



Iowa Department of Transportation

SPECIAL PROVISIONS FOR PORTLAND CEMENT CONCRETE PAVERS

Linn County
NHSX-100-1(66)--3H-57
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Effective Date
March 18, 2014

THE STANDARD SPECIFICATIONS, SERIES 2012, ARE AMENDED BY THE FOLLOWING ADDITIONS AND MODIFICATIONS. THESE ARE SPECIAL PROVISIONS AND SHALL PREVAIL OVER PUBLISHED STANDARD SPECIFICATIONS.

120132.01 DESCRIPTION.

- A. This part of the Specifications includes all labor, materials, equipment, and supervision required to furnish and install Portland Cement Concrete (PCC) Pavers.
- B. This section includes the specifications for Portland Cement Concrete (PCC) Pavers, HMA setting bed, adhesive, paver joint filler sand, concrete subbase preparation, and paver and joint filler installation.

120132.02 MATERIALS.

A. PCC Pavers.

- 1. Acceptable PCC Paver suppliers who can, or do, produce a PCC Paver that matches the style, size and colors of the PCC Pavers specified.
- 2. Compressive Strength: Greater than 8000 psi. ASTM C 140.
- 3. Water Absorption: Maximum of 5% ASTM 936.
- 4. Freeze-thaw and De-icing Salt Durability testing per ASTM C 1645.
- 5. Comply with ADA regulations.
- 6. Abrasion resistance: ASTM C 418.
- 7. Size and Color: 4 inches by 8 inches (nominal) by 3 1/8 inches thick; red-brown.

8. Pattern: As indicated in the plans.

B. Asphaltic Setting Bed for Pavers.

Asphaltic setting bed shall be in accordance with Section 2303 of the Standard Specifications, except for the following:

1. Grading Requirements for Setting Bed Aggregate.

Sieve Size	Percent Passing
3/8 inch	100
No. 4	80 to 100
No. 8	60 to 85
No. 16	40 to 70
No. 30	25 to 55
No. 50	15 to 35
No. 100	8 to 20
No. 200	6 to 14

2. Other Requirements.

- Ndesign = 50 gyrations
- Target Air Voids = 0.50-2.0%
- Type A aggregate per Section 4127
- Crushed Content Minimum: 45%
- Film Thickness: ≥ 8.0
- Fine Aggregate Angularity: 40 minimum
- Sand Equivalence: 40 minimum
- Binder: PG 64-22

C. Neoprene Asphalt Adhesive for Pavers.

Neoprene asphalt adhesive shall conform to the following:

Mastic (Asphalt Adhesive).

- Solids (base): 75 + 1%
- Pounds/Gallon: 8 – 8.5 pounds
- Solvent: Varsol (over 100°F Flash)

Base (2% Neoprene, 10% Fiber, 88% Asphalt).

- Melting Point: ASTM D-36, 200°F Minimum
- Penetration: 77° F, 100 gram load, 5 second (0.1mm), 23-27
- Ductility: ASTM D 113-07 @ 25°C, 5 cms/per minute, 125 cm, minimum

D. Joint Filler Sand.

1. Provide joint filler sand that is washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.
2. Grading Requirements for Joint Filler Sand – ASTM C 144

Sieve Size	Natural Sand Percent Passing	Manufactured Sand Percent Passing
No. 4	100	100
No. 8	95 to 100	95 to 100
No. 16	70 to 100	70 to 100
No. 30	40 to 75	40 to 100
No. 50	10 to 35	20 to 40
No. 100	2 to 15	10 to 25
No. 200	0	0 to 10

120132.03 CONSTRUCTION.

A. Submittals.

1. Paver manufacturer's material test data certifying pavers comply with specification.
2. Four paver samples representing actual size, shape, and color range.
3. Setting bed and joint filler sand gradation reports.
4. Supplier's formulation for Neoprene-modified asphalt adhesive.

B. Site Disturbances.

1. Take precautions to insure equipment and vehicles do not disturb or damage existing site grading, walks, drives, utilities, plants, etc.
2. Repair and/or return to original condition any damage caused by Contractor's negligence at no cost to Contracting Authority.
3. Provide temporary barricades and warning lights as required for protection of project work and public safety.

C. Delivery, Storage, and Handling.

1. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers packaging with identification labels intact.
 - a. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.
 - b. Deliver concrete pavers to the site in steel banded, plastic banded or plastic wrapped packaging capable of transfer by fork lift or clamp lift.
 - c. Unload pavers at job site in such a manner that no damage occurs to the product.
2. Storage and Protection: Store materials protected such that they are kept free from mud, dirt, and other foreign materials. Cover joint sand with waterproof covering if needed to prevent exposure to rainfall or removal by wind. Secure the covering in place.

D. Quality Assurance.

1. **Quality Control Plan.**
 - a. The installer and manufacturer shall establish, provide and maintain a quality control plan. The quality control plan shall provide reasonable assurance that the materials and completed construction submitted for acceptance will conform to the contract requirements. Although guidelines are established and certain requirements are

specified, they are a minimum and the installer and manufacturer shall assume full responsibility for meeting all requirements.

- b. The installer and manufacturer shall agree upon a method for measuring the clusters at the factory and in the field. That method shall be submitted in writing to the Contracting Authority for approval.
- c. The Quality Control Plan shall contain at a minimum, but not limited to, the following elements:
 - 1) The manufacturer's quality control procedures.
 - 2) The manufacturer's production records showing at a minimum the date of manufacture, a mix design designation, mold number, mold cycles, and sequential pallet numbers. Copies of such records shall be made available to the Contracting Authority upon request.
 - 3) A description of the anticipated growth (due to mold wear) in the cluster size and a plan for managing the growth so as to not interfere with placement by paving machine(s), if mechanically installed.
 - 4) The installer's quality control procedures, including but not limited to, dimensional control methods, paving machine(s) head adjustment, typical daily work schedule to insure that all pavers placed on the bedding course on any given day are adjusted as required and vibrated, and installation of void filler completed at the end of that work day. (Exception: The installation of the void filler may not be installed for the first and second day due to start-up procedures.)

2. Sampling and Testing

- a. The manufacturer shall employ an independent testing company, qualified to undertake tests in accordance with the applicable standards specified herein. Test results shall be provided to the installer and the Contracting Authority, upon request.
- b. Pavers shall be tested for density and dimensional variation, compressive strength (ASTM C140), density and absorption (ASTM C140) and abrasion resistance (ASTM C418).
 - 1) The initial testing frequency shall be one set of tests for each 100,000 full-sized pavers delivered to the site or at any time a change in the manufacturing process, mix design, cement, aggregate or other material occurs.
 - 2) The following number of full-sized pavers shall be randomly sampled for each test: five for dimensional variation; three for density and absorption; three for compressive strength; and three for abrasion resistance.
 - 3) If all pavers tested pass all requirements for a sequence of 400,000 pavers then the testing frequency may be relaxed to one set of tests for each 500,000 full-sized pavers. If any pavers fail any of the required tests then the testing frequency shall revert to the initial testing frequency.
 - 4) When any of the individual test results fail to meet the specified requirements, the cube of pavers represented by that test sample shall be rejected. The manufacturer shall provide additional testing of paver samples taken from both before and after the rejected test sample to determine the sequence of the paver production run that should be rejected. In addition, the testing frequency shall revert to the initial testing frequency specified in Item B.1 for the balance of the project.
 - 5) Additional testing, as described above, shall be carried out at no additional expense to the Contracting Authority. The sequence of pavers found to be defective shall, if they have been delivered to the site, be removed from the site promptly at no expense to the Contracting Authority or installer.
 - 6) Pavers shall be sound and free from defects that would interfere with the proper placing of the pavers or impair the strength or performance of the construction.

3. Method Statement

The installer and manufacturer shall each prepare a Method Statement describing the overall plan to complete the work. This plan shall include at a minimum:

- a. The quality control plan.

- b. A description of the anticipated mold life, rate and effect of mold wear on pavers produced, individual mold runs, and a mold rotation plan.
- c. Clear diagrams of the site showing the proposed starting point of the installation and the proposed direction of installation.
- d. A method of measuring the clusters at the factory and in the field.
- e. A description of the anticipated growth in cluster size due to mold wear and a plan for dealing with that growth or other dimensional variances.
- f. A description of the personnel and equipment to be employed for each portion of the work including manufacture, installation and quality control.
- g. The manufacturer's proposed daily production rate and mold life for this project and supply data demonstrating experience on similar past projects. Installer shall state the proposed daily installation rate.

4. Qualifications

Every manufacturer and installer shall demonstrate that they have supplied and/or installed pavers for projects of a similar nature, with regard to installation and production capacity of at least 300,000 square feet.

a. Paver Manufacturer's Qualifications.

- 1) The manufacturer shall demonstrate a minimum of 5 years successful experience in the manufacture of interlocking concrete block pavers.
- 2) The manufacturer shall have sufficient production capacity and established quality control procedures to produce, transport, and deliver the required number of pavers with the quality specified, without causing a delay to the work.
- 3) The manufacturer shall have suitably experienced personnel and a management capability sufficient to produce the number of quality pavers as depicted on the contract plans and as specified herein.

b. Paver Installer's Qualifications.

- 1) Installer shall provide installation history, including references in writing with contact information, demonstrating to the satisfaction of the Contracting Authority their ability to perform the paver installation and related work indicated in the contract documents.
- 2) The installer shall have suitably experienced personnel and a management capability sufficient to execute the work indicated in the contract documents.
- 3) The installer's foreman shall demonstrate, including references, a minimum of 5 years experience in the installation of unit paver systems similar in size and nature to this project.

E. Environmental Requirements.

- 1. Do not install setting bed or pavers during heavy rain or snowfall.
- 2. Do not install setting bed and pavers over frozen base materials.
- 3. Do not install frozen setting bed.
- 4. Do not install concrete pavers on frozen setting bed.

F. Preparation of Concrete Subbase.

- 1. Inspect PCC subslab or bridge deck to insure surface is clean and built in conformance with details.
- 2. Verify elevation difference between PCC subslab or bridge deck and adjacent finished PCC raised sidewalk and curb surfaces to confirm concrete pavers can be installed flush with bordering PCC sidewalk pavement and curb tops.

G. Placing Bituminous Setting Bed.

1. Prior to bituminous setting bed installation, install protective covering over adjacent PCC sidewalk, curbs, and roadway pavement to avoid pavement staining and other surface damage.
2. Install the setting bed over the PCC sub-slab surface, place 3/4 inch deep control bars directly over the base.
 - a. If grade must be adjusted, set wood chocks under depth control bars to proper grade.
 - b. Set two bars parallel to each other approximately 11 feet apart to serve as guides for the striking board, which shall be a straight 2 inch by 6 inch board 12 feet long with no camber, twist or warp.
 - c. Depth control bars must be carefully set to bring pavers to proper grade when laid.
3. Place some bituminous bed between parallel depth control bars. Pull the striking board over bars several times.
 - a. After each passage, low porous spots must be showered with fresh bituminous material to produce a smooth, firm, and even setting bed.
 - b. As soon as this initial panel is completed, advance the first depth control bar to the next position, to prepare for striking the next panel.
 - c. Carefully fill up any depressions that remain after removing the depth control bars and wood chocks.
4. The setting bed shall be rolled with a 600 pound, walk-behind, power roller to a nominal depth of 3/4 inches while still hot; the thickness shall be adjusted so that when the concrete pavers are placed, the top surface of the pavers will be at the required finished grade.
5. After the setting bed has cooled, a coating of neoprene asphalt adhesive shall be applied by mopping or squeegeeing or troweling over the top surface of the bituminous setting bed so as to provide a bond under the pavers; if the adhesive is troweled, the trowel shall have serrations not to exceed 1/16 inch.
6. Limitations: placement of the setting bed and application of the modified asphalt adhesive will comply with Article 2303.03 of the Standard Specifications except as indicated in these Special Provisions.

H. Installation of PCC Pavers.

1. After the modified asphalt adhesive is applied, carefully place the pavers by hand in straight courses with hand tight joints and uniform top surface.
2. Good alignment must be kept and the pattern shall be that shown on the plans.
3. Paver Joint lines shall not deviate from string lines more than $\pm 1/2$ inch over 50 feet.
4. Joints between pavers shall be between 1/16 inch and 3/16 inch wide, and no more than 5% of the joints shall exceed 1/4 inch wide to achieve straight bond lines.
5. Fill gaps at the edges of the paved area with cut pavers or edge units.
6. For pavers to be placed along edges, cut with a double blade paver splitter or masonry saw.
7. Adjust paver pattern at pavement edges such that cutting of edge pavers is minimized.
8. Cut paver edges are to abut pavers only; a paver spacer bar must abut the cut edge of a paver.

9. Do not place cut paver edges against concrete.
10. Keep skid steer and forklift equipment off newly laid pavers that have not received initial compaction and joint sand.

I. Joint Treatment.

1. Use a low-amplitude plate compactor capable of at least minimum of 4,000 lbf at a frequency of 75 to 100 Hz to vibrate the pavers into the setting bed. Remove any cracked or damaged pavers and replace with new units.
2. Simultaneously spread, sweep and compact dry joint sand into joints continuously until full. This will require at least 4 to 6 passes with a plate compactor. Do not compact within 6 feet of unrestrained edges of paving units.
3. All work within 6 feet of the laying face must shall be left fully compacted with sand-filled joints at the end of each day or compacted upon acceptance of the work. Cover the laying face or any incomplete areas with plastic sheets overnight.
4. Remove excess sand from surface when installation is complete.
5. Allow excess joint sand to remain on surface to protect pavers from damage from other trades. Remove excess sand when directed by the Engineer.
6. Surface shall be broom clean after removal of excess joint sand.
7. Final joints will be from 0 inches to maximum of 1/4 inch for concrete pavers.

J. Field Quality Control.

1. The final surface tolerance from grade elevations shall not deviate more than $\pm 3/8$ inch under a 10 foot straightedge.
2. Check final surface elevations for conformance to contract documents.
3. The surface elevation of pavers shall be 1/8 inch to 1/4 inch above adjacent drainage inlets, concrete collars, curbs, sidewalks, or channels.
4. Lippage: No greater than 1/8 inch difference in height between adjacent pavers.

K. Cleaning.

1. Clean concrete pavers in accordance with the manufacturer's written recommendations.
2. Sweep excess sand from paved surfaces and remove from site.
3. Remove all excess materials and debris from site.
4. Thoroughly remove any staining on adjacent sidewalk, curb, or roadway pavement that was caused by any of the paving operations covered in these Special Provisions. Clean the work area to the satisfaction of the Engineer.

L. Protection.

After work in this section is complete, protect work from damage due to subsequent construction activity on the site.

120132.04 METHOD OF MEASUREMENT.

The Engineer will measure the SQUARE FOOT surface area of the installed Portland Cement Concrete (PCC) Pavers.

120132.05 BASIS OF PAYMENT.

- A. Payment for Portland Cement Concrete (PCC) Pavers includes all labor, materials, equipment, and supervision required to furnish and install concrete pavers.
- B. Unit Price for Portland Cement Concrete (PCC) Pavers shall include subslab preparation, material and installation of pavers, HMA setting bed, adhesive, and joint filler.