SIZES, SHAPES
Concrete pavers are defined as units having a surface area no greater than 100 in² (0.665 m²) and having a length divided by thickness (aspect ratio) not exceeding 4. Oldcastle produces the following shapes for unique architectural detail:
- Mega Bergerac® - Large format distressed paver. Antique stone-like appearance with dimpled surface
- Bergerac - Medium format. Antique stone-like appearance with dimpled surface
- Dublin® Cobble Modular, Combo or Circle - Smaller format. Antiqued with distressed surfaces and edges
- Cambridge Cobble - Similar to the Dublin without distressed surface
- Holland - Traditional brick-like appearance

LIMITATIONS
Like any pavement, the long-term performance of interlocking concrete pavement relies on the correct materials and an adequately prepared soil subgrade and base. Specific limitations are identified in Belgard technical guides.

APPROVALS
Consult manufacturer for current information on compliance with requirements of specific agencies and/or building code jurisdictions.

ENVIROMENTAL CONSIDERATIONS
Materials are noncorrosive and safe for the environment.

PHYSICAL/CHEMICAL PROPERTIES
Interlocking concrete pavers manufactured in the U.S. should meet the requirements of ASTM C936, Standard Specification for Solid Interlocking Concrete Paving Units. Those produced in Canada should meet the requirements of CSA-A231.2, Precast Concrete Pavers.

5. Installation
Installation should be performed by experienced contractors who have been instructed and tested on knowledge of interlocking concrete pavement construction.

Subgrade Preparation
Belgard interlocking concrete pavements typically consist of a soil subgrade, an aggregate base, bedding sand, concrete pavers, edge restraints and drainage. Geotextiles may be used under the base or over clay and silt 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, pavement design methods, materials and construction practices.
Once excavation and grading are complete, compact the soil subgrade prior to placing the geotextile (if applicable) and aggregate base. Soil compaction should be at least 98% Proctor density (per ASTM D698) for pedestrian areas, and at least 98% modified Proctor density (per ASTM D1557) for areas under continual traffic. Some soils may not achieve these levels of density and compaction due to a low bearing capacity or from continual moisture. If such soils 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.

Base Material Preparation
Aggregate base materials should conform to those used under asphalt. If no local standards exist, then requirements for aggregate base in ASTM D2940 are recommended. The thickness of the base depends on the strength of the soil, drainage, climate and traffic loads.

Base thickness under asphalt can typically be used under interlocking concrete pavers. Aggregate bases for patios and walks are 4" - 6" (100 - 150 mm), driveways 6" - 8" (150 - 200 mm), and streets 8" (200 mm) or greater thickness. These thicknesses may be adjusted according to climate, site conditions and traffic. The base should be compacted to a minimum 6" (150 mm) lift. The aggregate base should be compacted to at least 98% Proctor density for patios, walkways and residential driveways. Compaction next to curbs, utility structures, lamp base and other protrusions in the pavement is 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 finished surface of the compacted base should have tolerance of ± 3/8" (± 10 mm) over 10' (3 m).

Bedding Sand
Bedding sand should conform to the grading requirements of ASTM C33 or CSA A23.1. 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 a consistent, even thickness between 1" and 1 1/2" (25 and 40 mm).

Do not use the sand to fill depressions in the base since these eventually will be reflected in the surface of the finished pavement. Fill any depressions with base material and compact. Geotextile may be applied under the bedding sand adjacent to curbs, roof parapets, drains, utility structures and over asphalt or cement-stabilized bases to prevent migration of the bedding sand into joints or cracks. When applied in these locations, the fabric should be turned up against vertical surfaces to contain the bedding sand.

Shapes and Patterns
The concrete pavers' shape determines the type of laying patterns. Forty-five and 90 degree herringbone patterns are recommended in areas subject to continual vehicular traffic. They will give the maximum interlock and structural performance. Some patterns have "edge" pavers specifically designed to fit against the edge restraints. Concrete pavers can be cut with a splitter or masonry saw to fit the pavers within 3' (1 m) of unfinished edges. Compaction also, but extra effort may be required in sweeping and compaction to fill the joints. All pavers within 3' (1 m) of unfinished edges should have the joints full and be compacted at the end of each day.

Edge Restraints
Edge restraints around interlocking concrete pavement are essential to their performance. They hold the pavers and sand together, enabling the system to remain interlocked. For walks, patios and driveways, edge restraints can be Celtik Curb, steel, aluminum, troweled (hidden) concrete curb (recommended for non-freeze/thaw climates), or plastic edging specifically designed for concrete pavers. Formed or precast concrete restraints are required for crosswalks, parking lots, drives, streets, and industrial, port and airport pavements.

Precast concrete and cut stone curbs are suitable for streets, driveways and parking lots. Edge restraints are typically placed before installing the bedding sand and concrete pavers. Some edge restraints such as Celtik Curb, plastic, steel and aluminum can be installed after placing the concrete pavers. Surface and subsurface drainage should conform to that used for any other flexible pavement.

Roof Plaza/Parking Decks
Belgard interlocking concrete pavements can be placed on parking garage roofs and pedestrian roof plazas. Concrete pavers provide attractive ballast for waterproof membrane. As a heat sink, the pavers reduce thermal stress on the membrane. The roof deck 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 the membrane. The roof deck structure should be designed for concrete pavers. Formed or precast concrete restraints can be used with vehicular pavements.

Compaction
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 4000 lb (18 kN) and frequency of 75 - 100 Hz. After the pavers are compacted, sand is swept and vibrated into the joints until they are full. Joint sand should conform to the grading requirements of ASTM C144 or CSA-A179. The coarser bedding sand can be used in the joints also, but extra effort may be required in sweeping and compaction to fill the joints. All pavers within 3' (1 m) of unfinished edges should have the joints full and be compacted at the end of each day.

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the pavement or directing drain holes to catch basins, especially if there is a high watertable. The drain holes should be covered with geotextile to prevent loss of bedding sand. Geotextile may need to be applied at pavement joints and cracks. Cracks larger than 3/8" (9.5 mm) width should be patched prior to placing geotextile, bedding sand and pavers.

Concrete pavers can be set on a bituminous setting bed with neoprene modified asphalt mastic for pedestrian or vehicular applications. The base under the bituminous sand setting bed is typically concrete. Pavers can be mortared directly to a concrete base using an acrylic fortified mortar bed. Mortared applications are recommended in non-freeze/thaw regions and for pedestrian applications only.

Bitumen and mortar-set pavers are expensive compared to sand-set paving and slow to construct. Polymer adhesives specially designed for adhering concrete pavers to concrete enable faster installation without the chance of accidentally staining the surface of the pavers with mortar. Polymer adhesives are not recommended for vehicular areas.

Celtik Curb Installation
Aggregate base thickness must be consistent with paver base material and extend 12" (305 mm) beyond curb for adequate anchoring. Install the curb on the same laying bed as the abutting pavers. Alternate the angled curb modules for straightline curbs. Install the angled curb modules in the same direction for curves. Secure plastic anchors outside of each unit and insert spikes into well-compacted base material.

PRECAUTIONS
- Do not install sand or pavers during heavy rain or snowfall
- Do not install sand and pavers over frozen base materials
- Do not install frozen sand
- Do not install pavers on frozen or saturated sand

6. Availability & Cost

AVAILABILITY
Belgard interlocking concrete pavers are available from Oldcastle companies throughout the U.S. and Canada. Visit the Belgard website to locate local companies.

COST
Installed cost information may be obtained from a local Belgard manufacturing facility.

7. Warranty
Oldcastle certifies that the specified product meets the requirements of ASTM C936 or CSA A231.2, as applicable. Belgard offers a lifetime product warranty against manufacturing defects, provided the product is installed by an authorized Belgard contractor.

8. Maintenance
When properly designed and installed, concrete pavers require little maintenance. If there is a need to remove dirt or stains, or if there is a need to protect the surface from stains, cleaners and sealers specifically designed for concrete pavers should be used.

9. Technical Services
Oldcastle offers design assistance and technical support. The support is delivered through publications, software, public relations, the Internet, audio/visual presentations, educational seminars, AIA and ASLA continuing education programs and certification for paver installers.

Oldcastle also provides resources for homeowners interested in patios, walkways, pool decks and driveways. Oldcastle offers marketing and technical resources for sale on its website.

10. Filing Systems
- First Source
- MANU-SPEC™
- Additional product information is available from the manufacturer upon request.