GRAVELPAVE2
BY INVISIBLE STRUCTURES™

Gravelpave2

INSTALLATION AND MAINTENANCE

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This document is a reference guide for installing and maintaining your Gravelpave2 system. Please ensure to follow the instructions in this guide to create and maintain a properly functioning system. Lifetime warranty coverage is contingent upon proper installation.

INVISIBLE STRUCTURES™ EST. 1982

SITE PREPARATION

ADJACENT PAVING COMPLETED
All adjacent paving must be installed prior to the installation of the Gravelpave2 system. (Pavers may be installed directly on sand-filled Gravelpave2, which will prevent cracking, tipping and replacements.)

AMBIENT TEMPERATURE
We recommend a minimum installation temperature of 40 degrees F (4 degrees C). Do not use frozen or ice-covered materials. Do not build on a frozen, wet, or muddy subgrade.

APPROVAL
All fire lane installations require fire department approval prior to installation of the base course. The depth must meet their specifications.

STORAGE
If Gravelpave2 must be stored prior to installation, storing it upright and covering it to protect it from the elements is recommended.

TOOLS / MATERIALS

AGGREGATE FILL
Clean, angular stone with a maximum uniform size of ¾", free of small particles, is required to fill the Gravelpave2 rings.

ANCHORS AND WASHERS
Set of six for every meter-sized part, provided with the rolls of Gravelpave2.

BASE COURSE MATERIALS
Ensure the mix of gravel and sand corresponds to our technical specifications, detailed in the Porous Base Course section of this guide.

BINDER
An optional product that can eliminate gravel migration with proper maintenance. All binders must be non-toxic and help retain porosity.

COMPACTOR
Any base course for vehicular applications must be compacted to 95 Proctor.

CONCRETE RAKE
A concrete rake works well to evenly distribute the gravel.

EXCAVATION MATERIALS
To ensure proper base course depth.

GRAVELPAVE2
Recycled HDPE ring-on-grid porous paving rolls with filter fabric backing in sizes 1010 (107 sq ft.) and 2020 (430 sq ft.).

MALLET OR HAMMER
To secure the anchors and washers in the base course.

NUT DRIVER
Optional tool to speed up the snap-fit connections.

PRUNING SHEARS
Trim edges and cut curves to custom fit the Gravelpave2 system. Even rings on the edges can be cut to fit.

SUBGRADE

- Excavate the area accounting for 1" of product + the number of inches appropriate for your Base Course. Base Course depth is determined based on application.
- If concealing the appearance of the rings is desired, add an additional ¼" to the excavation depth for aggregate overfill. (NOTE: Aggregate overfill is not recommended for ADA installations unless a binder is used.)
- Here are some recommended depths as a guide:

  All depths require an additional +1" for product (+¼" for cosmetic gravel overfill, if desired)

Pedestrian	1" minimum*
Golf Cart	2" minimum*
Car/SUV	6" minimum
Trucks	8" minimum
Fire Trucks	12" minimum
H20 Loading	12" minimum

*Increase up to 4" to optimize drainage in heavy rain areas, if desired.

- Confirm that all adjoining trenches, drains, and irrigation connections are operational and clear of debris.
- Grade subgrade to a uniform level and ensure it does not exceed the following slopes:

Fire Lanes	5% maximum
Cars and Trucks	8% maximum
Golf Carts, Trails	15 – 20%

POROUS BASE COURSE

Once a satisfactory subbase has been confirmed, installation of the porous base course can begin.

- Coordinate base installation with any subdrains and irrigation lines. (For design details, visit invisiblestructures.com.)
- Pour porous base course material meeting either the following sieve breakdown:

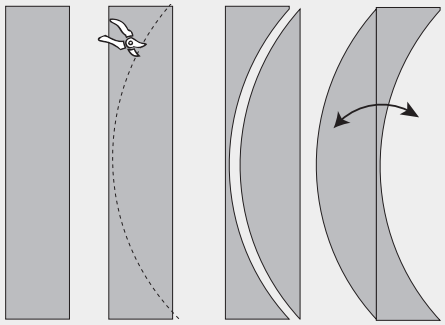
1"	100% passing
¾"	80-100% passing
⅜"	60-80% passing
#4	40-60% passing
#10	25-40% passing
#40	5-25% passing
#200	0-5% passing

- Alternatively, combine three parts #57 stone with 1 part concrete sand.
- Material may be "pit run" or "crusher run". However, avoid using clay-based materials and/or decomposed granite. If using limestone, or another stone that loses porosity with continuous water exposure over time, it is required that at least 30 – 40% sand be added to the mix to maintain porosity.
- Compact the base course to 95% in "lifts" or piles not to exceed six inches.
- Leave 1.25" of depth below final grade for the Gravelpave2 product and the aggregate fill with a maximum of ¼" of fill above the surface of the rings. (For ADA applications, leave only 1" of depth below final grade and do not overfill the rings. This will maximize traction.)
- Use a strong stream from a water hose to test the base course. Make sure the water drains easily from the surface.

LAYING GRAVELPAVE2

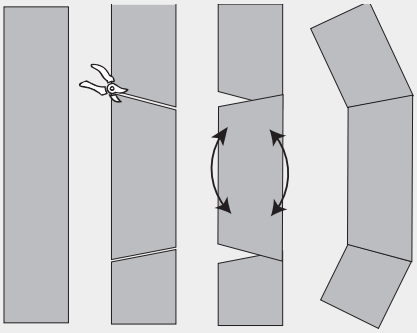
- Clip the zip ties and roll out the Gravelpave2 rolls over the prepared area. The rings should be facing up.
- Rolls can be connected to maintain uniform coverage using the snap-fit connectors. All connectors must be together if Gravelpave2 is being used as a fire lane. (Pro tip: use a nut driver on the connectors.)
- Gravelpave2 can be easily cut with pruning shears. For curve cutting techniques, refer to the below diagrams:

Technique 1 – Make dramatic curve



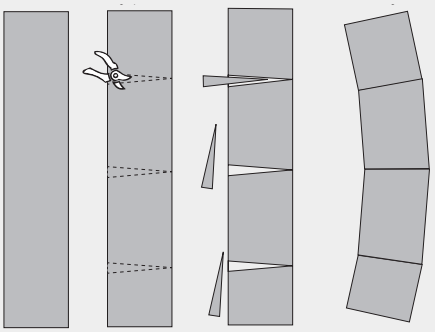
1. Unroll product.
2. Cut curve in rolls; avoid rings if possible.
3. Separate.
4. Reposition pieces; extra anchoring recommended.

Technique 2 – Make moderate curves



1. Unroll product.
2. Cut rolls at an angle; avoid rings if possible.
3. Flip strategically placed pieces.
4. Reposition pieces; extra anchoring recommended.

Technique 3 – Make slight curves



1. Unroll product.
2. Cut wedges; avoid rings if possible.
3. Remove wedges.
4. Reposition pieces; extra anchoring recommended.

- Small, trimmed pieces and areas on slopes can be further secured using the available anchors and washers.

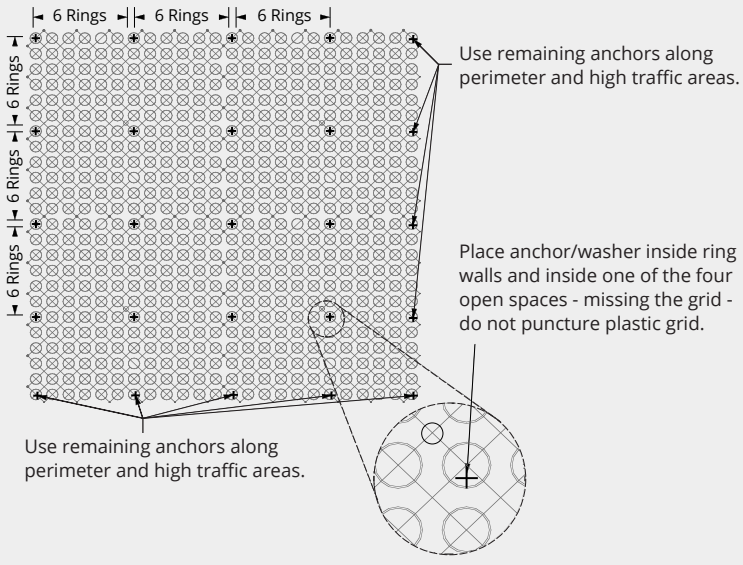
ANCHORS & WASHERS

- Gravelpave2 should be anchored down using the provided anchors and washers.
- Use six anchor/washer sets for every square meter in the following pattern:

Gravelpave2 Pinning Instructions

60 anchors supplied per 108 sq ft (10 sq m)
Size and type of anchor may vary

1. Place one anchor (minimum) every six rings
2. Place anchor inside rings, in one of the four open spaces (do not puncture grid).
3. Place remaining anchors around perimeter of site and in high traffic areas



- For repeated, high-traffic areas such as entrances and exits to driveways and parking lots, use additional anchor/washer sets to secure the perimeter. If sufficient extra sets have not been provided for your installation purposes, please contact sales@invisiblestructures.com or 303-233-8383 for assistance.

INSTALLATION

DELINEATORS

Should the installation include InvisiMarker delineators, or any other type of delineation device, they should be installed at the pre-determined locations prior to filling the rings with aggregate.

AGGREGATE

If you are using a binder with your aggregate, check the manufacturer's instructions to determine whether it must be pre-mixed in the aggregate before or after filling the rings.

For optimal function, all aggregate fills should be:

- Approximately ¾" in size.
- Clean, sharp and angular.
- Stone types that will not break down over time – like granite.

Aggregate fills with problematic results:

- Softer materials – like seashells – will break down over several years, causing fine particles to clog the system. Should that occur, vacuum the system and rinse the Gravelpave2 grid panels from behind to remove any clogged debris, then reinstall.
- Pea gravels (rounded) tend to migrate easily above the rings. To avoid this, use a binder.

Once the proper aggregate is chosen:

- Dump desired aggregate into empty rings until level with the top.
- Use a concrete rake to evenly distribute the aggregate in the rings.
- To hide the rings, overfill by ¼" maximum (not recommended for optimal function on ADA installations unless a binder is used).

BINDERS

There are several different binders that will work with a Gravelpave2 system. All require reapplication after a certain amount of time.

- Cement – by mixing the gravel with the recommended percentage of cement binder prior to pouring the gravel, the result will be effective in preventing migration. However, it can create a grey-ish, dull appearance and reduce porosity.
- Clear Tree Resin – not recommended as it will result in a complete loss of porosity. If porosity is not a concern, it will yield a clear-colored result.
- Polymer – it may reduce porosity but shouldn't eliminate it. The finished result yields a glossy finish.
- Organic – typically water permeable and natural-looking. Some brands even boast the ability of the binder to "self-heal" through reinvigoration by rainwater. This will reduce future reapplications.

MAINTENANCE

REGULAR MAINTENANCE

- If a binder was used, reapply binder as recommended by the manufacturer's instructions.
- If no binder was used, rake errant gravel back onto the Gravelpave2 every few months should any have migrated to adjacent surfaces.
- Refill any low spots to ensure there are no naked rings.

EXTREME WEATHER MAINTENANCE

Gravelpave2 areas can be easily plowed using standard truck-mounted snowplow blades with 1" skids on the corners to keep the bottom blade from damaging the product or migrating the gravel. Avoid long-term snow pileup to prevent concentrated sedimentation accumulation.

TROUBLESHOOTING

POOR SURFACE DRAINAGE

If water is pooling, mud is present, or there is a loss of permeability, check for the following conditions:

- Was a sharp, clean, angular stone, approximately ¾" in size installed in the system? Or has the stone broken down at all, causing particulates to accumulate?
- Was a geotextile installed beneath the rings?
- Was the base course comprised of decomposed granite?
- Did the base course contain more than 60 – 70% limestone – or was enough sand used in a limestone base course?
- Has the rainfall exceeded the water storage space within the base course? (If this occurs with frequency, consider deepening the base course or installing an underground water storage unit like Rainstore3.)

If any of these conditions are present, the installation must be corrected per the instructions in this manual. Fortunately, the Gravelpave2 can be easily reused. If more anchor/washer sets are required to re-install your installation, contact Invisible Structures corporate office at 303-233-8383.

DEBRIS

If leaves, trash, or any other debris collect on the surface, removal with a rake or blower is recommended to avoid loss of porosity and contamination.

WEED GROWTH

Vegetation cannot grow through the fabric lining. However, weed seedlings can sprout on top of the fabric, between the gravel. These are easily removed as they are not rooted in the system.

OIL/ANTIFREEZE SPILLS

- Small Spills – Naturally occurring micro-organisms in gravel can break down oil and "clean" spills prior to them reaching the water table below. Therefore, common oil drippings are acceptable.
- Large Spills – Large oil or antifreeze spills may stain the aggregate fill. If power washing is insufficient, vacuum out and replace the affected area.

EXPOSED RINGS

The Gravelpave2 system should sit completely beneath the gravel. Should any fill drop below the top of the rings, simply add additional aggregate until the rings are full or covered.

RUTS

The appearance of ruts in a Gravelpave2 installation is a sign of improper installation. Possible errors include:

- Improper base course depth, composition installation or compaction.
- Topsoil installed between base and Gravelpave2.
- More than ¼" of aggregate above the top of the rings.

If any of these conditions exist, they must be corrected per the instructions in this manual.

UTILITY ACCESS

Should a subsurface utility, such as a water or gas line, need to be accessed or repaired, the Gravelpave2 can be easily removed and reinstalled. To remove, cut to the necessary depth with a sod cutter or backhoe and pull up or roll up the section. Set it aside.

Upon completion of the work, reinstall product per the instructions in this manual, including the compaction of the base course. If the Gravelpave2 grid is damaged, it is still usable as it can be anchored in place. If the rings are damaged, please reach out to an Invisible Structures representative for replacements.

WARRANTY

Invisible Structures, Inc. provides a limited lifetime warranty on all its products and will work with you to uncover any potential installation errors. Only product damaged within a proper installation will be replaced under the warranty. Proper documentation is required. Shipping and re-installation charges are not included.

If we can assist you in any way, please contact the Invisible Structures Corporate Office at 303-233-8383 or sales@invisiblestructures.com