

Item No. 480S
Concrete Paver Units For Sidewalks
And Streetscape Requirements

480S.1 Description

This item shall govern furnishing and installing interlocking concrete paver units, manufactured for the construction of sidewalks, constructed as herein specified on an approved base or subgrade in conformity to the lines, grades and details indicated on the Drawings, Standard Detail or as established by the Engineer or designated representative.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, the inch-pound units are given preference followed by SI units shown within parentheses.

480S.2 Submittals

The submittal requirements of this specification item may include:

- A. Samples for initial selection from manufacturer color charts showing the full range of colors, textures and patterns for each type of paver unit indicated on the Drawings,
- B. Shop drawings indicating locations of color changes, pattern orientation and cross-section details,
- C. Product data including sieve analysis of sand bedding material and compaction test results on subgrade, subbase and base courses,
- D. Manufacturer Certification that the Interlocking Paver Units meet or exceed all the requirements of ASTM C-936 and this specification item.
- E. Number, manufacturer, model, construction, finish and installation details of streetscape appurtenances of bicycle racks, benches, chairs, trash receptacles and above grade tree planters [for sidewalks, 12 feet (3.66 meters) or wider].

480S.3 Materials

- A. Base Course

Base Course shall be constructed of either a fibrous reinforced concrete (Standard Specification Item No. 407S, "Fibrous Concrete"), Class J Portland cement concrete (Standard Specification Item No. 403S, "Concrete For Structures") or a cement treated material (Standard Specification Item No. 204S, "Portland Cement Treatment for Materials In Place").

B. Concrete Paver Units

Paver units shall be modular concrete pavers conforming to ASTM Designation: C-936 "Solid Concrete Interlocking Paving Units" and the requirements specified in this Item. The paver units shall be made using normal weight aggregates conforming to ASTM C-33.

C. Pigments

Pigments used in concrete paver units shall be synthetic iron oxide and shall be alkali-resistant, light fast, water insoluble, chemically inert and weather resistant.

D. Bedding Sand

Bedding sand shall conform to the requirements of a concrete sand Grade No. 1 as indicated in Table 2, Standard Specification Item No. 403S, "Concrete for Structures" with the exception of the Fineness Modulus and aggregate gradation requirements.

The aggregate gradation shall be in compliance with the following gradation:

Sieve Designation/Size		% Passing By Weight (Mass)
U. S.	S. I.	
3/8"	9.5 mm	100
No. 4	4.75 mm	85-100
No. 100	150 µm	10-30

The bedding sand shall be free from frozen material or injurious amounts of deleterious soluble salts, vegetable matter or other contaminants likely to cause efflorescence or contribute to reduced skid resistance and shall contain no more than 0.5 percent by weight (mass) of clay lumps.

The bedding sand shall be of uniform moisture content from 3 to 7 percent, when spread and shall be protected against rain when stockpiled on site prior to spreading.

E. Grout Mix

When required in conjunction with a bedding layer for the concrete paver units or with paver closure units, the grout mix shall be composed of one part Portland cement, one part masonry cement (or 1/4 part hydrated lime), parts of concrete sand equal to 2-1/2 to 3 times the sum of the volumes of the cement and lime used, and sufficient water to make the mixture plastic

480S.4 Physical Requirements

The general shape of the concrete paver units shall be similar to that indicated on the Drawings. The concrete paver units shall be of the color and laid in the pattern as specified on the Drawings or as approved in writing by the Engineer or designated representative.

All units shall be sound and free of defects that would interfere with the appearance or proper placement of the unit or impair the strength or longevity of the final structure. Any units, which are structurally damaged during the work, shall be immediately removed and replaced.

480S.5 Construction Method

A. Preparation of subgrade, subbase and base layers

The subgrade, subbase or base course shall be shaped to the lines, grades and cross sections as indicated on the Drawings or as directed by the Engineer or designated representative and shall be thoroughly compacted. Any unsuitable material encountered in the subgrade shall be removed and replaced by a suitable material and compacted to a uniform grade. When subgrade stabilization has been specified, the subgrade shall be prepared accordingly.

If the subgrade is undercut by more than 4 inches (100 mm) or the natural ground is below "top of subgrade" by more than 4 inches (100 mm), the necessary backfill shall be made with an approved material and compacted with a mechanical tamper. Hand tamping will not be permitted.

B. Bedding Sand Installation

An uncompacted sand bed base shall be screeded over the compacted base to a minimum thickness of 1 inch (100 mm) but no more than 1 1/2 inches (38 mm). This assumes that after placement and vibration of the paving units the thickness of the compacted sand bed will be approximately 1/2 inch (12.5 mm) lower. Bedding sand shall not be used for leveling the base course.

The spread sand shall be carefully maintained in a loose condition and protected against precompaction both prior to and following screeding. Any precompacted sand or screeded sand left overnight shall be loosened before other units are placed. Sand shall be lightly screeded in a loose condition to the predetermined depth, slightly ahead of placement of the paving units. Under no circumstances shall the sand be screeded more than 1/2 hour in advance of the placement of paving units.

Screeded sand must be fully protected against accidental precompaction including compaction by rain or dew. Any screeded sand, which is precompacted prior to placement of units, shall be removed and brought back to profile in a loose condition.

C. Paver Unit Installation

Concrete paver units shall be placed on the uncompacted screeded sand bed and/or grout bedding in the laying pattern indicated on the Drawings. Concrete paver units shall be bedded in a 1" (25 mm) thick mortar bed or a 1" (25 mm) sand layer placed on top of a 3" (75-mm) minimum Class A Fibrous Concrete pad (see Standard Specification Item 407S, "Fibrous Concrete") or on top of 4" (100-mm) thick layer of Class J Portland Cement Concrete (Standard Specification Item No. 403S, "Concrete For Structures") or cement treated material (see Standard Specification Item No. 204S, "Portland Cement Treatment for Materials In Place").

The Contractor shall exercise particular care to maintain the specified laying pattern throughout the job. Paver units shall be placed to achieve gaps nominally 1/8 inch (3.2 mm) wide between adjacent units to insure that all joints are correctly aligned.

The first row shall abut an edge restraint with a gap of 1/8 inch (3.2 mm) and shall be laid at a suitable angle to the edge restraint to achieve the required visual orientation of paver units in the completed pavement.

The first two rows of concrete paver units adjacent to edge restraints, building walls, openings in the sidewalk layout for meter boxes (see Standard Detail 480S-1), meter vaults (see Standard Detail 480S-2), valve access pipe (see Standard Detail 480S-3), light/traffic poles and light fixtures (see Standard Detail 480S-4), curb and gutter (see Standard Detail 480S-5) external stairs (see Standard Detail 480S-6) and any other projections in the sidewalk shall be set in a 1" (25 mm) thick grout layer. As an alternative to grouting the first two layers of concrete paver units, a Portland cement concrete (Class A, "Concrete for Structures") band, that is a minimum of 6" (150 mm) wide and 4" (25 mm) deep with a # 3 (10M) rebar, may be constructed adjacent to edge restraints, building walls, projections through the sidewalk and other conditions indicated in details 480S-1 through 480S-6.

In each row, all full units shall be placed first. Closure units shall be cut and fitted subsequently. In no case shall a closure unit consist of less than 25 percent of a full unit. Areas with closure units less than 25 percent of a full unit shall be filled solid with mortar. Units may be cut using a mechanical or hydraulic cutter or by power sawing. A grout mix shall be used to fill larger edge spaces.

Any foot or wheelbarrow traffic during the construction shall use boards overlaying paver units to prevent disturbance of units prior to mechanical compaction. No other traffic shall be allowed on the pavement at this stage of construction.

D. Paver Unit Compaction

After placement of the paver units on the uncompacted screeded sand layer, consolidation of the sand bedding and the design levels and profiles of the paver units shall be obtained by not less than two and preferably three passes of a suitable flat plate compactor. Any grouted concrete paver units that are damaged or displaced during the compaction process shall be replaced and regouted.

The compactor shall be a high frequency, low-amplitude mechanical flat plate vibrator with a plate area sufficient to cover a minimum of 12 paver units. The compactor shall be capable of producing 3,500 to 5,000 pounds (15.5 to 22.2 kilo Newton) centrifugal compaction force. The flat plate compactor shall be equivalent to Model P-22 manufactured by Koehring, Master Division of Dayton, Ohio.

Compaction shall proceed as closely as possible following placement and shall be completed prior to the acceptance of any construction traffic.

Compaction shall not be attempted, however, within 3 feet (.9 meter) of the laying face of the paver units. Compaction shall continue until lipping has been eliminated between adjoining units. Joints shall be filled and compacted again as herein described.

All work extending to within 3 feet (.9 meter) of the laying face must be left fully compacted at the completion of each day's placement. Compaction of the remaining surface will be completed after sufficient units are laid in place.

As soon as practical after compaction and in any case prior to the termination of work on that day and acceptance of construction traffic, the bedding sand for joint-filling shall be spread over the pavement and allowed to dry. When dry, the filling sand shall be swept to fill the joints. At least one pass of the plate vibrator will be used to achieve compaction of the joint filling sand.

As soon as possible after filling the joints, light construction traffic should be encouraged to use the pavement to assist in the development of the paver unit lockup. Such traffic should traverse the greatest possible area of the pavement. After traffic has been allowed on the street, joints shall be refilled with dry sand periodically until no additional sand will be accepted in the joints.

480S.6 Streetscape Location Requirements

A. Benches

Benches shall be placed either perpendicular to the curb with the center of the bench on line with trees and light poles and facing toward the building entry, or parallel to the building and within 6" (150 mm) of the building wall, facing out to the street.

Bench siting shall be in conformance with Standard Detail No. 432S-9C in 12' (3.6 M) or wider sidewalks and Standard Detail No. 432S-9D in sidewalks of width between 12" (3.6 M) and 18' (5.4 M).

B. Bike Racks

Bike racks are to be placed perpendicular to the curb with the centerline of the rack on line with trees and light poles.

Bike rack siting shall be in conformance with Standard Detail No. 710S-6A in 12' (3.6 M) or wider sidewalks and Standard Detail No. 710S-6B in sidewalks of width between 12" (3.6 M) and 18' (5.4 M).

C. Trash Receptacles

Trash receptacles shall either be placed along the curb, with the center line of the receptacle on line with the trees and light poles, or shall be located at the building entry in alignment with the structural bay system of the building. If located at the entry there shall be no more than 1 foot (300 mm) clearance between the receptacle and the building wall.

Trash receptacle siting adjacent to curb ramps within an intersection shall be in conformance with Standard Detail No. 432S-8C in 12' (3.6 M) or wider sidewalks.

480S.7 Streetscape Furniture Installation Requirements

Bicycle racks, benches, chairs or trash receptacles shall only be installed in sidewalks, that are 12 feet (3.66 meters) or wider. When installation is indicated on the Drawings or directed by the Engineer or designated representative, these items shall be permanently installed as indicated in Standard Detail Nos 710S-3, 432S-9A and 432S-8A.

Above grade tree wells shall be installed in conformance with Standard Detail 432S-7E, while above grade tree planters shall be installed in conformance with Standard Detail Nos. 432S-7D and 432S-7G.

480S.8 Pedestrian Railing

When a pedestrian railing installation is required along sidewalks for pedestrian protection as indicated on the Drawings or directed by the Engineer or designated representative, this type of pedestrian railing shall be permanently installed in conformance with one of the following designated Standard Details: 707S-1, 707S-2, 707S-3 or 707S-4.

When a pedestrian railing installation is required along portions of sidewalks identified as 'ramps' for ADA accessibility purposes as indicated on the Drawings or directed by the Engineer or designated representative, this type of pedestrian railing shall be permanently installed in conformance with one of the following designated Standard Details: 707S-2, 707S-3 or 707S-4

480S.9 Measurement

Accepted work performed as prescribed by this item will be measured by the square foot (square meter: 1 square meter equals 10.76 square feet) of surface area of "Concrete Paver Units".

Accepted work performed as prescribed by "Sidewalk Ramps" will be measured per each for the type of ramp indicated on the Drawings.

Accepted work performed as prescribed by "Streetscape Appurtenances" will be measured per each for the type of appurtenance indicated on the Drawings.

Accepted work performed as prescribed by "Pedestrian Railing" will be measured per lineal foot of the type of railing indicated on the Drawings.

480S.10 Payment

The work performed as prescribed by this item and measured as provided under section 480S.9, "Measurement", for "Paver Sidewalk" and/or "Sidewalks Reconstruction" will be paid for at the unit bid price per square foot; per each for Curb Ramps with Pavers and "Streetscape Appurtenances" or per lineal foot for "Pedestrian Railing".

The unit bid price for new sidewalk shall include full compensation for excavating and/or removal and/or relocating obstructions, vegetating adjacent areas disturbed by sidewalk construction, preparing the subgrade; for furnishing and placing all materials including cushion material, all reinforcement, joints, expansion joint materials, and for any other materials, manipulations, labor, tools, equipment, finishing, curing and incidentals necessary to complete the work.

The unit bid price for sidewalk reconstruction shall include full compensation for excavating and/or removal of existing sidewalk and other obstructions, relocating obstructions, replacing PVC drain pipe, re-vegetating adjacent areas disturbed by sidewalk construction, preparing the subgrade; for furnishing and placing all materials including cushion material, all reinforcement, joints, expansion joint materials, and for any other materials, manipulations, labor, tools, equipment, finishing, curing and incidentals necessary to complete the work.

The unit bid price for ramps shall include full compensation for preparing the subgrade when not included as a separate item; for furnishing and placing all materials, manipulation, labor, tools, equipment and incidentals necessary to complete the work. All necessary excavation, filling and grading of the slopes adjacent to the completed concrete paver units shall be included in the unit price bid for this specification item, unless included as a separate pay item in the Contract bid form.

The unit bid price for streetscape appurtenances shall include full compensation for the individual item (i.e. bench, chair, bicycle rack, trash receptacle, street light or above grade tree planter), as well as the removal of existing paver sidewalk, preparation of footings, furnishing and placing all materials, manipulation and finishing, labor, tools, equipment and incidentals necessary to complete the work.

The unit bid price for pedestrian railing shall include full compensation for the complete installation of the specific pedestrian railing including but not limited to preparation of footings or curb, furnishing and placing all materials, manipulation and finishing, labor, tools, equipment and incidentals necessary to complete the work.

Payment will be made under:

New Sidewalk

Pay Item 480S-NS:	Concrete Paver Units for Sidewalks, _____mm.	Per Square Foot.
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Sidewalk Reconstruction

Pay Item 480S-RS:	Reconstruct Concrete Paver Sidewalk, including removal of existing sidewalk	Per Square Foot.
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Ramps

Pay Item 480S-RP-1:	Curb Ramp with Pavers (Type I)	Per Each.
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Pay Item 480S-RP-1A:	Curb Ramp with Pavers (Type IA)	Per Each.
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Pay Item 480S-RP-1B:	Curb Ramp with Pavers (Type IB)	Per Each.
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Streetscape Appurtenances

Pay Item 480S-SAP-1:	Streetscape Bench (_____ inches in length)	Per Each.
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Pay Item 480S-SAP-2:	Streetscape Chair	Per Each.
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Pay Item 480S-SAP-3:	Streetscape Bicycle Rack	Per Each.
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Pay Item 480S-SAP-4:	Streetscape Trash Receptacle	Per Each.
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Pay Item 480S-SAP-5:	Streetscape Street Light	Per Each.
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Pay Item 480S-SAP-7A:	Streetscape Tree Well for Clay Soils	Per Each.
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Pay Item 480S-SAP-7B:	Streetscape Tree Well for Granular Soils	Per Each.
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Pay Item 480S-SAP-7D:	Streetscape Above Grade Tree Planters with Bench	Per Each.
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Pay Item 480S-SAP-7E:	Streetscape Above Grade Tree Well with Seat	Per Each.
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Pay Item 480S-SAP-7F:	Streetscape Tree Well without Grate	Per Each.
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Pay Item 480S-SAP-7G:	Streetscape Above Grade Galvanized Steel Tree Planters	Per Each.
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Pedestrian Railing

Pay Item 480S-PRP-1:	Pedestrian Railing (Standard 707S-1)	Per LF.
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Pay Item 480S-PRP-2:	Pedestrian ADA Railing – Option 1 (Standard 707S-2)	Per LF.
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Pay Item 480S-PRP-3:	Pedestrian ADA Railing – Option 2 (Standard 707S-3)	Per LF.
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Pay Item 480S-PRP-4:	Pedestrian ADA Railing – Option 3 (Standard 707S-4)	Per LF.
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End

SPECIFIC CROSS REFERENCE MATERIALS

Specification 432S, "P. C. Concrete Sidewalks"

City of Austin Standard Specifications

Designation

Description

Item No. 204S	Portland Cement Treatment for Materials in Place
Item No. 403S	Concrete for Structures
Item No. 407S	Fibrous Concrete

City of Austin Standard Details

Designation

Description

432S-7D	Above Grade Tree Planters
432S-7E	Above Grade Tree Well with Bench
432S-7G	Above Grade Galvanized Steel Tree Planters
432S-8A	Trash Receptacle Installation in Concrete Paver Sidewalk
432A-8C	Furnishing Location in 12' (3.6 m) or greater Trash Receptacle Siting
432S-9A	Bench Chair Installation in Concrete Paver Sidewalks
432S-9C	Furnishing Location in 12' (3.6 m) or greater Sidewalks-Bench Siting
432S-9D	Furnishing Location in Greater than 12' (3.6 m) or Less than 18' (5.4 m) Sidewalks-Bench Siting
480S-1	Sidewalk Paver Installation-Hatch Opening for Meter Box
480S-2	Sidewalk Paver Installation-Water Meter Vault
480S-3	Sidewalk Paver Installation-Alternate Customer Cut-Off
480S-4	Sidewalk Paver Installation-Light Pole/Fixture & Traffic Signal Pole
480S-5	Sidewalk Paver Installation-Pavers Along Back of Curb
480S-6	Sidewalk Paver Installation-Exterior Stairs and Steps
707S-1	Pedestrian Railing
707S-2	Pedestrian ADA Railing – Option 1
707S-3	Pedestrian ADA Railing – Option 2
707S-4	Pedestrian ADA Railing – Option 3
710S-3	Bicycle Rack Installation in Concrete Paver Sidewalk (Alternate 1)
710S-6A	Furnishing Location in 12' (3.6 m) or greater Sidewalks-Bicycle Rack Siting
710S-6B	Furnishing Location in Greater than 12' (3.6 m) or Less than 18' (5.4 m) Sidewalks-Bicycle Rack Siting

American Disabilities Act, Federal Register; Volume 56, No. 144; July 26, 1991

ADA Accessibility Guidelines For Building And Facilities

<u>Designation</u>	<u>Description</u>
Section 4.2	Detectable Warnings on Walking Surfaces
Section A4.29.2	Detectable Warnings on Walking Surfaces

Architectural Barriers; Texas Civil Statutes, Article 9102; June 14, 1995

Texas Accessibility Standards (TAS)

<u>Designation</u>	<u>Description</u>
Section 4.29	Detectable Warnings on Walking Surfaces
Section A4.29.2	Detectable Warnings on Walking Surfaces

American Society for Testing and Materials, ASTM

<u>Designation</u>	<u>Description</u>
ASTM C-33	Specification for Concrete Aggregates
ASTM C-936	Specifications for Solid Concrete Interlocking Paving Units

RELATED CROSS REFERENCE MATERIALS

City of Austin Standard Contract Documents

<u>Designation</u>	<u>Description</u>
00700	General Conditions
01500	Temporary Facilities
01550	Public Safety and Convenience

City of Austin Utilities Criteria Manual

<u>Designation</u>	<u>Description</u>
Section 5.2.3	Utility Adjustments For Roadway Construction Projects

City of Austin Standard Specifications

<u>Designation</u>	<u>Description</u>
Item No. 102S	Clearing and Grubbing
Item No. 104S	Removing Portland Cement Concrete
Item No. 110S	Street Excavation
Item No. 111S	Excavation
Item No. 132S	Embankment

Item No. 201S	Subgrade Preparation
Item No. 203S	Lime Treatment for Materials In Place
Item No. 480S	Concrete Paving Unit
Item No. 485S	Concrete Paving Units for Sidewalk Ramps
Item No. 604S	Seeding for Erosion Control

City of Austin Standard Details

<u>Designation</u>	<u>Description</u>
432S-2A	Detectable Warning-Paver
432S-3	Type I Curb Ramps-Full Intersection
432S-3A	Type I Curb Ramps-T Intersection
432S-3B	Type IA/IB Curb Ramps-Full Intersection
432S-3C	Type IA/IB Curb Ramps-T Intersection
432S-3D	Combined Curb Ramps-Full Intersection
432S-3E	Combined Curb Ramps-T Intersection
432S-3F	Combined Sidewalk Curb Ramp with Pavers
432S-3G	Combined Sidewalk Curb Ramp with Pavers within Limited ROW
432S-3H	Type I Curb Ramps within PC/PT of Curb and Gutter
432S-5	Type I Sidewalk Curb Ramp
432S-5A	Type IA Sidewalk Curb Ramp
432S-7C	Tree Well for New Trees Planted Within Concrete Sidewalk 3.6 m (12') or Greater
432S-7F	Tree Well Without Grate