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Pervious Pavement: An Honest Assessment



Woodbridge Neighborhood Road Reconstruction Project

- Residential neighborhood
 - Fully developed – homes 1950 - present
 - Adjacent to Lake Owasso
- Approx. 3800LF of asphalt roadway
 - No curb and gutter
 - Width 16 to 22-feet
- Storm sewer
 - 1 catch basin N. end of project area
 - Direct discharge into lake



Project Improvements

- Remove and replace roadway
- Install concrete curb and gutter
- Install storm sewer collection system
- Misc. repairs to sanitary sewer
- Extend watermain to properties not served by City water

Design Challenges

- Stormwater management
- Stormwater management
- Stormwater management

Stormwater Management Challenges

- Lake Owasso – Grass Lake Watershed
 - At minimum treat stormwater for sediment & nutrient removal prior to discharge
 - Preferred eliminating discharge
- Only one easement available for outlet pipe located on north end of project
 - Site sloped from north to south
 - Easement for additional outlet pipe difficult to obtain
- Land not available for treatment pond

Stormwater Management Options Evaluated #1

- Conventional collection system – catch basins, underground piping, treatment, and discharge to Lake Owasso
 - Transfer water to north end
 - Underground tank needed for treatment - \$\$\$, potential maintenance and odor issues
 - Required discharge pipe to lake
 - Trench excavation would affect established trees along road edge

Stormwater Management Options Evaluated #2

- Collection system w/infiltration – catch basins and underground infiltration piping

- Sandy soil suited for infiltration

- Overflow pipe to lake required

- Due to ROW limitations could not provide enough storage for 10-year storm

- Trench excavation would affect established trees along road edge

- Least expensive initial capital cost

Stormwater Management Options Evaluated #3

- Pervious concrete with rock storage layer
 - Sandy soil suited for infiltration
 - Eliminates stormwater collection infrastructure
 - Discharge pipe to lake not required
 - Storage available in excess of 10-year storm
 - Excavation less affect on established trees
 - No long term data on durability in northern climates
 - Approximately 10% more initial capital cost than underground infiltration piping

Selection of Pervious Concrete

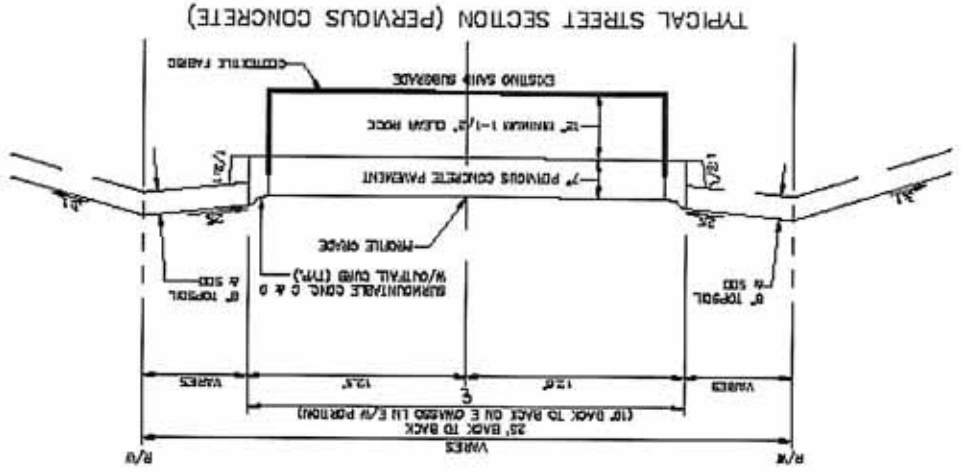
- Elimination of discharge pipe to lake
- Underground pipes not required
 - Reduce affect on character of neighborhood
- Location of the neighborhood
 - Low volume traffic
- Past City experience
 - 2007 installed 900-foot x 12-foot alley
 - Strong relationship with industry, suppliers, and installers

Selection of Pervious Concrete Continued

- Soil type good for infiltration
- Project site was relatively flat
 - Hydraulic design important
- Advancements in mix designs and placement techniques
- Could control maintenance schedule



CITY OF SHOREVIEW
WOODBRIDGE NEIGHBORHOOD
RECONSTRUCTION
CITY PROJECT NO. 09-01



TYPICAL STREET SECTION
EXHIBIT 2
MARCH 2009

Construction

- Project awarded in May, construction started in June
 - General - Veit
 - Concrete installer - North Country Concrete
 - Concrete supplier - Cemstone
- First section of concrete placed July 7
- Last section placed August 31
- Largest public street project in US to date

Monitoring the Effect of Infiltration

- Ground water monitoring wells
 - In conjunction with Ramsey Conservation & MN Dept of Health
 - Installed 3 wells on site & 1 well off site
 - Monitor quality and level
 - Completed two rounds of water quality tests prior to construction
 - Plan to test water every 6 months
- Installed automatic rain gauge on site

Monitoring Performance of the Pervious Concrete

- Infiltration performance
 - Visit site during rain events
 - Rain gauge
 - Monitoring pipe in rock drainage layer
- Pavement performance - long term
 - Surface durability
 - Ride quality
 - Cracking
 - Length of service life

Maintenance Issues

- Keeping the surface pores clean
 - Infiltration rates of 300–500in/hr – can handle some clogging
 - In-field testing shows clogging typically occurs in top 1-inch
 - City is currently testing street sweepers
 - In-field testing with epoxy and coring
 - Some areas require deeper cleaning
 - Schedule of cleaning is a work in progress

Maintenance Issues Cont.

- Use different winter maintenance philosophy – experiment with salt usage
- Educating Residents
 - Sent out flier with info on how they can help to keep the surface clean
 - On-site open house to answer questions and provide information about the street
- Signage throughout the project area with information about the pavement
- Experiment with crack filling in the future



Construction Photos











Conclusion

Pervious concrete is a viable and cost effective solution to stormwater management.

Designers and stormwater professionals should include pervious concrete in their BMP toolbox.