

**PERMEABLE INTERLOCKING PAVERS****PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. Subgrade Preparation
- B. Placement of Storage Aggregate
- C. Placement of Filter Aggregate
- D. Placement of Bedding Course
- E. Placement of Permeable Interlocking Pavers
- F. Quality Control
- G. Protection of the Pavement

**1.02 DESCRIPTION OF WORK**

Construct permeable interlocking pavement for mitigation of stormwater runoff.

**1.03 SUBMITTALS**

- A. Sample Pavers:** Representative of the type and color proposed for the project.
- B. Installation Instructions:** Manufacturer's published installation instructions.
- C. Material Certification:** Submit certification letter from paver manufacturer indicating compliance with the ASTM specifications and the contract documents.
- D. Bedding, Filter, and Storage Aggregates:** Submit 5 pound samples of each aggregate type. Include aggregate type, source, gradation, and compacted void content.
- E. Project Details:** Include schedule, construction procedures, and quality control plan that describes material staging; paving direction; details of placement and compaction of the storage, filter, and bedding aggregate; and the paver installation procedures.
- F. Involved Parties:** Submit a list of all subcontractors, material suppliers, and testing laboratories.

**1.04 SUBSTITUTIONS**

Comply with Division 1 - General Provisions and Covenants.

**1.05 DELIVERY, STORAGE, AND HANDLING**

Comply with Division 1 - General Provisions and Covenants.

**1.06 SCHEDULING AND CONFLICTS**

Comply with Division 1 - General Provisions and Covenants.

**1.07 SPECIAL REQUIREMENTS**

Install a 5 foot by 5 foot mock-up paver area on the prepared substrate to determine joint sizes, lines, laying patterns, paver edge treatments, colors, and texture of the project. If approved by the Engineer, it may be incorporated into the project.

**1.08 MEASUREMENT AND PAYMENT**

**A. Class 10, Class 12, or Class 13 Excavation:** Comply with [Section 2010, 1.08, E.](#)

**B. Engineering Fabric:**

- 1. Measurement:** Measurement will be in square yards for the surface area covered with engineering fabric. Both horizontal and vertical areas covered with engineering fabric will be measured.
- 2. Payment:** Payment will be made at the unit price per square yard of engineering fabric.
- 3. Includes:** Unit price includes, but is not limited to, placing and securing filter fabric and any overlapped areas.

**C. Underdrain:**

- 1. Measurement:** Each type and size of pipe installed will be measured in linear feet from end of pipe to end of pipe along the centerline of pipe, exclusive of outlets. The vertical height of cleanouts; the vertical height of observation wells; and lengths of elbows, tees, wyes, and other fittings will be included in the length of pipe measured.
- 2. Payment:** Payment will be made at the unit price of each type and size of pipe.
- 3. Includes:** Unit price includes, but is not limited to, furnishing and placing pipe, cleanouts, observation wells, and pipe fittings.

**D. Storage Aggregate:**

- 1. Measurement:** Measurement will be in tons based upon scale tickets for the material delivered and incorporated into the project.
- 2. Payment:** Payment will be made at the unit price per ton of storage aggregate.
- 3. Includes:** Unit price includes, but is not limited to, furnishing, hauling, placing, and compacting storage aggregate.

**E. Filter Aggregate:**

- 1. Measurement:** Measurement will be in tons based upon scale tickets for the material delivered and incorporated into the project.
- 2. Payment:** Payment will be made at the unit price per ton of filter aggregate.
- 3. Includes:** Unit price includes, but is not limited to, furnishing, hauling, placing filter, and compacting aggregate.

**1.08 MEASUREMENT AND PAYMENT (Continued)****F. Permeable Interlocking Pavers:**

1. **Measurement:** Measurement will be in square yards for the area of each type of permeable interlocking pavers installed. The area of manholes, intakes, or other fixtures in the pavement will not be deducted from the measured pavement area.
2. **Payment:** Payment will be made at the unit price per square yard of each type of permeable interlocking pavers.
3. **Includes:** Unit price includes, but is not limited to, testing, furnishing and placing bedding course, furnishing and installing permeable interlocking pavers, furnishing and placing joint/opening fill material, refilling joint after 6 months, and pavement protection.

**G. PCC Edge Restraint:**

1. **Measurement:** Measurement will be in linear feet for each type and size of PCC edge restraint. The area of manholes, intakes, or other fixtures in the pavement will not be deducted from the measured pavement area.
2. **Payment:** Payment will be at the unit price per linear feet for each type and size of PCC edge restraint.
3. **Includes:** Unit price includes, but is not limited to, final trimming of subgrade or subbase, bars and reinforcement, joints and sealing, surface curing and pavement protection, safety fencing, and boxouts for fixtures.

**PART 2 - PRODUCTS****2.01 ENGINEERING FABRIC**

Comply with [Iowa DOT Section 4196](#), requirements for subsurface drainage.

**2.02 UNDERDRAIN**

- A. Provide slotted or perforated pipe(s) complying with the requirements for Type 1 Subdrain in [Section 4040](#).
- B. Provide 6 inch diameter collector pipes unless otherwise specified in the contract documents.
- C. Provide 4 inch diameter lateral pipes unless otherwise specified in the contract documents.

**2.03 AGGREGATE**

Provide crushed stone with 90% fractured faces. Wash all stone materials to ensure less than 2% passing the No. 200 sieve.

- A. **Storage Aggregate:** Aggregate complying with [Iowa DOT Section 4122](#), [Gradation No. 13a](#), Class 2 durability.
- B. **Filter Aggregate:** Aggregate complying with [Iowa DOT Section 4115](#), [Gradation No. 3](#), Class 2 durability.
- C. **Bedding/Joint/Void Filler Aggregate:** Crushed stone complying with [Iowa DOT Section 4125](#), [Gradation No. 29](#).

**2.04 PERMEABLE INTERLOCKING PAVERS**

- A. **Interlocking Concrete Pavers:** Comply with ASTM C 936 for minimum 3 1/8 inch thick pavers.
- B. **Clay Brick Pavers:** Comply with ASTM C 1272 for minimum 2 3/4 inch thick, Type F brick for PX applications.

**2.05 PCC EDGE RESTRAINT**

Provide PCC edge restraint complying with [Section 7010](#). A PCC edge restraint may be standard curb and gutter section, a vertical curb section, or a narrow concrete slab.

**PART 3 - EXECUTION****3.01 PRE-INSTALLATION PROTECTION**

- A. Complete grading, utility installation, and other earth disturbing operations prior to excavating for the permeable paver system.
- B. Prior to placing permeable interlocking pavers, stabilize the drainage area or install sediment control practices upstream to protect the area from sediment in stormwater runoff from disturbed soil.

**3.02 SUBGRADE PREPARATION FOR PERMEABLE INTERLOCKING PAVERS**

- A. Excavate area to the elevations and grades specified in the contract documents.
- B. When underdrain is specified, excavate a minimum 12 inch wide by 8 inch deep trench at locations specified in the contract documents.
- C. Where fill materials are required, compact materials to 95% of maximum Modified Proctor Density. Do not over compact.
- D. Fill and lightly re-grade any areas damaged by erosion, ponding, or traffic compaction prior to placing the engineering fabric.

**3.03 ENGINEERING FABRIC**

- A. Install engineering fabric over completed subgrade, including trench for underdrain when specified.
- B. Overlap adjacent strips of fabric a minimum of 12 inches.
- C. Extend fabric up the sides of the subbase trench to the bottom of the proposed pavement.

**3.04 UNDERDRAIN****A. Underdrain Collector Pipes:**

1. Place 2 inches of filter aggregate in the bottom of the underdrain trench over engineering fabric.
2. Begin underdrain collector installation at the outlet and continue upgrade.
3. Lay underdrain collector pipe to the proper line and grade. Place pipe with perforations down.
4. Place filter aggregate over installed pipe in layers no more than 6 inches thick. Thoroughly tamp each layer with mechanical tampers.
5. Provide cleanouts where specified in the contract documents. Comply with [Figure 4040.232](#).
6. Connect underdrain collector to outlet. Comply with [Figure 4040.233](#). Install rodent guard on all underdrain pipe 6 inches or smaller.
7. Install underdrain cleanout pipes and observation wells as specified in the contract documents.

**3.04 UNDERDRAIN (Continued)****B. Underdrain Lateral Pipes:**

1. Place 2 inches of filter aggregate over the bottom of the prepared subgrade at lateral pipe locations specified in the contract documents.
2. Lay underdrain lateral over filter aggregate to the proper line and grade. Place pipe with perforations down.
3. Connect underdrain laterals to underdrain collector with wye or tee fitting.
4. Install plug or cap on upstream end of lateral pipe.
5. Place additional filter aggregate along each side of the lateral pipe to the springline of the pipe.

**3.05 STORAGE AGGREGATE**

- A. Place storage aggregate in 6 inch maximum lifts to the thickness specified in the contract documents. If underdrain system is specified, take care not to damage or displace pipe during placement of storage aggregate.
- B. Compact each lift with a vibratory drum roller with a minimum of two passes in vibratory mode and two passes in static mode until no visible movement can be seen in the aggregate layer. Do not crush aggregate. Do not operate compaction equipment directly over underdrain, until a minimum of 12 inches of storage aggregate is placed over the underdrain.
- C. Install storage aggregate to the elevation specified in the contract documents.

**3.06 FILTER AGGREGATE**

- A. Place filter aggregate directly over storage aggregate.
- B. Install aggregate in a single lift with a thickness of 4 inches.
- C. Compact filter aggregate until no visible movement can be seen in the aggregate layer with four passes from a vibratory plate compactor or vibratory roller. If a vibratory roller is utilized, perform the final two passes without vibration. Do not crush aggregate. If specified, proof roll according to [Section 2010, 3.06, C](#).

**3.07 BEDDING AGGREGATE**

- A. Place bedding aggregate directly over filter aggregate.
- B. Install aggregate in a single lift with a thickness of 2 inches.
- C. Use laser guided spreader or place screed rails on the completed filter aggregate layer. Use screed width no less than the full width of each cross-section component of the roadway and no less than 16 feet for parking areas. Set elevation to reflect compaction following paver placement. Surface variations must be within 3/8 inch when tested with a 10 foot straightedge.
- D. Restrict pedestrians and equipment from screeded bedding prior to placement of pavers.

**3.08 INSTALLING PCC EDGE RESTRAINT**

Place PCC edge restraint according to [Section 7010](#).

**3.09 INSTALLING INTERLOCKING PERMEABLE PAVER SYSTEM**

Place and install pavers according to the pattern specified, the paver manufacturer's published installation specifications, and the following:

- A. Where pavers are placed against a curb and gutter or other pavement, installation of an edge course or soldier course is required if the pavement edge is not straight. Trim pavers as required to compensate for deviations in the adjacent pavement edge. Do not cut pavers to less than 1/3 their original size.
- B. Install PCC edge restraint.
- C. Place chalk lines on the bedding course to maintain straight joint lines.
- D. After pavers have been installed on the bedding course, and all cut pavers have been inserted to provide a full and complete surface, inspect pavers for damaged units and irregular joint lines. Remove and replace pavers as required.
- E. After inspection and replacement of damaged pavers, fill joint openings with bedding stone. Sweep the surface clean.
- F. Compact pavement surface with a minimum of three passes of a vibratory plate compactor capable of at least 5,000 pounds centrifugal compaction force. Vary direction of each pass by 45 degrees to the previous pass. Do not operate plate compactor within 6 feet of an unrestrained pavement edge.
- G. Re-inspect pavers, and remove and replace all damaged units. Refill joint openings completely. Sweep pavers clean. Complete compaction with two passes of the plate compactor.
- H. Refill all paver joint openings with bedding aggregate 6 months after installation.

**3.10 QUALITY CONTROL**

- A. Ensure horizontal alignment of the PCC edge restraint is within 1/2 inch of design alignment.
- B. Ensure final surface is within 3/8 inch when tested with a 10 foot straightedge.
- C. Ensure no greater than 1/8 inch difference in height between adjacent pavers.
- D. Maintain surface elevation within 1/4 inch above adjacent drainage inlets, gutters, and other appurtenances.

**3.11 PROTECTION OF PAVEMENT**

- A. Protect pavement from heavy construction traffic, including trucks, skid steers, loaders, and all tracked vehicles.
- B. Provide barriers and protection as necessary.

**3.11 PROTECTION OF PAVEMENT (Continued)**

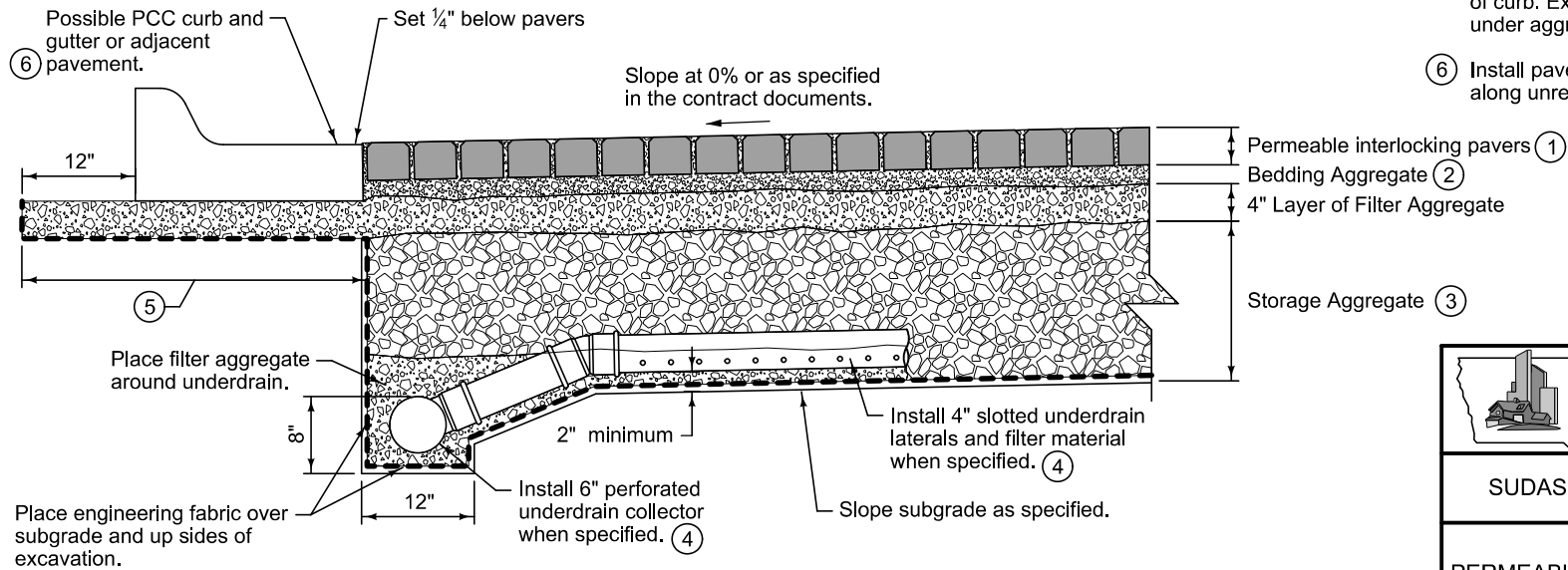
- C. Do not place soil, mulch, sand, aggregate, or stockpile other materials on the pavement surface that may contaminate the pavement and plug the porous surface.
- D. Remove by vacuuming any base and bedding materials contaminated with sediment and replace with clean materials at no cost to the contracting authority.


END OF SECTION



Refer to the contract documents for dimensions, grades, and additional requirements for permeable interlocking pavers and associated improvements.

- ① Permeable interlocking pavers as specified in the contract documents.
- ② 2 inch minimum permeable bedding aggregate to accommodate imperfections in the permeable pavement filter aggregate layer.
- ③ Permeable pavement storage aggregate thickness as specified in the contract documents.
- ④ When underdrain collectors and/or laterals are specified, install to the line and grade specified in the contract documents. Place permeable pavement filter aggregate to springline of pipe.
- ⑤ Place 4 inches of filter aggregate under curb and gutter section. Extend to 12 inches beyond the back of curb. Extend engineering fabric under aggregate.
- ⑥ Install paver edge restraint system along unrestrained edges.



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- ② 2 inch minimum permeable pavement bedding aggregate to accommodate imperfections in the permeable pavement filter aggregate layer.
- ③ Permeable pavement storage aggregate thickness as specified in the contract documents.
- ④ Set PCC edge restraint 1/4 inch below pavers.

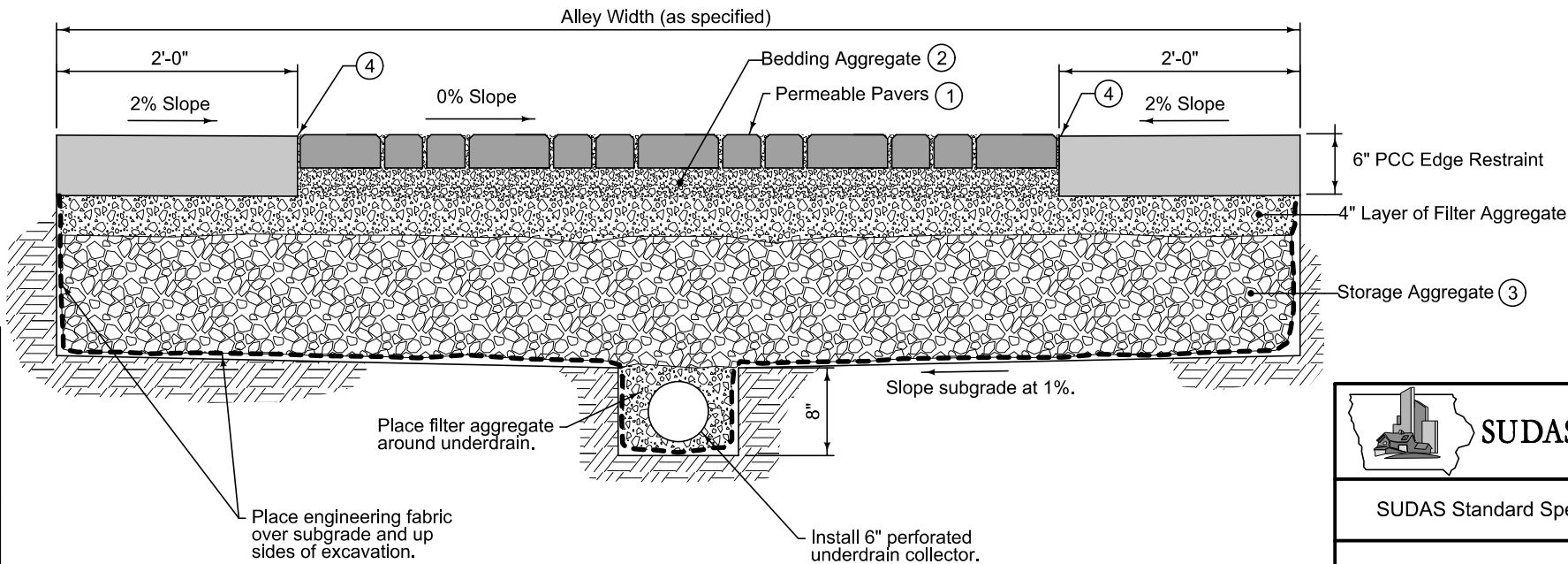


FIGURE 7080.102 SHEET 1 OF 1

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TYPICAL ALLEY WITH PERMEABLE PAVERS

