



FRONTIER²⁰

PORCELAIN PAVERS INSTALLATION GUIDE

 **LANDMARK**
CERAMICS

Dear Customer,

Thank you for choosing **Frontier20**.

In this manual, you will become familiar with the benefits and versatility that porcelain pavers can provide if you are seeking a low maintenance and extremely durable product.

This installation manual will provide the installer with a guide on how to properly install the Frontier20 porcelain pavers and as well as educate the consumer on how to maintain the appearance and functionality of the porcelain pavers. The installation practices listed in this guide are recommendations based on typical masonry, and or hardscape installation practices. Consulting your local codes department for their requirements is highly recommended as installation methods may vary from region to region due to differing native soils, frost line depth and freeze thaw cycles. If you have any questions, please feel free to call us and we at Landmark Ceramics will be happy to assist you.

Landmark Ceramics - UST, Inc.
1427 N Main St
Mount Pleasant, TN 38474
Tel. 931-325-5700
tech-support@lcusa.com



FRONTIER20

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1. PORCELAIN PAVERS ADVANTAGES



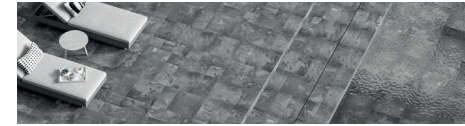

EASY TO INSTALL





EASY TO KEEP CLEAN
Mild environmentally friendly detergents can be used when cleaning your porcelain pavers. Pressure washers up to 1500 PSI may be used without fear of etching or striping.






SCRATCH RESISTANT
Landmark Frontier20 porcelain pavers are extremely hard with an equally hard surface making them virtually scratch proof.






FADE RESISTANT
Landmarks Frontier20 baked on graphics are created using ingredients that are completely unaffected by the sun ensuring enjoyment of your porcelain paving investment for many years to come.


ANTISLIP
The structure and texture of the porcelain paver reduce the risk of slipperiness.



RESISTANT TO MOSS AND MOLDING
Landmark Frontier20 is so dense that mold and mildew are not able to establish themselves in a permanent way making removal very easy and simple.


FROST RESISTANT
Landmark Frontier20 porcelain pavers are so dense that frost and or freezing temperatures do not affect it.

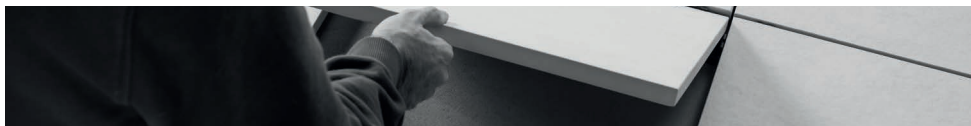

RESISTANT TO SALTS
Landmark Frontier20 porcelain pavers are completely unaffected by use of salts.



EASY TO REPLACE AND REMOVE
When not mortared down or installed with adhesive Landmark's Frontier20 can be easily removed and repositioned in a new area.



DRIVE OVER*
When properly installed over concrete, Landmark Frontier20 porcelain pavers are suitable for light residential vehicular traffic.
(* When installed over reinforced concrete (4" minimum) using a thinset mortar suitable for porcelain paver.

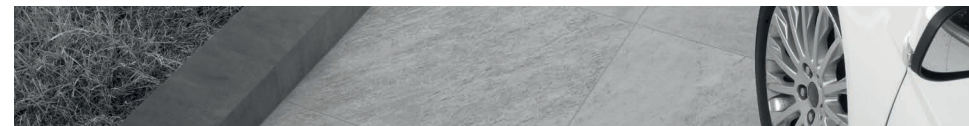

RESISTANT TO ACID AND CHEMICALS
Landmark Frontier20 is made with inert ingredients that do not react or accept acids and or chemicals allowing you to make environmentally friendly cleaning decisions!


NO SEALING NEEDED
No sealers are needed because Landmark Frontier20 is so dense virtually nothing can stick to it!




STAIN RESISTANT
Landmark's Frontier20 porcelain pavers are virtually nonporous. Due to the baked on glazing process nothing can be absorbed including stains.


RESISTANT TO THERMAL SHOCK
Landmark's porcelain pavers are baked at temperatures up to 2300 degrees F which in turn causes a very strong molecular bond making for a very dense material. Due to its density it become very inert allowing for extreme and sudden temperature changes in the range of - 60 F +140 F.




ECO-FRIENDLY
Landmark Frontier20 porcelain pavers are produced in our environmentally friendly complex following the strictest state and federal regulations. Because of Landmarks environment friendly commitment, we can incorporate up to 20% recycled content in our USA made porcelain pavers.


SAVING OVER TIME
Low maintenance cost.

2. INSTALLATION OPTIONS

2.A THIN SET MORTAR APPLICATION OVER REINFORCED CONCRETE

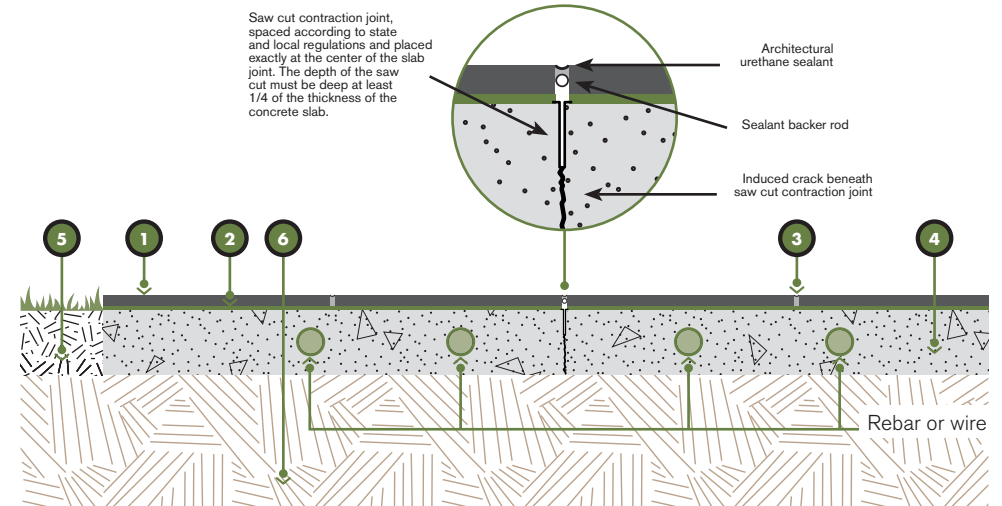
(PEDESTRIAN FOOT OR LIGHT VEHICULAR TRAFFIC)

PRACTICAL INSTALLATION

Follow the drawing on the side.

- The concrete platform shall be constructed with proper workmanship and designed to suit the site's specific conditions, anticipated loads, and traffic type. Additionally, it must adhere to all applicable state and local regulations where the work is performed.
- Contraction/control joints might be necessary in the underlying screed depending on the size of the paved area. Important: it is essential that all contraction and control joints align with the joint lines of the installed porcelain pavers and that they are not located beneath any paver otherwise the paver will reflectively crack along the joint.
- Make sure the pavement has approximately a 2 percent slope directed away from nearby buildings and pools.
- Please consult your paver supply distributor to select a thin-set mortar suitable for porcelain pavers for exterior application of porcelain pavers.
- Installation of cementitious adhesive and grout shall follow the manufacturer's technical instructions, specifically those applicable to outdoor installations.
- For concrete foundation slabs that do not require contraction/control joints, provide a minimum grout joint of 5/32" (4 mm). For larger slabs requiring contraction/control joints, provide control joints with a width of 3/8" (1 cm).

IMPORTANT: For best cutting results, 2 cm pavers should be cut using a wet saw—preferably a table or bridge saw—with an appropriate blade designed for porcelain pavers.



1. Frontier20 porcelain 3/4" nominal (20 mm) pavers
2. Thinset
3. 5/32" (4mm) minimum grout joint
4. Concrete base
5. Soil
6. Subgrade

NOTES:

- Never compact porcelain pavers with a plate compactor. If necessary, use a roller paver compactor specifically designed for porcelain, taking care not to chip or damage the pavers.
- Never install porcelain pavers without spacers (min 4mm - 5/32").
- Use only high-quality and ANSI A137.1 compliant adhesive suitable for the outdoor installation of porcelain pavers.
- Please refer to the adhesive and joint-filling manufacturers' requirements for specifics in regard to the installation and use of their products.
- When installing porcelain pavers on a screed for pedestrian use in applications such as balconies and terraces, it might be advisable to consider using an uncoupling membrane suitable for exterior use, to provide crack isolation, waterproofing, and drainage. Make sure the membrane is installed in compliance with manufacturer's recommendations.
- For pavers of 20" inches or longer, an offset no greater than 30% is strongly recommended.
- Please note that the above section drawing is an example only.
- Project and site evaluation, structural design must be performed by a qualified professional engineer.



2.B TYPICAL FLEXIBLE BASE INSTALLATION (PEDESTRIAN FOOT TRAFFIC)

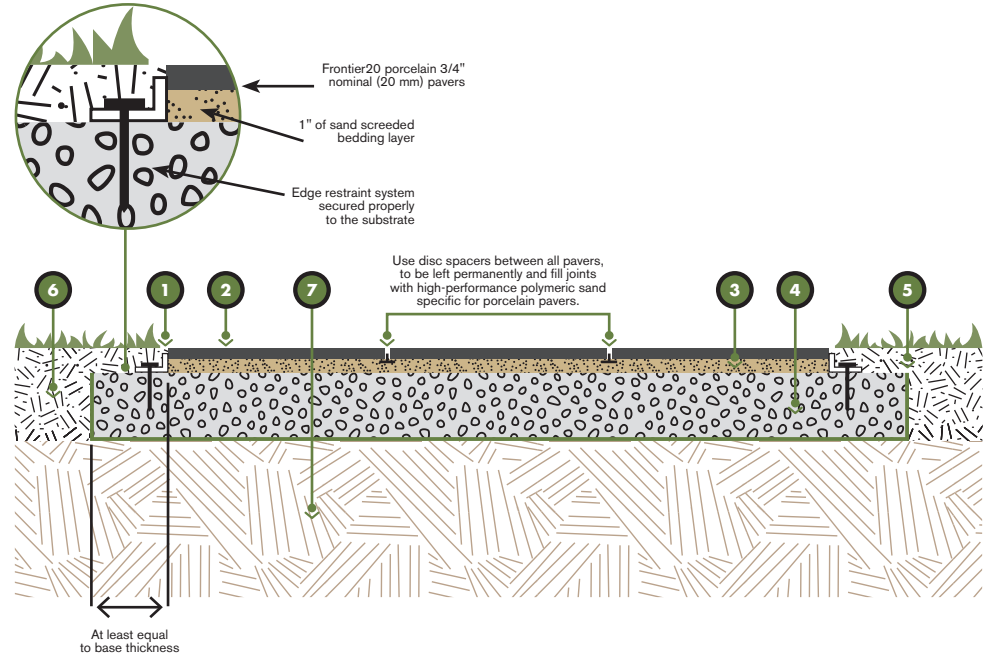
PRACTICAL INSTALLATION

Follow the drawing on the side.

- In practice, all requirements should be evaluated by qualified and experienced professionals, considering the specific site conditions and applicable local regulations
- Excavate 6-8 inches to allow appropriate compacted aggregate base depth suitable to site conditions – in some conditions a deeper base may be appropriate.
- Install a compacted or open grade base substrate with approximately 10 inches of “overdig” extending beyond the planned perimeter of the paved area.
- The substrate must be properly compacted for stability, and a separating fast-draining geotextile fabric may be installed to reduce soil and aggregate migration.
- Make sure the pavement has approximately a 2 percent slope directed away from nearby buildings and pools.
- Install an appropriate edge restraint system, securing it properly to the substrate in accordance with the manufacturer’s instructions, based on the type of base material used. Generally, a low-profile restraint with a vertical height of 1.5" (4 cm) is recommended, as illustrated in the drawing.
- Pre-compact the sand bedding course and screed it to a 1" thickness, ensuring a smooth surface.
- Make sure the plastic spacers min 5/32" (4 mm) are installed at all corners of the installed pavers in order to prevent pavers from touching each other (and potentially chipping) and to allow better water drainage.

IMPORTANT: For best cutting results, 2 cm pavers should be cut using a wet saw—preferably a table or bridge saw—with an appropriate blade designed for porcelain pavers.

EDGE RESTRAINT SYSTEM SECURED INTO BASE



- | | |
|---|------------------------------------|
| 1. Edge restraint system | 4. 6-8" compacted aggregate base |
| 2. Frontier20 porcelain 3/4" nominal (20 mm) pavers | 5. Fast-draining geotextile fabric |
| 3. 1" of sand screeded bedding layer | 6. Soil |
| | 7. Subgrade |

NOTES:

- Never compact porcelain pavers with a plate compactor. If necessary, use a roller paver compactor specifically designed for porcelain, taking care not to chip or damage the pavers.
- Never install porcelain pavers without spacers (min 4mm - 5/32").
- For pavers of 20" inches or longer, an offset no greater than 30% is strongly recommended.
- Please note that the above section drawing is an example only.
- Project and site evaluation, structural design must be performed by a qualified professional engineer.



2. INSTALLATION OPTIONS

2.C PERMEABLE APPLICATION (PEDESTRIAN FOOT TRAFFIC)

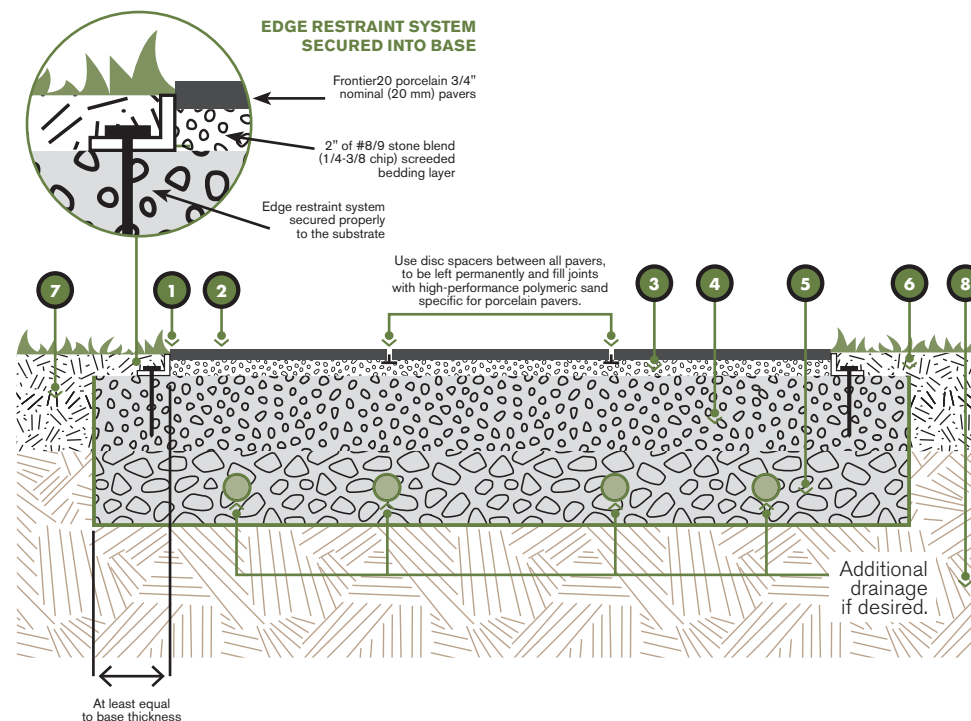
PRACTICAL INSTALLATION

Follow the drawing on the side.

- In practice, all requirements should be evaluated by qualified and experienced professionals, considering the specific site conditions and applicable local regulations.
- Weather conditions, soil type, and site-specific factors should be considered when selecting the most appropriate installation method.
- Prepare a substrate that extends approximately 8 to 10 inches beyond the perimeter of the paved area, ensuring the paved surface is kept at an appropriate distance from any adjacent structure.
- Open graded aggregate base must be free of foreign materials, ideally produced from crushed limestone or equivalent and be similar to a gradation of 3/4 or ASTM 57 where available.
- Open graded aggregate base should be 6 inches thick or greater.
- If desired, an open graded aggregate subbase free of foreign materials, 2-4" stone, ASTM 2, 3, 4 where available, can be added.
- Open graded aggregate subbase should be 6 inches thick or greater.
- In case open graded aggregate subbase is not added it is recommended to increase open aggregate base thickness (thickness to be determined based on the specific site conditions and characteristics).
- Use a fast-draining geotextile fabric underneath the subgrade to help prevent aggregate migration.
- A 2" #8/9 stone blend (1/4-3/8 chip) is to be used for a screed layer. Many professionals like to compact this layer as it reduces a "hollow" sound under the porcelain pavers.
- Always use appropriate sub-surface porcelain paver spacers. Keep in mind the permeability of any system is dictated by the joint size, not the pavers, for more flow you may desire a wider joint.
- Install an appropriate edge restraint system, securing it properly to the substrate in accordance with the manufacturer's instructions, based on the type of base material used. Generally, a low-profile restraint with a vertical height of 2 1/2" is recommended, as illustrated in the drawing.
- The thickness of the drainage layers should be determined based on the specific site conditions and characteristics.
- For sites with fine-grained soils, such as silts or clays, or with contributing water sources like downspouts or groundwater, a perforated pipe underdrain should be installed to prevent subgrade saturation. Ensure that the underdrain discharges to an appropriate and approved location.
- Make sure the pavement has approximately a 2 percent slope directed away from nearby buildings and pools.

- Make sure the plastic spacers min 5/32" (4 mm) are installed at all corners of the installed pavers in order to prevent pavers from touching each other (and potentially chipping) and to allow better water drainage.

NOTE: The location and quantity of linear drainage are determined by the specific nature of the site. IMPORTANT: For best cutting results, 2 cm pavers should be cut using a wet saw—preferably a table or bridge saw—with an appropriate blade designed for porcelain pavers.



1. Edge restraint system
2. Frontier20 porcelain 3/4" nominal (20 mm) pavers
3. 2" of #8/9 stone blend (1/4-3/8 chip) screeded bedding layer
4. 6" thick or greater open graded aggregate base (crushed limestone or equivalent, similar to a gradation of 3/4 or ASTM 57 where available)
5. 6" thick or greater open graded aggregate subbase (2-4" stone blend) if desired
6. Fast-draining geotextile fabric
7. Soil
8. Subgrade

NOTES:

- Never compact porcelain pavers with a plate compactor. If necessary, use a roller paver compactor specifically designed for porcelain, taking care not to chip or damage the pavers.
- Never install porcelain pavers without spacers (min 4mm - 5/32").
- For pavers of 20" inches or longer, an offset no greater than 30% is strongly recommended.
- Please note that the above section drawing is an example only.
- Project and site evaluation, structural design must be performed by a qualified professional engineer.

2. INSTALLATION OPTIONS

2.D TRASS BEDDING INSTALLATION (PEDESTRIAN FOOT TRAFFIC)

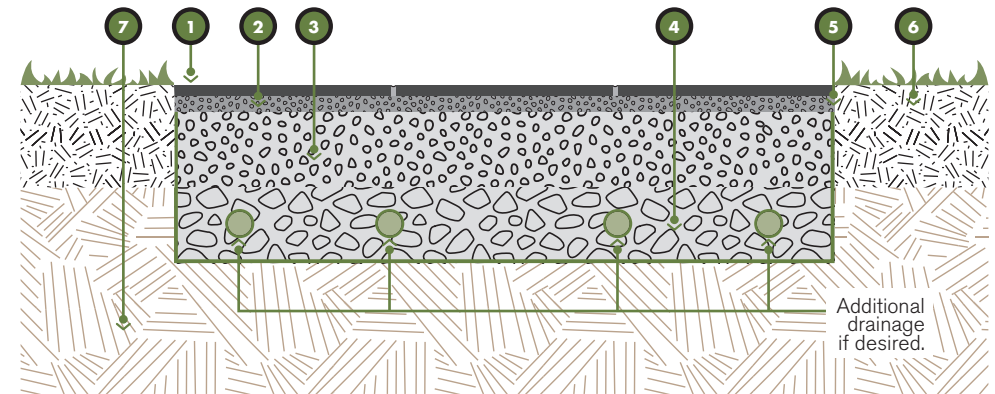
PRACTICAL INSTALLATION

Follow the drawing on the side.

- In practice, all requirements should be evaluated by qualified and experienced professionals, considering the specific site conditions and applicable local regulations.
- Weather conditions, soil type, and site-specific factors should be considered when selecting the most appropriate installation method.
- Prepare a substrate that extends approximately 8 to 10 inches beyond the perimeter of the paved area, ensuring the paved surface is kept at an appropriate distance from any adjacent structure.
- Open graded aggregate base must be free of foreign materials, ideally produced from crushed limestone or equivalent and be similar to a gradation of 3/4 or ASTM 57 where available.
- Open graded aggregate base should be 6 inches thick or greater.
- If desired, an open graded aggregate subbase free of foreign materials, 2-4" stone, ASTM 2, 3, 4 where available, can be added.
- Open graded aggregate subbase should be 6 inches thick or greater.
- In case open graded aggregate subbase is not added it is recommended to increase open aggregate base thickness (thickness to be determined based on the specific site conditions and characteristics).
- Use a fast-draining geotextile fabric underneath the subgrade to help prevent aggregate migration.
- A 2" #8/9 blend (1/4-3/8 chip) stone blend is to be used for a screed layer. Many professionals like to compact this layer as it reduces a "hollow" sound under the porcelain pavers.
- Using an approved thinset mortar, bond the 2cm pavers directly to the open grade Trass screed layer.
- When using Trass a grout joint or porcelain compatible polymeric or resin sand as jointing material can be used.
- Always use appropriate sub-surface porcelain paver spacers. Keep in mind the permeability of any system is dictated by the joint size, not the pavers, for more flow you may desire a wider joint.
- The thickness of the drainage layers should be determined based on the specific site conditions and characteristics.
- For sites with fine-grained soils, such as silts or clays, or with contributing water sources like downspouts or groundwater, a perforated pipe underdrain should be installed to prevent subgrade saturation. Ensure that the underdrain discharges to an appropriate and approved location.
- Make sure the pavement has approximately a 2 percent slope directed away from nearby buildings and pools.

- Provide a minimum joint width of 5/32" (4mm) using a standard removable tile spacer and fill joints with high-performance polymeric sand or resin sand specific for porcelain pavers.

NOTE: The location and quantity of linear drainage are determined by the specific nature of the site. IMPORTANT: For best cutting results, 2 cm pavers should be cut using a wet saw—preferably a table or bridge saw—with an appropriate blade designed for porcelain pavers.



1. Frontier20 porcelain 3/4" nominal (20 mm) pavers
2. 2" of #8/9 stone blend (1/4-3/8 chip) screeded bedding layer mixed with Trass.
3. 6" thick or greater open graded aggregate base (crushed limestone or equivalent, similar to a gradation of 3/4 or ASTM 57 where available)
4. 6" thick or greater open graded aggregate subbase (2-4" stone blend) if desired
5. Fast-draining geotextile fabric
6. Soil
7. Subgrade

NOTES:

- Never compact porcelain pavers with a plate compactor. If necessary, use a roller paver compactor specifically designed for porcelain, taking care not to chip or damage the pavers.
- Never install porcelain pavers without spacers (min 4mm - 5/32").
- For pavers of 20" inches or longer, an offset no greater than 30% is strongly recommended.
- Please note that the above section drawing is an example only.
- Project and site evaluation, structural design must be performed by a qualified professional engineer.



2.E SAND SET OVER CONCRETE (PEDESTRIAN FOOT TRAFFIC)

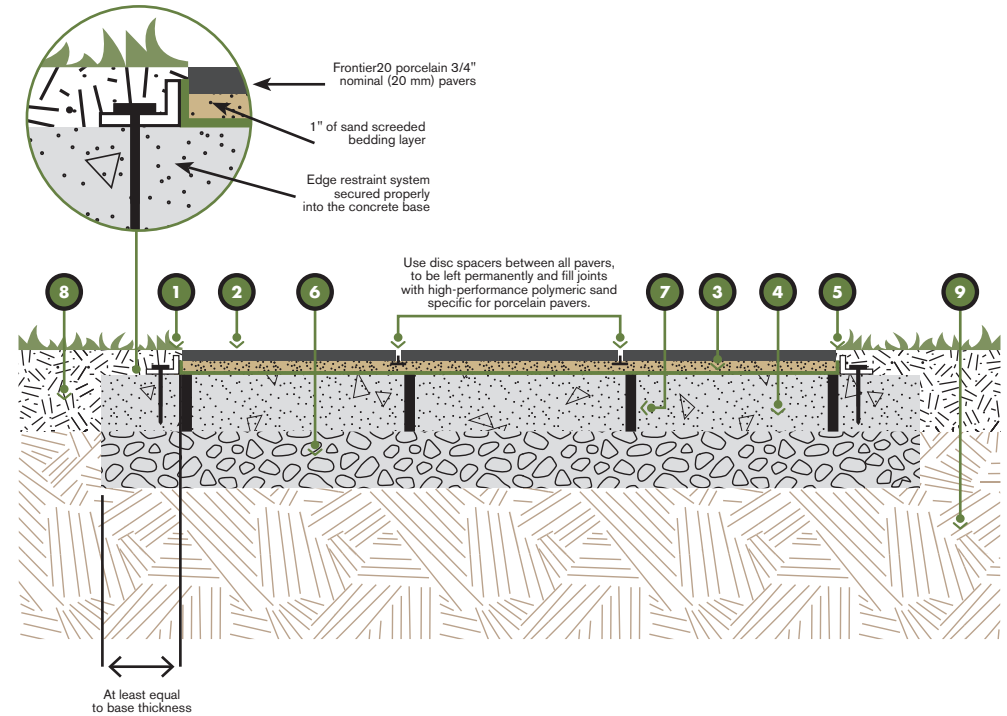
PRACTICAL INSTALLATION

Follow the drawing on the side.

- In practice, all requirements should be evaluated by qualified and experienced professionals, considering the specific site conditions and applicable local regulations.
- Prepare a substrate that extends approximately 6" beyond the perimeter of the paved area, ensuring the paved surface is kept at an appropriate distance from any adjacent structure.
- Make sure the concrete base is intact and free of significant cracks that could compromise its stability and that it does not exhibit differential settlement or movement.
- Make sure the pavement has approximately a 2 percent slope directed away from nearby buildings and pools.
- The specified edge restraint system is a low-profile type with a vertical height of 1.5" (4 cm), as illustrated in the drawing.
- Install an appropriate edge restraint system, securing it properly to the substrate in accordance with the manufacturer's instructions, based on the type of base material used.
- Lay a layer of filter fabric on top of the concrete slab to contain sand and fold it up the front of the edging.
- Make sure the plastic spacers min 5/32" (4 mm) are installed at all corners of the installed pavers in order to prevent pavers from touching each other (and potentially chipping) and to allow better water drainage.
- Pre-compact the sand bedding course and screed it to a 1" thickness, ensuring a smooth surface.

IMPORTANT: For best cutting results, 2 cm pavers should be cut using a wet saw—preferably a table or bridge saw—with an appropriate blade designed for porcelain pavers.

EDGE RESTRAINT SYSTEM SECURED INTO CONCRETE BASE



1. Edge restraint system
2. Frontier20 porcelain 3/4" nominal (20 mm) pavers
3. 1" of sand screeded bedding layer
4. Existing or new concrete 4" minimum
5. Fast-draining geotextile fabric
6. Minimum 4" of drainage compacted aggregate layer
7. Series of 2" diameter drainage holes drilled 24" apart
8. Soil
9. Subgrade

NOTES:

- While this installation method is appropriate in areas with a warm climate, it may not be ideal in freeze-thaw conditions.
- Never compact porcelain pavers with a plate compactor. If necessary, use a roller paver compactor specifically designed for porcelain, taking care not to chip or damage the pavers.
- Never install porcelain pavers without spacers (min 4mm - 5/32").
- For pavers of 20" inches or longer, an offset no greater than 30% is strongly recommended.
- Please note that the above section drawing is an example only.
- Project and site evaluation, structural design must be performed by a qualified professional engineer.



2. INSTALLATION OPTIONS

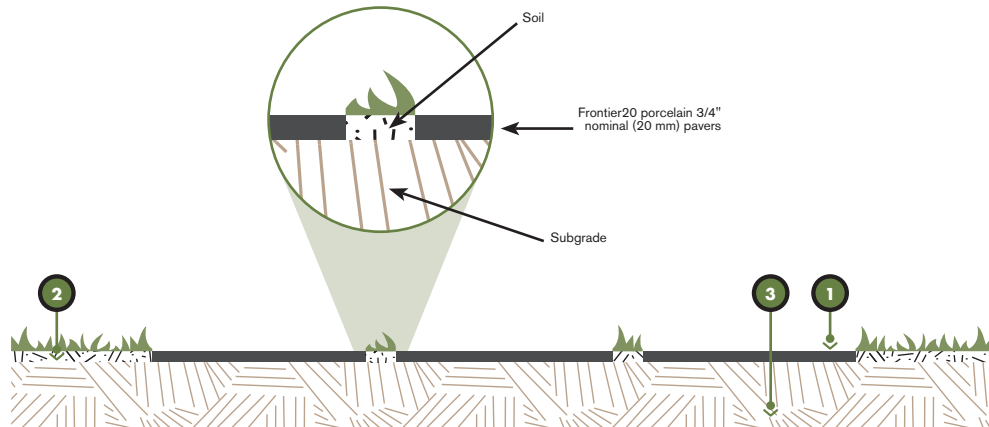
2.F DRY LAY OVER GRASS (PEDESTRIAN FOOT TRAFFIC)

PRACTICAL INSTALLATION

Follow the drawing below.

- Make sure the pavement has approximately a 2 percent slope directed away from nearby buildings and pools.
- In the desired area, remove any debris and cut the grass as short as possible.
- Using a hard or landscape rake, scratch up the top 1" of soil.

IMPORTANT: For best cutting results, 2 cm pavers should be cut using a wet saw—preferably a table or bridge saw—with an appropriate blade designed for porcelain pavers.



1. Frontier20 porcelain 3/4" nominal (20 mm) pavers

2. Soil
3. Subgrade



NOTES:

- Never compact porcelain pavers with a plate compactor. If necessary, use a roller paver compactor specifically designed for porcelain, taking care not to chip or damage the pavers.
- Never install porcelain pavers without spacers (min 4mm - 5/32").
- For pavers of 20" inches or longer, an offset no greater than 30% is strongly recommended.
- Please note that the above section drawing is an example only.
- Project and site evaluation, structural design must be performed by a qualified professional engineer.

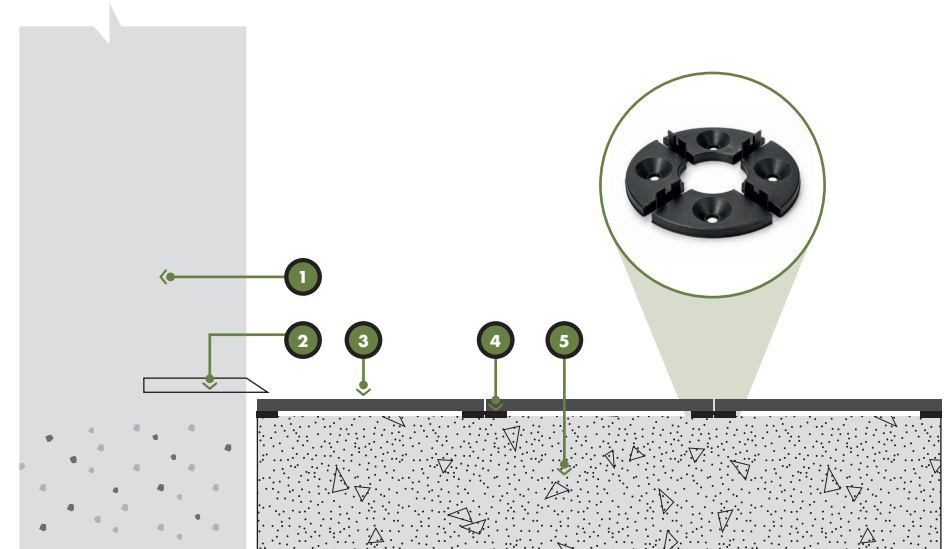
2.G LOW HEIGHT SUPPORTS (UP TO 3/4" - 20 MM) PEDESTAL INSTALLATION OVER EXISTING SUBSTRATE* (PEDESTRIAN FOOT TRAFFIC)

PRACTICAL INSTALLATION

Follow the drawing on the side.

- In practice, all requirements should be evaluated by qualified and experienced professionals, considering the specific site conditions and applicable local regulations.
- Make sure that the plastic pedestal supports are installed on all the corners of the installed pavers.
- It is recommended to surround the paved area with low edge retention system to prevent lateral movement. As an alternative it is possible to fix the pedestals around the edges to the existing slab or substrate.
- An L shape profile of aluminum or PVC might be used to construct a retaining edge.
- Make sure the pavement has approximately a 2 percent slope directed away from nearby buildings.
- Make sure the spacer tabs are intact in the corners where the porcelain pavers might come into contact.

IMPORTANT: For best cutting results, 2 cm pavers should be cut using a wet saw—preferably a table or bridge saw—with an appropriate blade designed for porcelain pavers.



1. House or structure.
2. Threshold for door.
3. Frontier20 porcelain 3/4" nominal (20 mm) pavers
4. Pedestal
5. Existing slab or substrate

NOTES:

- Never install porcelain pavers without spacers (min 4mm - 5/32").
- For pavers of 20" inches or longer, an offset no greater than 30% is strongly recommended.
- Please note that the above section drawing is an example only.
- Project and site evaluation, structural design must be performed by a qualified professional engineer.

* For installation on adjustable height pedestals (from 1 1/4" to 16") please contact tech-support@lcusa.com



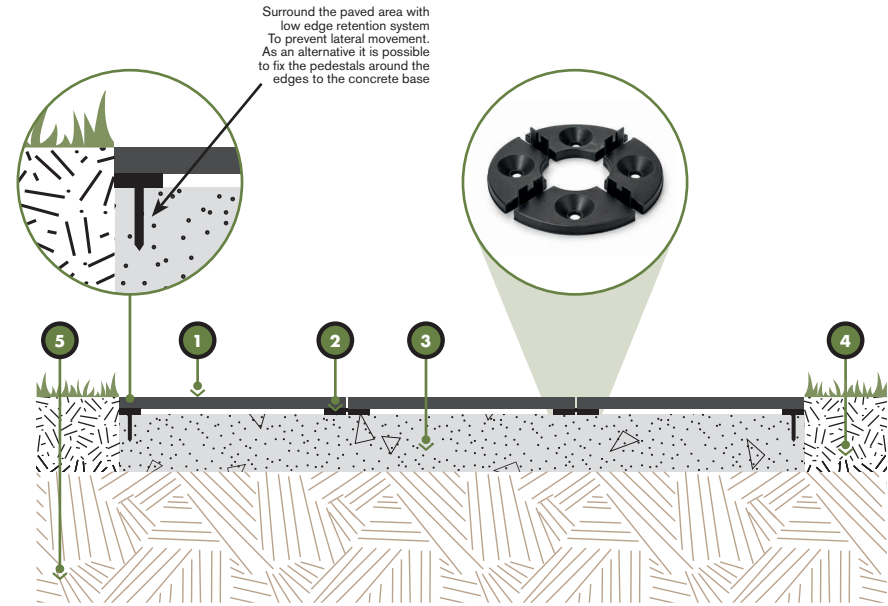
2.H INSTALLATION OVER 3/4" PEDESTAL ON CONCRETE (PEDESTRIAN FOOT TRAFFIC)

PRACTICAL INSTALLATION

Follow the drawing on the side.

- In practice, all requirements should be evaluated by qualified and experienced professionals, considering the specific site conditions and applicable local regulations.
- Make sure that the plastic pedestal supports are installed on all the corners of the installed pavers.
- It is recommended to surround the paved area with low edge retention system to prevent lateral movement. As an alternative it is possible to fix the pedestals around the edges to the concrete base.
- An L shape profile of aluminum or PVC might be used to construct a retaining edge.
- Make sure the pavement has approximately a 2 percent slope directed away from nearby buildings.
- Make sure the spacer tabs are intact in the corners where the porcelain pavers might come into contact.

IMPORTANT: For best cutting results, 2 cm pavers should be cut using a wet saw—preferably a table or bridge saw—with an appropriate blade designed for porcelain pavers.



- | | |
|---|------------------|
| 1. Frontier20 porcelain 3/4" nominal (20 mm) pavers | 3. Concrete base |
| 2. 3/4" pedestal | 4. Soil |
| | 5. Subgrade |

NOTES:

- Never install porcelain pavers without spacers (min 4mm - 5/32").
- For pavers of 20" inches or longer, an offset no greater than 30% is strongly recommended.
- Please note that the above section drawing is an example only.
- Project and site evaluation, structural design must be performed by a qualified professional engineer.

* For installation on adjustable height pedestals (from 1 1/4" to 16") please contact tech-support@lucsa.com



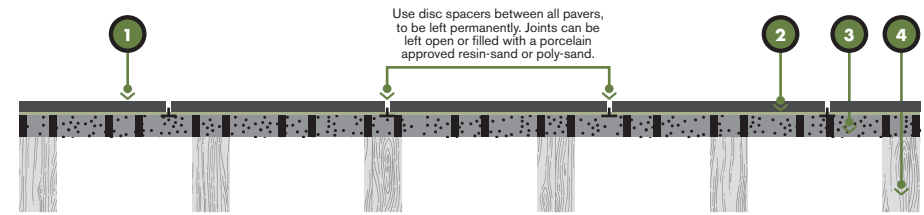
2.1 INSTALLATION OVER DECKING (PEDESTRIAN FOOT TRAFFIC)

PRACTICAL INSTALLATION

Follow the drawing on the side.

- Ensure all footings, piles, bearers, and joists have been inspected or designed by a qualified professional to meet relevant building codes, load and site requirements.
- Top of joists must be flat to one another.
- Deck joists must be spaced correctly according to state and local regulations where the work is performed.
- Select plastic grates that fit the joists being used, or joists that can be cut to fit appropriately per manufacturer's specifications.
- Make sure the pavement has approximately a 2 percent slope directed away from nearby buildings.
- Install plastic grates on deck joists strictly complying with grate manufacturer recommendations.
- Securely install a fabric or membrane appropriate for the application. There are permeable and non-permeable options, the selection would depend on the intended use for the area below the deck. If using a non-permeable option, ensure the grade of the decking steers toward an appropriate drainage terminal.
- Secure low profile sub-surface tile spacers to the deck grates in accordance with manufacturer specification.
- Joints can be left open or filled with a porcelain approved resin-sand or poly-sand. There will be significant sand migration during installation so plan on decreased square footage per bag/bucket of sand.

IMPORTANT: For best cutting results, 2 cm pavers should be cut using a wet saw—preferably a table or bridge saw—with an appropriate blade designed for porcelain pavers.



1. Frontier20 porcelain 3/4" nominal (20 mm) pavers
2. Outdoor fabrics or sound insulating mattress (if desired)
3. Plastic grates
4. Deck joists

NOTES:

- Never install porcelain pavers without spacers (min 4mm - 5/32").
- For pavers of 20" inches or longer, an offset no greater than 30% is strongly recommended.
- Please note that the above section drawing is an example only.
- Project and site evaluation, structural design must be performed by a qualified professional engineer.



01. PORCELAIN PAVERS ADDITIONAL RECOMMENDATIONS FOR THE INSTALLATION, ORDINARY CLEANING AND MAINTENANCE.

Landmark Ceramics recommends carrying out the procedures for the ordinary cleaning of Frontier20 floor surfaces using water and commercially available neutral detergents: the inclination of the surface and the space between adjacent slabs for dry-system installation favor the natural flow of water. However, it is important to take into consideration that any type of floor surface is subject to the surface tension effect of liquids: it is the same property of water that gives the tendency to transform into spherical droplets and which cause the curved top surface of a glass full of water. The surface tension can obstacle the complete drainage of water and cause a temporary stagnation of liquid on the slab edges. In order to avoid this problem, Landmark Ceramics recommends ensuring adequate inclination of the surface during installation so as to encourage the flow of water between adjacent slabs.

Please remember in any case that, in view of the distinctive advantages of porcelain stoneware, Frontier20 absorbs practically no water, which makes it highly frost-proof. This may lead to localized water pooling, mainly on the edges of the pavers, independently of the manner and quality of the laying. Laying is also recommended with a minimum gap of 4 mm (5/32"). Should liquid deposit on the surface, it is recommended to push it towards grout lines using a brush or remove it with a wet and dry vacuum cleaner.

Specific details and instructions are given for each of the following installation options. Different climates and geographical locations will affect the thickness of the base.

Depending on the location, contractors will lay the standard base thickness to install porcelain pavers for the needs of the area. When installing porcelain pavers, the bedding coarse sand must be pre-compacted and then struck off with a screed to the required thickness as shown in the drawings. Before the laying of the porcelain pavers, the sand layer underneath must be pre-compacted. The sand layer needs a 5 to 6% moisture content to insure a smooth strike off finish. Compacting dry sand will not give the desired results.

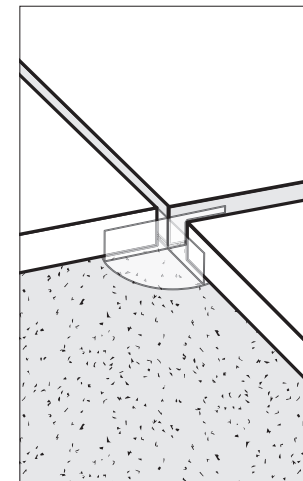
- Only use a paver saw with a wet cut porcelain blade to wet cut porcelain pavers.
- Before installing your porcelain pavers in sand set installations, pre-compact and strike off your sand leveling course.
- Plastic 3/16" (4mm) spacers, or 1/4" (6mm) spacers for modular patterns, must always be used to install pavers on sand set and permeable installations.
- Never install pavers with porcelain-to-porcelain contact.
- The use of plate compactors is not recommended to be used on the porcelain pavers.



02. PORCELAIN PAVERS JOINT FILLING.

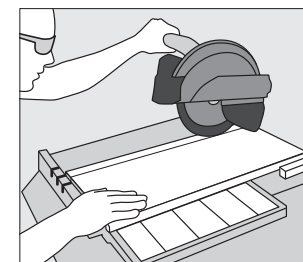
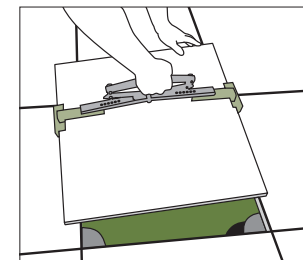
When installing porcelain paver on sand set base, fill the paver joints with one of these options:

- Traditional sand - Fill the open joints with traditional dry sand until completely filled. Sweep any excess sand off the pavers. Refilling of the joints with sand may be needed in the future due to wind and rain erosion.
- Polymeric sand - Polymeric sand is a blend of polymers which harden when subjected to moisture. Make sure to use only polymeric sand specific for porcelain pavers. Sweep the sand into the open joints until completely filled. All excess sand and dust must be swept from the surface. Use a blower for the final dust removal to make certain all excess sand is removed. Any residual sand or dust can result in staining of the surface. Once the filling of the joints and the cleaning of the surface is complete, mist the pavement with water which activates the polymer and cures the mixture.



03. PORCELAIN PAVERS HANDLING AND SPECIALTY TOOLS.

Porcelain paver pallets are shipped with a very strong plastic covering and the individual units are packaged in protective cardboard boxes. The protective cardboard boxes guard them from the possibility of chipping. The handling of multiple loose stones can result in damaging or chipping of the pavers. Protect any un-used boxed pavers from the elements once the plastic shipping cover is removed. This ensures the integrity of the protective cardboard boxes. Wet cut paver saw is used to cut paver accurately and cleanly to fit around edges and corners. The saw must be equipped with a diamond blade manufactured for wet cutting porcelain and designed to safely cut a 24" (60 cm) length porcelain paver. A paver clamp to easily handle the installation and removal of pavers. Gloves are highly recommended while handling and installing porcelain slabs to protect the hands from injury. Notched trowels and grout float tools for cementitious adhesive and grout Installation. Follow the adhesive and grout manufacturer's recommendations to select the appropriate tools needed for application.



04. PORCELAIN PAVERS RAISED FLOORS INSTALLATION SYSTEMS: WARNINGS.

Landmark products are made using the best technology available, and their technical performances match or exceed requirements from both ASTM and ISO standards for porcelain products. Nevertheless, if the application of the 20 mm slabs requires the ceramic product used in structural installations, the project engineer and/or customer must carefully assess the project requirements with regard to the technical specifications of the slabs.

To prevent the risk of damage or injury, the manufacturer recommends:

In a raised floor installation, it is important to note that, even though porcelain is an extremely hard and compact material, the ceramic slab is not bonded to the ground, but laid on raised pedestals. Since the ceramic slab is a hard, not elastic material, it could break for various reasons (such as, but not limited to, a heavy object falling on the paver, heavy equipment/machinery operated improperly, etc.).

Therefore, the manufacturer recommends checking the specific intended use before starting the installation and:

- Comply with the table for raised installation provided below.
- In all installations on pedestals higher than 3/4", reinforcing must be applied on the back of the slabs (double fiberglass mesh) which must be ordered through Landmark and which will be applied prior to shipment of the goods.
- If a Buyer, customer, or end user decides to use another anti-collapse solution other than double fiberglass mesh among those available in the market (including any double fiberglass mesh not applied by Landmark), Landmark specifically disclaims, and Buyer agrees, that Landmark shall not have any responsibility for damage to the product, objects, or persons caused by the breakage of any of pavers. Additionally, if a Landmark-supplied backing solution is not used on raised installations, Landmark disclaims, and Buyer agrees, that Landmark shall not have any responsibility for damage to the product, objects, or persons caused by the breakage of any pavers.

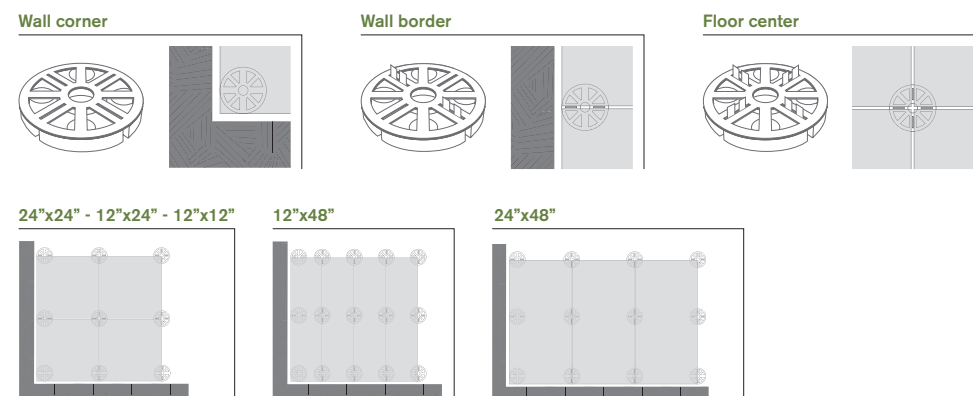
SUPPORTS REQUIREMENTS			
	SIZE	UP TO 3/4" (20MM)	ABOVE 3/4" (20MM)
	12"x12" (300x300 mm)	4 supports 0,32 pcs/sq ft	Please contact Landmark Ceramics
	12"x24" (600x300 mm)	4 supports 0,32 pcs/sq ft	Please contact Landmark Ceramics
	24"x24" (600x600 mm)	4 supports 0,32 pcs/sq ft	Please contact Landmark Ceramics
	24"x36" (600x900 mm)	6 supports 0,32 pcs/sq ft	Please contact Landmark Ceramics
	12"x48" (300x1200 mm)	6 supports 0,65 pcs/sq ft	Please contact Landmark Ceramics
	24"x48" (600x1200 mm)	6 supports 0,65 pcs/sq ft	Please contact Landmark Ceramics

For any dry installation system of flooring above the ground level, Landmark recommends compliance with local regulations and conditions of use regarding wind-load, loadbearing, seismic events, etc. Outdoor paving solutions installed unglued above the ground level are subject to the action of the wind, with the risk, in some cases, of becoming airborne. Landmark recommends using a qualified professional to check the suitability of any above ground installation system in accordance with the local laws and regulations and the conditions of use. Failure to do so could result in serious injury or property damage, for which Landmark shall have no liability.

Installations must be completed onto a solid, water-resistant substrate with the correct slope to guarantee water drainage.

Supports come equipped with four spacers that allow for the creation of grout lines between pavers. For a correct installation against walls or corners, it is necessary to keep the supports distant from the wall and remove 2 or 4 spacers as showed in the picture below. Landmark Ceramics recommends to strictly follow the instructions for the raised installation of Frontier20. Failure to comply with these recommendations may lead to improper use of the product and could cause serious property damage or injury. Additionally, failure to comply with these recommendations will result in the Warranty provided herein becoming null and void.

For further information and recommendations concerning the installation systems please refer to our website at <https://outdoor.landmarkceramics.com/installation-pavers.php> or <https://outdoor.landmarkceramics.com>.



All information provided in this document is subject to change. Please refer to our websites (<https://www.lcusa.com> and <https://outdoor.landmarkceramics.com>) for the latest, most accurate and up-to-date information.

FIRST FLOOR DEEP CLEANING AFTER INSTALLATION OVER CONCRETE

After Grouting the Joints (**pic.1**) It is important to remove the excess grout with a sponge and clear water (**pic.2**). After 12/48 hours, the grout in the joints will have “set up”/hardened significantly. There will be a noticeable residual “haze”. Typically, a diluted acid cleaner specifically for removing “Grout Haze”, combined with a soft scrubbing pad will remove the majority if not all the “Haze”.

Change your acid/water solution frequently for best results. It is also recommended to keep a bucket of clean water to remove the acid/water solution. It is recommended to keep and use clean dry towels to help remove as much residual water and keep the floor as dry as possible. Please refer to the cleaning chemical company’s suggested methods and dilution rates. (**pic.3**).

For areas with excess grout or grout that becomes adhered to the face of the tile, further cleaning with an Acid/Water Solution may be necessary. Please refer to the Cleaning Chemical Company’s instructions as not all acids or chemicals are the same. The excess grout residue (**pic.4-5**) must be removed so that it does not dry and stick on the surface. It is necessary to change the cleaning water frequently and rinse well. Care must be taken on inlayed, polished and especially Anti Slip products similar to Frontier20.

The use of a floor-washing machine combined with the use of a diluted acid detergent helps reach the spaces between adjacent tiles and clean them properly. If such a cleaning procedure is not carried out, or if such cleaning is carried out too late, the grout residue creates an absorbent film, which holds dirt, making the surface difficult to clean: in this case, Landmark Ceramics will not be liable for any damage caused to the surface.

ORDINARY CLEANING

After the first deep cleaning (described above) is complete, ordinary cleaning will be necessary based on traffic and use of the floor. We strongly advise against the use of waxes, oily soaps, impregnating products and treatments (water and oil repellent) on the porcelain stoneware product, as their application is unnecessary.

Many off the shelf detergents contain waxes and gloss-inducing additives which, after various washes, can deposit a bright coat on the floor. For films left by soap, lime scale, dirt, use an acid detergent, suitably diluted in water (read the product instructions carefully).

It is also important to point out that Hydrofluoric acid (HF) and its derivatives can irredeemably damage porcelain stoneware. For routine cleaning, Landmark recommends the use of bleach or ammonia, suitably diluted in water; for polished porcelain stoneware, dry the floor after washing to prevent unsightly smudges.

TIP: Since rinsing well with plenty of clean water is a fundamental part of the day-to-day cleaning procedure, Landmark advises against the use of products which state that they “do not need rinsing”.

EXTRAORDINARY CLEANING

In the case of particularly stubborn stains, we recommend using specific detergents such as those indicated in chart below. The removal of any type of stain is easier when the stain is still fresh. It is always important to test the detergents on a small area before applying to the entire surface, particularly in the case of porcelain stoneware with a lapped or polished finish.



PIC 1. Fill joint with grout.



PIC 2. Remove excess grout with clean water.



PIC 3. Add specific acid cleaning agent for porcelain tile to clean water.



PIC 4. First floor deep cleaning after 12/48 h from installation.



PIC 5. Removal of excess grout residues with hard brush.



CLEANING AGENTS

TYPE OF STAIN	SOLUTION	DETERGENTS	MANUFACTURER
INORGANIC STAINS			
Cement Carbon Calcium Efflorescence Chalk Metallic residues Rust Cement-based grout Colored grout Wall paint	Acid	DETERGENT WITH AN ACID BASIS *	
		DETERDEK or similar	UNITED STATES > Fila Chemicals USA, Corp. 10800 N.W. 21st Street #170 Miami, FL 33172 USA Tel. +1-305-513-0708 email filausa@filasolutions.com
		KERANET (liquid) or similar	MAPEI Americas Headquarters 1144 E. Newport Center Drive Deerfield Beach, Florida 33442
ORGANIC STAINS			
Coca Cola Ice Cream Coffee Wine Beer Animal fats Vegetable fats Mustard Mayonnaise Ketchup Jam Linseed oil Lipstick Wax	Alkaline and neutral	LIMITED FOAM TYPE PRODUCT **	
		PS87 or similar	UNITED STATES > Fila Chemicals USA, Corp. 10800 N.W. 21st Street #170 Miami, FL 33172 USA Tel. +1-305-513-0708 email filausa@filasolutions.com
		FILACLEANER or similar	UNITED STATES > Fila Chemicals USA, Corp. 10800 N.W. 21st Street #170 Miami, FL 33172 USA Tel. +1-305-513-0708 email filausa@filasolutions.com
		Ammonium	Universal
RESIDUAL RINGS of organic nature	Saline solution	Sodium hypochloride (bleach for white laundry)	Universal
Silicone oils Machine Oil Resins and glazes Coal and natural rubber Encres et feutres		FILASOLV or similar	UNITED STATES > Fila Chemicals USA, Corp. 10800 N.W. 21st Street #170 Miami, FL 33172 USA Tel. +1-305-513-0708 email filausa@filasolutions.com
		Aceton	Universal
		NITRO - THINNER	Universal
		TURPENTINE	Universal
		TRICHLORETHYLENE	Universal
		CIF AMMONIACAL	Universal
		HAND CLEANSER	Universal
Tire		Ice+scraper	
Silicone and chewin-gum		Ice+scraper	

N.B. When using the above products, the instructions on the package should be followed.

* **Detergent with an acid base:** a detergent with an acid basis, specifically recommended after bath floor or wall installation, for the decalciofiant cleaning and the regular maintenance.

** **Limited foam type product:** a limited foam type product degreasing and general cleaning, suitable for all types of stains but especially for remove of vegetable and animals fats.



LANDMARK CERAMICS

Landmark Ceramics - UST, Inc.

1427 N. Main Street
Mount Pleasant, TN 38474

Tel. 931.325.5700

outdoor.landmarkceramics.com

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