



Green Stormwater Infrastructure

University at Albany

Indu Lnu

ilnu@albany.edu

MS4 Requirements

Must evaluate Best Management Practices

<https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#constr>

Campus Center Expansion



11,000SF Porous Concrete Pavers



10,000SF Green Roof



7,600SF Porous Asphalt Parking Lot and Walkways



Impact on Project Budget

Baseline Measures

Infiltration Chambers	\$300,000
Standard Poured-in-Place Concrete @\$8/SF	\$ 88,000
Standard Asphalt @ \$4.70/SF	\$ 35,000
TOTAL	\$423,000

Impact on Project Budget

Green Infrastructure Measures

Infiltration Chambers	\$185,000
Porous Concrete Pavers @\$23.50/SF	\$257,000
Porous Asphalt @ \$12/SF	\$ 91,000
Green Roofs @ \$40/SF	\$401,000
Additional Design and SWPPP Amendment	\$ 35,000
TOTAL	\$969,000
EFC Grant Funding	\$607,765
University Cost Share	\$361,325

Cost vs. Water Quality Volume

Measure	Cost per Unit of Water Quality Volume Savings
Infiltration Chamber	\$40/Cubic Feet WQv
Porous Asphalt	\$90/Cubic Feet WQv
Porous Precast Concrete	\$195/Cubic Feet WQv
Green Roof	\$500/Cubic Feet WQv

Costs of GI measures based on incremental costs on change orders. Costs can be lower on projects where GI measures are included in the design from the start.

What's Good About GI Measures

- No rain splashing or black ice
- Better traction
- Reduced salt and no sand use
- No catch basins, piping, separate treatment facilities that need to be maintained
- Student education and perception

What to Watch Out For

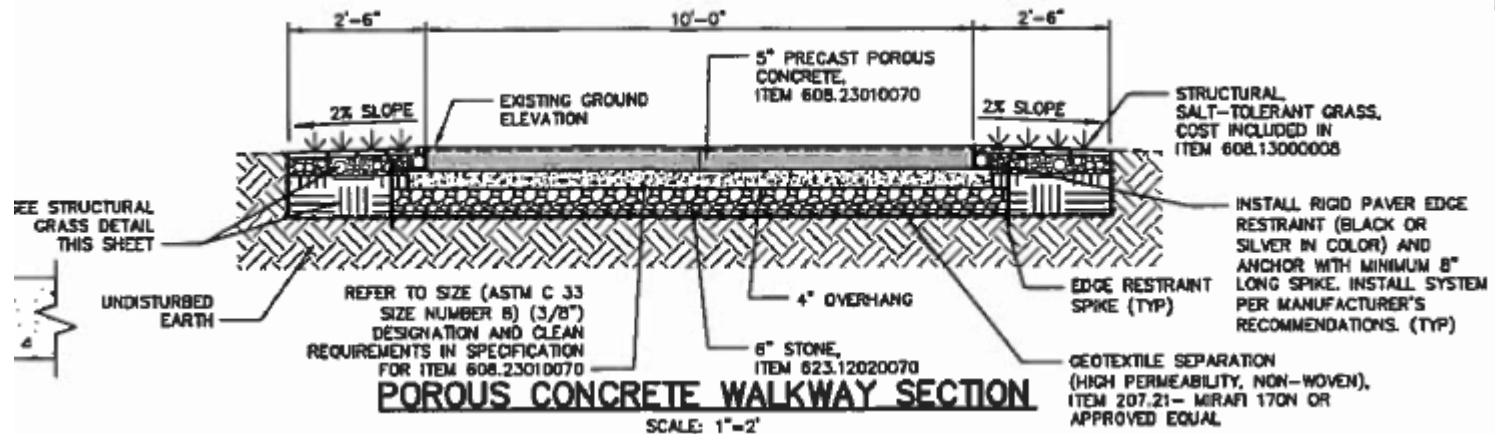
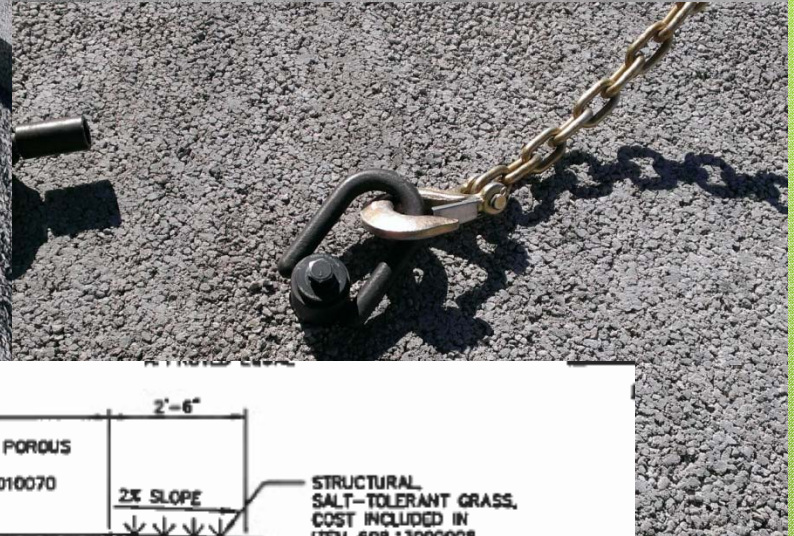
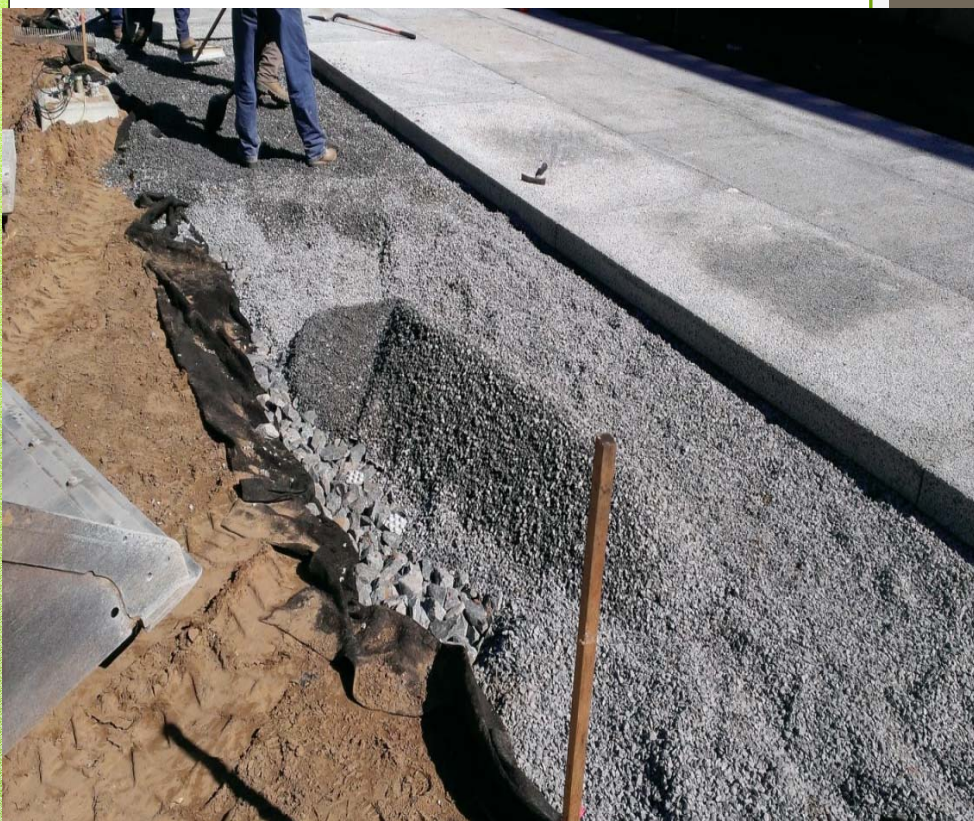
- Not many qualified engineers/contractors/product vendors
- Needs more quality control during installation
- Schedule impact
- Need to train grounds crew and remind them not to salt/sand
- Aesthetics

Porous Asphalt

- New DOT mix - addresses problems from heavy traffic, static turning, etc.
- Critical- Temperature at delivery and before rolling, rolling speed
- O&M- Vacuum once a year, leave the blade up a little during plowing

Porous Concrete Pavers

- Porous poured-in-place is cheaper but not there yet
- 5' x 8' x 5" Stormcrete panels
- Can be colored/stained
- Few defective pavers
- Poor install with gaps between pavers
- Salt is an enemy- restrict to heavy snowstorm
- Some spalling in year one



Green Roof

- LiveRoof Lite
- Soil depth ~2 ½"
- 1' x 2' x 1 7/8" tray module
- Saturated weight ~15-17 lbs/sf
- Minimal maintenance
- Cooling load reduction