

TECHNICAL SPECIFICATIONS

Application Guide for Cobble Systems Concrete Pavers for Street and Heavy Vehicular Traffic (Pervious Applications).

Product Description Applications: Concrete pavements are appropriate for any application that requires paving. These areas include sidewalks, parking lots, pedestrian plazas, roof plaza decks, roof ballast, roof parking decks, embankment stabilization, gas stations, medians, streets, industrial pavements, ports, and airports.

Composition and Materials: Cobble Systems concrete pavers are colored through utilizing liquid pigments and composed of portland cement, granite aggregate and coarse fines. Admixtures are typically placed in the concrete mix to reduce efflorescence. These materials are combined with a small amount of water to make a flowable concrete. The pavers are manufactured in factory-controlled conditions with machines that apply vibration. The result is a consistent, dense, high strength concrete that is molded into the shapes of real stones. When installed, this unique surface produces an upscale architectural appearance.

Technical Data Physical Characteristics: When manufactured in the U.S., concrete pavers made by Carpetstones of North America, Inc. (aka Cobble Systems) typically meet or exceed the requirements in ASTM C 140, ASTM C 67, ASTM C 33, ASTM C 150, and ASTM C 979, Standard Specifications for Solid Interlocking Concrete Paving Units.

Applications Standards: For pavements applications built upon a compacted base coarse material, 1 5/8 in. (40 mm) thick pavers are recommended. Concrete paver pavements are typically constructed as flexible pavements on a compacted soil subgrade and compacted aggregate base. Cobble Systems concrete pavers are then placed on a thin layer of bedding sand (minimum: 1/2 in. or 13 mm), and compacted into place. Then, the epoxy grout mixture is squeezegeed into the joints. Once the grout has fully cured, compression from vertical loads on a single paver is transferred throughout the paving system to surrounding pavers by shear forces through the epoxy grout. The sand based epoxy grout in the joints enables applied loads to be spread in a manner similar to asphalt, reducing the stresses on the pervious base and subgrade.

Benefits: This paver and grouting system combines to form the structural performance of the concrete pavement. Concrete pavers do not require time to cure. They arrive at the site ready to install. Once installed, and the Cobble Systems grout has been applied, the paved surface is ready for vehicular traffic within 48 hours (depending upon environmental conditions). This can reduce construction time and restore access quickly. The joints between each paver eliminate cracking normal to conventional asphalt and concrete pavement. Unlike concrete or asphalt, concrete pavers do not rely on continuity of their material for structural integrity. Colored units can be used for lane and parking delineations, traffic direction markings, utility markings, and artistic graphic designs. Various colors, shapes, and laying patterns can support control and direction of pedestrian or vehicular traffic, and can be used as detectable warnings on pedestrian ramps at intersections. The epoxy grouted joints in the pavement surface facilitate removal of surface water. This decreases nighttime glare when wet and enhances skid resistance. Pedestrian slip resistance meets or exceeds guidelines recommended in the Americans with Disabilities Act (ADA). It is recommended that snow be removed with a hand shovel. If bladed mechanical snow removal devices are required, insure that a 4" rubber blade is attached to the cutting edge of the metal blade (do not allow mechanical metal blade to come into contact with paver systems, as this may damage the pavers). Concrete pavers have greater resistance to deicing salts than conventional paving materials due to high cement content, strength, density, and low absorption.

Installation:

It is recommended that installation be performed by experienced contractors who hold a current certificate from Cobble Systems' Installer Certification Program. Contractors holding this certificate have been instructed and tested on knowledge of Cobble Systems concrete pavement construction. Concrete paver pavements typically consist of a soil subgrade, an aggregate base, pervious concrete, bedding sand, concrete pavers, edge restraints, and drainage (see Figure 1). Geotextiles are sometimes used under the base, over fine, moist subgrade soils to extend the life of the base and reduce the likelihood of deformation. The installation guidelines below apply to pedestrian and many vehicular applications. For street, industrial, port and airport pavement designs, consult with a qualified civil engineer familiar with local soils and pavement design methods.

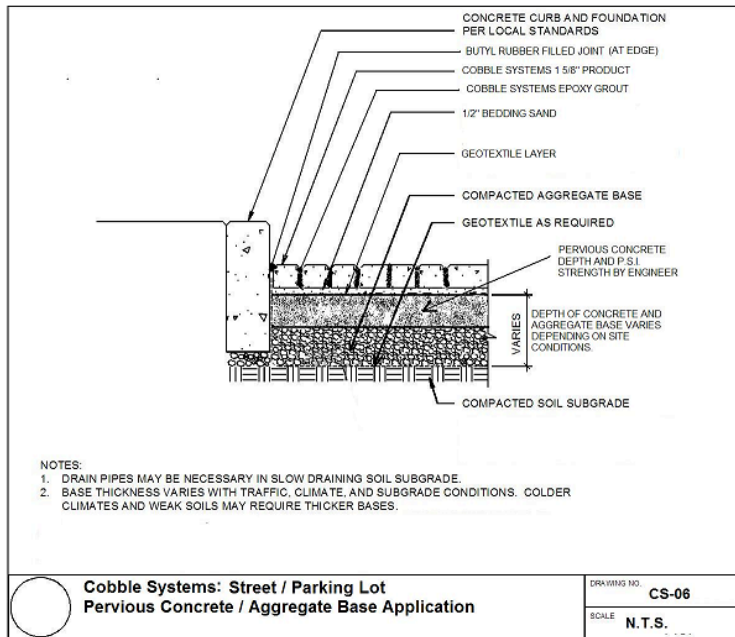


Figure 1.

Soil Subgrade: Once excavation has been complete, the soil subgrade should be compacted prior to placing the aggregate base. Compaction should be at least 98% Proctor density (per ASTM D 698) for pedestrian areas and residential driveways, and at least 98% modified Proctor density (per ASTM D 1557) for areas under constant vehicular traffic. Consult compaction equipment manufacturers' recommendations for applying the proper equipment to compact a given the soil type. Some soils may not achieve these recommended minimum levels of density. These soils may have a low bearing capacity or be continually wet. If they are under a base that will receive constant vehicular traffic, the soils may need to be stabilized, or have drainage designed to remove excess water.

Aggregate Base: Aggregate base materials should conform to that used under asphalt. If no local, state, or provincial standards exist, then the requirements for aggregate base in ASTM D 2940 are recommended. The base should be compacted in 6 in. (150 mm) maximum lifts. The thickness of the base depends on the strength of the soil, drainage, climate, and traffic loads. Base thickness used under asphalt can typically be used under Cobble Systems concrete pavers. Minimum aggregate bases for walks should be 2 to 4 in. (50 to 100 mm), driveways 6 to 8 in. (150 to 200 mm), and streets 6 to 8 in. (150 to 200 mm). Thickness may be adjusted depending on site conditions and traffic. Compaction of the aggregate base under pedestrian and residential driveway pavements should be at least 98% of standard Proctor density (per ASTM D 698). The aggregate base should be compacted to at least 98% modified Proctor density (per ASTM D 1557) for vehicular areas. Compaction equipment suppliers can provide information on the appropriate machines for compacting base material. These density recommendations for areas next to curbs, utility structures, lamp bases, and other protrusions in the pavement are essential to minimize settlement. Site inspection and testing of the compacted soil and base materials are recommended to ensure that compaction requirements have been met. Compacted base materials stabilized with asphalt or cement may be used in heavy load applications or over weak soil subgrades. The surface of the compacted base should be smooth with a maximum tolerance of $\pm 3 / 8$ in. (10 mm) over a 10 ft. (3 m) straight-edge.

Bedding Sand: Bedding sand should conform to the grading requirements of ASTM C 33 or CSAA23.1-FA1. Do not use mason sand. Stone dust or waste screenings should not be used, as they can have an excessive amount of material passing the No. 200 (0.075 mm) sieve. The sand should be screened to an even thickness of $\frac{3}{4}$ " in. to 1". Do not use the sand to fill depressions in the base. Geotextile should be applied under the bedding sand. When applied in these locations the fabric should be turned up against vertical surfaces to contain the bedding sand.

Epoxy Joint Sand: Bedding sand may not be used as epoxy joint sand. Only clean, dry silica sand may be used that conforms to the grading requirements of ASTM-C418-05. This sand is often called medium grade (BX-12), or coarse grade (BX-8) sandblasting sand.

Concrete Pavers: (This sections refers to applications involving 1 5/8 inch thick pavers) The shape and style of the concrete pavers determines the range of laying patterns (Figure 3). All Cobble Systems patterns are designed and recommended in areas subject to continual vehicular traffic. They will give the maximum structural performance. Concrete pavers can be cut with a brick splitter or diamond blade masonry saw to fit along the edge

of the pavement. Once the pavers are placed in their specified pattern(s), they are compacted into the bedding sand with a plate compactor. The compactor should have a minimum force of 5,000 lbs. (22 kN) and frequency of 75 to 100 hz. After the pavers are compacted, Silica Epoxy Mortar (SEM) or epoxy grout and sand is squeegeed into the joints until they are full. All pavement within 3 ft (1 m) of unfinished edges should be compacted at the end of each day, prior to epoxy application.

Edge Restraints: Due to the compaction of Cobble Systems concrete pavement and SEM epoxy grout bonding agent, edge restraints around areas of none vehicular traffic is not essential to their performance. The epoxy grout enables the system to remain affixed together. Concrete restraints are recommended for heavy vehicular traffic, crosswalks, parking lots, drives, streets, industrial, port, and airport pavements. Edge restraints are typically placed before installing the bedding sand and concrete pavers. Consult your local Cobble Systems representative for more information regarding the correct edge restraint system for your application.

Drainage: Surface and subsurface drainage systems, as well as pavement grades, should conform to that used for any other flexible pavement.

Roof Plaza/Parking Decks: Cobble Systems concrete pavements can be placed on parking garage roofs and pedestrian roof plazas. Concrete pavers provide an attractive ballast for the waterproof membrane (Figure 4). As a heat sink, the pavers reduce thermal stress on the membrane. The roof structure should be waterproofed, designed to withstand loads, and be sloped at least 2% to drain. Protection board should be applied according to the recommendations of the waterproof membrane manufacturer. Geotextile is applied around roof drains to prevent the migration of bedding sand. The drains should have holes at the level of the waterproof membrane to allow removal of subsurface water (Figure 5).

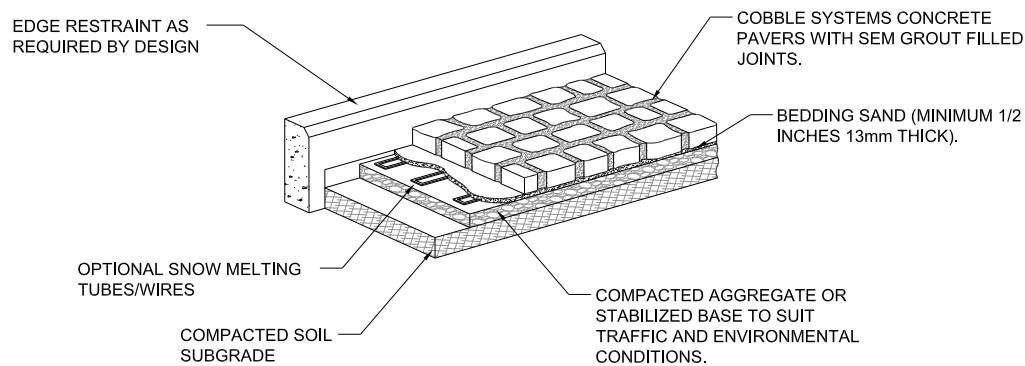


FIGURE 8. SNOW MELTING SYSTEM

NOT TO SCALE

Snow Melting Systems: Interlocking concrete pavements can accommodate snow melting systems for pedestrian and vehicular applications (Figure 8). The systems consist of hot, liquid-filled tubing or radiant wires placed in the bedding sand, in compacted aggregate concrete, or asphalt base. Snow melt systems turn on automatically when a snowstorm starts, eliminating plowing, ice hazards, and the need for de-icing salts. The result is less potential for injuries from slipping on ice and decreased liability. An aggregate base can be used to support the tubing or wires for pedestrian areas and residential driveways. Both systems must be secured to the base prior to placing the bedding sand. The systems are installed by specialty contractors (electricians and/or plumbers). The bedding sand may be as much as 2 in. (50 mm) thick to cover and protect the tubing or wires. For other vehicular areas, the tubing or wires should be in placed in a concrete or asphalt base.

Availability and Price

Availability: Cobble Systems Interlocking concrete pavers are available from distributors throughout the U.S. and Canada. Check with Cobble Systems website for a list of the local distributors (www.cobblesystems.com)

Price: Installed prices will vary depending on the site location, pattern, thickness, area, base requirements, edge restraints, and drainage requirements. Contact your local Cobble Systems dealer regarding material prices. Visit Cobble System website (www.cobblesystems.com) to find your local Cobble Systems representative.

Warranty

Cobble Systems certifies that the specified product meets the requirements of ASTM C 140, ASTM C 67, ASTM C 33, ASTM C 150 and ASTM C 979. Cobble Systems manufactures premier simulated stone products by utilizing superior materials and admixtures along with high quality control standards. We provide a LIFETIME GUARANTEE on the structural integrity of our products, but not the installation. Material that is found to be defective beyond normal wearing of the product will be replaced as long as the material was installed according to manufacturers specifications using approved installation techniques. Color, texture and finish cannot be guaranteed to match the original product. Labor and transportation costs relating to replacement of material are not included. No claims will be accepted without authorization from a Cobble Systems representative. Proof of purchase is required. Damage resulting from misuse, abuse or abnormal use, chemical action, improper installation or faulty design are expressly excluded from this Warranty. Due to the nature of the products, color variances and efflorescence cannot be guaranteed.

Maintenance

When properly installed, Cobble Systems concrete pavements require practically no maintenance. As with all pavements, they will become soiled over time depending on the amount of use. Contact a local Cobble Systems supplier or the manufacturer's website (www.cobblesystems.com) for information Cobble Systems concrete pavers.