

Save the Rain: Green Infrastructure Program Standard Maintenance Procedure (SMP)

SMP-01: Porous Pavement Vacuuming

Porous Pavement Vacuuming is done in order to remove sediment that may lead to a clogging of the porous surface, preventing water from infiltrating through the pavement into the stone reservoir.

Porous Pavement Vacuuming applies to several types of porous pavements described below:

- Porous Pavers: an alternative to traditional hardscape paving which allows water to infiltrate between the pavers and through permeable layers below ground. When vacuuming porous pavers, the setting should be adjusted to a lower power in order to prevent complete removal of aggregate between voids (unless more intensive vacuuming is required to alleviate clogged areas).
- Porous Concrete: a type of concrete that has a high porosity due to an increased void space to facilitate water infiltration through the porous concrete into a stone reservoir and then into the ground.
- Porous Asphalt: a type of asphalt that has a high porosity due to an increased void space to facilitate water infiltration through the porous asphalt into a stone reservoir and then into the ground.
- Flexible Porous Pavement (e.g., Flexipave): a type of porous pavement that has a high porosity due to an increased void space to facilitate water infiltration through the porous pavement into a stone reservoir and then into the ground. This porous pavement is made from recycled rubber (tires) that is mixed with a bonding agent and aggregate and is somewhat flexible when weighted movement is applied on its surface.

Type of Maintenance: Preventative

Tools and Supplies:

- Porous pavement vacuum
- Water source
- Safety cones, trash bags, gloves, street broom

Frequency: Semi-Annually for Porous Concrete, Porous Asphalt, Flexible Porous Pavement
Annually for Porous Pavers (Spring)

Labor Requirements: 2 people for approximately 2 hours per acre

Maintenance Procedure (numbers correspond with Maximo sequencing):

- 10 *Safety set-up:* Set up safety perimeter. Ensure that no vehicles are parked in the vicinity of the location and that area is closed to the public. Public notice announcing area closing needs to be posted per City/County standards of notification.
- 20 *Inspect:* Visually inspect porous pavement for damage, including holes, cracks, excessive scuffing, settlement, and areas of standing water. Inspect status of aggregate between voids in porous pavers before and after vacuuming to see if additional replacement aggregate is needed. Record observations/damage in the **Maintenance Report Log**, include photos if possible, and report as necessary.
- 30 *Prepare site for vacuuming:* Remove (by hand) bulky debris and waste materials from surface of porous pavement that may be too large to be picked up and/or block/clog the vacuum hose (i.e. litter, tree

branches, wire, car parts) prior to using vacuum. Use a rigid street broom to loosen debris as needed. Pay particular attention to pavement edges and heavily loaded areas.

40 *Vacuum:* Vacuum porous pavement per the vacuum manufacturer recommendations.

Note: If vacuuming porous pavers, set vacuum at a lower power in order to prevent complete removal of aggregate between voids (unless more intensive vacuuming is required to alleviate clogged areas).. Vacuum machine speed should be adjusted so that the vacuum draws out the first inch or so of stone and dirt in the openings between porous pavers, as this is where most unwanted sediment/debris typically collects.

Follow all steps in the Manufacturer's Operation Checklist for the specified vacuum.

- 41 Engage the Water Feature/ Water Dust Control Option of the vacuum (or equivalent on specific vacuum model).
- 42 Drive the vacuum over the porous pavement, operating at a slow speed setting not greater than 5 miles per hour. Overlap the edges of the vacuum runs and make two passes over the entire porous pavement area.
- 43 Frequently check and empty the filter bag (located above the debris bag) when vacuuming areas with excessive sediment.
- 50 *Post-vacuuming inspection:* After two passes, visually inspect porous pavement to ensure adequate debris removal. Any areas with visible debris/sediment still present should be vacuumed again until debris is removed. In the event that the surface of the porous pavement becomes clogged with fine dirt or sand, follow maintenance tasks outlined in **SMP-02 Porous Pavement Power Washing**. Record observations in the **Maintenance Report Log**.
- 60 *Review checklist:* Follow all steps in the post-operation checklist for the specified vacuum.
- 70 *Measure debris removal prior to disposal:* Remove material/debris from vacuum bag and hopper and put into a labeled trash bag. Label bag with date and project location, and note the weight on the **Maintenance Report Log**.
- 80 *Clean up:* Clean up work area and vacuum equipment (per Manufacturer's Operation Manual).
- 90 *Safety completion:* Remove safety perimeter and re-open lot for parking/public access.

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SMP-02: Porous Pavement Power Washing

Porous Pavement Power Washing applies to several types of porous pavements described below. Power washing should be done if porous pavement surfaces become clogged with fine dirt or sand. Power washing of the pavement surface allows partial restoration of the original void space and therefore permeability and should immediately follow the porous pavement vacuum task (once every three years or more often as necessary). Power washing of porous pavers should never occur as it may damage pavers and/or remove aggregate between pavers.

- Porous Concrete: a type of concrete that has a high porosity due to an increased void space to facilitate water infiltration through the porous concrete into a stone reservoir and then into the ground.
- Porous Asphalt: a type of asphalt that has a high porosity due to an increased void space to facilitate water infiltration through the porous asphalt into a stone reservoir and then into the ground.
- Flexible Porous Pavement (e.g., Flexipave): a type of porous pavement that has a high porosity due to an increased void space to facilitate water infiltration through the porous pavement into a stone reservoir and then into the ground. This porous pavement is made from recycled rubber (tires) that is mixed with a bonding agent and aggregate and is somewhat flexible when weighted movement is applied on its surface.

Type of Maintenance: Preventative

Tools and Supplies

- Power washer
- Water source
- Safety cones, trash bags, gloves, street broom

Frequency: Once every three years (perform immediately after thorough vacuuming) or more frequently if necessary, recommended time is Spring.

Labor Requirements: 2 people for approximately 2 hours per acre

Maintenance Procedure (numbers correspond with Maximo sequencing):

- 10 *Safety set-up:* Set up safety perimeter. Ensure that no vehicles are parked in the vicinity of the location and that area is closed to the public. Public notice announcing area closing needs to be posted per City/County standards of notification.
- 20 *Inspect:* Visually inspect porous pavement for damage, including holes, cracks, settlement, excessive scuffing/raveling and areas of standing water. Record observations/damage in the **Maintenance Report Log**, include photos if possible, and report as necessary.
- 30 *Prepare site for power washing:* Remove (by hand) bulky debris and waste materials from surface of porous pavement that may block or impede power washer access to the surface (i.e. litter, tree branches, wire, car parts). Use a rigid street broom to loosen debris as needed. Pay particular attention to pavement edges and heavily loaded areas.
- 40 *Power wash:* Follow manufacturer's recommendations for use of the power washer unit with the clarifications noted below. Ensure that the water inlet valve and pump are both on.

- 41 Set the pressure levels to be no greater than 500 PSI.
- 42 Perform two passes over surface of pavement, with wand spraying at a 45 degree angle. Do not keep water flow on one location for longer than 5 seconds.
- 50 *Vacuuming:* Power washing may need to be followed immediately by vacuuming. Refer to SMP-01 Porous Pavement Vacuuming for detailed instructions. If sediment is exposed (brought to the surface) during power washing, this sediment must be immediately removed through vacuuming instead of allowing the sediment to migrate and re-enter the porous pavement.
- 50 *Post-power washing inspection:* Visually inspect porous pavement to ensure adequate sediment/debris removal. Any areas with visible debris/sediment still present should be washed again until debris is removed. Note if water remains ponded in any areas of the porous pavement. Record observations in the **Maintenance Report Log**.
- 60 *Store equipment:* Shut off pump and return hose and wand to proper storage place.
- 70 *Safety completion:* Remove safety perimeter and re-open lot for parking/public access.

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SMP-03: Porous Paver Maintenance (Restoring Aggregate)

Porous pavers are an alternative to traditional hardscape paving which allows water to infiltrate between the pavers and through the permeable layers below them. Pavers are laid out on the surface and clean-washed aggregate material (also called screening or gravel) are placed in the spaces (voids) between paver units to provide stability and surface drainage while keeping unwanted debris out of the system. This SMP refers specifically to the task of refilling the voids between pavers with additional aggregate material to replace any material that has been lost by vacuuming and/or due to natural migration, settlement, and erosion.

Type of Maintenance: Preventative

Tools and Supplies

- Safety cones
- Rigid Street Broom
- Shovel
- Manhole Pick
- Wheelbarrow
- Clean-washed small aggregate (gravel) per project specifications

Frequency: As needed when gravel infill is not within ½ inch of the paver surface, immediately following vacuuming

Labor Requirements: 2 people for approximately 3 hours per acre

Maintenance Procedure (numbers correspond with Maximo sequencing):

- 10 *Safety set-up:* Set up safety perimeter. Ensure that no vehicles are parked in the vicinity of the location and that area is closed to the public. Public notice announcing area closing needs to be posted per City/County standards of notification.
- 20 *Inspect:* Visually inspect porous pavers for damage, including broken pavers, cracks, settlement, and any areas of standing water or evidence of standing water. Inspect status of aggregate infill material in the voids between porous pavers to see if additional replacement aggregate is needed. Evaluate if voids (joints) between porous pavers are clogged or not

Inspect to see if pavers themselves are missing from any areas and note need for replacement pavers. Record observations/ damage in the **Maintenance Report Log**, include photos if possible, and report as necessary.
- 30 *Prepare site:* Remove (by hand) bulky debris and waste materials from surface of pavers.
- 40 *Cleaning Clogged Voids:* If voids (joints) between porous pavers are still clogged even after area has been vacuumed (**SMP-01 Porous Pavement Vacuuming**), use a manhole pick to tool out joint until clean aggregate is found. Follow aggregate replacement instructions below.
- 40 *Add aggregate:* Using a shovel, spread aggregate over the surface of the pavers. Using a broom, sweep aggregate into the voids between porous paves, taking care to fill in any obvious holes. Once the aggregate

has been added to the pavers, and the voids have been filled, perform a final sweeping pass with the hand broom to remove any excess gravel from the paver surface.

50 *Clean up:* Clean-up work area.

60 *Safety completion:* Remove safety perimeter and re-open area for parking/public access.

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SMP-08: Winter Maintenance for Porous Pavements

During the winter, porous pavement surfaces require different maintenance practices from standard pavement surfaces in order to maintain performance and promote infiltration. Specifically, sanding of porous pavement surfaces is prohibited, salting must be minimal, and plow blade heights may need to be set higher in some instances. In addition, plowed snow should not be stockpiled directly on top of porous pavement if possible.

Type of Maintenance - Preventative

Tools and Supplies

- Truck with snow plow
- Salt/Deicers and appropriate machinery as needed
- Hand shovel

Frequency: As necessary following snowfall or icy conditions

Labor Hours: 2 people for approximately 1-2 hours per acre (varies with snow conditions)

Maintenance Procedure (numbers correspond with Maximo sequencing):

- 10 *Safety set-up:* Set up a safety perimeter
- 20 *Inspect:* Visually inspect entire area to be plowed prior to plowing snow and/or salting the porous pavement surface. Refer to project site plan if necessary to identify location of landscape elements and porous pavement surfaces. Note presence of trees, shrubs, landscape features, and wheel stops or bollards so that plow does not hit them during plowing and cause physical damage. Record observations in the **Maintenance Report Log** and report as necessary. If possible, take photographs to document site conditions.
- 30 *Remove trash/debris:* Remove any large debris and trash from porous pavement surface prior to plowing.
- 40 *Plow:* If plowing on top of porous pavers, raise plow blade to a slightly higher level (1" higher) than for other types of porous pavement (asphalt, concrete, or flexipave) to prevent the plow from catching paver edges and dislodging paver units. If possible, it is recommended that a rubber plow blade be used for plowing porous pavement surfaces.
- 50 *Storage of snow piles:* If possible, do not leave plowed snow piles on top of porous pavement surfaces to melt. This may result in sediment from the plow operations entering the porous pavement which can lead to clogging. Move snow piles to standard/conventional pavement area or to grassy/lawn area nearby. Refer to project site plan if necessary to identify location of landscape elements, porous and non-porous pavement surfaces, and snow stockpiling areas.

- 60 *Salting:* Use road salt in moderation on porous pavement surfaces. If possible, use an environmentally-safe road salt/deicer. Use approximately only 25% of the amount of deicing salt that is routinely applied to standard pavement parking lots or as needed to maintain acceptable driving conditions. (This is approximately a 75% reduction in salt use that is recommended).

Recommended Environmentally Safe Road Salts: Calcium magnesium acetate (CMA) and potassium acetate (KA) are highly recommended. A second suggestion is calcium chloride (CaCl), which is similar to sodium chloride but can be used in smaller amounts. A mix of sodium chloride or calcium chloride and CMA or KA is better than one of the salts alone. Recommended products include GEOMELT, ECO Salt, and GEOSALT.

- 70 *Record:* Make note of any unrecorded observations in the **Maintenance Report Log.**

- 80 *Safety completion:* Remove safety perimeter.