

**SPECIAL SPECIFICATION SS481  
SIDEWALK PERMEABLE PAVERS****481.1 Description**

This item shall govern furnishing and installing permeable interlocking concrete pavers, manufactured for the construction of sidewalks, constructed as herein specified on an approved base or subgrade in conformity to the lines, grades and details indicated on the Drawings, Standard Detail or as established by the Engineer or designated representative.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

**This specification is not applicable for permeable pavers with an underdrain system or for permeable paver that will receive vehicle traffic.**

**481.2 Qualifications**

Utilize an installer with job foremen holding a record of completion from the Interlocking Concrete Pavement Institute (ICPI):

- **Required:** Certified Concrete Paver Installer
- **Preferred:** PICP Specialist Designation

**481.3 Submittals**

The submittal requirements of this specification item may include:

- A. Class A portland cement (p.c). concrete mix design,
- B. Minimum 3 lb (2 kg) samples of subbase, base and bedding aggregate materials.
- C. Sieve analysis of aggregates for subbase, base and bedding materials per ASTM C 136.
- D. Permeable concrete pavers:
  1. Paver manufacturer's catalog sheets with product specifications.
  2. Four (4) representative full-size samples of each paver type, thickness, color, and finish. Submit samples indicating the range of color expected in the finished installation.
  3. Accepted samples become the standard of acceptance for the work of this Section.
  4. Laboratory test reports certifying compliance of the concrete pavers with ASTM C 936.
  5. Manufacturers' material safety data sheets for the safe handling of the specified paving materials and other products specified herein.
  6. Paver manufacturer's written quality control procedures including representative samples of production record keeping that ensure conformance of paving products to the product specifications.
- E. Geotextile testing results for flow rate per ASTM D4491
- F. Written Method Statement and Quality Control Plan that describes material staging and flow, paving direction and installation procedures, including representative reporting forms that ensure conformance to the project specifications.
- G. **Mock-Ups:**
  1. Install a 10 ft x 10 ft paver area.

2. Use this area to determine surcharge of the bedding layer, joint sizes, and lines, laying pattern, color and texture of the job.
3. This area will be used as the standard by which the work will be judged.
4. Subject to acceptance by owner, mock-up may be retained as part of finished work.
5. If mock-up is not retained, remove and properly dispose of mock-up.

#### 481.4 Materials

- A. Permeable Interlocking Concrete Paver Units:
  1. Paver Type: Eco-CityLock 80cm - 5x10 or approved equal
  2. Material Standard: Comply with ASTM C936.
  3. Color and finish: As specified by the plans or engineer.
  4. Color Pigment Material Standard: Comply with ASTM C979.
  5. Size: 3.15 in (height) x 10 in (length) x 5 in (width)
  6. Paving unit shall have interlocking joints with vertically aligned horizontal interlocking spacer bars on each of its sides exhibiting unit to unit horizontal restriction movement in both horizontal axes.
  7. Paver joint with shall be a nominal 1/4 in. (6.35 mm) installation width to comply with being less than the ADA maximum horizontal surface open area.
  8. Paving unit chamfer shall have a maximum 1/16 in. (1.5 mm) chamfer to minimize vibration in the jointed surface.
- B. Geotextile
  1. Woven Geotextile; Mirafi FW700 or approved equal
  2. Flowrate per ASTM D4491 of 18 gal/min/ft<sup>2</sup> minimum
- C. Impermeable Liner  
  
30 MIL PVC impermeable liner
- D. Portland Cement Concrete  
  
Portland cement concrete shall be Class A conforming to Specification Item No. 403S, "Concrete for Structures" or Specification Item No. 407S, "Fibrous Concrete".
- E. Reinforcement  
  
Reinforcement shall conform to Specification Item No. 406S, "Reinforcing Steel" or Specification Item No. 407S, "Fibrous Concrete".
- F. Expansion Joint Materials  
  
Expansion joint materials shall conform to Specification Item No. 408S, "Expansion Joint Materials".
- G. Membrane Curing Compound  
  
Membrane curing compound shall conform to Specification Item No. 409S, "Membrane Curing"
- H. Crushed stone filler, bedding, base and subbase

1. Crushed stone with 90% fractured faces, LA Abrasion < 40 per ASTM C 131.
2. Do not use rounded river gravel for vehicular applications.
3. All stone materials shall be washed per ASTM C117-17 with less than 2% passing the No. 200 sieve.
4. Joint/opening filler, bedding, base and subbase: conforming to ASTM D448 gradation as shown in Tables 1, 2 and 3 below:

**Table 1**  
**ASTM No. 8**

Sieve Size	Percent Passing
1/2"	100%
3/8"	85-100%
#4	10-30%
#8	0-10%
#16	0-5%

**Table 2**  
**ASTM No. 9**

Sieve Size	Percent Passing
1/2"	100%
3/8"	100%
#4	85-100%
#8	10-40 %
#16	0-10%

**Table 3**  
**ASTM No. 57**

Sieve Size	Percent Passing
1 1/2"	100%
1"	95-100%
1/2"	25-60%
#4	0-10%
#8	0-5%

**481.5 Construction**

**A. General**

1. Verify that the soil subgrade is free from standing water.

2. Stockpile joint/opening filler, base and subbase materials such that they are free from standing water, uniformly graded, free of any organic material or sediment, debris, and ready for placement.
3. Install curb & gutter, concrete rip rap and/or retaining walls prior to starting permeable paver installation.

## B. Installation

### 1. General

- a. Any excess thickness of soil applied over the excavated soil subgrade to trap sediment from adjacent construction activities shall be removed before application of the geotextile and subbase materials.
- b. Keep area where pavement is to be constructed free from sediment during entire job. Geotextiles, Base and bedding materials contaminated with sediment shall be removed and replaced with clean materials.
- c. Do not damage drainpipes, overflow pipes, observation wells, or any inlets and other drainage appurtenances during installation. Report any damage immediately to the project engineer.

### 2. Geotextiles

- a. Place on sides of soil subgrade. Secure in place to prevent wrinkling from vehicle tires and tracks.
- b. Overlap a minimum of 12 inches in the direction of drainage.

### 3. Open-graded base – 1<sup>st</sup> lift

- a. Moisten, spread and compact the No. 57 base layer in one 4 in. (100 mm) thick lift.
- b. On this layer, make at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 t (8 T) vibratory roller until there is no visible movement of the No. 57 stone. Do not crush aggregate with the roller.
- c. The surface tolerance the compacted No. 57 base should not deviate more than.  $\pm 1$  in. over a 10 ft straightedge.

### 4. Paver Border & Flow Barriers

- a. Install paver border flow barrier as required by plans
- b. Keep No. 57 stoned covered and protected while concrete cures a minimum of 4 days
- c. On this layer, make at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 t (8 T) vibratory roller until there is no visible movement of the No. 57 stone. Do not crush aggregate with the roller.
- d. The surface tolerance the compacted No. 57 base should not deviate more than.  $\pm 1$  in. (25 mm) over a 10 ft (3 m) straightedge.

### 5. Open-graded base – 2<sup>nd</sup> lift

- a. Moisten, spread and compact the No. 57 base layer in one 4 in. (100 mm) thick lift.
- b. On this layer, make at least two passes in the vibratory mode then at least two in the static mode with a minimum 10 t (8 T) vibratory roller until there is no visible movement of the No. 57 stone. Do not crush aggregate with the roller.
- c. The surface tolerance the compacted No. 57 base should not deviate more than.  $\pm 1$  in. over a 10 ft straightedge.

### 6. Bedding layer

- a. Moisten, spread and screed the No. 8 or 9 stone bedding material. Maintain a consistent 2 in. thickness prior to compaction with the pavers.
  - b. Fill voids left by removed screed rails with No. 8 or 9 stone.
  - c. The surface tolerance of the screeded No. 8 bedding layer shall be  $\pm 3/8$  in over a 10 ft straightedge.
  - d. Do not subject screeded bedding material to any pedestrian or vehicular traffic before paving unit installation begins.
7. Permeable interlocking concrete pavers and joint/opening fill material
- a. Lay the paving units in the pattern(s) and joint widths shown on the drawings. Maintain straight pattern lines.
  - b. Fill gaps at the edges of the paved area with cut units. Cut pavers subject to tire traffic shall be no smaller than  $1/3$  of a whole unit.
  - c. Cut pavers and place along the edges with a masonry saw.
  - d. Fill the openings and joints with No. 8 or 9 stone.
  - e. Remove excess aggregate on the surface by sweeping pavers clean.
  - f. Compact and seat the pavers into the bedding material using a low-amplitude, 75-90 Hz plate compactor capable of at least 5,000 lbf (22 kN). This will require at least two passes with the plate compactor.
  - g. Do not compact within 6 ft of the unrestrained edges of the paving units.
  - h. Apply additional aggregate to the openings and joints if needed, filling them completely.
  - i. Remove excess aggregate by sweeping then compact the pavers. This will require at least two passes with the plate compactor.
  - j. All pavers within 6 ft of the laying face must be left fully compacted at the completion of each day.
  - k. The final surface tolerance of compacted pavers shall not deviate more than  $\pm 3/8$  in. under a 10 ft long straightedge.
  - l. The surface elevation of pavers shall be  $1/8$  to  $1/4$  in. above adjacent drainage inlets, concrete collars or channels.
- C. Quality Control
1. After sweeping the surface clean, check final elevations for conformance to the drawings.
  2. Lippage: No greater than  $1/8$  in. difference in height between adjacent pavers.
  3. The surface elevation of pavers shall be  $1/8$  to  $1/4$  in. above adjacent drainage inlets, concrete collars or channels.
  4. Bond lines for paver courses:  $\pm 1/2$  in. over a 50 ft string line.
  5. Testing By Contractor
    - a. Verify the surface infiltration at a minimum of 100 in./hour using test method C 1781.
    - b. Testing shall occur every 300' minimum and be witnessed by the Inspector.
  6. **Contractor shall return to site after 6 months from the completion of the work and provide the following as required:** fill paver joints with stones, replace broken or cracked pavers, and re-level settled pavers to initial elevations. Any additional work shall be considered part of original bid price and with no additional compensation.
- D. Protection

After work in this section is complete, the General Contractor shall be responsible for protecting work from sediment deposition and damage due to subsequent construction activity on the site.

**1510.5 Measurement**

“Paver Border” will be measured by the linear foot.

“Permeable Pavers” will be measured by the square foot.

“Flow Barrier” will not be measured and paid for directly but shall be included in the unit price bid for “Permeable Pavers”.

**1510.6 Payment**

Payment for “Paver Border” will be paid for at the contract unit for the linear foot installed. The unit bid price shall include full compensation for excavation, preparation of the subgrade, furnishing and placing all concrete and base material, reinforcing steel, dowels, expansion joint material, curing material, backfill and for all other materials, manipulations, labor, tools, equipment and incidentals necessary to complete the work.

Payment for “Permeable Pavers” will be paid for at the contract unit for the square foot installed. The unit bid price shall include full compensation for excavation, preparation of the subgrade, furnishing and placing all flow barriers, base material, reinforcing steel, dowels, expansion joint material, curing material, backfill, impermeable liners, geotextile, and for all other materials, manipulations, labor, tools, equipment and incidentals necessary to complete the work.

Payment, when included as a contract pay item, will be made under one of the following:

<b>SS481-PB:</b>	Paver Border	Per LF
<b>SS481-PP:</b>	Permeable Pavers	Per SF

END OF SECTION 481