Provided By:

# PAVERS ON A MORTAR BED
## SECTION 32 14 13

*Note: This guide specification for the U.S. is for concrete pavers mortared to a concrete base with mortared joints for exterior applications. Pavers installed with this method recommended for areas subject to pedestrian traffic only. This Section includes the term "Architect." Edit this term as necessary to identify the design professional in the General Conditions of the Contract.* ***The text must be edited by a qualified, licensed design professional to suit specific project requirements. ICPI makes no representations or warranties of any kind, expressed or implied, and disclaims any liability for damages resulting in the use of this guide construction specification.***

*There are two methods used for mortared applications of concrete pavers. They are (1) setting pavers on a thick workable latex-fortified mortar bed and (2) sometimes applying a bond coat and then a thin layer of latex-fortified mortar. The latter procedure is called term "thin set." Both methods place mortar on a cured concrete base.*

*The installation methods referenced in this guide specification are found in ANSI Specifications for Installation of Ceramic Tile and the Tile Council of America's Handbook for Ceramic Tile Installation. Reading these references is a prerequisite to using this guide specification. Mortar manufacturers can provide additional guidance on selection and installation of their products depending on which installation method is chosen. Grout in this guide specification refers to mortar used to fill paver joints.*

## PART 1 GENERAL

### 1.01 SUMMARY

**A. Section Includes**

1. Precast concrete pavers with grouted joints.
2. Preparation of concrete base.
3. Bond coat.
4. [Thin set] Mortar bed.
5. [Cleaners, Sealers.].

**B. Related Sections**

1. Section [ ] - Aggregate Subbase.
2. Section [ ] - Concrete [Walks] [Curbs] [and] [Gutters],
3. Section [ ] - Cast-in-Place Concrete.
4. Section [ ] – Sealants and Caulking.

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## 1.02 REFERENCES

**A. American National Standards Institute (ANSI)**

1. American National Specifications for the Installation of Ceramic Tile.

**B. American Society for Testing and Materials (ASTM)**

1. C140 Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
2. C920 Standard Specification for Elastomeric Joint Sealants.
3. C936 Standard Specification for Solid Concrete Interlocking Paving Units.
4. C1645 Standard Test Method for Freeze-thaw and De-icing Salt Durability of Solid Concrete Interlocking Paving Units.

**C. Tile Council of America (TCA):**

1. Handbook for Ceramic Tile Installation.

**D. Interlocking Concrete Pavement Institute (ICPI) Technical Bulletins**

1. Tech Spec 5 Cleaning, Sealing and Joint Sand Stabilization of Interlocking Concrete Pavement.

## 1.03 SUBMITTALS

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

**B. Manufacturer's drawings and details: Indicate perimeter conditions, relationship to adjoining materials and assemblies, [expansion and control joints,] concrete paver [layout,] [patterns,] [color arrangement,] installation [and setting] details.**

**C. Mortar color samples that indicate the extremes of color variation expected in the finished installation.**

**D. 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 manufacturer's available colors.
2. Accepted samples become the standard of acceptance for the work.
3. Test results from an independent testing laboratory for compliance of paving unit requirements to ASTM C936.
4. Manufacturer's certification of concrete pavers by ICPI as having 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. Regulatory Requirements and Approvals: [Specify applicable licensing, bonding or other requirements of regulatory agencies.].**

**C. Single-source Responsibility: Obtain each color, type, and variety of unit paving, joint materials and setting materials from single sources with resources to provide products and materials of consistent quality, appearance and physical properties without delaying progress of the Work.**

**D. Field-constructed Mock-up: Prior to installation of pavers, erect mock-up(s) for each form and pattern of unit paver required. Build mock-up(s) using materials, base construction, expansion joints, and special features for contiguous work, as indicated for final unit of Work.**

a. Install a 7 ft x 7 ft (2 x 2 m) paver area.

b. Use this area to determine surcharge of the mortar bed, joint sizes, lines, laying pattern(s), color(s), and texture of the job.

c. This area will be used as the standard by which the work will be judged.

d. Subject to acceptance by owner, mock-up may be retained as part of finished work.

e. 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. [Store concrete paver cleaners and sealers per manufacturer's instructions.]**

1. Cover mortar sand with waterproof covering if needed to prevent exposure to rainfall or removal by wind. Secure the covering in place.
2. Protect cementitious materials from moisture and freezing temperatures. Store in a dry location.

## 1.06 PROJECT/SITE CONDITIONS

**A. Environmental Requirements:**

1. Do not install in rain or snow.
2. Do not install over when outside temperature is below 40° F (5° C).

## 1.07 MAINTENANCE

**A. Extra Materials: Provide [Specify area] [Specify percentage.] additional material for use by owner for maintenance and repair.**

**B. Pavers shall be from the same production run as installed materials.**

# PART 2 PRODUCTS

## 2.01 CONCRETE PAVERS

*Note: Concrete pavers may have spacer bars on each unit. They are highly recommended for mechanically installed pavers. Manually installed pavers may be installed with or without spacer bars.*

**A. Manufacturer: [Specify ICPI member manufacturer name.].**
1. Contact: [Specify ICPI member manufacturer contact information.].

**B. Interlocking Concrete Paver Units, including the following:**
1. Paver Type: [Specify name of product group, family, series, etc.].
   a. Material Standard: Comply with ASTM C936: Average compressive strength (C140): 8000 psi (55 MPa) with no individual unit under 7200 psi (50 MPa); Average water absorption (ASTM C140): 5% with no unit greater than 7%; Freeze-thaw resistance (ASTM C1645). 28 freeze-thaw cycles with no greater loss than 225 g/m$^2$ of paver surface area or no greater loss than 500 g/m$^2$ of paver surface area after 49 freeze-thaw cycles. Test to -15° C while immersed in a 3% saline solution if pavement is exposed to deicers. Freeze-thaw testing requirements shall be waived for applications not exposed to freezing conditions.
   b. Size: [Specify] inches [mm] x [Specify] inches [mm] x [Specify] inches [mm] thick.
   c. Color [and finish]: [Specify color.] [Specify finish].
   d. Color Pigment Material Standard: Comply with ASTM C979.

## 2.02 PRODUCT SUBSTITUTIONS

**A. Substitutions: No substitutions permitted.**

## 2.03 MORTAR BED

*Note: Verify the compatibility of the selected mortar with the pavers before proceeding with mortaring. Consult with the mortar manufacturer's representative for recommendations.*

**A. Mortar bed or thin-set mortar: Meets ANSI A118.15, Specifications for Improved Modified Dry-Set Cement Mortars.**

*Note: Use epoxy mortars when application is subject to freeze-thaw conditions or deicing salts.*

**[A. Epoxy mortar: Meets ANSI 118.3, Specifications for chemical resistant, water cleanable tile-setting, and-tile grouting epoxy and water cleanable tile-setting epoxy adhesive.]**

## 2.04 JOINTING MATERIAL

*Note: Verify the compatibility of the selected pigmented mortar with the pavers before proceeding. Consult with the grout manufacturer's representative for recommendations.*

**A. Meets ANSI 118.7, polymer modified cement grouts for tile installation.**

*Note: Use epoxy mortars when application is subject to freeze-thaw conditions and deicing salts.*

**[A. Meets ANSI 118.3, Specifications for chemical resistant, water cleanable tile- setting, and-tile grouting epoxy and water cleanable tile-setting epoxy adhesive.]**

**B. Jointing mortar colors: selected by the Architect from the manufacturer's complete color range.**

**C. Acceptance of mortar products is subject to the approval of the Architect and the paver manufacturer prior to bid closing.**

## 2.05 ACCESSORIES

**A. Water: Potable and free from minerals or other materials that are detrimental to mortar.**

**B. Primer: As recommended by the mortar material manufacturer.**

**C. Sealant [and backing materials]: Conforming to ASTM C920 as specified in Section [ ].**

**D. Mixes: Prepare pre-mix materials in accordance with manufacturer's written instructions.**

**E. Edge Restraints: Provide edge restraints installed around the perimeter of all interlocking concrete paving unit areas as follows:**

1. Manufacturer: [Specify manufacturer.].
2. Material: [Plastic] [Concrete] [Aluminum] [Steel] [Pre-cast concrete] [Cut stone] [Concrete].
3. Material Standard: [Specify material standard.].

*Note: Delete article below if cleaners and sealers are not specified.*

**F. [Cleaners] [Sealers]**

1. Material Type and Description: [Specify material type and description.].
2. Material Standard: [Specify material standard.].
3. Manufacturer: [Specify manufacturer.].

# PART 3 EXECUTION

## 3.01 ACCEPTABLE INSTALLERS

**A. [Specify acceptable paving subcontractors.].**

*Note: The elevations and surface tolerance of the base determine the final surface elevations of concrete pavers. The paver installation contractor cannot correct deficiencies in the base surface with additional mortar bedding or by other means. Therefore, the surface elevations of the base should be checked and accepted by the General Contractor or designated party, with written certification to the paving subcontractor, prior to placing mortar and concrete pavers.*

## 3.02 EXAMINATION

**A. Inspect areas and conditions under which work is to be performed and notify the Architect in writing of conditions detrimental to the proper and timely completion of the work.**

**B. Verify that concrete base is sloped for drainage and is free of standing water, dust, oil, grease, paint, wax, curing compounds, primer, sealers, form release agents, or any deleterious substances and debris which may prevent or reduce bonding. [Conduct moisture tests to verify that concrete surfaces are completely cured, free from hydrostatic pressure and having a moisture content of less than 5%.]**

**C. Verify that jointing materials can be cleaned from pavers or provide coating to pavers to facilitate removal of jointing materials.**

**D. Do not proceed with the work until unsatisfactory conditions have been corrected by the General Contractor or designated subcontractor to the satisfaction of the installer [and surfaces and conditions comply with the applicable requirements of ANSI A-108.1].**

## 3.03 PREPARATION

**A. Completely remove loose particles and debris from surface of concrete base. This may require mechanical grinding and scarifying of the surface.**

**B. Neutralize any trace of strong acid or alkali from the substrate prior to mortar application.**

**C. If leveling of the concrete surface is necessary, apply latex Portland cement mortar surface leveling materials to the surface of the substrate to bring the surface to a true, even plane. Allow mortar-leveling materials to set prior to installation.**

**D. Surface to receive [slurry coat and] mortar shall have a tolerance of ±1/4 in. (6 mm) over 10 ft (3 m) for normal mortar setting bed applications and ±1/8 in. (3 mm) over 10 ft (3 m) for thin set mortar setting bed applications.**

## 3.04 INSTALLATION

**A. Moisten concrete base and apply slurry bond coat to concrete base per manufacturer's directions.**

**B. Mix and apply mortar setting bed material in accordance with the manufacturer's instructions. Spread mortar in quantities that will remain plastic and workable during installation of pavers.**

*Note: Finishing the surface of a mortar bed or thin-set mortar typically involves placing a skim coat with a flat trowel on one pass and returning with a pass of the notched side of the trowel. Pavers are placed with a slight twisting motion to help ensure adhesion of the mortar to the bottom of the paver. Each paver is tapped with a rubber mallet to further bed each into the mortar. An occasional paver should be lifted after this process to be sure there is full coverage of the mortar against the bottom of the paver. Larger pavers may require buttering with a skim coat of mortar to help ensure complete adhesion to the mortar bedding.*

**C. Moisten the bottoms of the pavers prior to placing on mortar or thin-set materials.**

**D. Lay pavers in pattern(s) on mortar bed as indicated on the drawings. Saw cut pavers as required with a masonry saw. Cut perimeter units no less than [1/4] of full-size units. Do not install stained, chipped, cracked, or broken pavers.**

*Note: Maximum recommended joint width is 3/8 in. (10 mm).*

**E. Maintain [3/8] in. [10 mm] wide joints.**

**F. Joints shall be uniform and straight in all both directions as indicated on the drawings.**

**G. Lippage: maintain no greater than 1/16 in. (1.5 mm) height difference between adjacent pavers.**

**H. Follow manufacturer's recommended times for setting mortar to cure before filling joints.**

**I. Maintain clean surfaces and joints prior to applying jointing material.**

**J. Mortar joints in accordance with ANSI A108.10.**

## 3.05 EXPANSION AND CONTROL JOINTS

**A. Locate and obtain the approval of the Architect before commencing the installation.**

**B. In accordance with TCA Detail No. EJ171, Handbook for Ceramic Tile Installation.**

1. Provide [at maximum 12 ft (3.6 m) on center in each direction] [as indicated on the drawings].
2. Provide where dissimilar materials contact the pavers including walls, columns, and curbs.
3. Carry completely through the assembly to surface.
4. Keep clear of mortar setting bed and jointing materials.
5. Apply backer materials and sealant in joints as specified in Section [ ].

*Note: Cleaning and sealing may be required for some applications. See ICPI Tech Spec 5 Cleaning, Sealing and Joint Sand Stabilization of Interlocking Concrete Pavement for guidance on when to clean and seal paver surfaces. Delete article below if cleaners and sealers are not applied.*

## 3.06 [CLEANING] [SEALING]

**A. [Clean] [Seal] concrete pavers in accordance with the manufacturer's written recommendations.**

## 3.07 FIELD QUALITY CONTROL

*Note: 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 the complex curves on the pavement surface.*

**A. The final surface tolerance from grade elevations shall not deviate more than ±1/4 in. (±10 mm) under a 10 ft (3 m) straightedge.**

**B. Check final surface elevations for conformance to drawings.**

## 3.08 PROTECTION

**A. Protect finished work against weather, freezing and immersion in water for [at least 21 days after installation][per mortar and grout manufacturer's recommendations].**

**B. Protect pavers from construction-related foot traffic [for at least 24 hours after completion of the installation] and general foot traffic [for at least 72 hours after installation] [per the mortar and grout manufacturer's recommendations].**

**C. Protect textured paver materials during installation and afterwards. [Seal architectural finishes of pavers immediately after the mortar is dry.] Cover and protect the textured surface from vehicular traffic during the construction period.**

**D. After work in this section is complete, the General Contractor shall be responsible for protecting work from damage due to subsequent construction activity on the site.**

END OF SECTION

## ABOUT CMHA

The Concrete Masonry & Hardscapes Association (CMHA) represents a unification of the Interlocking Concrete Pavement Institute (ICPI) and National Concrete Masonry Association (NCMA). CMHA is a trade association representing US and Canadian producers and suppliers in the concrete masonry and hardscape industry, as well as contractors of interlocking concrete pavement and segmental retaining walls. CMHA is the authority for segmental concrete products and systems, which are the best value and preferred choice for resilient pavement, structures, and living spaces. CMHA is dedicated to the advancement of these building systems through research, promotion, education, and the development of manufacturing guides, design codes and resources, testing standards, and construction practices.