and appurtenances within the project areas.
 6. Protect floors with suitable coverings when necessary.
 7. Dust and Water Control: Contractor shall contain particular debris generated by his work activities from polluting the atmosphere or waterways.
 8. Construct temporary insulated dust resistant partitions where required separating areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dust resistant doors and security locks.
 9. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
 10. On-site burning shall not be permitted.
 11. Remove protections at completion of work.
- E. Damages: Promptly repair damages caused to adjacent facilities by demolition work.

- F. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
1. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- G. Flame Cutting: Do not use cutting torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire suppression devices during flame-cutting operations.
- H. Utility Services: Maintain existing utilities in service and protect them against damage during demolition operations.
1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
 2. Maintain fire protection services during selective demolition operations.
- I. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.
1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Use appropriate materials and proper equipment to complete the work of this Section. Provide all necessary barricades, warning devices, enclosures, etc. as required to comply with governing safety regulations.

PART 3 - EXECUTION

3.01 PREPARATION

- A. General: Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
1. Cease operations and notify Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
 2. Cover and protect equipment and fixtures from soilage or damage when demolition work is performed in areas where such items have not been removed.
 3. Erect and maintain dust resistant partitions and closures as required preventing spread of dust or fumes to occupied portions of the building.
 - a. Where selective demolition occurs immediately adjacent to occupied portions of the building, construct dust resistant partitions of minimum 4-inch studs and ½-inch fire-retardant plywood on demolition side.
 - b. Provide weatherproof closures for exterior openings resulting from demolition work.
 4. Locate, identify, stub off, and disconnect utility services that are not indicated to remain.
 - a. Provide bypass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to MGI and Owner if shutdown of service is necessary during changeover.

3.02 DEMOLITION

- A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.

1. Demolish concrete in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools except as indicated in the construction drawings.
 2. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
 3. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.
- B. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Consultant, written with accurate detail describing the unanticipated conflict. Pending receipt of directive from Owner's Representative, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3.03 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from building site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose off site.
1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
 2. Burning of removed materials is not permitted on project site.

3.04 CLEANUP AND REPAIR

- A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean.
1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION 02 07 00

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION

- A. Furnish, fabricate and install reinforcement and associated items required or indicated on the drawings for cast-in-place concrete, including, but not necessarily limited to, reinforcing steel bars, welded wire fabric, ties, and supports.
- B. Contractor shall note that new steel shall be uncoated ("black steel"). All steel, including welded wire fabric, shall be field-coated with primer to total surface coverage, inclusive of, but not limited to, top side, bottom side, ends, and all other exposed surfaces, in accordance with the material manufacturer's recommendations. Coverage shall be reviewed in the field by the Engineer prior to concrete placement; concrete placement may be delayed until primer coverage is determined to be acceptable by Engineer. Reference Section 2.01.

1.03 WORK SPECIFIED ELSEWHERE

- A. Furnishing and placement of inserts, anchorages, and other embedded items as specified in other sections.

1.04 QUALITY ASSURANCE

- A. Unless otherwise shown or specified, fabrication and placement of all concrete reinforcement and related items shall conform to the following codes and standards:
 - 1. American Concrete Institute, ACI 318, "Building Code Requirement for Reinforced Concrete."
 - 2. American Concrete Institute, ACI 315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures."
 - 3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."

1.05 SUBMITTALS

- A. **Shop Drawings:** Submit shop drawings with mill certificates for fabrication, bending, and placement of concrete reinforcement all as may be required. Comply with the ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures." Show bar schedule, stirrup spacing, diagrams of bent bars, arrangements and assemblies, for the fabrication and placement of concrete reinforcement.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. **Delivery:** Deliver reinforcement to the Project Site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

Protection: Use all means necessary to protect concrete reinforcement before, during, and after installation and to protect the materials and installed work of all trades. Take all necessary precautions to maintain identification of fabricated bars after bundles are broken.

Storage: Store concrete reinforcement materials at the site to prevent damage and accumulation of dirt or excessive rust.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. **Reinforcing Bars:** ASTM A615, Grade 60, deformed.
- B. **Welded Wire Fabric:** ASTM A82 and ASTM A185.
- C. **Zinc-Rich Primer:** All steel, including welded wire fabric, shall be field-coated with primer to total surface coverage, inclusive of, but not limited to, top side, bottom side, ends, and all other exposed surfaces, in accordance with the material manufacturer's recommendations. Coverage shall be reviewed in the field by the Engineer prior to concrete placement; concrete placement may be delayed until primer coverage is determined to be acceptable by Engineer. Acceptable primer shall be MasterProtect P8100 AP, as manufactured by BASF Construction Chemicals, LLC, or approved equal. Reinforcing bars to be coated shall conform to Section 2.01-A.

- D. Bar Supports: Bar supports and spacing of same shall be per recommendations set forth by Chapter 3 of the "CRSI Manual of Standard Practice." Reinforcing bars supported from formwork shall rest on wire bar supports, or on bar supports made of dielectric material or other acceptable materials. Wire bar supports shall be coated with dielectric material, compatible with concrete, for a minimum distance of 2 inches from the point of contact with reinforcing bars.
- E. Tie Wire: Wire shall be 16 gauge or heavier, black-annealed. Reinforcing bars shall be tied with tie wire or other acceptable materials.
- F. For epoxy grouting reinforcing steel use the Hilti "HIT RE 500 System" supplied by Hilti Fastening Systems, "Dowel Fast" System by Powers Fasteners, or approved equal. Follow manufacturer's directions for installation and required surface preparation.

2.02 FABRICATION

- A. General Requirements: Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication to tolerances complying with CRSI Manual of Standard Practice. In case of fabricating errors, do not re-bend or straighten reinforcement in a manner that will injure or weaken the material.
- B. Unacceptable Workmanship: Reinforcement with any of the following defects will not be permitted in the work:
 - 1. Bar lengths, depths and bends exceeding specified fabrication tolerances.
 - 2. Bends or kinks not indicated on drawings or final shop drawings.
 - 3. Bars with reduced cross-section due to excessive rusting or other cause.

PART 3 - EXECUTION

3.01 PLACING REINFORCEMENT

- A. General Requirements:
 - 1. All reinforcing bars shall be placed in accordance with CRSI "Recommended Practice for Placing Reinforcing Bars."
 - 2. Bars shall be placed to the tolerance specified in ACI 318-99.
 - 3. Place all reinforcement according to the approved placement drawings. Use sufficient bar supports, tie anchors, additional reinforcing bars, if required, and other accessories to hold all bars securely in place.

- B. Concrete Coverage: Place reinforcement to obtain the minimum coverage specified on the drawings for concrete protection. Arrange, space, and securely tie bars and bar supports together with 16 gauge wire to hold reinforcement accurately in position during concrete placement operation. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
- C. Cleaning Reinforcement: Steel reinforcement, at the time concrete is placed around it, shall be free from loose rust and mill scale, oil, grease, paint, earth, ice and all coatings, which would reduce or destroy bond between steel and concrete. Clean reinforcement as necessary prior to, during, or after placement to achieve this result.

When bars project from construction joints, all cement mortar clinging to the bars from previous concreting shall be removed before the ensuing enveloping concrete is placed.

- D. All steel, including welded wire fabric, shall be field-coated with primer to total surface coverage, inclusive of, but not limited to, top side, bottom side, ends, and all other exposed surfaces, in accordance with the material manufacturer's recommendations. **Coverage shall be reviewed in the field by the Engineer prior to concrete placement; concrete placement may be delayed until primer coverage is determined to be acceptable by Engineer.**

3.02 REINFORCING BAR LAP SPLICES

- A. New slab reinforcing bars may be spliced to existing bars by lapped splices if adequate lengths of exposed existing bars are available. Provide reinforcement lap splices by placing bars in contact and tying with wire tightly. Comply with the requirements of Engineering Data Report Number 45, 'Tension Development and Lap Splice Lengths of Reinforcing Bars Under ACI 318-99' for minimum required length of bar for lap splices. Alternatively, the contractor can follow the values provided below for lap splice lengths based on the following guidelines:

LAP SPLICE LENGTHS FOR BARS IN TENSION (IN INCHES)

<u>Bar Size</u>	<u>Uncoated Reinforcement</u>
3	16
4	16
5	22
6	31
7	50
8	62

- Note 1. Based on Class B splice = $1.3 l_d$ (l_d = tensile development length)
Normal weight concrete
 $f'_c = 4,000$ psi min.
Grade 60 reinforcement
Concrete cover = 1.00 in. or greater
Bars have less than 12 in. concrete cast below them.
- Note 2. Lap splice lengths for steel based on concrete cover equal to or greater than 3 bar diameters and clear spacing between bars equal to or greater than 6 bar diameters.
- Note 3. For lightweight aggregate concrete, multiply the tabulated values by 1.3.

- B. Do not make splices at points of maximum stress if possible.
- C. Stagger top splices, and in horizontal wall reinforcement separate at least five feet longitudinally in alternate bars of opposite tiers.
- D. Stubs and dowels required to receive and engage subsequent work shall extend a sufficient length to develop the strength of the bar. Place dowel and stub bars in the forms and secure against displacement during the placing of concrete. Where stub steel and dowels extend through construction joints in walls, they shall be thoroughly cleaned of adhering particles of concrete, before continuing the placing of any subsequent concrete.
- E. Where splicing length is insufficient either additional concrete removal or mechanical bar splicing shall be implemented at the direction of the Engineer.

3.03 REINFORCING BAR MECHANICAL SPLICES

- A. Bars to be spliced by the mechanical splicing process shall be free of paint, oil, rust, scale or other foreign material. The splice shall be done in accordance with the manufacturer's recommendations which shall be submitted to the Engineer for approval.

The mechanical splice shall meet full tension requirement of 100% of the yield strength (f_y). The mechanical splices shall be performed using the Quick Wedge system manufactured by Erico Products, Inc. (800)248-2677, MBT Bar Lock System (800) 755-4888, or approved equal.

Test assemblies shall include the same bars, couplers and anchors. The same equipment shall be used to make these assemblies as to be used on the project.

- B. Unskilled operators must be trained and indoctrinated by an authorized representative of the system manufacturer. Upon satisfactory completion of the training, a certificate will be issued by the system manufacturer to show the splicer's name, badge, number/Social Security Number and date certified.
- C. Test splices should be made on the size, type and grade of rebar to be used in production. If a change of size, type of grade or rebar occurs, new test results should be obtained.

Minimum rebar deformation heights and spacing within the splice must conform to the requirements of ASTM A625, or ASTM A706 as appropriate. If minimum deformation heights and spacing requirements cannot be satisfied, the system's manufacturer may at its option offer and get an approval for alternate splicing procedure to meet the specified splicing strength requirements.

- D. The frequency of test splices shall be as follows:

First Fifty (50) - One Test
Next Fifty (50) - One Test
Thereafter, every one hundred (100) - One Test

The test splice shall be a SISTER SPLICE (removable splice made in-place and in sequence adjacent to production splices by the same operator and under same conditions.)

Separate test frequencies are not necessary to horizontal, vertical and diagonal splices.

- E. If any splice used for testing fails to meet the design code strength requirements, two splices in-place shall be cut from the previous lot and tested. If these sister splices fail, the contractor shall at his own expense, test as many splices as directed by the Engineer and re-splice all test and failed splices.

END OF SECTION 03 20 00

SECTION 03 21 00

TOPICALLY APPLIED CORROSION INHIBITORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SCOPE OF WORK

- A. This Section covers surface applied concrete steel reinforcement corrosion inhibitors. The corrosion inhibitor shall be furnished and applied to concrete surfaces indicated on the drawings and/or as determined by the Engineer.

1.03 QUALIFICATIONS

- A. Work specified herein shall be performed by and be the responsibility of the Installation Contractor authorized, approved and qualified by the manufacturer of materials used; having necessary equipment and facilities to fulfill requirements of the manufacturer and this section.
- B. Manufacturer Qualifications: Manufacturer shall provide evidence showing that the specified materials have been manufactured by the same source and successfully installed on a yearly basis for a minimum of five years on projects of similar scope and complexity.
 - 1. Manufacturer to be ISO 9002 certified.
 - 2. Manufacturer shall provide a list of at least five (5) projects (with reference names and phone numbers) where materials have been satisfactorily applied, of similar scope and complexity to this project
- C. Installer Qualifications: Waterproofing installer shall demonstrate qualifications to perform the work of this Section by submitting the following documentation:
 - 1. Licensing/certification by the manufacturer as an applicator of the product to be used.

2. List of at least two projects (with reference names and phone numbers) satisfactorily completed under the current company name, of similar scope and complexity to this project. Previous experience submittal shall correspond to specific product proposed for use by applicator.
3. A minimum of five (5) years in business under the same name.

1.04 QUALITY CONTROL

A. Codes and Standards:

- 1) Specified products shall comply with local and state regulations regarding health, safety, and VOC (Volatile Organic Content) regulations.
- 2) The corrosion inhibitor must reduce total corrosion of heavily corroding rebar by an average of 90%, at relative humidity of 75% or greater.
- 3) The corrosion inhibitor must reduce corrosion by 90% or greater using FHWA RD-98-153 test protocol on cracked slab black bars subjected to 48 weeks of cyclic salt water ponding.
- 4) The corrosion inhibitor must increase the resistance of new chloride ions by 90% minimum using AASHTO T277 "Rapid Determination of the Chloride Permeability of Concrete".
- 5) All corrosion and chloride data must be performed by a qualified independent laboratory.

B. Product Coordination:

- 1) Review other sections of these specifications in which curing compounds or paints, are to be provided on concrete surfaces to be sealed to ensure compatibility with the corrosion inhibitor.

C. Environmental Requirements:

- 1) Maintain ambient temperature above 40 degrees F during and 24 hours after installation.
- 2) Do not proceed with application on materials if ice or frost is covering the substrate.
- 3) Do not proceed with application if ambient temperature of surface exceeds 100 degree F.

- 4) Do not proceed with the application of materials in rainy conditions or if heavy rain is anticipated with 4 hours after application.

D. Warranty:

- 1) The system manufacturer shall furnish the Owner a written single-source performance warranty that the concrete reinforcement corrosion inhibitor will be free of defects related to workmanship or material deficiency and meet or exceed the following requirements for a ten (10) year period from the date of substantial completion of the work provided under this section of the specification.
- 2) Using a device which employs linear polarization with a guard ring (device should be certified under SHRP) the corrosion current of the treated concrete shall be less than 0.5 $\mu\text{A}/\text{cm}^2$ for the life of the warranty period.
 - a. Testing shall be done by the material manufacturer, certified manufacturer's representative or independent testing lab in random locations, as selected by the Engineer to verify material performance. Testing shall be performed at a frequency/time interval as indicated below. Subsequent tests shall be performed in the same general locations. The number of test performed shall be one test location per 50,000 SF of application area, or a minimum of three (3) test locations. Cost of testing are to be considered as being included within the purchase price of the material. Manufacturer shall be expected to provide a certified written report on manufacturer's letterhead listing the results of all testing performed.
 - b. Test Frequency:
 - At substantial completion of application of product, and prior to issuance of manufacturer's warranty.
 - At 5 years after issuance of manufacturer's dated warranty.
- 3) The required written warranty shall specify that the manufacturer shall be responsible for providing labor and material to retreat areas of the structure that do not comply with the warranty requirements for material performance.

1.05 SUBMITTALS

- A. Submit manufacturer's product, data sheet, application and surface preparation instructions, proof of applicator status, test data for each batch of material submitted and warranty for approval prior to application.
- B. When payment for corrosion inhibitor application is based on square foot area of application, the area used in calculations shall be horizontal surfaces only.

- C. As a condition for payment of the corrosion inhibitor application, the contractor must submit an invoice indicating the delivery and site receipt of the quantity of material calculated and designated for this project. In addition to the calculated quantity, the invoice shall also reflect the project address, or be designated for use on this project, if delivered to the contractor's address. No leftover material from previous projects will be permitted for use on this project.

PART 2 - PRODUCTS

2.01 CORROSION INHIBITOR MATERIAL

- A. Provide a clean, ready-to-use, surface applied product manufactured at an ISO 9002 certified facility which will penetrate the concrete. Inhibitor material shall not permanently alter the appearance or surface texture of concrete surfaces.
- B. Corrosion inhibitor material shall be one of the products offered by the manufacturer listed below. Substitute materials or manufacturers may be allowed, but only as approved by Engineer, and in accordance with applicable provisions in the Bid Documents
- 1) Evonik – Protectosil CIT
 - or
 - 2) Approved Equal
- C. All corrosion inhibitors applied shall contain fugitive dye to demonstrate complete and thorough application to surface.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine all concrete surfaces to assure that conditions are acceptable for application of the approved corrosion inhibitor. All concrete deck and/or concrete repair areas shall be cured a minimum of 28 days prior to application of approved corrosion inhibitor unless otherwise approved in writing by Manufacturer and as accepted by the Engineer. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Protection: Unless inhibitor does not affect adhesion of sealants, paints and patching materials all adjacent surfaces shall be protected as necessary in accordance with the manufacturer's recommendations. Follow the manufacturer's recommendations regarding condition of concrete surfaces before, during and after application.

B. Surface Preparation:

- 1) All joint sealants and patching of concrete surfaces shall be performed and fully cured before application of approved corrosion inhibitor. If directed or otherwise specified, apply corrosion inhibitor to routed cracks prior to application of approved sealant materials. Contractor shall verify with manufacturer of corrosion inhibitor if materials utilized are fully compatible prior to beginning work.
- 2) Prior to application of corrosion inhibitor, concrete surfaces shall be dry and cleaned of all dust, dirt, debris, grease, oil, grout, mortar, and other foreign matter. Concrete patches and all existing surfaces shall be shot-blasted clean or as otherwise recommended in writing by the corrosion inhibitor manufacturer and as approved by the Engineer.

3.03 FIELD QUALITY CONTROL

- A. Test Applications: Before application of inhibitor will be accepted, a test panel will be applied to the concrete to verify performance under the warranty provisions.

3.04 APPLICATION

- A. Product shall be applied as supplied by the manufacturer without dilution or alteration.
- B. Corrosion inhibitor shall be applied in accordance with the use of spray, brush, or roller as per manufacturer's recommendations as approved by the Engineer. Corrosion inhibitor shall be applied at a net coverage rate of 75 to 100 ft²/gallon. Material shall be applied in two to three equal coats, as directed by the manufacturer upon its review of the test application results. Separate coats shall be applied with a minimum one hour dry time between coats.
- C. Follow manufacturer's recommendations concerning protection of glass, metal and other non-porous substrates. Contractor will be responsible to clean all surfaces that are contaminated by the corrosion inhibitor.
- D. Follow manufacturer's recommendation concerning protection of plants, grass and other vegetation. Contractor will be responsible for replacing all plants, grass or vegetation damaged by the corrosion inhibitor.

3.05 CLEANING

- A. As Work Progresses, clean spillage and overspray from adjacent surfaces using materials and methods as recommended by corrosion inhibitor manufacturer.

- B. Remove protective coverings from adjacent surfaces when no longer needed.

3.06 COMPLETION

- A. Work that does not conform to specified requirements shall be corrected and/or replaced as directed by the Owners Representative at contractor's expense without extension of time.

END OF SECTION 03 21 00

SECTION 03 24 00

FIBROUS REINFORCEMENT IN CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 033000 – Concrete Work.

1.02 SCOPE OF WORK

- A. All concrete work used in this project shall be fiber reinforced as specified herein.

1.03 STANDARDS

- A. Testing:
 - 1. Slump - Perform conventional slump test in accordance with A.S.T.M. C143 prior to adding the fibrous reinforcement.
 - 2. Test Specimens – Fiber-reinforced concrete test specimens prepared for quality control/material acceptance shall be vibrated externally as opposed to internal rodding per the recommendations of ACI 544.
- B. Submittals:
 - 1. Sufficient data shall be submitted verifying all fibrous reinforcement physical properties as specified in Section 2.01.C inert polypropylene, twisted fibrillated bundles, length, specific gravity, modulus of elasticity, tensile strength as well as volume used as specified.
 - 2. Acceptable submittals shall be manufacturer's Sweets Engineering Catalogue and/or C.S.I. Spec-Data covering all data as specified.
- C. Acceptable Manufacturers:
 - a. “FORTA-FERRO” as manufactured by the FORTA Corporation.
(www.forta-ferro.com)
 - b. “FIBERMESH 300” as manufactured by Propex Operating Company
(www.fibermesh.com).

- c. "Grace Microfiber" as manufactured by Grace Construction Products.
(www.na.graceconstruction.com)
- d. Or approved equal.

PART 2 - PRODUCTS

2.01 MATERIAL

- A. General Description - Synthetic fibrous reinforcement to be used as secondary/temperature reinforcement in the Portland cement concrete.
- B. Areas of Use - Fibrous reinforcement to be used in new ready-mixed concrete and shotcrete mortar used in soffit repairs.
- C. Physical Properties
 - 1. Chemical: Fibrous reinforcement shall be chemically and alkali inert, virgin polypropylene.
 - 2. Configuration: Fibrous reinforcement shall be in collated fibrillated (connected screen) form and also in twisted bundle form.
 - 3. Length: The fibrous bundle length shall be a minimum of 0.75".
 - 4. Specific Gravity: 0.91
 - 5. Modulus of Elasticity: 0.70 x 10 to the 6th p.s.i.
 - 6. Tensile Strength: 70,000 p.s.i. minimum

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Volume - The fibrous reinforcement shall be used at the rate of 1.5 pounds (minimum) per cubic yard of concrete.
- B. Addition and Mixing - Fibrous reinforcement shall be added directly into the concrete either at the batch plant or at the job site. If added at the batch plant with the aggregates, typically no additional site mixing time is required. If a super-plasticizer is used, the fibrous reinforcement shall be added first. If the mixing drum contains less than 50% of capacity (i.e. 4 cubic yards in a 10 cubic yard capacity drum), back the concrete up to the top of discharge and empty the fibrous reinforcement directly on top of the concrete before mixing.

- C. Placement - Fibrous reinforced concrete shall be moved and placed per standard A.C.I. recommendations. Tined rakes are prohibited as a means of moving the fibrous concrete. If pumping or shooting fibrous concrete, elevate ready mix discharge chute approximately 12" (or higher) above the pump grate or screen to improve the fibrous concrete flow into the pump.
- D. Finishing - Standard A.C.I. recommended finishing practices apply for fibrous concrete with the following additional considerations:
1. Hard-Trowel Finish - Avoid Wood trowels and floats which are abrasive to the surface - use steel/magnesium tools.
 2. Textured Finish - use stiff-bristled broom (bristles stiffer than the fibers themselves) and brush in only one direction.
 3. Cure and joint properly per A.C.I. standard recommendations.
- E. It should be noted that fibrous reinforced concrete bleeds less and slightly slower than un-reinforced concrete which should be considered during the finishing process.

END OF SECTION 03 24 00

SECTION 03 30 00

CONCRETE WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 032000 – Concrete Reinforcement
- C. Section 032400 – Fibrous Reinforcement in Concrete
- D. Section 033400 – Concrete repair using Trowel Applied Materials.

1.02 SUMMARY

- A. This Section specifies cast-in-place concrete, including formwork, mix design, placement procedures, and finishes.

1.03 SCOPE OF WORK

- A. This work shall consist of full/partial depth removal of concrete slabs at locations indicated on the drawings using jackhammers and placing new, low water-cementitious materials ratio, fiber-reinforced, air-entrained structural concrete according to the specifications.
- B. Work shall include the provision of tooled joints between new and existing concrete surfaces, and at designated locations and spacing as directed by the Engineer; Contractor shall verify placement of joints at time of concrete placement. **NOTE: Tooling of joints shall be performed at time of concrete placement; sawcutting of joints after concrete cures will not be allowed.**

1.04 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for proprietary materials and items, including forming accessories, admixtures, patching compounds, bonding grout/agent, joint systems, curing compounds, and others as requested by Consultant.

- C. The Contractor shall submit trial mix proportion with compressive strength test results to the Consultant for approval.
- D. The Testing Agency shall submit test results of cylinders for each day's testing.
- E. The Contractor shall submit the proposed pouring sequence and construction joint layout for approval by the Consultant.
- F. Minutes of pre-construction conference.

1.05 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 - 1. ACI 318, "Building Code Requirements for Structural Concrete," or AASHTO specifications.
- B. Materials and installed work may require testing and retesting at any time during progress of work. Retesting of rejected materials for installed work, shall be done at Contractor's expense.
- C. Pre-Construction Conference: Conduct conference at Project site to comply with requirements of Division 1 Section 01300 - Submittals, and Section 01400 - Quality Control Services.
- D. At the onset of the project start or at least 30 days prior to the first concrete pour, the contractor shall conduct a meeting to review the proposed mix designs and to discuss the required methods and procedures necessary to achieve the required concrete quality. The meeting will review requirements for submittals, status of coordinating work, and availability of materials. It will also establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Representatives of each entity directly concerned with cast-in-place concrete should attend the meeting, including, but not limited to, the following:
 - 1. Contractor's superintendent
 - 2. Laboratory responsible for concrete design mixes
 - 3. Laboratory responsible for field quality control
 - 4. Ready-mix concrete producer
 - 5. Concrete subcontractor, if any
 - 6. Primary admixture manufacturers
 - 7. Consultant or Owner's representative

The minutes shall include a statement by the concrete contractor indicating that the proposed mix design and placing techniques will produce the concrete quality required by these specifications.

1.06 APPLICATOR'S QUALIFICATIONS:

- A. The Contractor shall have a minimum of five years of experience in performing work similar to that shown in the drawings and specifications.
- B. The Contractor may be requested to submit a list of five projects in which similar work to that specified was successfully completed. This list shall contain the following for each of the five projects.
 - 1. Project Name
 - 2. Owner of Project
 - 3. Owner's Representative, Address and Telephone Number
 - 4. Brief Description of Work
 - 5. Cost of Portion of Work Similar to that Specified in this Section
 - 6. Total Restoration Cost of Project
 - 7. Date of Completion

PART 2 - PRODUCTS

2.01 FORM MATERIALS:

- A. Forms for Exposed Finish Concrete: N/A
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
- C. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to exposed surface.
 - 1. Provide ties that, when removed, will leave holes not larger than 1-inch diameter in concrete surface.

2.02 CONCRETE MATERIALS:

- A. Portland Cement: ASTM C 150, Type I, non air-entraining, of recent manufacture and free of lumps.
1. Use one brand of cement throughout project unless otherwise acceptable to Consultant.
- B. Normal Weight Aggregates: ASTM C-33 and as herein specified. Provide aggregates from a single source for exposed concrete. Coarse aggregates shall be clean, sound crushed stone or crushed gravel. Maximum size of coarse aggregate shall be 1/2 inch. No chert shall be permitted.
- C. Water: Potable water.
- D. Sand: ASTM C-33. Sand shall be clean and sharp.
- E. Admixtures, General: Provide admixtures for concrete that are free from chloride ions.
- F. Air-Entraining Admixture: ASTM C-260, certified by manufacturer to be compatible with other required admixtures.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Air-Mix" or "AEA-92," as manufactured by Euclid Chemical Co. (www.euclidchemical.com)
 - b. "Darex AEA" or "Daravair," as manufactured by W.R. Grace & Co. (www.na.graceconstruction.com)
 - c. "MasterAir VR 10" or "MasterAir AE 200," as manufactured by BASF Corp. Admixture Systems. (www.basf-admixtures.com)
 - d. "Sika AER," as manufactured by Sika Corp. (www.sikausa.com)
 - e. or approved equal.
- G. Water-Reducing Admixture: ASTM C 494, Type A.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:

2. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Eucon WR-75," "WAR-91" or "Eucon MR," as manufactured by Euclid Chemical Co. (www.euclidchemical.com)
 - b. "WRDA with Hycol," or "Daracem 65," as manufactured by W.R. Grace & Co. (www.na.graceconstruction.com)
 - c. "MasterPozzolith 32" or "MasterPolyheed 997," as manufactured by BASF Corp. Admixture Systems. (www.basf-admixtures.com).
 - d. "Plastocrete 161," as manufactured by Sika Corp. (www.sikausa.com)
 - e. or approved equal.

H. High-Range Water-Reducing Admixture (Super Plasticizer):
ASTM C 494, Type F or Type G.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Eucon 37," "Eucon 1037," or "Plastol 5000," as manufactured by Euclid Chemical Co. (www.euclidchemical.com)
 - b. "WRDA 19" or "Daracem 100," as manufactured by W.R. Grace & Co. (www.na.graceconstruction.com)
 - c. "MasterRheobuild 1000," as manufactured by BASF Corp. Admixture Systems. (www.basf-admixtures.com).
 - d. "Sikament 300," as manufactured by Sika Corp. (www.sikausa.com)
 - e. or approved equal.

I. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:

- a. "Eucon Retarder 75," as manufactured by Euclid Chemical Co. (www.euclidchemical.com)
 - b. "Daratard-17," as manufactured by W.R. Grace & Co. (www.na.graceconstruction.com)
 - c. "MasterSet R 100," as manufactured by BASF Corp. Admixture Systems. (www.basf-admixtures.com).
 - d. "Plastiment," as manufactured by Sika Corporation. (www.sikausa.com)
 - f. or approved equal.
- J. Certification: Written conformance to the above-mentioned requirements and the chloride ion content of admixtures will be required from the admixture manufacturer prior to mix design review by the Engineer.
- K. Fibrous Reinforcement:
- 1. Subject to compliance with requirements, provide fibrous reinforcement as per specification Section 03240.
- 2.03 RELATED MATERIALS:
- A. Moisture-Retaining Cover: Burlap and plastic complying with ASTM C 171.
 - B. Moist Curing: Curing shall be accomplished by wet curing only. A curing membrane shall only be used in floor areas if approved in writing by the Consultant or Owner's representative.
- 2.04 PROPORTIONING AND DESIGN OF MIXES
- A. Prepare design mixes for concrete by laboratory trial batch or field experience methods as specified in ACI 301, Section 4.2.3. Use an independent testing facility acceptable to the Consultant for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing.
 - B. Submit written reports to the Consultant of each proposed mix at least 15 days prior to start of work. Do not begin concrete production until proposed mix designs have been reviewed and approved by the Consultant. All mix designs shall be submitted on a Mix Design Submittal Form.
 - C. Design mix(es) to provide structural concrete with the following properties;
 - 1. 5000-psi, 28-day compressive strength, structural normal weight 145 pcf; W/C ratio, 0.40 maximum; fiber reinforcement as per Section 03240.

2.05 ADMIXTURES

- A. Use high-range water-reducing admixture (Super-plasticizer) in concrete for placement and workability.
- B. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content of 6.0% with a tolerance of plus or minus 1.0 percent.
- C. Use admixtures for water reduction and set control in strict compliance with manufacturer's directions.
- D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
 - 1. 3 inches plus or minus ½ inch, prior to addition of superplasticizing admixture.
 - 2. Not more than 8 inches final slump after addition of superplasticizing admixture.

2.06 CONCRETE MIXING

- A. Provide batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.
- B. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as specified.
 - 1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01. PREPARATION

- A. Remove concrete members as indicated on the drawing. The removal of concrete shall be performed using approved methods and prepare the concrete surfaces to receive new concrete as shown on plans and as directed by the engineer in the field.

3.02 FORMS

A. General:

1. The Contractor shall submit detailed drawings for formwork for examination by the Consultant. If such drawings are not satisfactory to the Consultant, the Contractor shall make such changes in them as may be required, but it is understood that the Consultant's examination of the drawings as submitted or corrected shall in no way relieve the Contractor of responsibility for obtaining satisfactory results.
2. All forms shall be so constructed and maintained that the finished concrete will be true to line and grade and of the shape and dimensions shown on the Plans. The forms shall be constructed so that they can be removed without injury to the concrete.
3. Forms shall be mortar-tight, sufficiently rigid to prevent distortion due to the wet concrete mix and other loads incident to construction operations, including vibration, and so constructed and maintained to prevent warping and opening of the joints due to shrinkage of the form material. Molding strips shall be placed in the corners of forms so as to produce beveled edges on permanently exposed concrete corners.
4. The interior of forms shall be treated with non-staining form oil before concrete is placed to prevent adhesion of the concrete to the form.
5. All lumber in contact with concrete shall be free from knotholes, loose knots, cracks, splits, warps or any other defects which would mark the appearance of the finished structure. Any lumber which had defects affecting its strength shall not be used.
6. In designing forms, concrete shall be considered as a liquid weighing 150 pounds per cubic foot for vertical loads and for computing the hydrostatic head for horizontal pressure. In addition, a live load allowance of 50 pounds per square foot shall be used on horizontal projections of surfaces. Forms shall be designed so that no member will develop a dead load deflection of more than 1/270th of the span.
7. Spreader blocks and non "stay-in-place" bracing shall be removed from forms before concrete is placed. In no case, shall any portion of wood be left in the concrete.

B. Forms for Permanently Exposed Surfaces:

1. Forms for concrete surfaces that will be permanently exposed to view shall be constructed of plywood or of metal panels. Wood or metal linings for forms shall be of such kind and quality, or shall be so treated or coated, that there will be no chemical deterioration or discoloration of the formed concrete surface. The type and condition of form linings, and the construction of the forms, shall be such that form surfaces will be even and uniform.
2. Plywood sheets less than five-eighth inch in thickness shall be placed against a solid wood backing of three-quarter inch sheathing. Plywood sheets five-eighth inch or more in thickness may be used without backing provided the forms are constructed to withstand pressure developed during placing of concrete without producing visible waviness between studs. Plywood sheets shall be placed so that joints are tight and with the long dimension horizontal.
3. Metal for forms shall be of such thickness that the forms will remain true to shape. Clamps, pins, or other connecting devices shall be such that they will hold the forms rigidly together in place and allow removal without injury to the concrete. Metal forms which do not present a smooth surface or line up properly shall not be used. All metal forms shall be kept free from rust, grease, or other foreign material which would discolor the concrete.
4. Form panels, either of wood or metal, shall be constructed and assembled so as to result in tight joints between the panels.

C. Form Anchorage:

1. Forms shall be securely tied together with approved rods, and braced in a substantial and unyielding manner. In general, tie rods shall be designed to also act as struts or spreader. Wood struts will not be permitted to remain in the concrete.

2. For concrete surfaces that will be permanently exposed to view, metal ties or anchorages within the forms shall be constructed so as to permit their removal to a depth of at least one and one-half inches from the face without injury to the concrete. The cavities on both sides of the concrete resulting from the removal of the end of form ties shall be filled with dry-pack Portland cement mortar having the same proportions of cement and sand as the mortar in the body of the concrete. The surface of the filling shall be left sound, smooth and even and shall match, insofar as practicable, the color of the surrounding concrete.
3. Devices which, when removed, will leave an opening entirely through the concrete will not be permitted. Wire ties shall not be used. Any parts of metal supports or spacers for reinforcement that are left in place within one and one-half inches of an exposed surface of the concrete shall be of non-rusting metal or have a non-rusting coating. If such parts are galvanized, the weight of zinc coating shall average not less than two ounces per square foot of actual surface.

D. Inspection of Forms:

1. All dimensions of forms in place shall be carefully checked before concrete is placed. Immediately prior to placing concrete, any warping or bulging shall be corrected and all dirt, sawdust, shavings or other debris removed. In narrow walls where the bottom of the forms are otherwise inaccessible, the lower boards or panels shall be left loose on the back side so that extraneous material can be removed just prior to placing concrete.
2. If during placing of the concrete, the forms show signs of bulging or sagging, they shall be properly realigned and securely braced, and, if necessary to make proper correction, the portion of the concrete affected shall be removed.
3. When forms are unsatisfactory in any way, either before or during the placing of concrete, the placing shall be suspended until the defects are corrected.
4. If the forms develop any defects, such as bulging, sagging, leakage or irregular surfaces after the concrete has been poured, that portion of the work shall be removed, reconstructed or repaired as directed by the Consultant without additional compensation to the Contractor.

3.03 PLACING FINISHING AND CURING:

A. Bonding Grout:

1. After the existing concrete surface has been cleaned, it shall be uniformly saturated by pre-wetting for 2 hours minimum. Surface must be wet to saturated surface dry (SSD) condition, and any freestanding water shall be completely removed prior to placing the bonding grout. Immediately before placing concrete, a thin coating of bonding grout shall be scrubbed into the properly prepared surface of the existing concrete. Proper workmanship shall be exercised to insure that all existing surfaces receive a thorough, even coating and that no excess grout is permitted to collect in pockets. The rate of progress in applying grout shall be limited so that the grout does not become dry before it is covered with new concrete.
2. Bonding grout for patching concrete to existing concrete shall consist of equal parts by weight of Portland cement and sand mixed in a portable mechanical mixer with sufficient water to form a stiff slurry. The consistency of this slurry shall be such that it can be applied with a stiff brush or broom to the old concrete in a thin, even coating that will not run or puddle in low spots.
3. Should the bonding grout dry before the concrete is placed, the Contractor will remove the dried grout and sandblast clean the grouted surface, at his expense, before placing fresh bonding grout.
4. When the method of concrete removal includes hydro-milling or hydro-demolition, the requirements for the use of bonding grout may be waived. Prepared surfaces shall be clean and free of laitance, foreign material and any debris encountered during surface preparation. Do not allow cement to dry and re-adhere on the surfaces. The surface shall be uniformly saturated by wetting for 4 hours (min.) Surface will be saturated surface dry (SSD) condition, and any free standing water shall be completely removed prior to concrete placement. No free moisture or puddles on the surface will be permitted or accepted.

- B. Placing and finishing: After the bonding grout has been applied, concrete shall be placed, consolidated by vibration, and shall be finished by screening and bull floating to bring the finished surface to specified elevation. The surface shall then receive a light broom finish, as directed by the Engineer. The reinforcing steel shall have a minimum concrete cover as shown on plans. The finished concrete shall be suitably protected, until the completion of the required curing period. Provide tooled joints between new and existing concrete surfaces, and at designated locations and spacing

as directed by the Engineer; Contractor shall verify placement of joints at time of concrete placement. **NOTE: Tooling of joints shall be performed at time of concrete placement; sawcutting of joints after concrete cures will not be allowed.**

C. Curing: The recommendations of ACI 308 Standard Practice for Curing Concrete, shall be followed. When water is required to wet the surface of the newly placed concrete, it shall be applied as a fine spray so that it will not mark or pond on the surface. Except where otherwise specified, the curing period shall be at least 72 hours. If high early strength concrete is approved by the Consultant, the curing period may be reduced as directed by the Consultant. If fly ash or slag is approved in the mix by the Consultant, the curing time will be extended. Curing shall be accomplished by wet curing only. The curing and sealing compound shall only be used on floor and slab areas approved by the Consultant.

1. The surface of the newly poured concrete shall be covered with wetted burlap as soon as the concrete has hardened sufficiently to prevent marring of the surface. The burlap shall overlap six inches. At least two layers of wetted burlap shall be placed on the finished surface. The burlap shall be kept saturated by means of a mechanically operated sprinkling system. In place of the sprinkling system, two layers of burlap may be substituted for one layer of burlap and impermeable covering.

The burlap sheets shall be placed so that they are in contact with the vertical faces of concrete slabs after removal of slab forms, and that portion of the material in contact with those faces shall be kept saturated with water.

2. Membrane Curing Method. Membrane curing will not be permitted unless approved in writing by the Consultant. Concrete at these locations shall be cured by another method as specified above.

After the concrete has been finished, the surface shall be cured with the specified curing compound. The seal shall be maintained for the specified curing period. The vertical faces of concrete slabs shall, likewise, be sealed immediately after the forms are removed. This high solids curing and sealing compound shall be applied at a maximum coverage rate of 250 square feet per gallon. These applications shall be made with mechanical equipment. At locations where the coating is discontinuous or where pinholes show or where the coating is damaged due to any cause and on areas adjacent to sawed joints, immediately after sawing is completed, an additional coating of membrane curing compound shall be applied at the rate of one gallon per 250 square feet.

3. The Consultant may order curing by another method specified herein if unsatisfactory results are obtained with a curing compound. Prior to starting The Work, the Contractor shall have available, at the site of The Work, supply of one of the other approved curing materials sufficient for curing one day's production.
4. The Contractor's construction operations including the management of traffic, shall be such as to avoid damage to the coatings of curing compound for period of not less than the curing period specified. Any curing compound that is damaged or that peels from the concrete surface within the curing period specified, shall be repaired by the Contractor without delay and in an approved manner. No additional compensation will be allowed to the Contractor for performance of this work.

3.04 REMOVAL OF FORMS:

- A. General: Formwork may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 72 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

3.05 REUSE OF FORMS

- A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable to Consultant.

3.06 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with bonding grout or proprietary repair products immediately after removal of forms, when acceptable to Consultant.

1. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar before bonding grout has dried.
 2. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surface texture of surrounding concrete. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- B. Repair of Concrete Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Consultant. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry-pack mortar, or precast cement cone plugs secured in place with bonding agent.
1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

3.07 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General: The Owner will employ a testing laboratory to perform tests and to submit test reports.
- B. Sampling and testing for quality control during placement of concrete may include the following, as directed by Consultant.
- C. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 1. Slump: ASTM C 143; one test at point of discharge for each truck delivering the concrete; additional tests when concrete consistency seems to have changed.
 2. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each truck of air-entrained concrete.

3. Concrete Temperature: Test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and each time a set of compression test specimens is made.
 4. Compression Test Specimen: ASTM C 31; one set of 6 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cure test specimens are required.
 5. Compressive Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. more than the first 25 cu. yds. of each concrete class placed in any one day; one specimen tested at 3 days, two specimen tested at 7 days, 2 specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 6. When frequency of testing will provide fewer than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
 7. When total quantity of a given class of concrete is less than 50 cu. yds., Consultant may waive strength test if adequate evidence of satisfactory strength is provided.
 8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 9. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.
- D. Test results will be reported in writing to the Consultant, Ready-Mix Producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for 7 day tests and 28 day tests.
- E. Nondestructive 3-day Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

- F. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Consultant. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests when unacceptable concrete is verified.

END OF SECTION 03 30 00

SECTION 03 34 00

CONCRETE REPAIR USING TROWEL APPLIED MATERIALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to this Section.
- B. Section 033000 – Concrete Work.

1.02 SCOPE OF WORK:

- A. This work shall consist of the removal of existing unsound concrete to required depth and the installation of a trowel applied, fast-setting cement mortar at locations indicated on drawings and/or at other locations designated by the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. The fast-setting polymer repair mortar shall achieve a compressive strength of 5,000 psi in 28 days. The products approved under this section are as follows.
 - 1. Horizontal Repair Mortar:
 - a. “MasterEmaco T 310 CI” as manufactured by BASF Construction Chemicals, LLC (800) 433-9517.
 - b. “MasterEmaco S 440 CI” as manufactured by BASF Construction Chemicals, LLC (800) 433-9517.
 - c. “SikaTop 122 Plus” as manufactured by Sika Corporation (800) 933-7452.
 - d. “Concrete-Top Supreme” as manufactured by Euclid Chemical Company (800) 321-7628.
 - e. "MasterEmaco T 1060 Rapid Mortar" as manufactured by BASF Construction Chemicals, LLC (800) 433-9517.
 - f. or approved equal.

2. Vertical and Overhead Repair Mortar:
 - a. "MasterEmaco S 488 CI" as manufactured by BASF Construction Chemicals, LLC (800) 433-9517.
 - b. "SikaRepair SHB" as manufactured by Sika Corporation (800) 933-7452.
 - d. "Verticoat Supreme" as manufactured by Euclid Chemical Company (800) 321-7628.
 - e. "MasterEmaco N 425" as manufactured by BASF Construction Chemicals, LLC (800) 433-9517.
 - f. or approved equal.

PART 3 - EXECUTION

3.01 SURFACE PREPARATIONS:

- A. All loose and unsound concrete shall be removed with small chipping hammers. Remove concrete a minimum of 3/4" beyond the reinforcing steel.
- B. The surface shall be blown clean with compressed air to assure that all loose and hollow concrete is removed. The reinforcing steel shall be sandblasted to remove all rust.

3.02 PLACING, FINISHING AND CURING:

- A. Apply patching material as follows and in accordance with manufacturer's recommendations.
- B. Saturate the surface dry with water so that it maintains a dark gray color one half hour before placing.
- C. Scratch a base coat firmly into the dampened surface and apply the balance of the patch. Consolidate the mortar for density. For deep patches, add recommended filler and apply the material in lifts, allowing it to stiffen enough between lifts to support its own weight. For repairs over 4 inches deep, steel ties shall be provided to aid in weight support. Maximum filler addition to be 1 part filler to 2 parts mortar material by volume. The surface shall be troweled and brushed to match surrounding concrete.
- D. The finished patch shall be cured for at least 48 hours. Keep damp with water or coat with a water-based curing and sealing compound conforming to ASTM C1315 as recommended by the polymer repair mortar manufacturer.

- E. In hot weather, the surface shall be kept cool by shading. Use cold liquid for mixing. Work material rapidly since heat accelerates set. Cure immediately. In cold weather, do not make repair if temperature is expected to fall below freezing within 48 hours of placing. The patches must be kept at a minimum of 60 degrees F. for 72 hours for proper curing.

3.03 TESTING:

- A. The patched areas shall be sounded with a chain drag and/or hammer after 7 days after concrete placement; any hollowness detected shall be corrected by the Contractor by removing and replacing the patch at no extra cost to the Owner.

END OF SECTION 03 34 00

SECTION 03 34 50

CONCRETE REPAIR USING FORM AND PUMP MATERIALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and all Divisions of the Specifications apply to this Section.

1.02 SCOPE OF WORK:

- A. This work shall consist of the removal of existing unsound concrete to required depth and the installation of a prepackaged pump and pour repair material at locations indicated on drawings and/or at other locations designated by the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. The pump and pour repair material shall achieve a minimum compressive strength of 5,000 psi in 28 days. The products approved under this section are as follows.
 - 1. “MasterEmaco S477 CI, MasterEmaco S440 and S440 CI” as manufactured by BASF Building Systems (www.buildingsystems.basf.com).
 - 2. “Sikacrete 211 SCC Plus or SikaTop 111 Plus” as manufactured by Sika Corporation (www.sikausa.com).
 - 3. “FormFlo P-38 or FormFlo P-51” as manufactured by J.E. Tomes & Associates (www.jetomes.com).

PART 3 - EXECUTION

3.01 SURFACE PREPARATIONS:

- A. Saw cut the perimeter of the repair area to a nominal depth of 1/2”. Take precautions in areas likely to contain top reinforcing not to cut any reinforcing steel or post-tensioning strands.
- B. All loose and unsound concrete shall be removed with small chipping hammers to provide a minimum 1/4” substrate profile. Remove concrete a minimum of 3/4” beyond the reinforcing steel.

- C. The surface shall be blown clean with compressed air to assure that all loose and hollow concrete is removed. The reinforcing steel shall be sandblasted to remove all rust. All measures must be taken to prevent flash rusting from occurring to the reinforcing steel.
- D. Forms shall be watertight. Apply a suitable form release to the forms.

3.02 PLACING, FINISHING, AND CURING:

- A. Apply repair material as follows and in accordance with manufacturer's recommendations.
- B. Mix the repair material according to manufacturer's recommendations. Follow the manufacturer's guidelines for extending the repair mortar by adding aggregate if required.
- C. Saturate the surface with water and allow to dry so that there is no standing water and the surface maintains a dark gray color one half hour before placing.
- D. Vibrate form while pumping repair material using a variable pressure pump. Do not overpump so that the forms deflect.
- E. Cure the repaired area as recommended by the repair mortar manufacturer.

3.03 TESTING:

- A. The patched areas shall be sounded with a hammer after 7 days after concrete placement; any hollowness detected shall be corrected by the Contractor by removing and replacing the patch at no extra cost to the Owner. The contractor shall provide access, at their expense, for the Engineer to sound all repaired areas.

END OF SECTION 03 34 50

SECTION 05 50 00

MISCELLANEOUS METALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 specification Sections apply to the work of this section.
- B. Section 033000 – Concrete Work.
- C. Section 033400 – Concrete Repair using Trowel Applied Materials

1.02 DESCRIPTION OF WORK

- A. The extent of Miscellaneous Metal items are typically shown on the drawings or called for in the specifications, and specified herein to include, but not be limited to, the following:
 - 1. Fabrication and installation of the handrail/guardrail systems throughout the stair systems,
 - 2. Fabrication and installation of miscellaneous metal systems and components throughout the stair systems.
 - 3. Fabrication and installation of the rail systems along the interior and exterior parapet and wall openings.
- B. Work shall include the submission of shop drawings; Shop Drawings shall be stamped by a Professional Engineer registered in the State of Connecticut. Reference Part 1.04.B for additional information.

1.03 QUALITY ASSURANCE

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to verify and supplement dimensions shown on Repair Drawings, where possible. Do not delay job progress; allow for trimming and fitting wherever taking field measurements before fabrication might delay work.
- B. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Materials shall be properly marked and match-marked where field assembly so requires. The sequence of shipment shall be such as to expedite and minimize the field handling of materials.

1.04 SUBMITTALS

- A. Manufacturer's Data: Submit manufacturer's specifications, anchor details and installation instruction for products to be used in the fabrication of miscellaneous metal work, including painting products.
- B. Shop Drawings: **Submit shop drawings for fabrication, installation and erection of steel systems and components. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items. Provide templates for anchor bolt installation. Fabrication shall not proceed until shop drawings have been reviewed. Fabrication, assembly, installation and erection shall conform to reviewed and accepted shop drawings. Shop Drawings shall be stamped by a Professional Engineer registered in the State of Connecticut.**
- C. Calculations: As required, submit calculations proving metal systems performance and compliance with specified loads with stamp of licensed Professional Engineer registered in the State of Connecticut. Shop Drawings shall include calculations with all design criteria, element forces, and sizing.

1.05 WARRANTY

- A. The General Contractor shall provide a Certificate for 5-year Corrective Period to cover repairs due to defects in materials and workmanship associated with work covered under this Section of the Technical Specifications.

PART 2 - PRODUCTS

2.01 MATERIALS AND COMPONENTS

- A. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
- B. Steel Plates: ASTM A36 unless noted otherwise.
- C. Steel Angles at Expansion Joint shall be hot-dip galvanized: ASTM A153.
- D. Steel Plates to be Bent or Cold Formed: ASTM A283, Grade C.
- E. Concrete Inserts: Threaded type, galvanized ferrous castings, either malleable iron ASTM A47 or cast steel ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.

- F. Non-shrink Nonferrous Grout: Five-Star Non-Shrink Grout, or approved equal.
- G. All Miscellaneous metal components shall be factory hot-dipped galvanized and any abrasions shall be field corrected.

2.02 FASTENERS

- A. General: Provide zinc-coated fasteners unless otherwise noted. Select fasteners for the type, grade and class required.
- B. Bolts and Nuts: Regular hexagon head type, ASTM A307-86a, Grade A.
- C. Lag Bolts: Square head type, FS FF-B-561C-70.
- D. Machine Screws: Cadmium plated steel, FS FF-S-92B-75B-75.
- E. Plain Washers: Round, carbon steel, FS FF-W-92B-74B-74.
- F. Toggle Bolts: Tumble-wing type, FS FF-B-588C-74, type, class and style as required.
- G. Lock Washers: Helical spring type carbon steel, FS FF-W-84A-69.

2.03 PAINT

- A. Metal Primer Paint: Themec No. 4-55 Versare, Dupont No. 67-746, PPG No. 6-20, or approved equal. Primer selected must be compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Division 9.
- B. Galvanizing Repair and Primer Paint: Zinc dust, zinc oxide, alkyd paint conforming to FS TT-P-641, Type II.

2.04 FABRICATION, GENERAL

- A. Workmanship:
 - 1. Fabrication: Fabricated and assemble in the shop to the greatest extent possible. Locate field joints in assemblies at concealed locations. Detail assemblies to minimize field handling and expedite erection.
 - 2. Handling: Fabricate with exposed surfaces smooth, and square. Use special care in handling and shipping both before and after galvanizing and shop painting.

3. Piece Marks Hidden: Fabricate such that piece marks are fully hidden in the final structure or made with such media to permit full removal after erection.
4. Mill Mark Removal: Fabricator shall deliver steel with no mill marks (stenciled, stamped, raised etc) in exposed locations. Mill marks shall be omitted by cutting of mill material to appropriate lengths where possible. Where not possible, the fabricator can fill and/or grind to a smooth surface finish.
5. Grinding of sheared edges: Fabricator shall grind all edges of sheared, punched or flame-cut steel to smooth exposed rough edges a radius of approximately 1/32".
6. Rolled Members: Member specified to be rolled to a final curved shape shall be fully shaped in the shop and tied during shipping to prevent stress relieving. Distortion of the web or stem, and of outstanding flanges or legs of angles shall be visibly acceptable to the Architect from a distance of 20 feet under any lighting condition determined by the Architect. Tolerances for the walls of rectangular or circular HSS members after rolling shall be the specified dimension $\pm 1/2$ ".
7. Seal weld open ends of round and rectangular hollow structural section with 3/8" closure plates. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations exposed to weather.
8. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections grind exposed welds smooth and flush to match and blend with adjoining surfaces.
9. Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in finished product. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.
10. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head (countersunk) screws or bolts.
 - a. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

- b. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.

B. Galvanizing:

- 1. Provide a zinc coating for those items shown or specified to be galvanized, as follows:
 - a. ASTM A153 for galvanizing iron and steel hardware.
 - b. ASTM 123 for galvanizing rolled, pressed and forged steel shapes, plates, bars and strip 1/8 thick and heavier.
 - c. ASTM A386 for galvanizing assembled steel products.

C. Shop Painting:

- 1. Shop paint miscellaneous metal work except surfaces and edges to be field welded and members or portions of members to be embedded in concrete or masonry which are galvanized, unless otherwise specified.
- 2. Remove scale, rust and other deleterious materials before applying shop coat. Clean in accordance with SSPC SP-3-63 "Power Tool Cleaning" to remove all scale, rust, and foreign matter after first solvent cleaning to remove all oil and grease.
- 3. Remove oil, grease and similar contaminants in accordance with SSPC SP-1 63 "Solvent Cleaning".
- 4. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions, and at a rate to provide uniform dry film thickness of 2 to 4 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.
- 5. Apply one shop coat to fabricated metal items, except apply two coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

2.05 MISCELLANEOUS METAL FABRICATIONS

A. Rough Hardware:

- 1. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel shapes as required.
- 2. Manufacture or fabricate items of sizes, shapes and dimensions required.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. The erector shall check all members upon delivery for twist, kinks, gouges, or other imperfections which might result in rejection of the appearance of the member. Coordinate remedial action with fabricator prior to erecting steel.

3.02 PREPARATION

- A. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.03 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, and other connectors as required.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry or similar construction.
- C. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrications, and are intended for bolted or screwed field connections.
- D. Field Welding: Comply with AWS Code for procedures of manual shielded metal arc-welding, appearance and quality of welds made, and methods used in correcting welding work.
- E. Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections and abraded areas of the shop paint on miscellaneous metal is specified in Section 99000 of these specifications.

END OF SECTION 05 50 00

SECTION 07 12 00

TRAFFIC BEARING WATERPROOFING MEMBRANE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 07 92 00 – Sealants and Caulking.

1.02 SCOPE OF WORK

- A. Work shall consist of the provision of all labor, material and equipment required for the installation of a new waterproofing membrane system. Traffic bearing waterproofing membrane installation shall be performed by a manufacturer-certified waterproof membrane installation contractor and shall be installed in strict accordance with manufacturer's installation instructions as approved by the Engineer.

Contractor shall note that application of the new traffic bearing membrane shall be based upon the horizontal projection of the work; all vertical surfaces shall be incidental to the work, and therefore, included in the Contract Price. Membrane shall turn up vertical surfaces (i.e. perimeter walls, columns, curbs, etc.) a minimum of 6"; Contractor shall coordinate all terminations in the field with the Engineer.

Contractor shall note that Work shall also consist of replacing all control/construction joint sealants as well as replacing all cove joint, all as required by the manufacturer or otherwise directed by the Engineer, as it becomes exposed during the work, for the subsequent installation of the new membrane; Contractor shall note, however, that where cove joints are found lacking (upon exposure), work shall include installation of new cove joint regardless. Joints shall be tooled and/or routed as necessary to provide the profile required for installation of an approved two-component polyurethane sealant material in strict accordance with manufacturer's recommendations as approved by the Engineer. ***Contractor shall note that all sealant work shall consist of the installation of non-sag polyurethane sealant (use of self-leveling polyurethane sealant shall be prohibited) and shall be incidental to the installation of the membrane system.***

Contractor shall note that Work shall include addressing any shallow-depth deviations in the concrete surface, not otherwise addressed by Bid Item 2.A. *These shallow-depth repair locations, typically considered addressable by installation of a leveling course in accordance with the manufacturer's recommendations, shall be reviewed by the manufacturer and approved by the Engineer prior to start of work.*

- The Installation of a New Heavy-duty Membrane System in accordance with the "Heavy-Duty" requirements of the Specifications,
- Installation of Shallow-Depth/Leveling Course.

1.03 GENERAL

- A. The work of this Section includes, but is not limited to, surface preparation, installation of a liquid applied elastomeric membrane system to provide a waterproof, chemical and abrasion resistant non-skid traffic bearing topping.
- B. Examine existing surfaces and verify existing conditions. Determine acceptability of the concrete surfaces and preexisting waterproofing membrane scheduled to be repaired and notify, in writing, acceptance of these surfaces to be coated or otherwise repaired. Verify dimensions as no extras will be allowed for inconsistency in dimensions.
- C. Cleaning and preparation of existing surfaces to receive materials shall be the Contractor's responsibility. Prepare surfaces as specified hereinafter and as recommended by manufacturer of the material selected.
- D. Provide and maintain barricades and traffic control at special coating areas during installation and curing period for vehicular and pedestrian traffic.

1.04 QUALIFICATIONS

- A. Work specified herein shall be performed by and be the responsibility of the Installation Contractor authorized, approved and qualified by the manufacturer of materials used; having necessary equipment and facilities to fulfill requirements of the manufacturer and this section.
- B. Manufacturer Qualifications: Manufacturer shall provide evidence showing that the specified materials have been manufactured by the same source and successfully installed on a yearly basis for a minimum of ten years on projects of similar scope and complexity. Manufacturer to be ISO 9001 certified.

- C. Installer Qualifications: Waterproofing installer shall demonstrate qualifications to perform the work of this Section by submitting the following documentation:
1. Licensing by the waterproofing manufacturer as an applicator of the product to be used.
 2. List of at least five projects (with reference names and phone numbers) satisfactorily completed under the current company name, of similar scope and complexity to this project. Previous experience submittal shall correspond to specific membrane system proposed for use by applicator.
 3. A minimum of five (5) years in business under the same name.

1.05 SUBMITTALS

- A. Manufacturer's Data: Submit specifications, installation instructions and general recommendations by the manufacturer of fluid applied waterproofing materials. Include manufacturer's certified test data showing compliance with the requirements. Provide copy of license agreement between manufacturer and installer indicating division of warranty responsibility.
- B. Shop Drawings: Submit shop drawings showing large scale details of all edge terminations, joint treatments, penetration or projections and flashing conditions.
- C. Samples: Submit complete samples of each membrane system to be used. Sample shall be applied to plywood or similar rigid material.
- D. As-Built Information: Upon completion of the work and prior to final payment, submit two (2) maintenance manuals identified with the project name, location and date, types of coating systems applied and drawings indicating the types of coating systems and their location in the structure. Include a schematic drawing of each membrane type which clearly identified the successive coats or layers of the membrane system. Identify each coat or layer by dry film thickness or application rate and by manufacturer's reference number or name which specifically identifies the product used for each coat. Include recommendations for routine care and maintenance. Provide list of contractors nearest the project location who are qualified to perform repairs to the membrane. Identify common causes of damage and include instructions for temporary patching until permanent repairs can be made by qualified personnel.

- E. VOC Requirements: Where applicable, the manufacturers shall ensure that all components of specified products do not exceed volatile organic compound (VOC) limits of 400 g/l. Projects in the following locations are affected by this requirement.

Maricopa County (Arizona), California, Connecticut, Delaware, Maryland, New York, New Jersey, Pennsylvania, Washington DC and Arlington County, Alexandria, Fairfax County, Fairfax, Loudoun County, Falls Church, Prince William County, Manassas, Manassas Park, Stafford County (all northern Virginia).

1.06 DELIVERY AND STORAGE

- A. Deliver materials to project site in sealed, original packages or containers bearing name and brand of manufacturer. Each container shall have manufacturer's printed label. Materials shall be stored in the area designated by the General Contractor or Consultant.
- B. Upon delivery, notify the Consultant. Only materials brought to area and approved may be used.
- C. Store materials in single place designated by Owner and/or Consultant. Keep storage place neat and clean. Cleaning rags and waste materials shall be deposited in metal containers having tight covers or removed from the garage each night. Every precaution shall be taken to avoid danger of fire. Provide dry chemical or CO2 fire extinguishers in areas. Allow no smoking or open containers or solvents. Store all solvents in proper safety cans.
- D. Empty containers used on job shall have labels canceled and shall be marked as to reuse.

1.07 JOB CONDITIONS

- A. A specified coating shall not be applied if weather is too cold, raining, snowing or if any other conditions exist that will not permit proper application or curing of coating. Follow manufacturer's written directions. Humidity should not deviate from acceptable ranges during application and curing. Protection required for proper installation and curing shall be the responsibility of the Coating Contractor and shall be reflected in Bid.

- B. Protect adjacent surfaces and materials with covering, duct tape and drop cloths as required to keep adjacent surfaces free of coating. Upon completing, remove protection and clean. Surfaces soiled or damaged by special coating shall be cleaned or replaced at no extra cost to Owner.
- C. Proceed with the installation of waterproofing only after the substrate construction has been completed and cured and after penetrating components have been installed, so that the membrane will not be penetrated or damaged by subsequent work.
- D. When payment for elastomeric deck coating is based on area of application, the area used in calculations shall be horizontal surfaces only.

1.08 WARRANTY

- A. Materials Manufacturer and Installation Contractor shall be jointly and severally responsible and shall submit an affidavit signed by both parties warranting the installed system and repaired areas for a minimum period of five years from date of final completion.

The Installer shall repair or replace membrane which leaks water, deteriorates excessively, wears prematurely or otherwise fails to perform as required within the guarantee period, due to failure of materials or workmanship. The guarantee shall include an agreement to remove and replace other work which has been superimposed on elastomeric waterproofing work, such as traffic markings, as required to repair or replace the waterproofing system. Any required repairs under the warranty shall specify that all costs associated with the provision and coordination of the implementation of an Owner approved traffic control plan to redirect vehicular and pedestrian traffic around active work zone.

PART 2 - PRODUCTS

2.01 SOURCE OF MATERIALS

- A. The waterproofing membrane system shall be a complete system of compatible materials, and shall be compatible with all preexisting membrane areas to be repaired. Completed system as installed shall be designed by the manufacturer to produce a waterproofing, non-skid traffic-bearing and chemical resistance surface. Systems approved for use under this section shall be one of the following:

Heavy-Duty Applications: These systems are designed for parking structures that receive heavier volumes of vehicular traffic and are subject to more significant wearing. Contractor shall verify all system requirements with manufacturer prior to start of work.

1. “Auto-Gard E,” as manufactured by Neogard (214) 353-1689.

The system consists of an epoxy or urethane primer applied to the cleaned concrete surface at a minimum rate of 300 square feet per gallon no more than 24 hours prior to base coat application; when cured, apply FC7500/7960 urethane base coat at an average thickness of 20 mils dry (20 mils wet). When cured, apply 70714/70715-09 epoxy wear coat at an average thickness of 16 mils dry (16 mils wet) and immediately broadcast #16 aluminum oxide aggregate at a rate of 15 to 20 pounds per 100 square feet in all areas. Remove excess aggregate. Apply FC7540/7964 urethane top coat at an average thickness of 14 mils dry (16 mils wet).

2. “MasterSeal Traffic 2530”, as manufactured by BASF Building Systems (952) 496-6000.

The system consists of the 100% solids polyurethane primer (MasterSeal P 255) applied at a minimum rate of 300 square feet per gallon. Apply MasterSeal M 265 Base Coat (2 component polyurethane 100% solids) at a rate of 25 mils dry (25 mils wet). Allow base to cure and then apply MasterSeal 350 epoxy at a rate of 20-25 mils dry and broadcast Dynagrip #9 aggregate to saturation at a rate of about 1 pound per 1 square feet in all areas. Remove excess aggregate. Apply MasterSeal TC 295 Top Coat (2 component polyurethane 100% solids) at 15-20 mils wet.

B. WATERPROOFING MEMBRANE (Base Coat)

The base coat/intermediate coat (membrane) shall meet the following minimum performance criteria:

1. Minimum Tensile Strength (ASTM D412):
 - Base Coat - 1,000 psi
 - Intermediate Coat - 600 psi
2. Minimum Elongation (ASTM D412):
 - Base Coat - 350%
3. Minimum Adhesion (ASTM D903):
 - Base Coat - 20 psi

4. A light application of primer compatible with the elastomeric seal coat shall be applied onto the clean, dry concrete surface. The elastomeric coating shall be applied uniformly to the primed surface. The elastomeric base coat shall be applied in strict accordance with manufacturer's requirements for the system and verified by wet mill thickness testing (minimum one test per 500 square feet).

The coating shall be allowed to cure adequately. Special treatment shall be provided at all construction joints, cove joints and at all cracks over 1/16" in width. This special treatment shall be included in the bid price for the waterproofing membrane installation. The coating shall also be applied at base of columns, walls and curbs to produce a 6" high base.

C. WEARING COURSE

- (1) A compatible wearing course shall be applied over the elastomeric coating in accordance with the manufacturer's instructions. Selected and approved aggregate shall be broadcast evenly over the surface and fall on the surface in vertical direction so as not to displace uncovered coating.
- (2) Aggregates should be spread to an excess thickness until surface appears dry. After the coating has sufficiently cured, the excess aggregates shall be removed and the tie coat shall be applied to the surface.

D. LEVELING COURSE (IF REQUIRED)

1. A compatible leveling course shall be applied directly onto the concrete surface after cleaning and prior to application of the primer. The leveling course is intended to fill and smooth pop-outs, scaling, depressions and pitting in the concrete surface due to abrasion, finishing problems or other existing conditions. Products listed below should be confirmed with the selected manufacturer's instructions.
 - a. Neogard: Leveling of the concrete surface prior to membrane system application in order to achieve a suitable substrate shall be performed using a Neogard 70714/70715-09 epoxy and sand mixture or FC base coat, depending on profile of concrete.
 - b. BASF: Leveling of the concrete surface prior to membrane system application in order to achieve a suitable substrate shall be performed using MasterSeal 350 two component, fast-setting 100% solids epoxy, extended with 16 - 30 sieve aggregate as needed.

E. TOTAL SYSTEM REQUIREMENTS

1. Minimum System Thickness without Aggregate (Dry mils) in parking areas shall be 40 mils
2. Minimum System Thickness without Aggregate (Dry mils) in heavy wear areas shall be 52 mils
3. All systems shall be wear balanced for parking stall and drive aisle applications according to the manufacturer's recommendations and in accordance with the above minimum mil thicknesses.
4. Color of Wearing Course/Wearing Surface shall be as selected by the Consultant/Owner.

PART 3 - EXECUTION

3.01 CONDITION OF SUBSTRATE

A. Membrane Repair:

1. Verify areas where preexisting waterproofing membrane is to be repaired with the Engineer and examine the condition of the preexisting membrane where waterproofing membrane repair work is to be performed. Do not proceed with the work until unsatisfactory conditions have been corrected and approved by the manufacturer's representative and Engineer.
2. Installation of products constitutes Installers and Manufacturer's acceptance of existing conditions.

B. New Membrane Installation:

1. Verify areas where new waterproofing membrane is to be installed and examine the condition of the concrete substrate where new elastomeric waterproofing membrane is to be applied. Do not proceed with the work until unsatisfactory conditions have been corrected and approved by the manufacturer's representative.
2. Installation of products constitutes Installers and Manufacturer's acceptance of existing conditions.

3.02 PREPARATION OF SUBSTRATE

A Membrane Repair:

1. Clean surface of preexisting waterproofing membrane of, dust, debris, oily materials and other substances detrimental to implementing waterproofing membrane repairs, as recommended by the waterproofing system's manufacturer. All loose, de-bonded/delaminated membrane shall be removed down to bare concrete and new waterproofing membrane installed as new.
2. Contractor shall assure in writing compatibility of waterproofing membrane materials prior to implementing repairs or recoating. All horizontal and vertical waterproofing membrane surfaces to be repaired shall be free of defects and contaminants and properly prepared to provide suitable bond between old and newly applied materials and to provide a clean uniform textured surface upon completion of repair work.

B. New Membrane Installation:

1. Clean the substrate of protrusions, dust, debris, oily materials and other substances detrimental to the work, as recommended by the waterproofing system's manufacturer.
2. Shot blast clean all horizontal surfaces to remove contaminants and to provide a clean uniform textured surface.
3. Clean vertical surfaces of column bases, spandrels, walls, protrusions, etc., to provide a clean uniform textured surface.
4. Install cant strips and similar accessories as shown and as recommended by the waterproofing manufacturer (even though not shown) in the manner recommended by the manufacturer.

3.03 FLASHINGS, PRIMERS AND JOINT CONTROL

- #### A. Cracks/Construction Joints:
- At locations of possible movement in the substrate construction, including cracks which have developed and construction joints, prepare the substrate to increase the fluid applied waterproofing capability for bridging the movement without failure. Use only products which have been determined to be compatible with the elastomeric waterproofing.

- B. Fill voids and non-moving cracks and joints in the substrate with sealant or other compounds as recommended by the waterproofing manufacturer for compatibility. Fill rough areas of substrate (rough within limitations specified by the manufacturer) with a feathered-out coating of elastomeric waterproofing, squeegee-applied to form a smooth top surface.
- C. Prime substrate as recommended by the waterproofing system's manufacturer.
- D. Mask off adjoining surfaces not to receive fluid applied waterproofing, to effectively prevent the spillage or migration of materials outside the membrane area.

3.04 INSTALLATION

- A. Manufacturer's Technical Representative: Start the installation of elastomeric waterproofing membrane, only in the presence and with the advice of the manufacturer's technical representative. A series of four (4) wet mill gauge tests shall be conducted for every 1000 sq. ft. on the first day of installation in the presence of the representative to ensure proper coverage rate.
- B. General: Comply with manufacturer's instruction, except where more stringent requirements are shown or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
- C. Mix separately packaged components in accordance with manufacturer's instructions.
- D. Apply the elastomeric membrane to the primed deck within the time specified by the manufacturer.
- E. Apply a uniform coating of cold applied elastomeric waterproofing to the substrate and adjoining surfaces indicated to receive the membrane.
 - 1. Apply coating by hand, complying with manufacturer's recommendations regarding horizontal and vertical surfaces.
 - 2. Provide waterproof membrane at base of columns, spandrels, to produce a 6" high base. Curb surfaces shall be considered floors and waterproofed unless otherwise noted.
- F. Wearing Surface: Apply top coat in one or two applications to achieve the specified dry film thicknesses.

1. While coating is still fluid, uniformly broadcast aggregate over the surface at the specified rates.
 2. After top coat has cured, remove all excess aggregate from the deck surface.
 3. Apply a tie coat to the cured surface to encapsulate the top layer of aggregate.
- G. Permit cold applied membrane to cure without delay, and under conditions which will not contaminate or deteriorate the fluid applied waterproofing material. Block off traffic and protect membrane from physical damage.

3.05 CLEAN-UP

- A. Upon completion of work, carefully examine entire installation. Correct all defective or damaged work.
- B. Upon completion, or at such other times as directed, remove all surplus materials, cartons, rubbish and debris resulting from these operations and legally dispose of off-site.

3.06 PERFORMANCE REQUIREMENTS

- A. It is required that traffic topping be watertight and not deteriorate excessively under normal weather exposure and for normal traffic conditions in applications indicated, not under manufacturer-recommended cleaning procedures, for period of warranty.
- B. It is required that traffic topping work not deteriorate under spillage of motor oil, transmission fluids, and other motor vehicle operating compounds, nor for exposure to normal ice/snow melting substances not specifically excluded by manufacturer's product information.

3.07 PROTECTION

- A. Provide protection to ensure that work will be without damage or deteriorations at time of final acceptance.

END OF SECTION 07 12 00

SECTION 07 90 50

PRESSURE EPOXY INJECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION

- A. The Contractor shall provide all necessary materials, equipment, and labor required to epoxy inject cracks at locations shown on drawings or as directed by the Consultant.

1.03 APPLICATOR QUALIFICATIONS

- A. The Contractor shall have a minimum of three years of experience performing work similar to that shown in the drawings and specifications.
- B. The Contractor shall submit a list of five projects in which similar work to that specified herein was successfully completed. The list shall contain the following for each of the five projects:
 - 1. Project Name
 - 2. Owner of Project
 - 3. Owner's Representative, Address and Telephone Number
 - 4. Brief Description of Work
 - 5. Cost of Portion of Work Similar to that specified in this Section
 - 6. Total Restoration Cost of Project
 - 7. Date of Completion of Work
- C. The sum of the costs of the five projects provided in B.5 above shall be a minimum of \$50,000.
- D. A full-time on-site supervisor shall be provided by the Contractor for the entire duration of the epoxy injection work. The supervisor shall have had a minimum of 2 years of documented supervisory experience with the products to be used. If the supervisor does not have that experience, the supplier or manufacturer of the materials shall provide a full-time qualified, certified by the manufacturer, field inspector on jobsite during the entire period of material application. The Installation

Contractor shall submit with his bid to the Consultant a proof of obtaining licenses or permits as required.

1.04 QUALITY CONTROL

- A. The materials supplier shall provide the following test data for each production run or batch of epoxy formulation to be used:
1. Tensile strength by ASTM D638
 2. Elongation at break by ASTM D638
 3. Flexural strength of ASTM D790
 4. Flexural modulus by ASTM D790
 5. Compressive yield strength by ASTM D695
 6. Compressive modulus by ASTM D695
 7. Heat deflection temperature by ASTM D648
 8. Slant shear strength by AASHTO-237

1.05 SUBMITTALS

- A. The Contractor shall submit the following to the Consultant:
1. Documentation showing compliance with the Applicator Qualifications as specified hereinbefore.
 2. Technical data sheets published by the material manufacturers for each epoxy product or formulation to be used showing that his products meet the requirements of the specifications. Technical data shall include the following:
 - a. Intended use
 - b. Pot life (neat)
 - c. Initial cure time (1000 psi)
 - d. Tack free (thin film)
 - e. Final cure (75% ultimate strength)
 - f. Tensile strengths by ASTM D638-76 (14 days)
 - g. Tensile elongation by ASTM D638-76 modified (14 days)
 - h. Flexural strength and modules per ASTM D790-71 at 24 hours, 3 days, and 7 days at 77 degrees F.
 - i. 24-hr. compressive strength by ASTM C109 modified (1 part epoxy to 3-1/4 parts aggregate)
 3. Submit safety data sheets for each product.

1.06 PRODUCT DELIVERY

- A. The product shall be delivered and handled strictly according to the manufacturer's recommendations. Any containers of the material to be used which have been opened previously shall not be accepted.

1.07 JOB CONDITIONS

- A. Existing and environmental conditions: The Installation Contractor shall examine the condition of surfaces into which the epoxy is to be injected. He shall follow the recommendations of the manufacturer with regard to limitations of the materials in various moisture and temperature levels.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The epoxy injection materials shall be a two-component, 100% solids, low viscosity, high strength epoxy resin adhesive.

One of the following approved products shall be used:

1. "Sikadur 35, Hi-Mod LV or LPL" as manufactured by the Sika Corporation (www.sikausa.com)
2. "MasterInject 1500" as manufactured by BASF (www.buildingsystems.basf.com)
3. "Eucopoly Injection Resin" as manufactured by the Euclid Chemical Company (www.euclidchemical.com)
4. or approved equal

- B. One of the following approved products shall be used to seal injection ports and cracks for injection grouting:

1. "Sikadur Injection Gel" as manufactured by the Sika Corporation.
2. "MasterEmaco ADH 327 RS" as manufactured by BASF.
3. "Euco #452 or #620 Gel" as manufactured by the Euclid Chemical Company.
4. or approved equal

- C. Aggregate:
1. Aggregate shall be clean, dry, graded, and bagged
 2. Well-rounded or spherical-shaped sand is recommended for flowability
 3. Aggregate may be graded as follows by volume:

2 parts, 12 mesh to 1 part, 80 mesh, or
3 parts, 16 mesh to 1 part, 90 mesh
 4. If the above sand is not used, 30-mesh silica sand shall be used.

2.02 MIXES

- A. Where approved by the Consultant, the Contractor may use a pre-placed aggregate technique. The ratio of binder to aggregate by volume shall be 0.8 or greater. Test data shall be submitted for conformance with the following:
1. Compressive strength by ASTM D695-76-8000 psi minimum
 2. Compressive modulus by ASTM D695-76-2.75 x 10⁶ minimum

2.03 EQUIPMENT

- A. The equipment used to inject the epoxy shall meet all of the following performance requirements:
1. Automatic proportioning of materials within the mix ratio tolerances set by the manufacturer of the epoxy material.
 2. Mix the epoxy automatically and completely in line (batch mixing will not be permitted).
 3. Inject the material under pressures recommended by the materials supplier.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION, INJECTION, AND DELIVERY SYSTEM

- A. The epoxy shall be injected into the cracks or joints only from the lower elevations of the members. The bottom, side, and top surfaces of cracked members must be sealed with a gel-consistency epoxy prior to injection, and must contain appropriate injection ports.

- B. The Contractor shall notify the Consultant of the start of the first injected cracks. In the event that unsound concrete is located in a zone along a crack, and this prevents the complete injection of the cracks, then the unsound concrete shall be removed prior to injection.
- C. The epoxy material injected into the cracks or joints shall be highly suited for this usage. The pressure injection system shall be capable of filling cracks as small as 0.002 inches in width.
- D. Where cracks to be injected have any existing sealant, waterproofing materials, or other debris in the cracks, these cracks shall be cleaned using low-pressure hot water or high-pressure water jet, as appropriate.
- E. The Contractor shall clean surfaces of excess epoxy by grinding or other appropriate means so that only the edge thickness of completed epoxy-injected cracks is noticeable. Injection ports shall not extend beyond the plane of the surfaces of the existing concrete.

3.02 PREPACKING LARGE CRACKS

- A. Where required in cracks of large thickness, the Contractor shall prepack the cracks with fine aggregates to minimize the effects of exotherm, or reduce tensile stresses caused by volume reduction during cooling of the injected epoxy.

3.03 FIELD QUALITY ASSURANCE

- A. The Contractor shall supply samples of the injection epoxy, non-sag epoxy, and epoxy mortar to the Testing Laboratory for the purpose of performing compression tests.
- B. A minimum of three samples per day of each epoxy formulation or use shall be made.
- C. Samples shall be made by placing epoxy into 3/8-in. inside diameter test tubes. The height of the sample shall be approximately 1 in. so that after trimming a cylinder of 3/8 in. diameter and 3/4" length can be obtained.

END OF SECTION 07 90 50

SECTION 07 91 00

EXPANSION JOINT SEALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 03 34 00 – Concrete Repair with Trowel Applied Materials.

1.02 SCOPE OF WORK

- A. Work shall include the removal and replacement of designated expansion joint glands.

1.03 QUALITY ASSURANCE

- A. The manufacturer and approved applicator shall provide a 5 year guarantee that the joint seal will not leak or fail from normal vehicular traffic. Any type of failure of the new joint seal which occurs within the specified warranty period shall be repaired by the Contractor at no cost to the Owner.
- B. Consult the Manufacturer's representative and establish the minimum provisions required to ensure satisfactory work. A licensed applicator with a minimum of 5 years experience on similar joints shall install the specified joint seal.

1.04 SUBMITTALS BY THE CONTRACTOR

- A. The Contractor shall submit shop drawings showing all the expansion joint details required for this particular project for approval by the Consultant in addition to Manufacturer's literature with an applicable portions deleted.
- B. Where required by jurisdiction, the Contractor shall submit test data showing that the expansion joint system (including fire barrier material) meets or exceeds fire rating requirements. Testing procedures shall be in accordance with requirements set forth or adopted by the local jurisdiction.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

All materials shall be delivered on the job and stored in a place protected from damage, moisture and exposure to the elements in exact accordance with manufacturer's instructions.

1.06 JOB CONDITIONS

Weather Conditions: Do not proceed with installation of expansion joints and sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation. Proceed with the work only when forecasted weather conditions are favorable for proper cure and strength development of the nosing material.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The expansion joint seal system shall be a complete system of compatible materials designed by the manufacturer to produce a waterproof, traffic-bearing expansion joint seal. The system shall also meet or exceed any fire rating requirements set forth by the local building code requirements.
- B. The gland elements shall be a continuous, factory extruded unit for the entire straight run length of the joint. Changes in direction or elevation shall be accomplished by factory molded elbows, tees, crosses and the like. The seal shall be turned up a minimum of 6 inches (vertically) unless otherwise shown on plans. The seal element shall not be mitered/jointed unless approved by the Consultant in writing and shall meet the following performance criteria.

Tensile Strength	ASTM D412	1,500 psi
Elongation at Break	ASTM D412	175 % (Min.)
Hardness, Type A durometer	ASTM D2240	64 ± 5

The premolded elements shall be a continuous, factory molded unit for the entire straight run length of the joint. Changes in direction or elevation shall be accomplished by factory molded elbows, tees, crosses and the like. The seal shall be turned up a minimum of 6 inches (vertically) unless otherwise shown on plans. The seal element shall be mitered/jointed at all changes in direction and shall meet the following performance criteria.

Tensile Strength	ASTM D412	250 psi
Elongation at Break	ASTM D412	500 % (min)
Hardness, Type A durometer	ASTM D2240	30+/-5

- C. Expansion joint systems approved for use in one or more applications are provided in the master list below. Due to variations in specific details of the locations, expected movement, expected traffic exposure, availability, ease of installation and existing blockout geometry, all systems are not suitable for one particular project. The Contractor shall reference the specific expansion joint detail on the specific project drawings and list of approved products shown on the drawings, including gland size, etc. for the respective condition.
- D. Epoxy-Adhered, Air-Pressurized Neoprene Expansion Joint Seal:
1. Jeene, FW-Series, model as applicable, manufactured by Watson Bowman Acme, tel: (716) 691-8162.
 2. or approved equal.
- E. Pre-compressed Impregnated Foam Expansion Joint Seal:
1. “Wabo H-Seal,” model as applicable, manufactured by Watson Bowman Acme, tel: (716) 691-8162.
 2. or approved equal.
- F. Contractor shall review specific details on drawings for each project regarding products and model numbers approved for use.

Due to various joint width openings and overall block-out dimensions, the Contractor and expansion joint supplier should verify field condition prior to bid submission and execution of the work.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Preparatory Work
1. The block-out shall be provided to the specified dimensions and acceptable to the manufacturer. The licensed installer shall additionally verify that the ‘as-built’ configuration of the block-out for the expansion joint will allow the expansion joint to be installed such that elevation differences in the vicinity of the joint and across the joint will not exceed industry and ADA-related recommendations. Any edge raveling at the joint opening or spalls shall be repaired with a suitable compound to provide a solid, square block-out.
 2. The block-out substrate shall be sandblasted clean of all contaminants and impurities immediately prior to the system installation to assure proper adhesion.

3. The membrane gland element shall be unpackaged and laid in a relaxed position to relieve any temporary set from shipment packaging prior to placement. The pre-molded element shall be wiped clean with a solvent solution such as toluene.
4. It is recommended that adjacent deck surfaces be taped off and protected to assure a clean, neat professional installation.

B. Installation

The entire installation shall be made in strict accordance with the manufacturer's written instruction.

1. Follow standard manufacturer's recommendation for installation of the material, taking into account block-out dimensions, joint width and ambient temperature conditions.

3.02 TESTING

All new expansion joint seals shall be tested. Any leaking observed shall be rectified by the Contractor and the joint shall be re-tested until no leakage is observed. It is the responsibility of the Contractor to absolutely make certain that the joints are totally waterproofed.

END OF SECTION 07 91 00

SECTION 07 92 00

SEALANTS AND CAULKING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

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

1.02 SCOPE OF WORK:

- A. Furnish labor, materials and equipment for sealing and caulking of cracks, construction or control joints and cove in the reinforced concrete structural slabs as shown on drawings or designated by the Consultant. The sealant shall be compatible with any specified waterproofing membrane base coat material.

1.03 JOB CONDITIONS:

- A. The sealant shall be installed in floor cracks, construction and/or control joints in the areas shown on drawings or designated by the Consultant. In the case of repair of existing cracks that are sealed or filled with other materials, the existing sealant material shall be raked out and the exposed concrete cleaned by sandblasting or grinding at those locations designated for repair.

1.04 FULL RESPONSIBILITY:

- A. System manufacturer will have the full responsibility for: (1) Instructing the Contractor on the required configuration of joints and (2) Reviewing and approving tooled joints constructed as a part of surface preparation prior to installing the sealant.

1.05 GUARANTEE:

- A. The Contractor shall provide a single source performance guarantee that the joint system repaired, including related work in the slab installed by the Contractor, will not leak water or de-bond from adjacent concrete for a 5 year period starting from the date of substantial completion. Any repairs required during the guarantee period starting from the date of substantial completion shall be performed by the Contractor at no additional cost to the Owner.

1.06 APPLICATOR QUALIFICATIONS:

- A. The Contractor shall have a minimum of three years of experience in performing work similar to that shown in the drawings and specifications.
- B. The Contractor shall submit a list of five projects in which similar work to that specified hereinbefore was successfully completed. The list shall contain the following for each of the five projects:
 - 1. Project Name
 - 2. Owner of Project
 - 3. Owner's Representative, Address and Telephone Number
 - 4. Brief Description of Work
 - 5. Cost of Portion of Work Similar to that Specified in this Section
 - 6. Total Restoration Cost of Project
 - 7. Date of Completion of Work

The sum of the costs of the five projects provided shall be a minimum of \$50,000.

- C. A full time on-site supervisor shall be provided by the contractor for the duration of the sealant and caulking work. This supervisor shall have had a minimum of 2 years documented supervisory experience with the products to be used.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. The sealant to be used shall be non-sag two component polyurethane sealants of the chemically curing type containing no asphalt, coal tar, or plasticizers. The joint sealant shall comply with Federal Specification TT-S-00227E, Type II, Class A, Corporation of Consultants CRD-C-506-72; ASTM C-920-79, Type M, Grade NS, Class 25.

Approved sealants are as follows:

- 1. "SikaFlex-2C-NS TG," as manufactured by Sika Corporation (www.sikausa.com)
 - 2. "Iso-Flex 881 NS Sealant" as manufactured by LymTal International, Inc. (www.lymtal.com)
 - 3. "THC-901" as manufactured by Tremco (www.tremcosealants.com)
 - 4. "MasterSeal NP 150" as manufactured by BASF Building Systems (www.buildingsystems.basf.com)
 - 5. or approved equal.
- D. The manufacturer of the sealant system used in this project shall share responsibility for all sealant work and joint preparation work in slab.

PART 3 - EXECUTION

3.01 TYPICAL SURFACE PREPARATION:

The Contractor shall either grind the surface of all cracks and construction joints designated for repair with sealant to the shape of 1/2" x 1/2" v-groove, or saw-cut a square 1/2" x 1/2" groove, grind sharp corner of groove and apply bond breaker to bottom horizontal surface. Edges of cracks or joints to be sealed shall be of sound concrete. Prior to installing sealant, surfaces shall be cleaned of foreign materials and debris, V-groove ground and primed.

3.02 RECORD OF SEALED CRACK AND JOINT LOCATIONS AND TYPES:

- A. After determining the cracks and joints to be sealed and the detail types required, the Contractor shall prepare scale shop drawings showing the sealed crack and/or joint locations and submit them to the Consultant for his approval. The Shop Drawings submitted shall be reviewed by the Consultant for the condition of the existing cracks/joints, the size/shape of the routed crack, and the type of detail selected.
- B. The Shop Drawings submitted shall be used as a record of the detail types used and the measured number of linear feet of each sealed crack. Quantities of work done on a unit price basis shall be recorded on the document and submitted to the Consultant with Request for Payment.

END OF SECTION 07 92 00

SECTION 09 01 90

ACRYLIC WATERPROOF COATING

PART 1 - GENERAL

1.1 SUMMARY

- A. This work shall consist of approved methods of cleaning vertical concrete and masonry surfaces, and miscellaneous repair/re-coat of a high-build, water-based, 100% acrylic, waterproof coating system as specified at locations that are impacted by the Work, as follows:
1. Painting of Stair Tower Surfaces; vertical and overhead surfaces (verify final color with Owner/Architect/Engineer),
 2. Painting of concrete column surfaces (verify final color with Owner/Architect/Engineer),
 3. Painting of concrete ceiling surfaces (verify final color with Owner/Architect/Engineer),
 4. Painting of concrete beam surfaces (verify final color with Owner/Architect/Engineer),
 5. Painting of concrete parapet surfaces (verify final color with Owner/Architect/Engineer),
 6. Other miscellaneous surfaces noted on the drawings or as directed by the Owner/Architect/Engineer.
- B. Related Sections:
1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.
 2. Section 099000 - Painting

1.2 GENERAL

- A. The work of this Section includes, but is not limited to, surface preparation, installation of a liquid applied elastomeric system that provides flow of vapor through the coating with a water resistant, crack bridging, chemical and mildew resistant coating.
- B. Examine existing surfaces and verify existing conditions. Determine acceptability of the surfaces and in writing notify the Consultant of acceptance. Verify dimensions as no extras will be allowed for inconsistency in dimensions.

- C. Cleaning and preparation of existing surfaces to receive materials shall be the Contractor's responsibility. Prepare surfaces as specified hereinafter and as recommended by manufacturer of the material selected.
- D. Provide and maintain barricades for special coating areas during installation and curing period for protection of pedestrian and/or vehicular traffic in the immediate area.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements

- 1. Flexibility, per ASTM D1737, 1 inch mandrel: No cracking.
- 2. Wind-Driven Rain, TT-C-555B: Passed.
- 3. Water-Vapor Permeance: 13 perms per ASTM D1653.
- 4. Carbon-Dioxide Diffusion per PR EN 1062-6:
 - a. R (equivalent air layer thickness): 1,318 feet (402 m).
 - b. Sc (equivalent concrete thickness): 39 inches (100 cm).
- 5. Accelerated Weathering at 5,000 Hours: Passes per ASTM G23, Type D.
- 6. Visual Color Change at 5,000 Hours: Passes per ASTM D1729.
- 7. Chalking at 5,000 Hours: Passes per DOT Method A and B.
- 8. Freeze/Thaw Resistance at 50 Cycles: Passed per ASTM C67.
- 9. Salt Spray Resistance: Passes per ASTM B117 at 300 hours.
- 10. Dirt Pick-Up: 92.02 percent per ASTM D3719.
 - a. After 6 months exposure: Passed.
- 11. Fungus Resistance: No growth per ASTM D3273.
- 12. Impact Resistance, per ASTM D2794:
 - a. Direct: 30 inch-pounds.
- 13. Surface Burning Characteristics, per ASTM E84:
 - a. Flame Spread: 1.
 - b. Smoke: 4.
 - c. Fuel Contribution: 7.

B. Approximate Coverage Rates: 75 to 100 square feet per gallon (1.84 to 2.46 sm per L).

C. Wet Film Thickness (WFT): 16 to 22 mils (406 to 559 microns).

- D. Dry Film Thickness (DFT): 6 to 8 mils (152 to 203 microns)

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical bulletins and MSDS on each product.
- B. Submit list of project references as documented in this Specification under Quality Assurance Article. Include contact name and phone number of person charged with oversight of each project.
- C. Quality Control Submittals: Provide protection plan of surrounding areas and non-cementitious surfaces.

1.5 QUALITY ASSURANCE

- A. Work specified herein shall be performed by and be the responsibility of the Installation Contractor authorized, approved and qualified by the manufacturer of materials used; having necessary equipment and facilities to fulfill requirements of the manufacturer and this section.
- B. Installer Qualifications: Coating installer shall demonstrate qualifications to perform the work of this Section by submitting the following documentation:
 - 1. Certification or license by the coating manufacturer as an applicator of the product to be used.
 - 2. List of at least five projects (with reference names and phone numbers) satisfactorily completed under the current company name, of similar scope and complexity to this project. Previous experience submittal shall correspond to specific membrane system proposed for use by applicator.
 - 3. A minimum of five (5) years in business under the same name.
- C. Manufacturer Qualifications: Company with minimum 15 years of experience in manufacturing.
- D. Field Sample:
 - 1. Install at Project site or pre-selected area of building an area for field sample, minimum 4 feet by 4 feet, using specified system.
 - 2. Apply material in strict accordance with manufacturer's written application instructions.
 - 3. Manufacturer's representative or designated representative will review technical aspects; surface preparation, repair, and workmanship.

4. Field sample will be standard for judging workmanship on remainder of Project.
 5. Maintain field sample during construction for workmanship comparison.
 6. Do not alter, move, or destroy field sample until Work is completed and approved by Engineer.
 7. Obtain Owner/Engineer's written approval of field sample before start of material application, including approval of aesthetics, color, texture, and appearance.
- E. Preconstruction Field-Adhesion Testing: Perform adhesion per ASTM D3359, Measuring Adhesion by Tape, Method A. Minimum adhesion rating of 4A is required on 0 to 5 scale.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store tightly sealed materials off ground and away from moisture, direct sunlight, extreme heat, and freezing temperatures.

1.7 PROJECT CONDITIONS

- A. A specified coating shall not be applied if weather is too cold, raining, snowing or if any other conditions exist that will not permit proper application or curing of coating. Follow manufacturer's written directions. Humidity should not deviate from acceptable ranges during application and curing. Protection required for proper installation and curing shall be the responsibility of the Coating Contractor and the related cost shall be included in the proposal.
- B. Protect adjacent surfaces and materials with covering, duct tape and drop cloths as required to keep adjacent surfaces free of coating. Upon completing, remove protection and clean. Surfaces soiled or damaged by special coating shall be cleaned or replaced at no extra cost to Owner.
- C. Proceed with the installation of coating only after the substrate construction has been completed and cured and after penetrating components have been installed, so that the coating will not be penetrated or damaged by subsequent work.

1.8 WARRANTY

- A. Materials Manufacturer and Special Coating Contractor shall be jointly responsible and shall submit an affidavit signed by both parties warranting the installed system for a period of ten years from date of substantial completion. The Contractor shall repair or replace coating which, deteriorates excessively, wears prematurely or otherwise fails to perform as required within the guarantee period, due to failure of materials or workmanship. The guarantee shall include an agreement to remove and replace other work which has been superimposed on coating work as required to repair or replace the coating system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products from the following manufacturer: BASF Building Systems, 889 Valley Park Drive, Shakopee, MN 55379, tel: 800- 433-9517, www.BASFbuildingsystems.com.

2.2 MATERIALS

- A. Two (2)-coat, water-based, 100 percent acrylic, elastomeric, waterproofing coating system. Acceptable system shall be MasterProtect HB 400[®] Smooth.
1. Density: 11.4 pounds per gallon to 12.4 pounds per gallon per ASTM D1475.
 2. Solids Content, per ASTM D5201:
 - a. By Weight: 56.2%.
 - b. By Volume: 38%.
 3. Viscosity: 102 KU to 110 KU per ASTM D562.
 4. VOC Content: 0.90 pounds per gallon per ASTM D3960.
- B. Final color shall be chosen by Owner from Manufacturer's complete color options.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Contractor shall examine all existing conditions, and confirm extents of application with Owner/Engineer.

- B. Contractor shall confirm required surface preparation with manufacturer, and shall provide written confirmation from manufacturer that existing conditions have been properly prepared for coating application.

3.2 SURFACE PREPARATION AND APPLICATION

- A. All surface preparation and application methods shall be performed as recommended by manufacturer and approved by Engineer.
- B. Protect adjacent Work areas and finish surfaces from damage during coating system application.
- C. Ensure that substrate is sound, clean, dry, and free of dust, dirt, oils, grease, laitance, efflorescence, mildew, fungus, biological residues, chemical contaminants, and other contaminants that could prevent proper adhesion.
- D. Clean surface by using high-pressure waterblasting or other methods as required to remove contaminants, as recommended by manufacturer and approved by Engineer.
- E. Ensure area being repaired is structurally sound and fully cured.
- F. Remove blisters and loose or delaminated areas.
- G. Sand or grind edges of previous coating to ensure adhesion and smooth transition to new material. Sand edges to featheredge.
- H. Wash down prepared surfaces and allow to completely dry.
- I. The contractor shall follow Manufacturer's recommendations in the application of the coating.
- J. The final color and texture of the building surfaces shall be acceptable by the Owner/Engineer based on the field sample. Any defective Work as determined by the Owner/Engineer shall be corrected prior to final acceptance of the installation.

END OF SECTION 09 01 90

SECTION 09 90 00

PAINING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF WORK

- A. The extent of painting work is shown on the drawings and specified herein to include, but not be limited to, the following:
1. Painting of metal framing elements (columns and beams)
 2. Parking stall, line striping and other traffic markings.
 2. Painting of metal surfaces throughout the stairs.

1.03 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum of ten years documented experience.
- B. Installer: shall have a minimum of five years professional experience in the installation and application of the coatings to be used for this work.
- C. Paint Coordination:

Provide finish coats which are compatible with the prime paints used. Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of the total coatings system for the various substrates.

- D. Codes and Standards:

SSPC-"Systems and Specifications", published by the Steel Structure Painting Council.

1.04 SUBMITTALS

A. Manufacturer's Data:

1. Submit manufacturer's technical information in standard printed published form, including performance criteria and application instructions for each material proposed for use.
2. List each material and cross-reference to the specific paint and finish system and application. Identify by manufacturer's catalog number and general classification.

B. Samples:

1. Submit samples of each color required, for Architects review.
2. Color shall be as herein specified or as selected by the Architect prior to the start of work.

1.05 OWNER'S INVENTORY

- A. Provide one gallon of each color used, to Owner, for maintenance purposes.

1.06 DELIVERY AND STORAGE

- A. Deliver all paint to site in manufacturer's sealed and labeled containers. Labels shall bear manufacturer's name, brand, type of paint, Federal spec. number (if applicable), color of paint, and instructions for reducing.
- B. Store materials and equipment in a designated storage space on the site. Keep storage space neat, clean and accessible at all times. Protect floors from paint spillage.

1.07 PROTECTION

- A. Place paint or solvent-soaked rags, waste, or other materials which might constitute a fire hazard in metal containers and remove from premises at the close of each day's work. Take every precaution to avoid damage by fire.
- B. Provide foam type 2-1/2 gallon capacity fire extinguishers for each paint storage space.

- C. Protect the work of all other trades against damage, marking or injury by suitable covering during the progress of the painting and finishing work.

1.08 JOB CONDITIONS

- A. Examine all surfaces to receive coatings and report to the Architect any condition which is not acceptable. Commencement of work and in any area constitutes acceptance of conditions and places the responsibility for a workmanlike job on this Section.
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F. and 95 degrees F., unless otherwise permitted by the paint manufacturer's printed instructions.
- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.

1.09 WARRANTY:

- A. Warrant work performed in writing to be free of defects relating to workmanship or material deficiency for five (5) years from date of Substantial Completion. Make repairs necessary during this period immediately after notification at no additional expense to the Owner. At the end of five (5) years all materials shall have full adherence and there shall be no evidence of blisters, running, peeling, scaling, chalking, rusts, streaks, fading or stains. Washing with alkali-free soap and water shall remove surface dirt without producing deteriorating effects.

PART 2 - PRODUCTS

2.01 MATERIAL QUALITY

- A. Provide only absolutely pure linseed oil, turpentine, shellac, and other like materials that are of the highest quality, with identifying labels intact and seals unbroken. Use no thinners other than those specified by the manufacturer.
- B. Use only primers and undercoaters that are suitable for each surface to be covered and that are compatible with the finish coat required.
- C. Use products of the same manufacturer for succeeding coats.

1. Where shop primed materials are to be finish painted and/or prime coat materials are by a different manufacturer than the finish coat materials, confirm compatibility of the primers with the manufacturer of the finish coat paints.
2. Where existing previously painted surfaces are to be finish painted, confirm compatibility of existing painted surfaces with the manufacturer of the succeeding new paints.

2.02 PAINT AND FINISHING MATERIALS

- A. Paint and finishing materials not otherwise specified: Highest grade products of one of the following manufacturers:
 1. Benjamin Moore & Co.
 2. Dur-A-Flex, Inc., - Concrete
 3. Tnemec Co. or approved equal - Concrete and Ferrous Metals.
 4. Con-lux Coatings, Inc.
 5. Sherwin Williams, Industrial Coatings.
 6. or approved equal.
- B. Products of specific companies are listed in the schedule for reference as the standard of quality required for each paint system.
- C. Materials: Factory-mixed, delivered to site ready for application, except for tinting of undercoats and possible thinning, and in manufacturer's original unopened containers. Each container shall bear manufacturer's label, showing name, brand, type and color of paint, instructions for thinning and types and percentages of pigment, vehicle and solvent.
- D. Paint composition: Non-chalking and mildew resistant.

2.03 SCHEDULE OF PAINTS AND FINISHES

- A. Steel and Iron: Handrails and railings; miscellaneous ferrous metals not otherwise specified
 1. First Coat (Primer) Manufacturer's standard; factory-applied.
 2. Intermediate Coat Macropoxy 646 Fast Cure Epoxy (Sherwin Williams).
 3. Finish Coat Acrolon 218 HS Polyurethane (Sherwin Williams).

- B. Light gage metals and related iron and steel (Steel doors and frames; mechanical and electrical equipment not factory finished and miscellaneous light gage metal not otherwise specified).
1. Prime Coat Manufacturer's standard; factory-applied.
 2. Intermediate Coat Macropoxy 646 Fast Cure Epoxy (Sherwin Williams).
 3. Finish Coat Acrolon 218 HS Polyurethane (Sherwin Williams).
- C. Traffic and Parking Stall Markings (all colors shall be verified in the field with the Owner/Engineer for adjustments as may be required):
1. First Coat 15 mils wet thickness.
 2. Second Coat Same as First
 3. Parking lines, striping and arrows on driving surfaces shall be pavement marking paint, conforming to U.S. Bureau of Public Roads colors, unless otherwise noted:
 - a. Setfast Low VOC Acrylic Traffic Marking Paint (2 coats minimum), by Sherwin Williams,
 - b. or approved equal.
 4. All lines and arrows must be chalk marked and approved by the Owner and Architect/Engineer prior to paint applications. Sufficient paint shall be applied to produce markings with clear, true edges and uniform color and cross-sections. Paint shall be applied at the rate of not less than one gallon of paint per 100 square of pavement covered. Striped edges shall not deviate more than ½" in 20 foot length.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

A. General:

1. Perform all preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.

2. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease with clean cloths and cleaning solvents. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.
3. Before applying succeeding coats, primers and undercoats shall be completely integral and shall perform the function for which they are specified. Properly prepare and touch up all scratches, abrasions or other disfigurements and remove any foreign matter before proceeding with the following coat. All spot-priming or spot-coating shall be featheredged into adjacent coatings to produce a smooth and level surface.

B. Ferrous Metals:

After erection is completed, touch-up heads of bolts, welded surfaces which are unpainted, and surfaces or areas where the primer has been abraded or otherwise damaged.

C. Galvanized Metals:

1. Clean unpainted galvanized metal surfaces of all oil, grease and other contaminants in accordance with the applicable requirements of SSPC-SP 1-63 "Solvent Cleaning", prime as follows:
 - a. Prime with a zinc dust, zinc oxide, alkyd paint conforming to FS TT-P-641f, Type II.
2. Prior to application of subsequent coats, thoroughly clean all surfaces to ensure the removal of any grease, soil, dust or foreign matter. Take particular care to prevent the contamination of cleaned surfaces with salt, acids, alkali or other corrosive chemicals before prime coating and between subsequent coats of paint.

D. Application of Traffic Markings:

1. All existing striping and traffic markings shall be removed entirely by shotblasting prior to application of new paint.
2. Contractor shall note that existing markings may be re-painted, only as accepted by Engineer. Should markings (new and re-coated) peel or loose adherence, Contractor shall be responsible for complete removal and re-painting of said markings at no cost to Owner.

3.02 MATERIALS PREPARATION

- A. Mix and prepare painting materials in strict accordance with the manufacturer's directions.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir all materials before application to produce a mixture of uniform density, and as required during the application of the materials.

3.03 APPLICATION

- A. Apply paint with brush, roller, spray, or other acceptable practice in accordance with the manufacturer's directions.
- B. Spread all materials evenly and smoothly without runs, sags or other defects. Make edges of paint adjoining other materials or colors sharp and clean, without overlapping.
- C. The number of coats and paint film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has completely dried. Sand between each enamel coat application with fine sandpaper, or rub surfaces with pumice stone where required to produce an even, smooth surface in accordance with the coating manufacturer's directions.
- D. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. Give special attention to insure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a film thickness equivalent to that of flat surfaces.
- E. For each coat of paint use slightly different shade than preceding coat. Tint final undercoat to color of finish coat.
- F. Paint directional arrows, parking stalls, marking lines, etc., to be as detailed on the Drawings. Unless otherwise detailed, single line width to be four (4") inches wide. Striped (crosshatched) areas shall be four (4) inch wide lines sixteen (16) inches on center (V.I.F.). Lay out all painted lines and define with chalk markings for approval before proceeding with painting.
- G. Install stall striping using a gravity flow method approved by the Architect. Spray painting will not be approved.

3.04 CLEAN-UP

- A. During the progress of the work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.
- B. Upon completion of painting work, clean paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- C. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

END OF SECTION 09 90 00

SECTION 22 01 00

BASIC MECHANICAL REQUIREMENTS

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. Basic Mechanical Requirements specifically applicable to Division 22 Sections in addition to Division 1 – General Requirements.

1.2 INTENT

- A. It is the intention of the Specifications and Drawings to call for finished work, tested and ready for operation. All materials, equipment and apparatus shall be new and of first class quality.
- B. Any apparatus, appliance, material or work not shown on Drawings, but mentioned in the Specifications, or vice versa, or any incidental accessories or minor details not shown, but necessary to make the work complete and perfect in all respects and ready for operation, even if not particularly specified, shall be provided by the contractor without additional expense to the owner.
- C. The Contractor shall give notice to the Engineer of any materials apparatus or omissions believed to be in violation of laws, ordinances, rules or regulations or authorities having jurisdiction. In the absence of such written notice, it is mutually agreed that the Contractor shall include the cost of providing all systems in accordance with applicable regulations without extra compensation.

1.3 SUBMITTALS

- A. Submit under provisions of Division 1 Sections.
- B. Include products as required by individual Sections.
- C. Submit Shop Drawings and Product Data grouped to include complete submittals of related systems, products and accessories in a single submittal.
- D. Mark dimensions and values in units to match those specified.
- E. Submit plan indicating measures being taken to maintain indoor air quality of occupied portion of building during construction.

1.4 DRAWINGS AND COORDINATION

- A. Drawings are schematic in nature and do not indicate every item, piece of equipment and detail. Provide complete, operating systems.
- B. Install work as closely as possible to layouts shown on drawings. Modify work as necessary to meet job conditions and to clear other equipment. Consult Architect before making changes which affect the function or appearance of systems.
- C. Dimensions, elevations and locations are shown approximately. Verify dimensions in field.
- D. Architect reserves the right to order changes in layout of such items as piping, ducts and equipment if such changes do not substantially effect costs and if effected items have not been fabricated or installed.
- E. In some cases, drawings are based on products of one or several manufacturers, as listed on Contract Documents. Contractor shall be responsible for modifications made necessary by substitution of products of other manufacturers. Modifications may be required in electrical distribution materials and components, structural supports, concrete pads, gas piping, breeching and chimneys, etc.
- F. Do not install part of a system until all critical components of the system and related systems have been approved. Coordinate parts of systems.
- G. Coordinate work with work specified in other Sections. Relocate work if required for proper installation and functioning of other systems.
- H. Install products in accordance with manufacturer's instructions. Notify Architect if Contract Documents conflict with manufacturer's instructions. Comply with Architect's interpretations.
- I. Provide brackets, supports, anchors and frames required for installation of work specified in this division. Such metal work shall conform to the requirements of Section 05500.
- J. Where Contract Documents provide conflicting information, Contractor shall be responsible for design having highest cost.

1.5 PROJECT RECORD DRAWINGS

- A. Prepare project Record Drawings of mechanical systems in conformance with the requirements of the General Conditions and Division 1 Sections.

1.6 INDOOR AIR QUALITY

- A. Provide measures to maintain minimum standard for indoor air quality in accordance with SMACNA guidelines, by preventing air contaminated by demolition and construction activities from being transferred to occupied portions of building when work includes renovation, addition or alteration to building occupied during demolition/construction.
- B. Measures shall include but not be limited to the following:
 - 1. Air filtration.
 - 2. Temporarily sealing ductwork, air inlets and outlets and ventilation openings to prevent transfer of contaminated air.
 - 3. Installation of bypass ducts or openings and additional temporary system modifications as required to prevent cross contamination, and to maintain proper system operation during construction.
- C. Submit plan of cross contamination control measures in accordance with SMACNA guidelines prior to beginning construction.

1.7 PRELIMINARY OPERATION

- A. Operate mechanical systems with required supervision for at least two full days prior to substantial completion. Make necessary adjustments and check proper operation.

1.8 TESTS PRIOR TO SUBSTANTIAL COMPLETION

- A. Tests shall be attended by representatives of mechanical subcontractors, equipped with instruments required to demonstrate proper functioning of systems, as specified. Demonstrate the following:
 - 1. Equipment installed and operating in accordance with the manufacturer's specifications and instructions and with these specifications.
 - 2. Safety and temperature controls operating as specified.
 - 3. Systems properly flushed, cleaned and free of contaminants.
 - 4. Systems properly balanced.
 - 5. Motors equipped with proper overload protection and not operating under overload. Obtain ammeter readings.
 - 6. Instruments recording properly.

7. Submit report listing system tested, date, results and description of fault corrections, if any.

1.9 WARRANTY

- A. Submit written warranty of warranties covering work specified in Division 22. Warranty period shall be five years from the date of Substantial Completion. Owner is to receive full use of equipment for period of warranty.

1.10 OPERATING AND MAINTENANCE MANUALS

- A. Submit Operating and Maintenance manuals in accordance with this Section and Division 1 Sections.
- B. Include operating and maintenance instructions for equipment where applicable.
- C. List replacement parts and order procedure.
- D. Include lubrication instructions and schedule, with types of lubricant to be used.
- E. Instruct Owner's personnel in use of equipment specified in this Division.

1.11 REGULATORY REQUIREMENTS

- A. Conform to applicable provisions of the Connecticut Basic Building Code which include the following:
 1. International Building Code.
 2. International Mechanical Code.
 3. International Plumbing Code.
- B. Amendments, alterations, deletions and addition of certain provisions to the above as indicated Connecticut Supplement.
- C. New construction and renovation work will also conform to applicable provisions of the Connecticut Public Health Code.
- D. Indoor air quality during construction will be maintained in accordance with SMACNA IAQ Guidelines for Occupied Buildings under Construction.

- E. New construction and renovation work will also conform to applicable provisions of the Connecticut Fire Safety Code which include the following:
 - 1. Code for Safety to Life from Fire in Buildings, National Fire Protection Association, Inc., Standard 101 (NFPA 101).
 - 2. Amendments, alterations, deletions and addition of certain provisions to the above as indicated in the Connecticut Supplement.
- F. Work of this project shall be barrier free and will conform to the Americans with Disabilities Act (ADA), ICC/ANSI 117.1 and Uniform Federal Accessibility Standards (UFAS).
- G. New construction and renovation work will comply with the requirements of the International Energy Conservation Code for energy efficiency.
- H. Conform to applicable municipal requirements.
- I. Obtain and pay for permits and inspections from authorities having jurisdiction.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 22 01 00

SECTION 22 41 30

DRAINAGE

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. The work under this Division of the Contract shall include all labor, materials, scaffolding, equipment and services necessary for the installation of work related to drainage systems. The work in general shall include, but not be limited to the following:

1. Installation of new floor drains and piping.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. The following codes and specifications shall govern. In cases of conflict, the more stringent of the requirements shall be adhered to.

1. National Standard Plumbing Code
2. IBC, IRC as adopted locally and/or Local Plumbing Codes that may govern

- B. This Contractor shall secure and pay for any necessary approvals, permits, inspections, etc., before commencing any work so as to avoid all delays during construction and he shall turn over the official records of the granting of permits to the Owner. This shall be done without additional cost to the Owner.

1.03 SUBMITTALS

- A. The Plumbing Contractor shall submit shop drawings and manufacturer's data for all equipment and fixtures before work is fabricated and installed.

- B. The Contractor shall submit a list of names of manufacturers of the various types of pipe, fittings, valves, appurtenances and equipment properly indicating the specific service for which each item is to be used. After approval of the manufacturers names, Contractor shall submit complete catalog data or Shop Drawings containing exact description of items to be furnished. Data of a general nature will not be accepted.

1.04 SUPERVISION

- A. This Contractor shall provide a competent supervisor who shall be constantly on the premises while job is in progress, and who shall familiarize himself with the requirements of all other Contracts, in order that the work may be coordinated and proceed in an efficient manner.

PART 2 - PRODUCTS

2.01 MATERIALS – AS REQUIRED

- A. All materials shall be the best of the respective kinds, suitable for the conditions and duties imposed upon them in service. They shall be the latest standard catalog products of the manufacturers indicated. Where two or more items of the same type of materials or equipment are required, they shall be the product of a single manufacturer.
- B. Where the approval of manufactured article is by catalog number, it shall be construed as applying only to the article proper. All trimmings and fittings required shall be in strict conformity with the specification requirements.
- C. It is hereby distinctly provided that the materials or appliances furnished shall comply with all requirements of the insurance underwriters and local inspection authorities and shall be provided, in all cases, with the necessary auxiliary or incidental trimmings required to make same complete.

2.02 HANGERS AND SUPPORTS – AS REQUIRED

- A. Furnish and install suitable hangers and supports for all piping lines. Hangers and supports shall be Grinnell, Crane or Grabler. Provide supports which in each case will be amply strong and rigid for the load, and which shall not weaken or unduly stress the building construction.
- B. Hangers shall be of heavy construction suitable for the size of pipe to be supported. All materials shall be wrought or malleable iron or steel. Hangers shall be swivel ring, split ring, wrought pipe clamp or adjustable wrought clevis type.
- C. Vertical risers shall be supported by heavy duty hangers installed close to the base of the pipe risers and by riser clamps at each floor level. Risers shall have extension clamps resting on floor slabs.

D. Support horizontal piping in accordance with the following schedule.

Pipe	Max. Hanger Spacing
Cast Iron Pipe	5'-0"
Steel Pipe	12'-0"
PVC Pipe	6'-0"

E. Provide minimum one hanger at each pipe fitting.

2.03 DRAINAGE SYSTEMS – AS REQUIRED

A. Pipe and Fittings:

1. Black iron piping with no hub joints.

B. Drains:

1. The drains shall be new, heavy-duty galvanized drains with sediment bucket. Drain size match existing which varies; contractor shall confirm all sizes prior to start of work.
2. Acceptable manufacturers include:
 - a. Model 533-G-Y, Zurn Industries, Inc., 1801 Pittsburgh Avenue, Erie, PA 16502, Tel: (814) 455-0921.
 - b. Or approved equal.

C. Cleanouts:

1. Cleanout fittings shall be extra heavy pattern with cast brass screw jointed cleanout plug.
2. In piping larger than 4 inches in diameter, 4 inch cleanout plugs are to be used.
3. Cleanouts on leaders shall be manufactured by Zurn, Josam, or Smith.

PART 3 - EXECUTION

3.01 INSTALLATIONS – AS REQUIRED

A. Piping:

1. All piping at ceilings shall be hung from the construction above and as close as possible to the bottom of beams, slabs, etc.

2. Horizontal storm piping shall be installed at a uniform grade of not less than 1/8 inch per foot.
3. All risers shall be plumb and true, neatly spaced and parallel with walls and other pipes. Horizontal piping shall be straight and direct as possible, running at right angles with or parallel to walls and beams.
4. Protect all piping from entrance of dirt or other foreign materials during the construction period.
5. Piping shall be cut accurately to measurements established at the site and worked into place without springing or forcing. All cut pipe must have ends reamed and be free from burrs. Install piping to permit free expansion and contraction without damage.
6. Coordinate piping installations with structure, lighting, electrical conduit, and all other materials and equipment. Cutting or other weakening of building structure to facilitate piping installation is not permitted.
7. Provide necessary temporary connections, valves, oversize flushing connections, pumps, etc. as required to properly clean and test systems.

B. Supports & Sleeves:

1. Approved supports shall be installed and sized as required to carry the weight of the pipe and contents.
2. Provide cored hole for all pipes passing through floors and any other building construction, of adequate diameter to allow a minimum of 3/4 inch clearance all around.
3. Anchors shall consist of rigid members clamped or welded to the pipe to prevent pipe movement at that point. Attach anchors to structural members of building.
4. Support all risers at each floor level by means of clamp rests.

C. Joints:

1. Any leaking joints shall be completely disassembled and remade with new materials.

D. Accessibility:

1. All equipment shall be so arranged as to be accessible for repairs and replacement without disturbing adjacent work.

3.02 MECHANICAL CUTTING AND PATCHING

- A. Contractor shall be responsible for all cutting, fitting, or patching of his Work which may be required to make its several parts come together properly. Cutting of structural members shall not be done without written approval of the Consultant.
- B. Do all cutting and patching required for the installation of the Work. Any damage caused to the building by this cutting and patching, shall be corrected at no additional cost to the Owner.
- C. Patching of all openings for new installations and all openings resulting from the removal or relocation of any installations shall be done by craftsmen skilled in the particular trade affected, with materials of like type.

3.03 CLEANING

- A. All piping, equipment and appurtenances installed under this Section shall be thoroughly cleaned and properly protected during construction, and put in first class operating condition before being offered for acceptance.
- B. In general, all painting will be done by others. All equipment shall be delivered to the job site with manufacturers standard shop finish. All equipment furnished under this Section shall be thoroughly cleaned and left ready for finished painting.

3.04 TESTS

- A. Upon completion of the several portions of the Work, the various pieces of apparatus and equipment shall be tested to demonstrate that the same fulfills the specifications and requirements. The systems shall be tested in accordance with Local Code and in no case less than the following:
 - 1. The entire system of piping shall be thoroughly blown out for the purpose of removing dirt and grease. This shall be continued for as long a period of time as is necessary to thoroughly clean the installations. The Contractor shall make good for any defects in the equipment which may result from pumping water containing any foreign matter.
 - 2. Drainage Systems: The entire system existing and new portions of storm piping shall be tested by the Plumbing Contractor under a water test. The water test shall include the entire system from the lowest point to the highest pipe above the roofs. Water tests shall be made in accordance with all the local requirements.

Every portion of the system shall be tested to a hydrostatic pressure equivalent to at least a ten foot head of water. After filling, the Contractor shall shut off water supply and shall allow it to stand fifteen (15) minutes, under test, during which time there shall be no loss of leakage. Any defects in materials or workmanship found to exist and cause leakage, shall be repaired or replaced with new material as may be required by the Consultant, and the test repeated until work is shown to be watertight.

- B. This Contractor shall furnish and pay for all devices, materials, supplies, labor attendance and power required in connection with all test. All tests shall be made in the presence and to the satisfaction of the Plumbing and other Inspectors of the local authorities.
- C. Defects disclosed by the test shall be repaired or if required by the Consultant; defective work shall be replaced with new work without extra charge to the Owner. Test shall be repeated and directed until all work is proven satisfactory.
- D. The Plumbing Contractor shall notify the Consultant and others having jurisdiction at least forty-eight (48) hours in advance of making the required tests so that arrangements may be made for their presence to witness the tests.

END OF SECTION 22 41 30