



2021 ARCHITECTURAL COLLECTION



Bringing YOUR VISION to Life



Designed and installed in some of the most prestigious commercial spaces in North America, Architects, Landscape Architects and Engineers trust Unilock to bring their architectural vision to life and to withstand the toughest rigor of a commercial environment.



DESIGNED BY
CONFLUENCE.
THE PAVERS
SELECTED FOR
THIS UNIVERSITY
CAMPUS BRING
PROMINENCE TO
THE QUAD SPACE –
CREATING A 'THERE'.





PROJECT: Kansas City University, Kansas City, MO. **DESIGN:** Confluence. **PRODUCT:** Promenade® plank pavers with Smooth Premier finish in Dark Charcoal, Steel Grey and a custom color.

KCU transformed the entire west side of their urban Kansas City campus with the addition of the Center for Medical Education Innovation (CMEI). The campus was deficient in open and engaging pedestrian space for students to relax, socialize and study. The development of a new quad became the heartbeat of campus and the spatial glue that connects the proposed CMEI building to surrounding existing buildings – creating a ‘there’.

The campus environment dramatically shifted from vehicular oriented to pedestrian focused with the quad and adjacent plaza. However, the project’s

biggest hurdle was creating pedestrian focused space with the requirement of providing a 20’ wide vehicular fire lane around the new quad. The incorporation of pavers would be crucial in creating a plaza environment that downplays the emergency access route. Establishing a strong paving pattern placed emphasis on the pedestrian experience while bringing prominence to the quad space. Unilock Promenade plank pavers with a Smooth Premier finish provided the desired color palette to contrast the gradation from true white to deep charcoal grey, offering the ideal paver that set the project up for success and brought together the design vision.



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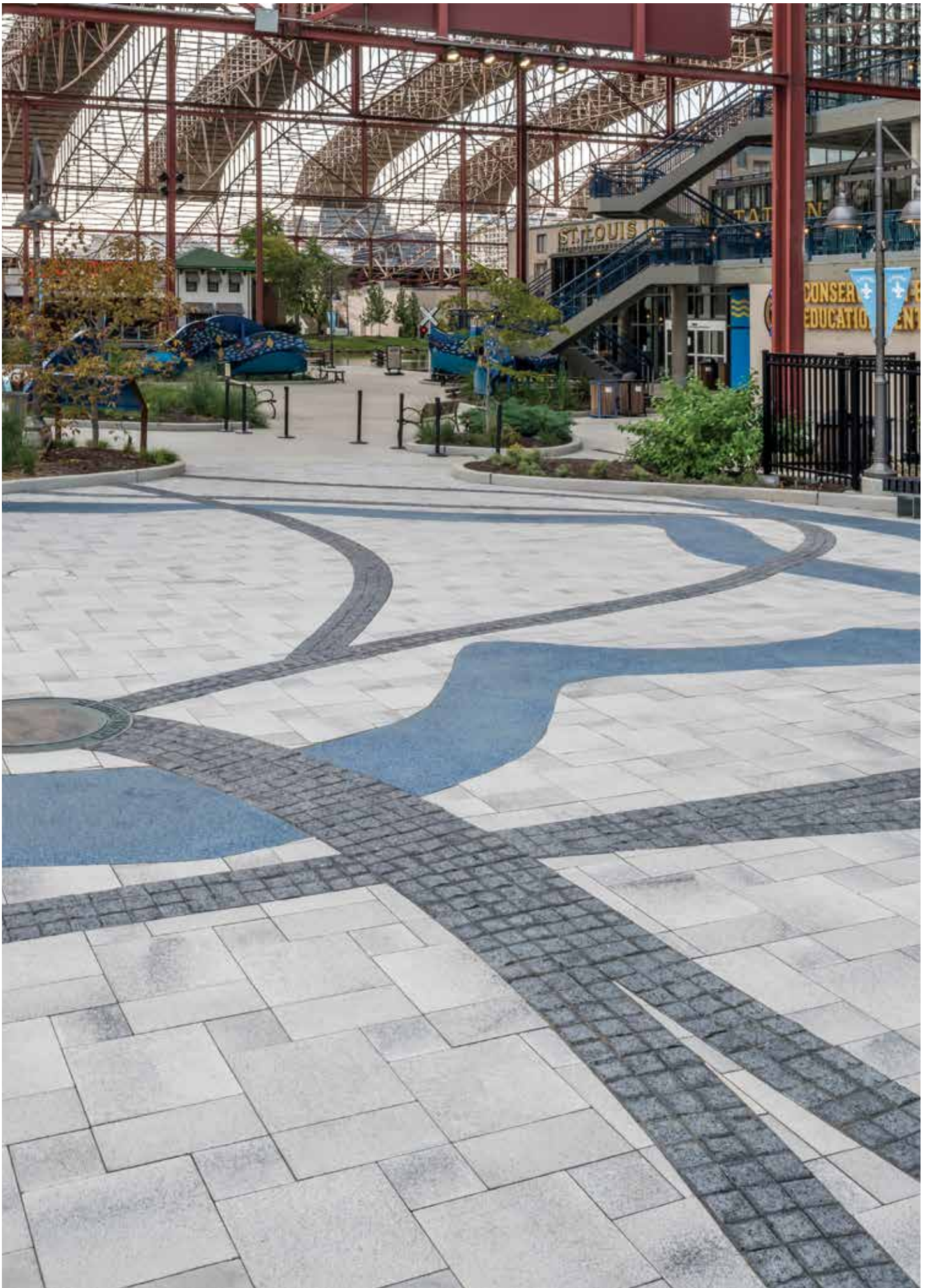
The possibilities are endless. Let's see what we can create together.

PROJECT: Humber Bay Shores Park, Toronto, ON. **DESIGN:** LEES+ Associates. **PRODUCT:** Squares with Series™ finish in Black Granite, Ice Grey and Mountain Mist.



BE INSPIRED





PROJECT: St. Louis Aquarium at Union Station, St. Louis, MO. **DESIGN:** PGAV Destinations. **PRODUCT:** Umbriano™ in Winter Marvel. Unigranite™ in Dark Charcoal.



PROJECT: Cambridge Discovery Park, Cambridge, MA. **DESIGN:** Paul Finger Associates. **PRODUCT:** Planks with Umbriano™ finish in Autumn Sunset, French Grey, Midnight Sky and Winter Marvel.



PROJECT: Mount St. Mary's, Cincinnati, OH. **DESIGN:** McGill Smith Punshon Design. **PRODUCT:** Umbriano™ in Summer Wheat and Rectangles with Series™ finish in Onyx Black



PROJECT: University of Delaware - Biopharmaceutical Innovation Center, Newark, DE. **DESIGN:** Ground Reconsidered. **PRODUCT:** Rectangles with Umbriano™ finish in French Grey, Midnight Sky and Winter Marvel.



PROJECT: Corporate Park, Walpole, MA. **DESIGN:** Jacobs Engineers. **PRODUCT:** Planks with Umbriano™ finish in French Grey, Midnight Sky and Winter Marvel.

GEOMETRIC DESIGN has roots in prehistoric and early modern art and is currently on-trend. Patterning used with standard shapes such as squares and rectangles can deliver strong geometric execution, achieving a truly unique design.



PROJECT: Tower Crossing, Naperville, IL. **DESIGN:** Napleton Auto Group. **PRODUCT:** Umbriano™ in Summer Wheat and Midnight Sky, Il Campo in Granite Blend.



PROJECT: 1001 W Fulton Roof Deck, Chicago, IL. **DESIGN:** Ileakis Associates | Gutierrez Landscaping Services, Inc. **PRODUCT:** Arcana™ in Covara, Modena and Vivanto.



PROJECT: Radio City Condos, Toronto, ON. **DESIGN:** Martin Wade LA MWLA. **PRODUCT:** Planks with Series™ finish in Black Granite and Smooth Premier finish in Steel Grey Blend.



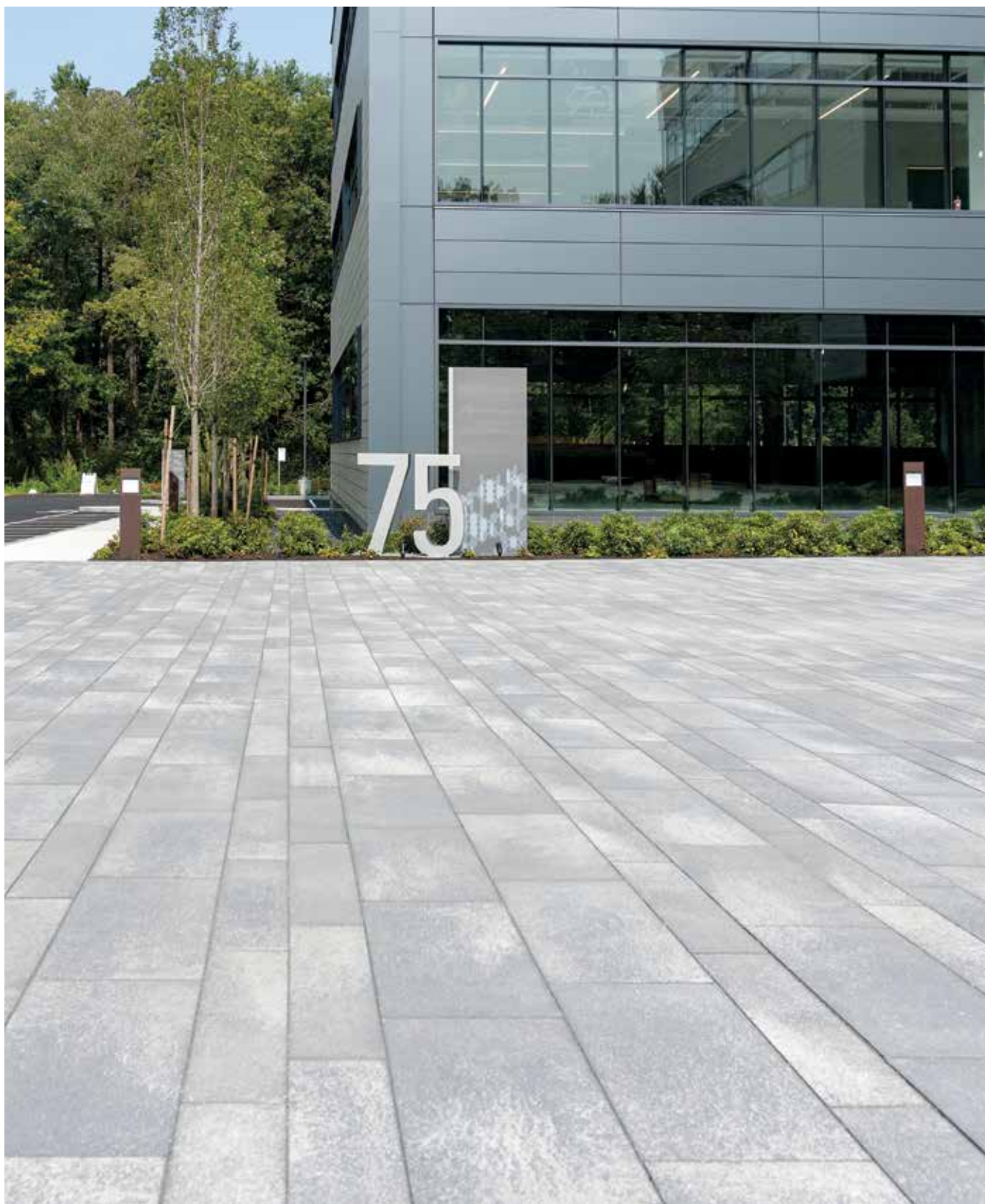
PROJECT: Huron Street - Chinatown, Toronto, ON. **DESIGN:** The Planning Partnership. **PRODUCT:** Holland Premier™ in Charcoal and Natural. Bronte® Street Paver in Charcoal.



PROJECT: Bower Condos, Oakville, ON. **DESIGN:** NAK Design Strategies. **PRODUCT:** Hex / City Park Paver™ with Series™ finish in Black Granite and Glacier.



PROJECT: Jean Lumb Public School Park, Toronto, ON. **DESIGN:** The Planning Partnership. **PRODUCT:** Squares with Senzo™ finish in Bianco and Crema. Umbriano™ in Winter Marvel and Midnight Sky.

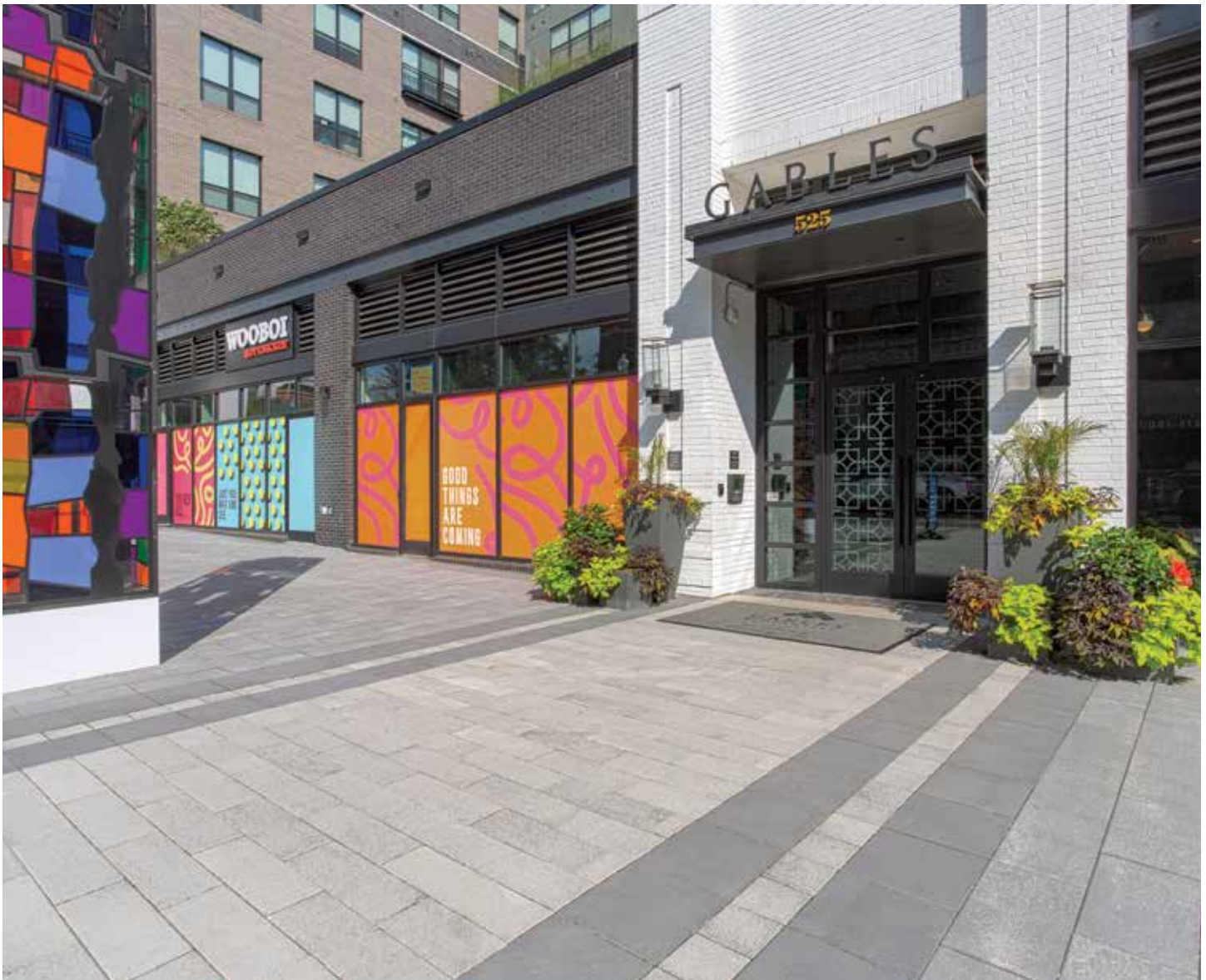


PROJECT: 75 Hayden Ave, Lexington, MA. **DESIGN:** Lemon Brooke. **PRODUCT:** Rectangles and Planks with Umbriano™ finish in French Grey.

CLEAN, UNCLUTTERED LINES are the foundation for a contemporary project. Often achieved with large format slabs and pavers, the unique and modern finishes of Unilock products allow smaller format pavers to create distinctive, modern landscapes.



PROJECT: 740 Aberdeen Roof Deck, Chicago, IL. **DESIGN:** Hitchcock Design Group. **PRODUCT:** Arcana™ in Corvara.



PROJECT: Gables Old Town North, Alexandria, VA. **DESIGN:** Mahan Rykiel. **PRODUCT:** Rectangles with Umbriano™ finish in French Grey, Midnight Sky and Winter Marvel.



PROJECT: University of Toronto - Mississauga Campus, Mississauga, ON. **DESIGN:** Plant Architect. **PRODUCT:** Planks with Series" finish in Ice Grey and Smooth Premier finish in Steel Grey.



PROJECT: 1035 W Fulton Roof Deck, Chicago, IL. **DESIGN:** Hartshorne Plunkard Architecture | Summit Design + Build **PRODUCT:** Arcana™ in Modena.

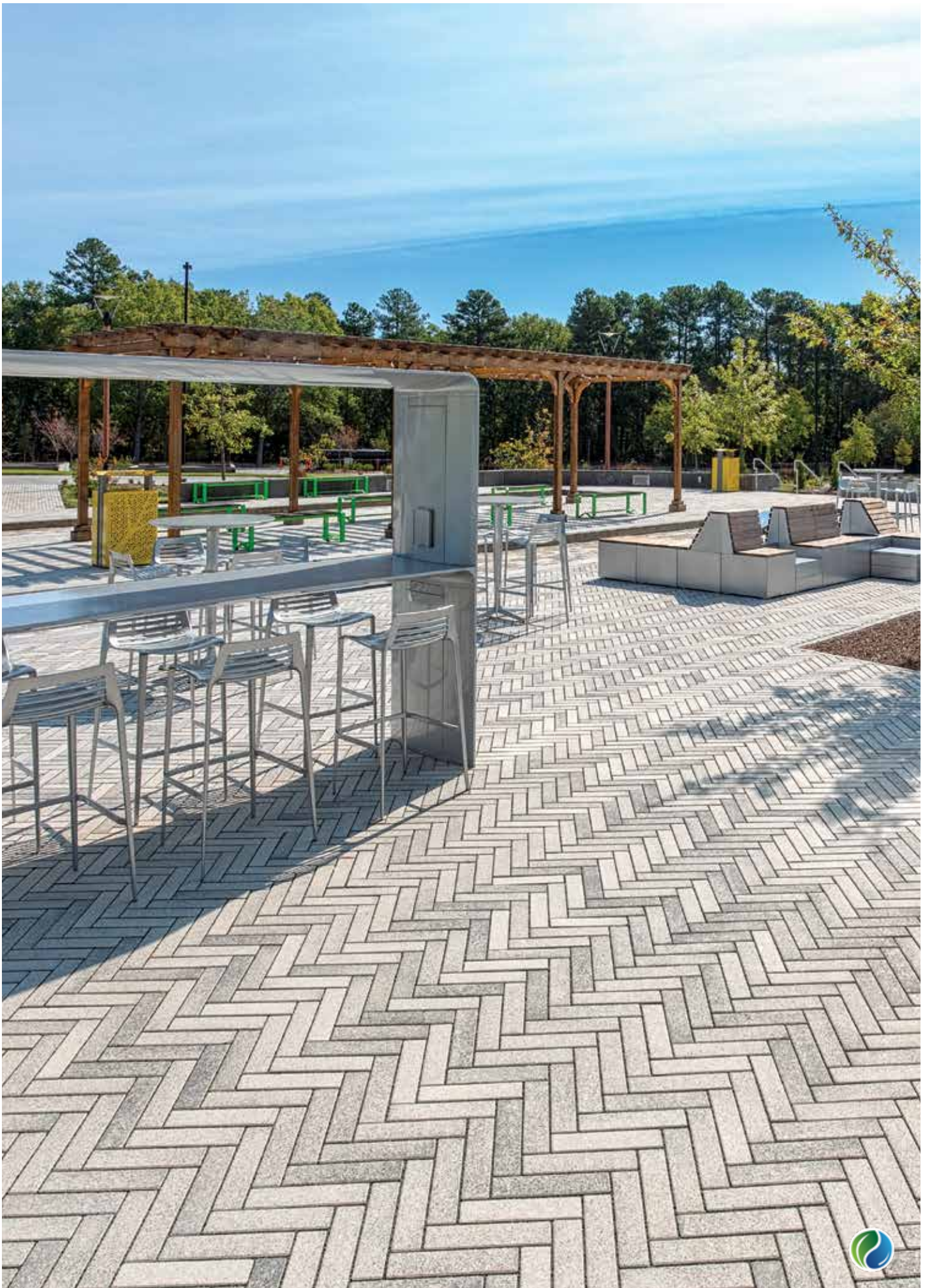


PROJECT: Lillian Park, Toronto, ON. **DESIGN:** Janet Rosenberg & Studio. **PRODUCT:** Permeable Planks / Eco-Promenade® with Umbriano™ finish in Grenada White.



PROJECT: Crescent Merriweather, Columbia, MD. **DESIGN:** Mahan Rykiel Associates Inc. **PRODUCT:** Rectangles with Umbriano® finish in French Grey and Winter Marvel.

LINEAR, PLANK PAVING DESIGN styles have emerged as a paving trend. Whether directing the flow of traffic or creating a dramatic destination, Unilock offers an extensive range of sizes along with unique finishes to ensure your design vision is achieved.



PROJECT: Parmer Research Triangle Park, Durham, NC. DESIGN: O'Brien Atkins. PRODUCT: Permeable Planks / Eco-Promenade® with Umbriano™ finish in Winter Marvel.



PROJECT: University of Maryland, Baltimore County, Baltimore, MD. **DESIGN:** Mahan Rykiel Associates Inc.. **PRODUCT:** Rectangles with Series™ finish Ice Grey and Smooth Premier finish in Granite Blend and Nantucket.



PROJECT: Marshfield Plaza, Chicago, IL. **DESIGN:** Christy Webber Landscapes | Terra Engineering, LTD. **PRODUCT:** Permeable Planks / Eco-Promenade™ with Umbriano™ finish in French Grey and Winter Marvel.



PROJECT: Buffalo Exchange Street Station, Buffalo, NY. **DESIGN:** Sowinski Sullivan Architects. **PRODUCT:** Planks with Smooth Premier finish in Opal, Sandstone and Steel Mountain.



PROJECT: Iowa Culinary Institute at Des Moines Area Community College, Ankeny, IA. **DESIGN:** Shive Hattery Inc. **PRODUCT:** Planks with Umbriano® finish in French Grey and Series® finish in Onyx Black.



PROJECT: 145 Broadway, Cambridge, MA. **DESIGN:** Sasaki. **PRODUCT:** Planks with Umbriano™ finish in Summer Wheat, French Grey and Winter Marvel.



PROJECT: Unionville Gardens, Markham, ON. **DESIGN:** Strybos Barron King Landscape Architecture. **PRODUCT:** Artline™ with Smooth Premier finish in Almond Grove.



PROJECT: West Eau Claire Park, Calgary, AB. **DESIGN:** O2 Planning + Design. **PRODUCT:** Rectangles / Planks with Il Campo® and Smooth Premier finishes.



PROJECT: The Haley Mansion, Joliet, IL. **DESIGN:** 3D Brick Paving Co. **PRODUCT:** Town Hall® in three colors blended on site.

DESIGN HAS EVOLVED through the ages but sometimes the right style is not the most recent. From old-world cobblestones to historic brick style street pavers, Unilock offers authentic surface textures, colors and the assurance of the latest technology to deliver durable long-lasting products for your designs.



PROJECT: Newton Streetscape, Newton, NC. **DESIGN:** Allison Platt and Associates. **PRODUCT:** Richcliff® in Dawn Mist. Town Hall® in Burgundy Red and Burnt Clay.



PROJECT: Peabody's Interiors, Brown Deer, WI. **DESIGN:** Breezy Hill. **PRODUCT:** Courtstone® in Basalt.



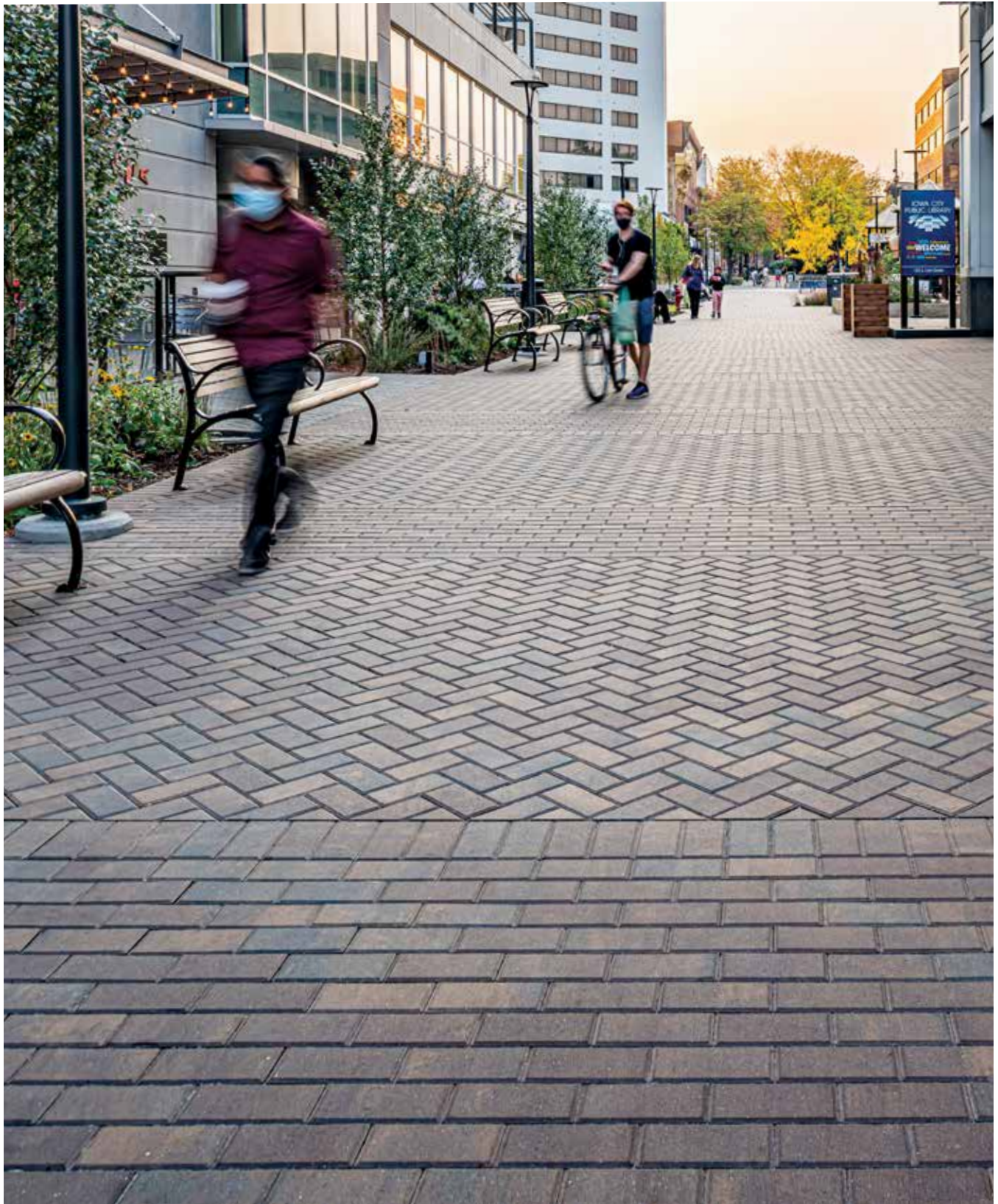
PROJECT: Blackfriars Bridge Parkette, London, ON. DESIGN: Dillon Consulting. PRODUCT: Town Hall® in Basalt.



PROJECT: Newton Streetscape, Newton, NC. DESIGN: Allison Platt and Associates. PRODUCT: Richcliff® in Dawn Mist. Town Hall® in Burgundy Red and Burnt Clay.



PROJECT: Plainville Public Safety, Plainville, MA. DESIGN: Kaestle Boos Associates. PRODUCT: Copthorne® in Burgundy Red, Burnt Clay and Old Oak.



PROJECT: Iowa City Pedestrian Mall, Iowa City, IA. **DESIGN:** Genus Landscape Architects. **PRODUCT:** Rectangles with Smooth Premier finish in Sierra.

THERE ARE MANY INTERPRETATIONS of traditional paving design from formal to rustic. Explore possibilities in this expansive style from standard brick pavers to natural stone, smooth surfaces or riven flagstone. Whether your preference is simple rectangle or multi-unit random collections, there are many product styles to consider for your traditional design.



PROJECT: Lindsay Downtown Streetscape, Lindsay, ON. DESIGN: CIMA+ Bowmanville. PRODUCT: Planks with Series™ finish in Heritage Brown and Golden Sand.



PROJECT: University of Maryland, Baltimore County, Baltimore, MD. **DESIGN:** Mahan Rykiel Associates Inc. **PRODUCT:** Rectangles - Standard finish Nantucket, Granite Blend. Planks - Standard finish in Granite Blend.



PROJECT: Blackhawk Country Club, Madison, WI. **DESIGN:** Olson Toon Landscaping, Inc. **PRODUCT:** Beacon Hill® Platform with Flagstone finish in Bavarian.



PROJECT: Riverside Metra Station, Riverside, IL. **DESIGN:** Christopher B. Burke Engineering. **PRODUCT:** Permeable Rectangles with Il Campo® finish in Heritage Brown and Smooth Premier finish SS0080 stripes.



PROJECT: Des Moines Area Community College - Student Center, Akeny, IA. **DESIGN:** RDG Planning & Design. **PRODUCT:** Rectangles with Smooth Premier finish in Brown, Charcoal and Sandstone.



PROJECT: Cambridge Discovery Park, Cambridge, MA. **DESIGN:** Paul Finger Associates. **PRODUCT:** Rectangles with Standard finish in Rustic Red.



PROJECT: Vaughan Subway Station, Vaughan, ON. **DESIGN:** Claude Cormier et Associés. **PRODUCT:** Planks with Smooth Premier finish in Dark Charcoal.



PROJECT: St. Isaacs Jogues Church, Hinsdale, IL. **DESIGN:** Daniel Weinbach & Partners, Ltd. **PRODUCT:** Squares / Rectangles with Series™ finish in Golden Tan and Squares with Smooth Premier finish in Sycamore.

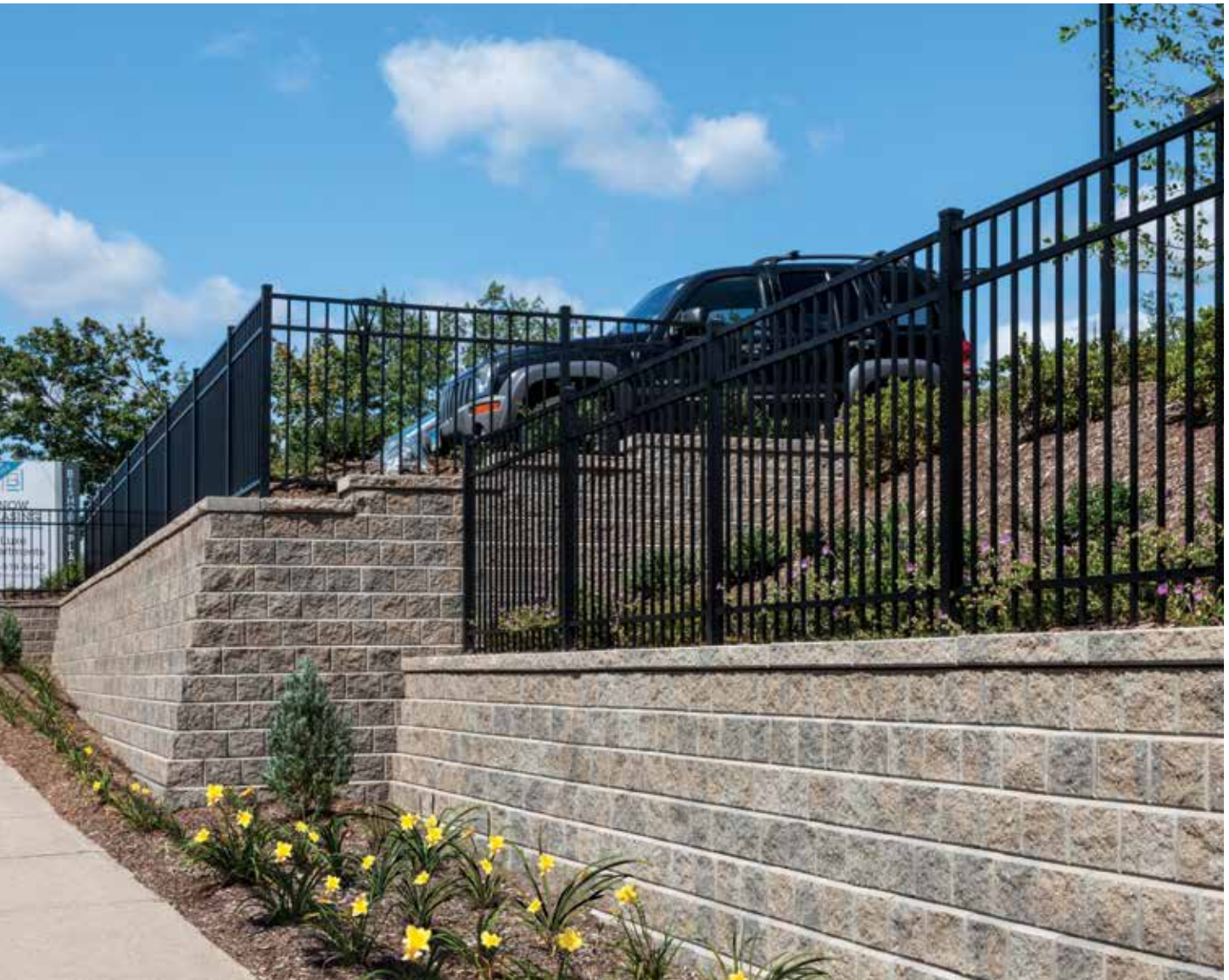


PROJECT: Langley Terrace, Newton, MA. DESIGN: G2 Collaborative. PRODUCT: U-Cara® Multi Face Wall with Smooth Premier fascia panels in Steel Mountain.

RETAINING WALLS range from structural to non-structural, contemporary to natural, and large-scale to small. Unilock offers many different styles to meet the needs of the application and aesthetic for your project with additional resources, such as design support available as you need it.



PROJECT: Peoples Bank Yankee Peddler, Holyoke, MA. **DESIGN:** Tighe & Bond in partnership with Coweaset Engineering. **PRODUCT:** Rivercrest® Wall in Coastal Slate.



PROJECT: Bishops Place, West Hartford, CT. **DESIGN:** CR3 LLP. **PRODUCT:** Pisa2™ / Concord Wall® in Almond Grove.



PROJECT: Langley Terrace, Newton, MA. **DESIGN:** G2 Collaborative. **PRODUCT:** U-Cara® Multi Face Wall with Smooth Premier fascia panels in Steel Mountain.



PROJECT: Roxbury Latin School, Roxbury, MA. **DESIGN:** Stantec. **PRODUCT:** SienaStone™ in Granite Blend.



PROJECT: Auburn Hills Amphitheater, Auburn Hills, MI. **DESIGN:** OHM Advisors. **PRODUCT:** Rivercrest® Wall and Ledgestone® Coping in Buff.



PROJECT: Crystal Gardens, Markham, ON. **DESIGNER:** Cosburn Nauboris Ltd. **PRODUCT:** U-Cara® Multi-Face Wall with Umbriano finish fascia panels in Summer Wheat and Midnight Sky.

THE DETAILS

Every project's success is directly proportionate to the attention paid to the many details. At Unilock, we take pride in supporting designers with those fine details, from **product choice and finish selection, to cross-sections, construction documents and installation guidelines.** We're present from the very beginning of your design process right through to project completion.



THE BEST Product

SUPERIOR CHOICE

Surfaces must be engineered to withstand the test of time. Unilock pavers not only satisfy requirements for structural integrity, safety, cost, environmental impact, maintenance and field-proven performance, but they also provide superior skid resistance and weathering. Because of the unique combination of product strength, ease of maintenance, aesthetics and reusability, they have a better life-cycle cost than other products. Pavers are a flexible system, so their surface area can move slightly without jeopardizing structural integrity. Concrete pavers require less maintenance than other products and can withstand heavy loading. They can also be manufactured in different shapes, colors and finishes for your large scale projects.

STRENGTH AND DURABILITY

All Unilock pavers and walls are manufactured to meet and exceed the ASTM standards without compromising the composition. They are stronger than other materials with their higher compressive strength, which is achieved by a specialized manufacturing process, and have lower absorption rates that are essential in freeze thaw climates. At Unilock, we will not sacrifice quality for cost.

STANDARDS & TEST METHODS

ASTM STANDARDS - PAVERS & SLABS

Type	ASTM	Compressive Strength	Water Absorption	Freeze/Thaw (49 cycles)	Flexural Strength	Flexural Strength	Dimensional Accuracy
PAVERS	ASTM C936	8,000 PSI MIN.	< 5%	<500 G/M2			± 1/16" (1.6MM)
SLABS	ASTM C1782	8,000 PSI MIN.	< 5%	<500 G/M2	>725 PSI AVG.	>650 PSI MIN.	± 1/16" (1.6MM)

Unilock® meets and exceeds C936 paver manufacturing standards and C1782 Standard Specification for Paving Slabs.

Pavers

- > C140 for Compressive Strength and Absorption
- > C1645 for Freeze-Thaw Durability

Slabs

- > C140 for Absorption and Compressive Strength
- > ASTM C1645 for Freeze-Thaw Durability
- > ASTM C1782 or CSA 231.1 for Flexural Strength

ASTM STANDARDS - WALLS

TYPE	ASTM	ASTM/ NCMA Compressive Strength	Water Absorption	Freeze/Thaw (50 cycles)	Dimensional Tolerances
WALLS	ASTM 1372 NCMA Zone 3	3000/5,500 PSI MIN.	< 7LB/FT ²	≤1.5%	± 1/8" (3.2MM)

Unilock meets and exceeds C1372 Standard Specification for Dry Cast Segmental Retaining Wall Units.

Dry Cast Retaining Walls

- > C140 for Compressive Strength and Absorption
- > ASTM C1262 for Freeze-Thaw Durability
- > NCMA Zone 3 with de-icing salt exposure guidelines

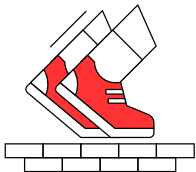
ACCESSIBILITY

The American with Disabilities Act Accessibility Guidelines (ADAAG) provides measurable criteria to determine compliance, not individual product evaluation. Gaps, joints or openings, greater than ½" horizontal and ¼" vertical should be avoided as they can disrupt wheelchair maneuvering. (United States Access Board – Guidelines and Standards)

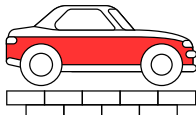
THE IMPORTANCE OF ASPECT RATIO

Simply defined, aspect ratio is the overall length of a paver divided by its height.
LENGTH/HEIGHT = ASPECT RATIO

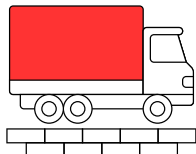
If an insufficient aspect ratio is used, any flexing or rocking caused by movement on the surface such as pedestrian or vehicular traffic, could result in breakage of the paver units. Not only is this breakage unsightly, but it can also compromise the integrity of the segmental system.



OVER 5 : 1
Pedestrian Only



4 : 1
Light-Duty
Vehicular

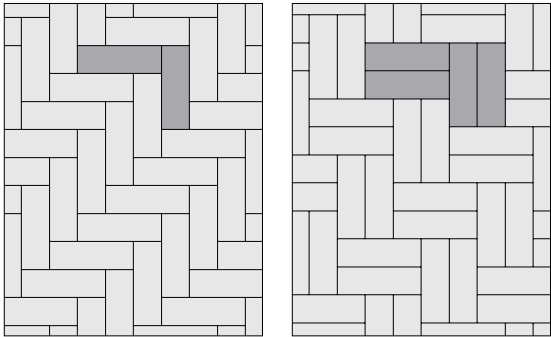


3 : 1 OR LESS
Heavy-Duty
Vehicular

LAYING PATTERN CONSIDERATIONS

The laying pattern used in your application can also add a significant amount of strength to your design. A herringbone pattern provides the best ‘lock-up’, adding strength against rotational forces such as tires at a roadway intersection in the same way the ‘L’ shaped paver provides maximum performance.

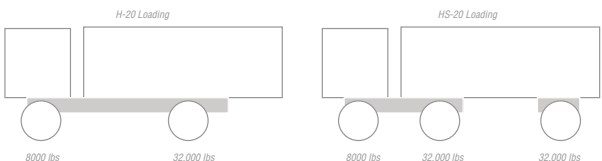
*SPEAK WITH YOUR UNILOCK REPRESENTATIVE
FOR MORE INFORMATION.*



HEAVY-DUTY CONSIDERATIONS

Unilock has a variety of shapes and sizes available to fit your heavy-duty application and style preferences. For maximum performance where twisting and tipping will be factors, consider the unique “L” interlocking shape as it provides superior resistance under heavy loads. The patented locking features work in tandem with the “tri-axis” technology. The result? A stronger, more stable pavement surface.

Heavy-duty Unilock paving systems are also designed for rapid mechanized installation, making them competitive and affordable.



H-20 & HS-20 LOAD RATING

Similar to top of deck stresses per AASHTO H-20 loading conditions (32,000 lbs/14,500 kg), Unilock pavers can support 3-4 axle vehicles. This would include delivery, fire and semi-truck and trailer traffic in light-duty roadway applications.

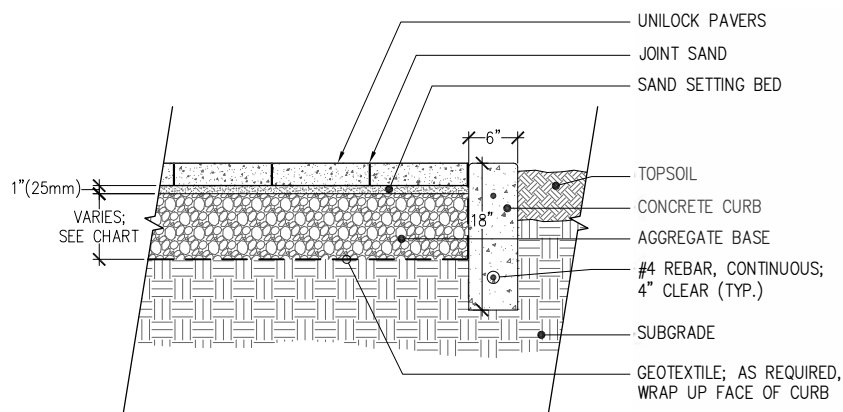
APPLICATION BY SIZE, THICKNESS & PRODUCT

Product	Product Size	Thickness	Pedestrian	Commercial Pedestrian*	Light-Duty Vehicular	Commercial Vehicular	Heavy-Duty	Permeable
Anchorlock™		80 mm	✓	✓	✓	✓	✓	
Artline™		100 mm	✓	✓	✓			
Artline™		70 mm	✓					
Beacon Hill™		80 mm	✓	✓	✓			
Beacon Hill™		60 mm	✓					
Bristol Valley™		60 mm	✓					
Brussels Block®		70 mm	✓	✓	✓			
Brussels Dimensional™ Paver		100 mm	✓	✓	✓	✓		
Hex / City Park Paver™		70 mm	✓	✓	✓	✓		✓ (80 mm)
Copthorne®		60 mm	✓	✓	✓	✓		
Courtstone®		60 mm	✓	✓		✓		
Dura-Mat		100 mm			✓			✓
Eco-Line®		100 mm	✓	✓	✓	✓	✓	✓
Eco-Optiloc™		80 mm	✓	✓	✓	✓	✓	✓
Mattoni™		70 mm	✓	✓	✓			
Optiloc™		80 mm	✓	✓	✓	✓	✓	
Richcliff®		60 mm	✓	✓	✓	✓		
Thornbury™		70 mm	✓	✓	✓			✓
Town Hall®		70 mm	✓	✓	✓	✓		✓
	36 x 36	100 mm	✓					
	18 x 36	100 mm	✓					
	24 x 24	100 mm	✓	✓	✓			
	24 x 24	70 mm	✓					
	24 x 24	50 mm	✓					
	18 x 24	50 mm	✓					
	16 x 24	100 mm	✓	✓	✓ **			
	12 x 36	100 mm	✓					
	12 x 24	150 mm	✓	✓	✓	✓		
	12 x 24	100 mm	✓	✓	✓ **			
	12 x 24	70 mm	✓					
	12 x 24	50 mm	✓					
	12 x 18	100 mm	✓	✓	✓	✓		
	8 x 24	150 mm	✓	✓	✓			
	8 x 24	100 mm	✓	✓	✓ **			
	6 x 24	150 mm	✓	✓	✓	✓		
	6 x 24	70 mm	✓					
	16 x 16	100 mm	✓	✓	✓	✓		
	16 x 16	80 mm	✓	✓	✓			
	16 x 16	70 mm	✓	✓	✓			
	8 x 16	100 mm	✓	✓	✓	✓		
	8 x 16	70 mm	✓	✓	✓			
	7 x 14	60 mm	✓					
	7 x 14	70 mm	✓	✓	✓			
	7 x 14	80 mm	✓	✓	✓			
	4 x 16	100 mm	✓	✓	✓	✓		✓
	12 x 12	100 mm	✓	✓	✓	✓		
	12 x 12	70 mm	✓	✓	✓			✓
	6 x 12	100 mm	✓		✓	✓	✓	
	6 x 12	80 mm	✓	✓	✓	✓		
	6 x 12	70 mm	✓	✓	✓			
	10 x 10	80 mm	✓	✓	✓	✓		✓
	5 x 10	80 mm	✓	✓	✓	✓	✓	✓
	8 x 8	100 mm	✓	✓	✓	✓	✓	
	8 x 8	80mm	✓	✓	✓	✓		
	8 x 8	70 mm	✓	✓	✓	✓		
	6 x 8	70 mm	✓	✓	✓	✓	✓	
	4 x 12	100 mm	✓	✓	✓	✓	✓	
	4 x 12	80 mm	✓	✓	✓			
	4 x 12	70 mm	✓	✓	✓			
	3 x 12	100 mm	✓	✓	✓	✓	✓	✓
	6 x 6	80 mm	✓	✓	✓	✓		
	6 x 6	70 mm	✓	✓	✓	✓		
	5 x 5	80 mm	✓		✓	✓		✓
	4 x 8	80 mm	✓	✓	✓	✓	✓	
	4 x 8	70 mm	✓	✓	✓	✓		
	4 x 8	60 mm	✓	✓	✓			
	4 x 4	70 mm	✓	✓	✓	✓		
	3 x 6	100 mm	✓	✓	✓	✓	✓	

All pavements require a site specific design. A Herringbone laying pattern is essential for most vehicular trafficked pavements and becomes more critical as the demands on the pavements increase. Please contact your local Unilock Representative for specific design details. This chart is only a guideline. *Subject to occasional light duty service vehicles. **Installed on a concrete base.

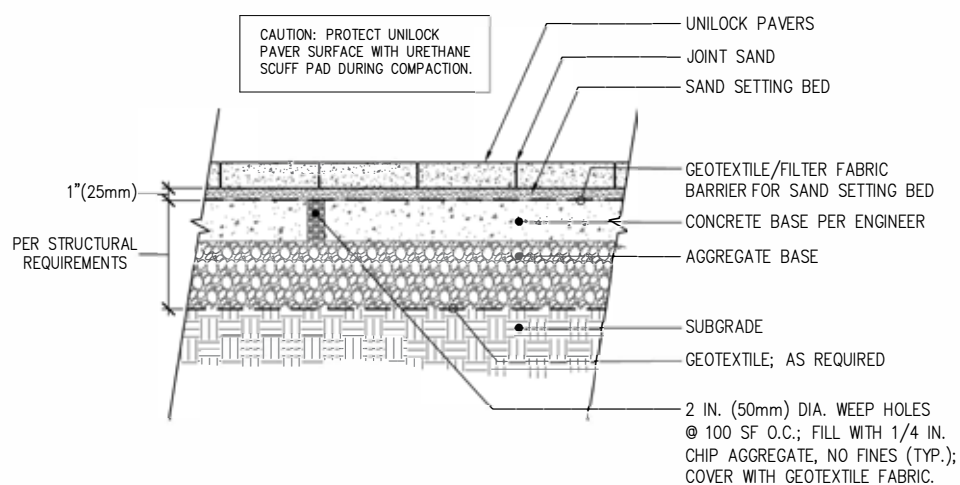
NON-PERMEABLE INSTALLATIONS

Commercial environments are demanding and having the correct base design is essential. Below are a couple of examples of the base detail; however, every base detail must be specific to site conditions and load capacity. Contact your Unilock Representative to learn more.



PAVER INSTALLATION ON GRANULAR

From pedestrian to heavy-duty applications this detail is tried and true. Contact your Unilock Representative to learn more. Specific installation details may vary based on site conditions.



PAVER INSTALLATION ON SAND OVER CONCRETE

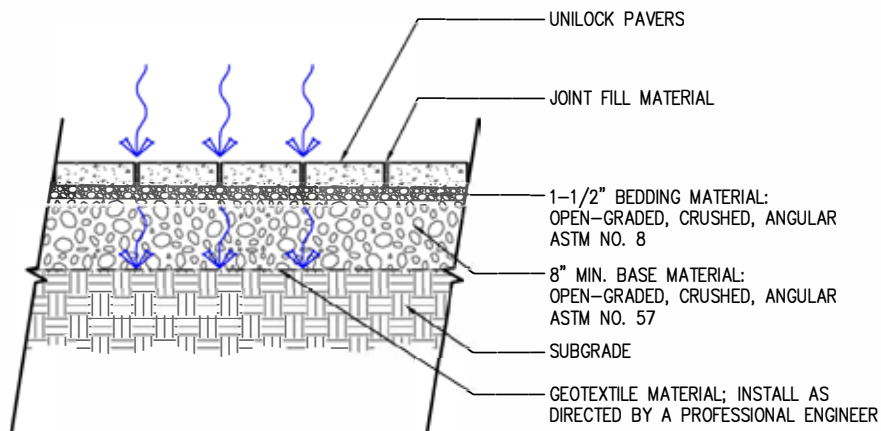
Ideal for heavy-duty applications, this detail ensures adequate base support under heavy loads. Approving the proper sand type and gradation is critical for lock up and drainage in vehicular applications. Contact your Unilock Representative to learn more. Specific installation details may vary based on site conditions.

PERMEABLE INSTALLATIONS

Similar to the non-permeable paver systems structural component, permeable paver installations offer secondary purpose for capturing and detaining rainwater. Common uses can range from sidewalk and plaza areas, to heavy-duty parking lots and roadways and include various base depths as shown in the two details below.

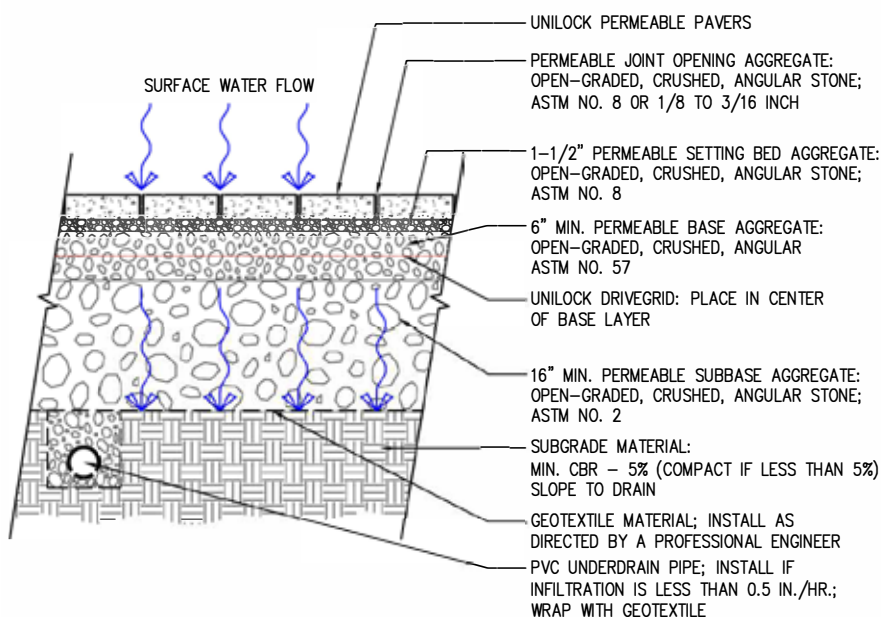
PERMEABLE ON OPEN GRADED AGGREGATE - LIGHT DUTY

This cross-section is an example of a light-duty pedestrian sidewalk application. Contact your Unilock Representative to learn more. Specific installation details will vary based on site conditions.



PERMEABLE ON OPEN GRADED AGGREGATE - HEAVY-DUTY

Heavy-duty permeable applications require additional base support as illustrated below. This cross section is only an example. Contact your Unilock Representative to learn more. Specific installation details will vary based on site conditions.



ARCHITECTURAL SLABS

Unilock has many options for paving products on roof decks. Various installation methods will determine the appropriate products for the application. While pedestal installation typically utilizes the square or large slabs, a granular installation will extend your product choice and design flexibility. **Ask your Unilock Representative for details.**

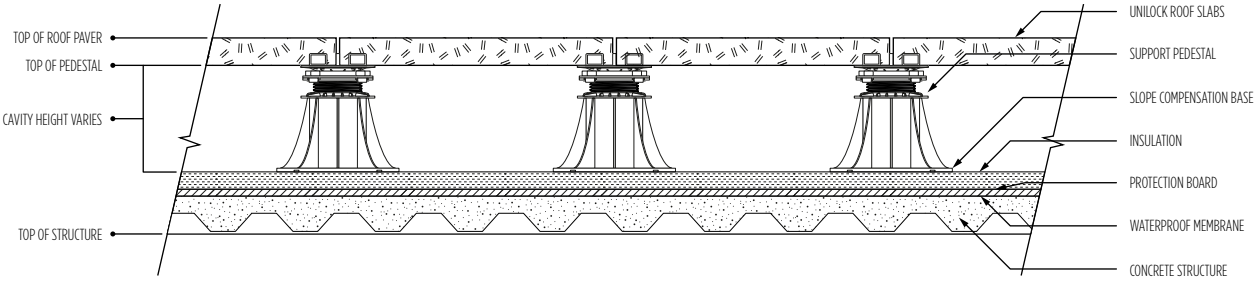


Product Type	Thickness	Shape	Product Weights
Arcana™ + Skyline™	50mm	606 x 606mm	24 lbs/sq.ft.
Beacon Hill™ XL	60mm	900 x 540mm** 720 x 540mm**	27.5 lbs/sq.ft.

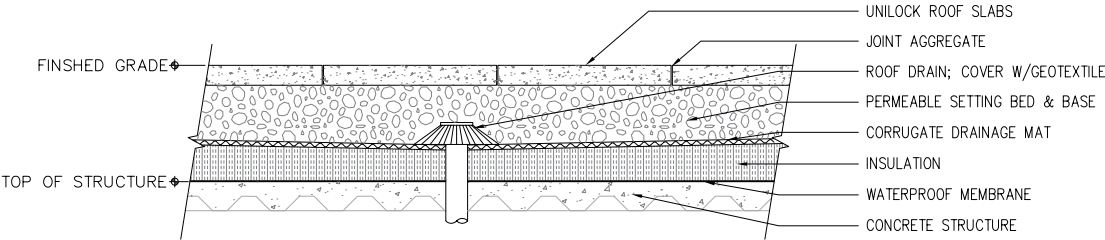


PEDESTAL SYSTEM

Unilock offers adjustable and stackable pedestal systems for your project. Contact your Unilock Representative to learn more. Specific installation details may vary based on pedestal height, load-bearing requirements, safety standards and wind-lift.



GRANULAR BASE SYSTEM



The cross sections shown are examples of the type of installation systems and technical features of Unilock products. Unilock shall not be deemed responsible for improper use of the product or of damage deriving from any use different from those recommended

and/or installation procedures not in line with the following instructions relevant to a raised installation. **All roof top slab/pedestal installations must be engineered by a professional engineer.**

LEED® Credit Opportunities

LEED, Leadership in Energy & Environmental Design, is a green building certification program that recognizes best-in-class building strategies and practices that have a positive impact on the health of occupants, while promoting renewable, clean energy. To receive LEED certification, building projects satisfy prerequisites and earn points to achieve different levels of certification. Unilock products can help with your certification goals.

POTENTIAL LEED CREDITS FOR UTILIZING PERMEABLE PAVERS

Rainwater management: LEED v4.1

Up to three points can be achieved for retaining rainwater onsite based on the percentile kept. 85% (zero lot line projects only) • 3 points, 95% - 2 points and 98% - 3 points. (all except Healthcare - subtract one point). *See LEED v4.1 for more specific project/site details.*

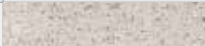














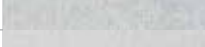







Heat Island Reduction - Non-Roof: LEED v4.1

Paving materials with a three-year aged solar reflectance (SR) value of at least 0.28. If three-year aged value information is not available, use materials with an initial SR of at least 0.33 at installation OR use an open grid pavement at least 50% pervious • 2 points (except Healthcare - 1 point). *See LEED v4.1 for more specific site calculations.*

Solar Reflectance

Solar Reflectance Index (SRI) is a criterion used by USGBC that measures values of sunlight and radiation bouncing from built surfaces. It is used to measure urban heat island effects in city centers. Dark pavement absorbs heat during the day and then releases it at night. This process creates a situation that causes urban centers to stay warmer all the time which contributes to air pollution and increased energy consumption. Careful selection of materials and colors can help reduce urban heat island effects.

SAMPLE OF QUALIFIED UNILOCK COLORS (≥33)

Surface Finish	Color	Swatch	Solar Reflectance	SRI*
Umbriano™ (mottled)	Grenada White		0.45	52
	Summer Wheat		0.42	48
	Winter Marvel		0.35	38
Series™ (Exposed Granite)	SS0025		0.42	48
	SS0016		0.41	46
	Golden Tan		0.40	45
	Chardonnay Tan		0.39	44
	Peppered Granite		0.38	42
	Coral Gem		0.37	41
	SS0026		0.37	41
	Ice Grey		0.35	38
	Mineral Ice Grey		0.31	33
Arcana™	Lugano		0.46	53
	Modena		0.46	53
Smooth Premier	Cream		0.49	57
	TX Active White		0.46	53
	SS0080		0.44	50
	Chamois		0.41	46
	Tuscany Blend		0.39	44
	Steel Mountain		0.30	32
Standard Finish	Canvas		0.33	36
	River		0.32	34
	Nevada		0.31	33

Materials and Resources: LEED v4.1

- > Building Product Disclosure and Optimization - Sourcing of Raw Materials
 - Sourcing of Raw Materials and Extraction • 1 point
- > Building Product Disclosure and Optimization - Material Ingredient Reporting
 - Material Ingredient Reporting • 1 point

Values may change slightly by region due to variations in local aggregate and granite.

Please be sure to contact your Unilock Representative for a comprehensive and current list of SRI product values.

Unilock is the only company in North America with memberships in Eurobeton and Stein + Design, two prestigious European concrete product innovation groups, which give us exclusive access to **leading edge product designs** and manufacturing processes.



ENDURACOLOR™ ARCHITECTURAL FINISHES

Only Unilock offers EnduraColor Architectural Finishes. These products set a new standard for everlasting beauty thanks to proprietary blends of some of nature's highest performing minerals such as granite and quartz, combined with manufacturing technologies that are unique to Unilock.



ENDURACOLOR™

The refined surface of Unilock EnduraColor products is achieved with a **two-step manufacturing process** that combines a base of coarser aggregates for a **stronger foundation**, with concentrated color and **wear-resistant finer aggregates on top**. This process protects the surface from the appearance of fading over time because the top layer prevents large, lighter color aggregates from ever showing through. Now, with U-Cara®, walls are available with EnduraColor too!



CLASSIC

Unilock Classic pavers and walls are manufactured to exceed ASTM standards for quality and strength. Available in classic shapes and styles, these products utilize a traditional **product mix of large and small aggregates**, that is consistent from top to bottom, with color mixed throughout.

Unilock TECHNOLOGIES

All **products are not created equal**. Many products look great when they're first installed, but after time the difference shows. For **over 48 years**, the very best designers and contractors have **relied on Unilock** to supply cutting edge paver and wall products that enable them to build extraordinary projects that stand the test of time.



Reala™

Utilizing Reala technology, a multitude of natural stone surfaces, brick and historic cobblestones are cast to create a wide variety of authentic textures with consistent dimensions that are more cost efficient to install.

Products with Reala:

COPTHORNE®, COURTSTONE®, RICHCLIFF®, TOWN HALL®, RIVERCREST® WALL, LEDGESTONE™, AND MACKINAW™

Ultima™

Only Unilock has the technology in North America to manufacture Ultima Concrete resulting in pavers up to four times stronger than poured concrete. With Ultima, the look you purchase is the look that will last.

Products with Ultima:

COPTHORNE®, COURTSTONE®, RICHCLIFF® AND TOWN HALL®



ColorFusion™

The look of natural granite is achieved when color and granite particles are randomly dispersed using proprietary ColorFusion technology to achieve a unique mottled surface.

Products with ColorFusion:
UMBRIANO™ AND U-CARA®



EasyClean™

With EasyClean, the occasional spill doesn't have to leave a lasting mark on your new pavement. Unlike costly after-market sealers which merely coat the top, EasyClean goes beyond the surface and becomes integral to the product during manufacturing, making spills and other debris easier to clean before a stain can develop. Ask your Unilock Representative for more information about adding EasyClean to the products on your commercial projects.

Products with EasyClean:
ARCANA™, GRANITO™, MATTONI™, UMBRIANO™, SENZO™, AND U-CARA®

Nothing protects pavers from stains like EasyClean.

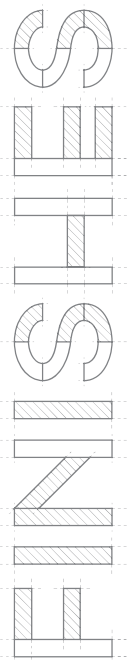
✓	Pavers are pre-sealed at the factory
✓	Enhanced resistance to weathering
✓	Reduced dirt absorption
✓	Stains from leaves, coffee, ketchup, mustard, wine and BBQ oils are easier to remove

Classic Coat

Factory sealed standard finish pavers are available with Classic Coat to protect the surface texture and color. Ask your Unilock Representative for more information about using products with Classic Coat on your commercial projects to save time and money post installation.

Products with Classic Coat:
CONSULT YOUR REGIONAL PRODUCT DATA

Unilock has an extensive collection of in stock and quick ship products to suit your project. Our **vast array of sizes, edges, finish and color options** make it easy to achieve your design vision. Speak with your Unilock Representative about in stock options available in your market.



ARCHITECTURAL FINISHES

Proprietary blends of some of nature's highest performing minerals such as granite and quartz are combined with manufacturing technologies that are exclusive to Unilock.



Umbriano™ Mottled Finish with ColorFusion™ and EasyClean™



Senzo™ Matte Finish with EasyClean™



Series™ Exposed Granite Finish



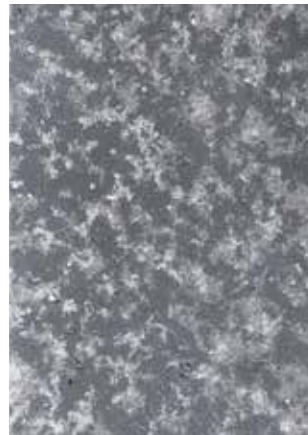
Il Campo® Brushed Finish



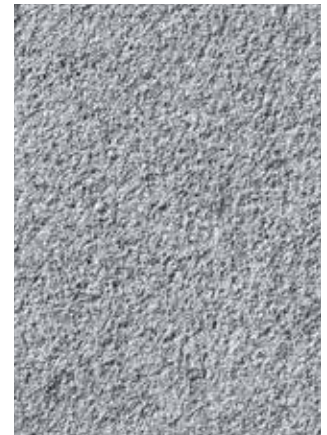
Smooth Premier Finish



Flagstone Premier Finish



Granito™ Boldly Mottled Finish with EasyClean™



Revela™ Shot-Blast Finish



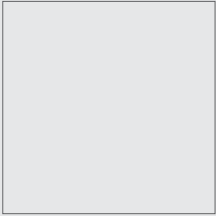
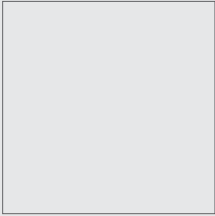
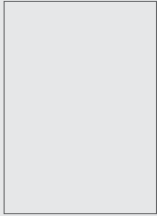

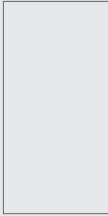
Classic Thru-Mix Finish

CLASSIC FINISH


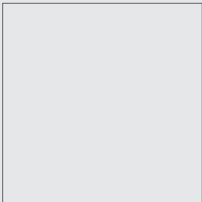

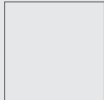



Classic finish utilizes a traditional product mix of large and small aggregates, that is consistent from top to bottom, with color mixed throughout. Rest assured they are manufactured to exceed ASTM standards for quality and strength.

SHAPES & SIZES

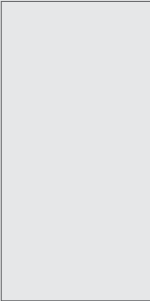
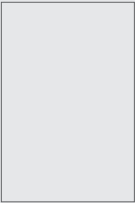

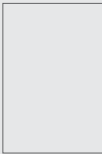







SLABS

				
23½ x 23½ x 2 (600 x 600mm) T: 50mm	23½ x 23½" (606 x 606mm) T: 50mm	17½ x 23½" (453 x 606mm) T: 50mm	11½ x 23½" (301 x 606mm) T: 50mm	11½ x 23½ (300 x 600mm) T: 50mm





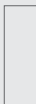
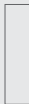

SQUARES

						
36 x 36" (900 x 900mm) T: 100mm	24 x 24" (600 x 600mm) T: 50, 70 or 100mm	16 x 16" (400 x 400mm) T: 70, 80 or 100mm	12 x 12" (300 x 300mm) T: 70 or 100mm	8 x 8" (200 x 200mm) T: 70, 80 or 100mm	6 x 6" (150 x 150mm) T: 70 or 80mm	4 x 4" (100 x 100mm) T: 70mm

RECTANGLES

										
18 x 36" (450 x 900mm) T: 100mm	16 x 24" (400 x 600mm) T: 100mm	12 x 24" (300 x 600mm) T: 50, 70, 100 or 150mm	12 x 18" (300 x 450mm) T: 100mm	8 x 16" (200 x 400mm) T: 70 or 100mm	7 x 14" (180 x 360mm) T: 60, 70 or 80mm	6 x 12" (150 x 300mm) T: 70, 80 or 100mm	5 x 10" (120 x 240mm) T: 80mm	6 x 8" (150 x 200mm) T: 70mm	4 x 8" (100 x 200mm) T: 60, 70 or 80mm	3 x 6" (75 x 150mm) T: 100mm

PLANKS

						
12 x 36" (300 x 900mm) T: 100mm	8 x 24" (200 x 600mm) T: 100 or 150mm	6 x 24" (150 x 600mm) T: 70 or 150mm	4 x 16" (100 x 400mm) T: 100mm	4 x 12" (100 x 300mm) T: 70, 80 or 100mm	3 x 12" (75 x 300mm) T: 100mm	2¼ x 9½" (60 x 240mm) T: 70mm

RANDOM BUNDLES		
Artline™ Platform 6% - 17% x 4% and 7% (170-450 x 125 and 187.5mm) T: 70mm or 100mm		Beacon Hill™ Platform 21 x 14, 14 x 14, 7 x 14" (540 x 360, 360 x 360, 180 x 360mm) T: 60 or 80mm
Thornbury Platform 13% x 16%, 13% x 8%, 6% x 8" (350 x 420, 350 x 210, 170 x 210mm) T: 70 or 80mm	Tribeca Platform 5% x 12, 5% x 9, 5% x 7" (130 x 305, 130 x 230, 130 x 175mm) T: 60mm	Small Random Platform 6 x 8, 6 x 6, 4 x 6" (150 x 200, 150 x 150, 100 x 150mm) T: 70mm

GEOMETRICS			
8 x 8" (200 x 200mm) T: 70mm	10% x 10%" (260 x 260mm) T: 80mm	6x12x16%" (150 x 300 x 424mm) T: 70 or 80mm	8% x 5%" (147 x 224mm) T: 80mm

PERMEABLE OPTIONS				
8 x 8" (200 x 200mm) T: 80mm	10% x 10%" (260 x 260mm) T: 80mm	9% x 9%" (250 x 250mm) T: 80mm	4 x 16" (100 x 400mm) T: 100mm	3 x 12" (75 x 300mm) T: 100mm
12 x 12" (300 x 300mm) T: 100mm	10 x 10" (240 x 240mm) T: 80mm	5 x 10" (120 x 240mm) T: 80mm	5 x 5" (120 x 120mm) T: 80mm	Eco-Line® Random Bundle 9% - 14" x 3 3/8" and 4" T:100mm

Not all shapes and sizes are available in all regions, or in all finish or edge options (not shown). Consult your Unilock Representative for more information. All measurements are nominal.

T = height / thickness of the slab or paver



Since **Unilock introduced permeable pavers to North America** more than twenty-five years ago, we have steadily increased our selection of sizes, shapes, colors and finishes. Our permeable pavers are **suitable for a variety of applications** and have joint spacing that complies with the Americans with Disabilities Act.



Permeable Paver Innovation

Unilock introduced permeable paving to North America in 1991, and has continued to lead the charge with new innovative products. Our extensive involvement in permeable paving and long-standing international alliances have allowed us to gain valuable knowledge, experience, and best practices that we can share with clients to help ensure their projects are a success.

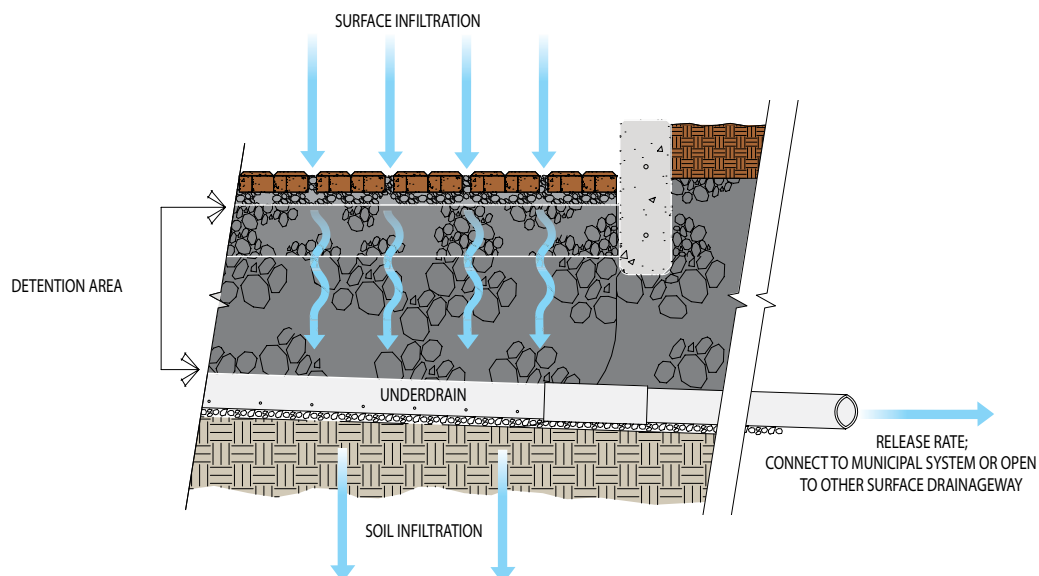


The problem with stormwater is that it has to have **somewhere to go**, ideally back into the ground. Today's urban environments are covered with impervious hard surfaces such as rooftops, parking lots and highways in excessive amounts, instead of pervious fields and forests. This runoff flows into storm drains and ultimately into local rivers, lakes and streams, carrying heavy metals, bacteria and other pollutants that foul our water and put our health at risk.

Some communities use separate systems for sewage and stormwater, however, older urban communities use

combined sewer systems that allow for overflow from the two inputs that release directly into local rivers and coastal waters when the system is overloaded. This allows for millions of gallons of raw waste and other pollutants into the waters we may fish, swim, boat or may be sources of drinking water.

Storm frequencies, intensities and duration are shifting and in many regions more severe storms occur more frequently than expected. Increased rainfall and snowfall will place increased demands on stormwater sewer and flood control systems.





PROJECT: Yolanda Garcia Park, Bronx, NY. **DESIGN:** New York City Parks. **PRODUCT:** Permeable Hex / City Park Paver™ with Smooth Premier finish in Dark Charcoal, Medium Grey and White.

Permeable Paver DESIGN CONSIDERATIONS

Rainfall intensity and duration are typically analyzed together for traditional non-permeable surfaces. However, with a permeable paver surface, intensity is less of a factor as the surface infiltration rate will exceed the capabilities of most storms. A permeable paver surface is **capable of handling more than 100" (2,540 mm) per hour**. The paver joints must be adequately maintained to allow for maximum infiltration.

Although many rainfall events only last for a few minutes, for larger rainfall events, the impact of duration is important to recognize. A heavy rain could fall at the intensity rate of 6" (152 mm) per hour, but the duration may only last for 10 minutes with a resulting actual rain amount of only 1" (25 mm). Longer duration events can often be more demanding, even with less intensity. Actual monthly rainfalls in the Midwest U.S., for example, average 4" (100 mm). Therefore, permeable paving systems can easily contain most rainfall events.

Runoff coefficient (C value) is used to measure the percentage of water that runs off different surface types. For example, bituminous asphalt has a C value of 0.85. This means that during a rainfall, 85 percent of the water will run off the surface. (Source: Design and Construction of Sanitary and Storm Sewers, American Society of Civil Engineers, New York, p. 332, 1969). In comparison, turf has a C value of 0.15 or 15 percent. **The C value**

of permeable paving, with up to a 5 percent slope, is actually zero, unless the rainfall intensity exceeds the surface infiltration rate or the entire open-graded base reaches capacity. With a properly designed permeable paver system, capacity will rarely be reached. To achieve maximum surface infiltration, maintenance of the joints may be necessary.

Soil infiltration is another way to absorb runoff. During the site investigation project phase, conducting a geotechnical or porosity test will determine the soil infiltration rate, which will establish stormwater design requirements. Typical industry recommendations suggest installing an underdrain for soil with less than 0.5" (13 mm) per hour of infiltration. It is possible for underdrain systems to be eliminated for soils with infiltration rates greater than 0.5" (13 mm) per hour.

Release rate refers to the volume of water that is allowed to be discharged into a municipal system or waterway, usually measured in cubic feet per second. Many stormwater regulatory agencies require that the post-development release rate not exceed pre-development conditions. **Permeable paving slows and detains stormwater in the open-graded base so that it can be gradually released.** Local jurisdictions should be contacted for required release rates.

Benefits of INFILTRATION

Rainwater infiltration is extremely important to the groundwater supply. According to the U.S. Geological Survey, one of America's most important natural resources is groundwater. Half of the drinking water in the U.S. comes from groundwater, with the balance coming from lakes and rivers. It is vital to agriculture and other industries, as well as essential for ensuring the health of rivers, streams, wetlands and other water bodies. Urban sprawl contributes to the decrease in pervious area for rainwater infiltration and reduced groundwater levels. Soil infiltration is a simple method for ensuring future water availability.

Installing a permeable paver system above porous soils allows for rainwater infiltration, reducing runoff and flooding. Most soils, even clay, allow for some infiltration. Soils with high porosity, such as sand, can have a higher infiltration rate than the actual rate of rainfall. For example, if it is raining at a rate of 2" (51 mm) per hour, and the soil has an infiltration rate of 4.5" (114 mm) per hour, the soil will absorb water before it can run off. Even poor soil with a low infiltration rate will work. For example, a soil with 0.25" (6 mm) per hour of infiltration will have complete infiltration after about four hours per inch of rainfall.

TYPICAL INFILTRATION RATES OF VARIOUS SOIL GROUPS

Soil Conservation Service Group	Typical Soil Type	Saturated Infiltration Rate	
		in/hr	mm/hr
A	Sand	8.27"	210 mm
A	Loamy Sand	2.41"	60 mm
B	Sandy Loam	1.02"	26 mm
B	Loam	0.52"	12.7 mm
C	Silt Loam	0.27"	6.8 mm
C	Sandy Clay Loam	0.17"	4.3 mm
D	Clay Loam and Silty Clay Loam	0.09"	2.3 mm
D	Clay	0.06"	1.5 mm

INFILTRATION RATES FOR UNILOCK PERMEABLE PAVERS *Newly Installed*

		PAVER	JOINT MATERIAL	Joint Width*	Void Space*	Infiltration Rate**	Minimum Infiltration Rate** for Rainfall intensity of:			
							2"/hr	4.5"/hr	6.5"/hr	11"/hr
ADA ACCESSIBLE	Small: 1/4" Joint	Eco-Line®	ASTM # 9 Aqua Rock	6.25mm	5.8%	560	34	78	112	190
		Eco-Promenade®	ASTM #9 - SEK Chip	7 mm	10.12%	934	20	44	64	109
		Eco-Priora™ Herringbone	ASTM #9 - SEK Chip	7 mm	7.08%	676	28	64	92	155
		Eco-Priora™ 5 x 10	Kafka - 1/8 to 3/16"	7 mm	6.8%	633	29	66	96	162
		Eco-Priora™ Pattern H	ASTM #9 - Roscoe Chip	7 mm	5.7%	509	35	79	114	193
		Eco-Priora™ Pattern H	IDOT FA 22	7 mm	5.7%	347	35	79	114	193
		Eco-Priora™ 10 x 10	Kafka - 1/16 to 3/16"	7 mm	4.6%	327	43	98	141	239
	Medium: 1/8" to 3/8" Joint	Town Hall®	Kafka - 1/8 to 3/16"	9mm	6.5%	784	31	69	100	169
		City Park Paver™	ASTM #9 - SEK Chip	10mm	4.2%	934	48	107	155	262
	Large: 3/8" to 1/2" Joint	DuraFlow™	ASTM #8 IDOT CA-16	12mm	8%	912	25	56	81	138
		Eco-Optiloc™	HPB	12 mm	7.3%	404	27	62	89	151
		Eco-Optiloc™	ASTM #8 IDOT CA-16	12 mm	7.3%	912	27	62	89	151
	Extra Large: >1/2"	Tribeca Cobble™	ASTM #9 Aqua Rock	10mm	5.6%	400	36	80	116	196
		Thornbury™	ASTM # 9 Aqua Rock	18mm	4.4%	385	45	102	148	250
		Eco-Stone™	ASTM #8 IDOT CA-16	6 mm	10.18%	784	19	42	60	102
		Ecoloc®	Kafka - 1/8 to 3/16"	7 mm	12.18%	1060	18	41	59	99

NOTE: The 2", 4.5", 6.5" and 11" per hour Rainfall Intensity examples are based on common 5 minute rainfall intensity charts and are not the same as total rainfall quantity. *Joint Width is measured at the top of the paver. Void Space is calculated at the base of the paver. **Infiltration rate is inches per hour based on testing done when first installed and is an approximation.

Detention and VOLUME CONTROL

BASE STORAGE CAPACITY

Traditional surface detention ponds which act as holding facilities for rainfall are an inefficient use of space. For most land uses and all impervious areas, such as roofs, roads and parking lots, stormwater runoff flows through a system of pipes that release it into detention or retention ponds. This valuable surface area could be much more effectively utilized.

A permeable paving base for stormwater detention is a very efficient use of land. With this system, the surface is pervious, allowing detention area to be contained underneath. The detention is created under every square foot of permeable paving, as deep as necessary.

Permeable paver systems use crushed, angular, open-graded aggregate base materials. These materials are entirely different from those used for traditional impervious roads and parking lots. Those traditional systems use dense-graded aggregates containing fines, making them extremely slow-draining. Conversely, the **use of open-graded aggregates provides a void space or porosity of approximately 40 percent.** This is utilized for detention and allows for a rapid surface infiltration rate of over 500" (12,700 mm) per hour (see page 30 for aggregate infiltration rates).

CRITERIA				RAINWATER HARVEST VOLUME			BASE STORAGE CAPACITY			SURPLUS / (DEFICIT) STORAGE			% USED
Rainfall In/Hr (mm/hr)	Surface Area Ft2 (m2)	Base Depth In (mm)	Void Space	Cubic Ft (m3)	Acre Feet	Gallons (m3)	Cubic Ft (m3)	Acre Feet	Gallons (m3)	Cubic Ft (m3)	Acre Feet	Gallons (m3)	
1 (25 mm)	43,560 (4,047 m ²)	14 (35 mm)	40%	3,630 (103 m ³)	0.08	27,154 (103 m ³)	20,328 (576 m ³)	0.47	152,064 (576 m ³)	16,698 (473 m ³)	0.38	124,910 (473 m ³)	17.9%
1 (25 mm)	43,560 (4,047 m ²)	18 (46 mm)	40%	3,630 (103 m ³)	0.08	27,154 (103 m ³)	26,136 (740 m ³)	0.60	195,511 (740 m ³)	22,506 (637 m ³)	0.52	168,357 (637 m ³)	13.9%
1 (25 mm)	43,560 (4,047 m ²)	22 (56 mm)	40%	3,630 (103 m ³)	0.08	27,154 (103 m ³)	31,944 (905 m ³)	0.73	238,958 (905 m ³)	28,314 (802 m ³)	0.65	211,804 (802 m ³)	13.9%
3.04 (77 mm)	43,560 (4,047 m ²)	14 (35 mm)	40%	11,035 (312 m ³)	0.25	82,548 (312 m ³)	20,328 (575 m ³)	0.47	152,064 (575 m ³)	9292.92 (263 m ³)	0.21	69,516 (263 m ³)	54.3%
3.04 (77 mm)	43,560 (4,047 m ²)	18 (46 mm)	40%	11,035 (312 m ³)	0.25	85,548 (312 m ³)	26,136 (740 m ³)	0.60	195,511 (740 m ³)	15,101 (428 m ³)	0.35	112,963 (428 m ³)	42.2%
7.58 (19 mm)	43,560 (4,047 m ²)	14 (35 mm)	40%	27,515 (779 m ³)	0.63	205,827 (779 m ³)	20,328 (575 m ³)	0.47	152,064 (575 m ³)	(7,187) 203 m ³	(0.16)	53,763 (204 m ³)	135.4%
7.58 (19 mm)	43,560 (4,047 m ²)	22 (56 mm)	40%	27,515 (779 m ³)	0.63	205,827 (779 m ³)	31,944 (905 m ³)	0.73	238,957 (905 m ³)	4,429 (125 m ³)	0.10	33,131 (125 m ³)	86.1%

Detention volumes or storage capacities for permeable paving are based on different rainfall events.



CASE STUDY

Southwest Park *by* Starr Whitehouse

Hoboken, New Jersey

As part of an extensive resiliency plan to mitigate flooding in a Hoboken neighborhood, a one-acre parking lot was turned into a unique park. The new space offers a refined spot for a variety of recreational activities with moveable seating areas, a lawn, child-friendly play zones, and much more.

Permeable pavers helped the park meet the city's demand for sustainability with integrated green infrastructure capable of managing 200,000 gallons of stormwater in its underground water detention system. Permeable Planks were designed to direct rainwater back into the subbase and detention system through the joint material and keep it away from sewer systems.

The paving pattern was achieved using three colors of special order Unilock Series™ finish in the Permeable Plank shape. The colors play on the hues of neighborhood buildings creating an interesting and vibrant space for all to enjoy.

PROJECT: Southwest Park. Hoboken, NJ DESIGN: Starr Whitehouse. PRODUCT: Permeable Plank with Series™ Finish

Improved WATER QUALITY



MEDIAN POLLUTANT REMOVAL

Without water, life cannot survive. For fish, wildlife and humans, clean water is a necessity. Even plants need a certain quality of water. The infiltration process of a permeable paving system will remove harmful pollutants such as oil. **The EPA recognizes permeable paving as a best management practice (BMP)** for non-point source pollutants. Utilizing permeable pavers is a simple step to ensure cleaner water and to minimize increases in water temperature. Often forgotten, water temperature is an important quality issue. Increased water temperatures can increase the amount of bacteria and algae, and can decrease aquatic life. Allowing the water to immediately drain from the surface ensures it

will not be heated from an impervious surface before it reaches a runoff area.

The Interlocking Concrete Pavement Institute (ICPI) has conducted tests that determine water quality. Their findings indicate that **cleaner water results from being filtered through a permeable paving system.** Traditional systems have no means for cleaning water. Many municipalities in North America have begun to implement strategies to improve water quality by using BMPs like permeable paver systems. Even smaller communities have joined in the effort to create more sustainable water management systems.

POLLUTANT	INFILTRATION TRENCH DESIGN TYPE*			INFILTRATION TRENCHES & POROUS PAVEMENT
	0.5 in (13mm) Runoff per Impervious Acre	1.0 in (25mm) Runoff per Impervious Acre	2-Year Design Storm Treatment	Median Pollutant Removal**
Total Suspended Solids	60-80%	80-100%	80-100%	95%
Total Phosphorous	40-60%	40-60%	60-80%	70%
Total Nitrogen	40-60%	40-60%	60-80%	51%
Biological Oxygen Demand	60-80%	60-80%	80-100%	-
Bacteria	60-80%	60-80%	80-100%	-
Metals	60-80%	60-80%	80-100%	99% (Zn)

*Note: These rates are not based on actual data since monitoring what enters and leaves any infiltration facility is difficult to measure. This data is based on land application of pollutants and their treatment through soils. **Actual monitored removal rates.



Geometric Eco-Optiloc™

CASE STUDY

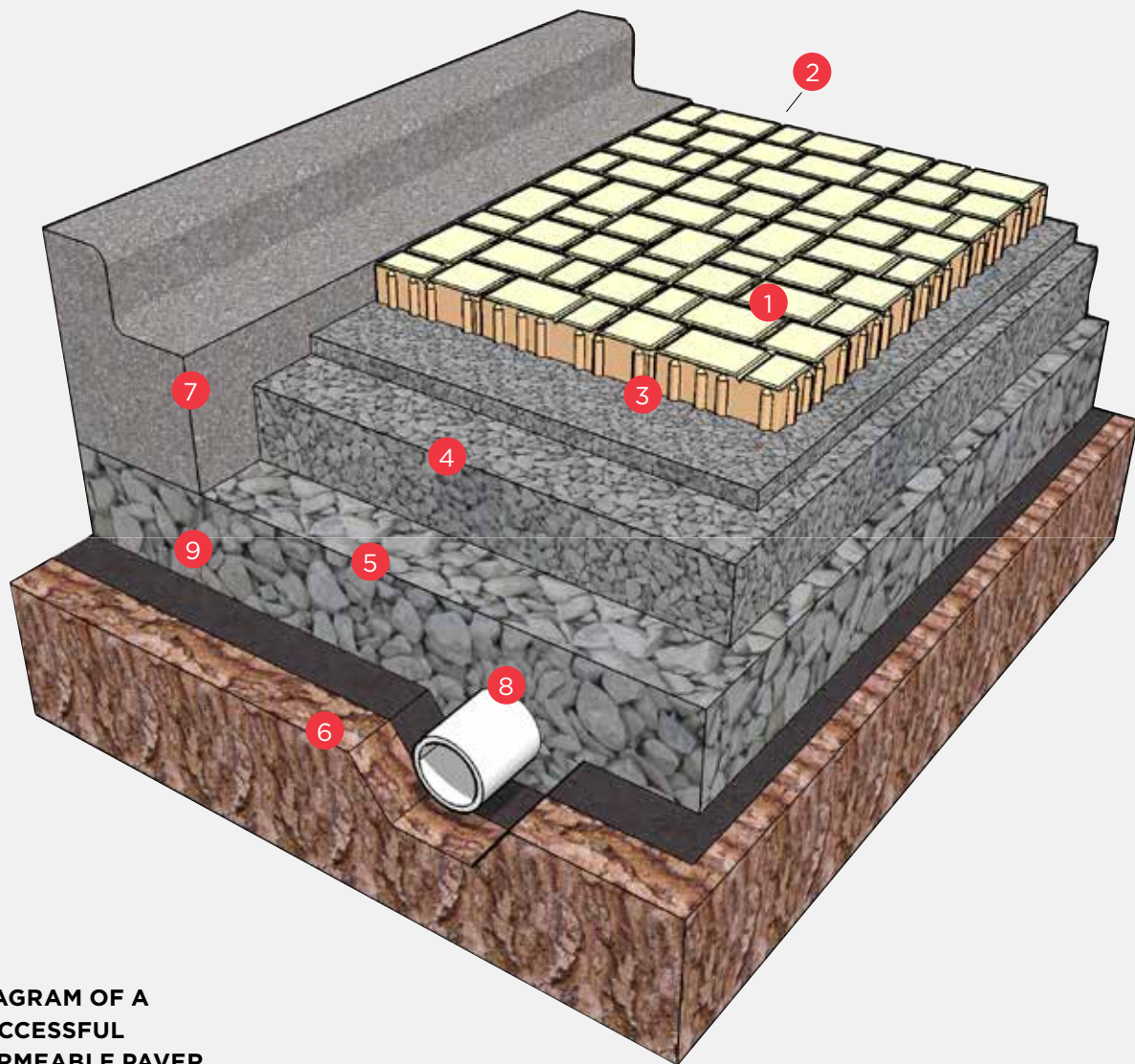
Cleveland Clinic Hospital *by* Cawrse & Associates, Inc.

Avon, Ohio

WETLAND REQUIREMENTS. Cleveland Clinic Hospital located in Avon, Ohio needed to expand in order to continue meeting the health care needs of its community. The clinic identified the need to build a new, multi-story tower and significantly increase parking on a tight budget. The challenge the design team faced was that much of the available property and the adjacent property was wetland. Stormwater runoff from the parking lot was not allowed in order to protect the wetland.

The design team, in conjunction with the Army Corps of Engineers, decided that permeable pavers were the best approach to deal with the stormwater sensitivities. The high infiltration rate of Eco-Optiloc meant that stormwater would be reabsorbed below ground and the 'L' interlocking shape of Eco-Optiloc provided superior resistance to heavy vehicular and truck traffic. The mechanical installation of the pavers, coupled with the low cost of maintenance, kept the project on budget in the short and long term.

Nine components of a highly **Successful** **Permeable Pavement**



**DIAGRAM OF A
SUCCESSFUL
PERMEABLE PAVER
INSTALLATION**

1 | Unilock Permeable Interlocking Concrete Paver

With various aesthetically pleasing colors and textures, creative choices are not compromised by function. Permeable Interlocking Concrete Pavers (PICPs) are the most durable of any porous pavement material. Unilock's minimum 8,500 psi (57 MPa), high-strength, no-slump concrete allows water to infiltrate between paver units instead of through the material. The joint sizes vary between paver options, ranging from 0.25" (6 mm) to 0.5" (13 mm), which meet the Americans with Disabilities Act specifications for permeable pavement, and allows a minimum of 100" (2,540 mm) per hour of surface infiltration.

2 | Joint Aggregate – ASTM No. 8 OR 9

As the initial filtering layer, the 0.25" (6 mm) crushed, angular, chip stone captures approximately 80 percent of debris in the first 1" (25 mm) to 2" (51 mm). The secondary function of the joint aggregate is to increase the positive interlock between the paver units, which is essential to the structural stability of the PICPs. The joint aggregate must always remain filled to the lip of the PICP units to reduce unnecessary clogging.

3 | Setting Bed Aggregate – ASTM No. 8

Using the 0.25" (6 mm) crushed, angular, chip stone, instead of sand, provides a smooth leveling course for placing pavers and additional structural interlocking of the PICPs. Unlike sand, the setting bed aggregate allows for rapid water infiltration with over 500" (12,700 mm) per hour through the 40 percent void-space. Sand must be avoided as a setting bed in a PICP application.

4 | Base Aggregate – ASTM No. 57

When subsoil conditions are conducive to supporting the ASTM No. 57 (12.5-25mm) crushed, angular, open-graded base material without migration, it can be used without ASTM No. 2 (50-63mm) subbase aggregate. Minimum thickness must be designed to sufficiently support anticipated loads, as well as accommodate stormwater detention in the 40 percent void space of the material. The ASTM No. 57 base aggregate, with a minimum thickness of 4" (102 mm), serves as a transition material between the ASTM No. 8 (2-10mm) setting bed and the ASTM No. 2 subbase aggregate. The infiltration rate of the ASTM No. 57 is over 500" (12,700 mm) per hour.

5 | Subbase Aggregate – ASTM No. 2

Subsoil conditions will dictate the necessity of this larger ASTM No. 2 (50-63mm), crushed, angular, open-graded subbase aggregate thickness. Installation of such material will provide increased structural stability on sites with poor soil conditions. A minimum thickness of 8" (203 mm) is required for effective performance. Subbase aggregate thickness must be designed to sufficiently support anticipated loads. As an added feature, the ASTM No. 2 subbase aggregate temporarily detains stormwater runoff in the 40 percent void-space of the material. The ASTM No. 2 also has an infiltration rate of over 500" (12,700 mm) per hour.

6 | Subgrade

Existing soil materials will determine the performance capabilities of the PICP system. Pre-construction soil analysis, including percolation, California Bearing Ratio and penetrometer measurements (blow counts), are mandatory for proper design. Subsoils with less than 0.5" (13 mm) per hour of infiltration may require underdrainage, scarification and potentially amendments. Subsoils with greater than 0.5" (13 mm) per hour are considered highly permeable. Subsoil compaction can cause a detrimental reduction in permeability and can be eliminated.

7 | Edge Restraint

PICP containment is vitally important to the success of interlocking properties. Lack or failure of an edge restraint will negatively impact the integrity of the pavement surface. For all vehicular PICP applications, an edge restraint, such as a concrete curb, is required. For non-vehicular and pedestrian areas, a plastic edging is sufficient when properly anchored into the subbase.

8 | Underdrain

In PICP systems, the underdrain pipe is based on several factors, such as the permeability of the subsoil, detention requirements, and stormwater release rate of the site. With highly permeable subsoils over 0.5" (13 mm) per hour, the underdrain pipe could be eliminated. Underdrain pipe size is inconsequential, provided the flow rate is greater than the release rate.

9 | Mechanical Base Stabilization

Subsoil characteristics will determine the need for base stabilization. Specifically designed geogrid style systems, such as DriveGrid™ system, can be placed between the subsoil and ASTM No. 57 (12.5-25mm) base aggregate or ASTM No. 2 (50-63mm) and subbase. DriveGrid is not required between aggregate material layers. The base stabilization must be determined by soil conditions specific to each project. DriveGrid should be considered for any weaker subsoils.

Design and TECHNICAL INFORMATION

Typical Runoff Coefficients for the Rational Method

Land Use Type	Recommended Value
Industrial	0.75
Downtown Business District	0.85
Single-Family Residential	0.40
Multi-Family Residential	0.60
Parks	0.20

Source: *Design and Construction of Sanitary and Storm Sewers.*
American Society of Civil Engineers, New York, p. 332, 1969.
Coefficients are based on 5 – 10 year storm frequencies.

Surface Type	Recommended Value
Bituminous Asphalt	0.85
Pour-In-Place Concrete	0.85
Lawns – Sandy Soils	0.13
Lawns – Heavy Soils	0.20
Permeable Pavers	0.0*

* Actual value until detention in permeable base reaches capacity.



		SOIL SUBGRADE TEXTURE / INFILTRATION RATE INCHES / HOUR (MM/SEC)										
		Sand	Loamy Sand	Sandy Loam	Loam	Silt Loam	Sandy Clay Loam	Clay Loam	Silty Clay Loam	Sandy Clay	Silty Clay	Clay
Criterion	T _s (hrs)	8.27 (6x10 ⁻⁵)	2.41 (2x10 ⁻⁵)	1.02 (7x10 ⁻⁶)	0.52 (4x10 ⁻⁶)	0.27 (2x10 ⁻⁶)	0.17 (1x10 ⁻⁶)	0.09 (6x10 ⁻⁷)	0.06 (4x10 ⁻⁷)	0.05 (3x10 ⁻⁷)	0.04 (2x10 ⁻⁷)	0.02 (10 ⁻⁷)
f x T _s / V _r	24	496 (12.6)	145 (3.7)	61 (1.5)	31 (0.8)	16 (0.4)	10 (0.25)	5 (0.12)	4 (0.1)	3 (0.07)	2 (0.05)	1 (0.02)
for	48	992 (25.2)	290 (7.4)	122 (3.1)	62 (1.6)	32 (0.8)	20 (0.5)	11 (0.3)	7 (0.17)	6 (0.15)	2 (0.15)	2 (0.05)
(V _r = 0.4)	72	1489 (37.8)	434 (11)	183 (4.6)	93 (2.4)	149 (1.2)	31 (0.8)	16 (0.9)	11 (0.13)	9 (0.2)	7 (0.17)	4 (0.1)

T_s = Maximum allowable storage time

V_r = Voids ratio

Lowest values unless base exfiltration is supplemented with drain pipes.

Maximum allowable depths, inches (m) of storage for selected maximum storage times (T_s in hours), minimum infiltration rates and inches/hour (mm/sec)(31).

The Natural Resources Conservation Service (NRCS) method typically uses 24-hour storm events as the basis for design. Therefore, this design method is based on controlling the increased runoff for a specific 24-hour storm. The specific duration and return period (e.g., 6 months, 1 year, 2 years, etc.) are provided by the locality. If the increase in peak discharge associated with the storm event cannot be managed, a first-flush event should be the minimum selected for design.

BASE & AGGREGATE CHARTS

Careful selection of base material, as described below, ensures that an installation can handle almost any amount of rainfall. Testing results of all the aggregates listed below show a void ratio of approximately 40 percent. Choosing the correct void filter is critical as well. The aggregate infiltration rates below illustrate the performance of the system.

Aggregate Infiltration Rates

Approximate Particle Size	Permeability (k) in./hr (m/s)
ASTM No. 8 (2 – 10 mm)*	1,400 - 4,000 (3×10^{-1} to 1×10^{-2})
ASTM No. 9 (2 – 5 mm)	140 - 1,400 (1×10^{-2} to 1×10^{-3})
ASTM No. 10 (1 – 3 mm)	14 - 140 (1×10^{-3} to 1×10^{-4})
ASTM No. 57 (12.5 – 25 mm)*	500 - 2,000
ASTM No. 2 (50 – 63 mm)*	>1,000

Permeability ranges of joint fill aggregates for permeable pavers.

* Unilock recommendations

Setting Bed Aggregate

Sieve Size	Percent Passing
0.5" (12 mm)	100
0.375" (9.5 mm)	85 – 100
(4.75 mm) (No. 4)	10 – 30
(2.36 mm) (No. 8)	0 – 10
(1.16 mm) (No. 16)	0 – 5

Grading requirements for ASTM No. 8 bedding and joint / opening filler.

Setting bed aggregate can be used as joint aggregate for Eco-Optiloc®.

Base Aggregate

SIEVE Size	Percent Passing
1.5" (37.5 mm)	100
1" (25 mm)	95 – 100
0.5" (12 mm)	25 – 60
(4.75 mm) (No. 4)	0 – 10
(2.36 mm) (No. 8)	0 – 5

Grading requirements for ASTM No. 57 base.

Subbase Aggregate

Sieve Size	Percent Passing
3" (75 mm)	100
2.5" (63 mm)	90 – 100
2" (50 mm)	35 – 70
1.5" (37.5 mm)	0 – 15
0.75" (19 mm)	0 – 5

Sieve sizes for ASTM No. 2 aggregates.

BASE THICKNESS

Permeable paving is not a typical segmental pavement. Unilock recommends that a professional engineer design a site-specific plan based on available site information. Along with information provided in this brochure, Unilock offers comprehensive software solutions, and industry-experienced consultants to assist you in the design of your pavement.

Pavement Use	Subbase ASTM No. 2	Base ASTM No. 57	Minimum Total
Heavy-duty industrial	14" (355 mm)	6" (152 mm)	20" (508 mm)
Municipal street	12" (305 mm)	6" (152 mm)	18" (457 mm)
Light-duty parking lot	8" (203 mm)	6" (152 mm)	14" (356 mm)
Residential driveway	n/a	12" (305 mm)	12" (305 mm)
Non-vehicular sidewalk	n/a	10" (254 mm)	10" (254 mm)

Notes: 1) All permeable pavers require a 1.5" (38 mm) setting bed of ASTM No. 8 for placement. 2) All thicknesses are after compaction. 3) Geotextiles between subgrade and ASTM No. 2 are optional and based on soil conditions. 4) Geotextiles are not required between the subbase, base or setting bed layers.

RETAINING WALLS

A great retaining wall should provide an aesthetic that **blends subtly with the environment and surrounding architecture.** For decades, Unilock segmental retaining walls have been the choice of Landscape Architects, Designers and Engineers who are looking for **classic, clean lines and timeless appeal.**



RETAINING WALL Design

SEGMENTAL RETAINING WALLS

Why do so many engineers select Unilock® for retaining walls? In a word: confidence. Confidence that Unilock manufactured products have the structural, safety and weathering capabilities needed for the project. Confidence in the field performance of a vast portfolio of structures. Confidence that Risi Stone will provide the engineering support required to get the job done accurately and expeditiously.



PROJECT: Office Complex Mississauga Rd. Mississauga, ON. DESIGN: RisiStone Engineering. PRODUCT: SonomaStone™ in Natural.

	ASTM C1372 / NCMA Zone 3 (de-icing exposure)	UNILOCK STD.
Compressive Strength - Minimum	3000/5500 PSI	5500 PSI
Absorption - Maximum (No individual unit greater than)	15 lb/ft ³	7 lb/ft ³
Dimensional Tolerance (length, width, or height)	± 1/8" (± 3.2mm)	± 1/8" (± 3.2mm)

SOLID CORE CONSTRUCTION

The solid body tongue and groove design provides engineers with the assurance that the structural properties are guaranteed. Not having to fill a hollow block core and the ability to easily modify blocks on-site is a considerable labor savings. Owners can be confident in the proven long-term performance of the wall's integrity.

QUALITY MANUFACTURING

Each unit's structural integrity and performance is ensured by manufacturing to specifications that meet or exceed American Society of Testing and Materials (ASTM) standards. The Unilock manufacturing system provides peace of mind by exceeding technical standards set by the National Concrete Masonry Association (NCMA) recommendation for Roadway and Non-Roadway Applications - Zone 3 - with exposure to de-icing salts, as well as local building codes.

BUILT TO LAST

Unilock manufactured retaining wall systems are engineered to last. Individual units range from 19lbs (8.6kg) to 1,700lbs (772.7kg), and some can be used to construct walls up to 40ft (12.2m) high. The mechanical installation characteristics of Unilock retaining walls surpass conventional modular wall systems in speed and performance. Vespa.RS advanced engineering software from Risi Stone lets you analyze all important factors including height, differing soil types, unique site conditions and loading requirements directly from CAD, saving valuable time.

SOLID ADVANTAGES

FEATURE	ADVANTAGE	BENEFIT
Solid Blocks	Provides greater durability	<ul style="list-style-type: none"> • More resistant to breakage and minor damage
	Easy to split or modify	<ul style="list-style-type: none"> • Blocks can be simply cut/alterd with no risk to final wall integrity
	No hollow cores to fill with gravel & compact	<ul style="list-style-type: none"> • Ensures maximum weight of each block is present • Maximum resistance to overturning • Reduced installation time and labour costs
Modular System	Wall is flexible, while still retains its structural integrity	<ul style="list-style-type: none"> • Absorbs movement and settlement • Requires minimal embedment
	Array of complementing special blocks	<ul style="list-style-type: none"> • Easily create site-specific features • Coping can be selected for various wall arrangements • Pre-fabricated corner blocks intensify corner strength and appearance, while speeding construction
	Requires only a compact granular base	<ul style="list-style-type: none"> • Reduces installation cost
Interlocking Tongue & Groove	Interlocking mechanism is molded directly in to the block	<ul style="list-style-type: none"> • Easy, quick installation • No separate pins or clips to install
	Maximum shear strength	<ul style="list-style-type: none"> • Shear strength is maintained along the entire length of block • Allows for superior geogrid connection
	Automatic alignment & self-battering	<ul style="list-style-type: none"> • Once the first course is installed flat and level, successive blocks stack quickly and easily
	Blocks are dry-stacked	<ul style="list-style-type: none"> • Lower cost — No mortar requirements • Minimal training is required to achieve excellent results
	Continuous interlock achieved throughout the wall	<ul style="list-style-type: none"> • Creates a stronger, more damage resistant structure
Combined with Geogrid Reinforcement	Higher walls can be achieved	<ul style="list-style-type: none"> • Able to use the same facia throughout the project on lower and higher walls (i.e. Gravity and geogrid reinforced walls can be mixed as site conditions dictate)

SUPPORT AND ASSISTANCE

Unilock & Risi Stone®

Unilock manufactures a number of Risi Stone Systems licensed retaining walls: Pisa2™, Concord Wall™, RomanPisa™, Rivercrest® Wall, SienaStone™, SonomaStone™, DuraHold® and DuraHold®2. With installations more than 25 years old, we offer the most proven SRW systems on the market.

Design assistance

Risi Stone offers many different levels of assistance. From general product information, typical cross-sections and software programs, to site specific final design packages, they will work with you to achieve the best possible design solution.

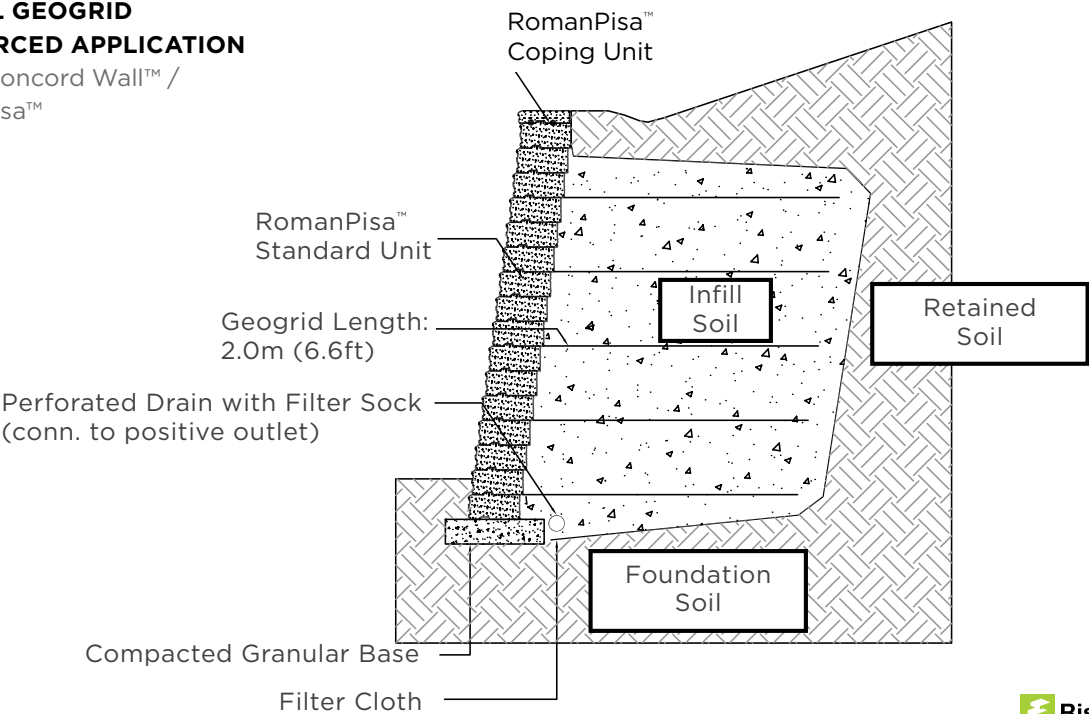
Preliminary Sections

For preliminary design, bidding or feasibility purposes, Risi Stone Systems have created one of the industry's most comprehensive collections of pre-engineered typical cross-section drawings for a variety of applications. These sections have been designed to meet very specific criteria in an attempt to be as close to your particular project as possible. They are sorted according to the main criteria used in the design of a segmental retaining wall. The search tool at www.unilock.com allows you to select the Risi Stone licensed product, the loading and the height of the wall, according to your project requirements to find cross sections that most closely match your project needs.

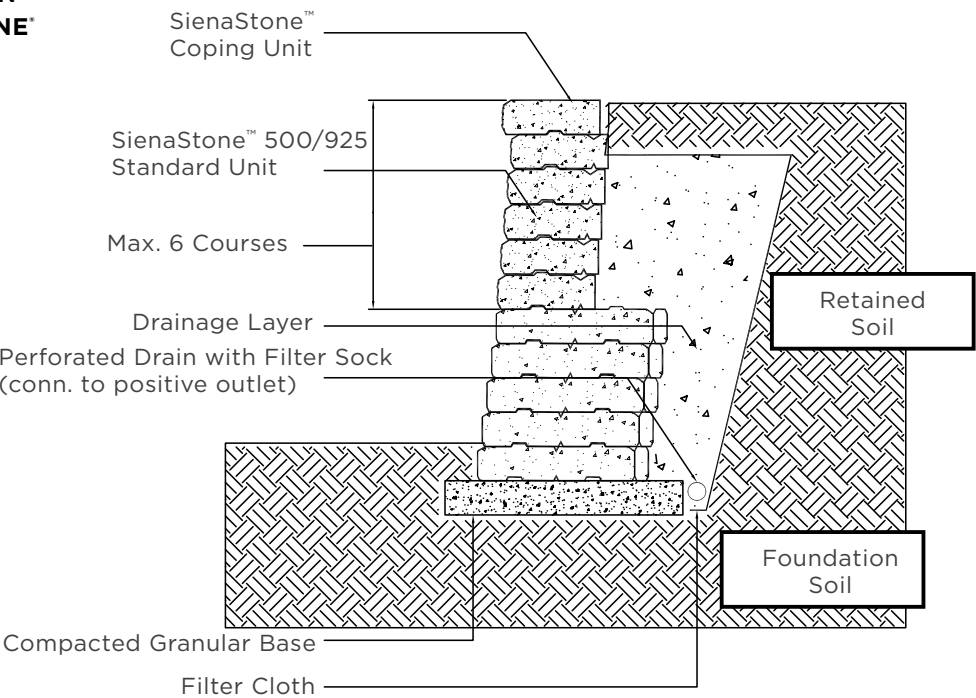
TYPICAL CROSS SECTIONS

TYPICAL GEOGRID REINFORCED APPLICATION

Pisa2™/Concord Wall™ /
RomanPisa™



TYPICAL GRAVITY APPLICATION - SIENASTONE™





Our years of industry-leading expertise and unparalleled personal attention and collaboration ensure that every intricate detail of your project runs smoothly. Our level of support is tailored to meet your needs:

Details and specs

Cross sections, details, specifications and technical support are assets available to you to build out your documents and drawings. Contact your Unilock Representative for more information.

Uvision® and Samples

Choosing the perfect product has never been easier. Our Uvision design software conveys your design in a rendering to aid your client with visualization. And when the time comes to finalize your product selection, your Unilock Representative will bring you all the real life samples you need.

Outdoor Idea Centers

Unilock Outdoor Idea Centers provide you with the perfect place for inspiration and a great destination for client feedback. When you visit be sure to see, touch and experience all that Unilock has to offer.

Lunch and learn

At Unilock, there is always something new. Ask your Unilock Representative about a Lunch and Learn session that also earns you valuable continuing education credits.

We're here to help through every step of your project. Talk to your Unilock Representative today to get all the details.



PROJECT: Corporate Park, Walpole, MA. **DESIGN:** Jacobs Engineers. **PRODUCT:** Planks with Umbriano™ in French Grey, Midnight Sky and Winter Marvel.



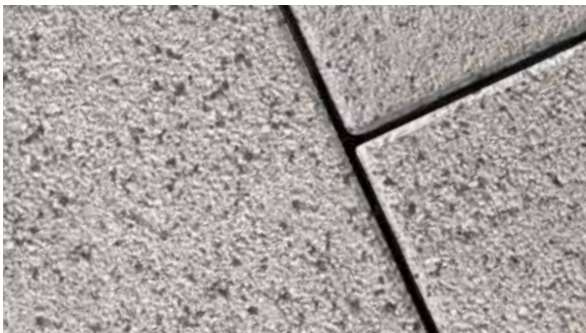
PROJECT: Walnut Street, Des Moines, IA. **DESIGN:** Confluence. **PRODUCT:** Rectangles with Series™ finish in Arctic Grey, Nordic Star, Onyx Black, Platinum Grey and two special order colors.

CUSTOMIZATION

Unilock allows you to customize products to suit your project. Our vast array of sizes, edges, finish and color options make it easy to achieve your design vision. Choose a shape or a finish first and then narrow down the desired color range. Then call your Unilock Representative for all of the special order options available in your market.



STEP 1 CHOOSE SHAPES



STEP 2 CHOOSE FINISHES



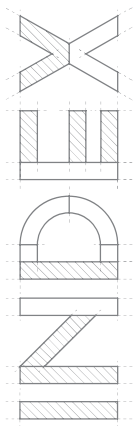
STEP 3 CHOOSE COLORS



STEP 4 CALL YOUR UNILOCK REPRESENTATIVE

Creating products to suit your unique design ideas is what we do best. Call us early in the design process to ensure every aspect is accurate, from shape and finish, to color and edge detail. Let's see what we can create together!

Products listed as "Special Order" are not currently inventoried and may require additional lead times for manufacturing. Special pricing and minimum quantities may apply. Contact your Unilock Representative to confirm all details before creating your specification.



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PROJECT: Mount St. Mary's, Cincinnati, OH. DESIGN: McGill Smith Punshon Design. PRODUCT: Umbriano™ in Summer Wheat and Rectangles with Series® finish in Onyx Black.

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