



**SPECIAL PROVISIONS
FOR
PERMEABLE CONCRETE PAVING**

**Story County
BR-810-0(93)--7A-85**

**Effective Date
November 17, 2009**

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

090012.01 GENERAL

A. Description

This work includes the requirements to install a permeable concrete paving system as indicated on the plans and as specified herein.

B. Definitions

1. Base Course: Layer of open-graded aggregate beneath the bedding course layer, comprised of small to medium particle sized crushed stone (typically 1/2 to 1 inch). Base layer shall be 6 inches thick.
2. Bedding Course: Layer of open graded aggregate directly beneath pavers, comprised of small particle sized crushed stone chips (typically 1/4 to 3/8 inch), commonly called the setting bed. Depth of the bedding course layer shall be a maximum of 2 inches.
3. Bundle: Several layers of paver clusters stacked vertically, packaged, and tagged for shipment. Commonly called a cube.
4. Chamfer: A 45° beveled edge around the top of a paver, 1/8 to 1/4 inch wide.
5. Cluster: The group of pavers forming a single layer taken from a bundle of pavers of the group of pavers held by the clamp of a paver laying machine.
6. Flats: The portion of the vertical side faces of a paver other than spacer bars.
7. Laying Face: The working edge of pavement where laying of pavers is occurring.

8. Method Statement: The paver installer's and manufacturer's plan for construction and quality control of the pavers.
9. Spacer Bars: Small protrusions on each side of pavers which are used to keep them uniformly spaced while minimizing chipping and spalling. Mechanically installed pavers shall have spacer bars.
10. Sub-base Course: Layer of open-graded aggregate beneath base course layer, comprised of large particle sized (2.5 to 3 inches) crushed stone. Depth shall vary depending on site conditions and specific requirements. Minimum depth of the sub-base course shall be 12 inches.
11. Void Filler: Open graded aggregate used to fill openings in pavers. The bedding course aggregate may be used as the void filler. Smaller particle sized stone chips (1/8 to 1/4 inch) are preferable.
12. Wearing Course: The top surface of the paver surrounded by a chamfer.

C. Quality Assurance

Installation shall be performed by personnel with at least one year of experience in placing interlocking concrete pavers on projects of similar nature or dollar cost.

D. Submittals

1. The Contractor shall submit three copies of the following to the Engineer a minimum of 30 calendar days prior to installation:
 - a. Shop or product drawings and product data.
 - b. Full size samples of concrete paving units to indicate color and shape selections. Color will be selected by the Contracting Authority from standard industry colors.
 - c. Sieve analysis for grading of bedding and joint sand.
 - d. Test results from an independent testing laboratory for compliance of paving unit requirements to ASTM C 936 or other applicable requirements.

E. Mock-ups

1. Install a 7 foot x 7 foot paver area as described.
2. This area will be used to determine surcharge of the bedding sand layer, joint sizes, lines, laying pattern, color, and texture of the job.
3. This area shall be the standard from which the work will be evaluated. This mock-up area shall not be incorporated into the work and shall be removed upon approval of the paver installation.

F. Delivery, Storage and Handling

1. Delivery concrete pavers to the site in steel banded, plastic, banded, or plastic wrapped cubes capable of transfer by forklift or clamp lift. Unload pavers at job site in such a manner that no damage occurs to the product.
2. Cover sand with waterproof covering to prevent exposure to rainfall or removal by wind. Secure covering in place.

3. Coordinate delivery and paving schedule to minimize interference with normal use of building adjacent to paving.

G. Environmental Conditions

1. Do not install sand or pavers during heavy rain or snowfall.
2. Do not install sand and pavers over frozen base materials.
3. Do not install frozen sand.

090012.02 MATERIALS

A. Pavers

1. Interlocking paving stones shall comply with the quality specifications for solid concrete interlocking paving units as per ASTM C 936 and the following:
 - a. Permeable Pavers shall be Eco-Optiloc Series 3000
 - b. Dimensions: 10.24 inch x 10.24 inch x 3.15 inch L-Shape
 - c. Color: Onyx Black
2. At the time of delivery to the work site, the average compressive strength of the pavers shall not be less than 8,000 pounds per square inch, with no individual unit less than 7,200 pounds per square inch. Testing procedures shall be in accordance with ASTM C 140.
3. The average absorption shall not be greater than 5% with no individual unit result greater than 7% per ASTM C 140.
4. The manufacturer shall satisfy the purchaser by laboratory testing that the paving units have adequate resistance to freezing and thawing per ASTM C 67. The specimens shall have no breakage and no greater than 1% loss in dry weight of any individual unit when subjected to 50 cycles of freezing and thawing.
5. Pavers shall be prismatic in plan and formed with straight, uniform edges. The tolerance for the flat portions of the sides shall not exceed 1/32 inch as measured with a steel straight edge. Slumped pavers exceeding this tolerance will be rejected. The length, width, and thickness of the pavers shall meet the allowable tolerances specified in ASTM C 936.
6. No paver shall be used which has been manufactured in a mold exceeding the mold life specified in the Method Statement, without written approval of the Contractor and Engineer.
7. The measurement across a cluster from any cube shall not vary by more than the allowable tolerance of the individual paver units (1/32 inch per paver times the number of pavers across the cluster).

B. Aggregates

1. Bedding Course Aggregate
Bedding course aggregate shall be washed, crusher run, and free of organic material and soluble salts or other contaminants likely to cause efflorescence. The gradation requirements shall comply with the following:

ASTM Sieve Size	Percent Passing (by weight)
1/2 inch	100-100
3/8 inch	94-100
1/4 inch	39-94
No. 4	23-39
No. 8	8-23
No. 16	0-8

2. Base Course Aggregate

Base course aggregate shall consist of washed, crusher run, open-graded stone and meet the following gradation requirements:

ASTM Sieve Size	Percent Passing (by weight)
1.5 inch	100-100
1 inch	90-100
3/4 inch	48-90
1/2 inch	27-48
1/4 inch	12-27
No. 4	0-12

3. Sub-Base Course Aggregate

Sub-base course aggregate shall consist of washed, crusher run, open graded stone and meet the following gradation requirements:

ASTM Sieve Size	Percent Passing (by weight)
4 inch	100-100
3 inch	80-100
2.5 inch	50-80
2 inch	20-50
1.5 inch	5-20
1 inch	0-5

4. Void Filler Aggregate

Use black granite chips as void filler for permeable paver units.

090012.03 CONSTRUCTION REQUIREMENTS

A. Sub-grade Preparation

1. Meet the requirements of Section 2109 of the Standard Specifications.
2. The Engineer will verify that the sub-grade has been shaped and compacted in conformance to the lines, grades, and cross-sections shown on the plans to provide for the construction of the permeable paving areas.
3. The final sub-grade profile shall be uniformly compacted to a minimum of 90% standard proctor density and proof-rolled using vibratory steel drum roller to delineate soft areas. Remove unstable soil and replace with clean, dry compacted earth fill in soft areas.

B. Sub-base Course

1. The sub-base course shall consist of a minimum thickness of 12 inches and compacted using a vibratory smooth-drum roller. It shall be installed in lifts not to exceed 6 inches. Upon completion of the sub-base course installation, the area shall be proof-rolled using a heavy rubber-tired vehicle (such as a loaded tandem truck) to identify any area requiring additional compaction. The sub-base course shall be installed to the elevation per the plans.

C. Base Course

The base course shall consist of a thickness of 6 inches placed in one lift, and compacted using a vibratory smooth-drum roller until there is no visible movement of aggregate under static rolling. The base course shall be installed to the elevation and cross-section per the plans.

D. Bedding Course

1. The bedding course shall be spread loose in a uniform layer to give a depth after compaction of the paving units of a maximum of 2 inches. The Contractor shall screed the bedding course using either a mechanical screed beam apparatus or by the use of screed guides and boards.
2. The screeded bedding aggregate shall not be subjected to any traffic by either mechanical equipment or pedestrian use prior to the installation of the paver units. The voids left after the removal of the screed rails shall be filled with loose aggregate as the paver bedding course proceeds.

E. Paver Installation

1. Pavers shall be installed in approximately the order in which they were manufactured. No cluster shall be installed next to a cluster that was manufactured more than 2500 cycles before or after.
2. Lay pavers in the pattern as shown on the drawings. Lay pavers away from the existing laying face or edge restraint in such a manner as to ensure that the pattern remains square. Chalk lines shall be used upon the bedding course to maintain straight joint lines. Joint spacing between pavers shall be between 1/8 and 1/4 inch; however, the joint width may need to be increased to 3/8 inch, if necessary, to maintain straight joint lines. Lines and grades shown on the plans shall be established and maintained during the installation of the wearing course.
3. Pavers shall be cut using a table-mounted masonry saw. Block splitting will not be permitted. All cut faces shall be vertical. Dry cutting of the pavers shall be performed using a dust collection system.
4. Once pavers have been placed upon the bedding course and all cut pavers have been inserted to provide a full and complete surface, inspect pavers for damaged units and remove and replace those units.
5. The pavement surface shall be compacted to achieve consolidation of the bedding course and paving stones and brought to design levels and profiles by two passes of a suitable plate compactor. Compaction of the pavers shall be accomplished by the use of a vibratory plate compactor capable of a minimum of 4500 pounds of compaction force. No compaction will be permitted within 3 feet of unrestrained edges of the pavement. After compaction, inspect the pavers for damaged units and remove and replace those units.
6. On completion of vibration, the surface tolerances shall be plus or minus 1/4 inch from finish levels. Upon completion, the wearing course surface shall be swept clean of all excess materials. Remove from the site surplus materials, equipment, and debris resulting from these operations. Check final elevations for conformance with the contract documents.

090011.04 METHOD OF MEASUREMENT

The item for Permeable Concrete Paving will be the square yards of completed and accepted permeable paving in the locations shown in the contract documents. Sub-grade course, base course and bedding course will not be measured.

090011.05 BASIS OF PAYMENT

The Contractor will be paid the contract unit price per square yard price for Permeable Concrete Paving. This payment shall be full compensation for furnishing all equipment, labor, and materials for the field staking, form setting, transporting, furnishing, and installing sub-base course, base course, bedding course, and permeable pavers and associated work. Backfill will not be paid for directly, but shall be considered incidental to the permeable paving, as per plan.