

Note: This guide specification for U.S. applications is for concrete grid units placed on a sand bedding course over a compacted dense-graded aggregate base. The text allows an option of topsoil and grass in the grid openings over bedding sand or No. 8 open-graded aggregate in the grid openings and for the bedding course. This specification is for limited vehicular applications such as access roads and emergency fire lanes, as well as intermittently used overflow parking areas. This text must be edited to suit specific project requirements for projects. This Section includes the term “Architect.” Edit this term as necessary to identify the design professional in the General Conditions of the Contract.

If the area is exposed to recurring vehicular traffic and additional stormwater storage in the base is desired, the specifier should consider using permeable interlocking concrete pavements, as they provide additional structural support to vehicles while providing runoff storage in an open-graded, crushed stone base. In such cases, the specifier should refer to the ICPI manual, Permeable Interlocking Concrete Pavements.

## SECTION 32 14 13.19 - CONCRETE GRID PAVEMENTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Division 01 Specification Sections, Drawings, General Conditions, Supplementary General Conditions, and Special Conditions apply to this section.

#### 1.2 SUMMARY

- A. Section includes:
  - 1. Concrete grid units.
  - 2. Bedding sand.
  - 3. Edge restraints.
  - 4. Geotextiles.
  - 5. [Topsoil and grass for the grid openings.]
  - 6. [Open-graded aggregate for the grid openings.]
  - 7. [Open-graded aggregate bedding course].
- B. Related Sections:
  - 1. Section [\_\_\_\_\_]: Curbs and drains.
  - 2. Section [\_\_\_\_\_]: Dense-graded aggregate base.
  - 3. Section [\_\_\_\_\_]: Open-graded aggregate base.

#### 1.3 REFERENCES

- A. American Society of Testing Materials (ASTM)
  - 1. C 33, Specification for Concrete Aggregates.
  - 2. C 136, Method for Sieve Analysis for Fine and Coarse Aggregate.
  - 3. C 140, Standard Test Methods of Sampling and Testing Concrete Masonry Units.
  - 4. C 979, Standard Specification for Pigments for Integrally Colored Concrete.
  - 5. C 1319, Standard Specification for Concrete Grid Paving Units.

6. ASTM D 698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,000 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
7. D 2940, Standard Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports.
8. D 5268, Specification for Topsoil Used for Landscaping Purposes.

- B. Interlocking Concrete Pavement Institute (ICPI)
1. Tech Spec technical bulletins.

#### 1.4 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, paving slab [layout,] [patterns,] [color arrangement,] installation [and setting] details.
- C. Sieve analysis per ASTM C 136 for grading of bedding and base materials.

*Note: Include D below if the grid openings will be filled with topsoil and grass seed, or sod plugs.*

- D. Source and content of topsoil and grass seed [sod].
- E. Concrete grid units:
1. Color selected by Architect.
  2. [Four] representative full-size samples of each grid type, thickness, color, finish that indicate the extremes of color variation and texture 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 grid paving unit requirements to ASTM C 1319.
  5. Manufacturer's certification of concrete grid units by ICPI as having met applicable ASTM standards.
  6. Manufacturer's catalog literature, installation instructions, and material safety data sheets for the safe handling of the specified materials and products.

#### 1.5 QUALITY ASSURANCE

- A. Paving Subcontractor Qualifications:
1. Engage an experienced installer who has successfully completed grid pavement installations similar in design, material, and extent indicated for this Project.
  2. Hold a current certificate from the Interlocking Concrete Pavement Institute Concrete Paver Installer Certification program.
- B. Single-source Responsibility: Obtain each color, type, and variety of grids, 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.
- C. Regulatory requirements and approvals: [Specify applicable licensing, bonding or other requirements of regulatory agencies.]

- D. Mock-up
  - 1. Locate where directed by the Architect.
  - 2. Notify Architect in advance of dates when mock-ups will be erected.
  - 3. Install minimum [100] sf ([10] m<sup>2</sup>) of concrete grid units.
  - 4. Use this area to determine the quality of workmanship in to be produced in the final unit of Work including surcharge of the bedding sand layer, joint sizes, lines, pavement laying pattern(s), color(s), and texture.
  - 5. This area shall be used as the standard by which the work is judged.
  - 6. Subject to acceptance by the owner, mock up may be retained as part of the finished work.
  - 7. If mock up is not retained, remove and properly dispose of.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with Division 1 Product Requirement Section
- B. Deliver concrete grid units to the site in steel banded, plastic banded, or plastic wrapped packaging capable of transfer by forklift or clamp lift. Unload grids at job site in such a manner that no damage occurs to the product or existing construction.
- C. Cover sand with waterproof covering to prevent exposure to rainfall or removal by wind. Secure the covering in place.
- D. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.

#### 1.7 ENVIRONMENTAL CONDITIONS

- A. Do not install bedding materials or grid units during heavy rain or snowfall.
- B. Do not install bedding materials and grid units over frozen base materials.
- C. Do not install frozen bedding materials.

#### 1.8 GRID MAINTENANCE MATERIALS

- A. Supply [ ] sf [( m<sup>2</sup>)] of [each type and color of grid unit] in unopened pallets with contents labeled. Store where directed.
- B. From the same production run as installed materials.

### PART 2 - PRODUCTS

#### 2.1 CONCRETE GRID UNITS

- A. Manufacturer: Angelus Paving Stones
  - 1. Contact: Rialto Paver Plant at (951) 328-9115

- B. Concrete grid units, including the following:
  - 1. Grid unit type: Turfstone
    - a. [Material standard: Comply with material standards set forth in [ASTM C 1319].
    - b. Color [and finish]: [Specify color.] [Specify finish].
    - c. Color Pigment Material Standard: Comply with ASTM C 979.
    - d. Size: 16 inches x 24 inches x 3 1/8 inches thick.
- C. Manufactured in a plant where as having passed ASTM requirements in this specification.

2.2 PRODUCT SUBSTITUTIONS

- A. Substitutions: No substitutions permitted.

2.3 BEDDING MATERIALS

Note: If openings are filled with topsoil, use sand bedding. If the openings are filled with open-graded aggregate for additional runoff storage, the same aggregate should be used for the bedding. Edit 2.03 and 2.04 accordingly.

- A. General – Sieved per ASTM C 136.
- B. Bedding Sand

Note: The type of sand used for bedding is often called concrete sand. Sands vary regionally. Contact contractors local to the project and confirm sand(s) successfully used in previous similar applications bedding sand is not used in ditch liner applications, slope protection, riparian stabilization or with boat ramps constructed with concrete grid units.

- 1. Washed, clean, hard, durable crushed gravel or stone, free from shale, clay, friable materials, organic matter, frozen lumps, and other deleterious substances.
- 2. Conforming to the grading requirements in Table 1 below.
- 3. Do not use limestone screenings.

Table 1  
ASTM C 33 Gradation for Bedding Sand

Sieve Size	Percent Passing
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95 to 100
No. 8 (2.36 mm )	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (0.600 mm)	25 to 60
No. 50 (0.300 mm)	10 to 30
No. 100 (0.150 mm)	2 to 10
No. 200 (0.075 mm)	0 to 1

-OR-

- C. Washed, open-graded stone.

Note: Finer gradations such as ASTM No. 89 stone may be used.

1. Conforming to the grading requirements in Table 2 below.

Table 2

ASTM No. 8 Gradation for Bedding and Joint/Opening Filler

Sieve Size	Percent Passing
12.5 mm (1/2 in.)	100
9.5 mm (3/8 in.)	85 to 100
4.75 mm (No. 4)	10 to 30
2.36 mm (No. 8)	0 to 10
1.18 mm (No. 16)	0 to 5

## 2.4 FILL MATERIALS FOR GRID OPENINGS

- A. Topsoil: Conform to ASTM D 5268.

Note: Consult with local turf grass specialists for recommendations on grass seed mixture or sod materials.

1. Grass seed [Sod]: [mixture and source].  
-OR-
2. Open-graded aggregate.
3. Conforming the gradation requirements in Table 2. Do not use gravel.

## 2.5 EDGE RESTRAINTS

- A. Provide edge restraints installed around the perimeter of all concrete grid paving unit areas as follows:
  1. Manufacturer: [Specify manufacturer].
  2. Material: [Plastic] [Concrete] [Aluminum] [Steel] [Precast concrete] [Cut stone].
  3. Material standard: [Specify material standard].

## 2.6 ACCESSORIES

- A. Provide accessory materials as follows:
  1. Geotextile fabric:
    - a. Material Type and Description: [Specify material type and description].
    - b. Material Standard: [Specify material standard.].
    - c. Manufacturer: [Acceptable to concrete grid unit manufacturer] [Specify manufacturer.].

## PART 3 - EXECUTION

### 3.1 ACCEPTABLE INSTALLERS

- A. [Specify acceptable paving subcontractors.].

### 3.2 EXAMINATION

Note: Compaction of the soil subgrade is recommended to a minimum of 95% standard Proctor density per ASTM D 698 for pedestrian and lightly trafficked vehicular areas. Stabilization of the subgrade and/or base material may be necessary with weak or saturated subgrade soils.

Note: Local aggregate base materials typical to those used for highway flexible pavements are recommended, or those conforming to ASTM D 2940. Compaction of aggregate is recommended to not less than 95% Proctor density in accordance with ASTM D 698 is recommended for pedestrian and vehicular areas. 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. The recommended base surface tolerance should be  $\pm 3/8$  in. ( $\pm 10$  mm) over a 10 ft. (3 m) straight edge.

Note: The elevations and surface tolerance of the aggregate base determine the final surface elevations of concrete grids. The installation contractor cannot correct deficiencies in the base surface with additional bedding materials. 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 bedding materials and concrete grids.

- A. Acceptance of site verification conditions:
  - 1. Contractor shall inspect, accept and verify in writing to the grid installation subcontractor that site conditions meet specifications for the following items prior to installation of bedding materials and concrete grid units:
    - a. Verify that drainage and subgrade preparation, compacted density and elevations conform to specified requirements.
    - b. Verify that geotextiles, if applicable, have been placed according to drawing and specifications.
    - c. Verify that base materials, thickness, [compacted density,] surface tolerances and elevations conform to specified requirements.
    - d. Provide written density test results for the soil subgrade, base materials to the Owner, Contractor, and grid installation subcontractor.
  - 2. Do not proceed with installation of bedding materials and concrete grids until [subgrade soil and] base conditions are corrected by the Contractor or designated subcontractor.

### 3.3 PREPARATION

- A. Verify that base is dry, certified by Contractor as meeting material, installation and grade specifications [and geotextile] are ready to support sand, [edge restraints,] grids and imposed loads.
- B. Edge Restraint Preparation:
  - 1. Install edge restraints per the drawings [and manufacturer's recommendations] [at the indicated elevations.].
  - 2. Mount directly to finished base. Do not install on bedding sand.
  - 3. The minimum distance from the outside edge of the base to the spikes shall be equal to the thickness of the base.

### 3.4 INSTALLATION

- A. Spread the sand [No. 8 stone] evenly over the compacted, dense-graded base course and screed uniformly to 1/2 to 1 in. (13 to 25 mm). Place sufficient sand [stone] to stay ahead of the laid grids.
- B. Ensure the grid units are free from foreign materials before installation.
- C. Lay the grid units on the bedding sand in the pattern(s) shown on the drawings. maintain straight joint lines.
- D. Joints between the grids shall not exceed [3/16 in. (5 mm)].
- E. Fill gaps at the edges of the paved area with cut grids or edge units.
- F. Cut grids to be placed along the edge with a double-bladed splitter or masonry saw.
- G. Sweep [top soil][No. 8 aggregate] into the joints and openings until full.
- H. Sweep the grid surface clear prior to compacting.
- I. Compact and seat the grids into the screeded [bedding sand] [No. 8 aggregate] using a low-amplitude, 75-90 Hz plate compactor capable of at least 4,000 lbs. (18 kN) centrifugal compaction force. Use rollers or a rubber or neoprene pad between the compactor and grids to prevent cracking or chipping. Do not compact within 6 ft (2 m) of the unrestrained edges of the grid units.
- J. All work to within 6 ft (2 m) of the laying face must be left fully compacted at the completion of each day.
- K. [Broadcast grass seed at the rate recommended by seed source.][Place sod plugs into openings.]  
[Add topsoil to the surface to cover the seeds.]
- L. Remove excess [topsoil][No. 8 aggregate] on surface when the job is complete.
- M. [Distribute straw covering to protect germinating grass seed [sod]. Water entire area. Do not traffic pavement for [30] days.] if seeded.

### 3.5 FIELD QUALITY CONTROL

- A. After removal of excess top soil/aggregate, check final elevations for conformance to the drawings. Allow 1/8 to 1/4 in. (3 to 6 mm) above specified surface elevations to compensate for minor settlement.
- B. The final surface tolerance from grade elevations shall not deviate more than  $\pm 3/8$  in. (10 mm) over a 10 ft (3 m) straightedge.
- C. The surface elevation of grid units shall be 1/8 to 1/4 in. (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.
- D. Lippage: No greater than 1/8 in. (3 mm) difference in height between adjacent grid units.

3.6 PROTECTION

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

END OF SECTION 321413.19