



Permeable Pavement: Bloomington Public Works Experience

Harrison Park Parking Lot Regional Infiltration Demonstration Project

Steve Segar, PE,
Engineering Division
October 27, 2009



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NONDEGRADATION

- 30 selected MS4s
- Loading Assessment to assess the change in storm water discharge pollutant loading
- Reduce Total Suspended Solids (TSS), Phosphorus and Volume



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NONDEGRADATION

Loading Assessment Models

- Land Use Changes
- Existing BMPs
- Proposed Volume Reduction BMPs



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Volume Reduction BMPs

- Regional Facilities – Specific Sites
- Redevelopment - Nine Mile Creek Watershed District Management Plan
- Redevelopment – Future City rules, etc.



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Volume Reduction BMPs

- Raingardens – PMP (Thomas Ave), private construction, workshops, Nine Mile Creek Watershed District Cost Share Program, and Blue Thumb
- City Projects – Harrison Park Demo Project includes permeable pavement and raingardens, other regional Infiltration sites



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SO WHY HARRISON PARK?

- Pavement distress
- Proximity to City Hall & Nine Mile Creek
- Recent construction at storm sewer outfall and continued erosion along path
- Soils were good for infiltration



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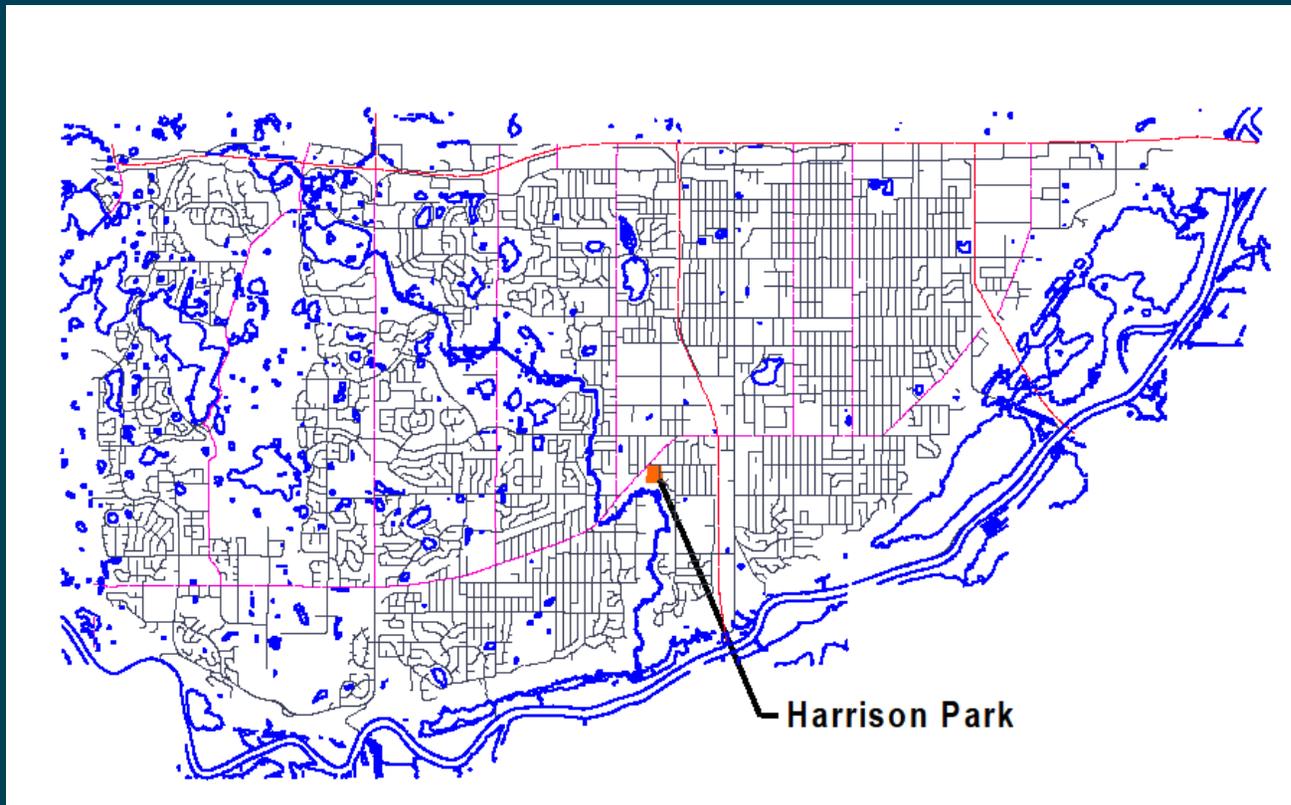
HARRISON PARK



Public Works: Administration, Engineering, Maintenance, and Utilities

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HARRISON PARK



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HARRISON PARK



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Park Master Plan

Harrison Picnic Grounds



Address: 1701 West 100th Street

Classification: Community Park

Size: 18.9 Acres

Existing Features:

- A Playground equipment
- B Trails (Access to Moir Park/Nine Mile Creek trails)
- C Off-street parking
- D Grills

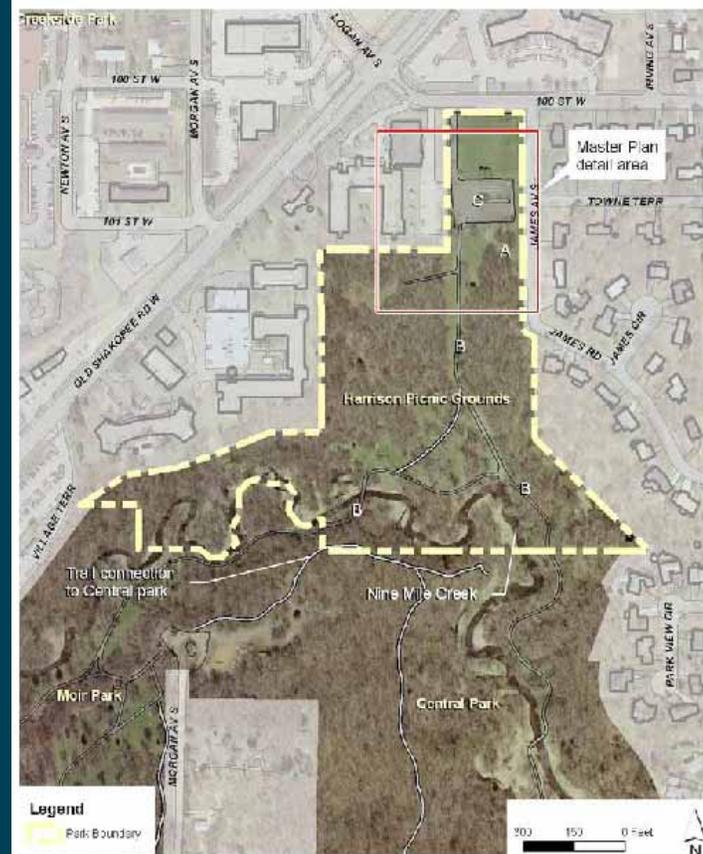
Planned Features & Improvements:

- Replace playground equipment in 2009 with swings and small play structure
- Additional shade trees
- New picnic shelter with exterior access timer locks.
- Security lights near parking lot

Accessibility recommendations:

- Parking lot striping & signage
- Accessible path to the accessible picnic table
- Provide sign at trail head indicating level of accessibility of trails
- Provide accessible surfacing under picnic tables
- Modify walkway to hilltop picnic with grades less than 5%

Harrison Picnic Grounds Existing Conditions





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DESIGN GOALS

- Demonstrate infiltration technology –
Public Education
- Reduce runoff volume
- Reduce peak flows
- Improve water quality
- Groundwater recharge



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DESIGN GOALS

- Improve creek base flow
- Provide cooling effect
- Reduce de-icing salt/sand use
- Bind heavy metals and other pollutants
- Reduce erosion along path
- 90% Reduction of annual runoff



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Other Preliminary Work

- Soil boring - granular fill, compacted
- Existing Utilities – storm sewer
- Other City Departments
Park & Rec – programming
Planning – meet City standards

Project No. 3193374		LOG OF BOREHOLE NO. B1		Sheet 1 of 1		
CITY OF Bloomington, Minnesota		ARCHITECT/ENGINEER				
SITE		PROJECT				
Bloomington, Minnesota N411211.2747, E621151.0895		Harrison Park				
DEPTH (FT.)	GRAPHIC LOG	DEPTH BY MEASURE IN FEET	NUMBER	TYPE	TESTS	
					WATER % RECOVERED K. DRIVEN	MOISTURE % DRY DENSITY SPT SHELL CORRECTION
Surface Elev.: 805.0 ft.						
1.0	FILL, silty sand with gravel, dark brown, frozen. 2" of bituminous at the surface	804.0	1	GS	15	
3.0	FILL, sand, brown, frozen	802.0	2	GS	15	
4.0	FILL, SAND, fine grained, brown, frozen to 4" then moist, dense to medium dense (SP) (Coarse Alluvium)	798.0	2	SS	16	
7.0	SAND with a little gravel, fine to medium grained, brown, moist, very loose to loose (SP) (Coarse Alluvium)	794.0	3	SS	18	
11.0	End of Boring	790.0	5	SS	18	

WATER LEVEL OBSERVATIONS		Stark Twin City Testing 682 Cromwell Ave. St. Paul, MN 55114 Telephone: 651-645-3801 Fax: 651-659-7348	STARTED	3/11/08	FINISHED	3/11/08
Name			DRILL CO.	Stark TCT	DRILL. PIC	357
		DRILLER	T. Aldrich	ASS. DRILLER	HH	
		LOGGED BY	APPROVED			



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GRADING

- 5% Slope is on steep side
- Benched grading at 1' intervals
- Minimize equipment compaction
- Non-woven fabric under recharge bed
- 18-24" (2") Crushed Granite, 40% voids
- 2" (3/8") Crushed Granite, paving surface

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GRADING



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GRADING



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GRADING





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CONCRETE CURB & GUTTER



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CONCRETE CURB & GUTTER

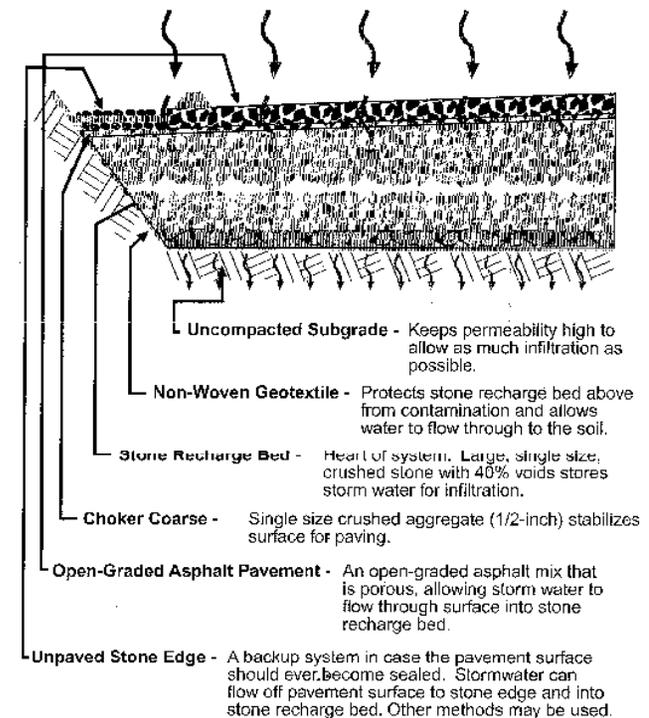


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PERVIOUS ASPHALT PAVEMENT

- MnDOT Guidance Manual
- Ramsey Washington Metro Watershed District project
- Materials – availability
- Minimal compaction

Innovative Stormwater Management POROUS ASPHALT PAVEMENT with Subsurface Recharge Bed





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PAVING PERVIOUS ASPHALT



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PAVING PERVIOUS ASPHALT





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PAVING PERVIOUS ASPHALT- MINIMAL COMPACTION



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PAVING PERVIOUS ASPHALT- ROLLER MARKS



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PAVING PERVIOUS ASPHALT- STRIPING



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RAIN GARDENS

- Complimentary Infiltration Technique - Education
- Natural materials and plantings
- Unique drainage characteristics
- Parking Median – tolerates drier conditions
- Shared Park/Apartments – tolerates wetter conditions
- Sized to fit space allowed, not drainage area
- Protect new pavement



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RAIN GARDENS



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RAIN GARDENS



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RAIN GARDENS



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RAIN GARDENS





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INFILTRATION TEST - 250 GALLONS



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INFILTRATION – IMPERVIOUS TO PERVIOUS



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MAINTENANCE

- What do we preserve it? Keep it clean; dirt, LEAVES, grass, no stockpiles
- Sweeping - fall & spring w/ vacuum sweeper, contract or own ?
- Plowing – Yes, with regular equipment
- Deicing - no salt or sand in lot, only on driveway (see picture coming up)
- Mowing – blow clippings towards grass, not into the lot

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MAINTENANCE / WINTER SAFETY

Harrison Park



Woodland Apts





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MAINTENANCE ISSUES

- Plows scraped irregular surface, lost some aggregate
- Surface oxidation –can it be sealed?
- Will voids plug up? Some say 15-20 years.
- Will median rain garden get enough water?
- Sweeping – twice a year is minimum, City will upgrade next sweeper purchase, improve timing and frequency



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Communicate with Maintenance Staff – Handout and Training

Anticipated Yearly Parking Lot Maintenance

Fall - Sweep lot with vacuum type sweeper, best after leaves have dropped. Contract this service.

Winter - Plow snow only. DO NOT APPLY SALT OR SAND. The snow will melt during sunny conditions and drain into the pavement. Other northern locations have reported excellent performance with minimal icy conditions. The open pores of the asphalt do not clog up with ice when plowed of most surface snow. The underlying crushed rock drainage bed, with 40% voids, allows for freezing water without heaving or buckling. The center island is designed for snow storage, but the plants are young this season, and plowing to the perimeter would be preferred this season. A small street sign reminding staff of not salting or sanding is planned at the entrance.

Spring - Sweep lot with vacuum type sweeper, after snow melt to remove winter debris.

Summer - Pick up trash and debris, as needed. Minimize heavy vehicle loading. Avoid any contamination of the pavement by construction or landscaping debris. No stockpiling of materials. When mowing the perimeter grass avoid blowing clippings into parking lot. Use leaf blowers to clean pavement of clippings or light debris. Any inadvertent contamination should be removed by a vacuum type sweeper before a rain storm.

Long Term Pavement Maintenance - There are no current recommended practices. Engineering will be monitoring the pavement performance, and reviewing other agency maintenance practices. One local porous asphalt parking lot is in its 3rd season, and is still performing well, but has a salt and pepper look since the asphalt is wearing off the surface aggregate. Fog sealing the surface may be one practical method. Chip sealing or other sealers must be avoided to maintain the permeability. Engineering will continue to review current information on long-term maintenance practices from MnDOT and pavement organizations. The pavement is anticipated to be functionally permeable for 10-15 years, with proper maintenance,

Maintenance Practices Review – Engineering is considering plans to monitor the storm sewer at the southwest corner of the lot for flow conditions and water quality. A 90 % reduction of runoff, on annual basis, is anticipated. Results of testing with a flush truck were dramatic; dumping approximately 250 gallons resulted in immediate infiltration. Maintenance staff is encouraged to give feedback on practices, problems, public contacts, etc.

Contacts – Steve Segar, x4533
Derek Cable, x4987

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Observations

Feb. 9, 2009

Feb. 19, 2009



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Observations – August 19, 2009

2" event, ½" in 15 min. @ photo

Harrison Park

Woodland Apts.



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Observations – August 19, 2009
2" event, ½" in 15 min. @ photo



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Observations – October 6, 2009

Rainy Day Pictures – Plugging at top or bottom?





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WHAT ELSE...

- Cost: \$8-10/SF for pervious pavement
- \$4-7/SF for dense graded asphalt
- Extra excavation
- Aggregate materials – recycle products?
- Unique bituminous mix
- Construction logistics
- Reduced storm sewer infrastructure



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OTHER PROJECTS

- Looking at other regional locations as defined in Nondegradation Plan, parks and other city property, parking strips, retrofit?
- PW east employee lot, permeable concrete?
- Penn/American – private development
- Other infiltrations techniques – vegetated strips, basins and underground storage systems



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THANKS TO:

Bloomington City Council, Mayor and City
Manager – direction, approved budget &
project

Bloomington Public Works

- Derek Cable, design and inspection
- Dave Gunderson, inspection
- Dave Hanson, rain garden plantings



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THANKS TO:

Veit and Co. – Prime Contractor

- Jeff Purcell - Grading foreman

Bituminous Roadways, Inc. – Paving & Mat'l Supplier

- Ron Pechia – Paving superintendent

Curb Masters, Inc.

Applied Ecological Services

- Matt Lasch, Chris Raebel – Rain gardens

Earthwizards

- Stacy Anderson – Design assistance



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QUESTIONS?

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