ULTIMATE ASSEMBLY®
ARCHITECTURAL PAVER
INSTALLATION GUIDELINES

HANOVER METHOD

American Hydrotech, Inc., 303 East Ohio Street, Chicago, IL, 60611-3387 (312) 337-4998 * 03/15

Product Description

Hanover® Architectural Pavers (pressed concrete slabs or natural granite) are the final component of Hydrotech's Ultimate Assembly®, a fully warranted membrane, insulation and paver system. Other components include MM6125® waterproofing membrane, Hydroflex® protection course, Hydrodrain® drainage medium and STYROFOAM® insulation. Hydrotech's full line of paver accessories allows for ease of installation and maximum project flexibility.

Experience is the key to a proper and tight fitting paver installation. While an experienced contractor can make even the most difficult installation look easy, Hydrotech strongly recommends that for any project beyond a simple and straightforward paver installation, the work be performed by an experienced paver installer who ultimately will be guaranteeing the installation. This may not be the Hydrotech approved roofing/waterproofing applicator. With many variables to consider, an inexperienced installer can easily overlook very small but important steps necessary for a proper installation.

Pre-Installation

Design

The first step in a successful Architectural Paver installation is good design. In almost all cases this is the responsibility of the architect, designer or sometimes the owner.

An accurate, preliminary paver layout must be supplied by one of these parties. The layout should include rough dimensions, paver sizes, location of different colors/finishes, all termination points (i.e. building walls, parapets, etc.), all elevation control points (i.e. doors, landings, stairs, elevation changes), all slope changes (i.e. ridges, valleys), just to name a few items.

In addition to the paver layout, details regarding the paver's installation should be provided - termination detailing where pavers meet building walls, doors, ramps, stairs, planters, etc.; specialty precast items such as planters, benches and copings. In the event the project's design calls for Hydrotech supplied precast items such as stairs, copings and wall panels, additional drawings, either architectural or contractor shop drawings (2 sets) must be submitted to Hydrotech for review and recommendations.

Shop Drawings

In many cases, if not all, the installing contractor will be required to provide shop or working drawings. This can typically entail re-drawing the paver layout provided by the designer ***after field verifying all dimensions.*** Depending on how complete and accurate the architectural drawings are and how complex the project is will determine how much more drawing and verifying the installer will need to do. ***This is a very important step!*** Making a mistake here can be very costly.

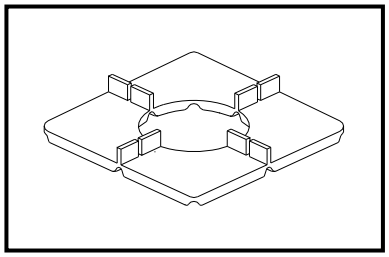
It is in this step that the installer will verify that what the architect has designed is practical. The architect will get a very good idea of where he should start the layout and approximately how the grid lines will be laid. The architect will be able to fairly accurately determine where paver cuts will be required as well as their size and shape, while maximizing the use of full pavers. It will also be very important to verify locations of drains and other items that may have an impact on the positioning of the pedestals. The final shop drawings must be approved by the architect/owner to verify acceptance of any cuts or unusual conditions.

Materials and Equipment

Once sizes and dimensions are verified and an accurate layout has been developed, the amounts and types of materials and accessories can be determined. Following is a list of products and accessories typically required.

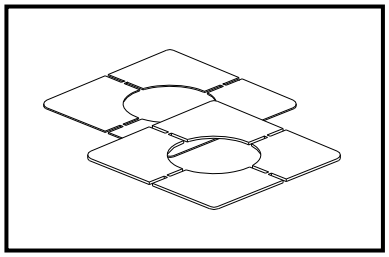
Pavers

If the design calls for all one color and finish, the number of pieces required is easy to figure. The more different colors and finishes introduced the more time consuming and important the material take-off becomes. Be sure to figure for all cut pieces as well. Oversized pavers can also be used to minimize or eliminate small cut pieces. Refer to *Cutting Pavers and the Use of Oversized Pavers* .



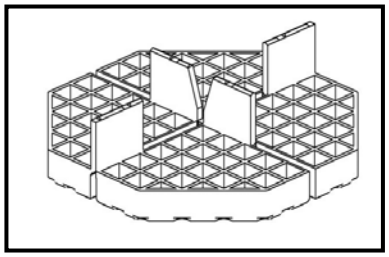
Flexible Fixed-Height Pedestals

Flexible Fixed-Height pedestals are 5 inch square rubber pads made of EPDM rubber. The pedestals are 3/8 inch thick with integral joint spacer tabs providing a 1/8 inch joint between pavers. While the Flexible Fixed-Height pedestals cannot be stacked, they can be combined with square leveling shims 1/16 and 1/8 inch thick made of the same flexible EPDM rubber.



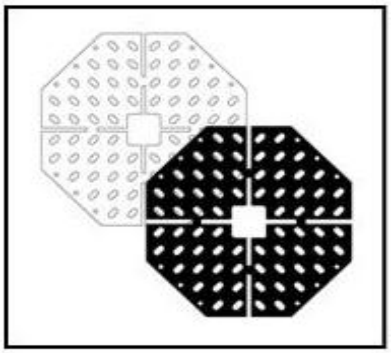
High-Tab Fixed-Height Pedestals

Fixed-Height pedestals are octagonal-shaped pads measuring 7 inches across made of high density polyethylene. The pedestals are 5/8 inch thick with integral joint spacing tabs providing a 1/8 inch joint between pavers. Fixed-Heigth pedestals may be stacked to elevate pavers 5/8 inch to just over 2 inches above the substrate.



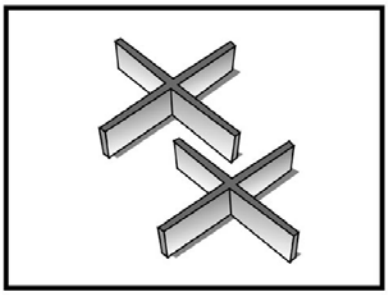
Leveling Plates

Leveling Plates are octagonal-shaped shims measuring 7 inches across made of flexible rubber. The Leveling Plates are available in 1/8 inch (white) and 1/16 inch (black) thicknesses are used for final elevation or slope adjustments. Leveling Plates may also be used when the elevation of the paver from the substrate needs to be less that the thickness of one Fixed-Height pedestal (5/8 inch).



Joint Spacers

In the event that Fixed-Height pedestals will not or cannot be used (i.e., due to height limitations), plastic, cruciform spacers are available to maintain the 1/8-inch joint between pavers. Spacers must be used in conjunction with Leveling Plates.

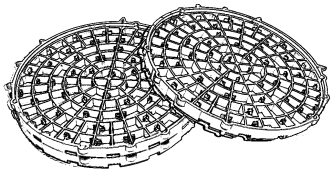


Elevator Adjustable Pedestals and Couplers
Elevator adjustable pedestals are used where a space ≥2 inches is required under the pavers.

Elevator adjustable pedestals consist of a Base and Top Plate, which can be combined with threaded Couplers, all made of high-density polypropylene. The Base Unit is a "female" threaded cylinder with 4 drainage holes inside and a bearing surface area of 42 square inches. The round Top Plate is a "male" threaded cylinder and flat deck with 4 integral 1/8 inch spacing tabs (or 3 for running bond installations) and inset rubber pads. The "male/female" threaded Couplers are used to join Base and Top Plates, extending the desired height – to a maximum height of 16 inches.

2" Base/2" Top 2"- 3"	3" Base/3" Top 3"- 4 3/4"	4" Base/4" Top 4 3/4"- 7 3/4"	3" Base/4" Top + Coupler 7 3/4"- 10"	4" Base/4" Top + Coupler 9"- 12"	4" Base/4" Top + 2 Couplers 12"- 16"

Compensator Paver Leveling System
Compensator discs are 7 3/4 inches in diameter, tapered in thickness (from 5/8 inch) and made of high density plastic. Compensators are specially designed tapered discs that allow the installer to achieve a level paver surface. One Compensator can level a slope of 1/8 inch per foot. Two or more Compensators stacked together and aligned properly can level slopes from 5/32 inch to 1/2 inch per foot.



The general rule-of-thumb is to figure one (1) pedestal per paver in the field. Figure additional pedestals for the perimeter in accordance with the following:
Total Perimeter (lf) X 12 inches ÷ Paver Dimension (in) = Additional Pedestals
(i.e., 1,000 ln.ft. X 12 = 12,000 ÷ 24 (for 24 in. pavers) = 500 addl. pedestals required for the perimeter)

Note: Blocks of Dow STYROFOAM® PD, HI-60 or HI-100, minimum 8 inches square, can also be used underneath fixed-height or adjustable pedestals to provide further elevation of the pavers off the deck. Only whole manufactured thicknesses should be used. Never slice or trim STYROFOAM® blocks through in thickness that will be used as pedestals. (However, it is important to note that extruded polystyrene material, such as Dow STYROFOAM® brand insulation is made with various compressive strengths (i.e., PD & HI-60 = 60 psi; HI-100 = 100 psi). The design professional should review the use of extruded polystyrene, whether as whole-deck insulation or elevation blocks, where the in-service impact loads may exceed the compressive strength of the product. Vertical compressive strength is measured at 5% deformation or at yield, whichever occurs first. Since STYROFOAM® brand insulation is a visco-elastic material, adequate design safety factors should be used to prevent long-term creep. For static loads, a safety factor of 3:1 should be used. For dynamic loads, a safety factor of 5:1 should be used. The bearing area of the paver pedestal being used to set the pavers on the foam must be considered when reviewing the loads imposed on the Dow STYROFOAM®.

Miscellaneous

*A line or laser level or transit will be needed to aid in squaring-up the area and determining the finished heights of the pavers and pedestals.

*A chalk line will be needed to layout the centerlines of the paver joints.

*A clear spray sealer is handy to keep critical centerline and other markings from being washed away.

*A construction adhesive (i.e., Liquid Nails) may be useful to keep critical pedestals from being moved after being set and leveled.

Installation

Before snapping the first chalk line the installing contractor should already be very familiar with the scope of the project. By reviewing the architectural drawings and design of the area, the contractor should have developed his own set of shop drawings that specifically layout the job locating all non-movable termination points, areas of cut pavers and the location of his starting point.

Just before the start of work, several items should be verified since as-built conditions can, and often do, vary from what is depicted on the drawings. Check all doorways, steps, curbs and all other fixed height termination points to verify that the finished paver surface meets each elevation as it should. Check the location of all drains or other items that will be hidden by the finished surface (i.e. conduits, ridges, valleys) to be sure they won't interfere with the placement of tabs or pedestals.

Centerline Layout

It is typically to the installer's advantage to locate the starting point near the center of the area of work. The first paver joint centerline should be established with a chalk line and then a second line running perpendicular to the first. The intersection of these "control lines" should be roughly in the center of the work area and will be the starting point for the layout of the pavers. These two control lines, and any other important centerlines established throughout the course of work, should be sprayed with a clear coat sealer to prevent them from being washed away.

From these control lines the centerlines for the joints of every row of pavers can be established, depending on the size of the pavers to be installed. The intersections of these lines will indicate the locations of paver pedestals.

Pedestals

Once the centerlines are established, placement of the support pedestals is relatively simple. The joint spacers should be placed so that they line up with the chalk lines. Precise alignment is not necessary until the pavers are actually being installed. Typically, each pedestal will support one corner from 4 different pavers.

The integral joint spacers on the Fixed-Height and Elevator pedestals can easily be cut off when placing pedestals at termination points and corners. In addition the Fixed-Height pedestals themselves can be cut in halves or quarters to accommodate perimeter and corner supports.

The height of the pedestals is determined by subtracting the paver thickness from the final finished elevation required. For elevations less than the thickness of a Fixed-Height pedestal (5/8 inch) Leveling Plates may be used in conjunction with Joint Spacrs. The Fixed-Height pedestals may be stacked together to accommodate up to 2 inches in height. At 2 inches and above, Elevator adjustable pedestals can be used.

Leveling Plates, which can be cut into halves or quarters, placed underneath pedestal can also be used for making minor elevation and leveling adjustments.

When a level paver installation on a sloped substrate is desired, the Compensator System should be employed. Substrate slopes of 1/8 inch per foot can be leveled with one Compensator. For slopes 5/32 inch to 1/2 inch per foot, two or more Compensators will be required (reference the following table).

Required Slope per Foot	Quantity Needed	Matching Tabs	Minimum Space Requirement	Numbers to Align Parallel with Slope	Compensator® Alignment
1/8"	1		1 1/8"	1-2 	No. 1 Notch must be placed toward high point of slope
5/32"	2	A/D	1 5/8"	7-8 	No. 7 Notch must be placed toward high point of slope
3/16"	2	A/C	1 5/8"	5-6 	No. 5 Notch must be placed toward high point of slope
7/32"	2	A/B	1 5/8"	3-4 	No. 3 Notch must be placed toward high point of slope
1/4"	2	A/A	1 5/8"	1-2 	No. 1 Notch must be placed toward high point of slope
3/8"	3	A/A/A	2 1/8"	1-2 	No. 1 Notch must be placed toward high point of slope
1/2"	4	A/A/A/A	2 5/8"	1-2 	No. 1 Notch must be placed toward high point of slope

The letter tabs must line up as indicated in the above table, with the top Compensator always set at “A”. The numbers on the Compensators serve as a reference point for the direction of the slope. The smaller number must always be placed toward the high point of the slope.

The minimum space requirement listed in the above table represents the space required between the top of the substrate and the bottom of the paver.

Support pedestals are always placed on top of the assembled Compensators to accept the pavers.

Note: Blocks of Dow STYROFOAM® PD, HI-60 or HI-100, minimum 8 inches square, can also be used underneath fixed-height or adjustable pedestals to provide further elevation of the pavers off the deck. Only whole manufactured thicknesses should be used. Never slice or trim STYROFOAM® blocks through in thickness that will be used as pedestals. (However, it is important to note that extruded polystyrene material, such as Dow STYROFOAM® brand insulation is made with various compressive strengths (i.e., PD & HI-60 = 60 psi; HI-100 = 100 psi). The design professional should review the use of extruded polystyrene, whether as whole-deck insulation or elevation blocks, where the in-service impact loads may exceed the compressive strength of the product. Vertical compressive strength is measured at 5% deformation or at yield, whichever occurs first. Since STYROFOAM® brand insulation is a visco-elastic material, adequate design safety factors should be used to prevent long-term creep. For static loads, a safety factor of 3:1 should be used. For dynamic loads, a safety factor of 5:1 should be used. The bearing area of the paver pedestal being used to set the pavers on the foam must be considered when reviewing the loads imposed on the Dow STYROFOAM®.

Pavers

To make placing the pavers as easy on the workers as possible, locate pallets of pavers strategically around the deck to insure the shortest movements of the product as possible. Be sure to note areas of different colors and finishes and distribute those pavers accordingly. Have on hand an adequate number of pallet jacks, carts, pry bars - and of course enough labor.
Note: When moving pavers around on the deck with jacks and/or carts or other wheeled devices, additional protection (i.e. plywood) is required over the MM 6125 roofing/waterproofing membrane, Hydroflex 30 protection and DOW Styrofoam Insulation.

As each pallet of pavers is unbanded, the pavers should be checked for chips and cracks and other imperfections. Make notes regarding whether the damage was done during transit or in subsequent handling. Chipped or broken pavers should be set aside and can be used for any cuts that may be necessary. Contact Hydrotech ***immediately*** for any rejected product that will require replacement.

VERY IMPORTANT! Keep the pedestals, and hence the pavers, on the centerlines and keep the system tight as work progresses. Double check periodically to assure that all pavers are level and flush with finished heights and adjacent pavers. Make the necessary adjustments with the pedestals and shims.

Cutting Pavers and the Use of Oversized Pavers

Pavers can be cut when necessary using standard concrete and/or masonry cutting equipment and tools. It is recommended that the smallest cut paver be no less than 1/3 the dimension of the full size paver (i.e. a 2' X 2' paver should be cut no smaller than 8" square or have no side smaller than 8").

In instances where this "no less than 1/3" rule is unavoidable, additional supports and the possibility of adhering the small paver piece to the pedestal (with a silicone adhesive sealant) must be considered to provide additional stability.

Oversized pavers are a very good alternate to cutting small pieces. Oversized pavers are made such that they give the appearance of being two pavers side-by-side even though the unit is one piece. This is done by casting a fake joint perpendicular to the long side of the paver. When the cuts are made, the resulting unit is actually larger than a full size paver and stability is assured. Oversized pavers should always be considered if small cuts are required at or in high traffic areas.

Setting Beds

Architectural Pavers, being concrete products, are susceptible to moisture drive through the material if water becomes trapped between the bottom of the paver and the substrate it is placed on. Under certain conditions this moisture drive can cause dishing, warping and cracking of the paver and can intensify efflorescence. As such, Hydrotech does not recommend that the Architectural Pavers be set in a setting bed but rather be set loose-laid in an open joint assembly using appropriate fixed-height and/or adjustable pedestals. Placing the pavers on pedestals allows water to drain freely off the surface of the pavers and away to the deck drains. Even if water should collect on the deck, the pavers are kept up and out of the water. Air circulation underneath the pavers aids in the quick drying of any standing water.

Hydrotech recognizes that there are situations that may require a setting bed for the paver installation. Common situations may include:

- The finished surface of a plaza extends beyond the confines of a structural deck onto grade.
- A handicap ramp, or other inclined area, at a building's entrance requires greater stability of the installed pavers.

In such situations a setting bed may be the only alternative and may be acceptable. All such situations must be discussed with Hydrotech for approval. Even after approval, *Hydrotech is not responsible for any dishing, warping, cracking, efflorescence, etc., which may occur as a result of the pavers installation in a setting bed.*

The three most common setting bed materials are mortar, bituminous and sand. Of the three, sand is the least preferred as it can hold water at the underside of the paver for extended periods of time.

There are many manufacturers of acceptable mortar bed materials (i.e. Laticrete) that may be used. Typically mortars are modified cementitious materials that are applied with a notched trowel with the pavers set into the fresh mortar. The pavers may be butt together or spaced with the joints grouted or caulked.

Bituminous setting beds typically begin with a bituminous asphalt bed to which is applied an asphaltic mastic adhesive. The pavers are set, typically butted together, into the fresh mastic. Many times sand is swept into the joints between pavers.

Even if the waterproofing contractor is installing the tab set pavers, Hydrotech strongly recommends that an experienced stone setter facilitate any setting bed installation.

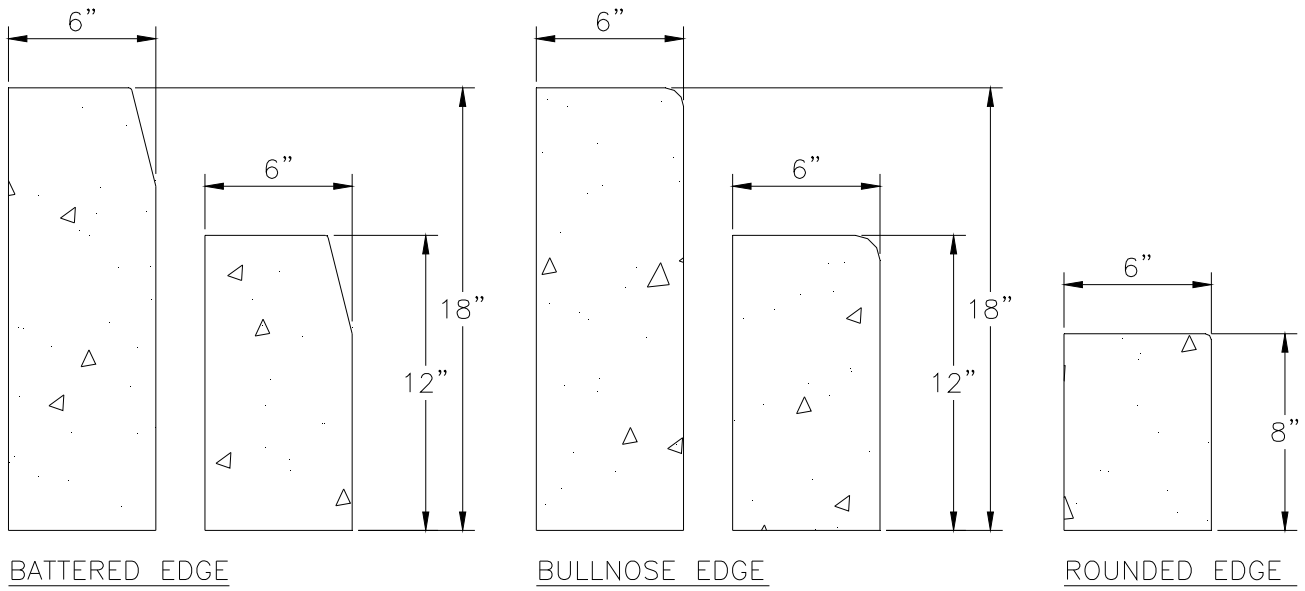
RockCurb®

Hanover RockCurb, as marketed by American Hydrotech, Inc. is high density, pressed concrete precast curbing units. RockCurb is available with battered or bullnose edges and in the standard Hanover Paver Tudor finish and colors in both straight units as well as some limited radius sections. Rockcurb is finished only on the top and front faces of the unit. The backside and end faces are not finished.

Hanover RockCurb precast curbing is designed to be used as transition units between the softscape of a Hydrotech Garden Roof® Assembly and the hardscape of an Ultimate Assembly or anywhere precast curbs are desired.

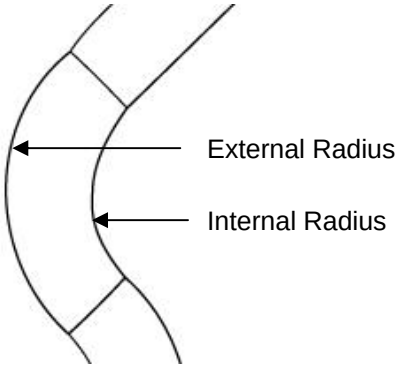
RockCurb Straight Sections

Straight sections are 36 inches long and 6 inches thick and 8 inch, 12 inch or 18 inch heights. RockCurb is produced with an angled battered edge and rounded bullnose in both the 12 and 18 inch heights. The 8 inch height is available in a slightly rounded edge only.



RockCurb Radius Sections

RockCurb Radius Sections can be used when the installation incorporates curves. Gentle arches or circles can be accommodated by using a combination of the standard radius and straight sections.



Curb Height	Radius Type	3 ft.	5 ft.	6 ft.	8 ft.	10 ft.	15 ft.	20 ft.	30 ft.
12 inch*	External		X			X	X	X	X
18 inch	External	X		X	X	X	X	X	X
18 inch	Internal			X			X	X	X

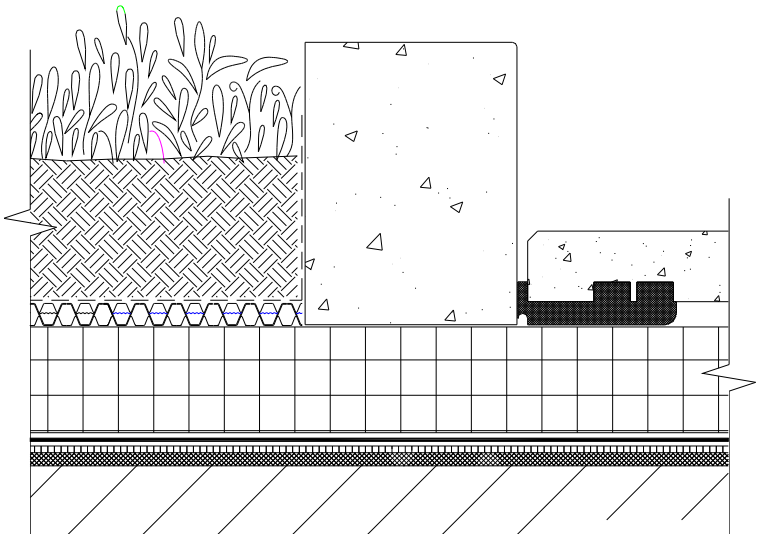
*12 inch radius sections are available in the Battered Edge, external radius only.
18 inch radius sections are available in both the Battered and Bullnose Edges.

Installation Suggestions

Hydrotech suggests that except for the most basic installations, a qualified stone setter/mason be consulted for the proper installation of precast curbing. This may not be the Hydrotech authorized roofing/waterproofing applicator. Hydrotech's warranty does not cover the installation – just the material.

8 inch high RockCurb

In most cases, the 8 inch high RockCurb (and in some cases the 12 inch high) can simply be gravity set. They are short and stable enough that the loads imposed from placement of subsequent topping materials on either side of the units should not pose a tipping hazard.

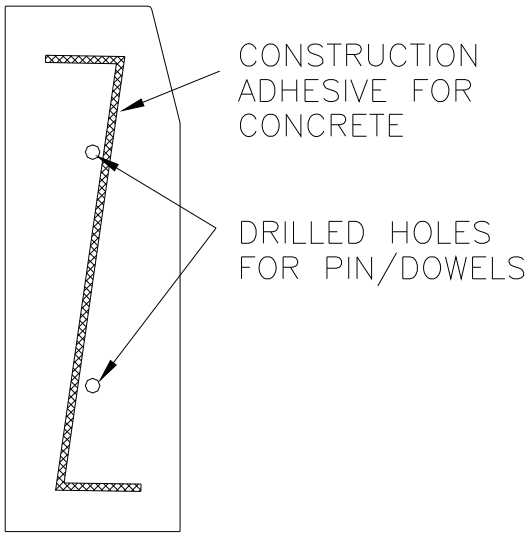


12 inch and 18 inch high RockCurb

To prevent the possibility of the taller RockCurb units from tipping over, it may be advisable to further anchor the units. This may be particularly prudent when the loads imposed by topping materials on either side are not equal.

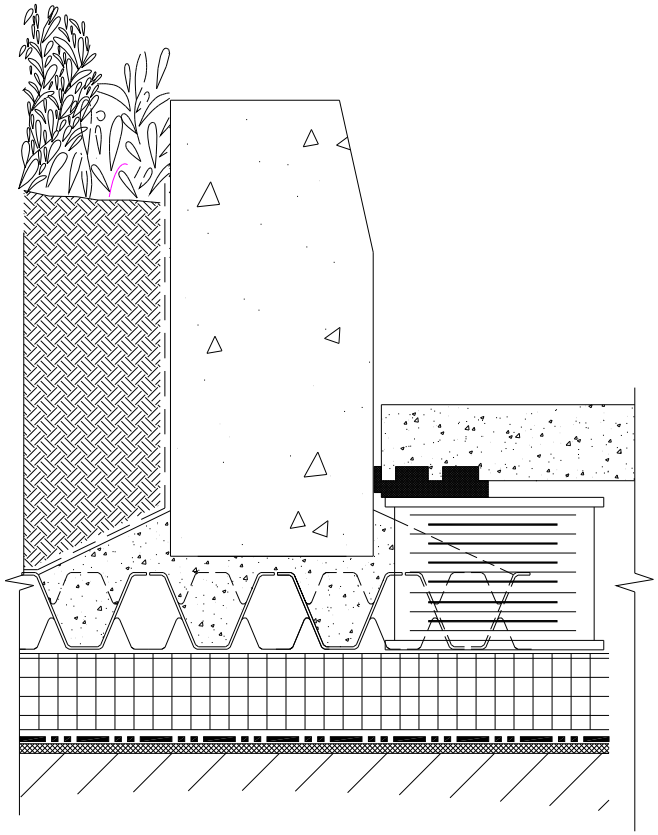
In some cases, it may be enough to pin or anchor the RockCurb units together end-to-end so that they act together in countering the loads. This can be accomplished using 3/4 inch steel bar/pins/dowels and a construction adhesive appropriate for bonding concrete surfaces. Typical installation would be as follows:

- Drill holes into the end faces of adjoining units. The holes should be slightly larger in diameter and roughly half as deep as the pin/dowel is long.
  Note: It is recommended that a jig be made that can be fit over the face of each unit so that the location of each hole will correspond with the holes of the adjoining unit.
- Apply construction adhesive to the end face of one unit. A 1/4 inch bead of adhesive should be applied in a "Z" shape. The bead of adhesive should be located at least 1 inch in from the edges of the RockCurb to avoid excess material from being squeezed outside the joint.
- The adjoining RockCurb unit may then be placed, lining up the holes with the pin/dowel, and the two surfaces butted together.
- The resulting tight joint between RockCurb units may be sealed with a quality urethane sealant – but this step is not required.



There may be instances where pinning and bonding RockCurb units together may alone not be sufficient to counter the loads to be imposed from either side.

Concrete/mortar ‘footings’ may be necessary to further anchor the units. ***Consult with the project architect/engineer or experienced stone setter for the proper size and spread of the footings necessary.***



Completion

Final Check

At the completion of the paver installation, walk the finished deck making a final check for damaged pavers or movement (shifting, rocking). Make the necessary replacements or adjustments.

Cleaning

A final cleaning by brooming off the surface followed by pressure washing using warm water should be done on every job. For heavily soiled pavers it is recommended that the pressure washing be done by a professional concrete/masonry cleaning contractor.

The pressure washing and scrubbing may remove efflorescence (see Efflorescence, page 10). If the efflorescence is not removed, then a cleaning with a diluted solution of muriatic acid (1 part acid to 12 parts water) or with various concrete/masonry cleaners specifically designed to remove efflorescence can be used.

Some recommended cleaner manufacturers are:
*Pro-So-Co (800) 255-4255
*Klein and Company (800) 241-0681
*Power Products (615) 726-0884
*Surtec, Inc. (510) 582-7800

Once again, *it is recommended that a professional cleaning contractor be retained*. Otherwise, consult with the cleaning agent manufacturer and follow all instructions and safety guidelines. It is always best to **test a cleaning agent on scrap pavers or in an inconspicuous area prior to total cleaning**.

Please see the following section *Post-Installation Maintenance* for further cleaning information.

Sealing

As a general rule of thumb, Hydrotech does not require or recommend applying any sealer on the pavers. However, there may be times when finished decks will be used as food courts, etc. and an owner may wish to seal the pavers in an effort to facilitate future cleaning of the deck.

Should the owner wish that the pavers be sealed the following precautions MUST be taken into account:

- A mock-up MUST be done. All sealers will change the color of the pavers to some degree and the proper application techniques must be worked out prior to sealing the entire deck.
- The mock-up should be done with extra pavers in case the result is not acceptable to the architect/owner.
- The deck (mock-up) must be clean and free of efflorescence and dirt, etc., BEFORE sealing.
- If any efflorescence is apparent, a proper slurry/efflorescence cleaner should be used as part of the cleaning process.

- The deck (mock-up) must be allowed to dry thoroughly (24 hours) prior to application of the chosen sealer.
- If the firm installing the pavers is not accustomed to sealing pavers then a professional should be hired to seal the deck.

While Hanover can supply a sealer, there are other options. Companies specializing in concrete maintenance products like ProSoCo should be consulted. The products available from Hanover are:

Natural Sealer is a water-based protecting sealant that still allows breath-ability of the concrete

Intensifying Sealer is a solvent-based sealer that provides excellent protection from water, alkalis, acids, air-borne pollutants and ultra-violet exposure.

> ***NOTE: Both sealers can be applied by an airless or hand-pump sprayer and roller. Both materials intensify and darken the color of the paver typically 1/2 to 3/4 of a shade. Therefore, a mock-up is essential.***

The choice of whether to use a sealer and which sealer to use is entirely between the contractor/architect/owner. *No warranty is available for any sealer application from Hydrotech.*

Post-Installation Maintenance

Generally, the Hydrotech Architectural Pavers, like most concrete type products, require no specific maintenance. Architectural Pavers are extremely durable concrete pavers that stand up to weather extremes and general wear and tear. The application of sealers or other surface treatments to protect the surface is not required.

Occasional spot checks are also required to adjust pavers which may have shifted or to replace pavers that have been damaged. As an open-joint system, the Ultimate Assembly provides ready access to the understructure for routine maintenance. Drains should be monitored on a regular basis and all obstructions removed to prevent flooding.

Following are some suggestions on general cleaning and snow removal, which may prove useful to the installing contractor and maintenance personnel.

Weekly

Sweep or pressure wash the surface of the pavers. In areas of high traffic, such as doorways, daily cleaning may be required.

Bi-weekly

Power sweep, then pressure wash the surface of the pavers. Spot clean any stained areas using procedures described in the following section "Cleaning Heavily Soiled Areas".

Cleaning Heavily Soiled Areas

Soiled areas should be cleaned as soon as possible to avoid permanent staining. The type of material that caused the soiling determines the correct cleaning procedure.

Oils or Petroleum Products
Remove as much of the material as possible with a hot water, high-pressure washing. Apply a degreaser cleaner directly to the soiled area. With a stiff nylon brush or broom, scrub the area. Rinse the area with hot water. In some cases, a second cleaning may be required following the same procedure.

Rust Stains
Soak the area with water. Scrub rust stain with masonry cleaner such as Limsol or Surclean products per the manufacturer's recommendations. Rinse the area thoroughly.

Normal Foot Traffic, Road Salts, Everyday Use
Wash the area thoroughly with a hot water, high-pressure washing. Use a commercial grade cleaner on heavily soiled areas, spraying the area with the cleaner and scrubbing with a nylon brush or broom. Rinse the area thoroughly.

Gum or Tar
Apply dry ice directly on the gum or tar. After the material has frozen use a putty knife or scraper to lift the material off of the paver surface.

Tobacco Stains

After pressure washing with hot water, saturate a paper towel with household bleach. Place the towel directly over the stain and cover with a piece of plastic sheeting. Tape the plastic sheet in place. The plastic keeps the area damp so that the bleach does not dry out.

Leave the stain covered for 24 to 48 hours. Remove the bleach "poultice" to check to see if the stain has lightened or been eliminated. Repeat the above if necessary.

Snow Removal

Snow can be cleared from the paver surface using shovels, walk-behind snow blowers or power brushes. Garden tractor equipment (20-24 hp) may also be used. Nylon or rubber blades are recommended if plow-type equipment is used, to avoid scratching the paver's surface. Tire chains can cause damage to patterned surfaces so extra care must be used.

If snow is properly removed from the paver surface, the use of snow melt materials is minimized. If used, snow melt materials should be spread lightly and evenly. Melted snow quickly drains away as the pavers are installed in an open-joint system. Minimizing the use of snow melt materials also keeps the material out of drain systems and reduces other maintenance concerns.

Maintenance Helpers

Waste Containers - properly located waste containers help reduce deck litter.

Cigarette Snuffers - all doorways and seating areas should have containers for both litter and cigarette butts.

Efflorescence

From time to time, a whitish colored deposit or staining may be noticed on Hydrotech's Architectural Pavers. This condition is known as efflorescence.

Any typical concrete contains calcium hydroxide (salt) as a product of the reaction between cement and water. Water that penetrates the concrete dissolves this latent salt. The heat of the sun and the normal evaporation drive of water draws the salt, in solution, to the surface of the concrete. As the water evaporates, the calcium hydroxide combines with carbon dioxide in the air to form calcium carbonate, which appears as a whitish deposit on the concrete surface.

Efflorescence is typically more common during cooler weather, when evaporation rates are slower, and will be noticed more on plainer, darker concrete surfaces.

Although considered unattractive on new pavers, efflorescence is harmless and will become lighter and less extensive as the pavers age. The length of time varies with weather conditions and wear. Efflorescence will not affect the structural integrity or longevity of the pavers. It is a common condition that all concrete products may exhibit and is beyond the control of the suppliers.

End users should be made aware that this condition is possible.

While Hydrotech does not assume responsibility for the efflorescence, or the cleaning of the pavers to remove it, the following suggestions are offered on how to remove or diminish it.

Most efflorescence can be removed by dry brushing and a **hot water**, high pressure washing.

Efflorescence can also be removed with a diluted solution of muriatic acid (1 part acid to 12 parts water) or with various concrete/masonry cleaners specifically designed to remove efflorescence. Some recommendations are:

*Pro-So-Co (800) 255-4255

*Klein and Company (800) 241-0681

*Power Products (615) 726-0884

*Surtec, Inc. (510) 582-7800

As with any acid or chemical cleaning agent, the manufacturer should be consulted as to the proper use of the product. **Any agent used on Architectural Pavers should be tested on an inconspicuous area or extra paver first**, to see if it causes any objectionable surface etching or discoloration. American Hydrotech, Inc. will assume no responsibility for the cleaning of the pavers or any undesirable effects of such cleanings performed by others.

In many cases, a final cleaning will be part of the project specifications. Whether it is or not, this final cleaning is the responsibility of the installing contractor and should be figured into every job.

Availability and Cost

All components of The Ultimate Assembly are available through Hydrotech representatives worldwide. Hydrotech's Architectural Pavers and accessories are shipped direct from the factory. Delivery time is subject to manufacturing schedule.

Guarantees

The Ultimate Assembly provides the owner with a single source warranty for all system components. Warranty coverage includes: leaks due to materials and/or workmanship problems; thermal retention of the insulation; and breakage of pavers due to freeze-thaw. Contact a Hydrotech representative for specific warranty information.

Technical Services

Technical support is available through Hydrotech's network of trained sales representatives and Technical Services Department.