Sherman Library

Maintenance Handbook for Porous Asphalt

Porous asphalt systems are an effective means of stormwater management. Unlike traditional pavements, rainfall drains through the pavement surface and infiltrates into the subsurface layers. By allowing rainfall to infiltrate close to where it first hits the ground, the porous asphalt promotes a more "natural" flow of stormwater through the watershed than what is typically experienced with traditional impervious hardscape areas. By minimizing the concentration of overland flow, porous asphalt also aids in the reduction of erosion and sedimentation to downgradient streams and waterbodies. Other benefits of porous pavement include the reduction of thermal impacts to downgradient watercourses and waterbodies, enhancement of water quality, runoff reduction, and groundwater recharge. In addition, it has also been proven that snow and ice melt with porous asphalt is drastically quicker than traditional pavement resulting in a reduction in the amount of salt needed for winter maintenance.

In order to promote the long term operation of porous asphalt, it is necessary to inspect and maintain porous asphalt areas. The most prevalent maintenance concern with porous asphalt is the potential for clogging of the pores making up the porous asphalt pavement section. Fine particles that can clog the pores are deposited on the surface from vehicles, the atmosphere, and runoff from adjacent land surfaces. The frequency of clogging can increase with age and use. While more particles become entrained in the pavement surface, it does not become impermeable. Studies of the long-term surface permeability of porous asphalt and other permeable pavements have found high infiltration rates initially, followed by a decrease, and then leveling off with time. To minimize the potential for clogs and to promote the long term infiltration capacity of a porous asphalt pavement section, it is necessary to adhere to the inspection and maintenance guidelines recommended in this handbook.

Inspection:

All porous pavement areas shall be inspected two times per month for the first three months after construction, and annually thereafter. Inspections should be conducted after large storms to check for surface ponding that might indicate local or widespread clogging. In addition, it is also important to frequently inspect that pavement areas are free of debris and sediment and that adjacent lawn and landscaped areas do not contain bare areas that may contribute sediment loads to the porous asphalt. The pavement surface should also be inspected to determine the existence of any cracking or potholes.

Porous Asphalt Inspection Frequency:

- Monthly
    - Inspect to make sure porous pavement areas are free of debris (i.e. twigs, leaves, litter, etc.) and sediment
    - Inspect porous asphalt areas to ensure there is no standing water between storms.
- As needed

    - Inspect upland and adjacent lawn areas for bare spots that may contribute sediment to the pavement surface.
    - Inspect pores in porous asphalt to determine if they are clogged with sediment. Try pouring water in areas that look clogged to see if it infiltrates through the asphalt.
- Annually
    - Inspect pavement surface for deterioration or spalling.

Routine Maintenance:
Research has found that porous asphalt pavements can have a much longer service life than conventional pavement. Due to the well draining stone bed and deep structural support of porous asphalt pavements, they tend to develop fewer cracks and potholes than conventional asphalt pavement. To facilitate the longer service life, however, porous asphalt pavement must be maintained regularly. The following maintenance operations should be performed as recommended below:

Porous Asphalt Routine Maintenance Frequency:
- Monthly
    - Remove any sediment or debris that may become deposited on porous asphalt areas to minimize clogging potential within porous asphalt.
- Quarterly
    - Vacuum sweep porous asphalt surface a minimum 4 times per year using a Billy Goat VQ902SPH wide area lawn vacuum or approved equal. An Elgin Whirlwind (or approved equal) sweeper truck may also be used as long as there are no clogs in the asphalt. Follow vacuum sweeping with high power pressure washing to keep the asphalt pores open.
- As needed
    - Repair any cracking and potholes that may occur by using conventional, non-porous patching mixes. Conventional, non-porous patching mixes may be used as long as the cumulative area repaired does not exceed 10% of the porous asphalt parking lot area. Under no circumstance shall “seal coats” be used.
    - Mow upland and adjacent lawn areas. Stabilize and/or vegetate any bare areas that may contribute sediment to the porous asphalt during a rain storm.
    - In areas that have become clogged, follow the procedure outlined below for Maintenance of Clogged Areas.
    - In porous asphalt areas that are operating properly, follow the procedure outlined below for Maintenance of Unclogged Areas.
    - In areas where extreme clogging has occurred, half inch holes can be drilled through the pavement surface every few feet or so to allow stormwater to drain to the aggregate base.
    - In cases where clogging occurs in a low spot in the pavement, it may be advisable to install a drop inlet to route water into the stone reservoir.

Maintenance of Clogged Areas:

1. For dust control, pre-wet the area with pressure washer low-pressure nozzle, or do maintenance on rainy day;
2. Remove coarse debris, stones, and any sediments on the surface with flat head shovel and push broom;
3. Use a shop-vac or Billy Goat VQ902SPH wide area lawn vacuum or approved equal to vacuum up loose sediments trapped in pores. A Billy Goat will make a mess if there is any standing water or if it is dry, so use the shop-vac for vacuuming any of the dirty puddles.
4. Corral clogging sediments (by using a pressure washer in low-pressure mode) from local high points to low spots by aiming at an angle and keeping the wand approximately 6 inches above the surface. These spots will already be clogged, so no additional damage will be done. Use a benign detergent spread with the power washer and a low-pressure (soap dispensing) wand for greater effect. Let the spray soak for several minutes. Place wand closer to pavement for greater pressure/ cleaning effect. Direct power washer spray away from clean pavement, and away from edges of site.
5. Use the shop-vac to pick up the water and suspended sediment as the power washer forces it to the low spots. Use visible turbidity and soap foaming as your guide for determining when it is clean.
6. Look closely again at the pores. Attempt to pour water in the area where the pavement was clogged. While the clog will most likely not be returned to full infiltration capacity, it should visibly infiltrate.
7. If all previous treatments have not removed embedded debris at this point, try blasting with the power washer in high-pressure mode. Dispersion of sediments will be minimized by having already removed all the previous sediment and debris before this point.

Maintenance of Unclogged Areas:

1. For dust control, pre-wet the area or do maintenance on a rainy day.
2. Use Billy Goat in areas that are moist but NOT with standing water. Make a couple passes. During the process, the operator can hear whether sediments are being picked up. Stop if excessive sediments or water are shooting back out of the unit. Keep going as long as appreciable sediments are being picked up. Look at bag to see if there is recovery. Empty collected debris and sediment into buckets for disposal.

3. An Elgin Whirlwind (or approved equal) sweeper truck may be useful for this kind of general cleaning, but it is not generally used for clogged areas.

Winter Maintenance Guidelines:

Maintenance of porous asphalt during and after winter snow and ice storms is slightly different than that of conventional pavement. While both conventional pavement and porous asphalt need to be plowed, the use of sand and salt for deicing and traction varies significantly between the two types of pavement. While deicers or road salts can be applied to both types of pavement, the application of sand to porous asphalt should be avoided to prevent the clogging of the pores within the porous asphalt pavement. Despite the lack of sand application to porous asphalt during winter storms for traction, research has found that porous asphalt can provide the same surface friction coefficient as compared to a traditional pavement surface with applied sand. It has also been found that porous asphalt requires less salt or deicer application than traditional pavement due to the ability of meltwater to pass readily through the porous asphalt rather than over a traditional impervious pavement.

Porous asphalt has been found to work well in cold climates as the rapid drainage of the surface reduces the occurrence of freezing puddles and black ice. Melting snow and ice infiltrates directly into the pavement facilitating faster melting. Cold weather and frost penetration do not negatively impact surface porous asphalt infiltration rates. Porous asphalt freezes as a porous medium rather than a solid block because permeable pavement systems are designed to be well-drained and infiltration capacity is preserved because of the open void spaces. Due to the reduced freeze-thaw stress as compared to conventional pavement, porous asphalt has been found to experience less of the breakdown associated with freeze/thaw cycling as compared to conventional impervious pavements which leads to a longer lifespan for porous asphalt.

Maintenance of porous asphalt does require a different approach as compared to traditional pavement. A list of winter maintenance considerations for porous asphalt areas has been provided as follows:

Porous Asphalt Winter Maintenance Considerations:

- Porous asphalt surfaces (like traditional paving surfaces) are commonly not treated and plowed until 2 or more inches of snow accumulation.
- Plow after every storm. If possible, plow with a slightly raised blade to prevent pavement scarring.
- Up to 75% salt reduction can be achieved with porous asphalt. Salt reduction amounts are site specific and are affected by various site factors such as shading.
- Apply anti-icing treatments prior to storms. Anti-icing has the potential to increase traffic safety at the lowest cost and with less environmental impact.

- Deicing is not required for black ice development. Meltwater readily drains through the porous surface thereby preventing black ice.
- Apply deicing treatments during, and after storms as necessary to control compact snow and ice not removed during plowing operations.
- Sand application should be avoided since it will increase the need for pavement vacuuming and increase the potential for clogging of the porous asphalt pores.
- Vacuum porous asphalt areas quarterly, especially after winter and fall seasons when debris accumulation and deposition is the highest.
- If standing water is observed during precipitation, cleaning is recommended.
- Plowed snow piles should not be left to melt over the porous asphalt as they can receive high sediment concentrations that can clog them more quickly.

- Apply extra deicing chemicals to thaw areas where there is compact snow or ice. Provide additional deicing chemicals as needed.