Permeable Paving

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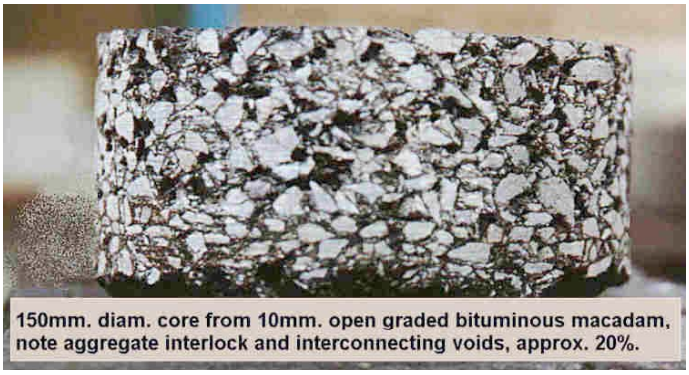
Porous Asphalt

Purpose:

- Porous asphalt used in place of traditional impervious paving materials decreases the total amount of runoff leaving a site
- Promotes infiltration of runoff into the ground
- Reduces the amount of pollutants carried to a storm drain or waterway
- Aids with reducing peak runoff velocity and volume
- Design for application of porous asphalt consists of at least four layers: a 2 to 4 inch layer of asphalt, a 1 to 2 inch filter layer of half-inch crushed aggregate, a 12 inch minimum reservoir layer of one to 3 inch aggregate and a layer of geotextile material
- Applicable to many uses, including parking lots, driveways, sidewalks, bike paths, playgrounds and tennis courts
- Can have a minimum service life of 20 years with proper maintenance



150mm. diam. core from 10mm. open graded bituminous macadam, note aggregate interlock and interconnecting voids, approx. 20%.

Benefits and Uses:

- Quantity and flood control
- Water quality treatment
- Recharges groundwater to underlying aquifers
- Allows for reduction of stormwater infrastructure (piping, catch-basin, retention ponds, curbing, etc)
- Suitable for cold-climate applications, maintains recharge capacity when frozen
- Allows for reduced salt and sand usage due to low / no black ice development
- Maintains traction while wet
- Reduced spray from traveling vehicles, reduced roadway noise
- Extended pavement life due to well drained base and reduced freeze-thaw

Disadvantages:

- Requires routine (quarterly) vacuum sweeping
- Proper construction stabilization and erosion control are required to prevent clogging
- Quality control for material production and installation are essential for success
- Accidental seal-coating or similar surface treatment will cause failure

Cost & Maintenance:

- Total project cost is comparable for porous asphalt with reduced stormwater infrastructure vs. standard pavement applications where stormwater infrastructure is required
- Material cost is 20 – 25 % more than traditional asphalt
- Long-term maintenance is required by routine quarterly vacuum sweeping
- Sweeping cost may be off-set by reduced deicing costs
- Repairs can be made with standard asphalt not to exceed 10 % of surface area

Pervious Concrete

Purpose:

- Capturing stormwater and allowing it to seep into the ground
- Concrete is instrumental in recharging groundwater, reducing Stormwater runoff, and meeting U.S. Environmental Protection Agency stormwater regulations
- Creates more efficient land use by eliminating the need for retention ponds, swales, and other stormwater management devices
- Pervious concrete mixture contains little or no sand, creating a substantial void content
- Primary use is in pavement
- Also referred to as porous concrete, permeable concrete, no-fines concrete, gap-graded concrete, and enhanced-porosity concrete
- Initial costs for pervious concrete pavements are higher than those for conventional concrete or asphalt paving - but total costs can be substantially lower

Benefits:

- Can aid in the process of qualifying for LEED Green Building Rating System
  - Stormwater Management
    - Allowing water to soak through and infiltrate, pervious paving reduces stormwater flow and pollutant loads - can contribute to LEED Credit 6
  - Minimize Site Disturbance
    - By integrating paving and drainage, less site area may need to be used to manage stormwater, allowing a more compact site development footprint - may contribute to LEED Credit SS 5
  - Local
    - Materials are usually extracted and manufactured locally - may contribute to LEED Credit M 5
  - Recycled content
    - Fly ash, slag cement, or silica fume can substitute partially for cement, and recycled aggregates can replace newly mined gravel - recycled content can contribute to LEED Credit M 4
  - Cool
    - Voids reduce mass reducing the heat build up associated with heat islands - lighter colored cements can increase reflectivity, not specifically approved for achieving LEED Credit SS 7
  - Lower installation costs
    - According to the Center for Watershed Protection, installing traditional curbs, gutters, storm drain inlets, piping, and retention basins can cost two to three times more than low-impact strategies for handling water runoff, such as pervious concrete. Projects that use pervious concrete typically don't need storm sewer ties-ins, which eliminates the cost of installing underground piping and storm drains. Grading requirements for the pavement is also reduced because there is no need to slope the parking area to storm drains.
  - Permits the use of existing sewer systems
  - Pervious concrete may also reduce the need for municipalities to increase the size of existing storm sewer systems to accommodate new residential and commercial developments.
  - Cities love pervious concrete because it reduces the need to rebuild storm sewer system Increased land utilization
    - Because a pervious concrete pavement doubles as a stormwater management system, there is no need to purchase additional land for installing large retention ponds and other water-retention and filtering systems. That means developers and property owners can use land more efficiently and maximize the return on their investments when new developments go up.
  - Increased land utilization
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  - Lower life-cycle costs
    - Pervious concrete is a sustainable paving material, with a life expectancy equal to that of regular concrete. Most parking areas, when properly constructed, will last 20 to 40 years, according to the Southern California Ready Mixed Concrete Association.
  - Reduce the amount of untreated runoff discharging into storm sewers.
  - Directly recharge groundwater to maintain aquifer levels.
  - Channel more water to tree roots and landscaping, so there is less need for irrigation.
  - Mitigate pollutants that can contaminate watersheds and harm sensitive ecosystems.
  - Eliminate hydrocarbon pollution from asphalt pavements and sealers.

Disadvantages:

- Inherent
  - Have a tendency of becoming clogged and are extremely expensive to clean out
  - Have a high rate of failure
  - Currently, the geotextile filters employed are incapable of filtering out nitrates, chlorides, or oils leaked from vehicles – this can lead to contaminated ground water
  - Anaerobic conditions can be brought about by heavy rains, which in turn can lead to impaired decomposition
- Practical
  - Lack of knowledge about the subject

- Often time, building codes prevent their installation

Costs & Maintenance:
- Significantly lower life-cycle cost than alternatives such as asphalt
- Initial cost of pervious installation may be slightly higher, concrete saves money in the long run due to its superior durability and strengths
- Requires fewer repairs than asphalt
- Has a longer life-span as well
- Pervious concrete is also economical in that it minimizes the need for runoff retainers, reducing property costs
- Very little overproduction since it is made directly on-site and as-needed
- Can be recycled once it has reached the end of its life-cycle

Difference porous asphalt and pervious concrete:
- The obvious difference is that concrete uses stone and sand aggregates, while asphalt is a petroleum-based product. However this study looks to identify further differences in durability, ability to improve water quality, and sustained ability to infiltrates stormwater. Check out our reports to see some of these differences

Permeable Paving in Nashville

Green Hills YMCA Parking Lot
Client:
Cost:
Size:
Location:
Neighborhood:

Metro Office Building
Client:
Cost:
Size:
Location:
Neighborhood:

Fulton Campus Parking Lot
Client:
Cost:
Size:
Location:
Neighborhood:

Bells Bend Nature Center Sidewalk
Client:
Cost:
Size:
Location:
Neighborhood:

Wal-Mart
Client::
Cost:
Size:
Location:
Neighborhood: