INTERLOCKING CONCRETE PAVERS

Section 02780

PART 1 GENERAL SPECIFICATIONS - Belair

Note: This guide specification for concrete paver applications in the U.S. for concrete pavers and bedding sand over a compacted aggregate base for pedestrian and vehicular applications should be edited to suit project conditions and location.

1.01 SUMMARY

A. Sections
   1. Concrete Pavers
   2. Bedding and Joint Sand
   3. Edge Restraints

B. Related Sections
   1. Section: [_]-Curbs and Drains
   2. Section: [_]-Aggregate Base
   3. Section: [_]-Cement Treated Base
   4. Section: [_]-Asphalt Treated Base
   5. Section: [_]-Pavements, Asphalt and Concrete
   6. Section: [_]-Roofing Materials
   7. Section: [_]-Geotextiles

Note: Pavements subject to vehicles should be designed in consultation with a qualified civil engineer, in accordance with established pavement design procedures, ICPI Lockpave software, and in accordance with the ICPI "Tech Spec" technical bulletins.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM C 33, Standard Specification for Concrete Aggregates.
   2. ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
   3. ASTM C 140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
   4. ASTM C 144, Standard Specification for Aggregate for Masonry Mortar.
   5. ASTM C 936, Standard Specification for Solid Concrete Interlocking Paving Units.
   6. ASTM C 979, Standard Specification for Pigments for Integrally Colored Concrete.
   7. ASTM D 698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,000 ft-lbf/ft^3 (600 kN-m/m^3)).
   8. ASTM D 1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).
   9. ASTM D 2940, Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports.

B. Interlocking Concrete Pavement Institute (ICPI):
   1. ICPI Tech Spec Technical Bulletins

1.03 SUBMITTALS

A. In accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.

B. Sieve analysis per ASTM C 136 for grading of bedding and joint sand.

C. Concrete pavers:
   1. [Four] representative full-size samples of each paver type, thickness, color, finish that indicate the range of color variation and texture expected in the finished installation. Color(s) selected by Architect/Engineer/Landscape Architect/Owner from Rinox Pavers available colors.
   2. Accepted samples become the standard of acceptance for the work.
   3. Test results from an independent testing laboratory for compliance of concrete pavers with ASTM C 936.
   4. Manufacturer's certification of concrete pavers met applicable ASTM standards.
   5. Manufacturer's catalog product data, installation instructions, and material safety data sheets for the safe handling of the specified materials and products.

E. Paver Installation Subcontractor:
   1. A copy of Subcontractor's current certificate from the Interlocking Concrete Pavement Institute Concrete Paver Installer Certification program.
   2. Job references from projects of a similar size and complexity. Provide Owner/Client/General Contractor names, postal address, phone, fax, and email address.

1.04 QUALITY ASSURANCE

A. Paving Subcontractor Qualifications:
   1. Utilize an installer having successfully completed concrete paver installation similar in design, material, and extent indicated on this project.
   2. Utilize an installer holding a current certificate from the Interlocking Concrete Pavement Institute Concrete Paver Installer Certification program.

B. Contractor shall conform to all state/provincial, local licensing and bonding requirements.

C. Mock-Ups:
   1. Install a 7 ft x 7 ft (2 x 2 m) paver area.
   2. Use this area to determine surcharge of the bedding sand layer, joint sizes, lines, laying pattern(s), color(s) 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.

1.05 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirement Section.

B. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers packaging with identification labels intact.
   1. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.
   2. Deliver concrete pavers to the site in steel banded, plastic banded or plastic wrapped packaging capable of transfer by forklift or clamp lift.
   3. Unload pavers at job site in such a manner that no damage occurs to the product.

D. Storage and Protection: Store materials protected such that they are kept free from mud, dirt, and other foreign materials.
   1. Cover bedding sand and joint sand with waterproof covering if needed to prevent exposure to rainfall or removal by wind. Secure the covering in place.

1.06 PROJECT/SITE CONDITIONS
A. Environmental Requirements:
   1. Do not install sand or pavers during heavy rain or snowfall.
   2. Do not install sand and pavers over frozen base materials.
   3. Do not install frozen sand or saturated sand.
   4. Do not install concrete pavers on frozen or saturated sand.

PART 2 PRODUCTS

2.01 INTERLOCKING CONCRETE PAVERS
A. Manufacturer:
Rinox Pavers LLC,
23 Quarry Road
Douglassville, PA 19518
P: 610-323-8800, F: 610-323-6601
www.RinoxPavers.com

B. Belair Series Interlocking Concrete Pavers:

Shape	Thickness	Dimensions
Belair	3 1/8”	9 3/8”x 4 5/8”
Belair	3 1/8”	9 3/8”x 9 3/8”
Belair	3 1/8”	9 3/8”x 14 3/16”

*All three sizes are included in one pallet (packaging unit)

Belair Square 14”x14”	3 1/8”	14”x14”
Belair Circle Kit	3 1/8”	Various sizes

*Belair 14”x14” & Belair Circle Kit are sold on separate pallets (packaging units)

C. Meet the following requirements set forth in ASTM C 936, Standard Specifications for Interlocking Concrete Pavers.

Note: If 3 1/8 in. (80 mm) thick pavers are specified, their compressive strength test results per ASTM C 140 should be adjusted by multiplying by 1.18 to equate the results to that from 2 3/8 in. (60 mm) thick pavers.
   1. Average Compressive Strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa) per ASTM C 140.
   2. Average Water Absorption (ASTM C 140): 5% with no unit greater than 7%.
   3. Freeze/Thaw Resistance (ASTM C 67): Resistant to 50 freeze/thaw cycles with no greater than 1% loss of material. Freeze-thaw testing requirements shall be waived for applications not exposed to freezing conditions.

2.02 PRODUCT SUBSTITUTIONS
A. Substitutions: No substitutions permitted.

2.03 BEDDING AND JOINT SAND

A. Provide bedding and joint sand as follows:

1. Washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.
2. Do not use limestone screenings, stone dust, or sand for the bedding sand material that does not conform to conform to the grading requirements of ASTM C 33.
3. Do not use mason sand or sand conforming to ASTM C 144 for the bedding sand.

Note: If the pavement will be exposed to heavy traffic with trucks, i.e., a major thoroughfare with greater than 1.5 million 18-Kip (80 kN) equivalent single axle loads, contact ICPI for test method and criteria for assessing the durability of bedding sand.

4. Where concrete pavers are subject to vehicular traffic, utilize sands that are as hard as practically available.
5. Sieve according to ASTM C 136.
6. Bedding Sand Material Requirements: Conform to the grading requirements of ASTM C 33 with modifications 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 (0.600 mm)	25 to 60
No. 50 (0.300 mm)	10 to 30
No. 100 (0.150 mm)	2 to 10
No. 200 (0.075 mm)	0 to 1

Note: Coarser sand than that specified in Table 2 below may be used for joint sand including C 33 material as shown in Table 1. Use material where the largest sieve size easily enters the smallest joints. For example, if the smallest paver joints are 2 mm wide, use sand 2 mm and smaller in particle size. If C 33 sand is used for joint sand, extra effort may be required in sweeping material and compacting the pavers in order to completely fill the joints.

7. Joint Sand Material Requirements: Conform to the grading requirements of ASTM C 144 as shown with modifications in Table 2 below:

Table 2
Grading Requirements for Joint Sand

ASTM C 144 Natural Sand	ASTM C 144 Manufactured Sand	
Sieve Size	Percent Passing	Percent Passing
No. 4 (4.75 mm)	100	100
No. 8 (2.36 mm)	95 to 100	95 to 100
No. 16 (1.18 mm)	70 to 100	70 to 100
No. 30 (0.600 mm)	40 to 75	40 to 100
No. 50 (0.300 mm)	10 to 35	20 to 40
No. 100 (0.150 mm)	2 to 15	10 to 25
No. 200 (0.075 mm)	0 to 1	0 to 10

Note: Specify specific components of a system, manufactured unit or type of equipment. See ICPI Tech Spec 3, Edge Restraints for Interlocking Concrete Pavements for guidance on selection and design of edge restraints.

2.04 EDGE RESTRAINTS

A. Provide edge restraints installed around the perimeter of all interlocking concrete paving unit areas.

B. Edge restraints shall be plastic/concrete/aluminum/steel/pre-cast concrete/cut stone/concrete

PART 3 EXECUTION

3.01 EXAMINATION

Note: For installation 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 ¼" above the final elevations after compaction. This difference in initial and final elevation is to compensate for possible minor settling.

A. Acceptance of Site Verification of Conditions:

1. Verify that subgrade preparation, compacted density and elevations conform to specified requirements.
2. Verify that geotextiles, if applicable, have been placed according to drawings and specifications.
3. Verify that [Aggregate] [Cement-treated] [Asphalt-treated] [Concrete] [Asphalt] base materials, thickness, [compacted density], surface tolerances and elevations conform to specified requirements.
4. Provide written density test results for soil subgrade, [aggregate] [cement-treated][asphalt-treated][asphalt] base materials to the Owner, General Contractor and paver installation subcontractor.
5. Verify location, type, and elevations of edge restraints, utility structures, and drainage inlets.
6. Do not proceed with installation of bedding sand and interlocking concrete pavers until [subgrade soil and] base conditions are corrected by the General Contractor or designated subcontractor.

3.03 PREPARATION

A. Verify base is dry, certified by General Contractor as meeting material, installation and grade specifications.

B. Verify that base [and geotextile] is ready to support sand, [edge restraints,] and, pavers and imposed loads.

C. Edge Restraint Preparation:

1. Install edge restraints per the drawings [and manufacturer's recommendations] [at the indicated elevations].

Note: Retain the following two subparagraphs if specifying edge restraints that are staked into the base with spikes.

2. Mount directly to finished base. Do not install on bedding sand.
3. The minimum distance from the outside edge of the base to the spikes shall be equal to the thickness of the base.

3.04 INSTALLATION

A. Spread bedding sand evenly over the base course and screed to a nominal 1 in. (25 mm) thickness, not exceeding 11/2 in. (40 mm) thickness. Spread bedding sand evenly over the base course and screed rails, using the rails and/or edge

restraints to produce a nominal 1 in. (25 mm) thickness, allowing for specified variation in the base surface.

1. Do not disturb screeded sand.
2. Screeded area shall not substantially exceed that which is covered by pavers in one day.
3. Do not use bedding sand to fill depressions in the base surface.

Note: When initially placed on the bedding sand, manually installed pavers often touch each other, or their spacer bars if present. Joint widths and lines (bond lines) are straightened and aligned to specifications with rubber hammers and pry bars as paving proceeds.

B. Lay pavers in pattern(s) shown on drawings. Maintain straight pattern lines as specified.

C. Points between the pavers on average shall be between 1/16 inch and 3/16 inch (2 mm to 5 mm) wide or otherwise specified.

D. Joint (bond) lines shall not deviate more than ±1/2 in. (±15 mm) over 50 ft. (15 m) from string lines.

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

F. Cut pavers to be placed along the edge with a [double blade paver splitter or] masonry saw.

G. Use a low-amplitude plate compactor capable of at least minimum of 4,000 lbf (18 kN) at a frequency of 75 to 100 Hz to vibrate the pavers into the sand. Use a protective membrane between the concrete pavers and the plate compactor to avoid damaging the surface of the pavers. Remove any cracked or damaged pavers and replace with new units.

H. Compact the pavers, sweeping dry joint sand into the joints and vibrating until they are full. This will require at least two to three passes with the compactor. Do not compact within 3 feet (1m) of the unrestrained edges of the paving units.

I. All work within 3 feet of the laying face must shall be left fully compacted with sand-filled joints at the end of each day or compacted upon acceptance of the work. Cover the laying face or any incomplete areas with plastic sheets overnight if not closed with cut and compacted pavers with joint sand to prevent exposed bedding sand from becoming saturated from rainfall.

J. Remove excess sand from surface when installation is complete.

K. The final surface elevations shall not deviate more than 3/8 inch (10 mm) under 10 feet (3 m) long straightedge.

L. The surface elevation of pavers shall be 1/8 to ¼ inch (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.

3.05 FIELD QUALITY CONTROL

A. Check final surface elevations for conformance to drawings.