



**DESIGN AND CONSTRUCTION GROUP
THE GOVERNOR NELSON A. ROCKEFELLER
EMPIRE STATE PLAZA
ALBANY, NY 12242**

ADDENDUM NO. 4 TO PROJECT NO. 44559

**CONSTRUCTION WORK, HVAC WORK, PLUMBING WORK, AND ELECTRICAL WORK
PROVIDE STATE POLICE FORENSIC IDENTIFICATION UNIT BUILDING,
HEADQUARTERS ADDITION AND COLD STORAGE BUILDING
TROOP E HEADQUARTERS
1569 ROCHESTER ROAD
CANANDAIGUA, NEW YORK**

February 12, 2016

NOTE: This Addendum forms a part of the Contract Documents. Insert it in the Project Manual. Acknowledge receipt of this Addendum in the space provided on the Bid Form.

CONSTRUCTION WORK SPECIFICATION

1. Refer to Specifications, ADD Section 321301 PERVIOUS CONCRETE PAVING to the project manual.
2. Page 013300 – 3, Paragraph 1.06 G Change the word “Construction” in the first sentence to “C, H, P, E.”

HVAC WORK SPECIFICATIONS

3. Page 013300 – 3, Paragraph 1.06 G Change the word “Construction” in the first sentence to “C, H, P, E.”

PLUMBING WORK SPECIFICATION

4. Page 013300 – 3, Paragraph 1.06 G Change the word “Construction” in the first sentence to “C, H, P, E.”

ELECTRICAL WORK SPECIFICATION

5. Page 013300 – 3, Paragraph 1.06 G Change the word “Construction” in the first sentence to “C, H, P, E.”

CONSTRUCTION WORK DRAWINGS

Attachments:

Section 321301 PERVIOUS CONCRETE PAVING

END OF ADDENDUM

Margaret F. Larkin
Executive Director
Design and Construction

SECTION 321301

PERVIOUS CONCRETE PAVING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Earthwork: Section 310000.
- B. Asphalt Concrete Paving 321216.
- B. Pavement Marking: Section 321723.

1.02 LEED REQUIREMENTS

- A. The materials and/or equipment specified in this section may contribute towards the prerequisites and credits required to obtain LEED certification for the Field Investigation Unit (FIU) building. Refer to spec section '018113 LEED Documentation Requirements' for information on submittals, procedures, material properties, and credits required for achieving LEED Certification.
- B. LEED submittals identified in this section, if any, are only applicable for the FIU building. A complete list of LEED submittals have been identified in spec section '018113 LEED Documentation Requirements'. The contractor is required to submit information for materials and/or equipment as outlined in spec section 018113 - even if this section does not indicate the submittal being required.
- C. Submit LEED submittals in accordance with Specification Section 013300 Submittals and 018113 LEED Documentation Requirements.

1.03 REFERENCES

- A. American Concrete Institute
 - 1. ACI 211.3R "Guide for Selecting Proportions for No-Slump Concrete"
 - 2. ACI 305 "Hot Weather Concreting"
 - 3. ACI 306 "Cold Weather Concreting"
 - 4. ACI 522 "Report on Pervious Concrete"
 - 5. ACI Flatwork Finisher Certification Program
 - 6. ACI Field Technician Certification Program
- B. American Society for Testing and Materials
 - 1. ASTM C 29 "Test for Bulk Density (Unit Weight) and Voids in Aggregate"
 - 2. ASTM C 33 "Specification for Concrete Aggregates"
 - 3. ASTM C 42 "Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete"
 - 4. ASTM C 94 "Specification for Ready-Mixed Concrete"
 - 5. ASTM C 117 "Test Method for Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing"

6. ASTM C 138 “Test Method for Density (Unit Weight), Yield and Air Content (Gravimetric) of Concrete”
 7. ASTM C 140 “Test Methods for Sampling and Testing Concrete Masonry Units and Related Units”
 8. ASTM C 150 “Specification for Portland Cement”
 9. ASTM C 172 “Practice for Sampling Freshly Mixed Concrete”
 10. ASTM C 260 “Specification for Air-Entraining Admixtures for Concrete”
 11. ASTM C 494 “Specification for Chemical Admixtures for Concrete”
 12. ASTM C 595 “Specification for Blended Hydraulic Cements”
 13. ASTM C 618 “Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete”
 14. ASTM C 989 “Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars”
 15. ASTM C 1077 “Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation”
 16. ASTM C 1602 “Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete”
 17. ASTM D 448 “Classification for Sizes of Aggregate for Road and Bridge Construction”
 18. ASTM D 1557 “Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³)”
 19. ASTM D “Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)”
 20. ASTM D 1752 “Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural construction”
 21. ASTM D 2434 “Test Method for Permeability of Granular Soils (Constant Head)”
 22. ASTM D 3385 “Test Method for Infiltration Rate in Field Using Double-Ring Infiltrometer”
 23. ASTM D 5093 “Test Method for Field Measurement of Infiltration Rate Using a Double-Ring Infiltrometer with a Sealed-Inner Ring”
 24. ASTM D “Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Falling Head, Method C)”
 25. ASTM E 329 “Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction”
- C. National Ready Mixed Concrete Association (NRMCA)
1. NRMCA Pervious Concrete Contractor Certification

1.04 SUBMITTALS

Prior to commencement of the work the contractor shall submit the following:

- A. Concrete Materials:
 - 1. Proposed concrete mixture proportions including all material weights, volumes, density (unit weight), water cementitious ratio, and void content. If mix proportions are proprietary, a written submittal from the concrete supplier is required documenting a minimum of two prior successful projects using the same mix design. The unit weight, water to cement ratio, and void content is still required to be reported.
 - 2. Aggregate type, source and grading.
 - 3. Cement, supplementary cementitious materials and chemical admixture manufacturer certifications.
- B. Aggregate Base Materials: Washed aggregate type, source, grading and void content (percent porosity).
- C. Qualifications: Evidence of qualifications listed under Quality Assurance in section 1.03 of this specification.
- D. Project Details: Specific plans including a jointing plan, details, schedule, construction procedures and quality control plan.
- E. Subcontractors: List all materials suppliers, subcontractors and testing laboratories to be used on the project.

1.05 QUALITY ASSURANCE

- A. Prospective Contractors shall attend a Pre-installation meeting where the pervious concrete pavement construction process will be described (see Section 1.08) by industry representatives from the NY Construction Materials Association.
- B. At or before the meeting, the Contractor shall submit evidence that a minimum of 2 members of the crew and at least one crew leader, shall be certified by the NRMCA Pervious Concrete Contractor Certification program. A minimum of one Certified individual as listed above, must be present on each pervious concrete placement, and the certified individual must be in charge of the placement crew and procedures.

The concrete supplier must supply proof of NRMCA Pervious Concrete Certification, or equal, and proof of two successful pervious concrete pavement projects, each greater than 1,000 ft², including but not limited to the following:

 - 1. Project name and address, owner name and contact information
 - 2. Test results including density (unit weight), void content and thickness
- C. This requirement may be waived by the Architect/Engineer, provided the Contractor demonstrates successful experience in the concrete industry and constructs test panel(s) for inspection and testing, per Section 1.06 of this guide. If the placing contractor and concrete producer have insufficient experience with pervious concrete pavement (less than two successful projects), the placing contractor shall retain an experienced consultant to monitor production at the concrete plant, handling, and placement operations at the project, solely at the Contractor's expense.
- D. Qualifications of testing laboratories- The testing laboratory shall have its laboratory equipment and procedures inspected at intervals not to exceed 2 years by a qualified national authority as evidence of its competence to perform the required tests and material designs. Acceptable national authority will include the AASHTO

Materials Reference Laboratory (AMRL) and/or the Cement and Concrete Reference Laboratory (CCRL) as appropriate. In addition, testing machines and equipment must be calibrated annually or more frequently by impartial means using devices of accuracy traceable to the National Bureau of Standards.

In fields other than those covered by the referenced ASTM standards, the testing laboratory shall accept only those assignments which it is able to perform competently by use of its own personnel and equipment. Any work to be subcontracted must be to laboratories meeting the same criteria.

The testing laboratory shall have demonstrated its competence in the applicable fields for a period of not less than 3 years.

The inspection and testing services of the testing laboratory shall be under the direction of a full time employee registered as a professional engineer in the state of New York. He shall have a minimum of five years of professional engineering experience in inspection and testing of concrete construction.

1.06 SPECIAL EQUIPMENT

Pervious concrete requires specific equipment for compaction and jointing. If the owner of the pervious concrete pavement desires joints, the concrete shall be jointed and compacted using the methods listed, or as alternatives as demonstrated and approved by the Architect/Engineer.

- A. Rolling compaction shall be achieved using a steel roller that spans the width of the section placed and exerts a minimum vertical pressure of 10 psi on the concrete, or they may use an hydraulically actuated rotating, weighted, tube screed, (i.e. Allen or Bunyan Roller Screed).
- B. Compaction for small areas shall be achieved using a standard soil plate compactor that has a base area of at least two square feet and exerts a minimum of 10 psi vertical pressure on the pavement surface through a temporary cover of a minimum of ¾" plywood. Alternatively, a commercially available hand "tube" roller, as manufactured by Bunyan, may be used.
- C. When contraction joints are required in pervious pavements, they may be constructed by rolling, or forming. Sawing of joints is discouraged due to the sediments introduced into the pavement, and the increased propensity of raveling of sawn joints. Rolled joints shall be formed using a "pizza cutter roller" to which a beveled fin with a minimum depth of ¼ the thickness of the slab has been attached around the circumference of a steel roller.
 1. If the Engineer allows sawed joints in writing, they shall be constructed using an early entry or wet saw. Note: Sawed joints may exhibit some unraveling, and any dust or slurry generated shall be removed during the sawing operation.

1.07 TEST PANELS

Prior to construction, test panels shall be placed and approved by the Architect/Engineer. The Architect/Engineer may waive this requirement based on contractor qualifications. At Contractors option, test panels may be constructed and approved sections of project aggregate detention (or groundwater recharge) layer.

- A. Test Panel shall be constructed in accordance with the plans and specifications, the contractor is to place two test panels, each a minimum 225 sf at the required project thickness, consolidated, jointed and cured using materials, equipment and personnel weights can be achieved and a satisfactory pavement can be installed at the site location.
- B. Test panel cost and removal, if necessary, shall be included as a line item in the contract proposal and contract. Test panels may be placed at any of the specified pervious concrete pavement locations on the project or at another test site.
- C. Quality: Test panels shall have acceptable surface finish, joint details, thickness, porosity and curing procedures and shall comply with the testing and acceptance standards listed in the Quality Control section of this specification. Test panels shall be tested for thickness in accordance with ASTM C 42; void structure in accordance with ASTM C 140 (Gravimetric Air Determination); and for core unit weight in accordance with ASTM C 140 paragraph 6.3
- D. Satisfactory performance of the test panels shall be determined by the Owner.
 - 1. Compacted thickness no more than 1/4" less than specified thickness. (T compacted greater than or equal to T specified – 1/4")
 - 2. Void Structure: 15% minimum; 25% maximum;
 - 3. Unit weight plus or minus 5 lb/ft³ of the design weight. If measured void structure falls below 15% or if measured thickness is greater than 1/4" less than specified thickness or if measured weight falls less than 5 lb/ft³ below unit weight, the test panel shall be removed at the contractors expense and disposed of in an approved landfill or recycling facility. If test panels are found to be satisfactory, they may be left in place and included in the completed work, at no additional cost to the project.

1.08 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. The contractor shall not place pervious concrete for pavement when the ambient temperature is 40° F or lower, unless otherwise permitted in writing by the Owner.
 - 2. The contractor shall not place pervious concrete for pavement when the ambient temperature is 90° F or higher, unless otherwise permitted in writing by the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

- A. PERVIOUS CONCRETE PAVEMENT
 - 1. Cement: Portland cement Type I, Type II, Type III, or Type V, conforming to ASTM C 150 or Portland cement Type IP or IS conforming to ASTM C 595.
- B. SUPPLEMENTARY CEMENTITIOUS MATERIALS

1. Fly ash conforming to ASTM C 618
2. Ground Granulated Blast-Furnace Slag conforming to ASTM C 989

C. ADMIXTURES

1.
 1. Air entraining admixtures with ASTM C 260
 2. Chemical admixtures shall comply with ASTM C 494
 - a. Mid-range water reducing admixtures (water reducers) Type A or High Range water reducing admixtures Type F or G are permitted due to low water-cementitious ratios specified for pervious concrete.
 - a. Hydration stabilizing admixtures, such as Delvo, Recover, Wash-out, Stop Set-L, or equal, meeting requirements of ASTM C 494, Type B Retarding or Type D Water reducing/ Retarding admixtures are required. This stabilizer suspends cement hydration by forming a protective barrier around the cementitious particles, which delays the particles initial set. If this mix heats up in the truck, a standard retarder will not prevent premature hydration, while the stabilizer will. The use of hot water during cold weather will require increased dosage of Hydration Stabilizer.

D. AGGREGATES FOR PERVIOUS CONCRETE:

1. Coarse aggregate shall be freeze-thaw durable, and meet the size and grading requirements as defined in ASTM D 448 (Standard Sizes of Coarse Aggregate, Table 4, AASHTO Specifications, Part I, 13th Ed., 1982 or later) and shall comply with ASTM C 33. Use No. 67, No. 7, No. 8, No. 89, No. 9, No. 11, or No. 12, unless an alternate size is approved for us based on meeting the project requirements. Data for proposed alternate material shall be submitted for approval per Section 1.05A of this guide. Fine aggregate complying with ASTM C 33, if used, shall not exceed 3 ft³ per yd³.
2. A combined coarse and fine aggregates gradation shall be provided and a minimum of 10% of the material shall pass the #4 sieve. Larger aggregate sizes may increase porosity but can decrease workability and strength. Well graded aggregates shall be avoided, as they may reduce porosity, and may not provide adequate void content.
3. Where available, natural rounded aggregates are recommended.

E.. WATER

Water shall be potable and comply with ASTM C 1602.

1. Mixture proportions: The Contractor shall furnish a proposed mix design, with proportions of materials, or if mix proportions are proprietary, a written submittal from the concrete supplier, prior to commencement of work. The data shall include unit weights determined in accordance with ASTM C 29, paragraph 11, jiggling procedure. The composition of the proposed concrete mixture shall be submitted to the Architect/Engineer for review and/or approval and shall comply with the following provisions,

unless an alternative composition is demonstrated to comply with the project requirements. Mixture performance will be affected by properties of the particular materials used. Trial mixtures must be tested to establish proper proportions and determine expected behavior. Concrete producers may have mixture proportions for pervious concrete optimized for performance with local materials. Appendix 6 of ACI 211.3R provides a guide for pervious concrete mixture proportioning. Proportions:

- a. Concrete mixture unit weight: range of 105 lb/ft³ to 130 lb/ft³ per ASTM C 29, paragraph 11, jigging procedure.
- b. Concrete mixture void content: range of 15% to 20%, per ASTM C 138, Gravimetric Air Determination.
- c. Cementitious content: range of 300 lb/yd³ to 520 lb/yd³, total cementitious content.
- d. Supplementary cementitious content: Fly ash: 25% maximum; Slag: 25% maximum, or combined supplementary cementitious content: 50% maximum.
- e. Water-cementitious ratio: range of 0.26 to 0.40.
- f. Aggregate content: the bulk volume of aggregate per cubic yard shall be equal to 27 ft³ when calculated from the dry rodded density (unit weight) determined in accordance with ASTM C 29, jigging procedure.
- g. Admixtures: admixtures shall be used in accordance with the manufacturer's instructions and recommendations.
- h. Mix water: the quantity or mixing water shall be established to produce pervious concrete mixture of the desirable workability to facilitate placing, compaction and finishing to the desired surface characteristics. Mix water shall be such that the cement paste displays a wet metallic sheen without causing the paste to flow from the aggregate. (A cement paste with a dull-dry appearance has insufficient mix water for hydration) Insufficient mix water results in inconsistency in the mix and poor bond strength. High water content may result in paste sealing the void system primarily at the bottom and poor bond at the upper surface.

PART 3 EXECUTION

3.01 PERVOUS CONCRETE PAVING

- A. Pavement thickness for all applications (excluding heavy traffic loads) shall be single- course placement 8 in. thick unless otherwise specified in the plans. Formwork:
 1. Form materials are permitted to be of wood or steel and shall be the full depth of the pavement. Caution: protect filter fabric, and impermeable membranes from puncture or tear when placing forms and form pins. Forms shall be of sufficient strength and stability to support mechanical equipment without deformation of plan profiles following spreading, strike-off and compaction operations. Forms may have a removable spacer of ½in. to ¾ in. thickness placed above the depth of pavement. The spacers shall be removed following placement and vibratory strike-off to allow roller compaction. (Removable spacers may not be necessary if

other means of strike-off and consolidation are used, such as a hydraulically actuated weighted pipe roller screed.)

B. Mixing and Hauling:

1. Production: Pervious concrete shall be manufactured and delivered in accordance with ASTM C 94.
2. Mixing: Mixtures shall be produced in central mixers or in transit (truck) mixers. When concrete is delivered in agitating or non-agitating units, the concrete shall be mixed in the central mixer for a minimum of 1.0 minute or until a homogenous mix is achieved. Concrete mixed in transit mixers shall be mixed at the speed designated as mixing speed by the manufacturer for 75-100 revolutions.
3. Transportation: The pervious concrete mixture may be transported or mixed on site and discharge of individual loads shall be completed within one (1) hour of the introduction of mix water to the cement. Delivery times may be extended beyond 90 minutes when an increased dosage of hydration stabilizer is used to maintain a wet metallic sheen.
4. Discharge: Each truckload shall be visually inspected for consistency of concrete mixture. Water addition shall be permitted at the point of discharge to obtain the required mix consistency, and as needed to maintain a wet metallic sheen. A minimum of 30 revolutions at the manufacturer's designated mixing speed shall be counted following the addition of any water to the mix, prior to further discharge. If water is added more than three times to a load, the dosage rate of Hydration Stabilizing Admixture should be increased in subsequent loads. Discharge shall be a continuous operation and shall be completed as quickly as possible. Concrete shall be deposited as close to its final position as practical and such that discharged concrete is incorporated into previously placed plastic concrete. If consolidation occurs during discharge, placement shall be halted and wet concrete removed.C. C

C. Placing and Finishing:

1. Prior to placing concrete, the subbase shall be soaked and in a wet condition at the time of placement. Failure to provide a moist subbase will result in a reduction in strength of the pavement.
2. Concrete may be deposited into forms by mixer truck chute, conveyor or buggy.
3. Unless otherwise permitted, the Contractor shall utilize a mechanical vibratory screed to strike-off the concrete $\frac{1}{2}$ in. to $\frac{3}{4}$ in. above final height, utilizing the form spacers described in Formwork. An alternative method to strike-off and compact the concrete is to use a hydraulically actuated weighted pipe rolled screed, (Bunyan Roller Screed), as described under 1.04 Special Equipment. If approved by the Architect/Engineer in writing, the Contractor may place the pervious concrete with either slip form or vibratory form riding equipment with a following compactive unit that will provide a minimum of 10 psi vertical force to the concrete. Similarly, strike-off by hand straightedge may be permitted for sidewalks and other small areas followed by compaction.

4. Care must be taken to prevent closing the void structure of pervious concrete. After mechanical or other approved strike-off and compaction operation and cross rolling, no other finishing operation will be allowed. Internal vibration shall not be permitted. If vibration, internal or surface applied, is used, it shall be shut off immediately when forward progress is halted for any reason.
5. Placed concrete shall not be disturbed while in the plastic state including edging. Low spots after the screeding operation shall be over-filled for surface repair and tamped to desired elevation with hand tampers, or re-screeded with hydraulically actuated weighted pipe roller screed.
6. Following strike-off, remove spacers and compact the concrete to the form level, utilizing a steel roller, a plate compactor on plywood or other method approved by the Architect/Engineer. Longitudinal rolling shall be followed immediately by cross rolling and joint rolling (if specified). Care shall be taken during compaction that sufficient compactive force is achieved without excessively working the concrete surface that might result in sealing off the surface porosity.
7. The pervious concrete pavement shall be compacted to the required cross-section and shall not deviate more than +/- 3/8 in. in 10 ft. from profile grade.

C. Jointing:

1. Joints in pervious sidewalks will be the same as joints in conventional concrete sidewalks. The intent is that the pervious concrete will be jointed in squares, length equal to width of section. (I.E. a 4' width of sidewalk is to be jointed every 4' of length).
2. Although joint spacing may control cracking, for conservative design, contraction (control) joints shall be installed at regular intervals not to exceed 30 ft., and slab length shall not exceed 2 times the width of the slab. Transverse contraction joints shall be installed at 1/4 the depth of the thickness of the pavement. These joints are to be installed as quickly as possible in the plastic concrete.
3. Jointing plastic concrete: Joints installed in the plastic concrete may be constructed utilizing a small roller as described in the Special Equipment section of this guide specification. When this option is used it shall be performed immediately after roller compaction and prior to curing. If the Engineer allows sawed joints in writing, they shall be constructed using an early entry or wet saw. Note: Sawed joints may exhibit some raveling, and any dust or slurry generated shall be removed during the sawing operation.
4. Transverse construction joints: Transverse construction joints shall be installed whenever placing is suspended for 30 minutes or whenever concrete is no longer workable.
5. Isolation joints: Isolation joints shall be used when abutting fixed vertical structures such as light pole bases, building foundations, etc.
6. Edging shall not be performed along isolation joints and construction joints, in order to reduce potential for raveling under traffic.

E. Curing:

1. Curing procedures shall begin immediately, no later than 20 minutes, from the time the pervious concrete is discharged from the truck. Placing, finishing and tooled jointing must be completed within the 20-minute window after discharge. The pavement surface shall be covered with a minimum 6 mil. thick polyethylene sheet or other approved covering material. Prior to covering, a soybean oil based product shall be applied to the surface of the concrete, or an evaporation reducer shall be sprayed above the surface. The cover shall overlap at all exposed edges and shall be secured (without using dirt or stone) to prevent dislocation due to winds or adjacent traffic conditions. A spray glue (i.e. 3M 77) is recommended to secure separate plastic sections and prevent moisture loss. For additional guidance on hot weather concreting, see ACI 305, and for cold weather concreting see ACI 306.
2. The low water/cementitious ratio and the high amount of exposed surface of pervious concrete make it especially susceptible to drying out. Immediately after screeding, the surface shall be kept moist and evaporation prevented using soybean based, spray applied curing compound and/or evaporation retarder immediately after screeding. Immediately after each transverse jointing, the polyethylene sheet curing shall be applied, then cross rolling shall be performed.
3. The curing cover shall remain securely in place, uninterrupted, for a minimum of 7 days in warm weather, or 10 days in cold weather. No vehicular traffic shall be permitted on the pavement until curing is complete (7 days) and no truck traffic shall be permitted for at least 14 days without written permission from the Engineer. Pedestrian traffic may be permitted on the concrete after 24 hours. The Engineer may permit earlier traffic opening times.
4. The owner and general contractor are responsible to notify contractor if plastic has been removed from the finished surface, and to temporarily recover the material immediately, until the contractor can reinstall more permanent covering.

F. Quality control – concrete

1. The Owner shall employ a testing laboratory that conforms to the requirements of ASTM E 329 and ASTM C 1077. All personnel engaged in concrete testing shall be certified by the IRMCA Certified Pervious Concrete Technicians or equivalent, and as ACI Concrete Field Technicians.
2. The Contractor shall pay all costs related to having the industry representative from the NY Concrete Promotion Council on site through the placement of all of the pervious concrete, including pre-construction meetings.
3. Traditional concrete testing procedures for strength and slump control are not applicable to this type of pavement material. Procedures to be used per this guide specification include: ASTM C 172, ASTM C 29, ASTM C 42 and ASTM C 138.
4. Concrete tests shall be performed for each 150 yd³ or fraction thereof with a minimum of one set of tests for each day's placement.
5. Sampling: Plastic concrete shall be sampled in accordance with ASTM C 172.

6. Unit weight (density): Unit weight shall be measured in accordance with ASTM C 29. The measure is to be filled and compacted in accordance with ASTM C 29, paragraph 11, jiggling procedure. The unit weight of the delivered concrete shall be ± 5 lb/ft³ of the design unit weight (density).
7. Void content: void content of the plastic concrete shall be calculated per ASTM C 138 (gravimetric air determination), and compared to the void percentage required by the hydraulic design. Unless otherwise specified, void content shall be between 15% and 25%.
8. After a minimum of seven (7) days, hardened concrete shall be tested at a rate of one set of three cores per 150 yd³ of concrete placed on one day or fraction thereof. Cores shall be drilled in accordance with ASTM C 42. Cores shall be measured for thickness, void structure and unit weight.
9. Thickness: untrimmed hardened core samples shall be used to determine placement thickness. The average of all production cores when measured for length shall not be more than 1/2 in. less than the specified design thickness.
10. Core unit weight (density) and void content: the cores be tested for unit weight (density) and void content using ASTM C 140. Unit weight (density) of cores trimmed and tested in the saturated condition, per ASTM C 140, paragraph 6.3.1, shall be ± 5 lb/ft³ of the design unit weight. Void content shall not be lower than 2% below the specified design void content. Void content shall be calculated as follows:

$$\% \text{ Voids} = (Dd/Di) * 100$$

where: Dd = oven dried density of core

Di = immersed density of core

G. Performance/Maintenance

Excessive raveling: at or before 28 days after placement, any areas of excessive surface raveling, as determined by the Architect/Engineer, shall be removed and replaced or repaired by the contractor,

1. At no additional cost to the project.

Surface drainage: at or before 28 days after placement, any areas of insufficient surface porosity, as determined by the Architect/Engineer in their design calculations, shall be removed and replaced by the Contractor, at no additional cost to the project.

Maintenance: at or before 28 days after placement, the contractor shall submit to the Architect/Engineer a written maintenance plan to prevent clogging of the pervious concrete pavement. The plan shall include periodic testing for porosity and methods to restore porosity if the rate drops below 150% of the design rate. Acceptable methods to restore levels of porosity are to vacuum and/or power-wash the pervious concrete sections. Fee for preparation of the maintenance plan shall be at no additional cost to the project.

3.2 PAVEMENT GUARANTEE

- A. Two-Year Guarantee against Defects in Paving: Contractor guarantees that any areas of settlement, heaving or other movement, cracks, spalling, raveling, surface pitting, flaking or other deterioration, or any other defects which occur in any new or replacement paving, as determined by the Architect and Owner, occurring within two (2) years after the date of substantial Completion, shall be cut out, removed, replaced and corrected to the satisfaction of the Architect and Owner, at the contractor's expense, in accordance with provisions of the contract dealing with correction of work.

END OF SECTION