

ARCHATRAK INSTALLATION GUIDE

PORCELAIN PAVERS

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PRE-INSTALLATION CONSIDERATIONS

Before commencing any work, installers and contractors must ensure that any substructures or substrates on which the pavers will be laid meet all requirements in terms of stability, compaction and load bearing capacity. To ensure good drainage, solid substrates should have a minimum slope of 1.5%.

For structural applications with $\frac{3}{4}$ " thick porcelain pavers, designers, architects, specifiers and/or clients should always make a careful assessment of the project requirements, including the nature of the site, the intended use and weight loadings in relation to technical characteristics of the pavers.

All local regulations especially those concerning the action of the wind, structural load, fire and seismic conditions, must be complied with.

With elevated deck applications where pavers are supported on pedestal systems, the shock resistance of porcelain pavers should also be considered to avoid the risk of damage or injury. Despite the intrinsic density and stiffness of porcelain pavers, pavers could potentially break if a heavy object is dropped from a significant height. Where hard and heavy objects are likely to be used or where floor heights are greater than 4", we recommend appropriate reinforcement is used under the pavers, such as glued glass fiber mats or metal trays.

Failure to comply with all local laws, regulations and our installation recommendations may lead to improper use of the product and could cause serious damage or injury to persons and property.

For additional support or other technical information on the installation of porcelain pavers, please contact Archatrak at sales@archatrak.com.

HANDLING PAVERS

- ✦ Porcelain pavers are typically supplied on plastic wrapped pallets with pavers packaged in protective cardboard cartons. To avoid damage to the pavers, do not remove the pavers from the protective cartons until they are ready for installation.
- ✦ Avoid leaving un-used boxed pavers exposed to weather to ensure the integrity of the protective cardboard cartons.
- ✦ A paver clamp should be used for easier handling of pavers, which can be used for both installation and removal of pavers.
- ✦ A pair of sturdy gloves is highly recommended when handling pavers.

CUTTING AND LAYING PAVERS

- ✦ Use a wet saw fitted with a diamond blade designed for cutting porcelain. The saw should be designed to safely cut a 24" wide porcelain paver. Bridge saws with a 10" blade are recommended. In general, thinner blades are less prone to chipping along the cut line.
- ✦ Never compact porcelain pavers with a plate compactor.
- ✦ Always compact and level sand beds before installing porcelain pavers in sand set installations.
- ✦ Porcelain pavers should not be installed with a porcelain to porcelain contact. 3/16" min. spacers are recommended for most installations.

JOINT INFILLING

In sand or gravel set installations, several options can be considered for infilling joints.

TRADITIONAL SAND

Dry sand offers good mechanical properties and will partially absorb any movement between pavers. However dry sand filled joints will not prevent growth of grass or other plant material, nor prevent insects such as ants from nesting and tunneling under the pavers. Under some circumstances, water could filter into the surface below, turning to ice in cold weather and lifting the pavers. In very windy locations, on slopes or where there is heavy rainfall, the sand in the joints can become depleted due to erosion.

Dry sand is swept into the open joints until they are completely filled. Excess sand is then swept away.

CEMENT BLENDED SAND

Joints with cement blended sand have excellent mechanical properties and are more durable than sand or polymeric sand. Weeds will not grow in joints filled with a cement sand mix and insects and ants cannot build nests. The paving is totally impermeable; once the joints have been filled, they are not subject to erosion and will remain intact over time.

Dry cement blended sand (typically 3 parts sand to 1 part cement) is swept into the open joints until they are completely filled. Excess cement blended sand is then swept away. It is extremely important that all excess sand and cement dust is swept from the surface as any residual material could discolor the surface. After the joints are filled, spray the paved area with a light mist of water to enable curing of the cement.

POLYMERIC SAND

Polymeric sand is composed of a mixture of polymer binders and dry sand. Once the sand is wet, it hardens and becomes quite solid, equally effective on both flat surfaces and sloping ground. The joints have excellent mechanical properties, absorbing movements between pavers.

Weeds will not grow in joints and insects and ants will not be able to make nests. The paving is impermeable and the joints remain intact, unaffected by erosion from wind or water.

Polymeric sand is swept into the open joints until they are completely filled. It is extremely important that all excess polymeric sand is swept from the surface as any residual material could discolor the surface. After the joints are filled, spray the paved area with a light mist of water to enable the process of polymerization. Spray again 5-10 minutes later. In dry weather, the polymerization process will be complete in a few hours so the paving becomes serviceable in about 24 hours.

GROUT FILLED JOINTS

Cement based grout offers excellent mechanical properties, absorbing any movement between the pavers. It also helps to distribute the surface load, ensuring maximum stability. Weeds will not grow in joints filled with cement grout and insects and ants cannot make their nests. The paving is totally impermeable and the joints remain intact over time.

After the mortar used to lay the pavers is dry, spread grout into the joints using a rubber blade, making sure the joints are completely filled. Pass the rubber blade diagonally across the joints to remove any excess grout. Immediately after filling the joints, use a damp sponge to remove residue on the surface of the pavers. After the grout is dry, remove any residue with a water and buffered acid solution. Finally, rinse well with water.

LEGAL DISCLAIMER

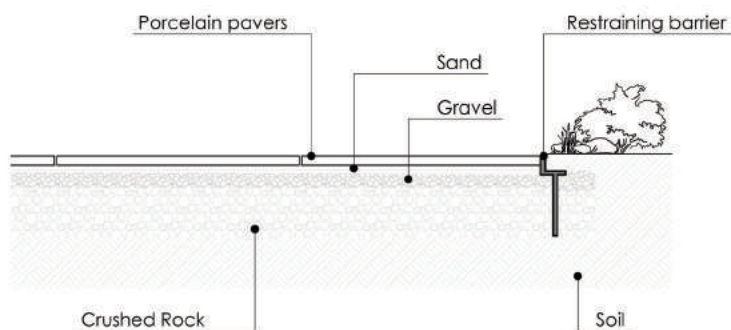
The information and recommendations in this document are for informational purposes only. The installation diagrams and procedures are to be considered as indicative only and have the sole purpose of illustrating various types of applications and the means of achieving a specific installation in a workmanlike manner. In no way should it be construed that information presented in this brochure overrides any regulations, standards or procedures that may apply to installation of unit paving in any specific configuration or locality.

INSTALLATION OPTIONS

1. ON SAND WITH COMPACTED GRAVEL BASE

Dry laying on sand is recommended for non-vehicular applications such as garden landscaping, patios, courtyards, walkways and terraces.

- ◇ After defining the area to be excavated, mark the perimeter using wooden or steel marker posts connected by a string. Note that the excavated area should be extended on all sides by approx. 6"-8" to ensure stability at the outer edges of the paved area.
- ◇ Remove the soil inside the marked area using a shovel or excavator. The depth of excavation will depend on several factors including the anticipated loading, the drainage capacity of the soil and the soil conditions in general.
- ◇ Using a rake or shovel, level the excavated area and ensure there is at least 2% slope for good drainage. Compact the soil with a vibro compactor.
- ◇ A restraining perimeter wall should be installed prior to laying the gravel/sand bed unless it is in direct contact with a footpath, wall or an existing edge that is sufficiently rigid. The perimeter wall should be fixed to the ground with mechanical fixing devices or constructed as a solid barrier using poured concrete.
- ◇ Place a sheet of geotextile fabric on top of the compacted soil to prevent the soil from mixing with the gravel.
- ◇ Fill the excavated area with $\frac{3}{4}$ " stone screenings to a thickness of 8" - 12", depending on the planned loading.
- ◇ Add a further layer of $\frac{3}{8}$ " gravel to a thickness between 4" - 8". Compact the two layers and then level ensuring there is a slope of approx. 2%.
- ◇ Place a sheet of geotextile fabric on top of the compacted gravel to prevent the gravel from mixing with the sand.
- ◇ Fill the area with sand to a thickness of between $\frac{3}{4}$ " and 2" and compact with a vibro compactor.
- ◇ Level the surface by sliding a wood or steel board placed on two parallel runners across the entire area, again ensuring there is a slope of approx. 2%.
- ◇ Taking care not to disturb the sand bed, lay the pavers using $\frac{3}{16}$ " min. spacers. Carefully tap the pavers with a rubber mallet to ensure they are not rocking on the sand bed and that they are level with each other.

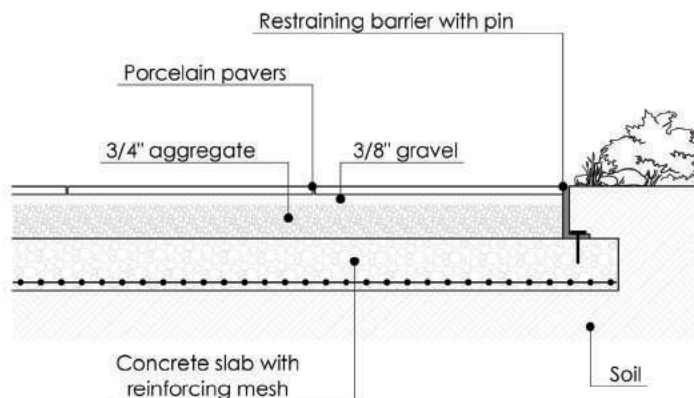


2. ON GRAVEL - PERMEABLE

Dry laying on gravel over a concrete base is recommended for applications such as garden landscaping, patios, courtyards, walkways and terraces. This method enables good drainage via the joints between the slabs, and permits drainage of water through the gravel.

After defining the area to be excavated, mark the perimeter using wooden or steel marker posts connected by a string. Note that the excavated area should be extended on all sides by approx. 6"-8" to ensure stability at the outer edges of the paved area.

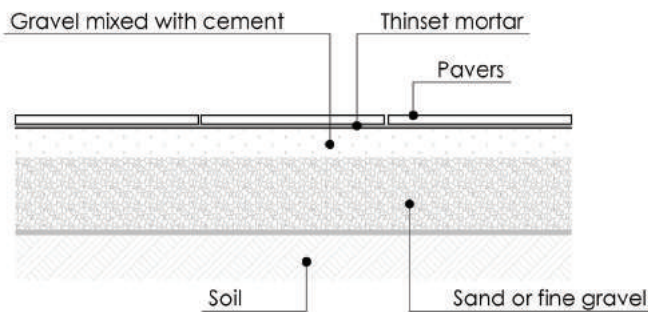
- ❖ Remove the soil inside the marked area using a shovel or excavator. The depth of excavation will depend on several factors including the anticipated loading, the drainage capacity of the soil and the soil conditions in general.
- ❖ Using a rake or shovel, level the excavated area and ensure there is at least 2% slope for good drainage. Compact the soil with a vibro compactor.
- ❖ Pour a base layer of concrete. Firstly lay welded reinforcing mesh over the area and pour a layer of concrete aggregate of thickness 4"-8" depending on the anticipated loading.
- ❖ The slab should be laid with a slope of 2-5% for drainage.
- ❖ After the concrete has set, lay a waterproof sheet over the concrete. To improve drainage, a honeycomb mat may be placed over the waterproofing sheet.
- ❖ Install a curb or restraining edge around the entire perimeter unless it is in direct contact with a footpath, wall or an existing edge that is sufficiently rigid. The perimeter wall should be fixed to the concrete with mechanical fixing devices. If possible, at least half the height of the restraining edge should be covered with soil on the external side of the paved area.
- ❖ Lay a 4"-12" thick layer of $\frac{3}{4}$ " aggregate, depending on the intended use, on top of the honeycomb mat. For greater stability, mix gravel with 5% cement and a small amount of water.
- ❖ Add a final bedding layer of approx. $\frac{3}{8}$ " gravel to a thickness of 2" and compact with a vibro compactor.
- ❖ Level the surface by sliding a wood or steel board placed on two parallel runners across the entire area, ensuring there is a slope of approx. 2%.
- ❖ Taking care not to disturb the gravel bed, lay the pavers using $\frac{3}{16}$ " min. spacers. Carefully tap the pavers with a rubber mallet to ensure they are not rocking on the gravel bed and that they are level with each other.



3. ON GRAVEL MIXED WITH CEMENT

Dry laying on gravel mixed with cement can be used for applications such as garden landscaping, patios, courtyards, walkways and terraces for a more stable surface than a completely dry installation, but it will not be possible to easily lift and replace pavers.

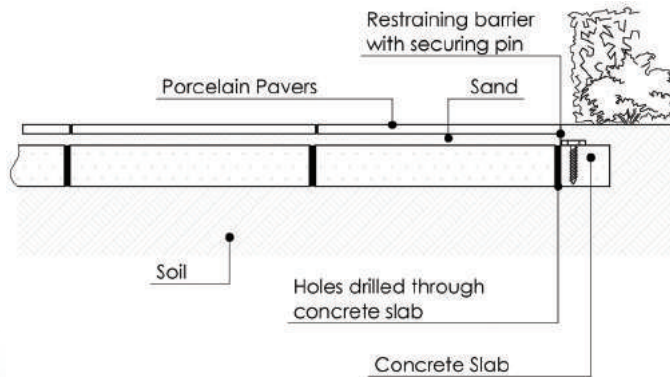
- ❖ After defining the area to be excavated, mark the perimeter using wooden or steel marker posts connected by a string. Note that the excavated area should be extended on all sides by approx. 6"-8" to ensure stability at the outer edges of the paved area.
- ❖ Remove the soil inside the marked area using a shovel or excavator. The depth of excavation will depend on several factors including the anticipated loading, the drainage capacity of the soil and the soil conditions in general.
- ❖ Using a rake or shovel, level the excavated area and ensure there is at least 2% slope for good drainage. Compact the soil with a vibro compactor.
- ❖ Fill the excavated area to a thickness of 8"-12" with a layer of sand or fine gravel, depending on the planned loading. Compact the sand/gravel with a vibro compactor and ensure that the 2% approx. slope for drainage is maintained.
- ❖ Mix gravel of size 3/16"-1/4" with 5% cement and a small amount of water and place over the compacted gravel layer to a thickness of 2"-4". Use a trowel to level the surface and if the joints between the pavers are not to remain as permeable, ensure there is slope of approx. 2%.
- ❖ For optimum adhesion of the pavers to the bedding layer, specialized thinset mortar can be applied to the underside of the pavers.
- ❖ Carefully tap the pavers with a rubber mallet to ensure they are bedded properly into the gravel/cement mix and that they are level with each other.



4. OVER CONCRETE BASE SET IN SAND

Dry laying over an existing concrete slab is an alternative method to installing on fixed height rubber pads, which will ensure a quieter surface when walked on as well as providing enhanced load bearing capacity.

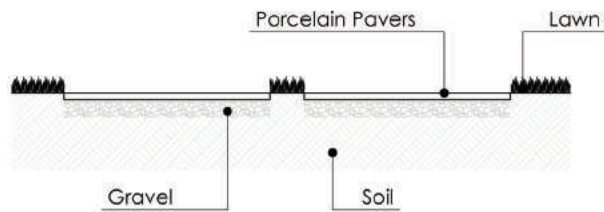
- ❖ A restraining perimeter wall should be installed prior to laying the pavers unless it is in direct contact with a footpath, wall or an existing edge that is sufficiently rigid. The perimeter wall should be fixed to the concrete base with mechanical fixing devices or constructed as a solid barrier using poured concrete.
- ❖ Drill 1/2" diam. drainage holes 24" on center through the concrete to provide additional drainage (if required).
- ❖ Place a sheet of geotextile fabric on top of the concrete to contain the bedding sand.
- ❖ Fill the area with sand to a thickness of approx. 1" and compact with a vibro compactor.
- ❖ Level the surface by sliding a wood or steel board placed on two parallel runners across the entire area, again ensuring there is a slope of approx. 2%.
- ❖ Taking care not to disturb the sand bed, lay the pavers using 3/16" min. spacers. Carefully tap the pavers with a rubber mallet to ensure they are not rocking on the sand bed and that they are level with each other.



5. OVER GRASS

The ideal laying method for creating stepping stones, walkways, barbecue areas and gazebos in the garden without requiring extensive excavation and site preparation.

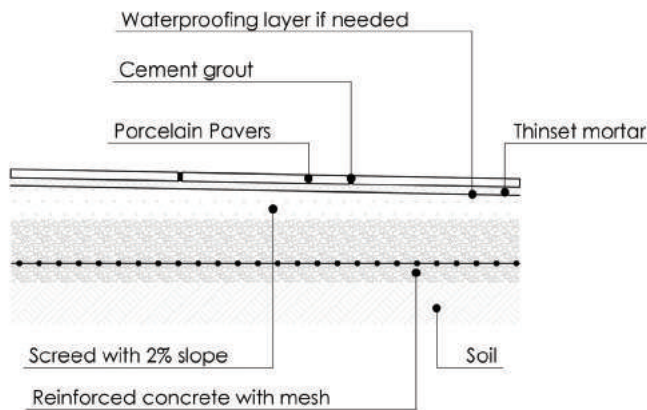
- ❖ Lay the pavers on the ground to determine the number of steps needed for the garden path, making sure the pavers are placed at equal distance from each other.
- ❖ The joint width between the pavers should be chosen depending on the appearance required. For stepping stones or pathways, the pavers would normally be laid with open joints with grass in between. However for areas where outdoor furniture will be used, pavers would normally be laid with closed joints.
- ❖ Mark the perimeter of each paver with a spade and then remove the pavers.
- ❖ Remove the turf up to a depth of 2"-3".
- ❖ Fill with a layer of fine 3/16"-1/4" gravel and compact the gravel before laying the pavers.
- ❖ If preferred, lay a 1" thick layer of sand to add as a bed for the pavers.
- ❖ Carefully lay the pavers so they protrude above ground level by about 1/4". The pavers must not protrude above the lawn level, to avoid damaging lawnmower blades when cutting the grass.
- ❖ Carefully tap the pavers with a rubber mallet to ensure they are bedded properly.



6. OVER CONCRETE BASE WITH THINSET OR ADHESIVE

Recommended for driveways, car parking areas and other areas subject to light vehicular traffic. Ideal for creating continuity between pedestrian areas and vehicular access areas.

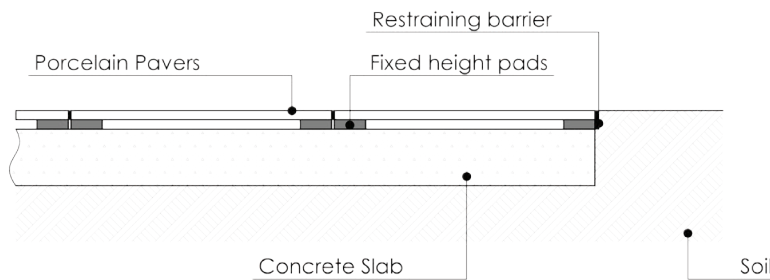
- ❖ Verify the concrete substrate is in good condition, is installed in accordance with relevant building codes and reinforced with steel mesh, and is constructed with a 2° slope pitched away from any building.
- ❖ Clean the surface of the concrete to ensure good adhesion of the pavers.
- ❖ Spread an approved exterior grade thinset mortar over the concrete using the correct sized notched trowel.
- ❖ Lay the pavers on the thinset with minimum 1/8" to 3/16" joint spacing where the area is not large enough to require expansion joints, or with 3/8" spacing where expansion joints are present. All expansion joints must be located along the joint line of the installed pavers to avoid cracking of the pavers.
- ❖ After the thinset has dried, grout the pavers with an approved exterior grade grout.
- ❖ Wash the pavers carefully after grouting to remove excess grout.
- ❖ A final buffered acid wash will also be required to remove any invisible grout residue.



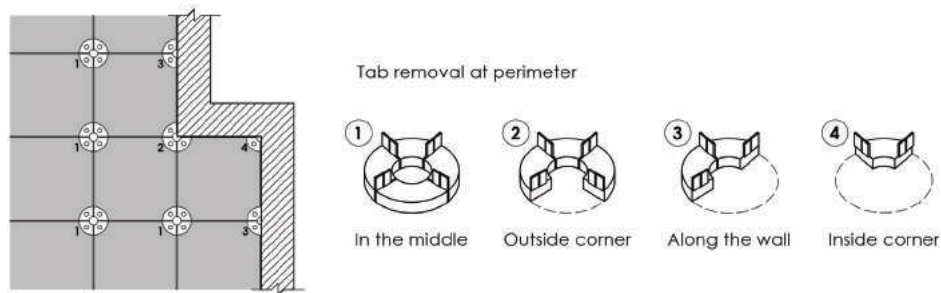
7. FIXED HEIGHT PEDESTALS OVER HARD SURFACES

A quick and easy method for laying pavers over existing concrete or other hard surfaces which may be removed and replaced at will.

- ❖ Ensure the substrate is smooth, even across the surface and is constructed with a 2° slope pitched away from any building.
- ❖ The paved area should be bounded fully by a containment barrier or other restraining device to ensure the pavers do not move. If however rubber fixed height support pads are used, the extra friction of these pads compared with plastic pads may be sufficient in many circumstances to mitigate the use of a restraining barrier.
- ❖ Draw the layout of the pedestals on the concrete using chalk and optimize the placement of the pavers to avoid cuts which would leave sections less than 8" wide.
- ❖ Place pedestals which have been cut in semicircles along the perimeter at the paver intersections, ensuring the only remaining spacer tabs are aligned with the gap between pavers. At right angle corners, cut pedestals into quadrants with all spacer tabs removed and place in corners.
- ❖ Place pavers carefully over the pedestals ensuring each paver butts tightly against the spacer tabs.
- ❖ Use 1/16" or 1/8" thick shims between the paver and pedestals as required to adjust for any slight unevenness of the substrate.
- ❖ Fixed height pedestals may be stacked on top of each other up to heights of approx. 1 1/2" providing the opportunity to create a paved area that is perfectly level and horizontal irrespective of any slight slope of the substrate.



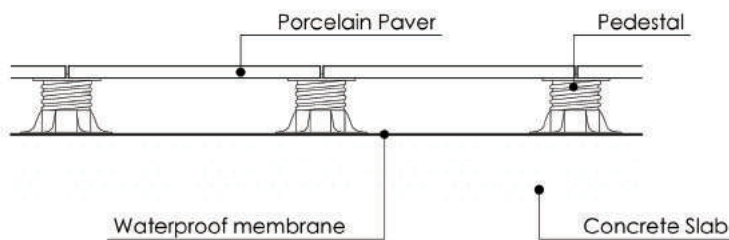
Placement of fixed height pedestals around perimeter walls



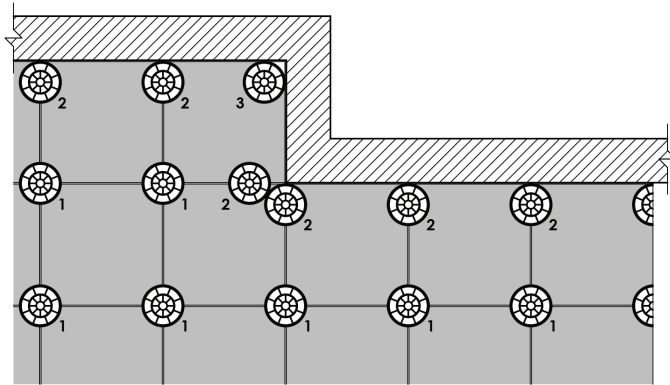
8. VARIABLE HEIGHT PEDESTALS OVER HARD SURFACES

The most convenient and cost effective method of building rooftop decks and elevated exterior floors over sloping or uneven substrates and for covering electrical cables and service pipework.

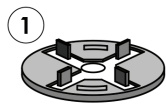
- ❖ Ensure the concrete slab is smooth, even across the surface and is constructed with a minimum 2° slope pitched away from any building.
- ❖ The paved area should be bounded fully by a containment barrier or other restraining device to ensure the pavers do not move.
- ❖ Use sight or laser lines to mark the intersections of the corners of each paver to be laid.
- ❖ Draw the layout of the pedestals on the concrete using chalk and optimize the placement of the pavers to avoid cuts which would leave sections less than 8" wide. With 24" x 24" pavers, allow one pedestal for each intersection of 4 pavers and at each intersection of two pavers around the perimeter. Depending on the proposed application, an additional pedestal may be required under the center of each paver, in which case all spacer tabs should be snapped or cut off from the pedestal head.
- ❖ Determine the slope at each intersection and select the appropriate pedestal to compensate for any slope. Note that the Eterno range of pedestals features a self-adjusting heads that automatically compensate for slopes up to 5%.
- ❖ Position the first pedestal in one corner of the area and place subsequent pedestals along a wall edge, spaced according to the width of the pavers to be used and cutting the bases of the pedestals to ensure the pedestals are as close as possible to the wall. Snap off tabs as required.
- ❖ Place a second row of pedestals parallel to the first and separated from the first row by the width of the pavers.
- ❖ Place the pavers with each corner resting on the top of each pedestal.
- ❖ Screw the head component up or down to ensure each paver is level. The surface should be checked for level as each row of pavers is laid.
- ❖ Install shims between the pavers and the head as necessary to ensure each paver is level, either to adjust a single quadrant or multiple quadrants.



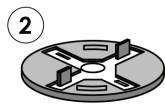
Placement of variable height pedestals around perimeter walls



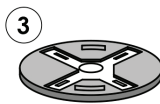
Tab removal at perimeter



In the middle

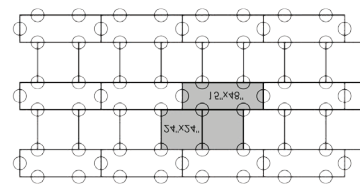
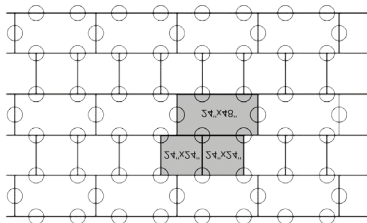
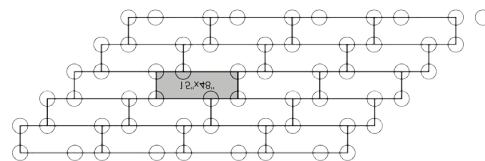
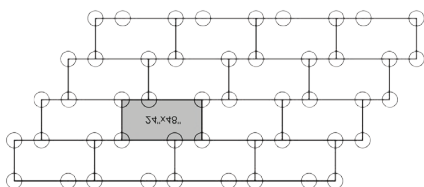
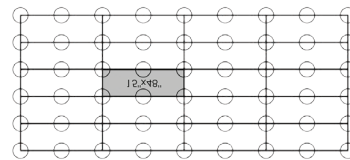
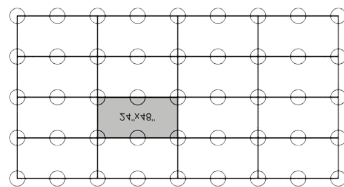


Along the wall



At corners

Pedestal placement for different sized pavers and laying configurations



SPECIAL CONSIDERATIONS FOR ELEVATED DECKING INSTALLATIONS

Project managers, specifiers and customers should carefully assess the intended use of porcelain pavers in elevated decking applications in relation to their specific technical specifications and properties.

Any outdoor paving materials installed above the ground level without adhesives or other secure fixing devices will be subject to the action of wind, with the risk in some cases of becoming airborne. Archatrak recommends confirming the suitability of the installation system for aboveground application in accordance with any local laws and regulations, including regulations relating to seismic events and hurricanes.

Archatrak engaged the Florida International University Hurricane Research Center to independently evaluate the resistance of 24" x 24" porcelain pavers to wind uplift using their Wall of Wind facility under a series of specifically designed test conditions including different wind angles, pedestal heights and parapet wall heights. Whilst the full Wall of Wind test report (available from Archatrak on request) should be consulted for details of both the test procedure and results obtained for each set of variables, it was found that the wind speed at which blow off of $\frac{3}{4}$ " thick 24" x 24" Archatrak porcelain pavers installed on fixed height pedestals and 45° wind angle occurred was 130 mph with no parapet present and 150 mph with a 12" high parapet.

The shock resistance of porcelain pavers should also be considered with pedestal installations to avoid the risk of damage or injury. Despite the intrinsic density and stiffness of porcelain pavers, slabs may break if a heavy object is dropped from a significant height. With 24" x 24" pavers, the installation of fifth pedestal in the center of the paver can provide greater load capacity and reduce the risk of damage or injury should a paver break due to a heavy object being dropped from a significant height. Nevertheless, where hard and heavy objects are likely to be used or where floor heights are greater than 4", it is recommended that appropriate reinforcement such as glued fiberglass mats or metal trays are applied to the underside of the pavers.

FAILURE TO COMPLY WITH THESE RECOMMENDATIONS COULD LEAD TO IMPROPER USE OF THE PRODUCTS AND COULD CAUSE SERIOUS DAMAGE TO PROPERTY OR INJURY.