

SECTION 02784

LIMESTONE PAVERS

This guide specification has been prepared by TexaStone Quarries LLC to assist design professionals in the preparation of a specification section covering cut limestone pavers, set in a full mortar bed.

Requirements for clear water repellents or sealers are not included in this section due to the wide variety of products available, but can easily be added if desired and if not specified in other sections of the project manual. Latex modifiers for setting beds and grouts can also be added to this section if desired.

This specification may be used as the basis for developing either a project specification or an office master specification. Since it has been prepared according to the principles established in the *Manual of Practice* published by The Construction Specifications Institute (CSI), it may be used in conjunction with most commercially available master specifications systems with minor editing.

The following should be noted in using this guide specification:

- Editing notes to assist users are separated from specification text by rows of asterisks. Delete these notes prior to final printing.
- Optional text requiring a selection by the user is enclosed within brackets, e.g.: "Section [01330.] [____.]"
- Items requiring user input are enclosed within brackets, e.g.: "Section [____ - ____]."
- Optional paragraphs are separated by an "OR" statement, e.g.:

**** OR ****

- Metric equivalents to inch-pound units follow the inch-pound units. Inch-pound units are contained within single character sets, i.e. <1 inch>. Inch-pound units are contained within double character sets, i.e. <<25 mm>>. Metric measurements are rationalized units based on the SI system of measurement. Delete either the inch-pound or metric units of measure depending on project requirements; do not include both units in a project specification, as conflicting requirements could result.

This and other guide specifications are available in both hard copy and a variety of electronic formats to suit most popular word processing programs and operating platforms. Please contact TexaStone Quarries LLC at 915-354-2569 or www.texastone.com for additional copies or for information on available electronic formats.

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 1. Cut limestone pavers, mortar set.
 2. Mortar.
 3. Accessories.

- B. Related Sections:
 1. Division 1: Administrative, procedural, and temporary work requirements.
 2. Section [07920 - Joint Sealers:] [_____ - _____:] Joint sealer and backer rod.

1.2 REFERENCES

 Edit the following to include only those standards referenced elsewhere in this section.

- A. American Society for Testing and Materials (ASTM):
 1. C 97 - Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.
 2. C 99 - Test Method for Modulus of Rupture of Dimension Stone.
 3. C 144 - Specification for Aggregate for Masonry Mortar.
 4. C 150 - Specification for Portland Cement.
 5. C 170 - Test Method for Compressive Strength of Dimension Stone.
 6. C 207 - Specification for Hydrated Lime for Masonry Purposes.
 7. C 241 - Standard Test Method for Abrasion Resistance of Stone Subject to Foot Traffic.
 8. C 270 - Specification for Mortar for Unit Masonry.
 9. C 404 - Specification for Aggregates for Masonry Grout.
 10. C 880 - Test Method for Flexural Strength of Dimension Stone.

- B. International Masonry Industry All-Weather Council (IMIAC) - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.3 SUBMITTALS

 The following provides for submission of detailed layout and installation drawings. Delete for smaller, less complex projects.

- A. Shop Drawings: Include location and sizes of pieces, arrangement and size of joints, and other details of installation.

- B. Samples:
 1. Stone: <[4 x 12] [____ x ____] inch> <<[100 x 300] [____ x ____] mm>> samples showing [each] color and finish.
 2. Mortar: <[3 x 3] [____ x ____] inch> <<[75 x 75] [____ x ____] mm>> samples showing [each] color range.

- C. Test Reports:
 1. Indicating mortar and grout compliance with ASTM C 270.
 2. Indicating stone compliance with specified requirements.

1.4 QUALITY ASSURANCE

The following provides for a site-constructed mockup for review of materials and workmanship. Delete for smaller, less complex projects.

- A. Mockup:
 - 1. Size: <[4] [] feet> <<[1200] [] mm>> wide x <[8] [] feet> <<[2400] [] mm>>-long.
 - 2. Locate [] [where directed by Architect/Engineer.]
 - 3. Show stone size, color, and finish; [control] [and] [expansion] joints; and joint profile.
 - 4. Approved mockup may [not] remain as part of the Work.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Stack stone minimum <4 inches> <<100 mm>> above ground. Provide non-staining spacers between pieces and polyethylene or other suitable film as protective covering.
- B. Protect mortar materials from moisture absorption and damage; reject damaged containers.
- C. Store sand to prevent inclusion of foreign matter.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Hot weather requirements: If ambient temperature is over <95 degrees F> <<35 degrees C>> or relative humidity is less than 50 percent, protect from direct sun and wind exposure for minimum 48 hours after installation.
 - 2. Cold weather requirements:
 - a. Follow IMIAC guidelines.
 - b. Do not use frozen materials or build upon frozen work.
 - 3. Do not apply water repellent coating:
 - a. When ambient or surface temperature is below minimum temperature recommended by manufacturer.
 - b. If possibility of entrapped or frozen water exists.
 - c. When rain is expected during next 72 hours.
 - d. During high winds.

PART 2 - PRODUCTS

2.1 MATERIALS

In the following paragraphs, select one or more stones to suit project conditions. Refer to current TexaStone literature or contact your TexaStone representative for assistance in making selections.

- A. Limestone:
 - 1. Source: "Permian Sea Coral" by TexaStone Quarries LLC, Garden City, Texas.
 - 2. Characteristics:
 - a. Water absorption: Maximum 3.50 percent, tested to ASTM C 97.
 - b. Specific gravity: 2.337, tested to ASTM C 97.
 - c. Density: Minimum <140 pounds per cubic foot> <<2255 kg/cu m>>, tested to ASTM C 97.
 - d. Modulus of rupture: Minimum <400 PSI> <<2.76 MPa>>, tested to ASTM C 99.
 - e. Compressive strength: Minimum <4000 PSI> <<27.68 MPa>>, tested to ASTM C 170.
 - f. Flexural strength: Minimum <700 psi> <<4.82 MPa>>, tested to ASTM C 880.

**** OR ****

B. Limestone:

1. Source: "Hadrian" by TexaStone Quarries LLC, Garden City, Texas.
2. Characteristics:
 - a. Water absorption: Maximum 8.0 percent, tested to ASTM C 97.
 - b. Specific gravity: 2.146, tested to ASTM C 97.
 - c. Density: Minimum <110 pounds per cubic foot> <<1762 kg/cu m>>, tested to ASTM C 97.
 - d. Modulus of rupture: Minimum <400 PSI> <<2.76 MPa>>, tested to ASTM C 99.
 - e. Compressive strength: Minimum <1800 PSI> <<12.41 MPa>>, tested to ASTM C 170.
 - f. Flexural strength: Minimum <300 psi> <<2.07 MPa>>, tested to ASTM C 880.

**** OR ****

C. Limestone:

1. Source: "Desert Sunset" by TexaStone Quarries LLC, Garden City, Texas.
2. Characteristics:
 - a. Water absorption: Maximum 8.0 percent, tested to ASTM C 97.
 - b. Specific gravity: 2.059, tested to ASTM C 97.
 - c. Density: Minimum <110 pounds per cubic foot> <<1762 kg/cu m>>, tested to ASTM C 97.
 - d. Modulus of rupture: Minimum <400 PSI> <<2.76 MPa>>, tested to ASTM C 99.
 - e. Compressive strength: Minimum <1800 PSI> <<12.41 MPa>>, tested to ASTM C 170.
 - f. Flexural strength: Minimum <450 psi> <<3.10 MPa>>, tested to ASTM C 880.

**** OR ****

D. Limestone:

1. Source: "TexaStone Pink" by TexaStone Quarries LLC, Garden City, Texas.
2. Characteristics:
 - a. Water absorption: Maximum 8.0 percent, tested to ASTM C 97.
 - b. Specific gravity: 2.075, tested to ASTM C 97.
 - c. Density: Minimum <110 pounds per cubic foot> <<1762 kg/cu m>>, tested to ASTM C 97.
 - d. Modulus of rupture: Minimum <400 PSI> <<2.76 MPa>>, tested to ASTM C 99.
 - e. Compressive strength: Minimum <1800 PSI> <<12.41 MPa>>, tested to ASTM C 170.
 - f. Flexural strength: Minimum <400 psi> <<2.76 MPa>>, tested to ASTM C 880.

**** OR ****

E. Limestone:

1. Source: "Cedar Hill Cream" by TexaStone Quarries LLC, Garden City, Texas.
2. Characteristics:
 - a. Water absorption: Maximum 9.0 percent, tested to ASTM C 97.
 - b. Specific gravity: 2.067, tested to ASTM C 97.
 - c. Density: Minimum <110 pounds per cubic foot> <<1762 kg/cu m>>, tested to ASTM C 97.
 - d. Modulus of rupture: Minimum <400 PSI> <<2.76 MPa>>, tested to ASTM C 99.
 - e. Compressive strength: Minimum <1800 PSI> <<12.41 MPa>>, tested to ASTM C 170.
 - f. Flexural strength: Minimum <500 psi> <<3.49 MPa>>, tested to ASTM C 880.

**** OR ****

F. Limestone:

1. Source: "Peach" by TexaStone Quarries LLC, Garden City, Texas.
2. Characteristics:
 - a. Water absorption: Maximum 8.0 percent, tested to ASTM C 97.

- b. Specific gravity: 2.154, tested to ASTM C 97.
- c. Density: Minimum <110 pounds per cubic foot> <<1762 kg/cu m>>, tested to ASTM C 97.
- d. Modulus of rupture: Minimum <400 PSI> <<2.76 MPa>>, tested to ASTM C 99.
- e. Compressive strength: Minimum <1800 PSI> <<12.41 MPa>>, tested to ASTM C 170.
- f. Flexural strength: Minimum <500 psi> <<3.49 MPa>>, tested to ASTM C 880.

In the following paragraphs select finish for exposed faces of stone. Refer to current TexaStone literature or contact your TexaStone representative for assistance in making selections.

- 3. Finish: [Split face.] [Sawn.] [Honed.] [Sandblasted.] [Etched.] [Polished] [Tumbled] [Bush hammered.]
- 4. Free from cracks, seams, and starts that could impair its structural integrity or function. Inherent variations characteristic to quarry from which it is obtained are acceptable.
- 5. Color, texture, and finish consistent with range of samples approved by Architect/Engineer.

G. Mortar Materials:

- 1. Portland cement: ASTM C 150, Type I, white, non-staining to stone. For exposed surfaces provide cement from one source throughout project.
- 2. Lime: ASTM C 207, Type S.
- 3. Aggregate: ASTM C 144, standard masonry type, [_____] color. For exposed surfaces, provide aggregate from one source throughout project.

H. Water: Clean and potable.

Include the following paragraph where a reinforced mortar bed is desired.

- I. Reinforcing Mesh: <[2 x 2] [____x____] inch> <<[50 x 50] [____x____] mm>> mesh, [16/16] [____/____] wire size; welded fabric, galvanized.

2.2 ACCESSORIES

Ensure that joint sealers specified in other sections are nonstaining to stone.

- A. Joint Sealer: Specified in Section [07920.] [____.]
- B. Stone Cleaner: Not harmful to stone, joint materials, or adjacent surfaces. Acids not permitted.

2.3 MIXES

- A. Mortar Mix: ASTM C 270, Type [N.] [____.]
- B. Mixing:
 - 1. Mix in accordance with ASTM C 270.
 - 2. Provide uniformity of color in exposed mortar.
 - 3. Thoroughly mix ingredients in quantities needed for immediate use.
 - 4. Mix dry ingredients mechanically until uniformly distributed; add water to achieve workable consistency.
 - 5. Discard lumpy, caked, frozen, and hardened mixes.
 - 6. Use mortar within 2-1/2 hours after initial mixing at ambient temperatures below <80 degrees F> <<27 degrees C>> and within 1-1/2 hours after initial mixing at ambient temperatures over

<80 degrees F> <<27 degrees C>>.

7. Do not add antifreeze compounds to lower freezing temperature of mortar or grout.

2.4 FABRICATION

- A. Fabricate for <[3/8] [____] inch> <<[10] [____] mm>> wide joints.
- B. Cut or saw joint surfaces square.
- C. [Saw] [Rough cut] backs of stone.
- D. Fabrication Tolerances:
 1. Variation in face dimension: Plus or minus <[1/16] [____] inch> <<[1.5] [____] mm>>.
 2. Variation in thickness, except at exposed ends: Plus or minus <[1/8] [____] inch> <<[3] [____] mm>>.
 3. Variation in thickness at exposed ends: Plus or minus <[1/16] [____] inch> <<[1.5] [____] mm>>.
 4. Variation from true plane: Plus or minus <[1/16] [____] inch in 3 feet> <<[1.5] [____] mm/m>>.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean stone prior to installation. Do not use wire brushes or implements that can mark or damage exposed surfaces.
- B. Wet stone in preparation for placement to minimize moisture suction from mortar.
- C. Allowable Substrate Tolerances: Maximum <1/4 inch in 10 feet> <<6 mm/3 m>> variation in substrate surface.
- D. Layout:
 1. Determine location of control joints.
 2. Minimize pieces less than half size.
 3. Locate cuts to be inconspicuous.

3.2 INSTALLATION

- A. Set paver units in full mortar bed to support pavers over full bearing surface.
- B. Mortar Bed Thickness: Minimum <[5/8] [1-1/4] [____] inch> <<[15] [31] [____] mm>> [, unless otherwise indicated].
- C. [Place reinforcing at mid-height of mortar bed.]
- D. Lay pavers to pattern [shown on Shop Drawings.] [furnished by Architect/Engineer.]
- E. Arrange stone pattern to provide uniform color distribution throughout.
- F. Place pavers with [uniform <[3/8] [____] inch> <<[10] [____] mm>> joints.] [joints of varying width.] Maintain <[3/8] [____] inch> <<[10] [____] mm>> joints between pavers and abutting vertical surfaces.
- G. Rake out joints to <3/8 inch> <<10 mm> depth.
- H. Fill joints with mortar. Pack and work into voids. Tool joints to [flush] [____] profile.

- I. Keep exposed faces free from mortar; remove mortar on exposed faces before it sets.
- J. Fit pavers around projections and at perimeter. Smooth and clean cut edges.
- K. Provide control joints over joints in substrate. Form joints to full depth of stone and setting bed, and equal to typical grout joint in width.
- L. Keep expansion joints free from mortar and grout.
- M. Fill control and expansion joints with sealer as specified in Section [07920.] [____.]

3.3 PROTECTION

- A. Do not permit traffic over finished paver surfaces until grout has cured.
- B. Do not permit storage of materials or equipment on completed pavers.
- C. Protect completed work until Project completion with non-staining sheet coverings.

3.4 CLEANING

- A. Clean <[4 x 4] [____ x ____] foot> <<[1200 x 1200] [____ x ____] mm>> sample panel in location directed by Architect/Engineer. When approved, use same materials and techniques to clean remainder of stone.
- B. Protect adjacent surfaces.
- C. Apply cleaner in accordance with manufacturer's instructions. Acids are not permitted.
- D. Do not use steel or metallic brushes.
- E. Thoroughly rinse surfaces with clean water after completion of cleaning; remove all traces of cleaning solution.

END OF SECTION