SECTION 02750
PORTLAND CEMENT CONCRETE PAVING

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. Requirements of "General Conditions of the Contract" and of Division 1, "General Requirements", apply to work in this Section with same force and effect as though repeated in full herein.

1.2 SCOPE OF WORK

A. Furnish materials, labor, transportation, services, and equipment necessary to instal portland cement concrete paving as indicated on Drawings and as specified herein.

B. Work included in this Section:
   1. Pervious concrete paving.

C. Work related in other Sections:
   1. Section 02310 - Rough Grading.
   2. Section 02811 - Irrigation System: Coordination of irrigation mainline PVC sleeving and lateral pipe.
   3. Section 02900 – Landscape Planting.

1.3 REFERENCES

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

B. ACI 304R - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

C. ACI 305R - Hot Weather Concreting.

D. ACI 306R - Cold Weather Concreting.

E. ACI 309R - Guide for Consolidation of Concrete.

F. ASTM A 615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.

G. ASTM C 31 - Standard Specification for Making and Curing Concrete Test Specimens in the Field.

H. ASTM C 33 - Standard Specification for Concrete Aggregates.

I. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

J. ASTM C 94 - Standard Specification for Ready Mix Concrete.

K. ASTM C 143 - Standard Specification for Hydraulic Hydrated Cement Concrete.

L. ASTM C 150 - Standard Specification for Portland Cement.

M. ASTM C 172 - Standard Practice for Sampling Freshly Mixed Concrete.

N. ASTM C 231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

O. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.

P. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

Q. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.

R. ASTM C 1064 - Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.

1.4 SUBMITTALS

A. In accordance with Section 01340 - Shop Drawings, Samples and Product Data: Procedures for submittals.

B. Concrete Mix Designs: Provide documention for pervious concrete paving.

1. The data shall include unit weights detemined in accordance with ASTM C29 paragraph 11, jiggin procedure. Compacted void content shall be a minimum o f10%. C Cement content shall be a minimum of 580 pounds per cubic yard, with total cementitious content to be a minimum of 630 pounds per cubic yard. Water cement ratio shall be a maximum of 0.30.

2. Laboratory and Cement Test Reports: Submit six (6) copies of laboratory test reports for concrete materials and a certificate with each concrete mixer truck, stating mix design, PSI rating, slump, water and cement quantity, cement/water ratio, fine and coarse aggregate and color additives.

2. Cement:

a) Manufacturer and plant location.
b) Cement type, i.e. Type I, II or V.

3. Admixtures:
   a) Manufacturer and plant location.
4. Sand:
   a) Source and type.
5. Aggregates:
   a) Source and type.
6. Signed certification from a licensed structural engineer.

C. Certification that Agency's mock-up has been reviewed and that materials and processes provided, will achieve intended effects indicated on Agency's mock-up.

D. Submit specification data "Cut Sheets" for agent, plastic dowel sleeves, chemical stain, curing agents, and clear sealers.

E. Products: Submit one pound samples, clearly identified, for each component used to prepare each paving type, including but not limited to, cement, sand, aggregate, coloring pigment, release agents, and chemical stains.

F. Submit process for installing pervious paving for approval prior to installation.

1.5 QUALITY ASSURANCE

A. Pre-Bid Conference: Prior to submitting bid, attend pre-bid conference with Agency to review Agency mock-up and to review requirements and artistic effect desired.

B. Mock-Ups:
   1. Contractor Mock-Ups: For each paving finish indicated on Drawings (asphalt excepted), provide a mock-up directly adjacent Agency's existing mock-up. Required concrete finish is to closely match Agency's mock-up. Contractor's mock-up will provide evidence to Agency that desired paving finish can be achieved by Contractor.
   2. Contractor Damage/Repair Mock-Ups: Provide a 2 x 2-foot "damage/repair" sample directly adjacent to each required 4 x 4-foot mock-up for each paving type specified on Project. Purpose of "damage/repair" samples are to clearly indicate Contractor's ability to repair damaged concrete to match existing, should damage occur during course of construction.

C. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

D. Installer: Provide evidence to indicate successful experience in providing patterned concrete work similar to that specified herein and can demonstrate successful experience through past project documentation and references.

1. Experience: Minimum 5 years experience in the installation of concrete paving.
2. Demonstration of Experience: 10 projects which have been completed within the past 36 months utilizing similar products, scope, and complexity.
3. Supervision: Perform placement and finishing of concrete work under supervision of a person having a minimum of 5 years of experience in placement and finishing of products specified herein.
4. Submit qualifications to Agency for information purposes. Submit a resume of Project Manager and Superintendent who will be overseeing the Work.

E. Slip Resistance: Provide a finish surface slip resistance coefficient of friction equal or greater than 0.6 for flat surfaces and 0.8 for ramps, when tested in accordance with ASTM F 489.

1.6 DELIVERY, STORAGE, AND HANDLING

A. In accordance with Section 01640 - Product Handling and Protection: Transport, handle, store, and protect.

B. Store materials in dry and protected locations and protect from damage.

C. Do not change brand of cement nor source of aggregate during course of Work.

1.7 SITE CONDITIONS

A. Do not place concrete when subbase surface temperature is less than 40 degrees F, nor when surface is wet.

1.8 COORDINATION

A. In accordance with Section 01041 - Project Coordination.

B. Ensure that irrigation sleeves, electrical conduit, and other utility elements are accomodated and as-built located prior to pouring concrete.

1.9 INSPECTION OF SITE

A. Verify conditions at site that affect Work of this Section, and take field measurements as required. Report major discrepancies between Drawings and field dimensions to Agency prior to commencing work.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
   1. Use flexible or curved forms for curves of 200-foot or less radius.

2.2 REINFORCING MATERIAL

A. Synthetic Fiber Reinforcement: 100% pure synthetic polypropylene fibers, engineered and designed for secondary reinforcement of concrete slabs, complying with ASTM C 1116 - Type III. Maximum length of fibers to be 3/4-inch.
   1. Acceptable Manufacturers:
      a. Fibermesh: Stealth (800)348-9348.
      b. Forta Fiber: Microfiber (800)245-0306.
      c. W.R. Grace: Monofiliment (800)433-0020.
      d. Bomanite; Monofiliment (800)854-2094.

C. Fiberglass reinforced plastic (FRP) reinforcinb bar shall be used to tie adjacent concrete slabs together. FRP rebar shall be of at least 1-1/2" diameter 18" oc both ways. Steel or epoxy coated steel shall not be used due to exposure to moisture experienced in pervious concrete.

D. Plain, Cold-Drawn Steel Wire: ASTM A 82.

E. Fabricated Bar Mats: Welded or clip-assembled steel bar mats, ASTM A 184. Use ASTM A 615, Grade 60 steel bars.

F. Construction Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

G. Epoxy-Coated Construction Joint Dowel Bars: ASTM A 775 over ASTM A 615, Grade 60 plain steel bars.

H. Joint Dowel Alignment Sleeves: Polypropylene plastic sleeve dowel to ensure proper alignment of steel dowels.
   1. Acceptable Manufacturers:
      a. Aztec Concrete Accessories, Inc. (800)531-3355: Speed Dowel sleeves.

I. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars in place. Use wire bar-type supports.
   1. Use supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150 - Type I.

B. Fly Ash: ASTM C 618 - Type F. The combined weight of fly ash conforming to ASTM C 618 shall not exceed 20% of the total weight of cementatious materials. Ground iron blast-furnace slag conforming to ASTM C989 may be used in amounts not to exceed 50% by weight of total cementitious material.

C. Concrete Aggregate: ASTM C 33 - Class 4, and as follows. Provide aggregates from a single source:
   1. Maximum aggregate size: 1-inch (3/8-inch pea gravel for "concrete dirt" only).

D. Water: Clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or reinforcement.

2.4 ADMIXTURES

A. Provide concrete admixtures that contain not more than 1 percent chloride ions and no calcium chloride.

B. Water-Reducing Admixture: ASTM 4 94, Type A.

C. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.

D. Water-Reducing and Retarding Admixture: ASTM C 494, Type D or E.

E. Acceptable Manufacturers:
   1. Water-Reducing Admixtures:
      a. ChemMasters Corp; Chemtard.
      b. Cormix Construction Chemicals; Type A Series.
      c. Euclid Chemical Company; Eucon WR-75.
   2. High-Range Water-Reducing Admixtures:
      a. Anti-Hydro Co. Inc.; Super P.
      b. Cormix Construction Chemicals; Cormix 2000, PSI Super.
      c. Eculid Chemical Company; Eucon 37.
   3. Water-Reducing and Acceleration Admixtures:

a. Conspec Marketing & Manufacturing Company; Q-Set.
b. Cormix Construction Chemicals; Gilco Accelerator or Lub NCR.
c. Euclid Chemical Company; Accelguard 80.

4. Water-Reducing and Retarding Admixtures:
a. Cormix Construction Chemicals; Type D Series.
b. Euclid Chemical Company; Eucon Retarder 75.
c. W.R. Grace Company: Daratard-17.

2.5 CURING MATERIALS

A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

B. Moisture-Retaining Cover: One of the following complying with ASTM C 171:
1. Waterproof paper.
2. Polyethylene film.
3. White burlap-polyethylene sheeting.

C. Clear, Waterborne Membrane-Forming Curing Compounds:
1. Provide curing materials that have a maximum volatile organic compound (VOC) rating of 350 g/l.

D. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
1. Clear, Waterborne Membrane-Forming Curing Compounds Acceptable Manufacturers:
a. Anti-Hydro Company; Clear Cure Water Base.
b. The Burke Company; Spartan Cote WB.
c. Cormix Construction Chemicals; Sealco VOC.
2. Acceptable Evaporation Control Manufacturers:
a. Conspec Marketing and MFG. Company; Aquafilm.
b. Euclid Chemical Company; Eucobar.
c. L&M Construction Chemicals; E-Con.

2.6 RELATED MATERIALS

A. Bonding Agent: Acrylic or styrene butadiene.

G. Epoxy Adhesive: ASTM C 881, two-component material suitable for dry or damp surfaces. Provide material type, grade, and class to suit requirements.

H. Miscellaneous Materials: Miscellaneous specialty materials, acids, or other materials required to achieve the specialized effects indicated by Agency's mock-up or as required by Agency.

I. Acceptable Manufacturers: Subject to compliance with requirements, products that may be incorporated in Work include, but are not limited to, the following:
   1. Clear Penetrating Sealer (water based):
      a. L.M. Scofield; Cementone Clear Sealer.
      b. Superstone; Clear Sealer.
      c. Lambert; Clear Sealer.

2.7 CONCRETE

A. Prepare design mixes for each type and strength of normal-weight concrete by either laboratory trial batch or field experience methods as specified under ACI 301.
   1. A field quality control testing agency will be provided by Agency.
   2. Limit use of fly ash to 25% percent of cement content by weight.

B. Proportion mixes according to ACI 211.1 and ACI 301 to provide normal-weight concrete with the following properties:
   1. Compressive Strength at 28 days: 4,000 psi.
   2. Maximum Water-Cement Ratio at Point of Placement: 0.55.
   3. Slump Limit at Point of Placement: 3-inches. Slump limit for concrete containing high-range water-reducing admixture: Not more than 8-inches after adding admixture to site-verified 2 to 3-inch slump concrete.
   4. Air Content: 2 1/2 to 4 1/2 percent.

C. Synthetic Fiber Reinforcement: 1 lb. per cu. yd of mix added only at batch plant.

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94.
   1. Reduce mixing and delivery time when air temperature is between 85 degrees F and 90 degrees F and reduce mixing and delivery time from 1-1/2 hours to 75 minutes.
   2. Reduce mixing and delivery time to 60 minutes when air temperature is above 90 degrees F.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Verify that paving subgrade consists of a minimum of 12-inches of compacted sand, passes less than 7% through a #200 sieve, and is compacted to at least 95% of the materials ASTM D 1557 maximum dry density for its full depth.

B. Verify that paving subgrade extends 1-foot beyond the outside edge of paving or curbing and has a positive outfall for trapped water.

C. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

D. Remove loose material from compacted subbase surface immediately before placing concrete.

E. Provide necessary chairs or supports, and maintain position of reinforcing bars.

F. Wet surface of sand subgrade prior to placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for paving to required lines, grades, and elevations.

B. Install forms to allow continuous progress of Work and so that forms can remain in place at least 24 hours after placing concrete.

C. Check completed formwork and screeds for grade and alignment to following tolerances:
   1. Top of Forms: Not more than 1/8-inch in 10-feet.
   2. Vertical Face on Longitudinal Axis: Not more than 1/4-inch in 10-feet.

D. Clean forms after each use and coat with form release agent to ensure separation from concrete.

3.3 PLACING REINFORCEMENT

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for placing and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover over reinforcement.

D. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

3.4 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to facilitate installation of their work.

B. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes and other utility structures until they are at the required finish elevation and alignment.

C. Comply with requirements and with ACI 304R for measuring, mixing, transporting, and placing concrete.

D. Deposit and spread concrete in a continuous operation between construction joints. Do not push, drag, or use vibrators to move concrete into place.

E. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309 R.

1. Consolidate concrete along face of forms with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Prevent dislocating reinforcing and dowels.

F. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on surface. Do not further disturb concrete surfaces prior to beginning finishing operations.

G. Hot-Weather Placement: Place concrete complying with ACI 305R when hot weather conditions exist.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement 90 degrees F and below. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water.

2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, or soft or dry areas.

H. Cold Weather Placement: Adhere to ACI 306R - Cold Weather Concreting for installing concrete paving during cold weather.

3.5 CONCRETE FINISHING

A. Medium Broom – Broom evenly and both ways.

3.6 JOINTING

A. Construct contraction, construction, and isolation joints to match irregular edge pattern of stamping tools with faces perpendicular to surface plane of concrete.

B. Contraction Joints: Provide contraction joints as indicated on Drawings (or to not exceed 10-feet in either direction), to minimize random surface cracking and as indicated on approved Paving Jointing and Pour Sequence Plan provided by Contractor. Match irregular pattern of stamping tools, sectioning concrete into areas as indicated on Drawings. Construct contraction joints for a depth equal to at least one fourth of concrete thickness, as follows:
1. Hand-tooled Joints: Form contraction joints in fresh concrete by grooving and finishing each joint edge with a radiused jointer tool.
2. Machine-Sawn Joints: Machine-sawn joints are not permitted unless otherwise indicated on Drawings. Provide saw cut joints as soon as concrete has sufficient strength to support sawing equipment.
3. Do not exceed 1/4-inch in joint width.

C. Doweled Construction Joints: Construct doweled construction joints at end termination's of paving where paving operations are stopped for more than 1/2 hour, unless paving terminates at an isolation joint and at all edges of different paving types. Locations of doweled construction joints to adhere as closely as possible to Contractor's Paving Jointing and Pour Sequence Plan.
1. Steel Dowels:
   a. Provide smooth steel dowels across construction joints to reduce differential movement across the joint. Utilize smooth steel dowels based upon the following:
      1) 6-inch Thick Pavement:
         (i) Diameter: 3/4-inch.
         (ii) Length: 24-inches.
         (iii) On-center Spacing: 18-inches.

2) 4-inch Thick Pavement:
(i) Diameter: 1/2-inch.
(ii) Length: 24-inches.
(iii) On-center Spacing: 18-inches.

b. To assist in correct alignment of steel dowels along construction joints use plastic dowel sleeves:
1) Insure that wood edge forms are true to line and grade prior to installing plastic dowel sleeves.
2) Install plastic dowel sleeves on wood forms at the specified on-center dowel spacing, centered between top and bottom of wood form.
3) Contact plastic dowel sleeve manufacturer for complete installation requirement.

2. Do not continue tie-reinforcement through sides of strip paving.
3. Use a bond breaking agent on cured concrete edges that will be joined with fresh concrete.
4. Immediately before new concrete is placed, wet construction joint and remove standing water.
5. Tool edges of construction joints to match decorative field jointing.

D. Isolation Joints: Provide isolation joints to permit horizontal and vertical movement between slab and fixed vertical edges such as building walls, steps, columns, and other vertical restraints. Locations of isolation joints to adhere as closely as possible to Contractor's Paving Jointing and Pour Sequence Plan.
1. Provide 1/4-inch thick pre-molded asphalt impregnated fiber board, backup, and caulking along edges of isolation joints.
2. Extend pre-molded asphalt impregnated fiber board to full-width and depth of joint, not less than 1/4-inch or more than 1-inch below finished surface of slab.
3. Furnish pre-molded asphalt impregnated fiber board in one-piece lengths for full width being placed. Where more than one length is required, lace or clip pre-molded asphalt impregnated fiber board sections together.
4. Protect top edge of pre-molded asphalt impregnated fiber board during concrete placement with a metal, plastic, or other temporary cap. Remove protective cap after concrete has been placed on both sides of joint to facilitate installation of caulking backup.
5. Joints for Non-Stamped Special Flooring: Tool to profile and dimensions detailed; fill with specified grout, tool grout to a concave profile.
6. Install isolation joint sealant as specified under Section 07900 - Joint Sealers.

3.7 CONCRETE PROTECTION AND CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 305R for hot weather and ACI 306R for cold weather protection during curing.

B. Evaporation Control: In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.

C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing, moisture retaining cover curing, curing compound, or a combination of following:
   1. Moisture Curing: Keep surfaces continuously moist for not less than 7 days with following materials:
      a. Water.
      b. Continuous water fog spray.
      c. Absorptive cover, water saturated, kept continuously wet.
   2. Cover concrete surfaces and edges with a 12-inch lap over adjacent absorptive covers.
   3. Curing Compound:
      a. Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions.
      b. Recoat areas subjected to heavy rainfall within 3 hours after initial application.
      c. Maintain continuity of coating and repair damage during curing period.

3.8 FIELD QUALITY CONTROL TESTING

A. Agency will employ a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include the following:
   1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
      a. Compression Test Specimens: ASTM C 31. One set of four (4) standard cylinders for each compressive strength test. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
      b. Compressive-Strength Tests: ASTM C 39. One (1) set for each day's pour of each concrete class exceeding 1/2 cu. yd. but less than 25 cu. yd., plus one (1) set for each additional 50 cu. yd. Test

one (1) specimen at 7 days, test two (2) specimens at 28 days, and retain one (1) specimen in reserve for later testing.

c. Slump: ASTM C 143. One (1) test at point of placement for each compressive strength test but not less than one (1) test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.

d. Air Contact: ASTM C 231, pressure method. One (1) test for each compressive strength test but no less than one (1) test for each day's pour of each type of air-entrained concrete.

e. Concrete Temperature: ASTM C 1064. One (1) test performed hourly when air temperature is 40 degrees F and below and when 80 degrees F and above. One (1) test for each set of compressive strength specimens.

2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five (5) randomly selected batches or from each batch if fewer than five (5) are used.

3. 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 concrete.

4. Strength level of concrete will be considered satisfactory if averages of sets of three (3) 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.

B. Test results will be reported in writing to Agency, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive strength tests will contain project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in paving, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7 day and 28 day tests.

C. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but not be used as the sole basis for acceptance or rejection.

D. Additional Tests: The testing agency will make additional tests of concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42.

3.9 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, defective, or does not meet the requirements of this Section.

B. Protect concrete from damage until Final Payment. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material until Final Payment.

3.10 CLEAN UP

A. At completion of Work, remove concrete stains from adjacent work, including but not limited to dissimilar paving types, walls, columns, railing posts, light fixtures, plant materials, to satisfaction of Agency.

END OF SECTION