

SECTION 32 14 43 - POROUS UNIT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Concrete Unit Pavers:
 - a. Permeable Interlocking Concrete Paver System.
- B. Related Requirements:
 - 1. Section 31 20 00 "Earth Moving" for excavation and compacted subgrade.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review specification requirements.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.

1.4 ACTION SUBMITTALS

- A. Product Data:
 - 1. For materials other than aggregates.
 - 2. For the following:
 - a. Pavers.
 - b. Precast concrete flow barriers.
 - c. Geotextiles.
 - d. Edge restraints.
- B. Sieve Analyses: For aggregate materials, according to ASTM C136.
- C. Samples:
 - 1. Full-size units of each type of unit paver indicated.
 - 2. Precast concrete curbs.
 - 3. Exposed edge restraints.
 - 4. Aggregate setting bed materials.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for unit pavers, indicating compliance with requirements.
 - 1. For grid paving units, include durability test data based on testing according to proven field performance requirements of ASTM C1319 performed on units subjected to three years' exposure to same general type of environment, temperature range, and traffic volume as Project.
 - 2. For solid interlocking paving units, include test data for freezing and thawing according to ASTM C67.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified porous unit paving installer. Installer's field supervisor shall have Concrete Paver Installer Certification from the Interlocking Concrete Pavement Institute (ICPI) with PICP (Permeable Interlocking Concrete Pavement) Specialist Designation.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - 2. Install a 10 foot by 10 foot paver area in location directed by the Owner.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
- B. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

1.8 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design porous unit paving system on sloped subgrades.
- B. Compliance Review: A qualified professional engineer responsible for porous unit paving system design shall review and approve submittals and source and field quality-control reports for compliance of materials and construction with design.
- C. All costs necessary to provide the engineered porous unit paving system as designed by the qualified professional engineer, shall be included in the cost of the Alternate.

PART 2 - PRODUCTS

2.1 CONCRETE UNIT PAVERS

- A. Source Limitations: Obtain each type of paver from single source that has resources to provide materials

and products of consistent quality in appearance and physical properties.

- B. Solid Concrete Pavers for Porous Paving: Solid interlocking paving units of shapes that provide openings between units, complying with ASTM C936/C936M, resistant to freezing and thawing when tested according to ASTM C67, and made from normal-weight aggregates.
 - 1. Thickness: 3 inches.
 - 2. Face Size and Shape: 6-inch by 12-inch.
 - 3. Opening Percentage: 10 percent.
 - 4. Color: As selected by Architect from manufacturer's full range.
- C. Basis of Design: Subject to compliance with requirements, Permeable Interlocking Concrete Paver System incorporated into the project shall be based on products and systems as follows:
 - 1. Wausau Tile H-Series permeable pavers with 1/4-inch lugs.
- D. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - 1. Belgard Pavers & Hardscapes
 - 2. EP Henry Corporation
 - 3. Unilock.

2.2 AGGREGATE SETTING-BED MATERIALS

- A. Graded Aggregate for Subbase: Sound crushed stone or gravel complying with ASTM D448 for Size No. 2.
- B. Graded Aggregate for Base Course: Sound crushed stone or gravel complying with ASTM D448 for Size No. 57.
- C. Graded Aggregate for Leveling Course: Sound crushed stone or gravel complying with ASTM D448 for Size No. 8.
- D. Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured according to test methods referenced:
 - 1. Survivability: Class 2; AASHTO M 288.
 - 2. Apparent Opening Size: No. 40 sieve, maximum; ASTM D4751.
 - 3. Permittivity: 0.5 per second, minimum; ASTM D4491.
 - 4. UV Stability: 50 percent after 500 hours' exposure; ASTM D4355.

2.3 FILL MATERIALS

- A. Aggregate Fill for Porous Paving: Graded, sound, crushed stone or gravel complying with ASTM D448 for Size No. 8.
 - 1. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Proof-roll prepared subgrade according to requirements in Section 312000 "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with porous paver installation only after deficient subgrades have been corrected and are ready to receive subbase and base course for porous paving.

3.2 INSTALLATION, GENERAL

- A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be structurally unsound or visible in finished work.
- B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
- D. Tolerances:
 - 1. Variation in Plane between Adjacent Units (Lipping): Do not exceed 1/16-inch unit-to-unit offset from flush.
 - 2. Variation from Level or Indicated Slope: Do not exceed 1/8 inch in 24 inches and 1/4 inch in 10 feet or a maximum of 1/2 inch.

3.3 INSTALLATION OF SETTING-BED

- A. Compact subgrade uniformly to at least 95 percent of ASTM D1557 laboratory density.
- B. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- C. Place drainage geotextile over prepared subgrade, overlapping ends and edges at least 12 inches.
- D. Place aggregate subbase and base, compact by tamping with plate vibrator, and screed to depth indicated.
- E. Place leveling course, and screed to a minimum thickness of 2 inches, taking care that moisture content remains constant and density is loose and constant until pavers are set and compacted.

3.4 INSTALLATION OF PAVERS

- A. Set interlocking unit pavers on leveling course, being careful not to disturb leveling base. If pavers have lugs or spacer bars to control spacing, place pavers hand tight against lugs or spacer bars. If pavers do not have lugs or spacer bars, place pavers with a 1/2-inch-maximum joint width. Use string lines to keep straight lines. Fill all gaps between units that exceed 1/2 inch with pieces cut to fit from full-size pavers.
- B. Compact pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf compaction force at 80 to 90 Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.

1. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches of uncompacted pavers adjacent to temporary edges.
 2. Before ending each day's work, compact installed concrete pavers except for 36-inch width of uncompacted pavers adjacent to temporary edges (laying faces).
 3. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches of laying face.
 4. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and leveling course on which pavers have not been placed with nonstaining plastic sheets to protect them from rain.
- C. Place graded aggregate fill immediately after vibrating pavers into leveling course. Spread and screed aggregate fill level with tops of pavers.
1. Before ending each day's work, place aggregate fill in installed porous paving except for 42-inch width of unfilled paving adjacent to temporary edges (laying faces).
 2. As work progresses to perimeter of installation, place aggregate fill in installed paving that is adjacent to permanent edges unless it is within 42 inches of laying face.
 3. Before ending each day's work and when rain interrupts work, cover paving that has not been filled with nonstaining plastic sheets to protect it from rain.
- D. As work progresses, remove and replace pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

END OF SECTION 32 14 43