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SLABS ON A MORTAR SETTING BED

SECTION 32 14 13.16

*Note: This guide specification for the U.S. is for concrete paving slabs mortared to a concrete base with mortared joints for exterior applications. Slabs 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 paving slabs. 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 paving slabs 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.

1.02 REFERENCES

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- 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. C920 Specification for Elastomeric Joint Sealants.
 - 2. C1782 Standard Specification for Segmental Concrete Paving Slabs.
- 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 paving slab [layout,] [patterns,] [color arrangement,] installation [and setting] details.**
- C. Concrete paving slabs:**
 - 1. [Four] representative full-size samples of each slab 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. Mortar color samples that indicate the extremes of color variation expected in the finished installation.
 - 3. Accepted samples become the standard of acceptance for the work.
 - 4. Test results from an independent testing laboratory for compliance of paving slab requirements to ASTM C1782.
 - 5. Manufacturer's catalog product data, installation instructions, and material safety data sheets for the safe handling of the specified materials and products.
- D. Paving Slab Installation Subcontractor:**
 - 1. A copy of Subcontractor's current certificate from the Interlocking Concrete
 - 2. Pavement Institute Concrete Paver Installer Certification program.
 - 3. 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 paving slab 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. Mock-Ups:**
 - 1. Install a 7 ft x 7 ft (2 x 2 m) slab 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 paving slabs to the site in steel banded, plastic banded or plastic wrapped packaging capable of transfer by fork lift or clamp lift.
 3. Unload slabs 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 paving slab cleaners and sealers per manufacturer's instructions.]**
 1. Cover mortar sand and grout 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. **Slabs shall be from the same production run as installed materials.**

PART 2 PRODUCTS

2.01 PRODUCT SUBSTITUTIONS

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

2.02 CONCRETE PAVING SLABS

Note: Concrete paving slabs may have spacer bars on each unit. They are highly recommended for mechanical installation. Manually installed slabs may be installed with or without spacer bars.

- A. **Manufacturer: [Specify ICPI member manufacturer name].**
 1. Contact: [Specify ICPI member manufacturer contact information].
- B. **Concrete Paving Slabs:**
 1. Slab type: [Specify name of product group, family, series, etc.].
 - a. Material Standard: Comply with ASTM C1782: 750 psi (5 MPa) average flexural strength. Freeze-thaw scaling testing requirements shall be waived for applications not exposed to freezing conditions.

- b. Color [and finish]: [Specify color.] [Specify finish].
- c. Size: [Specify] inches [mm] x [Specify] inches [mm] x [Specify] inches [mm] thick.

2.03 MORTAR

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

- A. Mortar bed or thin-set mortar: Meets ANSI A118.4, Specifications for latex-portland cement mortar.**

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 GROUT

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

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

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

- B. [Meets ANSI 118.3, Specifications for chemical resistant, water cleanable tile- setting, and-tile grouting epoxy and water cleanable tile-setting epoxy adhesive.]**
- C. Grout colors: selected by the Architect from the manufacturer's complete color range.**
- D. Acceptance of grout products is subject to the approval of both the Architect and the slab manufacturer prior to bid closing.**

2.05 ACCESSORIES

- A. Water: Potable and free from minerals or other materials that are detrimental to mortar and grout mixes.**
- 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-mixed 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 paving slabs. The paving slab installation contractor cannot correct deficiencies in the base surface with additional mortar bedding or by other means. Therefore, the surface elevations of the concrete 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 paving slabs.

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 grout materials can be cleaned from slabs or provide coating to concrete paving slabs to facilitate removal of grout 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].
- E. General Contractor shall certify in writing that concrete base complies to drawing elevations and specifications.

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 $\pm 1/4$ in. (6 mm) over 10 ft (3 m) for normal mortar setting bed applications and $\pm 1/8$ 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 and grout material in accordance with the manufacturer's instructions. Spread mortar in quantities that will remain plastic during installation of paving slabs.

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. Slabs are placed with a slight twisting motion to help ensure adhesion of the mortar to the bottom of the slab. Each slab is tapped with a rubber mallet to further bed each into the mortar. An occasional slab should be lifted after this process to be sure there is full coverage of the mortar against the bottom of the slab. Larger paving slabs may require back buttering with a skim coat of mortar to help ensure complete adhesion to the mortar bedding.

- C. Moisten the bottoms of the slabs prior to placing on mortar or thin-set materials.
- D. Lay slabs in pattern(s) on mortar bed as indicated on the drawings. Saw cut slabs 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 slabs.

Note: Maximum recommended mortared 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 slabs.
- H. Follow manufacturer's recommended times for setting mortar to cure before grouting.
- I. Maintain clean surfaces and joints prior to applying grout.
- J. Grout 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 slabs including walls, columns, and curbs.
 3. Carry completely through the assembly to surface.
 4. Keep clear of mortar setting materials and grout.
 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 slab surfaces. Delete article below if cleaners and sealers are not applied.

3.06 [CLEANING] [SEALING]

- A. [Clean] [Seal] concrete slabs 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 $\pm 1/4$ in. (± 6 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 slabs 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 slab materials during installation and afterwards. [Seal architectural finishes of slabs immediately after the grout 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.

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