

Interlocking Concrete Pavement (ICP) Design & Construction Guidance for use with the CCPIC ICP Guide Specification

Part 1 General

Pavements subject to vehicles should be designed in consultation with a qualified civil engineer, in accordance with [ASCE/T&DI/ICPI 58-16](#) Structural Design of Interlocking Concrete Pavement for Municipal Streets and Roadways, ICPI Structural Design software available on www.icpi.org, and in accordance with [ICPI Tech Spec](#) technical bulletins notably Tech Spec 4 on structural design. See ICPI Tech Specs 11 and 15 for guidance on specifying machine installed bedding materials and concrete pavers.

Note: Use the current year reference.

Part 2 Materials

2.01 CONCRETE PAVERS

In addition to ASTM standards conformance, ICPI recommends a maximum 3:1 aspect ratio (length ÷ thickness) and a minimum 3.125 inches (80 mm) thickness for vehicular applications. Residential driveways can use a minimum 2.375 inches (60 mm) thick units with a maximum 4:1 aspect ratio. Pedestrian areas can use units with an aspect ratio of 4:1 or greater.

2.03 BEDDING AND JOINT SAND

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 or Caltrans Traffic Index greater than 9.4 see ICPI Tech Spec 17, Bedding Sand Selection for Interlocking Concrete Pavements in Vehicular Applications for test methods and criteria for assessing bedding sand durability. Limestone screenings will typically not meet the durability requirements outlined in Tech Spec 17. However, there are some granite materials that may meet these requirements. Tech Spec 17 recommends using concrete sand as a first preference.

- B. Bedding sands should conform to ASTM C33 gradations for concrete sand. ICPI recommends the additional limitations on the No. 200 (0.075 mm) sieve as shown.
- C. ASTM C144 allows up to 10% passing the No. 200 (0.075 mm) sieve for manufactured sand. ICPI recommends reducing this to no more than 5% as a means to maintain interlock since material passing the No. 200 sieve can lubricate larger sand particles and thereby reduce interlock among paving units.

- C. Coarser sand than that specified in Table 2.03-C may be used for joint sand including ASTM C33 material as shown in Table 2.03-B. 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 ASTM C33 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.

2.05 EDGE RESTRAINTS

- A. 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. Concrete curbs are typically used as edge restraints for parking lots, alleys, and streets.

Part 3 Construction

3.03 SUBGRADE PREPARATION AND AGGREGATE BASE MATERIAL PLACEMENT

- A. Compaction of the soil subgrade is recommended to at least **95%** relative density per California Test 216. Stabilization of the subgrade and/or base material may be necessary with weak or saturated subgrade soils.
- A. Mechanical tampers are recommended for compaction of soil subgrade and aggregate base in areas not accessible to large compaction equipment. Such areas can include that around lamp standards, utility structures, building edges, curbs, tree wells and other protrusions.
- B. Prior to screeding the bedding sand, the recommended base surface tolerance should be $\pm 3/8$ inch (± 10 mm) over a 10-foot (3 m) straight edge. See ICPI Tech Spec 2, Construction of Interlocking Concrete Pavements for further guidance on construction practices.
- B. The elevations and surface tolerance of the completed base determine the final surface elevations of concrete pavers. Some contracts require the paver installation contractor to install only the bedding materials and concrete pavers and base installation is by others. In such cases, the paver installation contractor cannot correct deficiencies in the base surface with additional bedding sand or by other means. Therefore, the surface elevations of the base should be confirmed and accepted by the agency and it should provide written certification of compliance to the drawings and specifications to the paving subcontractor prior to placing bedding sand and concrete pavers.

3.05 CONCRETE PAVERS

- B. 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.
- C. Contact manufacturer of interlocking concrete paver units for recommended joint widths.

3.06 FIELD QUALITY CONTROL

- A. Surface tolerances on flat slopes should be measured with a rigid straightedge. Tolerances on complex contoured slopes should be measured with a flexible straightedge capable of conforming to complex curves on the pavement surface.
- C. For installations on a compacted aggregate base and soil subgrade, 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 helps compensate for possible minor settling normal to pavements.
- C. For pedestrian access routes maximum elevation change should not exceed ¼ inch (6 mm).

3.07 [CLEANING] [SEALING] [JOINT SAND STABILIZATION]

- A. Cleaning, sealing and/or joint sand stabilization may be required for some applications. See ICPI Tech Spec 5, Cleaning, Sealing and Joint Sand Stabilization of Interlocking Concrete Pavements for guidance on when to clean and seal the paver surface, and when to stabilize joint sand. Delete if cleaners, sealers, and or joint sand stabilizers are not applied.