CONCRETE THAT DRAINS?!

Understanding Pervious Concrete

Pervious concrete's ability to drain stormwater is making it a popular and sensible paving material. It's a great alternative for parking areas and driveway, sidewalk and areas requiring erosion control. Pervious concrete is not appropriate for areas subject to high traffic volumes or speeds. Pervious concrete contains the usual constituents of Portland cement, pea gravel, and water, with no fine aggregate (typically sand) to densify the structure. That's what makes it work….the open air spaces left where the sand would have typical filled in and created the impervious material we are so accustomed to. Using minimal to no sand in the mixture allows for a 15- to 30-percent air void factor. A pervious pavement, however, is not just the pavement on top, but rather a "system" of soil, subbase, and pavement. Each part of this system is essential for the pavement to function as intended. Pervious concrete provides a compressive strength at around 2500 psi with an effective void ratio of 20%, which allows water to drain into the base course (the infiltrating sublayer) at rates of 2 to 18 gallons per minute per square foot[1].

Advantages of Pervious Concrete

- Allows stormwater to infiltrate in the ground to replenish groundwater aquifers.
- Keeps pavement surfaces dry even in wet environments, like greenhouses
- Allows water and air to get the plant and tree roots
- Aerobic bacteria that develop within the pavement matrix breakdown oil and remove other pollutants from water that washes off the surface

Designing a Pervious Pavement System[1]

Site Considerations:

- Slope of ground typically should not exceed 5%
- Do not use in areas of potential contamination
- Water table must be a minimum of 3 feet below the base
- Bedrock must be a minimum of 2 feet below the base

Soil Type:

- Soil must be uncompacted and level
- Permeability of underlying soil must be tested and found acceptable
- There must be no organic material that could degrade and allow settlement
- Expansive clays are not suitable
- With poorly percolating soils, the system can be designed to retain all rainwater
- With very sandy soils, the pervious concrete can be places directly atop the sand

Geotextile Fabric:

- The subgrade and sides of the excavation must be covered by a nonwoven geotextile fabric
- Geotextile fabric should allow drainage

Aggregate subbase:

- The depth of the subbase depends on runoff volume required to be retained

- Ensure a void space of 40%
- Suggested stone is 6 to 12 inches of No. 57 stone

Pervious Concrete:

- Mix with No. 89 washed stone, 600 pounds Portland cement per cubic yard, 0.30 w/c ration, but no sand
- Typically has 20% to 25% voids
- Built to allow a water infiltration rate of 20 inches per hour
- Is six inches or more in depth
- Struck off with a vibratory screed and rolled with a steel pipe roller, or roughly struck off and compacted with a roller screed
- Covered with plastic and cured for a minimum of seven days

Learning From Other Mistakes:
Ther have been pervious installations that did not perform as expected due to lack of experience in the design, materials, or construction. If there are too many fines (small aggregate) and too much water , the paste can settle out and form an impermeable layer at the bottom of the pavement. If the mix to too dry, it can be unworkable. If the contractor overfinishes the surface, an impermeable layer can form, If curing isn't done properly, the concrete won't gain strength. But all of these problems are easily overcome with experience.

Objections typically raised about precious concrete are that it will be destroyed by freeze/thaw action or that it will clog with dirt. According to information about pervious pavement, there have been many successful pervious pavements placed in cold climates. Regarding the pavement becoming plugged or clogged by soil has been another perceived disadvantage. As long as soil isn't actually eroding onto the pavement surface, clogging (a.k.a "plugging") should not be a problem. Power washing or vacuuming are the recommended maintenance procedures for unsure your pavement remains free flowing, so to speak.

[1]**Concrete Construction** June 05, p 44, by William D. Palmer Jr.

For additional information about product specifications or availability, contact the following:

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