SECTION 321413.13

INTERLOCKING PRECAST CONCRETE UNIT PAVERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Interlocking concrete paver units.
2. Sand setting bed.
3. Sand joint filler.

1.2 REFERENCES

A. American Society of Testing and Materials (ASTM):

1. ASTM C 33 – Standard Specification for Concrete Aggregates.
2. ASTM C 136 – Method for Sieve Analysis for Fine and Course Aggregates.
3. ASTM C 140 C 33, Specification for Concrete Aggregates.
4. ASTM C 136, Method for Sieve Analysis for Fine and Coarse Aggregate.
5. ASTM C 140, Sampling and Testing Concrete Masonry Units.
6. ASTM 144, Standard Specification for Aggregate for Masonry Mortar.
7. ASTM C 936, Specification for Solid Interlocking Concrete Paving Units.
8. ASTM C 979, Specification for Pigments for Integrally Colored Concrete.
9. ASTM 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.
10. ASTM C 1319 – Standard Specification for Concrete Grid Paving Units.
11. ASTM 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.
12. ASTM D 2940, Graded Aggregate Material for Bases or Subbases for Highways or Airports.
13. ASTM D 5269 – Standard Specification for Topsoil Used for Landscaping Purposes.

1.3 SUBMITTALS

A. Product Data: For materials other than water and aggregates.

B. Samples: Submit fill size sample sets of concrete paving units indicating color and shape selections. Color to be selected by **Landscape Architect** from manufacturer's full range of available colors or as specified on the drawings.

C. Submit sieve analysis for grading of bedding and joint sand.

D. Submit test results from independent testing laboratory for compliance of paving unit ASTM C 936 requirements.

E. Indicate layout, patter, and relationship of paving joints to fixtures and project formed details.

1.4 QUALITY ASSURANCE

A. Mockups: Build mockups for each form and pattern of unit paver.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver concrete pavers to site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by fork lift or clamp lift.

B. Unload pavers at job site in such a manner that no damage occurs to product.

C. Cover sand with waterproof covering to prevent exposure to rainfall or removal by wind. Secure covering in place.

D. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.

1.6 PROJECT CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or build on frozen subgrade or setting beds.

B. Cold-Weather Requirements for Mortar and Grout: Heat materials to provide mortar and grout temperatures between 40 and 120 deg F. Protect unit paver work against freezing for 24 hours after installation.

PART 2 - PRODUCTS

2.1 CONCRETE PAVERS

A. Concrete Pavers: Solid interlocking paving units complying with ASTM C 936 and resistant to freezing and thawing when tested according to ASTM C 67, made from normal-weight aggregates.

1. Compressive Strength: 8000 psi (55 MPa) average with minimum 7,200 psi (50 MPa).
2. Absorption: 5 percent average, with maximum of 7 percent.
3. Pigment in accordance with ASTM C 979.
4. Manufacture materials in individual layers on production pallets.
5. Manufacture materials to produce solid homogeneous matrix in produced unit.

B. Manufacturers:

1. Basis-of-Design Product: Acceptable manufacturers include Pavestone and Unlock. The design for concrete pavers is based on Pavestone Company, Houston, Texas (281) 391-7283. Subject to compliance with requirements, provide the named product or a comparable product as approved by Landscape Architect:
2. Overall Dimension and Thickness: 60 mm x 98 mm x 198 mm.
3. Color: As selected by Landscape Architect.

C. Units shall be sound and free of defects that would interfere with proper placement of unit or impair strength or performance of construction.

D. Minor cracks incidental to usual methods of manufacture, or chipping resulting from customary shipment and delivery shall not be deemed grounds for rejection.

2.2 BEDDING SAND

A. Bedding and joint sand shall be clean, non-plastic, free from deleterious or foreign matter.

B. Sand shall be natural or manufactured from crushed rock.

C. Limestone screenings or stone dust shall not be used.

D. When concrete pavers are subject to vehicular traffic, sands shall be as hard as practically available.

E. Grading of sand samples for the bedding course and joints shall be done according to ASTM C 136. Bedding sand shall conform to the grading requirements of ASTM C 33 as shown in Table 1 below:

Table 1 – Grading Requirements for Bedding Sand ASTM C 33

Sieve Size Natural Sand	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

2.3 JOINT SAND

A. Joint sand shall conform to 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. 100 (150 µm)	2 to 15
No. 200 (75 µm)	0

2.4 SOURCE QUALITY CONTROL

A. Sampling and Testing:

1. Manufacturer shall provide access to lots ready for delivery to Owner or authorized representative for testing in accordance with ASTM 936 82 for sampling of material prior to commencement of paver placement.
2. Manufacturer shall provide minimum three (3) years testing backup data showing manufactured products that meet and exceed ASTM 936-82 when tested in compliance with ASTM C-140.
3. Provide random sampling with a minimum of nine (9) specimens per 20,000 square feet per product shape and size with repeated samples taken every additional 20,000 square feet or a fraction thereof.
4. Test units in accordance with ASTM for compressive strength, absorption and dimensional tolerance. Minimum three (3) specimens per test required for an average value. Testing of full units is preferred.
5. In the event a shipment fails to conform to specified requirements, manufacturer may sort and new tests shall be selected at random by Owner from retained lot and tested at the expense of manufacturer. If the second set of test units fails to conform to specified requirements, the entire lot will be rejected.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade preparation, compacted density and elevations conform to the specifications.

1. Compaction of the soil subgrade to at least 95% Standard Proctor Density per ASTM D 698 is recommended.
2. Higher density or compaction to ASTM D 1557 may be necessary for areas subject to continual vehicular traffic.
3. Stabilization of the subgrade and/or base material may be necessary with weak or saturated subgrade soils.
4. 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.

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.

3.2 INSTALLATION

A. Spread 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.

B. Screeded sand should not be disturbed. Place sufficient sand to stay ahead of laid pavers. Do not use the bedding sand to fill depressions in the base surface.

C. Ensure that pavers are free of foreign materials before installation.

D. Lay pavers in pattern(s) as shown on Drawings. Maintain straight pattern lines.

E. Joints between pavers on average shall be between 1/16 inch and 3/16 inch (2 mm to 5 mm) wide.
1. Some paver shapes require a larger joint.
2. Consult manufacturer for recommended joint widths.

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

1. Units cut no smaller than one-third of a whole paver are recommended along edges subject to vehicular traffic.
2. Cut pavers to be placed along the edge with a double blade paver splitter or masonry saw.
3. 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)

G. 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.

H. 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.

I. Sweep off excess sand when the job is complete.

J. Final surface elevations shall not deviate more than 3/8 inch (10 mm) under a 10 ft. (3 m) long straightedge.

K. Surface elevation of pavers shall be 1/8 inch to 1/4 inch (3 to 6 mm) above adjacent drainage inlets, concrete collars, or channels.

L. Contracts shall reapply sand as necessary to paver joints for a period of 90 days after completion of work.

M. After removal of excess sand, check final elevations for conformance to Drawings.

END OF SECTION 321413.13