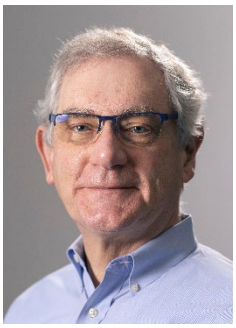
GEOCERAMICA®

DESIGN & INSTALLATION GUIDE

LIBERTYSTONE™

GeoCeramica®: The Natural Evolution for Segmental Paving
Reflections from Industry Veteran David R. Smith



The beauty and durability of porcelain is unmatched by any other segmental pavement surface. Porcelain's only performance challenge, a thin cross section, is resolved by GeoCeramica® by permanently joining it to a concrete paving slab. This combines the benefits of porcelain with dry cast concrete paving. The combination aligns GeoCeramica® with paving applications including walkways, patios, pools, plazas, and roof decks, all placed with confidence on just about any pavement base material. Porcelain's personality, which adds elegance and panache to every project, just grew larger.

Like many European products that helped grow the American paver industry, GeoCeramica® was first introduced and successfully marketed in 2016. Currently there are over 100 million square feet of the product successfully installed. GeoCeramica® landed in the U.S. via Libertystone Hardscaping Systems® in 2024.

The evolution story goes something like this: The paver industry started in Canada in 1973 and quickly spread to the U.S. Today, over a billion square feet of pavers and slabs are now sold annually. Some might remember the multi-color paver blends in the 1980s and how tumbled units in the 1990s took over the residential market. They provided a stone look at concrete prices. Sealers and polymeric joint sand improved appearances and performance. Next came face mix on pavers and slabs offering increased durability with a visually pleasing combination of colors, aggregates, and finishes. Slab sales took off to meet designer and homeowner demands for less busy, calmer paving patterns.

Around 2011, Italian companies initially brought thin outdoor porcelain tiles to the U.S. They introduced an efflorescence-free, highly scratch and winter-resistant surface to exterior applications. The market soon grew to sustaining domestic porcelain paving manufacturers supplying residential and commercial projects. The popularity of porcelain slabs is evidenced by their sales at some national-chain home center stores next to other paving materials.

GeoCeramica® is a significant evolutionary step of progress in the segmental pavement industry. The product is raising expectations for beauty and performance. Manufacturers like Libertystone® have embraced it as well as contractors, and most importantly, designers and homeowners.

For more information on Libertystone's GeoCeramica®, scan the QR code below.

GEOCERAMICA

David R. Smith built his first paver project in 1977. He visited The Netherlands in 1984 and became hooked on segmental paving ever since. In 1985, he built the first machine-installed interlocking concrete pavement street in the U.S. He helped start the Interlocking Concrete Pavement Institute in 1993 and has written countless technical papers and bulletins, manuals, training programs, books, and standards on segmental concrete pavements and permeable pavements. Through Segmental Pavement Specialists LLC, he currently consults for the industry, universities, and designers. He can be contacted at drsmith@doctorpavr.com.

Libertystone GeoCeramica® Construction Guide

The following provides an overview of the GeoCeramica® installation process for residential, non-vehicular applications. Many materials and procedures are similar to interlocking paver and slab installations. Most contractors are familiar with them. This guide notes similarities while highlighting procedures specific to GeoCeramica®. The overall goal is installing long-lasting, beautiful projects for customers without callbacks.

If needed, refreshers on paver and slab installation are online Tech Notes published by the Concrete Masonry and Hardscapes Association. CMHA also offers installer courses on interlocking, permeable interlocking, and slab pavements. The information in these courses provides some time- and money-saving information applicable to GeoCeramica® installations.

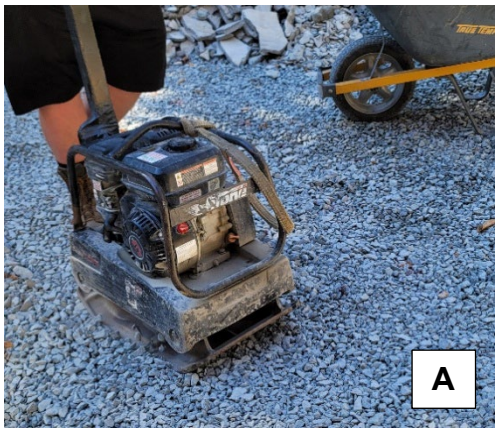
Construction steps are provided below for two bedding and base aggregate options:
(1) Open-graded aggregate (OGA) bedding on an OGA base. If the jointing material is permeable resin sand or small OGA, they create a permeable pavement with infiltration into the soil subgrade.
(2) Bedding sand on dense-graded aggregate (DGA) base plus overlay/inlays on existing concrete or asphalt bases.

Both options require underground utility lines first marked by a location service and then those lines avoided as soil excavation proceeds. For Option 1 with permeable pavement, the soil subgrade is typically flat or less than 1% slope for infiltration. For Option 1 and 2, geotextile is applied to the graded and compacted soil subgrade bottom and on the sides.

Option 1: OGA Bedding and Base (Recommended Method)
Use crushed stone complying with ASTM or AASHTO #57 or #67 gradations for the base. Minimum OGA base compacted thickness: Sandy soils, non-freezing climates: 4 in. (100 mm). All other soils: minimum 6 in. (150 mm).

Place OGA on the geotextile and spread with equipment riding on the OGA and not on the geotextile. Compact with a minimum 5,000 lbf (22 kN) vibratory plate compactor (**A**). Make at least two passes in perpendicular directions.

Water from gutter downspouts should be piped through the OGA base to an outflow location (**B**). Water from downspouts or adjacent pavements flowing directly onto a permeable pavement require perforated PVC underdrains to remove excess water that enters the OGA base. Soil subgrades for permeable applications usually have a minimum 1% slope away from structures. Foundations next to OGA bases that receive water may require waterproof separation using a minimum 30 mil (0.76 mm) thick PVC impermeable liner.



Edge Restraints – If there is no adjacent building, stone or concrete curbs to restrain a GeoCeramica® pattern at its perimeter, edge restraints may be required. One option is aluminum or plastic edging joined to a geogrid. Place the geogrid on the compacted OGA base (**C** & **D**). Extend its length under a minimum of two full, adjacent GeoCeramica® courses. Then join the geogrid to the edging after units are installed. Be sure the vertical portion of the edging restrains the bedding thickness (1 to 1¼ in. or 25 to 30 mm) *plus* at least the bottom half (~¾ in. or ~20 mm) of the total GeoCeramica® unit thickness. Do not use stakes in the OGA to secure edge restraints.

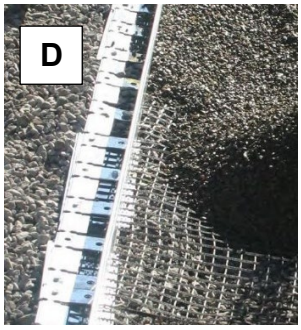
Precast or cast-in-place concrete curbs are another option. They are typically installed on a portion of the OGA compacted base thickness prior to placing the remaining OGA base and bedding.

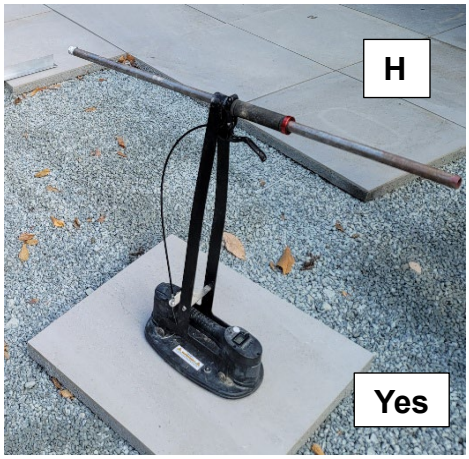
OGA Bedding - Gradation: ASTM or AASHTO #8 or #9 stone. Place screed rails and screed 1½ in. (40 mm) thick layer over the geogrid and compacted OGA base (**E**). Fill screed bar voids with #8 or #9 after removal. The screeded bedding should be a consistent thickness, not exceeding 1½ in. (40 mm) thick prior to GeoCeramica® placement and compaction.

A useful option is placing non-woven **geotextile** on the screeded OGA bedding to capture jointing materials. The geotextile ensures complete joint filling without loss into the OGA bedding layer. Geotextile on the screeded OGA is *not* required when using #89 or #9 stone for joint filler to create a highly permeable system that includes OGA base drainage.

GeoCeramica® Installation – A GeoCeramica® 1½ in. (4 cm) thick unit weighs about **70 lbs** (32 kgs). Twenty-six 2 x 2 ft (600 x 600 mm) units covering 100.75 sf (9.4 m^2) are stacked on each shipping pallet (**F**).

Prior to setting the slabs, pull and secure string lines to establish coursing for random, stack or running bond patterns (**G**). Wear gloves while moving units. It's safer to NOT lift them by hand. Whenever possible, lift and place slabs with vacuum equipment using two persons (**H**). A wheeled carrier assists as well.





Spacers on the sides of each slab create a ~¼ in. (5 to 6 mm) wide joint when installed. Adjust joint widths as needed to consistent spacing and even heights using a large rubber hammer. Do not use a pry bar inserted into the open joints. It may chip the porcelain.

Saw cutting - This must be done with a diamond saw blade for cutting porcelain and a water-cooled, stationary saw that meets the RPM requirements for the blade (**I**). Measure twice, mark, and cut once. Wear eye goggles, gloves, hearing protection, and a dust mask. Do not force GeoCeramica® through the saw blade. A slow and steady feed lets the saw do the cutting while maintaining required RPMs. Cleanly cut edges from wet saws are preferred over dry cutting.

For small cutouts, use a hand-held diamond blade saw with cooling water applied with a hose. Mark and then score grooves into the surface first, then more deeply saw cut. Wipe or wash clean all cut units and install on the screeded OGA bedding after installing whole units to complete the intended pattern. Secure edge restraints along the perimeter.

GeoCeramica® Compaction – Compact all installed units with a 4-5,000 pound-force (18-22 kN) vibratory roller compactor (**J**). Make two passes in a perpendicular direction to the other. *Do not compact units with a plate compactor as it will damage the units*.

Joint fill materials – Resin sand is recommended and installed according to manufacturers' directions. Water is applied to the slabs, sand packaging opened and spread into joints and filled using a hose, squeegee, and broom (**K**). Leave a clean surface. Resin sands may have some permeability when installed but can clog over time. Clean joints with a pressure washer without forcing sediment into the resin sand.

Option 2: Sand Bedding on DGA Base and Overlay/Inlay on Existing Concrete or Asphalt

Excavation, geotextile placement, DGA base installation, and compaction are the same as for interlocking pavement (**L**). Soil subgrade and surface slopes are typically 1½% or greater. Use DGA specified by the local or state transportation agency for asphalt pavement bases.

Minimum DGA compacted thickness: Sandy soils in non-freezing climates: 4 in. (100 mm). All other soils: minimum 6 in. (150 mm). Very cold climates may require 8 in. (200 mm) thick DGA or thicker.

Edge restraint material options: plastic, metal, precast or cast-in-place concrete, or troweled concrete in mild climates. Installation is same as interlocking pavement: secure with nail spikes into a DGA base or into a DGA base under asphalt; bolt into concrete (**M**).

Overlays on existing asphalt or concrete require 2 in. (50 mm) diameter weep holes spaced every 10 ft (3 m) along the lowest elevations. The holes should extend to the soil subgrade to drain the bedding sand. Fill holes with pea gravel and cover with geotextile prior to placing the bedding sand.

Sand bedding: ASTM C33 gradation, i.e., washed concrete sand. Do not use limestone screenings or stone dust. Do not use masonry sand (ASTM C144 gradation or similar). Screed bedding sand to a consistent 1¼ in. (25 to 30 mm), thickness like interlocking pavement. Set GeoCeramica® into the screeded bedding sand and compact with a vibratory roller compactor (**N**).

Saw Cutting and **GeoCeramica® Installation:** as noted in **Option 1**. Install resin joint sand as noted in **Joint fill materials** in **Option 1**.

GeoCeramica® can be mortar or adhesive-set on a concrete base (**O**). Contact Libertystone Hardscaping Systems for further information.