

SECTION 321400 - UNIT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Brick pavers set in aggregate setting beds.
 - 2. Concrete pavers set in aggregate setting beds.
 - 3. Aluminum edge restraints.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For materials other than water and aggregates.
- B. Product Data: For the following:
 - 1. Pavers.
- C. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C 136.
- D. Samples for Initial Selection: For each type of unit paver indicated.
- E. Samples for Verification: For full-size units of each type of unit paver indicated.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for unit pavers, indicating compliance with requirements.

1.6 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

1.8 FIELD CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.
- B. Weather Limitations for Mortar and Grout:
 - 1. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
 - 2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6. Provide artificial shade and windbreaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and higher.
 - a. When ambient temperature exceeds 100 deg F, or when wind velocity exceeds 8 mph and ambient temperature exceeds 90 deg F, set pavers within 1 minute of spreading setting-bed mortar.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 BRICK PAVERS

- A. Brick Pavers: Heavy vehicular paving brick; ASTM C 1272. Provide brick without frogs or cores in surfaces exposed to view in the completed Work.
 - 1. Thickness: As indicated.
 - 2. Face Size: As indicated.
 - 3. Color: As indicated by manufacturer's designations.
- B. Efflorescence: Brick shall be rated "not effloresced" when tested according to ASTM C 67.

2.3 CONCRETE PAVERS

- A. Concrete Pavers: Solid interlocking paving units complying with ASTM C 936/C 936M and resistant to freezing and thawing when tested according to ASTM C 67, made from normal-weight aggregates.
 - 1. Thickness: As indicated.
 - 2. Face Size: As indicated.
 - 3. Color: As indicated by manufacturer's designations.
- B. Concrete Pavers: Solid paving units made from normal-weight concrete with a compressive strength not less than 5000 psi, water absorption not more than 5 percent according to ASTM C 140, and no breakage and not more than 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C 67.
 - 1. Thickness: As indicated.
 - 2. Face Size: As indicated.
 - 3. Color: As indicated by manufacturer's designations.

2.4 CURBS AND EDGE RESTRAINTS

- A. Aluminum Edge Restraints: Manufacturer's standard extruded-aluminum edging (2.5" high x 2" base) with loops pressed from face to receive stakes at 1 per 12". Spikes shall be 3/8" x 10" steel spikes. Black finish.

2.5 ACCESSORIES

- A. Cork Joint Filler: Preformed strips complying with ASTM D 1752, Type II.
- B. Compressible Foam Filler: Preformed strips complying with ASTM D 1056, Grade 2A1.

2.6 AGGREGATE SETTING-BED MATERIALS

- A. Graded Aggregate for Subbase: Sound, crushed stone or gravel complying with ASTM D 448 for Size No. 57.
- B. Stone Screenings for Leveling Course: Sound stone screenings complying with ASTM D 448 for Size No. 10.

C. Granite Screenings for Clay Paver Joints: 1/8" maximum diameter granite screenings.

- D. Polymeric Sand for Concrete Paver Joints: Provide sand of color needed to produce required joint color.
- E. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications; made from polyolefins or polyesters, with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2, AASHTO M 288.
 2. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
 3. Permittivity: 0.02 per second, minimum; ASTM D 4491.
 4. UV Stability: 50 percent after 500 hours' exposure, ASTM D 4355.
- F. Herbicide: Commercial chemical for weed control, registered with the EPA. Provide in granular, liquid, or wettable powder form.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces indicated to receive unit paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Where unit paving is to be installed over waterproofing, examine waterproofing installation, with waterproofing Installer present, for protection from paving operations, including areas where waterproofing system is turned up or flashed against vertical surfaces.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Proof-roll prepared subgrade according to requirements in Section 312000 "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive subbase course for unit pavers.

3.3 INSTALLATION, GENERAL

- A. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.
- B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
1. For concrete pavers, a block splitter may be used.

- D. Handle protective-coated brick pavers to prevent coated surfaces from contacting backs or edges of other units. If, despite these precautions, coating does contact bonding surfaces of brick, remove coating from bonding surfaces before setting brick.
- E. Joint Pattern: As indicated.
- F. Tolerances: Do not exceed 1/32-inch unit-to-unit offset from flush (lippage) or 1/8 inch in 10 feet from level, or indicated slope, for finished surface of paving.
- G. Provide edge restraints as indicated. Install edge restraints after placing unit pavers.
 - 1. Install edge restraints to comply with manufacturer's written instructions. Install stakes at intervals required to hold edge restraints in place during and after unit paver installation.
 - 2. For metal edge restraints with top edge exposed, drive stakes at least 1 inch below top edge.
- H. Expansion and Control Joints: Provide for sealant-filled joints at locations and of widths indicated. Provide compressible foam filler as backing for sealant-filled joints unless otherwise indicated; where unfilled joints are indicated, provide temporary filler until paver installation is complete. Install joint filler before setting pavers. Sealant materials and installation are specified in Section 079200 "Joint Sealants."

3.4 AGGREGATE SETTING-BED APPLICATIONS

- A. Compact soil subgrade uniformly to at least 95 percent of laboratory density.
- B. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- C. Place aggregate subbase and compact to 100 percent of ASTM D 1557 maximum laboratory density, and screed to depth indicated.
- D. Place drainage geotextile over compacted base course, overlapping ends and edges at least 12 inches.
- E. Place leveling course and screed to a thickness of 1-1/2 inches, taking care that moisture content remains constant and density is loose and uniform until pavers are set and compacted.
- F. Treat leveling course with herbicide to inhibit growth of grass and weeds.
- G. Set pavers with a minimum joint width of 1/16 inch and a maximum of 1/8 inch, being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines.
 - 1. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.
- H. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500- to 5000-lbf compaction force at 80 to 90 Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.

1. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches of uncompacted pavers adjacent to temporary edges.
 2. Before ending each day's work, compact installed concrete pavers except for 36-inch width of uncompacted pavers adjacent to temporary edges (laying faces).
 3. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches of laying face.
 4. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and cover leveling course on which pavers have not been placed with nonstaining plastic sheets to protect them from rain.
- I. Spread dry polymeric joint sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add jointing sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.
 - J. Do not allow traffic on installed pavers until sand has been vibrated into joints.
 - K. Repeat joint-filling process 30 days later.

3.5 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

END OF SECTION 321400