Porous Pavement Maintenance Issues

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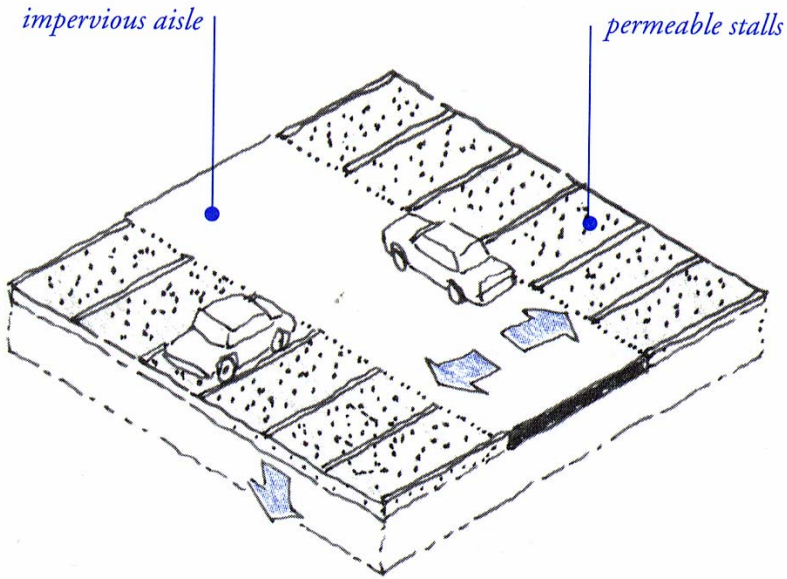
Types of Porous Paving

- Poured-in-place, continuous surface:
  - Pervious concrete
  - Porous asphalt
- Unit pavers:
  - Interlocking concrete pavers
  - Turf block
  - Brick
  - Natural stone
- Granular materials:
  - Crushed aggregate (gravel)

Applications

- Low traffic or pedestrian areas
- Overflow parking, “hybrid” lots
- Driveways, temporary parking areas
- Patios, plazas
- Emergency access or utility roads
- Storage or recharge beds under parking lots



“Start at the Source”
Figure 3-6:
Hybrid Parking Lot

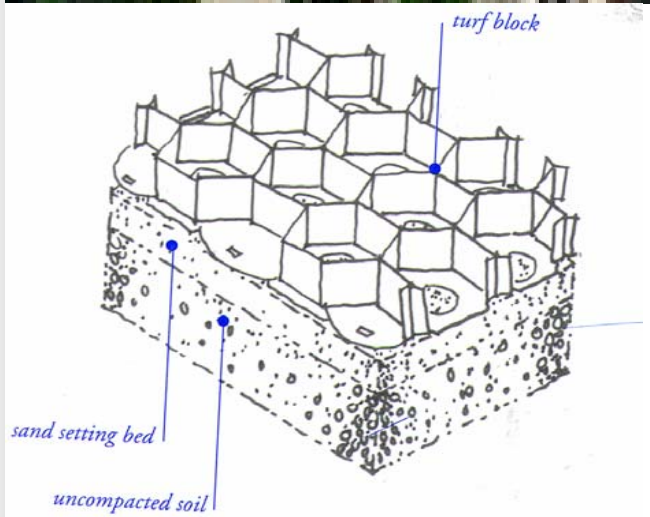


Fig. 3-7: Turf block

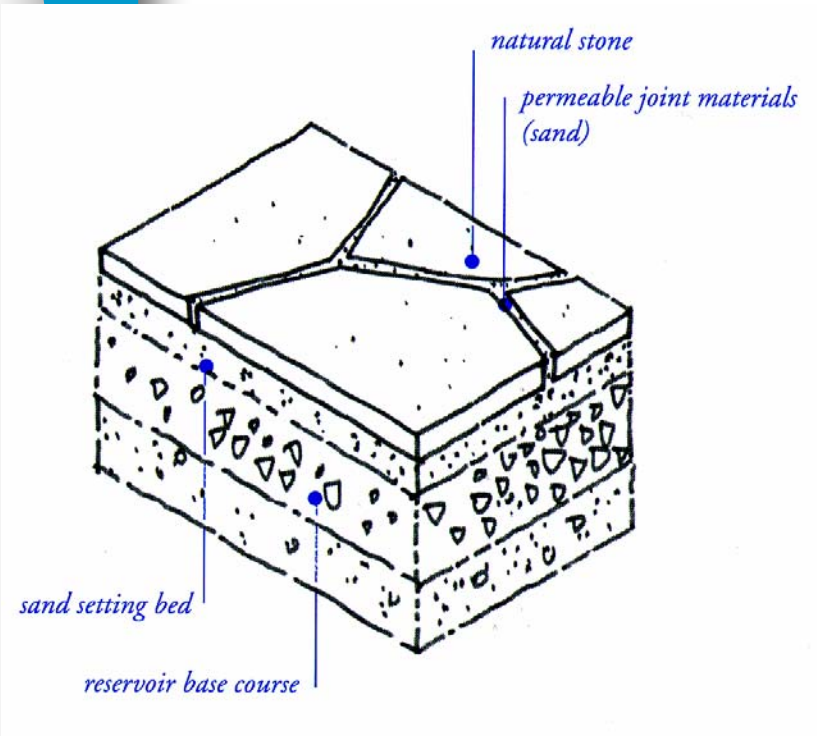


Figure 3-8:
Permeable joints

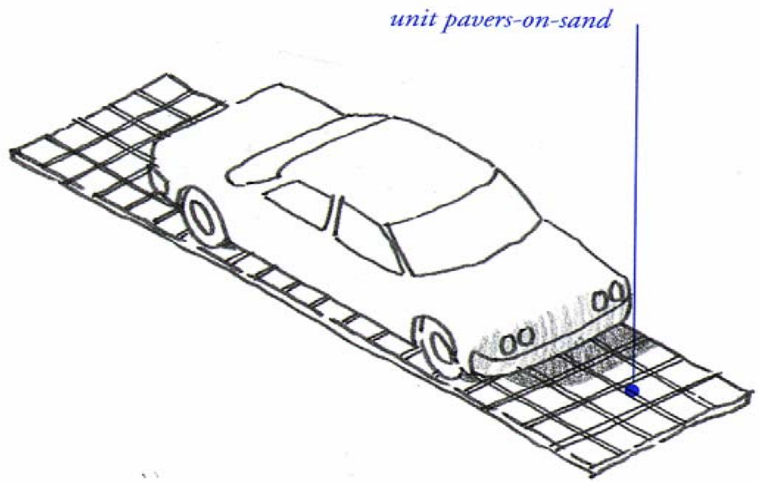
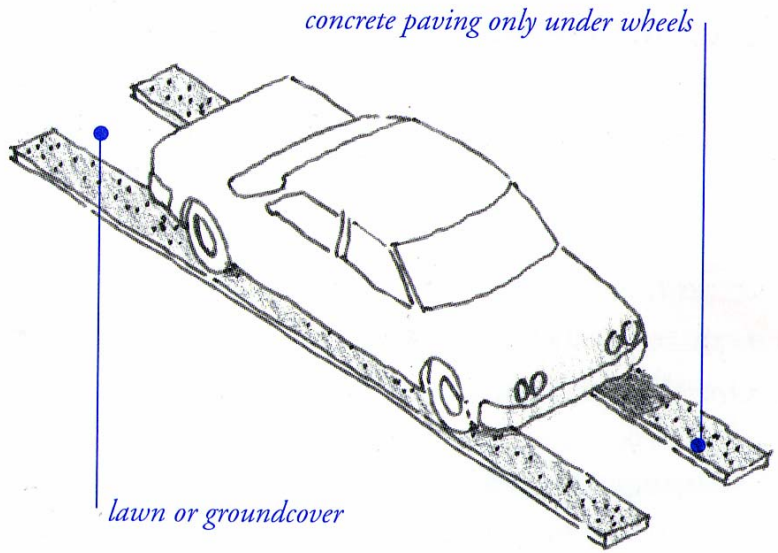


Figure 3-15: Unit Pavers

Figure 3-17: Paving only under wheels



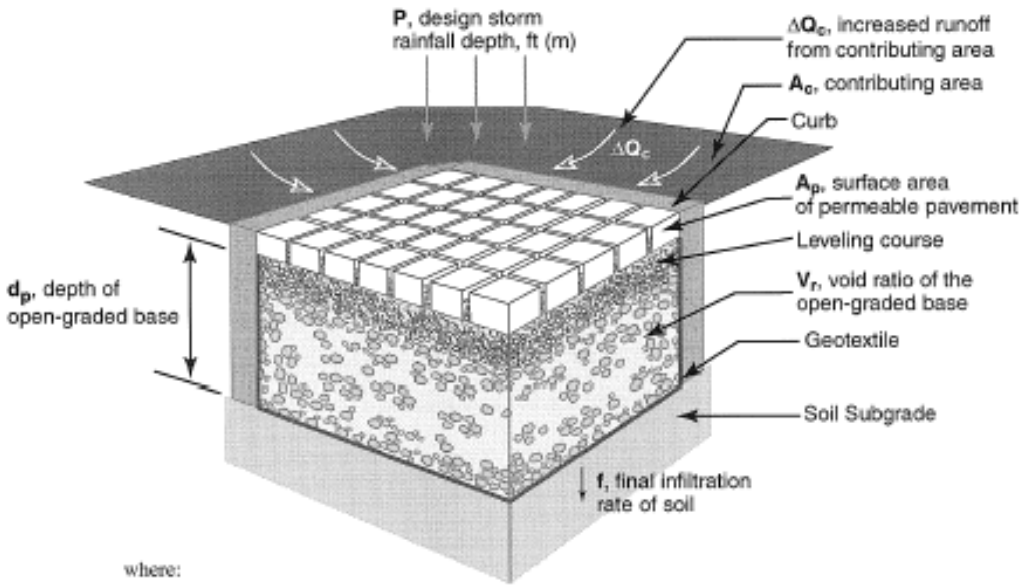
Porous Concrete Demonstration Project

Villanova University, PA

Unit Pavers: General Features

- Reduce impervious surface while providing stable, load bearing surface
- Sufficient void space at surface to allow infiltration
- Fine gravel setting bed
- Reservoir base course provides load-bearing capability and water storage
  - Open graded (35-40% void space)
  - Crushed stone (angular sides)

Permeable pavers need to be installed over a properly designed open-graded base course



where:

f = the final (design) infiltration rate in in./hr (m/hr) of the soil under the pavement (infiltration rates are determined from permeability tests and engineering judgement);

T_s = the maximum allowable storage time of 72 hours; and

V_r = the void ratio (space) of the crushed stone base (typically 0.4).

The maximum allowable depths are given in Figure 19 for selected values of **f**, T_s, and V_r.

A_c = contributing area, sf (m^2)

ΔQ_c = increased runoff from contributing area, ft (m) per a given design storm

A_p = surface area of permeable interlocking concrete pavement, sf (m^2)

P = design storm rainfall depth, ft (m)

d_p = depth of crushed stone base, ft (m)

T = effective filling time of the base, hours (2 hours is typical)

Figure 17. Design parameters for calculating the base depth for permeable interlocking concrete pavements.

Credit:

Permeable Interlocking Concrete Pavements, ICPI 2001

Unit Paver Installation

Palo Alto

Lessons Learned in Palo Alto

- Design base course based on site-specific soils data and expected loading
- Don’t lay pavers over sand and don’t compact the base course
- Keep sediments away from pavement during construction
- Avoid overcompaction of subgrade soils
- Provide subdrains if needed

Maintenance Concerns

- Reduced porosity from clogging
- Reduced exfiltration into native soils or underdrains
- Limit erosion/sedimentation from adjacent areas
  - During construction
  - Post-construction (e.g. pretreatment swale)
- Keep pavement surface clear of debris and sediment

Maintenance Tasks

- Vacuum sweep surface openings
- Maintain vegetation around pavement
- Keep pavement surface clear of leaves, debris and sediment
- Remove debris from overflow pipes
- Unit pavers - Replace broken pavers and replenish aggregate joint materials
- Turf block – mow grass to < 4 in., remove clippings, avoid chemicals

Inspection Tasks

- Inspect surfaces after major storms for debris, damage, ponding, pollutants
- Inspect adjacent areas for erosion
- Check drain outfalls, overflow pipes, and observation well
- Check for bare areas in turf, gravel, or other media

References

- *Start at the Source, Design Guidance Manual for Stormwater Quality Protection*, BASMAA, 1999. (see www.scvurppp.org)
- *California Stormwater BMP Handbook, New Development and Redevelopment*, CASQA, 2003 (see www.cabmphandbooks.com)
- www.stormwatercenter.net
- www.toolbase.org
- Interlocking Concrete Pavement Institute www.icpi.org