

SECTION 520—PERVIOUS CONCRETE PAVEMENT SYSTEM

520.1 DESCRIPTION—This work is the construction of plant-mixed pervious concrete pavement on a prepared surface designed to allow the infiltration of storm water into the subsoil. The pervious concrete surface layer is a horizontal plane that is permeable to water and air. The second layer of the storm water system is an open graded, angular stone layer that is used for temporary storm water detention.

520.2 MATERIAL—

(a) **Cement.** Section 701

(b) **Pozzolans.** Section 724

(c) **Aggregate.** Section 703

1. Coarse Aggregate.

1.a **For use in Concrete.** AASHTO No. 8, Type A.

1.b **For use in Detention Basin.** Either AASHTO No. 3 as the primary detention coarse aggregate topped with AASHTO No. 57 as a choker and leveling coarse; or AASHTO No. 57 only, as designed and specified.

2. Fine Aggregate.

2.a **For use in Concrete.** Fine Aggregate, Type A.

2.b **For use in Detention Basin.** Fine Aggregate, Type A or Type B.

(d) **Water.** Section 720.1

(e) **Concrete Admixtures.** Section 711.3 with the following addition:

(i) **Hydration Stabilizing Admixture.** A Bulletin 15 approved admixture that is both a water reducing and retarding admixture.

(f) **Geotextile, Class 4, Type A.** Section 212

(g) **Concrete Mix Design.** Design the pervious concrete mixture proportions in accordance with ASTM C 1688. Design the mixture to have a plastic unit weight between 115 pounds to 130 pounds and water cement ratio of 0.36 \pm 0.04. Adjust the mix water, if necessary, during production if the mixture has a dull or dry appearance to produce a wet metallic sheen without causing the paste to flow from the aggregate. Additional mix water may be added at the project, if necessary, to achieve this condition provided the plastic unit weight is within 5 pounds per cubic foot of the target design unit weight.

If reactive aggregates are used in the mixture, remediate for ASR in accordance with the Department's latest specification requirements.

Furnish the proposed mix design identifying all mixture components and weights or dosage amounts to the DME/DMM at least 3 weeks before the scheduled start of producing the mixture for the project. Include the target in-situ void content and 28 day unit weight values on the mix design form.

(h) **Concrete Curing Material.** A polyethylene curing sheet in accordance with ASTM C 171.

(i) **QC Plan.** Prepare and submit a QC Plan, as specified in Section 106. Provide the QC plan to the Representative at the start of the project. Do not begin production until receiving approval of the QC Plan from the Representative.

1. Cold Weather. Include provisions to protect pervious concrete from freezing throughout the 7 day curing period in accordance with ACI 306.1.

2. Hot Weather. Include detailed plans indicating the amount of hydration stabilizing admixture that will be added in 5F increments to provide time for placing and finishing the pervious concrete before initial set.

520.3 CONSTRUCTION—

(a) Test Sections. Produce two test sections using the approved mix design and placement and finishing operations to be used in production and construct at the project site on a prepared subgrade and base, using the material and construction requirements used in production. Each section must have an area of at least 225 square feet. Perform infiltration on both test sections in accordance with ASTM C 1701. The average of both infiltration values must exceed 200 inches per hour.

Submit the following information for each test section to the Representative:

- Test Section Thickness - Section 501.3(s). Thickness cannot be more than 1/4-inch less than the design thickness.
- Void Content - ASTM C 1754-12. Void structure of 20% \pm 5%.
- Hardened Density - ASTM C 1754-12 (The average hardened densities of the two test sections will be the hardened density used as the basis of acceptance for the remainder of the project with a tolerance of \pm 5 pounds per cubic foot and not to exceed 130 pounds per cubic foot.

Note: Test sections may, with the approval of the Representative, be incorporated into the project.

(b) Equipment. Provide equipment to strike off pervious concrete that provides an acceptable final finish using either a form-riding paving machine, roller screed, vibrating screed, or an asphalt paver. The final surface finish may be applied with steel finishing equipment or a motorized pan finisher provided the surface voids are not sealed.

1. Rollers. Use smooth steel-wheeled rollers in the static mode, seating with one to four passes. Do not use pneumatic tire rollers.

(c) Subgrade Preparation. Excavate subgrade to undisturbed soil without compaction, allowing the subgrade to be left as permeable as possible. Where erosion of subgrade has caused accumulation of fine materials and/or surface ponding, remove the accumulated material using light equipment and scarify the underlying soil to a minimum depth of 6 inches using a spring tooth rake or equivalent and a light tractor. Avoid driving concrete mixers or other equipment through the installation area. Correct and repair any damaged or compacted areas to the satisfaction of the Representative. Notify the Representative upon completion of subgrade work for final inspection and acceptance before proceeding with basin and choker course installation.

(d) Detention Basin. Prevent sediment from washing into beds during site development. Cover the bottom of the detention base with a minimum of 2 inches of fine aggregate to prevent soils from migrating into the storm water storage area. Wrap basin sides with a non-woven geotextile fabric. Install detention basin coarse aggregate in 8 inch maximum lifts. Compact the course as specified in Section 360.3. Install aggregates to grades indicated on drawings. Place the specified depth(s) of coarse aggregate on top of the fine aggregate and roll as specified in Section 520.3(b)1. Remove temporary sediment control materials when the site is fully stabilized.

(e) Setting Formwork. Set, align, and brace forms so that the cured concrete meets the tolerances and specified elevations. Apply form-release agent to any formed faces in contact with the concrete immediately before placement. Undamaged vertical faces of previously placed concrete may be used for subsequent placement.

(f) Mixing and Hauling. Operate truck mixers at the speed designated by the manufacturer for a minimum of 70 to 100 revolutions of the drum. Unless otherwise approved, place pervious concrete within 90 minutes after final introduction of any mix water.

(g) Placing and Finishing Fixed Form Pavement. Wet the subgrade or subbase with water before concrete placement such that the material is saturated but without standing water. Deposit the concrete either directly from the

transporting equipment or by conveyor onto the subgrade. Do not place pervious concrete on frozen material. Deposit concrete between forms to an approximate uniform height. Spread the concrete using mechanized equipment or hand tools without segregation.

Where trucks or buses may access the concrete, utilize a paver equipped with compaction tampers. For other areas a roller screed or vibrating screed may be used.

(h) Final Surface Finish. Final finish for paver placed concrete is to be achieved with a maximum 2-ton roller to eliminate seams. Do not allow rollers to bridge previously placed and cured concrete for 7 days or before the Representative is satisfied that the concrete has achieved sufficient strength to prevent damage.

Steel troweling may be used provided the surface voids remain open and the average density requirement and permeability values are met.

(i) Edging. Edge exterior formed surfaces to a radius of not less than 1/4-inch.

(j) Curing. Begin curing within 20 minutes of concrete discharge. Completely cover the pavement surface with a 6 mil minimum polyethylene sheet. Thoroughly secure the curing sheet at all exterior edges and interior laps to prevent removal from wind. Maintain curing for a minimum of 7 days.

(k) Construction Joints. Construct joints in the locations specified by either tooling into the pervious concrete immediately upon final finishing to approximately 1/4 slab thickness using a pervious concrete cross rolling tool or saw cut after the concrete has achieved sufficient compressive strength to prevent aggregate from being dislodged. If joints are saw cut, remove fines produced from the operation by vacuum to avoid clogging. If curing is interrupted, control the operation such that the polyethylene sheeting and curing is reinstated within 60 minutes of the initial removal.

(l) Weather. Do not place pervious concrete when air temperatures are projected to fall below 40F or lower any time during the 24-hour period following concrete placement or if rain is forecasted to occur before final finishing and curing. In the event that a rainfall event occurs, immediately stop production, form a construction joint and apply the polyethylene sheeting. With the approval of the Representative, a construction joint may be saw cut before resuming placement. Pervious concrete subjected to rainfall will be evaluated after curing for loss of mortar at the surface and repaired or removed and replaced at the discretion of the Representative.

(m) Testing and Acceptance.

1. Plastic Concrete. Perform unit weight testing on every truck in accordance with ASTM C 1688.

2. In Place Hardened Concrete. Identify and remove three 4-inch diameter cores for each 5,000 square feet in accordance with PTM No. 1. Transport the cores to the LTS for testing, indicating the required concrete thickness, density, and void content from the test sections.

2.a Project core lengths tested by LTS will be considered acceptable when meeting the following:

- Average core length: $-3/8$ -inch + $3/4$ -inch
- Length of any individual $-1/2$ -inch

2.b Oven dry density. ASTM C 1754-12.

2.c Core void content. Acceptance will be $\pm 5\%$ of the average voids in the cores of the accepted test section.

3. Infiltration Testing. Perform infiltration on three areas selected in accordance with PTM No. 1 for every 10,000 square feet of pervious concrete placed in accordance with ASTM C 1701. Remove and replace pervious concrete not meeting or exceeding a minimum average infiltration rate of 200 inches per hour. Document the average infiltration value from testing for use in future maintenance activities.

(n) Opening to Traffic. Do not open the pavement to vehicular traffic until the concrete has cured for at least 7 days during which the ambient temperature has exceeded 55F during any time of the day.

520.4 MEASUREMENT AND PAYMENT—Square Foot