

SECTION 02518 INTERLOCKING CONCRETE PAVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete paver units. [Concrete paver edge units.]
- B. Bedding and joint sand.

1.02 RELATED SECTIONS

- A. Section: [____ - ____]—Curbs and Drains.
- B. Section: [____ - ____]—Aggregate Base.
- C. Section: [____ - ____]—Cement Treated Base.
- D. Section: [____ - ____]—Asphalt Treated Base.
- E. Section: [____ - ____]—Pavements, Asphalt and Concrete.
- F. Section: [____ - ____]—Roofing Materials.
- G. Section: [____ - ____]—Bitumen and Neoprene Setting Bed, Acrylic Fortified Mortar Setting Bed.
- H. Section: [____ - ____]—Geotextiles.

1.03 REFERENCES

Street, industrial, port and airport pavement thicknesses should be designed in consultation with a qualified civil engineer, in accordance with established flexible pavement design procedures, and in accordance with the ICPI Technical Bulletins. Sample construction detail drawings are available from the ICPI.

- A. American Society of Testing and Materials (ASTM):
 - 1. C 33, Specification for Concrete Aggregates.
 - 2. C 136, Method for Sieve Analysis for Fine and Coarse Aggregate.
 - 3. C 140, Sampling and Testing Concrete Masonry Units.
 - 4. C 144, Standard Specification for Aggregate for Masonry Mortar.
 - 5. C 936, Specification for Solid Interlocking Concrete Paving Units.
 - 6. C 979, Specification for Pigments for Integrally Colored Concrete.
 - 7. D 698, Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 5.5-lb (2.49 kg) Rammer and 12 in. (305 mm) drop.
 - 8. D 1557, Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 10-lb (4.54 kg) Rammer and 18 in. (457 mm) drop.
 - 9. D 2940, Graded Aggregate Material for Bases or Subbases for Highways or Airports.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in the manufacture of concrete interlocking pavers for a minimum of three (3) years.

- B. Installation shall be by a contractor and crew with at least one (1) year of experience in placing interlocking concrete pavers on projects of similar nature or dollar cost.
- C. Installation Contractor shall conform to all local, state/provincial licensing and bonding requirements.

1.05 SUBMITTALS

- A. Submit product drawings and data.
- B. Submit full size sample sets of concrete paving units to indicate color and shape selections. Color will be selected by Architect/Engineer/Landscape Architect/Owner from manufacturer's available colors.
- C. Submit sieve analysis for grading of bedding and joint sand.
- D. Submit test results from an independent testing laboratory for compliance of paving unit requirements to ASTM C 936.
- E. Indicate layout, pattern, and relationship of paving joints to fixtures and project formed details.
- F. Substitutions: Substitutions shall be submitted 10 days prior to bid opening for acceptance.

1.06 MOCK-UPS

- A. Install a 7 ft. x 7 ft. (2 m x 2 m) paver area as described in Article 3.02. This area will be used to determine surcharge of the bedding sand layer, joint sizes, lines, laying pattern(s), color(s), and texture of the job. This area shall be the standard from which the work will be judged. Consideration shall be given with regard to differences in age of materials from time of mock-up erection to time of actual product delivery.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver concrete pavers to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by fork lift or clamp lift. Unload pavers at job site in such a manner that no damage occurs to the product.
- B. Sand shall be covered with waterproof covering to prevent exposure to rainfall or removal by wind. The covering shall be secured in place.
- C. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.

1.08 ENVIRONMENTAL CONDITIONS

- A. Do not install sand or pavers during heavy rain or snowfall.
- B. Do not install sand and pavers over frozen base materials.
- C. Do not install frozen sand.

PART 2 PRODUCTS

2.01 CONCRETE PAVERS

Concrete pavers may have spacer bars on each unit. These insure a minimum joint width between each unit into which sand is placed. Spacer bars help prevent contact of the edges with adjacent pavers and subsequent spalling. They are highly recommended for mechanically installed pavers. Manually installed pavers may be installed with or without spacer bars.

- A. Concrete pavers shall be supplied by Pavestone Company.
 Chatanooga, TN: 423.855.1899; Cincinnati, OH: 513.474.3783; D/FW, TX: 817.481.5802
 Denver, CO: 303.287-3700; Houston, TX: 281.391.7283; Las Vegas, NV: 702.221.2700
 Kansas City, MO: 816.524.9900; New Orleans, LA: 504.882.9111; Phoenix, AZ: 602.257.4588;
 San Antonio/Austin, TX: 512.558.7283, Dallas Service Center: 972.404.0400,
 Sacramento, California: 916.452.5233, Hagerstown, Maryland: 240.420.3780,
 Winters, California: 503.795.4400, New England: 508.880.4800,
 Cape Girardeau: 573.264.1500
- B. Product name(s)/shape(s), color(s), overall dimensions, and thickness of the paver(s) shall be:
 [_____ in./mm x _____ in./mm x _____ in./mm thick.]
 [_____ in./mm x _____ in./mm x _____ in./mm thick.]
 [_____ in./mm x _____ in./mm x _____ in./mm thick.]
- C. Pavers shall meet the following requirements set forth in ASTM C 936, Standard Specification for Interlocking Concrete Paving Units:
 1. Average compressive strength of 8,000 psi (55 MPa) with no individual unit under 7,200 psi (50 MPa).
 2. Average absorption of 5% with no unit greater than 7% when tested in accordance with ASTM C 140.
 3. Resistance to 50 freeze-thaw cycles when tested in accordance with ASTM C 67.
- D. Pigment in concrete pavers shall conform to ASTM C 979.
- E. Material shall be manufactured in individual layers on production pallets.
- F. Materials shall be manufactured to produce a solid homogeneous matrix in the produced unit.

2.02 VISUAL INSPECTION

- A. All units shall be sound and free of defects that would interfere with the proper placing of unit or impair the strength or permanence of the construction.
- B. Minor cracks incidental to the usual methods of manufacture, or chipping resulting from customary methods of handling in shipment and delivery, shall not be deemed grounds for rejection.

2.03 SAMPLING AND TESTING

- A. Manufacturer shall provide access to lots ready for delivery to the Owner or his authorized representative for testing in accordance with ASTM 936-82 for sampling of material prior to commencement of paver placement.
- B. Manufacturer shall provide a minimum of three (3) years testing backup data showing manufactured products that meet and exceed ASTM 936-82 when tested in compliance with ASTM C-140.
- C. Sampling shall be random with a minimum of nine (9) specimens per 20,000 sq. ft. per product shape and size with repeated samples taken every additional 20,000 sq. ft. or a fraction thereof.
- D. Test units in accordance with ASTM for compressive strength, absorption and dimensional tolerance. A minimum of three (3) specimens per test required for an average value. Testing of full units is preferred.

2.04 REJECTION

- A. In the event the shipment fails to conform to the specified requirements, the manufacturer may sort it, and new test units shall be selected at random by the Owner from the retained lot and tested at the expense of the manufacturer. If the second set of test units fails to conform to the specified requirements, the entire lot shall be rejected.

2.05 EXPENSE OF TESTS

- A. The expense of inspection and testing shall be borne by the Owner.

2.06 BEDDING AND JOINT SAND

The type of sand used for bedding is often called sand that is suitable for the manufacturing of concrete. Sands vary regionally. Screenings and stone dust can be unevenly graded and have an excess amount of material passing the No. 200 (75 Hm) sieve. Bedding sands with these characteristics should not be used. Contact paver contractors local to the project and confirm sand(s) successfully used in previous similar applications. Limestone sand should not be used for bedding sand. Mason sands are typically acceptable only for joint sand, provided they meet grading requirements as shown in Table 2 of this section.

- A. Bedding and joint sand shall be clean, non-plastic, free from deleterious or foreign matter. The sand shall be natural or manufactured from crushed rock. Limestone screenings or stone dust shall not be used. When concrete pavers are subject to vehicular traffic, the sands shall be as hard as practically available.
- B. Grading of sand samples for the bedding course and joints shall be done according to ASTM C136. The bedding sand shall conform to the grading requirements of ASTM C 33 as shown in Table 1.

Table 1
Grading Requirements for Bedding Sand

ASTM C 33	
Sieve Size	Percent Passing
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (600 µm)	25 to 60
No. 50 (300 µm)	10 to 30
No. 100 (150 µm)	2 to 10

Bedding sand may be used for joint sand. However, extra effort in sweeping and compacting the pavers may be required in order to completely fill the joints. If joint sand other than bedding sand is used, the gradations shown in Table 2 are recommended. Joint sand should never be used for bedding sand.

- C. The joint sand shall conform to the grading requirements of ASTM C 144 as shown in Table 2 below:

Table 2
Grading for Joint Sand

ASTM C 144	
Sieve Size	Natural Sand Percent Passing
No. 4 (4.75 mm)	100
No. 8 (2.36 mm)	95 to 100
No. 16 (1.18 mm)	70 to 100
No. 30 (600 µm)	40 to 75
No. 50 (300 µm)	10 to 35
No. 100 (150 µm)	2 to 15
No. 200 (75 µm)	0

PART 3 EXECUTION

3.01 EXAMINATION

For installations on a compacted aggregate base and soil subgrade, the specifier should be aware that the top surface of the pavers may be 1/8 to 1/4 in. (3 to 6 mm) above the final elevations after compaction. This difference in initial and final elevations is to compensate for possible minor settling.

- A. Verify that subgrade preparation, compacted density and elevations conform to the specifications. Compaction of the soil subgrade to at least 95% Standard Proctor Density per ASTM D 698 is recommended. Higher density, or compaction to ASTM D 1557 may be necessary for areas subject to continual vehicular traffic. Stabilization of the subgrade and/or base material may be necessary with weak or saturated subgrade soils. The Architect/Engineer should inspect subgrade preparation, elevations, and conduct density tests for conformance to specifications.
- B. Verify that geotextiles, if applicable, have been placed according to specifications.
- C. Verify that aggregate base materials, thickness, compaction, surface tolerances, and elevations conform to the specifications.

Local aggregate base materials typical to those used for flexible pavements or those conforming to ASTM D 2940 are recommended. Compaction to not less than 95% Proctor Density in accordance with ASTM D 698 is recommended for pedestrian areas. Compaction to not less than 98% Modified Proctor Density according to ASTM D 1557 is recommended for vehicular areas. The aggregate base should be spread and compacted in uniform layers not exceeding 6 in. (150 mm) thickness. Recommended base surface tolerance should be plus or minus 3/8 in. (10 mm) over a 10 ft. (3 m) straight edge. The Architect/Engineer should inspect geotextile materials and placement (if applicable), base preparation, surface tolerances, elevations, and conduct density tests for conformance to specifications.

Mechanical tampers are recommended for compaction of soil subgrade and aggregate base around lamp standards, utility structures, building edges, curbs, tree wells and other protrusions. In areas not accessible to roller compaction equipment, compact to specified density with mechanical tampers.

- D. Verify location, type, installation and elevations of edge restraints around the perimeter area to be paved.
- E. Verify that base is dry, uniform, even, and ready to support sand, pavers, and imposed loads.
- F. Beginning of bedding sand and paver installation means acceptance of base and edge restraints.

3.02 INSTALLATION

- A. Spread the sand evenly over the base course and screed to a nominal 1 in. (25 mm) thickness, not exceeding 1-1/2 in. (40 mm) thickness. The screeded sand should not be disturbed. Place sufficient sand to stay ahead of the laid pavers. Do not use the bedding sand to fill depressions in the base surface.
- B. Ensure that pavers are free of foreign materials before installation.
- C. Lay the pavers in the pattern(s) as shown on the drawings. Maintain straight pattern lines.
- D. Joints between the pavers on average shall be between 1/16 in. and 3/16 in. (2 mm to 5 mm) wide.

Some paver shapes require a larger joint. Consult manufacturer for recommended joint widths.

- E. Fill gaps at the edges of the paved area with cut pavers or edge units.

Units cut no smaller than one-third of a whole paver are recommended along edges subject to vehicular traffic.

- F. Cut pavers to be placed along the edge with a double blade paver splitter or masonry saw.
- G. Use a low amplitude, high frequency plate vibrator to vibrate the pavers into the sand. Use Table 3 below to select size of compaction equipment:

Table 3

Paver Thickness	Minimum Centrifugal Compaction Force
60 mm	3000 lbs. (13 kN)
80 mm	5000 lbs. (22 kN)

- H. Vibrate the pavers, sweeping dry joint sand into the joints and vibrating until they are full. This will require at least two or three passes with the vibrator. Do not vibrate within 3 ft. (1 m) of the unrestrained edges of the paving units.
- I. All work to within 3 ft. (1 m) of the laying face must be left fully compacted with sand-filled joints at the completion of each day.
- J. Sweep off excess sand when the job is complete.
- K. The final surface elevations shall not deviate more than 3/8 in. (10 mm) under a 10 ft. (3 m) long straightedge.

- L. The surface elevation of pavers shall be 1/8 in. to 1/4 in. (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.
- M. The resanding as necessary of paver joints shall be accomplished by contractor for a period of 90 days after completion of work.

3.03 FIELD QUALITY CONTROL

- A. After removal of excess sand, check final elevations for conformance to the drawings.

END OF SECTION