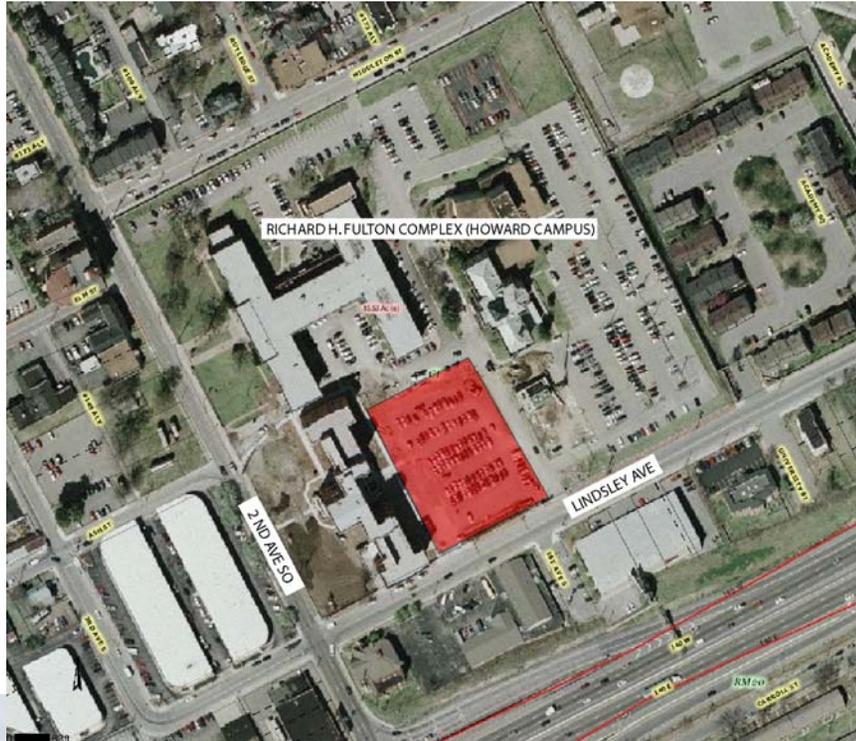


Richard H. Fulton Campus Low Impact Development Parking



Site Location



Overview

- Project Background
- Project Details
- Cost Implications
- Lessons Learned



Low Impact Development
Parking Lot- June 2009



Project Background

- Design begun in 2003, construction completed 2005
- Space constraints- Dense, heavily used, urban site
- Bedrock subgrade
- Complex underground infrastructure- Historic site from 1850's
- Drainage problems at intersection of 2nd Ave So & Lindsley Ave
- Originally combined storm and sanitary sewer system
- **Pioneer project for Low Impact Development (LID) practices**
- Metro wanted lot to be used as **demonstration site**
- Metro Stormwater Management Manual update in 2006 to include LID

- Project presentation June 2008 to Cumberland River Compact, Building Outside the Box, Local Officials Community Water Curriculum- ***Green Parking Workshop***
- To be featured on segment of WNPT's ***Volunteer Gardner*** summer of 2009

Drainage Flow

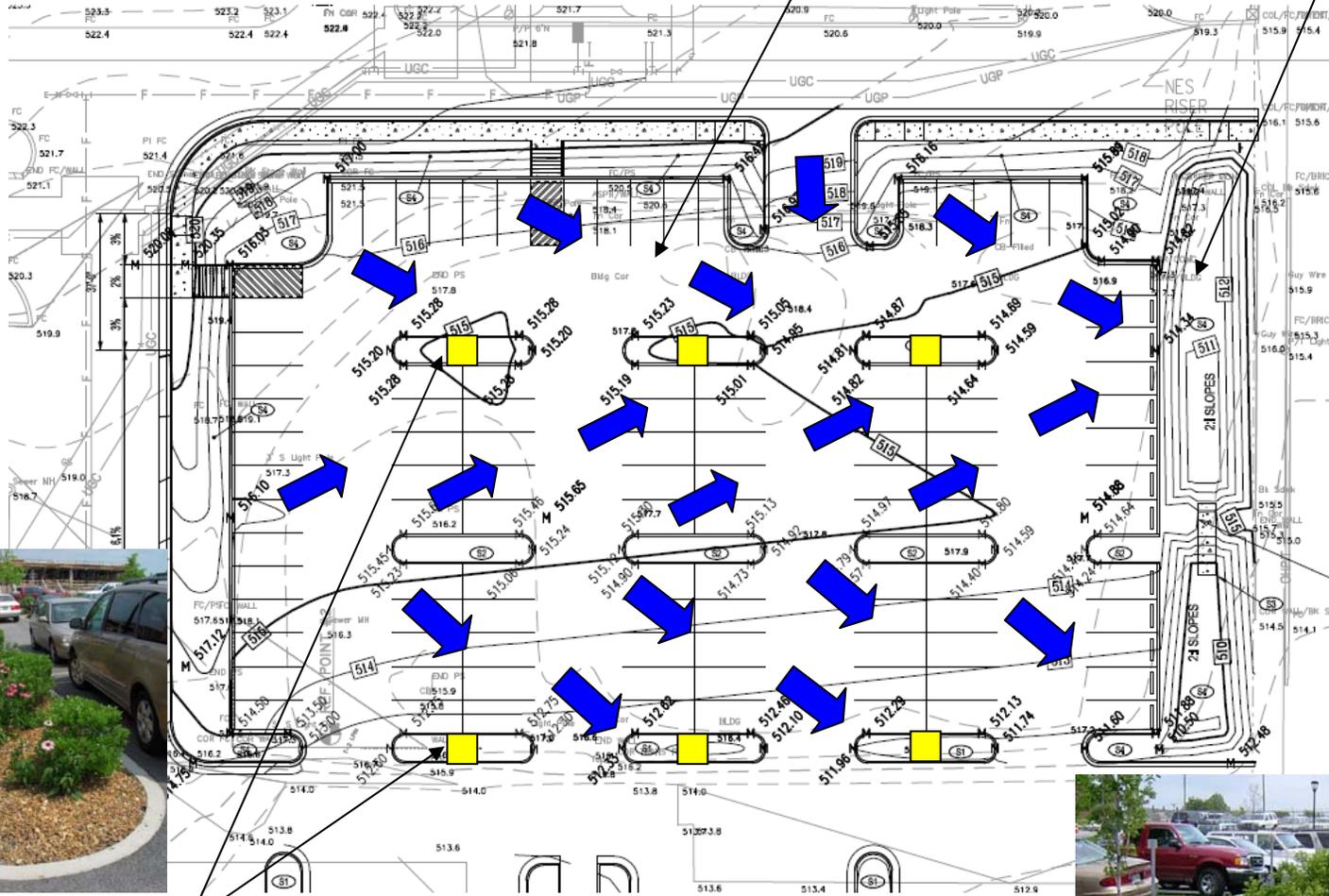
Permeable asphalt with underdrain system

Bioretention swale with grade control weir.

Runoff drains through permeable paving and to bioretention islands, then carried through underdrains to bioretention swale and back into stormwater system.



Parking islands are catch basins for overflow water



Permeable Asphalt Section

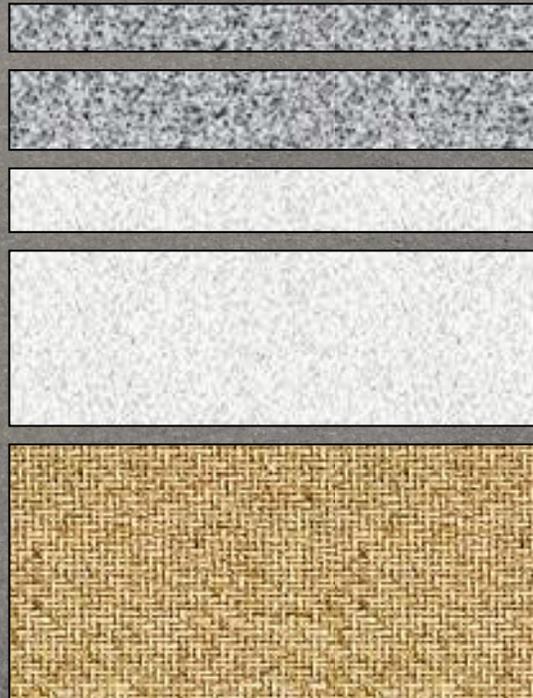
1.5" Hot Mix Asphalt
Open Graded Friction
Surface Course

3.5" Treated Asphalt
Permeable Base Course

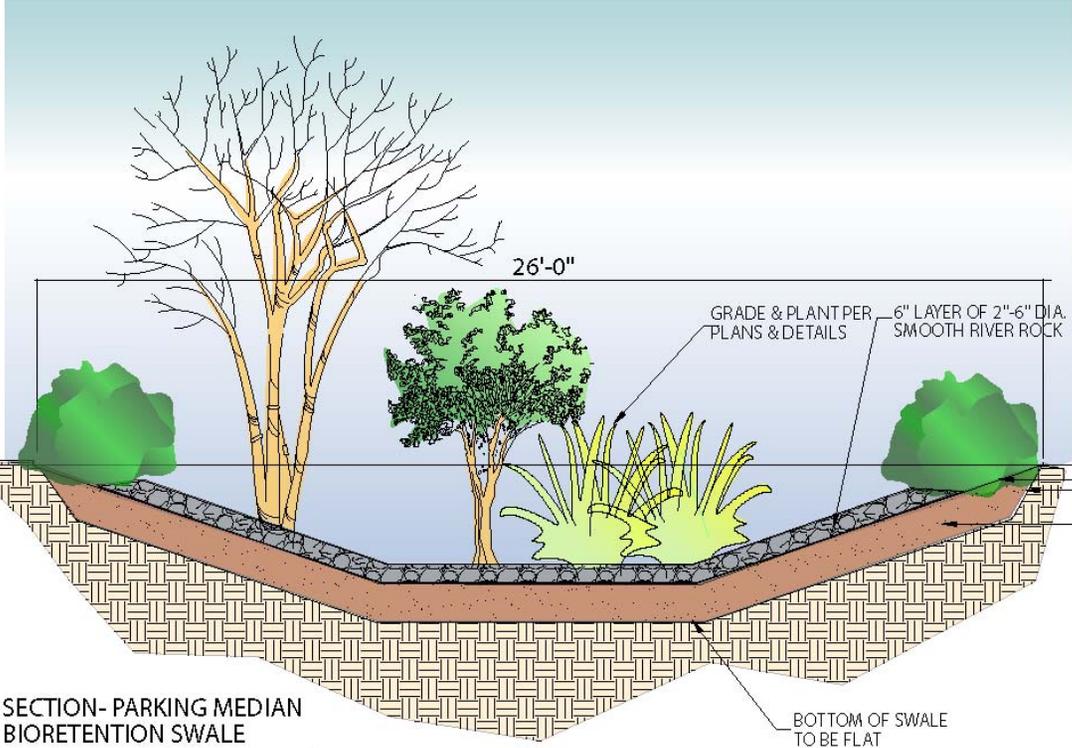
2" Mineral Aggregate
Base Course – No. 7

9" Mineral Aggregate
Base Course – No. 3 or 4

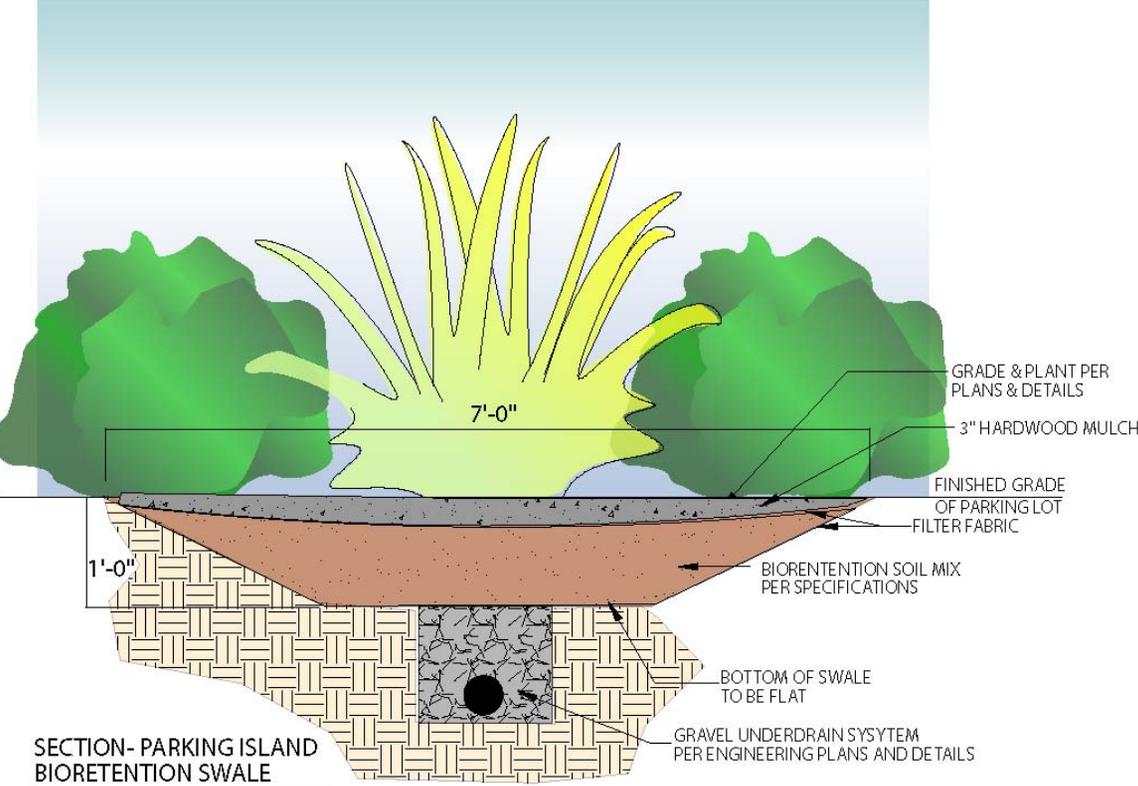
Compacted Subgrade



Bioretention Swale Detail



Bioretention Parking Island



Cost Implications:

- LID costs less than conventional stormwater management systems to construct and maintain, in part, because of fewer pipes, fewer below-ground infrastructure requirements, and less impervious surface.
- Costs are site-specific due to site's conditions
- Asphalt or conventional concrete stormwater management paving system costs between \$9.50 and \$11.50 per square foot, compared to a permeable paving stormwater management system at \$4.50 to \$6.50 a square foot.

Bioretention- \$3 to \$4 per square foot, depending on soil conditions and the density and types of plants used. Commercial, industrial and institutional site costs- \$10 to \$40 per square foot, based on the need for control structures, curbing, storm drains and underdrains.

Permeable Paving-

- Porous Concrete- \$2.00 to \$6.50/s.f.
- Grass/Gravel Pavers- \$1.50 to \$5.75/s.f.
- Interlocking Concrete Pavers- \$5.00 to \$10.00/s.f.
- Porous Asphalt- approx. \$4.00/s.f.

Site Specific Cost Implications

Paid premium on asphalt due to limited contractor experience in the area

Equipment availability caused scheduling problems

Relatively small size of lot

Underdrain system due to bedrock



Landscape Design Considerations

- Naturalized –vs- Manicured look
- Use native plants suited to moisture, light and soil conditions
- Mulch options are rock, wood chips or shredded hardwood depending on site specific need
- Biosoil- 10% native soil, 30% composted material and 60% gravelly sand

PLANT LIST FOR RHFC PARKING	
Latin Name	Common Name
Trees	
Acer saccharum	Sugar Maple
Acer Rubrum 'Armstrong'	Armstrong Maple
Cladratis lutea	Yellowwood
Platanus acerifolia	London Planetree
Quercus phellos	Willow Oak
Shrubs	
Buddleia davidii	Butterfly bush
Cephalanthus occidentalis	Button Bush
Hibiscus moscheutos	Swamp Mallow
Hypericum frondosum	Goldern St. John's Wort
Ilex crenata 'Green Luster'	Green Luster Holly
Ilex glabra 'Densa'	Dwarf Inkberry
Itea virginica	Virginia Sweetspire
Prunus laurocerasus 'Otto Luyken'	Otto Luyken Laurel
Viburnum rhytidophyllum	Leatherleaf Viburnum
Herbacous	
Echinacea purpurea	Purple coneflower
Iris pseudacorus	Yellowflag Iris
Rudbeckia fulgida 'Goldsturm'	Black-eyed Susan
Grasses & Sedges	
Chasmanthium latifolium	Upland Sea Oats



Lessons Learned

- Correct placement of asphalt is critical to the overall success of the system
- 'End-cap' curbs or curb with cuts around islands
- Quality, weed-free topsoil must be used
- Landscape fabric between soil and mulch
- Budget and plan for maintenance
- Missed opportunity for monitoring



