

Specifications for the Manhattan System

1. Scope

This specification covers basis of purchase, production properties, and installation of high strength interlocking concrete or clay pavers. The contractor must have previous experience based on similar size and circumstance for a minimum of five years.

2. Basis of Purchase

- 2.1 The specifier shall specify the color and size of interlocking concrete or clay pavers desired.
- 2.2 Specifier shall determine use of pavers as to whether they will be used in pedestrian or vehicular areas, then specify thickness required*. Interlocking concrete or clay paving stones are manufactured in various thicknesses.
- 2.3 Interlocking concrete pavers shall have minimum compression strength of 7,500 psi with no individual stone testing less than 7,200 psi.
- 2.4 Clay Pavers shall have a minimum compressive rate of 12,500 psi.
- 2.5 Interlocking concrete pavers or clay pavers shall have an absorption rate of less than 5% when tested in accordance with ASTM C140 with no individual stone testing more than 7%.

*Recommended pattern for vehicular traffic in Herringbone.

3. Products

3.1 Concrete Interlocking Pavers

- 3.1.1 All interlocking concrete pavers shall be in accordance with specifications, listed herein and as shown on plans. This product shall be supplied by LPS Pavement Company, 67 Stonehill Road Oswego, Illinois, Phone: 630/551-2100; outside of Illinois: 800/232-1770.
- 3.1.2 All interlocking concrete pavers shall conform to ASTM C936 specifications.
Materials used to manufacture interlocking concrete pavers shall conform to the following:
 - 3.1.3A Cement-ASTM C150 Portland Cement, Type 1
 - 3.1.3B Aggregates-ASTM C33 (washed, graded sand and natural aggregates, no expanded shale or lightweight aggregates).
 - 3.1.3C Admixtures should be added to mix to reduce efflorescence of pavers.
 - 3.1.3D Coloring agent should be iron oxide synthetic pigment.
- 3.1.4 Proven field performance-all pavers submitted for approval must have been used on a job of similar environment, temperature range, and traffic volume, as is contemplated for this project. It is necessary to submit documentation and minimum time requirements.
- 3.1.5 Visual inspection-all units shall be sound and free of defects. Surface of pavers will be a fine, pleasing texture and will be the same as samples submitted. Minor cracks incidental to the usual methods of manufacture, or minor chipping resulting from customary methods of handling in shipment, delivery and installation, shall not be deemed grounds for rejection.

3.2 Clay Interlocking Pavers

- 3.2.1 All clay pavers shall be in accordance with specifications listed herein and as shown on plans. This product shall be supplied by LPS Pavement Company, 67 Stonehill Road Oswego, Illinois, Phone: 630/551-2100; outside of Illinois: 800/232-1770.
- 3.2.2 All clay pavers shall conform to ASTM C902 – Pedestrian/Light Traffic or ASTM C1272 – Heavy Vehicular Traffic.

- 3.2.3 Proven field performance-all pavers submitted for approval must have been used on a job of similar environment, temperature range, and traffic volume, as is contemplated for this project. It is necessary to submit documentation and minimum time requirements.
- 3.2.4 Visual inspection-all units shall be sound and free of defects. Surface of pavers will be a fine, pleasing texture and will be the same as samples submitted. Minor cracks incidental to the usual methods of manufacture, or minor chipping resulting from customary methods of handling in shipment, delivery and installation, shall not be deemed grounds for rejection.

3.3 Bituminous Setting Bed

3.3.1 Bituminous Setting Bed for interlocking concrete and clay pavers shall be made from the following materials:

3.3.1A Asphalt cement to be used on the bituminous setting bed shall conform to ASTM Designation D-3381 the viscosity grade A.C. 10 or A.C. 20.

3.3.1B The fine aggregate to be used in the bituminous setting bed shall be clean, hard sand with durable particles and free from adherent coatings, lumps of clay, alkali salts and organic matter. It shall be uniformly grades from "course" to "fine" and all passing the No. 4 sieve and meet the gradation requirements when tested in accordance with the standard of test for sieve or screen analysis of fine and course aggregates ASTM Designation C-136-81.

3.3.1C The dried fine aggregate shall be combined with hot asphalt cement, and the mix shall be heated to approximately 300 degrees F at an asphalt plant. The approximate proportion of materials shall be seven (7) percent asphalt cement and ninety-three (93) percent fine sand. Each ton shall be apportioned by weight in the approximate ratio of 145 pounds asphalt to 1,855 pounds of sand. The contractor shall determine the exact proportions to produce the best possible mixture for construction of the bituminous setting bed to meet construction requirements.

3.3.2 Neoprene-Modified Asphalt Adhesive Under Interlocking Concrete and Clay Pavers:
Mastic (asphalt adhesive):

- Solids (base).....75+1%
- Pounds/Gallons..... 8-8.5 pounds
- Solvent..... Varsol (over 100 F. Flash)

BASE (2% Neoprene, 10% fibers, 88% Asphalt):

- Melting Point – ASTM D-36..... 200 F.Min.
- Penetration.77 F. 100 Gram Load five Second (.1mm)..... 23-27
- Ductility-ASTM D-113-44 at 25 C. 5cm/per minute..... 125cm Min.

3.3.3 Joint filler for interlocking concrete or clay pavers:

3.3.3A Sand and SandLOCK joint sand stabilizer should be used for clay pavers.

3.3.3B Clean sand should be used for interlocking concrete pavers.

4. Installation

4.1 Placing bituminous setting bed for interlocking concrete and clay pavers.

4.1A To install the setting bed over the base surface prepared by others, place ½" deep control bars directly over the base. Grade must be adjusted by placing plastic shims under depth control bars to proper grade. Set two bars parallel to each other approximately nine foot six inches (9'-6") apart to serve as guides for striking board (10'x2"x4"). The depth control bars must be set carefully to bring the pavers, when laid, to proper grade.

4.1B Place some bituminous bed between the parallel depth control bars. Pull this bed with the striking board over these bars several times. After each passage, low porous spots must be showered with fresh bituminous material to produce a smooth, firm and even setting bed. As soon as this initial panel is completed, advance the first bar to the next position, in readiness for striking the next panel.

Carefully fill up any depressions that remain after removing the depth control bar and plastic shims while asphalt is still hot and before compaction.

- 4.1C The setting bed shall be rolled with a power roller to a nominal depth of $\frac{3}{4}$ " while still hot. The thickness shall be adjusted so that when the interlocking concrete or clay pavers are placed, the top surface of the pavers will be at the required finished grade, approximately $\frac{3}{16}$ " above the adjacent surface.

Note: Do not roll the setting bed when installing concrete slabs over 12" square.

4.2 Installation of Pavers

- 4.2A After the neoprene modified asphalt adhesive is applied, carefully place the pavers by hand in straight courses with hand tight joints and uniform top surface. Good alignment must be kept, and pattern shall be that shown on the plans.

Note: Neoprene-modified asphalt adhesive shall not be used when installing concrete slabs over a non-rolled bituminous setting bed.

4.3 Joint Treatment

- 4.3A Hand tight joints (shall read from 0" to maximum of $\frac{1}{4}$ " for interlocking concrete and clay pavers. Sweep a dry mixture of sand into interlocking concrete or clay paver joints. Vehicular areas installed with clay pavers shall have SandLOCK joint sand stabilizer mixed in the sand before it is swept into the paver joints. The SandLOCK and sand must then be wet down to properly activate the SandLOCK.

Other Conditions:

- 1.1 Base by other: A minimum of four (4) inch deep concrete slab is the preferred base course. Base must be designed and constructed in accordance with state and local road specifications. To aid drainage, construct French drains in slab by placing 2" diameter sleeves at low points of slab while it is being poured. (Sleeves should be filled with pea gravel).
- 1.2 Vehicular Traffic: If there is to be vehicular traffic over the interlocking concrete or clay pavers, prime the concrete slab with emulsified asphalt (RS-1 or CRS-1) prior to the installation of the bituminous setting bed.
- 1.3 Curbs (constructed by others): Curbs may be required to retain pavers. Either concrete, aluminum angle, or other suitable materials should be used.
- 1.4 Protection Course (installed by others): Over all types of roofing, place an inorganic asphalt-impregnated protection board ($\frac{1}{4}$ " thick) when area is used for promenade traffic. Note: Protection board shall be adhered to the waterproofing membrane in vehicular applications so it does not become loose or shift under traffic.
- 1.5 Roof Drains (constructed by others): Use drains that have weep holes at the roofing level (dual-level drains).
- 1.6 Slope (constructed by others): Desired slope on roofs or on grade is a minimum of two and one half inches (2.5") in ten feet.
- 1.7 Landscaping and tree planting (installed by others): This should be performed prior to installation of pavers.