

# **POROUS PAVEMENT OPERATION AND MAINTENANCE PROTOCOL**

## **San Diego County Facilities**

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## **POROUS PAVEMENT OPERATION AND MAINTENANCE PROTOCOL**

### **General Maintenance**

The primary goal of porous pavement maintenance is to prevent the pavement surface and/or the underlying infiltration bed from being clogged with fine sediments. To keep the system clean throughout the year and prolong its lifespan, the pavement surface should be vacuumed biannually with a commercial cleaning unit. All inlet structures within or draining to the infiltration beds should also be cleaned out on a biannual basis.

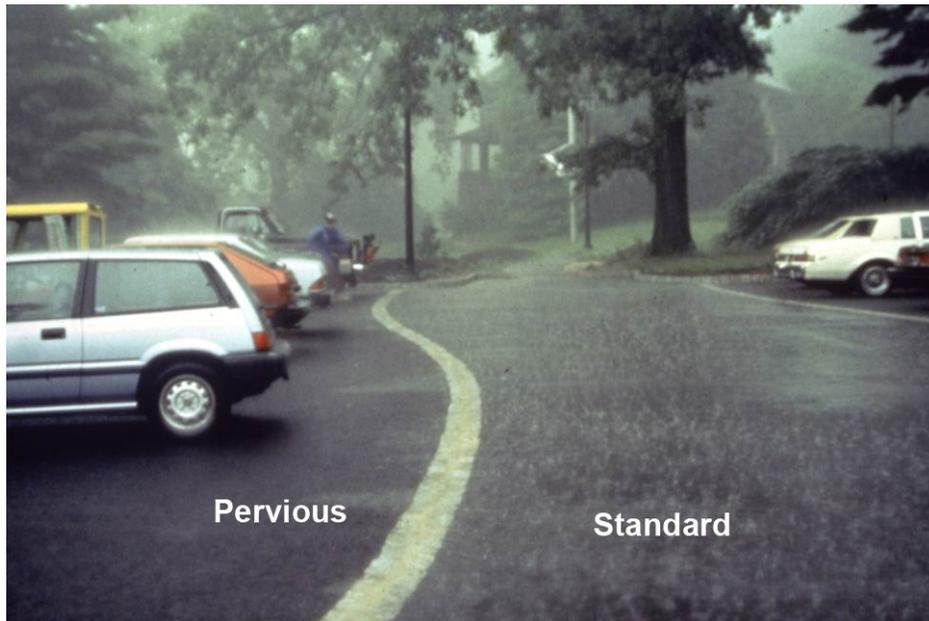


Figure 1: Routine and adequate maintenance has allowed the porous asphalt parking lot at the Morris Arboretum to still be effective 20 years after installation.

Planted areas adjacent to porous pavement should be well maintained to prevent soil washout onto the pavement. If any washout does occur it should be cleaned off the pavement immediately to prevent further clogging of the pores. Furthermore, if any bare spots or eroded areas are observed within the planted areas, they should be replanted and/or stabilized at once. Planted areas should be inspected on a semi-annual basis. All trash and other litter that is observed during these inspections should be removed.

Superficial dirt does not necessarily clog the pavement voids. However, dirt that is ground in repeatedly by tires can lead to clogging. Therefore, trucks or other heavy vehicles should be prevented from tracking or spilling dirt onto the pavement. Furthermore, all construction or hazardous materials carriers should be prohibited from entering a porous pavement lot.

Descriptive signage is recommended to maintain institutional memory of porous pavement



Figure 2: Example of soil wash-on/dumping from unstabilized landscaping.

### **Vacuuming**

Cahill recommends vacuuming porous asphalt and concrete pavement with a vacuum sweeper on a biannual basis. Acceptable types of vacuum sweepers include the Elgin Whirlwind and the Allianz Model 650. Though much less effective than “pure” vacuum sweepers, regenerative air sweepers, such as the Tymco Model 210, Schwarze 348, Victory, and others, are sometimes used. These units contain a blower system that generates a high velocity air column, which forces the air against the pavement at an angle, creating a ‘peeling’ or ‘knifing’ effect. The high volume air blast loosens the debris from the pavement surface, then transports it across the width of the sweeping head and lifts it into the containment hopper via a suction tube. Thus, sediment and debris are loosened from the pavement and sucked into the unit. (Note: simple broom sweepers are not recommended for porous pavement maintenance.)

If the pavement surface has become significantly clogged such that routine vacuum sweeping does not restore permeability, then a more intensive level of treatment may be required. Recent studies have revealed the usefulness of washing porous pavements with clean, low pressure water, followed by immediate vacuuming. Combinations of washing and vacuuming techniques have proved effective in cleaning both organic clogging as well as sandy clogging. Research in Florida found that a “power head cone nozzle” that “concentrated the water in a narrowly rotating cone” worked best. (Note: if the pressure of

the washing nozzle is too great, contaminants may be driven further into the porous surface.) Maintenance crews are encouraged to determine the most effective strategy of cleaning their porous installations.



Figure 3: Photo of Elgin Whirlwind Vacuum Air Sweeper, example of effective vacuuming device

For smaller installations, such as sidewalks, plazas, or small parking lots, “walk behind” vacuum units may prove most effective. Though these units can be loud and somewhat messy to the operator due to the lack of dust suppression, they are also relatively easy to operate and inexpensive. Examples of acceptable “walk behind” units include the Billy Goat models, the 5700 industrial-strength Scrubber by Tennant, and the sidewalk class vacuum sweepers made by Nilfisk, Advance and Hako. If “walk behind” units are used, it is recommended that the scrub pressure be kept relatively low. The dirtiest areas may need to be power washed after scrubbing to get out the dirt that has been deeply ground in.

### **Winter Maintenance**

Winter maintenance for a porous parking lot may be necessary, but is usually less intensive than that required for a standard asphalt lot. By its very nature, a porous pavement system with subsurface aggregate bed has superior snow melting characteristics than does standard pavement. Therefore, ice and light snow accumulation are generally not as problematic. However, snow will accumulate during heavier storms. Abrasives such as sand or cinders should not be applied on or adjacent to the porous pavement. Snow plowing is necessary for significant snow accumulation, but should be done carefully (i.e. by setting the blade slightly higher than usual, about an inch). Standard road salt is acceptable for use as a deicer on porous pavement, although a non-toxic, organic deicer, applied either as a blended, magnesium chloride-based liquid product or as pretreated rock salt, is

recommended. Acceptable liquid deicers include Magic-O, Ice B' Gone, Ice Ban, and Geomelt, among others. Magic Salt is an example of an acceptable pretreated salt product. Other acceptable deicer alternatives to standard sodium chloride include calcium chloride, magnesium chloride, potassium chloride, urea, and calcium magnesium acetate. Follow supplier recommendations when applying deicers to pavement.



Figures 4 and 5: Neither the porous asphalt parking lot at the University of Rhode Island nor the one at the Ford Rouge Plant in Dearborn, Michigan have experienced significant snow accumulations on the pavement after multiple harsh winters.

## **Repairs**

Potholes in the porous pavement are extremely unlikely, though settling might occur if a soft spot in the subgrade is not removed during construction. For damaged areas of less than 50 square feet, a declivity could be patched by any means suitable with standard pavement, with the loss of porosity of that area being insignificant. The declivity can also be filled with porous mix. If an area greater than 50 SF is in need of repair, approval of patch type must be sought from either the engineer or owner. Under no circumstance is the pavement surface to ever be seal coated. Any required repair of drainage structures should be done promptly to ensure continued proper functioning of the system.

With minimal maintenance, porous bituminous asphalt can function effectively for well over 20 years. However, in the event that maintenance of the porous pavement is neglected and it becomes clogged over time, the Owner shall vacuum the lot until the original permeability is restored. (If the original permeability of the lot cannot be restored, the pavement should be removed and replaced with a new porous mix.) Recent research has shown that one of the most effective ways of restoring porous pavement is applying a pressurized dose of a non-toxic detergent cleaning solution, allowing adequate soak time, and then vacuuming with a high performance unit (Elgin Whirlwind and the Allianz Model 650). Once again, it is important to note that high pressure washing may drive contaminants further into the porous surface and even into the underlying aggregate. It is therefore recommended that, prior to vacuum sweeping, a low performance pressure washer is used to get the solution to break the surface tension and reach into the pores.



Figure 6: Standard bituminous patch in porous asphalt parking lot. This lot was constructed with an unmodified porous mix (i.e. no polymer modification) and had rutted in the center of the aisle due to construction traffic.

- **Summary**

- **Prevent Clogging of Pavement Surface with Sediment**

- Vacuum pavement twice per year
    - Maintain planted areas adjacent to pavement
      - Immediately clean any soil deposited on pavement
    - Do not allow construction staging, soil/mulch storage, etc. on unprotected pavement surface
    - Clean inlets draining to the subsurface bed twice per year

- **Snow/Ice Removal**

- Porous pavement systems generally perform better and require less treatment than standard pavements
    - **Do not apply abrasives such as sand or cinders on or adjacent to porous pavement**
    - Snow plowing is fine but should be done carefully (i.e. set the blade slightly higher than usual)
    - Salt application is acceptable, although more environmentally-benign deicers are preferable

- **Repairs**

- **Surface should never be seal-coated**
    - Inspect for pavement rutting/raveling on an annual basis (some minor ruts may occur in the porous pavement from stationary wheel rotation)
    - Damaged areas less than 50 square feet can be patched with porous or standard asphalt
    - Larger areas should be patched with an approved porous asphalt