City Of Olympia **WSDOT Specifications**

SECTION 8-30, PERVIOUS CONCRETE SIDEWALKS

8-30.1 Description

Section 8-30 applies to the construction of pervious concrete sidewalks, made of Portland cement, aggregate, water, and other approved admixtures.

8-30.2 Materials

Materials shall meet the requirements of the following:

Cement shall be Portland Cement Type I or II conforming to ASTM C150.

Sand shall meet the requirements of 9-03.1(2) "Fine Aggregate for Portland Cement Concrete."

Fine Granular shall consist of naturally occurring granular material. It shall be free of various types of wood or extraneous or objectionable material. It shall meet the following test requirements:

Stabilometer "R" Value 72 min
Swell Pressure 0.3 psi max.

Fine Granular shall meet the following gradation:

Sieve Size	Percent Passing
Sieve # 4	95% Min
Sieve # 16	10% Max
US No. 200	1.5% Max

Water shall be potable.

Perco-Crete additive shall be as supplied from:

Michiels International Inc.
Kenmore, Washington:
Tel: 425-487-1151 / Fax: 425-487-1891
Frank Michiels Email: frankmichiels@miitrade.com

Superplasticizers shall be conforming to ASTM C1017 Type 1, AASHTO M 194: Types F.
Such as Master Builders Glenium® 3000 NS.pdf

(ASTM C 494 / AASHTO M 194: Types F & G; ASTM C1017: Type I)

8-30.3 Construction Requirements

8-30.3(A) Mix Design

Aggregate of 75% sand and 25% Fine Granular.
The aggregate to cement ratio in (pound/pound) shall be 5.9 : 1
The water to cement ratio (pound/pound) shall be 0.41
Additive of Perco-Crete at a rate of 33 pound per cubic yard of material.
Superplasticizers shall be 18 oz per 100 pound of cement.
The concrete shall be designed with 22% void content.

The concrete supplier shall verify that they are able to determine the free moisture of the sand aggregate to within 0.5% of the actual value of the sand moisture content. The procedure for moisture probe calibration and determining the stockpile moisture content variation shall be submitted to the Engineer for approval.

The concrete supplier shall submit a mix design and batching procedure for approval before batching the pervious concrete.

8-30.3(B) Batching and Carting

Concrete shall not be batched if the air temperature is above 87 degrees F.

There shall be no headwater or residual water remaining in the truck before batching the materials.

Batch sizes shall be limited to a maximum of 7 CY. There is no required minimum batch size.

The pervious concrete material shall be batched in the following sequence: (1) All of the free water and the superplasticizer; (2) half of the aggregates plus perco-crete; (3) mix for 1 minute, while continuing to rotate the drum add; (4) the cement; (5) the remaining half of the aggregates. Mix as fast as possible for **3 minutes**. Stop the rotation of the drum. DO NOT CONTINUE TO MIX OR ROTATE THE DRUM. The drum shall not turn again until it reaches job site and is ready to be placed.

NO ADDITIONAL WATER SHALL BE ADDED TO THE MATERIAL AFTER THE INITIAL BATCHING PROCESS UNLESS OTHERWISE APPROVED BY THE ENGINEER. NO WATER SHALL BE ADDED TO THE MIXTURE DURING HAULING OR DISCHARGING.

If balling of the mixture occurs, lengths of plastic decking material 24-inches long shall be added into the drum for all subsequent mixes. The decking material shall be incorporated into the concrete but shall be reused in the next batching operation.

8-30.3(D) Field Testing

Before any pervious concrete material is incorporated into the work, the material shall be visually inspected for uniform mixing and the correct moisture content. Material which does not meet visual inspection shall be rejected and shall not be included in the work. If the Engineer determines that the material has excessive balls it will be rejected. Material that is excessively wet or dry shall be rejected. When the concrete is at the correct moisture content a small sample can be compressed by hand to form a shape which will remain after compression. With slight bouncing the compressed concrete will break in to several large pieces. No consideration for payment of any sort will be given for rejected material.

8-30.3(E) Placement and Curing

Sidewalk forms shall be held in place by stakes or other approved methods that do not extend above the formwork height. The pervious concrete material shall be finished by a plate compactor or roller that must be able to ride on top of the formwork uninhibited by formwork stakes.

Before placing the pervious concrete material, the forms and subgrade shall be surface wet. Any excess water standing in pools or flowing shall be removed prior to placing pervious concrete.

The pervious concrete material shall be placed within one hour of the introduction of the mix water, unless otherwise approved by the Engineer.

Any portions of the concrete mixture which shows evidence of balling shall be thinly cast over the prepared area. No mixture which has evidence of balling shall be placed in the concrete section. Any portions of completed concrete which has evidence of balling in the mixture shall be removed and replaced at the contractor's expense.

The pervious concrete shall be manually screed to ½-inch higher than the curbs finished elevation. Care shall be taken to not incorporate foreign material into the concrete when placing and leveling. Spread the pervious concrete against and along the forms with care to avoid displacement of the forms. Use shovels or muckrakes, not rakes, for hand spreading and distributing. Do not foul the pervious concrete with foreign matter. Workers shall not walk in or compress the concrete material as they are placing and spreading the material.

After screeding the Contractor shall finish the edges of the sidewalk by hand. The Contractor shall use an edging tool to compress and round the edge of the plastic concrete. At the same time the forms shall be cleaned of any loose concrete.

After edge working, the concrete will be compressed with a vibrator plate compactor or roller or other approved finishing procedure. The vibrator plate compactor or roller shall span the entire width of the sidewalk and shall rest on the forms once the pervious concrete has compacted. Other procedures, if requested, shall be evaluated during the installation of the test panel(s). The

Engineer shall be solely responsible for determining the suitability of other finishing techniques.

The vibrator plate compactor shall be capable of exerting a base pressure of 10 psi. The plate shall span the entire width of the bike lane or sidewalk. The plate shall be between 12 to 20 inches long. The front edge of the plate shall angle or curve upwards. Different combinations of plate weight and vibration frequency may be used to achieve the 10 psi.

The roller shall have a weigh of 30 pounds per linear foot. The roller shall have a minimum diameter of 10 inches. The roller shall span the entire width of the sidewalk.

Expansion Joints shall be placed 50 feet apart. Contraction joints shall be 5 feet apart and shall be 1/3 the depth of the sidewalk. Contraction joints shall be installed in plastic concrete.

Immediately after finishing the concrete it shall be covered with 6-mm thick (min) white polyethylene sheet as per Section 5-05(13)B, White Polyethylene Sheeting. Prior to covering, a fog or light mist of water shall be sprayed above the surface. The sidewalk shall remain covered and be allowed to cure undisturbed for a minimum of 3 days. Barricades and markings shall be place about the newly placed concrete to keep pedestrian traffic from walking on it for the duration that it is covered. Weights shall be provided around the edges of the polyethylene sheeting to keep the sheeting in place. Payment for installation of polyethylene sheet shall be considered to be incidental to the bid item “Pervious Concrete Sidewalk.”

8-30.3(F) Test Panels

The Contractor is to complete two satisfactory test panels to demonstrate their ability to place pervious concrete sidewalk, before placing the rest of the pervious concrete sidewalk as required in the contract. The test panel is to be a minimum of 40 feet and a maximum of 80 feet long and to the dimensions. The maximum size of the test panel shall be one ready-mix truckload. The test panel shall be placed at any location specified to have pervious concrete sidewalk installed. The test panel shall be cured for 7 days and then inspected and tested for acceptance.

The test panel shall be acceptable if the pervious concrete material is placed to the lines and grades shown in the plans, if the material has sufficient infiltration capacity and strength. The Engineer shall be solely responsible for determining the acceptability of the test panel and is visually acceptable.

Upon acceptance of the test panel by the Engineer the rest of the remaining portions of work may be installed. If the test panel is determined to be unacceptable by the Engineer, the test panel shall be removed and disposed of in an appropriate manner. Payment for the removal, haul and disposal of the test shall be considered to be incidental to the bid item “Pervious Concrete Sidewalk.”

8-30.3(G) Quality Assurance Testing

Before final acceptance by the City the Contractor shall pressure wash the pervious concrete sidewalk. The pressure washing shall be completed by a washer working at a minimum of 3000

psi and 1.0 gpm. The nozzle shall be held a maximum of 3 inches off the concrete. The Contractor shall wash the entire top surface of the pervious concrete sidewalk. Any sections of pervious concrete that breaks up, pits or does not infiltrate shall be removed and replaced with acceptable pervious concrete. The approximate minimum infiltration rate required is 10 inches per hour. The Engineer shall be solely responsible for determining the acceptability of the concrete after pressure washing.

The Contractor may decide how soon after placing the pervious concrete that they perform the quality assurance testing for the City's acceptance.

8-30.3(H) Underdrain System

The underdrain system shall be excavated into the native soils in the sidewalk location. In preparation for the gravel backfill the native soil shall be excavated to the lines, grades, and depths shown in the plans. The depth of the underdrain gravel backfill shall be as shown on the detail in the plans and shall vary with the sidewalk slope.

In order to infiltrate the storm water locally and to prevent storm water flow to low spot, separation check dams shall be installed to prevent lateral flow within the underdrain system. The interval of the check dams shall be every 15 feet in sidewalk locations as shown in the detailed plan. Check dams may be made of compacted native or imported granular material or they may be made of structural materials. Check dams made of structural materials require approval of the design and material specification from the city. Payment for check dams and installation shall be incidental to the bid item "Pervious Concrete Underdrain System."

Construction geotextile shall be placed to the dimensions shown in the plans. All joints shall be overlapped to the manufactures recommendations. Construction geotextile for underground drainage shall meet the requirements of Section 9-33 for permanent erosion control, high survivability, and Class B filtration.

Gravel backfill shall consist of naturally occurring cleaned crushed gravel material. It shall be free of various types of wood or extraneous or objectionable material. It shall meet the following test requirements:

Stabilometer "R" Value 72 min
Swell Pressure 0.3 psi max.

The gravel shall meet the following gradation:

Sieve Size	Percent Passing
1½ inch square	100
½ inch	30 to 60
Sieve #4	5 Max
US No. 200	2 Max

The surface of the gravel backfill shall be compacted by roller or vibrator plate compactor before placing pervious concrete.

8-30.3(I) Other Relevant Sections

The following sections of the Washington State Standard Specifications for Road, Bridge and Municipal Construction 2006 shall apply to the construction of pervious concrete sidewalk:

5-05.3(2) Consistency
5-05.3(3) Equipment
5-05.3(4) Measuring, and Batching Materials
5-05.3(8) Joints
5-05.5(12) Surface Smoothness
5-05.5(13)B White Polyethylene Sheeting
5-05.5(22) Repair of defective Pavement Slabs
6-02.3(3) Admixtures
6-02.3(4) Ready-Mix Concrete
6-02.3(5)C Conformance to Mix Design
6-02.3(5)K Rejecting Concrete
6-02.3(6) Placing Concrete
6-02.3(17) Falsework and Formwork

8-30.4 Measurement

"Pervious Concrete Sidewalk" will be measured in place by the square yard to the neat lines and depths as shown on the plans.

"Pervious Concrete Testing" will be measured in place by the square yard to the neat lines and depths as shown on the plans.

"Pervious Concrete Underdrain System" shall be measured per cubic yard to the neat lines and depths as shown on the plans.

8-30.5 Payment

Payment of the bid item "Pervious Concrete Sidewalk" shall be full payment to excavate, grade, form, furnish, install, develop expansion and contraction joints, cover and protect the pervious concrete, including all equipment, labor, test strips, and incidentals necessary to complete the work as specified. Payment shall also include all cost to complete submittals, test panels and verification of batching procedures.

Payment of the bid item "Pervious Concrete Sidewalk Testing" shall be full payment to perform the quality assurance testing required for acceptance of the pervious concrete by the Engineer.

Payment of the bid item “Pervious Concrete Underdrain System” for both pervious cement concrete sidewalk and bike lane shall be full payment for excavation, haul, and dispose of excavated materials, and all costs to furnish and install the geotextile, gravel backfill materials. Payment shall include cost to excavate form and compact the check dams within the underdrain system.

8-30.5(1) Quality Assurance Price Adjustment

The contractor is allowed a up to a 5% failure rate on Pervious Concrete Sidewalk. The replacement of failed sections of pervious sidewalk up to 5% of the total installed pervious sidewalk shall be paid at unit bid price. No additional payment shall be made for the removal, disposal, or regrading of these replaced sidewalk sections. The replacement of failed sidewalk in excess of 5% shall be at the contractor’s expense.