Appendix

Minnesota Pollution Control Agency

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Permit No. MN 0061263

September 28, 2011

Budget	2010	2011	2012	2013	2014	2015
Storm Sewer & Flood Control Projects						
Stormwater Quality Improvements	$180,000	$765,000	$775,000	$775,000	$775,000	$775,000
Storm Sewer Tunnel Rehabilitation	$2,600,000	$4,050,000	$2,500,000	$2,000,000	$2,000,000	$2,000,000
	$2,780,000	**$4,815,000**	**$3,275,000**	**$2,775,000**	**$2,775,000**	**$2,775,000**
Storm Sewer Maintenance						
Storm Sewer Inspection, Maintenance & Repair	$293,304	$299,170	$305,153	$311,257	$317,482	$323,831
Pond Inspection & Maintenance	$12,028	$12,269	$12,514	$12,764	$13,019	$13,280
Pond Timber removal & grass cutting	$130,000	$132,600	$135,252	$137,957	$140,716	$143,531
Catch Basin Inpsection, Cleaning & Repair	$620,399	$632,807	$645,463	$658,372	$671,540	$684,971
	$1,055,731	**$1,076,846**	**$1,098,383**	**$1,120,350**	**$1,142,757**	**$1,165,612**
Street Maintenance						
Street Sweeping	$2,316,765	$2,363,100	$2,410,362	$2,458,570	$2,507,741	$2,557,896
Trash Receptacle Pickup	$307,940	$314,099	$320,381	$326,788	$333,324	$339,991
Neighborhood Cleanup	$121,678	$124,112	$126,594	$129,126	$131,708	$134,342
	$2,746,383	**$2,801,311**	**$2,857,337**	**$2,914,484**	**$2,972,773**	**$3,032,229**
Public Education Program	**$61,800**	**$63,036**	**$64,297**	**$65,583**	**$66,894**	**$68,232**
Storm drain stenciling contract						
Doorhangers						
Metro Clean Water Campaign						
Storm Sewer System Charge Mailer						
Total Budget	**$6,643,914**	**$8,756,192**	**$7,295,016**	**$6,875,416**	**$6,957,425**	**$7,041,073**

2% used for annual inflation

2010 Outfall Inspection Summary

Date	Receiving Water	Outfall #	Outfall Name	Narrative
10/2010	Miss. R.	010	Eustis	No maintenance required.
10/2010	Miss. R.	020	Lotus (Pelham)	Last 10 ft of structure separating.
10/2010	Miss. R.	030	Marshall	Chute deteriorating. Needs riprap.
10/2010	Miss. R.	040	West Kittsondale	No maintenance required.
10/2010	Miss. R.	050	Otis	Debris in invert, left wing of outlet damaged.
10/2010	Miss. R.	060	Portland Ave	6 ft of bottom gone, undermining.
10/2010	Miss. R.	070	Summit	No maintenance required.
10/2010	Miss. R.	080	Goodrich	No maintenance required.
10/2010	Miss. R.	090	Princeton	No maintenance required.
10/2010	Miss. R.	095	Berkeley	Rebar exposed on left side, missing left wing.
10/2010	Miss. R.	100	Jefferson	No maintenance required.
10/2010	Miss. R.	110	Randolph	Undermining right side of main structure, about 1ft.
10/2010	Miss. R.	115	Hartford	No maintenance required.
10/2010	Miss. R.	120	Scheffer	No maintenance required.
10/2010	Miss. R.	130	Highland	8 ft of bottom gone, undermining.
10/2010	Miss. R.	135	Hidden Falls	Submerged, wire exposed on left side.
10/2010	Miss. R.	140	Sheridan	No maintenance required.
10/2010	Miss. R.	145	West 7th (MnDOT)	No maintenance required.
10/2010	Miss. R.	150	Davern	No maintenance required.
10/2010	Miss. R.	151	Watergate Marina	No maintenance required.
10/2010	Miss. R.	156	Elway	No maintenance required.
10/2010	Miss. R.	158	Elway	No maintenance required.
10/2010	Miss. R.	160	Otto	No maintenance required.

Date	Receiving Water	Outfall #	Outfall Name	Narrative
10/2010	Miss. R.	170	Bay	Rebar exposed on top.
10/2010	Miss. R.	180	Sumac	No maintenance required.
10/2010	Miss. R.	190	Drake	No maintenance required.
10/2010	Miss. R.	195	Fountain Cave	Undermined, needs riprap.
10/2010	Miss. R.	200	Richmond	No maintenance required.
10/2010	Miss. R.	201	Richmond	No maintenance required.
10/2010	Miss. R.	206	Western	No maintenance required.
10/2010	Miss. R.	210	Smith	New riprap added from Smith to Market.
10/2010	Miss. R.		Centex North	No maintenance required.
10/2010	Miss. R.		Centex South	No maintenance required.
10/2010	Miss. R.	220	Sherman	No maintenance required.
10/2010	Miss. R.	230	Chestnut	No maintenance required.
10/2010	Miss. R.	240	Eagle	No maintenance required.
10/2010	Miss. R.	260	Market	No maintenance required.
10/2010	Miss. R.	270	St. Peter	No maintenance required.
10/2010	Miss. R.	280	Cedar	Submerged, no maintenance required.
10/2010	Miss. R.	290	Minnesota	Submerged, no maintenance required.
10/2010	Miss. R.	295	Robert	No maintenance required.
10/2010	Miss. R.	300	Jackson	No maintenance required.
10/2010	Miss. R.	310	Sibley	No flap, deteriorating on right side.
10/2010	Miss. R.	320	Broadway	Rebar exposed at water line.
10/2010	Miss. R.	325	Troutbrook	No maintenance required.
10/2010	Miss. R.	330	Phalen Creek	Wings cracked on both sides.
10/2010	Miss. R.	340	Urban	Left wing broke, right is cracked.

Date	Receiving Water	Outfall #	Outfall Name	Narrative
10/2010	Miss. R.	343	Warner and Childs	No maintenance required.
10/2010	Miss. R.	346	Warner and Childs	No maintenance required.
10/2010	Miss. R.	350	Beltline (RWMWD)	No maintenance required.
10/2010	Miss. R.	360	Battle Creek	No maintenance required.
10/2010	Miss. R.	365	Wyoming	Did not locate.
10/2010	Miss. R.	380	Page and Barge Ch Rd	No maintenance required.
10/2010	Miss. R.	385	Concord (MnDOT)	Rerouted in 2006.
10/2010	Miss. R.	387	Concord	New in 2006.
10/2010	Miss. R.	390	Robie	Rerouted in 2006.
10/2010	Miss. R.	400	Airport	No maintenance required.
10/2010	Miss. R.	405	Chester St	No maintenance required.
10/2010	Miss. R.	407	Eva St	No maintenance required.
10/2010	Miss. R.	410	Custer St	No maintenance required.
10/2010	Miss. R.	420	Moses St	No maintenance required.
10/2010	Miss. R.	430	Belle	No maintenance required.
10/2010	Miss. R.	440	Riverview	Right wing hit, debris.
10/2010	Miss. R.	460	Chippewa and Baker	No maintenance required.
10/2010	Crosby	152	Springfield	No maintenance required.
10/2010	Crosby	153	Rankin	End of outlet bell fell off. Bank eroding.
10/2010	Crosby	154	Homer	Bank is eroding.
10/2010	Crosby	155	Leland	5 to 6 inch gap around outlet pipe.
10/2010	Highwood	790	Springside Drive	No maintenance required.
10/2010	Highwood	791	Highwood	Needs rip rap. Starting to undermine.

City of Saint Paul

Cost of Work performed on storm pond assets

Search Parameters

Start Date: 01/01/2010
End Date: 12/31/2010

Results

Asset Id	Description	Service Request No	Created	Problem Description	Amount
0495610	Stormwater Pond - Arlington / Arkwright	1016786	05/28/2010	SECURE MTCE ROAD GATE.	41.73
0495610	Stormwater Pond - Arlington / Arkwright	1017724	06/08/2010	CLEAN POND INLETS & OUTLETS	42.19
0495610	Stormwater Pond - Arlington / Arkwright	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495610	Stormwater Pond - Arlington / Arkwright	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495610	Stormwater Pond - Arlington / Arkwright	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495610	0495610				388.12
0495611	Stormwater Pond - Arlington / Jackson	1012151	04/21/2010	CLEAN GRATE AT POND	119.14
0495611	Stormwater Pond - Arlington / Jackson	1017725	06/08/2010	CLEAN POND INLETS & OUTLETS	409.49
0495611	Stormwater Pond - Arlington / Jackson	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495611	Stormwater Pond - Arlington / Jackson	1021978	07/16/2010	CLEAN POND INLETS & OUTLETS	251.11
0495611	Stormwater Pond - Arlington / Jackson	1022169	07/19/2010	CLEAN POND INLETS & OUTLETS	424.48
0495611	0495611				1287.94
0495612	Stormwater Pond - Atwater / Western	1004010	02/10/2010	FENCE DAMAGED AT WESTERN POND	220.65
0495612	Stormwater Pond - Atwater / Western	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495612	Stormwater Pond - Atwater / Western	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40

0495612	Stormwater Pond - Atwater / Western	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495612	0495612				524.85
0495613	Stormwater Pond - Benson / Springfield	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495613	Stormwater Pond - Benson / Springfield	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495613	0495613				220.48
0495614	Stormwater Pond - Birmingham / Minnehaha	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495614	Stormwater Pond - Birmingham / Minnehaha	1032366	10/12/2010	REPAIR FENCE	171.05
0495614	0495614				254.77
0495615	Stormwater Pond - Birmingham / York	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495615	0495615				83.72
0495616	Stormwater Pond - Burg / E of Stinchfield	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495616	Stormwater Pond - Burg / E of Stinchfield	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495616	Stormwater Pond - Burg / E of Stinchfield	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495616	0495616				304.20
0495617	Stormwater Pond - Bush / Desoto	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495617	0495617				83.72
0495618	Stormwater Pond - Crosby Business Park	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495618	Stormwater Pond - Crosby Business Park	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495618	Stormwater Pond - Crosby Business Park	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495618	0495618				304.20
0495619	Stormwater Pond - Crosby Outlets	1020065	06/29/2010	REMOVE DEBRIS FROM OUTLET - NEED BACKHOE.	271.24
0495619	0495619				271.24
0495620	Stormwater Pond - Etna / Third	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72

0495620	0495620				83.72
0495621	Stormwater Pond - Fairview North	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495621	Stormwater Pond - Fairview North	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495621	Stormwater Pond - Fairview North	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495621	0495621				304.20
0495622	Stormwater Pond - Flandrau Case	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495622	0495622				83.72
0495623	Stormwater Pond - Furness Pkwy / Hoyt	1017730	06/08/2010	CLEAN GRATES	149.84
0495623	Stormwater Pond - Furness Pkwy / Hoyt	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495623	Stormwater Pond - Furness Pkwy / Hoyt	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495623	0495623				370.32
0495624	Stormwater Pond - Hazel / Nokomis	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495624	Stormwater Pond - Hazel / Nokomis	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495624	Stormwater Pond - Hazel / Nokomis	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495624	0495624				304.20
0495625	Stormwater Pond - Hazel / Ross	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495625	Stormwater Pond - Hazel / Ross	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495625	Stormwater Pond - Hazel / Ross	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495625	0495625				304.20
0495626	Stormwater Pond - High Bridge - East	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495626	Stormwater Pond - High Bridge - East	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495626	Stormwater Pond - High Bridge - East	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495626	0495626				304.20
0495627	Stormwater Pond - High Bridge - West	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495627	Stormwater Pond - High Bridge - West	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495627	Stormwater Pond - High Bridge - West	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08

0495627	0495627				304.20
0495628	Stormwater Pond - Hillcrest Knoll	1001822	01/21/2010	PICK UP MATTRESS SITTING ON FLANDRAU ARCHED ENTRY WAY.	50.48
0495628	Stormwater Pond - Hillcrest Knoll	1017729	06/08/2010	CLEAN GRATES	176.88
0495628	Stormwater Pond - Hillcrest Knoll	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495628	Stormwater Pond - Hillcrest Knoll	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495628	0495628				447.84
0495629	Stormwater Pond - Hunting Valley / Doswell	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495629	Stormwater Pond - Hunting Valley / Doswell	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495629	Stormwater Pond - Hunting Valley / Doswell	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495629	0495629				304.20
0495630	Stormwater Pond - Phalen Blvd / Burr - East	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495630	0495630				83.72
0495631	Stormwater Pond - Phalen Blvd / Burr - West	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495631	0495631				83.72
0495632	Stormwater Pond - Phalen Blvd / Earl	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495632	0495632				83.72
0495634	Stormwater Pond - Phalen Blvd / Johnson Pkwy	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495634	0495634				83.72
0495636	Stormwater Pond - Pleasant / View	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495636	Stormwater Pond - Pleasant / View	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495636	0495636				220.48
0495637	Stormwater Pond - Puchreiter Pond	1012153	04/21/2010	CLEAN GRATES	119.14
0495637	Stormwater Pond - Puchreiter Pond	1017728	06/08/2010	CLEAN GRATES	584.21

0495637	Stormwater Pond - Puchreiter Pond	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495637	Stormwater Pond - Puchreiter Pond	1022002	07/16/2010	CLEAN	552.44
0495637	Stormwater Pond - Puchreiter Pond	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495637	Stormwater Pond - Puchreiter Pond	1027923	09/03/2010	CLEAN GRATES	89.88
0495637	Stormwater Pond - Puchreiter Pond	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495637	Stormwater Pond - Puchreiter Pond	1030190	09/24/2010	TRAPPED DEER INSIDE OF POND AREA.	183.44
0495637	0495637				1833.31
0495638	Stormwater Pond - Sims / Agate	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495638	Stormwater Pond - Sims / Agate	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495638	Stormwater Pond - Sims / Agate	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495638	0495638				304.20
0495639	Stormwater Pond - Sylvan / Acker	1011959	04/20/2010	MATTRESS DUMPED NEAR EAST ENTRANCE GATE.	39.72
0495639	Stormwater Pond - Sylvan / Acker	1018265	06/14/2010	REPAIR FENCE AT POND	79.97
0495639	Stormwater Pond - Sylvan / Acker	1020082	06/29/2010	MEET XCEL ENERGY AND OPEN GATE FOR TOWER INSPECTION. THURSDAY, 7/1/10 @ 730AM	99.88
0495639	Stormwater Pond - Sylvan / Acker	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495639	Stormwater Pond - Sylvan / Acker	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495639	Stormwater Pond - Sylvan / Acker	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495639	0495639				523.77
0495640	Stormwater Pond - Terrace Ct / Whitall	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495640	Stormwater Pond - Terrace Ct / Whitall	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495640	Stormwater Pond - Terrace Ct / Whitall	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495640	0495640				304.20
0495641	Stormwater Pond - Westminster / Mississippi	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72

0495641	Stormwater Pond - Westminster / Mississippi	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495641	Stormwater Pond - Westminster / Mississippi	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495641	0495641				304.20
0495642	Stormwater Pond - Wheelock Pkwy - Lower	1017731	06/08/2010	UPPER & LOWER----CLEAN POND INLETS & OUTLETS	74.92
0495642	Stormwater Pond - Wheelock Pkwy - Lower	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495642	Stormwater Pond - Wheelock Pkwy - Lower	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495642	Stormwater Pond - Wheelock Pkwy - Lower	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495642	0495642				379.12
0495643	Stormwater Pond - Wheelock Pkwy - Upper	1017731	06/08/2010	UPPER & LOWER----CLEAN POND INLETS & OUTLETS	74.92
0495643	Stormwater Pond - Wheelock Pkwy - Upper	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495643	Stormwater Pond - Wheelock Pkwy - Upper	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495643	Stormwater Pond - Wheelock Pkwy - Upper	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495643	0495643				379.12
0495644	Stormwater Pond - Wildview / Lenox	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495644	Stormwater Pond - Wildview / Lenox	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495644	Stormwater Pond - Wildview / Lenox	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08
0495644	0495644				304.20
0495645	Stormwater Pond - Willow Reserve	1020098	06/29/2010	INSPECT AND CLEAN PONDS	83.72
0495645	Stormwater Pond - Willow Reserve	1025053	08/11/2010	INSPECT AND CLEAN PONDS	86.40
0495645	Stormwater Pond - Willow Reserve	1030032	09/23/2010	INSPECT AND CLEAN PONDS	134.08

0495645	0495645			304.20
0496004	Stormwater Pond - Highwood / Oak Bluff	1020098	06/29/2010 INSPECT AND CLEAN PONDS	86.24
0496004	Stormwater Pond - Highwood / Oak Bluff	1025053	08/11/2010 INSPECT AND CLEAN PONDS	84.74
0496004	Stormwater Pond - Highwood / Oak Bluff	1030032	09/23/2010 INSPECT AND CLEAN PONDS	131.51
0496004	0496004			302.49
	Grand Total			12028.32

Number Of Rows: 136

View as Excel
Printed On: 08/23/2011

City of Saint Paul

Storm Sewers Inspected by Date and Associated Costs

Search Parameters

Start Date: 01/01/2010

End Date: 12/31/2010

Results

Service Request No	Finished Date	Problem Code	Street	Cross Street	Feet Of Sewer Inspected	Associated Cost
Total Miles:	12.17			Total Feet:	64234	143494.31
0910609	01/12/2010	S-ITV	GROVE ST	MISSISSIPPI ST	2470	4318.74
1001291	01/19/2010	S-ITV	1981 YORKSHIRE CT	PRIOR AVE	363	383.76
0931116	01/20/2010	S-ITV	MOSES ST	WATER ST	444	1155.10
1000894	01/20/2010	S-ITV	CLARENCE ST	HOYT AVE	336	959.40
0910613	01/21/2010	S-ITV	11TH AVE	MINNESOTA ST	1312	1535.04
1002578	01/27/2010	S-ITV	1652 GURNEY ST	LARPENTEUR AVE	293	1740.98
1004515	02/16/2010	S-ITV	101 MANITOBA AVE	PARK ST	279	384.88
1004736	02/18/2010	S-ITV	1686 LEONE AVE	KENNARD ST	574	1535.04
1004985	02/24/2010	S-ITV	KANSAS AVE	ANNAPOLIS ST	613	479.70
0910607	02/25/2010	S-ITV	BALSAM ST	BROADWAY ST	564	1822.87
0910617	02/25/2010	S-ITV	SPRUCE ST	BROADWAY ST	214	287.84
1005996	03/03/2010	S-ITV	1244 VIRGINIA ST	ORANGE AVE	808	1806.39
0910707	03/08/2010	S-CTVPREP	9TH ST	EXCHANGE ST	293	2668.13
1006935	03/15/2010	S-IHOLE	1514 WESTERN AVE	NEBRASKA AVE	220	2715.18
1007232	03/15/2010	S-ITV	2155 SUBURBAN AVE	WINTHROP ST	217	575.64
1007441	03/16/2010	S-ITV	101 MCKNIGHT RD	LARRY HO DR	384	959.40
1007492	03/16/2010	S-ITV	862 CHARLES AVE	MILTON ST	217	575.64
1008350	03/24/2010	S-IHOLE	1826 SHERWOOD	WHITE BEAR AVE	238	960.98

			AVE			
1008502	03/25/2010	S-IHOLE	955 WOODBRIDGE ST	FRONT AVE	181	959.40
0839701	03/30/2010	S-ITV	SHERMAN ST	7TH ST	1065	1107.09
0905164	03/30/2010	S-CTVPREP	UNIVERSITY AVE	ROBERT ST	650	7239.22
0910704	03/30/2010	S-ITV	10TH ST	JACKSON ST	1264	2110.68
1010154	04/06/2010	S-IHOLE	7TH ST	FOREST ST	229	577.32
1010215	04/07/2010	S-ITV	836 PRIOR AVE	HEWITT AVE	230	575.64
1010820	04/12/2010	S-ITV	2247 5TH ST	MCKNIGHT RD	309	767.53
1010843	04/12/2010	S-ITV	2388 DOSWELL AVE	BROMPTON ST	181	383.76
1010906	04/13/2010	S-ITV	726 COTTAGE AVE	GREENBRIER ST	195	383.76
1011082	04/14/2010	S-IHOLE	890 BURR ST	YORK AVE	329	767.53
1011356	04/15/2010	S-ITV	1756 SAUNDERS AVE	DAVERN ST	167	575.64
1011456	04/16/2010	S-ITV	1926 NORFOLK AVE	PRIOR AVE	217	671.59
1011589	04/16/2010	S-CJET	CENTRAL AVE	OXFORD ST	50	2421.41
1011606	04/19/2010	S-IHOLE	1533 IVY AVE	HAZELWOOD ST	297	287.84
1012006	04/20/2010	S-ITV	HARRIET ISLAND PAVILLION		439	479.70
1012070	04/21/2010	S-IHOLE	MARSHALL AVE	ST ALBANS ST	328	479.71
1012181	04/21/2010	S-IHOLE	2167 PINEHURST AVE	CRETIN AVE	220	383.76
1012350	04/22/2010	S-IHOLE	123 GERANIUM AVE	JACKSON ST	144	287.84
1011321	04/26/2010	S-ITV	MARION ST	EDMUND AVE	183	960.98
1012856	04/28/2010	S-ITV	721 SNELLING AVE	HIGHLAND PKWY	293	959.40
1013224	04/29/2010	S-IHOLE	EDMUND AVE	MARION ST	280	383.76
1001918	04/30/2010	S-CLIST	6TH ST	ETNA ST	69	223.53
1012751	05/11/2010	S-ITV	CHELTON AVE	PRIOR AVE	1268	1055.34
1014775	05/12/2010	S-ITV	RICE ST	COTTAGE AVE	289	287.84
1015073	05/14/2010	S-ISTR	KENNY RD	PAYNE AVE	35	481.14
1015531	05/19/2010	S-IHOLE	647 THOMAS AVE	DALE ST	219	575.64
1015690	05/20/2010	S-IHOLE	1128 4TH ST	HANCOCK ST	67	479.71

1015714	05/20/2010	S-ITV	GRAND AVE	LEXINGTON AVE	192	575.64
1015713	05/21/2010	S-ITV	LEXINGTON AVE	GRAND AVE	809	2919.61
1015820	05/21/2010	S-IHOLE	WESTERN AVE	MARYLAND AVE	609	287.82
1015935	05/24/2010	S-IHOLE	FRANK ST	REANEY AVE	300	479.71
1015963	05/24/2010	S-IHOLE	1729 JULIET AVE	DAVERN ST	216	383.76
1015770	05/25/2010	S-IHOLE	EUSTIS ST	#280 OFF RAMP	279	767.53
1016072	05/25/2010	S-ITV	961 GRAND AVE	CHATSWORTH ST	80	671.59
1015788	05/26/2010	S-ITV	725 STATE ST	ROBERT ST	425	863.48
1015710	05/27/2010	S-IHOLE	YORK AVE	BARCLAY ST	193	769.12
1016788	05/28/2010	S-CTVPREP	6 WINONA ST	HALL - LIVINGSTON	271	575.64
1017048	06/02/2010	S-ITV	4TH ST	WALL ST	185	479.71
1017415	06/04/2010	S-ITV	1412 7TH ST	BIRMINGHAM	120	575.64
1018479	06/15/2010	S-ITV	1235 ALAMEDA ST	ORANGE AVE	401	577.32
1018460	06/16/2010	S-IHOLE	1440 SHERBURNE AVE	PASCAL ST	220	577.32
1018726	06/18/2010	S-IHOLE	VICTORIA ST	MARSHALL AVE	200	481.12
1019043	06/22/2010	S-IHOLE	1978 NOKOMIS AVE	IROQUOIS AVE	235	384.88
1019269	06/24/2010	S-ISTR	971 MCLEAN AVE	CYPRESS ST	220	192.44
1019672	06/28/2010	S-IHOLE	286 CONGRESS ST	BANCROFT AVE	149	689.76
1019789	06/28/2010	S-IHOLE	80 JESSAMINE AVE	PARK	193	481.12
1019835	06/29/2010	S-ISTR	2040 GRAND AVE	CLEVELAND AVE	439	144.35
1019855	06/29/2010	S-IHOLE	1965 LINCOLN AVE		1076	240.56
1019823	06/30/2010	S-ISTR	IRVINE AVE	SUMMIT AVE	787	1154.65
1019954	06/30/2010	S-IHOLE	1601 ENGLISH ST	HOYT AVE	220	577.32
1019780	07/01/2010	S-ITV	1829 FAIRMOUNT AVE	FAIRVIEW AVE IN THE ALLEY	425	519.19
1020276	07/01/2010	S-IHOLE	940 EARL ST	CASE AVE	164	384.88
1020330	07/06/2010	S-IHOLE	ARCH ST	WALES ST	315	752.38

1020626	07/06/2010	S-IHOLE	1084 ST CLAIR AVE	LEXINGTON AVE	203	384.88
1020854	07/08/2010	S-IHOLE	1377 RANDOLPH AVE	ALBERT ST	313	769.76
1002464	07/09/2010	S-ITV	5TH ST	CEDAR ST	752	1730.29
1018478	07/09/2010	S-ITV	GRAND AVE	LEXINGTON AVE	6932	24364.43
1021154	07/09/2010	S-IHOLE	28 JESSAMINE AVE	SYLVAN ST	216	577.32
1021408	07/13/2010	S-IHOLE	ST ALBANS ST	MARSHALL AVE	204	129.69
1021545	07/14/2010	S-ITV	1360 GROTTO ST	COTTAGE AVE	316	384.88
1021989	07/16/2010	S-IHOLE	77 MILTON ST	ASHLAND AVE	194	96.22
1022083	07/20/2010	S-IHOLE	382 LAFOND AVE	WESTERN AVE	331	1060.09
1023175	07/27/2010	S-IHOLE	CURTICE ST	ROBERT ST	220	478.64
1023259	07/28/2010	S-IHOLE	444 HOWARD ST	WILSON AVE	557	287.82
1024279	08/06/2010	S-IHOLE	COTTAGE AVE	FARRINGTON ST	181	294.73
1024300	08/06/2010	S-IHOLE	837 FULLER AVE	VICTORIA ST	326	491.19
1024385	08/09/2010	S-ITV	BENSON AVE	HOMER ST	190	392.94
1024272	08/11/2010	S-ITV	1473 IDAHO AVE	BARCLAY ST	330	396.13
1024559	08/11/2010	S-RREPAIR	904 SHERBURNE AVE	MILTON ST	253	3796.13
1024786	08/11/2010	S-IHOLE	761 HOWELL ST	CHELTON AVE	264	294.73
1025375	08/16/2010	S-IHOLE	GALTIER ST	MARYLAND AVE	80	491.19
1024303	08/17/2010	S-ITV	GRAND AVE	LEXINGTON AVE	12153	25300.14
1025630	08/17/2010	S-IHOLE	457 CURTICE ST	WATERLOO ST	220	589.42
1025714	08/24/2010	S-ISTR	MACKUBIN ST	HOLLY AVE	184	384.88
1026568	08/25/2010	S-ITV	855 CENTRAL AVE	VICTORIA ST	194	648.59
1027078	08/27/2010	S-IHOLE	SCHEFFER AVE	DAVERN ST	150	599.60
1026952	08/30/2010	S-ITV	1596 MINNEHAHA AVE	GERMAIN ST	60	245.60
1003289	09/02/2010	S-CLIST	JENKS AVE	FRANK ST	589	335.32
1003291	09/03/2010	S-CLIST	CASE AVE	FRANK ST	567	335.32

1028290	09/09/2010	S-ITV	35 MAGNOLIA AVE		468	129.69
1028879	09/14/2010	S-ITV	EXCHANGE ST	ELM ST	110	129.69
1028880	09/14/2010	S-ITV	679 WATSON AVE	OSCEOLA AVE	165	216.12
1028571	09/15/2010	S-ITV	2003 IGLEHART AVE	WILDER ST	416	217.51
1029214	09/24/2010	S-IHOLE	STILLWATER AVE	VAN DYKE ST	206	345.77
1030195	09/28/2010	S-ITV	2006 HAWTHORNE AVE	RUTH ST	217	216.12
1030716	10/01/2010	S-ITV	922 CLARK ST	YORK AVE	350	172.88
1030449	10/05/2010	S-IHOLE	COMO AVE	MARION ST	10	172.88
1031358	10/05/2010	S-IHOLE	1044 ST CLAIR AVE	OXFORD ST	230	216.12
1029186	10/06/2010	S-IHOLE	1864 STILLWATER AVE	VAN DYKE ST	309	425.53
1030985	10/12/2010	S-ITV	BUSH AVE	MENDOTA ST	787	1430.36
1033414	10/27/2010	S-ITV	9TH ST	JACKSON ST	644	734.70
0910705	11/03/2010	S-ITV	9TH ST	EXCHANGE ST	3167	3358.30
1035205	11/04/2010	S-IHOLE	1010 PAYNE AVE	LAWSON AVE	498	439.81
1002478	11/05/2010	S-ITV	4TH ST	JOHN ST	595	432.21
1037024	11/15/2010	S-ITV	365 WHEELOCK PKWY	HOYT AVE	302	259.32
1037715	11/19/2010	S-ITV	434 MISS RIVER BLVD	RANDOLPH AVE	260	300.59
1002489	12/09/2010	S-ITV	PARK ST	EMPIRE DR	1356	1160.07
1040132	12/09/2010	S-ITV	271 BURNS AVE	ETNA ST	215	259.32
1040155	12/10/2010	S-ITV	1523 CLARENCE ST	NEBRASKA AVE	52	217.51
1041396	12/28/2010	S-ITV	1176 COOK AVE	DULUTH ST	138	561.89

Number Of Rows: 119

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City of Saint Paul

Storm Manholes Inspected by Date and Associated Costs

Search Parameters

Start Date: 01/01/2010

End Date: 12/31/2010

Results

Service Request No	Finished Date	Problem Code	Street	Cross Street	Man Hole Count	Associated Cost
Total					25	6715.44
1011891	04/20/2010	S-IHOLE	121 MCKNIGHT RD	94	1	191.88
1015074	05/14/2010	S-ISTR	VARIOUS		1	9.77
1001205	06/21/2010	S-CLIST	MISS RIVER BLVD	EUSTIS ST	1	111.78
1021139	07/09/2010	S-IHOLE	1651 MARSHALL	FRY ST	1	91.66
1021188	07/09/2010	S-ISTR	PAYNE AVE	BEAUMONT ST	1	39.71
1022955	07/26/2010	S-IHOLE	1909 JAMES AVE	HOWELL ST	1	99.70
1024390	08/06/2010	S-IHOLE	MOUNDS BLVD	3RD ST	1	79.41
1024871	08/11/2010	S-ISTR	1154 MONTANA AVE	DUNLAP ST	1	27.98
1027131	08/30/2010	S-IHOLE	JORDAN AVE	CASE AVE	1	152.31
1028841	09/14/2010	S-IHOLE	FRONT AVE	ARGYLE ST	1	33.61
1028894	09/15/2010	S-ITV	FRONT AVE	ARGYLE ST	1	65.26
1029274	09/17/2010	S-ICOVER	ROBERT ST	4TH AVE	1	574.88
1029963	09/23/2010	S-ISTR	2194 MITCHELL AVE	WINTHROP ST	1	33.17
1030454	10/06/2010	S-ISTR	BROADWAY ST	KELLOGG BLVD	9	5025.46
1031678	10/07/2010	S-ISTR	RIVER PARK PLAZA	FILLMORE AVE	1	92.97
1017194	12/08/2010	S-RREPAIR	SUMMIT AVE	KENT ST	1	42.95
1024110	12/08/2010	S-RREPAIR	550 SUMMIT AVE	KENT ST	1	42.95

Number Of Rows: 18

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City of Saint Paul

Storm Manholes Cleaned by Date and Associated Costs

Search Parameters

Start Date: 01/01/2010

End Date: 12/31/2010

Results

Service Request No	Finished Date	Problem Code	Street	Cross Street	Man Hole Count	Associated Cost
Total					50	9617.57
1000571	01/08/2010	S-IODOR	LEXINGTON AVE	HOYT AVE	2	129.93
1002409	01/26/2010	S-IDRAIN	1430 CONCORDIA AVE	PASCAL ST	1	193.76
1005083	02/22/2010	S-IDRAIN	1037 SCHEFFER AVE	CHATSWORTH ST	2	100.09
1006002	03/03/2010	S-IDRAIN	1294 VAN BUREN AVE	SYNDICATE ST	1	79.41
1006085	03/03/2010	S-IDRAIN	1318 FAIRMOUNT AVE	HAMLINE AVE	1	38.83
1006262	03/04/2010	S-IDRAIN	1244 MATILDA ST	ORANGE AVE	1	117.30
1006410	03/05/2010	S-IDRAIN	539 GLENDALE ST	DOANE AVE	1	36.34
1010010	04/05/2010	S-CJET	WHITE BEAR AVE	7TH ST	1	203.12
1011595	04/16/2010	S-CJET	1084 MARION ST	COOK AVE	2	447.06
1011695	04/17/2010	S-CJET	RANDOLPH AVE	DAVERN ST	6	975.96
1012636	04/26/2010	S-CJET	RANDOLPH AVE	WHEELER ST	1	517.93
1012665	04/26/2010	S-CJET	RANDOLPH AVE	FAIRVIEW AVE	1	447.07
1012878	04/27/2010	S-CJET	RANDOLPH AVE	WHEELER ST	1	223.53
1014199	05/10/2010	S-CJET	UPPER AFTON RD	FLANDRAU ST	1	0.02
1014384	05/10/2010	S-CJET	PACIFIC ST	CLARENCE ST	1	44.71
1014582	05/11/2010	S-CJET	RANDOLPH AVE	KENNETH ST	1	99.01
1015300	05/17/2010	S-CJET	1979 RANDOLPH AVE	KENNETH ST	1	203.10
1016323	05/26/2010	S-CJET	SYNDICATE ST	ENGLEWOOD AVE	1	609.37

1016663	05/27/2010	S-CJET	WHEELOCK PKWY	GREENBRIER ST	1	406.25
1004309	06/14/2010	S-CLIST	CHATSWORTH ST	RANDOLPH AVE	1	40.51
1020569	07/02/2010	S-CJET	MARYLAND AVE	JACKSON ST	1	447.08
1021336	07/12/2010	S-CJET	FAIRVIEW AVE	HILLCREST AVE	1	0.03
1021225	07/14/2010	S-RREPAIR	PAYNE AVE	BEAUMONT ST	1	0.15
1022194	07/19/2010	S-CJET	CLEVELAND AVE	RAYMOND AVE	1	202.56
1022935	07/25/2010	S-CJET	CLEVELAND AVE	COMO AVE	1	1846.57
1024502	08/07/2010	S-CJET	GRAND AVE	DALE ST	6	464.25
1026079	08/19/2010	S-ISTR	IGLEHART AVE	ARUNDEL ST	1	224.09
1026109	09/15/2010	S-CJET	ARLINGTON AVE	PASCAL ST	2	1136.45
1012978	09/24/2010	S-CLIST	HANCOCK ST	3RD ST	1	88.54
1004360	10/13/2010	S-CLIST	MISS RIVER BLVD	EUSTIS ST	1	44.55
1004310	10/18/2010	S-CLIST	CHATSWORTH ST	RANDOLPH AVE	4	27.25
1034977	10/28/2010	S-CJET	RIVER PARK PLAZA	FILLMORE AVE	1	89.10
1037755	11/19/2010	S-CJET	983 CHATSWORTH ST	CENTRAL AVE	1	133.66

Number Of Rows: 34

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City of Saint Paul

Storm Manholes Repaired by Date and Associated Costs

Search Parameters

Start Date: 01/01/2010

End Date: 12/31/2010

Results

Service Request No	Finished Date	Problem Code	Street	Cross Street	Man Hole Count	Associated Cost
Total					143	133476.56
0963990	01/07/2010	S-RREPAIR	HAWTHORNE AVE	BURNQUIST	1	2532.19
0917830	01/20/2010	S-RREPAIR	LEXINGTON AVE	LARPENTEUR AVE	1	153.18
0917834	01/20/2010	S-RREPAIR	1578 LEXINGTON AVE	IOWA AVE	1	1167.38
1008121	03/23/2010	S-RREPAIR	ARCADE ST	GERANIUM AVE	1	141.78
1008129	03/23/2010	S-RREPAIR	MARION ST	AURORA AVE	1	364.15
1008103	03/24/2010	S-RREPAIR	ARCADE ST	COTTAGE AVE	1	297.46
1008612	03/25/2010	S-IHOLE	WHITE BEAR AVE	7TH ST EAST	1	289.61
1007663	03/26/2010	S-RREPAIR	MINNESOTA ST	7TH PL	1	3827.82
1009208	03/30/2010	S-RREPAIR	SIBLEY ST	SHEPARD RD	8	68.22
1008664	04/06/2010	S-RREPAIR	WHITE BEAR AVE	7TH ST	1	4746.04
1006498	04/16/2010	S-RREPAIR	1226 ST PAUL AVE	QUIRNIA AVE	1	1059.72
1006685	04/16/2010	S-RREPAIR	1084 MARION ST	COOK AVE	1	1682.83
1009083	04/17/2010	S-RREPAIR	RANDOLPH AVE	WHEELER ST	1	966.81
1009218	04/17/2010	S-RREPAIR	RANDOLPH AVE	DAVERN ST	1	1102.39
1009078	04/23/2010	S-RREPAIR	RANDOLPH AVE	FAIRVIEW AVE	1	2538.19

1009079	04/26/2010	S-RREPAIR	RANDOLPH AVE	FAIRVIEW AVE	1	947.96
1009082	04/27/2010	S-RREPAIR	RANDOLPH AVE	WHEELER ST	1	802.46
1010598	04/28/2010	S-RREPAIR	SUMAC	BUTTERNUT AVE	1	1349.34
1005393	05/05/2010	S-RREPAIR	PHALEN BLVD	JOHNSON PKWY & CLARNECE ST.	1	449.69
1009070	05/05/2010	S-RREPAIR	RANDOLPH AVE	PRIOR AVE	1	1270.16
1009081	05/05/2010	S-RREPAIR	RANDOLPH AVE	WHEELER ST	1	2532.02
1012040	05/07/2010	S-RREPAIR	121 MCKNIGHT RD	NORTH PARK DR	1	1452.79
1008116	05/11/2010	S-RREPAIR	RANDOLPH AVE	SARATOGA ST	1	219.50
1009057	05/13/2010	S-RREPAIR	2053 RANDOLPH AVE	CLEVELAND AVE	1	1321.38
1009063	05/13/2010	S-RREPAIR	RANDOLPH AVE	KENNETH ST	1	1255.32
1009067	05/13/2010	S-RREPAIR	1979 RANDOLPH AVE	KENNETH ST	1	1305.03
1009068	05/13/2010	S-RREPAIR	1979 RANDOLPH AVE	KENNETH ST	1	4043.34
1009152	05/19/2010	S-RREPAIR	RANDOLPH AVE	PRIOR AVE	1	136.12
1009219	05/19/2010	S-RREPAIR	RANDOLPH AVE	DAVERN ST	1	42.19
1015624	05/19/2010	S-RREPAIR	LEXINGTON AVE	GRAND AVE	1	1262.71
1009153	05/20/2010	S-RREPAIR	RANDOLPH AVE	KENNETH ST	1	58.34
1009157	05/20/2010	S-RREPAIR	RANDOLPH AVE	CLEVELAND AVE	1	144.32
1009156	05/21/2010	S-RREPAIR	RANDOLPH AVE	CLEVELAND AVE	1	46.07
1015437	05/21/2010	S-RREPAIR	JOHNSON PKWY	CASE AVE	1	918.65
1009155	05/25/2010	S-RREPAIR	RANDOLPH AVE	CLEVELAND AVE	1	47.77
1009073	05/26/2010	S-RREPAIR	RANDOLPH AVE	PRIOR AVE	1	2058.37
1016223	05/26/2010	S-ISTR	HUBBARD AVE	GRIGGS ST	1	745.36

1016629	05/27/2010	S-RREPAIR	WHEELOCK PKWY	GREENBRIER ST	1	267.88
1014580	06/03/2010	S-RREPAIR	MARYLAND AVE	LORIENT ST	1	1220.06
1017342	06/22/2010	S-RREPAIR	881 ARCADE ST	WELLS ST	1	1620.52
1014265	06/24/2010	S-RREPAIR	MARYLAND AVE	35 E	1	61.74
1019199	06/24/2010	S-RREPAIR	7TH ST	WABASHA ST	1	1215.02
1019837	06/28/2010	S-IHOLE	RANDOLPH AVE	ALBERT ST	1	157.42
1014578	07/02/2010	S-RREPAIR	MARYLAND AVE	JACKSON ST	1	955.70
1014574	07/07/2010	S-RREPAIR	MARYLAND AVE	JACKSON ST	1	1158.79
1017909	07/13/2010	S-RREPAIR	FAIRVIEW AVE	HILLCREST AVE	1	0.22
1021225	07/14/2010	S-RREPAIR	PAYNE AVE	BEAUMONT ST	1	0.15
1021674	07/14/2010	S-ISTR	RICE ST	COOK AVE	1	78.82
1021731	07/15/2010	S-RREPAIR	GRAND AVE	CHATSWORTH ST	1	62.00
1021732	07/15/2010	S-RREPAIR	DAVERN ST	RIVER	1	157.61
1021143	07/17/2010	S-RREPAIR	1261 CLEVELAND AVE	SCUDDER ST	1	889.03
1021145	07/17/2010	S-RREPAIR	1180 CLEVELAND AVE	RAYMOND AVE	1	1475.24
1021146	07/17/2010	S-RREPAIR	CLEVELAND AVE	RAYMOND AVE	1	1300.48
1016288	07/19/2010	S-RREPAIR	GRAND AVE	OXFORD ST	1	305.18
1021191	07/19/2010	S-RREPAIR	1651 MARSHALL	FRY ST	1	843.09
1022329	07/20/2010	S-RREPAIR	GRAND AVE	35 E	1	151.86
1020253	07/21/2010	S-RREPAIR	BAKER ST	DODD RD	1	3344.66
1022335	07/21/2010	S-RREPAIR	911 LAFOND AVE	VICTORIA ST	1	95.44
1022057	07/23/2010	S-RREPAIR	1023 GRAND AVE	OXFORD ST	1	752.37
1022058	07/23/2010	S-	964 GRAND	CHATSWORTH ST	1	321.10

		RREPAIR	AVE			
1021129	07/24/2010	S-RREPAIR	1435 CLEVELAND AVE	BUFORD AVE	1	1365.72
1021131	07/24/2010	S-RREPAIR	CLEVELAND AVE	DOSWELL AVE	1	2213.12
1021137	07/25/2010	S-RREPAIR	CLEVELAND AVE	COMMONWEALTH AVE	1	408.01
1021140	07/25/2010	S-RREPAIR	1299 CLEVELAND AVE	COMMONWEALTH AVE	1	776.16
1021151	07/25/2010	S-RREPAIR	CLEVELAND AVE	COMO AVE	1	1374.71
1022059	07/27/2010	S-RREPAIR	880 GRAND AVE	VICTORIA ST	1	1269.01
1022683	07/31/2010	S-RREPAIR	FAIRVIEW AVE	HIGHLAND PKWY	2	2060.91
1022685	07/31/2010	S-RREPAIR	FAIRVIEW AVE	ELEANOR AVE	1	844.36
1022686	07/31/2010	S-RREPAIR	FAIRVIEW AVE	ELEANOR AVE	1	994.85
1022939	07/31/2010	S-RREPAIR	657 FAIRVIEW AVE	SCHEFFER AVE	1	1087.98
1022940	07/31/2010	S-RREPAIR	661 FAIRVIEW AVE	SCHEFFER AVE	1	1013.76
1022942	07/31/2010	S-RREPAIR	640 FAIRVIEW AVE	SCHEFFER AVE	1	1086.87
1022943	07/31/2010	S-RREPAIR	630 FAIRVIEW AVE	BAYARD AVE	1	1757.23
1022961	08/02/2010	S-RREPAIR	FAIRVIEW AVE	BOHLAND AVE	1	531.61
1022671	08/03/2010	S-RREPAIR	FAIRVIEW AVE	HILLCREST AVE	1	1031.36
1022677	08/03/2010	S-RREPAIR	FAIRVIEW AVE	HILLCREST AVE	1	1438.27
1022681	08/04/2010	S-RREPAIR	FAIRVIEW AVE	FORD PKWY	1	785.17
1023072	08/04/2010	S-RREPAIR	1909 JAMES AVE	HOWELL ST	1	352.54
1017262	08/07/2010	S-RREPAIR	GRAND AVE	ST ALBANS ST	1	1342.11
1017276	08/07/2010	S-RREPAIR	GRAND AVE	GROTTO ST	1	1159.10
1017285	08/07/2010	S-RREPAIR	GRAND AVE	DALE ST	1	1725.60
1017270	08/10/2010	S-	AVON ST	GRAND AVE	1	3373.73

		RREPAIR				
1024983	08/11/2010	S-ICOVER	WILDER ST	CARROLL AVE	1	14.71
1025018	08/11/2010	S-ICOVER	BREWSTER ST	FIFIELD ST	1	27.98
1017268	08/16/2010	S-RREPAIR	GRAND AVE	AVON ST	1	53.74
1017266	08/19/2010	S-RREPAIR	GRAND AVE	AVON ST	1	3681.72
1017245	08/25/2010	S-RREPAIR	GRAND AVE	MILTON ST	1	3350.53
1017247	08/25/2010	S-RREPAIR	GRAND AVE	MILTON ST	1	2462.31
1017195	08/26/2010	S-RREPAIR	534 SUMMIT AVE	KENT ST	1	1649.95
0818397	08/30/2010	S-RREPAIR	556 SUMMIT AVE	KENT ST	1	1647.65
1025603	09/03/2010	S-RREPAIR	CHARLES AVE	ARUNDEL ST	1	3087.72
1017190	09/08/2010	S-RREPAIR	SUMMIT AVE	OAKLAND AVE	1	1140.89
1027932	09/08/2010	S-RREPAIR	SNELLING AVE	MINNEHAHA AVE	1	1495.13
1026396	09/09/2010	S-RREPAIR	WEIDE ST	BUSH AVE	1	1005.09
1027298	09/13/2010	S-RREPAIR	1970 CASE AVE	JORDAN AVE	1	807.33
1028292	09/13/2010	S-RREPAIR	HAMLINE AVE	UNIVERSITY AVE	1	2694.80
1028600	09/14/2010	S-RREPAIR	MOUNDS BLVD	SHORT ST	1	66.35
1016204	09/16/2010	S-RREPAIR	BURNS AVE	PEDERSON	1	1778.71
1016186	09/17/2010	S-RREPAIR	2041 BURNS AVE	RUTH ST	1	832.15
1016199	09/20/2010	S-RREPAIR	BURNS AVE	WINTHROP ST	1	1699.81
1029412	09/20/2010	S-ISTR	JACKSON ST	7TH PL	1	220.01
1017261	09/21/2010	S-RREPAIR	GRAND AVE	ST ALBANS ST	1	43.24
1017265	09/21/2010	S-RREPAIR	649 GRAND AVE	ST ALBANS ST	1	43.24
1017281	09/21/2010	S-RREPAIR	GRAND AVE	DALE ST	1	43.24
1017282	09/21/2010	S-	GRAND AVE	DALE ST	1	43.24

		RREPAIR				
1017255	09/23/2010	S-RREPAIR	GRAND AVE	VICTORIA ST	1	86.44
1017258	09/23/2010	S-RREPAIR	GRAND AVE	VICTORIA ST	1	86.44
1008415	09/24/2010	S-RREPAIR	MARION ST	RAVOUX ST	1	66.34
1028761	10/03/2010	S-RREPAIR	389 HAMLINE AVE	ST ANTHONY AVE	1	2216.58
1022339	10/08/2010	S-RREPAIR	7TH ST	ROSS AVE	1	381.90
1022340	10/08/2010	S-RREPAIR	7TH ST	ROSS AVE	1	1812.91
1022342	10/08/2010	S-RREPAIR	7TH ST	EARL ST	1	1942.33
1028575	10/12/2010	S-RREPAIR	7TH ST	BUSH AVE	1	1373.89
1022341	10/13/2010	S-RREPAIR	1024 7TH ST	ROSS AVE	1	1117.34
1008909	10/25/2010	S-RREPAIR	31 COMO AVE	CEDAR ST	1	112.55
1017227	10/26/2010	S-RREPAIR	GRAND AVE	OXFORD ST	1	56.29
1010554	10/28/2010	S-RREPAIR	RIVER PARK PLAZA	FILLMORE AVE	1	1085.18
1017219	11/03/2010	S-RREPAIR	GRAND AVE	LEXINGTON AVE	1	56.29
1017239	11/03/2010	S-RREPAIR	GRAND AVE	CHATSWORTH ST	1	112.55
1034702	11/04/2010	S-RREPAIR	2194 MITCHELL AVE	WINTHROP ST	1	168.85
1035760	11/04/2010	S-ICOVER	244 MARYLAND AVE	35	1	495.66
1034888	11/23/2010	S-RREPAIR	983 CHATSWORTH ST	CENTRAL AVE	1	2955.32
1028895	12/06/2010	S-RREPAIR	FRONT AVE	ARGYLE ST	1	65.21
1039555	12/06/2010	S-RREPAIR	1351 ENERGY PARK DR	ENERGY LN	1	42.95
1039556	12/06/2010	S-RREPAIR	1360 ENERGY PARK DR	ENERGY LN	1	85.88
1008905	12/07/2010	S-RREPAIR	401 GRAND AVE	RAMSEY ST	1	126.80
1008906	12/08/2010	S-	423 GRAND	LINCOLN AVE	1	126.80

		RREPAIR	AVE			
1017196	12/08/2010	S-RREPAIR	SUMMIT AVE	HEATHER	1	128.84
1027306	12/08/2010	S-RREPAIR	457 SNELLING	SPRUCE TREE PLACE	1	1882.97
1039498	12/08/2010	S-RREPAIR	COMO AVE	PARK ST	1	523.76
0921827	12/09/2010	S-RREPAIR	MARION ST	FULLER AVE	1	86.44
1022331	12/09/2010	S-RREPAIR	UNIVERSITY AVE	SYNDICATE ST	1	108.06
1017198	12/10/2010	S-RREPAIR	SUMMIT AVE	MACKUBIN ST	1	42.95
1017204	12/10/2010	S-RREPAIR	SUMMIT AVE	RAMSEY ST	1	85.88
1040525	12/16/2010	S-RREPAIR	435 JAMES AVE	OLD SHEPARD RD	1	380.41

Number Of Rows: 136

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City of Saint Paul

Catch Basins Inspected by Date and Associated Costs

Search Parameters

Start Date: 01/01/2010
End Date: 12/31/2010

Results

Sr No	Finished	Problem Code	Street	Cross Street	Catch Basin Count	Amount	Activity
1006804	03/09/2010	S-ISTR	30 DARLENE ST	UPPER AFTON RD	1	53.96	S-SINSSTR
1007396	03/16/2010	S-IHOLE	2105 CONWAY AVE	RUTH ST	1	94.88	S-SINSSTR
1007397	03/16/2010	S-IHOLE	2083 SCENIC PL	PEDERSEN ST	1	94.88	S-SINSSTR
1007462	03/16/2010	S-ISTR	DAYTON AVE	DALE ST	1	47.45	S-SINSSTR
1007463	03/16/2010	S-IHOLE	917 DAYTON AVE	MILTON ST	1	47.45	S-SINSSTR
1007488	03/16/2010	S-ICOVER	WHEELOCK PKWY	AVON ST	1	47.45	S-SINSSTR
1007489	03/16/2010	S-ICOVER	ORANGE AVE	DANFORTH ST	1	47.45	S-SINSSTR
1007661	03/17/2010	S-ISTR	ENERGY PARK DR	SNELLING AVE	1	47.45	S-SINSSTR
1007768	03/18/2010	S-IHOLE	775 NEBRASKA AVE	WEIDE ST	1	104.09	S-SINSSTR
1007897	03/19/2010	S-ISTR	ENERGY PARK DR	SNELLING AVE	1	106.09	S-SINSSTR
1008233	03/23/2010	S-IHOLE	THOMAS AVE	DUNLAP ST	1	13.32	S-SINSSTR
1008999	03/29/2010	S-ISTR	EAST SHORE DR	JOHNSON PKWY	1	81.68	S-SINSSTR
1009457	03/31/2010	S-IHOLE	PRIOR AVE	PORTLAND AVE	1	14.32	S-SINSSTR
1009767	04/02/2010	S-IHOLE	IDAHO AVE	MCAFEE ST	1	191.88	S-SINSSTR
1009812	04/02/2010	S-ISTR	PASCAL ST	ASHLAND AVE	1	191.88	S-SINSSTR
1010352	04/07/2010	S-IHOLE	CRETIN AVE	FORD PKWY	1	234.84	S-SINSSTR
1010765	04/12/2010	S-IHOLE	1843 ELEANOR AVE	FAIRVIEW AVE	1	191.88	S-SINSSTR
1011188	04/14/2010	S-IHOLE	PASCAL ST	ST ANTHONY AVE	1	191.88	S-SINSSTR
1011437	04/16/2010	S-ISTR	BURNS AVE	ENGLISH ST	1	38.40	S-SINSSTR
1011513	04/16/2010	S-IHOLE	MARYLAND AVE	DANFORTH ST	1	76.78	S-SINSSTR
1012640	04/27/2010	S-ISTR	ST ALBANS ST	PORTLAND AVE	1	84.38	S-SINSSTR
1012972	04/28/2010	S-IHOLE	SARGENT AVE	SYNDICATE ST	2	95.95	S-SINSSTR
1012986	04/28/2010	S-ISTR	PASCAL ST	GOODRICH AVE	1	95.95	S-SINSSTR
1013189	04/29/2010	S-ISTR	SARATOGA ST	ST CLAIR AVE	1	191.88	S-SINSSTR
1013325	04/30/2010	S-IHOLE	STONEBRIDGE	STANFORD CT	1	77.78	S-SINSSTR

			BLVD				
1014349	05/10/2010	S-IHOLE	AGATE ST	GERANIUM AVE	1	191.88	S-SINSSTR
1014515	05/13/2010	S-ISTR	DAVERN ST	SHERIDAN AVE	1	452.07	S-SINSSTR
1014565	05/11/2010	S-IHOLE	UNIVERSITY AVE	LAFAYETTE RD	1	37.67	S-SINSSTR
1014701	05/12/2010	S-24HRDISP	WYCLIFF ST	CAPP RD	1	97.88	S-SINSSTR
1014959	05/13/2010	S-ISTR	REANEY AVE	DULUTH ST	1	37.67	S-SINSSTR
1014965	05/13/2010	S-ISTR	1296 OSCEOLA AVE	SYNDICATE ST	1	75.34	S-SINSSTR
1015074	05/14/2010	S-ISTR	VARIOUS		22	214.71	S-SINSSTR
1015089	05/14/2010	S-ISTR	IDAHO AVE	ARUNDEL ST	1	97.88	S-SINSSTR
1015098	05/14/2010	S-ISTR	EUSTIS ST	COMO AVE	1	97.88	S-SINSSTR
1015605	05/19/2010	S-ISTR	2118 JULIET AVE	FINN ST	1	113.02	S-SINSSTR
1017081	06/02/2010	S-IODOR	COOK AVE	WEIDE ST	8	412.14	S-SINSSTR S-SINSSTR
1017179	06/03/2010	S-IHOLE	CHEROKEE AVE	ANNAPOLIS ST	1	75.34	S-SINSSTR
1017180	06/03/2010	S-IHOLE	SMITH AVE	WYOMING ST	1	75.34	S-SINSSTR
1017531	06/07/2010	S-RHOLE	EARL ST	CASE AVE	1	54.24	S-SINSSTR
1017584	06/07/2010	S-ISTR	12TH	JACKSON ST	1	97.88	S-SINSSTR
1018089	06/11/2010	S-ISTR	262 ARLINGTON AVE	GALTIER ST	1	97.88	S-SINSSTR
1018090	06/11/2010	S-ISTR	GERANIUM AVE	WALSH ST	1	97.88	S-SINSSTR
1018335	06/15/2010	S-IDRAIN	1077 BARRETT ST	JESSAMINE AVE	1	197.91	S-SINSSTR
1018403	06/15/2010	S-ICOVER	RANDOLPH AVE	WOODLAWN AVE	1	78.82	S-SINSSTR
1019054	06/23/2010	S-IHOLE	648 BURLINGTON RD	WINTHROP ST	1	214.51	S-SINSSTR S-SINSSTR
1019467	06/24/2010	S-ISTR	COMO AVE	LEXINGTON AVE	1	93.42	S-SINSSTR
1019517	06/24/2010	S-ISTR	MARION ST	RAVOUX ST	1	62.28	S-SINSSTR
1019619	06/25/2010	S-IHOLE	UNIVERSITY AVE	PRIOR AVE	1	107.44	S-SINSSTR
1019620	06/25/2010	S-ICOVER	THOMAS AVE	CHATSWORTH ST	1	53.74	S-SINSSTR
1019621	06/25/2010	S-IHOLE	THOMAS AVE	OXFORD ST	1	53.74	S-SINSSTR
1019813	06/28/2010	S-IHOLE	CONGRESS ST	WABASHA ST	1	39.72	S-SINSSTR
1019827	06/28/2010	S-ISTR	ROBERT ST	CESAR CHAVEZ ST	1	39.72	S-SINSSTR
1019969	06/29/2010	S-IHOLE	BARKLEY	THIRD	2	112.19	S-SINSSTR
1019971	06/29/2010	S-ICOVER	1317 BURNS AVE		1	74.78	S-SINSSTR
1020167	06/30/2010	S-IHOLE	7TH ST	ALBION	1	118.23	S-SINSSTR
1020189	06/30/2010	S-IHOLE	COMMERCIAL ST	4TH AVE	1	157.63	S-SINSSTR
1020268	06/30/2010	S-IHOLE	DAVERN ST	STANFORD AVE	1	101.91	S-SINSSTR
1020331	07/01/2010	S-IHOLE	SHIELDS	PIERCE	1	118.23	S-SINSSTR
1020585	07/06/2010	S-IHOLE	CENTRAL AVE	CHATSWORTH	2	55.19	S-SINSSTR

				ST			
1021188	07/09/2010	S-ISTR	PAYNE AVE	BEAUMONT ST	2	79.41	S-SINSSTR
1021362	07/13/2010	S-ISTR	GOODRICH AVE	HOWELL ST	1	169.66	S-SINSSTR
1021448	07/13/2010	S-IHOLE	GRIGGS ST	BLAIR AVE	1	192.44	S-SINSSTR
1021725	07/14/2010	S-ISTR	SIMS AVE	ARCADE ST	1	78.82	S-SINSSTR
1021841	07/15/2010	S-ISTR	NORTH PARK DR	MCKNIGHT RD	1	78.82	S-SINSSTR
1021849	07/15/2010	S-ISTR	NORTH PARK DR	FAYE ST	1	78.82	S-SINSSTR
1021969	07/16/2010	S-ISTR	849 WINTHROP ST	SPRINGSIDE	1	53.96	S-SINSSTR
1022736	07/23/2010	S-ISTR	3RD ST	BIRMINGHAM ST	1	98.92	S-SINSSTR
1022805	07/23/2010	S-ISTR	WINTER	CAPITAL	3	98.92	S-SINSSTR
1023012	07/26/2010	S-ISTR	CONWAY AVE	HOWARD ST	1	100.92	S-SINSSTR
1023163	07/27/2010	S-IHOLE	SNELLING AVE	EDGCUMBE RD	1	94.88	S-SINSSTR
1023877	08/03/2010	S-ISTR	915 HATCH AVE	COLNE ST	1	47.72	S-SINSSTR
1023962	08/03/2010	S-ISTR	RICE ST	ARLINGTON AVE	1	47.72	S-SINSSTR
1024015	10/25/2010	S-RREPAIR	RICE ST	ARLINGTON AVE	1	621.18	S-SREPSTR S-SINSSTR
1024173	08/05/2010	S-ISTR	JESSAMINE AVE	MENDOTA ST	1	329.85	S-SINSSTR
1024949	08/12/2010	S-ISTR	SHEPARD RD	WASHINGTON ST	4	94.88	S-SINSSTR
1025049	08/11/2010	S-IHOLE	UNIVERSITY AVE	CURFEW ST	2	14.71	S-SINSSTR
1025555	08/16/2010	S-ISTR	SIMPSON ST	MINNEHAHA AVE	1	47.45	S-SINSSTR
1025906	08/18/2010	S-IHOLE	DUNLAP ST	LAFOND AVE	1	53.96	S-SINSSTR
1026105	08/19/2010	S-ISTR	BLAIR AVE	GROTTO ST	1	53.46	S-SINSSTR
1026202	08/20/2010	S-ISTR	MARSHALL AVE	SNELLING AVE	1	14.71	S-SINSSTR
1027132	08/27/2010	S-IHOLE	GORMAN AVE	STEVENS ST	1	38.42	S-SINSSTR
1028275	09/10/2010	S-ISTR	2360 MISS RIVER BLVD	DAYTON AVE	1	76.25	S-SINSSTR
1028443	09/09/2010	S-ISTR	7TH PL	SIBLEY ST	1	33.17	S-SINSSTR S-SINSSITE
1028566	09/10/2010	S-IHOLE	748 BURR ST	MINNEHAHA AVE	2	76.25	S-SINSSTR
1028595	09/10/2010	S-ISTR	EARL ST	FREMONT ST	2	95.34	S-SINSSTR
1028906	09/15/2010	S-ISTR	UPPER AFTON RD	BURNS AVE	1	98.69	S-SINSSITE S-SINSSTR
1029036	09/16/2010	S-IHOLE	280 SUMMIT AVE	NINA ST	2	98.69	S-SINSSTR
1029277	09/17/2010	S-CJET	191 7TH PL	SIBLEY ST	1	89.10	S-SINSSTR
1029308	09/17/2010	S-IHOLE	CASE AVE	DESOTO ST	1	131.56	S-SINSSTR S-SINSSTR
1029680	09/22/2010	S-ISTR	1258 MARION ST	ORANGE AVE	1	32.90	S-SINSSTR
1029750	09/22/2010	S-IHOLE	NOKOMIS	TEWANNA	1	32.90	S-SINSSTR
1029751	09/22/2010	S-IHOLE	NOKOMIS	RUTH	1	65.78	S-SINSSTR

1030031	09/24/2010	S-ISTR	1669 RACE ST	ALASKA AVE	1	99.52	S-SINSSTR
1030080	10/01/2010	S-RREPAIR	2003 JEFFERSON AVE	DAVERN ST	2	264.55	S-SINSSTR S-SREPSTR
1030284	09/27/2010	S-ISTR	LAWSON AVE	PAYNE AVE	1	12.43	S-SINSSTR
1030670	09/29/2010	S-IHOLE	1060 LORIENT ST	ARLINGTON AVE	1	51.53	S-SINSSTR
1031328	10/05/2010	S-ISTR	WHITE BEAR AVE	HOYT AVE	1	65.78	S-SINSSTR
1031607	10/06/2010	S-ISTR	1517 ST CLAIR AVE	SARATOGA ST	1	98.69	S-SINSSTR
1031611	10/06/2010	S-ISTR	MISS RIVER BLVD	DAYTON AVE	1	65.78	S-SINSSTR
1032372	10/12/2010	S-ICOVER	5TH ST	BROADWAY ST	1	36.55	S-SINSSTR
1032782	10/15/2010	S-IHOLE	1138 CHURCHILL ST	COMO AVE	1	69.82	S-SINSSTR
1033199	10/19/2010	S-ISTR	1232 BREEN ST	HAWTHORNE AVE	1	118.26	S-SINSSTR S-SINSSTR
1033600	10/20/2010	S-ISTR	PAYNE AVE	WOODWARD AVE	1	87.00	S-SINSSTR
1034096	10/25/2010	S-ICOVER	935 WESTGATE DR	TERRITORIAL RD	1	98.69	S-SINSSTR
1034098	10/25/2010	S-IHOLE	457 SNELLING AVE	SHIELDS AVE	1	74.78	S-SINSSTR
1034407	10/26/2010	S-ISTR	776 IGLEHART AVE	AVON ST	2	375.55	S-SINSSTR
1034556	10/26/2010	S-IHOLE	HAMLINE AVE	HORTON AVE	1	98.69	S-SINSSTR
1034973	10/28/2010	S-ISTR	455 BURLINGTON RD	TOTEM RD	1	129.69	S-SINSSTR
1035989	11/05/2010	S-IHOLE	436 EDMUND AVE	ARUNDEL ST	1	65.78	S-SINSSTR
1036121	11/05/2010	S-ISTR	WHITALL ST	DESOTO ST	2	32.90	S-SINSSTR
1036215	11/08/2010	S-IHOLE	BERKELEY AVE	CRETIN AVE	1	32.90	S-SINSSTR
1037427	11/17/2010	S-ISTR	DOUSMAN ST	BANFIL ST	1	160.09	S-SINSSTR
1037628	11/19/2010	S-IODOR	2065 CARROLL AVE	CLEVELAND AVE	4	133.66	S-SINSSTR
1037631	11/19/2010	S-IHOLE	GERANIUM AVE	MATILDA ST	2	128.84	S-SINSSTR
1038540	11/29/2010	S-ISTR	ROBERT ST	CESAR CHAVEZ ST	1	224.07	S-SINSSTR
1038603	11/30/2010	S-IDRAIN	DAVERN ST	ST CLAIR AVE	1	65.78	S-SINSSTR
1039973	12/08/2010	S-WOTHER	225 SMITH AVE	CHESTNUT ST	1	44.45	S-SINSSTR
1041305	12/27/2010	S-ICOVER	SNELLING AVE	ASHLAND AVE	1	186.97	S-SINSSTR
1041701	04/21/2011	S-RREPAIR	SNELLING AVE	SUMMIT AVE	1	304.07	S-SINSSTR S-SREPSTR
TOTAL					167	12917.19	

Number Of Rows: 120

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City of Saint Paul

Catch Basins Cleaned by Date and Associated Costs

Search Parameters

Start Date: 01/01/2010
End Date: 12/31/2010

Results

Sr No	Finished	Problem Code	Street	Cross Street	Catch Basin Count	Amount	Activity
1001479	01/25/2010	S-IDRAIN	1922 PARKLAND CT	VALLEYSIDE DR (OFF OF)	2	96.88	S-SCLNSTR
1002185	01/23/2010	S-IDRAIN	VICTORIA ST	UNIVERSITY AVE	2	169.13	S-SCLNSTR
1002190	01/23/2010	S-IDRAIN	COMO AVE	ELFELT ST	1	438.30	S-SCLNSTR
1002192	01/23/2010	S-IDRAIN	UNIVERSITY AVE	PRIOR AVE	3	176.45	S-SCLNSTR
1002285	01/25/2010	S-CLIST	WESTERN AVE	SUMMIT AVE	12	48.45	S-SCLNSTR
1002288	01/25/2010	S-COTHER	LAUREL AVE	WESTERN AVE	1	48.45	S-SCLNSTR
1002301	01/25/2010	S-IDRAIN	DALE ST	MINNEHAHA AVE	2	448.19	S-SCLNSTR
1002332	01/25/2010	S-IDRAIN	IVY AVE	FLANDRAU ST	1	145.34	S-SCLNSTR
1002334	01/26/2010	S-IDRAIN	617 HYACINTH AVE	EDGERTON & PAYNE (NO THROUGH ALLEY)	1	96.88	S-SCLNSTR
1002854	02/01/2010	S-ISTR	TAYLOR AVE	FAIRVIEW AVE	1	686.01	S-SCLNSTR
1003624	02/05/2010	S-IDRAIN	MARTIN LUTHER KING BLVD	CEDAR / JOHN IRELAND	1	224.09	S-SCLNSTR
1003635	02/05/2010	S-IDRAIN	SNELLING AVE	UNIVERSITY AVE	1	112.05	S-SCLNSTR
1003636	02/05/2010	S-IDRAIN	VICTORIA ST	UNIVERSITY AVE	1	112.05	S-SCLNSTR
1003639	02/05/2010	S-IDRAIN	MISS RIVER BLVD	FORD PKWY	1	133.65	S-SCLNSTR
1003737	02/08/2010	S-IDRAIN	10 RIVER PARK PLAZA	FORD PKWY	4	670.32	S-SCLNSTR
1003780	02/08/2010	S-IDRAIN	FAIRVIEW AVE	UNIVERSITY AVE	2	1042.88	S-SCLNSTR
1004083	02/11/2010	S-IDRAIN	10 RIVER PARK PLAZA	FILLMORE AVE	1	158.83	S-SCLNSTR
1004166	07/07/2010	S-CLIST	OSCEOLA AVE	VICTORIA ST	1	405.68	S-SCLNMAIN S-SCLNSTR
1004167	10/18/2010	S-CLIST	OSCEOLA AVE	VICTORIA ST	1	68.12	S-SCLNSTR
1004309	06/14/2010	S-CLIST	CHATSWORTH ST	RANDOLPH AVE	5	202.56	S-SCLNSTR
1004310	10/18/2010	S-CLIST	CHATSWORTH ST	RANDOLPH AVE	5	136.25	S-SCLNSTR
1004457	02/16/2010	S-IDRAIN	UNIVERSITY AVE	VICTORIA ST	1	95.44	S-SCLNSTR
1004461	02/16/2010	S-IDRAIN	LAWSON AVE	WESTERN AVE	4	115.44	S-SCLNSTR
1004463	02/16/2010	S-IDRAIN	SHERBURNE AVE	SNELLING AVE	3	143.22	S-SCLNSTR
1004479	02/16/2010	S-IDRAIN	ORCHARD AVE	GROTTO ST	1	97.44	S-SCLNSTR

1004481	02/16/2010	S-IDRAIN	770 UNIVERSITY AVE	AVON ST	1	273.61	S-SCLNSTR S-SCLNSTR
1004532	02/17/2010	S-IDRAIN	ETNA ST	CONWAY AVE	2	158.84	S-SCLNSTR
1004580	02/17/2010	S-IDRAIN	NOKOMIS AVE	STILLWATER AVE	5	158.84	S-SCLNSTR
1004581	02/17/2010	S-IDRAIN	GRIGGS ST	UNIVERSITY AVE	1	86.44	S-SCLNSTR
1004593	02/17/2010	S-IDRAIN	1154 MONTANA AVE	DUNLAP ST	1	172.88	S-SCLNSTR
1004595	02/17/2010	S-IDRAIN	RUTH ST	5TH ST	4	264.71	S-SCLNSTR
1004597	02/17/2010	S-IDRAIN	375 OXFORD ST	CENTRAL AVE	2	194.88	S-SCLNSTR
1004604	02/17/2010	S-IDRAIN	848 RANDOLPH AVE	VICTORIA	1	86.44	S-SCLNSTR
1004641	02/17/2010	S-IDRAIN	SUSAN AVE	ST PAUL AVE	2	97.44	S-SCLNSTR
1004748	02/18/2010	S-IDRAIN	920 SELBY AVE	MILTON ST	3	79.97	S-SCLNSTR
1004803	02/18/2010	S-IDRAIN	MINNEHAHA AVE	HAMLINE AVE	1	79.97	S-SCLNSTR
1004817	02/18/2010	S-IDRAIN	FREMONT AVE	RUTH ST	3	159.95	S-SCLNSTR
1004931	02/19/2010	S-IDRAIN	1103 JESSAMINE AVE	FRANK ST	1	38.49	S-SCLNSTR
1004943	02/19/2010	S-IDRAIN	CONWAY AVE	GERMAIN ST	2	97.44	S-SCLNSTR
1004957	02/19/2010	S-IDRAIN	1478 DIETER ST	NEVADA AVE	1	97.44	S-SCLNSTR
1004976	02/19/2010	S-IDRAIN	MERRILL ST	HOYT AVE	1	97.44	S-SCLNSTR
1005080	02/22/2010	S-IDRAIN	91 RUTH ST	LARRY HO DR	2	100.09	S-SCLNSTR
1005124	02/23/2010	S-IDRAIN	1154 MONTANA AVE	DUNLAP ST	1	150.15	S-SCLNSTR
1005125	02/22/2010	S-IDRAIN	LAUREL AVE	WESTERN AVE	1	100.09	S-SCLNSTR
1005130	02/23/2010	S-IDRAIN	464 THOMAS AVE	ARUNDEL ST	2	200.19	S-SCLNSTR
1005131	02/24/2010	S-IDRAIN	375 SARATOGA ST	JEFFERSON AVE	1	79.97	S-SCLNSTR
1005133	02/23/2010	S-IDRAIN	MARYLAND AVE	VIRGINIA ST	2	250.24	S-SCLNSTR
1005203	02/23/2010	S-IDRAIN	BANFIL ST	RICHMOND ST	3	182.61	S-SCLNSTR
1005230	02/23/2010	S-IDRAIN	HAGUE AVE	OXFORD ST	2	200.19	S-SCLNSTR
1005354	02/24/2010	S-IDRAIN	THOMAS AVE	CHATSWORTH ST	2	79.97	S-SCLNSTR
1005358	02/24/2010	S-IDRAIN	592 PORTLAND AVE	DALE ST & KENT	2	79.97	S-SCLNSTR
1005495	02/25/2010	S-IDRAIN	IVY AVE	GERMAIN ST	2	199.94	S-SCLNSTR
1005544	02/25/2010	S-IDRAIN	1274 ROSE AVE	JOHNSON PKWY	2	79.97	S-SCLNSTR
1005566	02/26/2010	S-IDRAIN	950 SHERBURNE AVE	CHATSWORTH ST	2	79.97	S-SCLNSTR
1005573	02/26/2010	S-IDRAIN	VAN BUREN AVE	HAMLINE AVE	2	79.97	S-SCLNSTR
1005602	02/26/2010	S-IDRAIN	403 TOTEM RD	BURLINGTON RD	2	159.95	S-SCLNSTR
1005640	02/26/2010	S-IDRAIN	FAIRVIEW AVE	PINEHURST AVE	3	159.95	S-SCLNSTR
1005655	02/26/2010	S-IDRAIN	43 MONTANA AVE	SYLVAN	1	79.97	S-SCLNSTR
1005666	02/26/2010	S-IDRAIN	1577 SARGENT AVE	SNELLING AVE	1	79.97	S-SCLNSTR
1005761	03/01/2010	S-IDRAIN	MISS RIVER BLVD	FORD PKWY	4	116.47	S-SCLNSTR
1005772	03/01/2010	S-IDRAIN	FINN ST	SCHEFFER AVE	2	276.18	S-SCLNSTR S-

							SCLNSTR
1005797	03/01/2010	S-IDRAIN	MARSHALL AVE	GROTTO ST	3	119.14	S-SCLNSTR
1005798	03/01/2010	S-IDRAIN	DAYTON AVE	GROTTO ST	2	39.72	S-SCLNSTR
1005830	03/01/2010	S-IDRAIN	1354 CHARLES AVE	HAMLINE AVE	1	39.72	S-SCLNSTR
1005835	03/02/2010	S-IDRAIN	2039 ROBLYN AVE	WILDER ST	1	145.34	S-SCLNSTR
1005836	03/02/2010	S-IDRAIN	MARYLAND AVE	PARK ST	2	119.14	S-SCLNSTR
1005837	03/02/2010	S-IDRAIN	MARYLAND AVE	BURNQUIST ST	2	79.41	S-SCLNSTR
1005838	03/08/2010	S-IDRAIN	CASE AVE	WHITE BEAR AVE	1	534.70	S-SCLNMAIN S-SCLNSTR
1005844	03/02/2010	S-IDRAIN	1691 IOWA AVE	KENNARD ST	2	119.14	S-SCLNSTR
1005905	03/02/2010	S-ISTR	HOYT AVE	MAYWOOD ST	3	39.72	S-SCLNSTR
1005952	03/02/2010	S-IDRAIN	BLAIR AVE	SYNDICATE ST	2	39.10	S-SCLNSTR
1005954	03/02/2010	S-IDRAIN	BLAIR AVE	HAMLINE AVE	1	39.10	S-SCLNSTR
1005959	03/03/2010	S-IDRAIN	WESTERN AVE	SELBY AVE	2	79.41	S-SCLNSTR
1005971	03/04/2010	S-IDRAIN	2475 DOSWELL AVE	HUNTING VALLEY RD	3	368.84	S-SCLNSTR S-SCLNSTR
1005974	03/03/2010	S-IDRAIN	ST CLAIR AVE	LEXINGTON AVE	1	39.72	S-SCLNSTR
1005986	03/03/2010	S-IDRAIN	UNIVERSITY AVE	PRIOR AVE	1	116.47	S-SCLNSTR
1005997	03/03/2010	S-IDRAIN	745 ORANGE AVE	WALSH ST	1	119.14	S-SCLNSTR
1006064	03/03/2010	S-IDRAIN	JESSAMINE AVE	AVON ST	2	116.47	S-SCLNSTR
1006065	03/03/2010	S-IDRAIN	LAWSON AVE	KENT ST	2	39.72	S-SCLNSTR
1006078	03/03/2010	S-IDRAIN	PALACE AVE	PRIOR AVE	2	38.83	S-SCLNSTR
1006122	03/12/2010	S-CJET	ST CLAIR AVE	LEXINGTON AVE	1	894.69	S-SCLNSTR S-SCLNSTR
1006151	03/04/2010	S-IDRAIN	BLAIR AVE	ALDINE ST	1	78.19	S-SCLNSTR
1006246	06/28/2010	S-CLIST	29 SUMMIT CT	LAWTON ST	1	111.78	S-SCLNSTR
1006247	11/01/2010	S-CLIST	29 SUMMIT CT	LAWTON ST	1	177.08	S-SCLNSTR
1006252	06/28/2010	S-CLIST	WESTERN AVE	HOLLY AVE	4	111.78	S-SCLNSTR
1006253	11/01/2010	S-CLIST	WESTERN AVE	HOLLY AVE	4	132.83	S-SCLNSTR
1006254	06/28/2010	S-CLIST	WESTERN AVE	SUMMIT AVE	12	223.53	S-SCLNSTR
1006255	11/01/2010	S-CLIST	WESTERN AVE	SUMMIT AVE	12	265.62	S-SCLNSTR
1006294	03/04/2010	S-IDRAIN	BLAIR AVE	FRY ST	1	39.10	S-SCLNSTR
1006296	03/04/2010	S-IDRAIN	1833 GOODRICH AVE	FAIRVIEW AVE	1	78.19	S-SCLNSTR
1006299	06/30/2010	S-CLIST	LEXINGTON AVE	NEBRASKA AVE	4	203.12	S-SCLNSTR
1006300	11/03/2010	S-CLIST	LEXINGTON AVE	NEBRASKA AVE	4	135.13	S-SCLNSTR
1006302	03/05/2010	S-IDRAIN	1435 6TH ST	BIRMINGHAM ST	2	134.34	S-SCLNSTR
1006310	03/05/2010	S-IDRAIN	2047 IOWA AVE	FURNESS PKWY	2	495.48	S-SCLNSTR S-SCLNSTR
1006340	03/05/2010	S-IDRAIN	1655 FERNWOOD ST	LARPENTEUR AVE	1	279.64	S-SCLNSTR
1006410	03/05/2010	S-IDRAIN	539 GLENDALE ST	DOANE AVE	4	145.34	S-SCLNSTR
1006436	03/05/2010	S-IDRAIN	HAMLINE AVE	LAFOND AVE	1	39.10	S-SCLNSTR
1006437	03/05/2010	S-IDRAIN	14 CROCUS HL	DALE ST	1	39.10	S-SCLNSTR
1006456	03/05/2010	S-IDRAIN	ALBERT ST	TAYLOR AVE	2	39.10	S-SCLNSTR

1006464	03/05/2010	S-IDRAIN	681 FARRINGTON ST	VAN BUREN AVE	1	78.19	S-SCLNSTR
1006479	03/08/2010	S-IDRAIN	REANEY AVE	JOHNSON PKWY	2	504.09	S-SCLNSTR S-SINSSITE
1006496	03/05/2010	S-ISTR	1840 PRINCETON AVE	FAIRVIEW AVE	1	118.37	S-SCLNSTR
1006521	03/05/2010	S-IDRAIN	1317 BURNS AVE	CLARENCE ST	1	150.90	S-SCLNSTR
1006542	03/08/2010	S-IDRAIN	1640 IVY AVE	KENNARD ST	1	272.03	S-SCLNSTR S-SCLNSTR
1006553	03/05/2010	S-IDRAIN	2410 MYRTLE AVE	PELHAM BLVD	1	96.88	S-SCLNSTR
1006616	03/08/2010	S-IDRAIN	KIM PL	HAZEL ST	1	281.31	S-SCLNSTR S-SCLNSTR
1006617	03/08/2010	S-IDRAIN	LARRY HO DR	MICHAEL ST	1	206.74	S-SCLNSTR
1006619	03/08/2010	S-IDRAIN	LARRY HO DR	WINTHROP ST	1	206.74	S-SCLNSTR
1006639	03/08/2010	S-IDRAIN	SELBY AVE	WESTERN AVE	1	193.76	S-SCLNSTR
1006670	03/08/2010	S-IDRAIN	433 MENDOTA ST	MAPLE AVE	1	96.88	S-SCLNSTR
1006683	03/08/2010	S-IDRAIN	NORTH PARK DR	WINTHROP ST	1	78.19	S-SCLNSTR
1006761	03/09/2010	S-IDRAIN	HAZEL ST	WILSON AVE	2	484.40	S-SCLNSTR
1006824	03/09/2010	S-IDRAIN	419 BURGESS ST		1	193.76	S-SCLNSTR
1006859	03/10/2010	S-IDRAIN	SNELLING AVE	UNIVERSITY AVE	1	242.21	S-SCLNSTR
1006945	03/11/2010	S-IDRAIN	MARION ST	WAYZATA ST	1	145.34	S-SCLNSTR
1007034	03/11/2010	S-IDRAIN	1150 JENKS AVE	DULUTH ST	1	290.64	S-SCLNSTR
1007189	03/12/2010	S-IDRAIN	NORTH PARK DR	FAYE ST	2	193.76	S-SCLNSTR
1007987	03/20/2010	S-CJET	SHEPARD RD	JACKSON ST	4	709.05	S-SCLNSTR
1008601	03/25/2010	S-CJET	JOHNSON PKWY	BUSH AVE	1	608.55	S-SCLNSTR S-SREPSTR
1008648	03/26/2010	S-ISTR	ARKWRIGHT ST	MAGNOLIA AVE	2	1562.30	S-SREPSTR S-SCLNSTR
1009009	03/29/2010	S-CJET	RANDOLPH AVE	SNELLING AVE	1	211.77	S-SCLNSTR
1009012	03/29/2010	S-CJET	1413 ENERGY PARK DR	SNELLING AVE	1	2188.60	S-SCLNSTR S-SCLNSTR S-SCLNSTR
1009054	03/30/2010	S-CJET	SHEPARD RD	JACKSON ST	4	1117.67	S-SCLNSTR
1009234	03/30/2010	S-CJET	RANDOLPH AVE	FAIRVIEW AVE	1	335.32	S-SCLNSTR
1009236	03/30/2010	S-CJET	RANDOLPH AVE	FAIRVIEW AVE	1	223.53	S-SCLNSTR
1009429	03/31/2010	S-CJET	60 EMPIRE DR	JACKSON ST	1	211.77	S-SCLNSTR
1009491	04/01/2010	S-CJET	THOMAS AVE	DUNLAP ST	1	211.77	S-SCLNSTR
1009753	04/02/2010	S-IDRAIN	PAYNE AVE	CASE AVE	4	317.65	S-SCLNSTR
1009833	04/02/2010	S-CJET	DAYTON AVE	DALE ST	1	635.31	S-SCLNSTR
1010035	04/06/2010	S-IODOR	610 DESNOYER AVE	CURFEW ST	2	335.32	S-SCLNSTR
1010219	04/06/2010	S-CJET	THOMAS AVE	DUNLAP ST	1	223.53	S-SCLNSTR
1010242	04/06/2010	S-CJET	2083 SCENIC PL	PEDERSEN ST	1	1655.54	S-SCLNSTR S-SCLNSTR S-SCLNSTR
1010380	04/07/2010	S-CJET	SHERBURNE AVE	MARION ST	1	284.04	S-SCLNSTR
1010382	04/07/2010	S-CJET	CASE AVE	MENDOTA ST	1	94.68	S-SCLNSTR
1010384	04/07/2010	S-RREPAIR	MENDOTA ST	COOK AVE	1	284.04	S-SCLNSTR

1010408	04/08/2010	S-IDRAIN	CHARLES AVE	ARUNDEL ST	1	335.32	S-SCLNSTR
1010594	04/08/2010	S-CJET	2101 CONWAY ST	PEDERSEN ST	1	335.32	S-SCLNSTR
1010818	04/12/2010	S-CJET	1176 COOK AVE	DULUTH ST	1	223.53	S-SCLNSTR
1011064	04/13/2010	S-CJET	30 DARLENE ST	UPPER AFTON RD	1	830.19	S-SCLNSTR S-SCLNSTR S-SCLNSTR
1011065	04/13/2010	S-CJET	AVON ST	WHEELOCK PKWY	1	203.12	S-SCLNSTR
1011455	04/15/2010	S-CJET	JESSAMINE AVE	LEXINGTON PKWY	1	101.29	S-SCLNSTR
1011784	04/20/2010	S-CJET	775 GERANIUM AVE	WEIDE ST	3	946.49	S-SCLNSTR
1011862	04/19/2010	S-CJET	1081 PAYNE AVE	MAGNOLIA AVE	1	223.53	S-SCLNSTR
1012178	04/21/2010	S-CJET	HAMLINE AVE	CONCORDIA AVE	1	223.53	S-SCLNSTR
1012196	09/17/2010	S-CLIST	SURREY AVE	MARIA AVE	2	44.56	S-SCLNSTR
1012198	09/17/2010	S-CLIST	WILSON AVE	MENDOTA ST	1	89.10	S-SCLNSTR
1012201	09/20/2010	S-CLIST	EUCLID ST	MENDOTA ST	1	88.54	S-SCLNSTR
1012205	09/20/2010	S-CLIST	FREMONT AVE	FOREST ST	1	44.29	S-SCLNSTR
1012365	09/20/2010	S-CLIST	4TH ST	FOREST ST	1	44.29	S-SCLNSTR
1012366	09/20/2010	S-CLIST	PACIFIC ST	EARL ST	2	44.29	S-SCLNMAIN S-SCLNSTR
1012368	09/20/2010	S-CLIST	1211 4TH ST	GOTZIAN ST	1	88.54	S-SCLNSTR
1012370	09/20/2010	S-CLIST	OLD HUDSON RD	BIRMINGHAM ST	1	44.29	S-SCLNSTR
1012374	09/20/2010	S-CLIST	839 4TH ST	HOPE ST	1	44.29	S-SCLNSTR
1012375	09/20/2010	S-CLIST	5TH ST	KENNARD ST	2	88.54	S-SCLNSTR
1012568	04/24/2010	S-IDRAIN	MINNEHAHA AVE	WESTERN AVE	1	44.13	S-SCLNSTR
1012758	09/22/2010	S-CLIST	FREMONT AVE	HAZEL ST	4	88.54	S-SCLNSTR
1012763	09/22/2010	S-CJET	2117 MARGARET ST	WINTHROP ST	2	132.83	S-SCLNSTR
1012765	09/23/2010	S-CLIST	FREMONT AVE	PEDERSEN ST	2	88.54	S-SCLNSTR
1012766	09/23/2010	S-CLIST	5TH ST	WINTHROP ST	2	44.29	S-SCLNSTR
1012768	09/23/2010	S-CLIST	REANEY AVE	PEDERSEN ST	2	88.54	S-SCLNSTR
1012773	09/23/2010	S-CLIST	REANEY AVE	PEDERSEN ST	2	44.29	S-SCLNSTR
1012775	09/23/2010	S-CLIST	REANEY AVE	WHITE BEAR AVE	1	44.29	S-SCLNSTR
1012776	09/23/2010	S-CLIST	7TH ST	HAZEL ST	1	44.29	S-SCLNSTR
1012826	09/23/2010	S-CLIST	7TH ST	WHITE BEAR AVE	1	44.29	S-SCLNSTR
1012827	09/23/2010	S-CLIST	7TH ST	WHITE BEAR AVE	1	44.29	S-SCLNSTR
1012828	09/23/2010	S-CLIST	1891 STILLWATER AVE	VAN DYKE ST	1	88.54	S-SCLNSTR
1012829	09/24/2010	S-CLIST	STILLWATER AVE	FLANDRAU ST	1	44.29	S-SCLNSTR
1012830	09/24/2010	S-CLIST	ROSS AVE	FLANDRAU ST	1	44.29	S-SCLNSTR
1012832	09/24/2010	S-CLIST	1515 STILLWATER AVE	HAZELWOOD ST	1	44.29	S-SCLNSTR
1012833	09/24/2010	S-CLIST	1801 MECHANIC AVE	VAN DYKE ST	1	44.29	S-SCLNSTR
1012835	09/24/2010	S-CLIST	REANEY AVE	DULUTH ST	1	44.29	S-SCLNSTR

1012836	09/24/2010	S-CLIST	MINNEHAHA AVE	DULUTH ST	1	44.29	S-SCLNSTR
1012890	04/28/2010	S-CJET	1822 BERKELEY AVE		6	335.32	S-SCLNSTR
1012891	09/24/2010	S-CLIST	MINNEHAHA AVE	JOHNSON PKWY	1	44.29	S-SCLNSTR
1012894	09/24/2010	S-CLIST	BEECH ST	ATLANTIC ST	1	44.29	S-SCLNSTR
1012912	09/24/2010	S-CLIST	DALE ST	HOYT AVE	2	64.74	S-SCLNSTR
1012963	09/17/2010	S-CLIST	FRONT AVE	MACKUBIN ST	8	89.10	S-SCLNSTR
1012976	09/24/2010	S-CLIST	WELLS ST	MENDOTA ST	2	68.09	S-SCLNSTR
1012981	09/27/2010	S-CLIST	HALL AVE	PROSPECT BLVD	2	138.87	S-SCLNSTR
1013335	04/30/2010	S-CJET	CRETIN AVE	FORD PKWY	1	351.01	S-SCLNSTR
1013367	05/03/2010	S-CJET	PASCAL ST	ST ANTHONY AVE	1	335.33	S-SCLNSTR
1013498	05/03/2010	S-CTVPREP	CLEVELAND AVE	MISS RIVER BLVD	1	1229.47	S-SCLNSTR S-SCLNSTR S-SCLNSTR
1013527	05/04/2010	S-CJET	PEDERSEN ST	SCENIC PL	1	782.40	S-SCLNSTR S-SCLNSTR
1013814	05/05/2010	S-CJET	RANDOLPH AVE	FAIRVIEW AVE	1	223.54	S-SCLNSTR
1014055	05/07/2010	S-CJET	RANDOLPH AVE	WHEELER ST	1	223.54	S-SCLNSTR
1014057	05/06/2010	S-CJET	1809 RANDOLPH AVE	FAIRVIEW AVE	1	447.08	S-SCLNSTR
1014199	05/10/2010	S-CJET	UPPER AFTON RD	FLANDRAU ST	4	223.53	S-SCLNSTR
1014382	05/10/2010	S-CJET	PRIOR AVE	PORTLAND AVE	1	457.54	S-SCLNSTR S-SCLNSTR
1014424	05/10/2010	S-CJET	THOMAS AVE	WESTERN AVE	1	607.62	S-SCLNSTR S-SCLNSTR
1014487	05/11/2010	S-IDRAIN	5TH ST		2	111.78	S-SCLNSTR
1014488	05/11/2010	S-IDRAIN	5TH ST	MINNESOTA ST	1	111.78	S-SCLNSTR
1014497	05/11/2010	S-CJET	CHARLES AVE	DALE ST	2	351.02	S-SCLNSTR
1014499	05/11/2010	S-CJET	6TH ST	JACKSON ST	1	111.78	S-SCLNSTR
1014520	05/11/2010	S-IDRAIN	FOREST ST	EUCLID ST	1	351.02	S-SCLNSTR
1014584	05/11/2010	S-IDRAIN	MARGARET ST	MENDOTA ST	1	223.53	S-SCLNSTR
1014613	05/12/2010	S-IDRAIN	MARYLAND AVE	CYPRESS ST	2	457.55	S-SCLNSTR S-SCLNSTR
1014616	05/11/2010	S-IDRAIN	BEECH ST	MENDOTA ST	1	117.02	S-SCLNSTR
1014718	05/12/2010	S-IDRAIN	PAYNE AVE	IVY AVE	1	223.54	S-SCLNSTR
1014750	05/12/2010	S-IDRAIN	MARYLAND AVE	DULUTH ST	1	223.54	S-SCLNSTR
1014937	05/13/2010	S-IDRAIN	KENT ST	LAFOND AVE	1	223.54	S-SCLNSTR
1014983	05/17/2010	S-CJET	ORANGE AVE	DANFORTH ST	1	325.85	S-SCLNSTR
1014985	05/13/2010	S-CJET	1134 UNIVERSITY AVE	LEXINGTON AVE	1	216.84	S-SCLNSTR
1015302	05/17/2010	S-CJET	SARGENT AVE	SYNDICATE ST	1	406.25	S-SCLNSTR
1015303	05/17/2010	S-CJET	SARATOGA ST	ST CLAIR AVE	1	203.12	S-SCLNSTR S-SCLNSTR
1015399	05/18/2010	S-CJET	EDGCUMBE RD	HAMLINE AVE	1	609.37	S-SCLNSTR
1015625	05/20/2010	S-CJET	EAST SHORE DR	JOHNSON PKWY	1	2191.23	S-SCLNSTR S-SCLNSTR S-SCLNSTR S-SCLNSTR
1015815	05/20/2010	S-CJET	BURNS AVE	ENGLISH ST	1	304.69	S-SCLNSTR
1015816	05/20/2010	S-CJET	775 NEBRASKA	WEIDE ST	1	304.69	S-SCLNSTR

			AVE				
1016940	06/01/2010	S-CJET	DAVERN ST	SHERIDAN AVE	1	468.01	S-SCLNSTR
1017038	06/04/2010	S-CJET	FOREST ST	WELLS ST	1	507.81	S-SCLNSTR
1017083	06/02/2010	S-CJET	DAVERN ST	SHERIDAN AVE	1	670.60	S-SCLNSTR
1017102	06/08/2010	S-CJET	CLEVELAND AVE	HENDON AVE	2	1836.30	S-SCLNSTR S-SCLNSTR
1017348	06/04/2010	S-CJET	BURNS AVE	RUTH ST	1	203.12	S-SCLNSTR
1017349	06/04/2010	S-CJET	BURNS AVE	RUTH ST	1	1199.14	S-SCLNSTR S-SCLNSTR
1017448	06/04/2010	S-CJET	MARYLAND AVE	35 E	1	304.69	S-SCLNSTR
1017594	06/07/2010	S-CJET	MARYLAND AVE	JACKSON ST	1	406.25	S-SCLNSTR
1017595	06/07/2010	S-CJET	EARL ST	CASE AVE	1	609.37	S-SCLNSTR
1017629	06/08/2010	S-IDRAIN	1691 IOWA AVE		1	962.95	S-SCLNSTR S-SCLNSTR
1017630	06/08/2010	S-IHOLE	1626 DAYTON AVE	FRY ST	1	113.02	S-SCLNSTR
1017736	06/18/2010	S-CJET	318 WATER ST	OHIO ST	3	422.07	S-SCLNSTR
1017888	06/09/2010	S-CJET	FRANK ST	REANEY AVE	1	678.68	S-SCLNSTR
1017890	06/09/2010	S-RREPAIR	ESCANABA	NOKOMIS AVE	1	455.14	S-SCLNSTR
1017894	06/11/2010	S-IDRAIN	OSCEOLA AVE	SYNDICATE ST	2	455.14	S-SREPSTR S-SCLNSTR
1018095	06/11/2010	S-CJET	GERANIUM AVE	WALSH ST	1	447.08	S-SCLNSTR
1018298	06/14/2010	S-CJET	1240 BEECH ST	ATLANTIC ST	1	202.56	S-SCLNSTR
1018315	06/15/2010	S-IDRAIN	ALBEMARLE ST	ORANGE AVE	2	303.86	S-SCLNSTR
1018323	06/15/2010	S-IDRAIN	2177 IGLEHART AVE	CRETIN AVE	2	202.56	S-SCLNSTR
1018333	06/14/2010	S-IDRAIN	1077 BARRETT ST	JESSAMINE AVE	1	101.29	S-SCLNSTR
1018422	06/15/2010	S-CJET	MARYLAND AVE	JACKSON ST	1	506.42	S-SCLNSTR S-SCLNSTR
1018457	06/28/2010	S-CLIST	559 LAWSON AVE	JESSIE ST	1	223.53	S-SCLNSTR
1018458	11/05/2010	S-CLIST	559 LAWSON AVE	JESSIE ST	1	177.08	S-SCLNSTR
1018477	06/15/2010	S-CJET	FRANK ST	REANEY AVE	2	1054.77	S-SCLNSTR S-SCLNSTR
1018614	06/16/2010	S-CJET	SUBURBAN AVE	WINTHROP ST	1	674.66	S-SCLNSTR
1018658	06/16/2010	S-CJET	FORD PKWY	FAIRVIEW AVE	2	478.32	S-SCLNSTR
1018667	06/17/2010	S-IDRAIN	IDAHO AVE	EDGERTON ST	1	448.20	S-SCLNSTR
1018671	06/18/2010	S-IDRAIN	NEVADA AVE	FLANDRAU ST	1	422.07	S-SCLNSTR
1018892	06/21/2010	S-CJET	RANDOLPH	WOODLAWN	1	303.86	S-SCLNSTR
1018978	06/21/2010	S-CJET	444 LYNNHURST AVE	IRIS PL	1	506.42	S-SCLNSTR
1019034	06/21/2010	S-CJET	MARYLAND AVE	35 E	2	1792.94	S-SCLNSTR S-SCLNSTR S-SCLNSTR
1019198	06/23/2010	S-CJET	KLAINERT ST	TIMBERLAKE	1	912.38	S-SCLNSTR S-SCLNSTR S-SCLNSTR
1019267	06/24/2010	S-IDRAIN	CRETIN AVE	IGLEHART AVE	1	203.12	S-SCLNSTR
1019376	06/23/2010	S-CJET	TIMBERLAKE RD	BIGLOW LN	1	203.12	S-SCLNSTR

1019401	06/24/2010	S-IDRAIN	2145 BUSH AVE	WINTHROP ST	4	609.37	S-SCLNSTR
1019487	06/24/2010	S-CJET	TIMBERLAKE RD	BIGLOW LN	1	203.12	S-SCLNSTR
1019523	06/24/2010	S-CJET	MARYLAND AVE	BRADLEY ST	1	406.25	S-SCLNSTR
1019622	06/25/2010	S-IDRAIN	NORTH ST	BATES AVE	8	1035.79	S-SCLNSTR
1019653	06/25/2010	S-CJET	MARYLAND AVE	JACKSON ST	1	1380.61	S-SCLNSTR S-SCLNSTR
1019808	06/28/2010	S-IDRAIN	2204 7TH ST		1	223.53	S-SCLNSTR
1019841	06/28/2010	S-IDRAIN	HARVARD ST	WINONA ST	1	111.78	S-SCLNSTR
1019886	06/29/2010	S-CJET	MINNESOTA ST	7TH ST	1	710.94	S-SCLNSTR
1019972	06/30/2010	S-CJET	1397 HIGHLAND PKWY	ALBERT ST	4	609.37	S-SCLNSTR
1020040	08/23/2010	S-CJET	1317 BURNS AVE	ENGLISH ST	1	3652.33	S-SREPSTR S-SCLNSTR
1020094	06/29/2010	S-CJET	WYCLIFF ST	BRADFORD ST	1	710.11	S-SCLNSTR S-SCLNSTR
1020095	06/29/2010	S-CJET	1296 OSCEOLA AVE	SYNDICATE ST	1	203.12	S-SCLNSTR
1020235	07/01/2010	S-IDRAIN	HARTFORD AVE	DAVERN ST	3	778.96	S-SCLNSTR S-SCLNSTR
1020242	06/30/2010	S-CJET	EUSTIS ST	COMO AVE (300' S OF COMO E SIDE OF STRT)	1	304.69	S-SCLNSTR
1020284	06/30/2010	S-CJET	PASCAL ST	CHARLES AVE	1	609.38	S-SCLNSTR S-SCLNSTR
1020447	07/02/2010	S-IDRAIN	1004 MANVEL ST	BAYLESS	2	223.54	S-SCLNSTR
1020450	07/01/2010	S-CJET	515 CLEVELAND AVE	GILBERT AVE	1	101.56	S-SCLNSTR
1020451	07/01/2010	S-CJET	508 CLEVELAND AVE	GILBERT AVE	1	338.12	S-SCLNSTR
1020452	07/01/2010	S-CJET	MARYLAND AVE	JACKSON ST	1	811.67	S-SCLNSTR S-SCLNSTR
1020706	07/06/2010	S-IDRAIN	JAMES AVE	WHEELER ST	1	303.86	S-SCLNSTR
1020793	07/07/2010	S-IDRAIN	919 DAYTON AVE	MILTON ST	1	203.12	S-SCLNSTR
1020899	07/08/2010	S-CJET	UNIVERSITY AVE	MONTGOMERY ST	1	507.81	S-SCLNSTR
1021016	07/08/2010	S-CJET	1144 COMO AVE	LEXINGTON AVE	1	304.69	S-SCLNSTR
1021020	07/08/2010	S-CJET	IDAHO AVE	ARUNDEL ST	1	833.46	S-SCLNSTR
1021190	07/09/2010	S-CJET	1626 DAYTON AVE	FRY ST	1	560.25	S-SCLNSTR S-SCLNSTR
1021225	07/14/2010	S-RREPAIR	PAYNE AVE	BEAUMONT ST	2	1529.08	S-SREPSTR S-SCLNSTR
1021295	07/13/2010	S-IDRAIN	662 CONWAY ST	MARIA AVE	2	336.15	S-SCLNSTR
1021327	07/13/2010	S-IDRAIN	NORTH ST	BATES AVE	1	224.09	S-SCLNSTR
1021331	07/13/2010	S-IDRAIN	1635 SHERBURNE AVE	FRY ST	2	224.09	S-SCLNSTR
1021335	07/12/2010	S-CJET	GERANIUM AVE	WALSH ST	1	448.20	S-SCLNSTR
1021336	07/12/2010	S-CJET	FAIRVIEW AVE	HILLCREST AVE	4	336.16	S-SCLNSTR
1021373	07/13/2010	S-CJET	UNIVERSITY AVE	MARION ST	1	112.05	S-SCLNSTR
1021503	07/13/2010	S-IDRAIN	LOUIS ST	DAYTON AVE	1	224.09	S-SCLNSTR

1021542	07/14/2010	S-IDRAIN	AURORA AVE	MILTON ST	2	1015.62	S-SCLNSTR
1021548	07/14/2010	S-CJET	UNIVERSITY AVE	PRIOR AVE	1	1391.76	S-SCLNSTR S-SCLNSTR S-SCLNSTR
1021723	07/15/2010	S-IDRAIN	CARROLL	OXFORD ST	1	406.25	S-SCLNSTR
1021818	07/15/2010	S-ICOVER	IVY AVE	HAZELWOOD ST	2	78.82	S-SCLNSTR
1021844	07/15/2010	S-IDRAIN	WAYZATA ST	MARION ST	6	54.80	S-SCLNSTR
1021847	07/15/2010	S-IDRAIN	MILFORD ST	MARION ST	8	270.62	S-SCLNSTR
1021894	07/15/2010	S-CJET	648 BURLINGTON RD	WINTHROP ST	1	304.69	S-SCLNSTR
1021902	07/15/2010	S-CJET	NORTH PARK DR	MCKNIGHT RD	1	203.12	S-SCLNSTR
1022004	07/16/2010	S-CJET	GRAND AVE	LEXINGTON AVE	1	202.56	S-SCLNSTR
1022005	07/16/2010	S-CJET	MARION ST	ATWATER ST	2	405.13	S-SCLNSTR
1022160	07/19/2010	S-ISTR	MOUNT HOPE ST	PRESCOTT ST	1	97.88	S-SCLNSTR
1022186	07/19/2010	S-CJET	VAN BUREN AVE	SIMPSON ST	1	67.50	S-SCLNSTR
1022187	07/19/2010	S-CJET	THOMAS AVE	CHATSWORTH ST	1	405.13	S-SCLNSTR
1022192	07/19/2010	S-CJET	THOMAS AVE	OXFORD ST	1	202.56	S-SCLNSTR
1022967	07/26/2010	S-IDRAIN	PORTLAND AVE	SNELLING AVE	1	190.06	S-SCLNSTR
1022971	07/27/2010	S-IDRAIN	WEIDE ST	JENKS AVE	3	380.12	S-SCLNSTR
1023027	07/26/2010	S-CJET	JOHN ST	8TH ST	1	285.09	S-SCLNSTR
1023093	07/27/2010	S-CJET	FAIRVIEW AVE	FORD PKWY	1	190.06	S-SCLNSTR
1023594	08/02/2010	S-CJET	FAIRVIEW AVE	FORD PKWY	1	304.69	S-SCLNSTR
1023595	08/02/2010	S-CJET	FAIRVIEW AVE	PINEHURST AVE	1	203.12	S-SCLNSTR
1023619	07/30/2010	S-IDRAIN	792 ROSE AVE	WEIDE ST	6	301.56	S-SCLNSTR
1023625	07/29/2010	S-CJET	FAIRVIEW AVE	JUNO AVE	1	607.69	S-SCLNSTR
1023758	08/02/2010	S-IDRAIN	PORTLAND AVE	ARUNDEL ST	3	101.56	S-SCLNSTR
1023863	08/02/2010	S-CJET	NEVADA AVE	EDGERTON ST	1	581.25	S-SINSSITE S-SCLNSTR
1024242	08/05/2010	S-ISTR	LAWSON AVE	MENDOTA ST	6	405.13	S-SCLNSTR
1024587	08/11/2010	S-IDRAIN	MARION ST	WAYZATA ST	6	101.29	S-SCLNSTR
1024653	08/10/2010	S-CJET	GRAND AVE	MILTON ST	1	717.06	S-SCLNSTR S-SCLNSTR S-SCLNSTR
1024654	08/10/2010	S-RREPAIR	GRAND AVE	OXFORD ST	1	170.80	S-SCLNSTR
1024656	08/11/2010	S-IDRAIN	JENKS AVE	MENDOTA ST	6	101.29	S-SCLNSTR
1024723	08/10/2010	S-IDRAIN	JEFFERSON AVE	CLEVELAND AVE	1	103.30	S-SCLNSTR
1024746	08/10/2010	S-CJET	CONGRESS ST	WABASHA ST	1	206.60	S-SCLNSTR
1024749	08/10/2010	S-IDRAIN	JEFFERSON AVE	DAVERN ST	1	103.30	S-SCLNSTR
1024750	08/10/2010	S-IDRAIN	JEFFERSON AVE	SYNDICATE ST	1	206.60	S-SCLNSTR
1024792	08/10/2010	S-CJET	849 WINTHROP ST	SPRINGSIDE	1	1018.88	S-SCLNSTR S-SCLNSTR S-SCLNSTR
1024953	08/13/2010	S-CJET	ENERGY PARK DR	MIDWAY STADIUM	2	101.29	S-SCLNSTR
1025255	08/13/2010	S-IDRAIN	WOODBRIDGE ST	NEBRASKA AVE	1	271.55	S-SINSSITE S-SCLNSTR
1025281	08/13/2010	S-IDRAIN	HATCH AVE	MATILDA ST	1	303.86	S-SCLNSTR
1025414	08/16/2010	S-IDRAIN	ARCH	L'ORIENT	1	143.05	S-SCLNSTR

1025445	08/16/2010	S-IDRAIN	FOREST ST	WILSON AVE	6	161.64	S-SCLNSTR
1025450	08/13/2010	S-CJET	RICE ST	ARLINGTON AVE	1	112.06	S-SCLNSTR
1025687	08/17/2010	S-IDRAIN	DAYTON AVE	MILTON ST	1	304.69	S-SCLNSTR
1026248	08/23/2010	S-CJET	WINTER ST	CAPITOL BLVD	3	405.13	S-SCLNSTR
1026606	08/24/2010	S-IDRAIN	COMO AVE	GIBBS AVE	1	111.78	S-SCLNSTR
1026745	08/30/2010	S-CJET	566 SUMMIT AVE	OAKLAND AVE	1	203.12	S-SCLNSTR
1026748	08/26/2010	S-CJET	MISS RIVER BLVD	ELSIE	1	203.12	S-SCLNSTR
1026749	08/26/2010	S-CJET	MISS RIVER BLVD	ELSIE	1	203.12	S-SCLNSTR
1026764	08/25/2010	S-CJET	MARSHALL AVE	SNELLING AVE	1	202.56	S-SCLNSTR
1026947	08/27/2010	S-CJET	BURNS AVE	WINTHROP ST	1	1015.62	S-SCLNSTR S-SCLNSTR
1026949	08/27/2010	S-CJET	BURNS AVE	WINTHROP ST	1	608.25	S-SCLNSTR S-SCLNSTR
1026950	08/26/2010	S-CJET	BURNS AVE	PEDERSEN ST	1	229.76	S-SCLNSTR
1026951	08/27/2010	S-CJET	2041 BURNS AVE	RUTH ST	1	873.72	S-SCLNSTR S-SCLNSTR
1027143	08/27/2010	S-CJET	1512 ALBEMARLE ST	NEBRASKA AVE	1	203.12	S-SCLNSTR
1027287	08/30/2010	S-CJET	GORMAN AVE	STEVENS ST	1	406.25	S-SCLNSTR
1027558	09/01/2010	S-IODOR	SPRINGSIDE DR	BURLINGTON RD	3	335.32	S-SCLNSTR S-SCLNSTR
1027665	09/02/2010	S-IDRAIN	1456 EDMUND AVE	PASCAL ST	4	223.53	S-SCLNSTR
1028271	09/08/2010	S-CJET	BURNS AVE	WINTHROP ST	1	340.62	S-SCLNSTR
1028353	09/09/2010	S-ISTR	1100 PAYNE AVE	JESSAMINE AVE	1	102.19	S-SCLNSTR S-SCLNSTR
1028354	09/09/2010	S-ISTR	RAYMOND AVE	DOSWELL AVE	2	86.44	S-SCLNSTR S-SCLNSTR
1028666	09/13/2010	S-CJET	ST CLAIR AVE	FAIRVIEW AVE	3	132.83	S-SCLNSTR
1028753	09/13/2010	S-CJET	BURNS AVE	WINTHROP ST	1	88.54	S-SCLNSTR
1028754	09/13/2010	S-CJET	BLAIR AVE	SYNDICATE ST	1	88.54	S-SCLNSTR
1028842	09/20/2010	S-CJET	748 BURR ST	MINNEHAHA AVE	2	135.13	S-SCLNSTR
1029178	09/16/2010	S-CJET	541 VIRGINIA ST	CHARLES AVE	2	67.56	S-SCLNSTR
1029199	09/16/2010	S-CJET	SIMPSON ST	MINNEHAHA AVE	1	135.13	S-SCLNSTR
1029331	09/20/2010	S-CJET	CASE AVE	DESOTO ST	1	88.54	S-SCLNSTR
1029332	09/17/2010	S-CJET	PELHAM BLVD	MYRTLE ST	1	89.10	S-SCLNSTR
1029410	09/20/2010	S-CJET	SHEPARD RD	WASHINGTON ST	4	135.13	S-SCLNSTR
1029411	09/20/2010	S-CJET	280 SUMMIT AVE	NINA ST	2	67.56	S-SCLNSTR
1029598	09/21/2010	S-IDRAIN	PENNSYLVANIA AVE	JACKSON ST	6	88.54	S-SCLNSTR
1029602	09/22/2010	S-IDRAIN	RICE ST	COMO AVE	1	132.83	S-SCLNSTR
1029631	09/21/2010	S-IDRAIN	600 ROSE AVE	PAYNE AVE	1	44.28	S-SCLNSTR
1029658	09/21/2010	S-CJET	471 LYNNHURST AVE	IRIS PL	2	88.54	S-SCLNSTR
1029659	09/21/2010	S-CJET	5 IRIS PL	LYNNHURST AVE	1	132.83	S-SCLNSTR
1029660	09/22/2010	S-CJET	422 PIERCE ST	SHIELDS AVE	1	328.16	S-SCLNSTR S-

							SCLNSTR
1029661	09/22/2010	S-CJET	2360 DAYTON AVE	MISS RIVER BLVD	1	44.28	S-SCLNSTR
1029663	09/22/2010	S-CJET	1424 UPPER AFTON RD	BURNS AVE	1	132.82	S-SCLNSTR
1029982	09/23/2010	S-IDRAIN	HOWELL ST	RANDOLPH AVE	2	34.06	S-SCLNSTR
1030000	10/01/2010	S-CJET	577 STATE ST	KING ST	1	101.36	S-SCLNSTR
1030001	09/29/2010	S-CJET	571 STATE ST	STEVENS ST	1	293.05	S-SCLNSTR S-SCLNSTR
1030003	09/23/2010	S-IDRAIN	HOWELL ST	CHELTON AVE	1	110.07	S-SCLNSTR
1030009	09/23/2010	S-IDRAIN	WHEELOCK PKWY	35 E	2	33.17	S-SCLNSTR
1030041	09/23/2010	S-IDRAIN	2003 JEFFERSON AVE	DAVERN ST	2	102.19	S-SCLNSTR
1030273	09/27/2010	S-IDRAIN	150 PLATO BLVD		4	44.29	S-SCLNSTR
1030306	09/27/2010	S-CJET	1635 LAWSON AVE	PAYNE AVE	1	138.87	S-SCLNSTR
1030450	09/29/2010	S-RREPAIR	571 STATE ST	STEVENS ST	1	51.53	S-SCLNSTR
1030671	09/29/2010	S-IDRAIN	EDGERTON ST	JESSAMINE AVE	1	202.69	S-SCLNSTR
1030672	09/29/2010	S-ISTR	MINNEHAHA AVE	RIVOLI ST	1	12.43	S-SCLNSTR
1031025	10/01/2010	S-CJET	SHEPARD RD	CHESTNUT ST	94	2484.61	S-SCLNSTR S-SCLNSTR S-SCLNSTR
1031490	10/06/2010	S-CJET	1656 SUBURBAN AVE	KENNARD ST	1	95.85	S-SCLNSTR
1031501	10/05/2010	S-CJET	CEDAR ST	4TH AVE	1	317.59	S-SCLNSTR
1031923	10/07/2010	S-CJET	ROBERT ST	CESAR CHAVEZ ST	1	461.70	S-SCLNSTR S-SCLNSTR
1032212	10/11/2010	S-CJET	915 HATCH AVE	COLNE ST	1	112.31	S-SCLNSTR
1032213	10/11/2010	S-CJET	UNIVERSITY AVE	ST ALBANS ST	2	290.50	S-SCLNSTR S-SCLNSTR S-SCLNSTR
1032367	10/12/2010	S-CJET	SHERBURNE AVE	ALBERT ST	1	89.10	S-SCLNSTR
1032535	10/13/2010	S-CJET	NORTH PARK DR	MCKNIGHT RD	1	202.69	S-SCLNSTR
1032720	10/15/2010	S-IDRAIN	2015 IVY AVE	RUTH ST	5	309.90	S-SCLNSTR
1032868	10/15/2010	S-CJET	SUNNY SLOPE LN	EDGCUMBE RD	3	132.83	S-SCLNSTR
1032869	10/15/2010	S-CJET	BLAIR AVE	GROTTO ST	1	88.54	S-SCLNSTR
1033354	11/17/2010	S-CJET	1232 BREEN ST	HAWTHORNE AVE	1	191.69	S-SCLNSTR
1033358	10/19/2010	S-CJET	COMMERCIAL ST	4TH AVE	1	204.37	S-SCLNSTR
1033476	10/21/2010	S-CJET	917 DAYTON AVE		5	509.82	S-SCLNMAIN S-SCLNSTR
1033736	10/21/2010	S-CJET	1517 ST CLAIR AVE	SARATOGA ST	1	211.98	S-SCLNSTR S-SCLNSTR
1033737	10/21/2010	S-CJET	MISS RIVER BLVD	DAYTON AVE	1	67.56	S-SCLNSTR
1033846	10/21/2010	S-CJET	RICE ST	ARLINGTON AVE	1	67.56	S-SCLNSTR
1034110	10/28/2010	S-CJET	922 MILTON ST	FULLER AVE	6	133.66	S-SCLNSTR
1034263	10/25/2010	S-CJET	FULLER AVE	MILTON ST	1	89.09	S-SCLNSTR

1034410	10/26/2010	S-CJET	MINNEHAHA AVE	CYPRESS ST	1	65.78	S-SCLNSTR
1034522	10/26/2010	S-IDRAIN	2008 VILLARD AVE	RETURN CT	2	89.10	S-SCLNSTR
1034544	10/26/2010	S-IDRAIN	840 LAKE ST	7TH ST	1	89.10	S-SCLNSTR
1034622	10/28/2010	S-CJET	1701 PALACE AVE	DAVERN ST	1	89.10	S-SCLNSTR
1034626	10/28/2010	S-CJET	1096 SNELLING AVE	EDGCUMBE RD	1	89.10	S-SCLNSTR
1034630	10/28/2010	S-CJET	ST CLAIR AVE	STONEBRIDGE BLVD	1	133.66	S-SCLNSTR
1034819	10/28/2010	S-CJET	HAZEL ST	NEBRASKA AVE	1	89.10	S-SCLNSTR
1034849		S-CLIST	CHATSWORTH ST	RANDOLPH AVE	5	132.82	S-SCLNSTR
1034852	04/06/2011	S-CLIST	OSCEOLA AVE	VICTORIA ST	1	88.56	S-SCLNSTR S-SINSSITE
1034972	10/29/2010	S-CJET	300 5TH ST	BROADWAY ST	1	354.16	S-SCLNSTR
1034974	10/29/2010	S-CJET	3RD ST	BIRMINGHAM ST	1	88.54	S-SCLNSTR
1034978	10/29/2010	S-CJET	BAKER ST	CHIPPEWA AVE	1	132.83	S-SCLNSTR
1034979	10/29/2010	S-CJET	2200 CONWAY AVE	HOWARD ST	1	132.83	S-SCLNSTR
1035400	11/02/2010	S-CJET	720 CYPRESS ST	MINNEHAHA AVE	1	67.56	S-SCLNSTR
1035401	11/02/2010	S-CJET	721 CYPRESS ST	MINNEHAHA AVE	1	33.79	S-SCLNSTR
1035402	11/02/2010	S-CJET	1207 HAMLINE AVE	COMO AVE	1	168.92	S-SCLNSTR
1035403	11/02/2010	S-CJET	EARL ST	FREMONT ST	2	33.79	S-SCLNSTR
1035521	11/02/2010	S-CJET	MISS RIVER BLVD	DAYTON AVE	1	33.79	S-SCLNSTR
1035833	11/05/2010	S-CJET	935 WESTGATE DR	TERRITORIAL RD	1	132.83	S-SCLNSTR
1035837	11/19/2010	S-CJET	AYD MILL RD	GRAND AVE	1	177.07	S-SCLNSTR
1035851	11/05/2010	S-IDRAIN	MAGNOLIA AVE	MISSISSIPPI ST	1	280.22	S-SCLNSTR S-SCLNSTR
1036044	11/05/2010	S-CJET	451 TOTEM RD	BURLINGTON RD	1	132.83	S-SCLNSTR
1036271	11/08/2010	S-CJET	CENTRAL AVE	CHATSWORTH ST	2	270.54	S-SCLNSTR S-SCLNSTR S-SCLNSTR
1036278	11/08/2010	S-CJET	MARYLAND AVE	KENT ST	1	101.36	S-SCLNSTR
1036285	11/08/2010	S-CJET	1258 MARION ST	ORANGE AVE	1	168.92	S-SCLNSTR S-SCLNSTR
1036314	11/09/2010	S-CJET	ST ALBANS ST	THOMAS AVE	1	67.56	S-SCLNSTR
1036573	11/12/2010	S-CJET	EUCLID ST	MENDOTA ST	1	224.78	S-SCLNSTR S-SCLNSTR
1036574	11/12/2010	S-CJET	NOKOMIS	RUTH	1	122.59	S-SCLNSTR S-SCLNSTR
1036576	11/12/2010	S-CJET	NOKOMIS	TEWANNA	1	122.59	S-SCLNSTR
1037245	11/16/2010	S-CJET	436 EDMUND AVE	ARUNDEL ST	1	259.81	S-SCLNSTR
1037404	11/17/2010	S-IDRAIN	WAYZATA ST	MARION ST	2	95.85	S-SCLNSTR
1037557	11/18/2010	S-CJET	1060 LORIENT ST	ARLINGTON AVE	1	400.96	S-SCLNSTR S-SCLNSTR

1037558	11/18/2010	S-CJET	460 WHITALL ST	DESOTO ST	2	89.10	S-SCLNSTR
1037559	11/19/2010	S-CJET	LIVINGSTON AVE	BELVIDERE ST	1	400.96	S-SCLNSTR S-SCLNSTR
1037858	11/22/2010	S-CJET	1669 RACE ST	ALASKA AVE	1	68.12	S-SCLNSTR
1037859	11/22/2010	S-CJET	LAWSON AVE SE	PAYNE AVE	1	136.25	S-SCLNSTR
1038204	03/30/2011	S-CLIST	29 SUMMIT CT	LAWTON ST	1	44.28	S-SCLNSTR
1038206	03/30/2011	S-CLIST	WESTERN AVE	HOLLY AVE	4	44.28	S-SCLNSTR
1038208	04/05/2011	S-CLIST	WESTERN AVE	SUMMIT AVE	12	222.74	S-SCLNSTR
1038267	11/24/2010	S-CJET	DOUSMAN ST	BANFIL ST	1	394.38	S-SCLNSTR S-SCLNSTR S-SCLNSTR
1038269	11/24/2010	S-CJET	765 MARGARET ST	7TH ST	1	132.83	S-SCLNSTR
1038270	11/24/2010	S-CJET	FAIRMOUNT AVE	SYNDICATE ST	1	132.83	S-SCLNSTR
1038312	11/29/2010	S-CJET	DAYTON AVE	PIERCE ST	1	74.87	S-SCLNSTR
1038313	11/29/2010	S-CJET	DAYTON AVE	ALDINE ST	1	74.87	S-SCLNSTR
1038314	11/29/2010	S-CJET	DAYTON AVE	HERSCHEL ST	1	142.43	S-SCLNSTR S-SCLNSTR
1038339	04/06/2011	S-CLIST	LEXINGTON AVE	NEBRASKA AVE	4	136.14	S-SCLNSTR
1038751	11/30/2010	S-CJET	1660 HUDSON RD	KENNARD ST	1	101.36	S-SCLNSTR
1038765	11/30/2010	S-CJET	765 MARGARET ST	7TH ST	1	101.36	S-SCLNSTR
1038868	12/01/2010	S-CJET	787 JOHNSON PKWY	ROSS AVE	1	133.65	S-SCLNSTR
1038869	12/01/2010	S-CJET	GERANIUM AVE	MATILDA ST	2	311.84	S-SCLNSTR S-SCLNSTR
1041306	12/27/2010	S-IDRAIN	756 UNIVERSITY AVE	GROTTO ST	2	358.02	S-SCLNSTR
1041412	12/28/2010	S-IDRAIN	CENTRAL PARK	COLUMBUS ST	6	325.97	S-SCLNSTR
1041480	12/30/2010	S-IDRAIN	UNIVERSITY AVE	PRIOR AVE	6	1229.85	S-SCLNSTR
1041481	12/31/2010	S-IDRAIN	UNIVERSITY AVE	PRIOR AVE	3	259.32	S-SCLNSTR
1041495	12/29/2010	S-IDRAIN	1764 BEECHWOOD AVE	FAIRVIEW AVE	4	172.88	S-SCLNSTR
1041531	12/30/2010	S-IDRAIN	410 CHARLES AVE	WESTERN AVE	1	43.24	S-SCLNSTR
1041532	12/30/2010	S-IDRAIN	1015 LAFOND AVE	CHATSWORTH ST	1	43.24	S-SCLNSTR
1041579	12/30/2010	S-IDRAIN	556 ASHLAND AVE	KENT ST	3	77.46	S-SCLNSTR S-SCLNSTR
1041601	12/30/2010	S-IDRAIN	1922 PARKLAND CT	VALLEYSIDE DR	1	65.78	S-SCLNSTR
1041603	12/31/2010	S-IDRAIN	CLEAR AVE	GREENBRIER ST	5	166.13	S-SCLNSTR
1041606	12/30/2010	S-IDRAIN	UNIVERSITY AVE	VICTORIA ST	1	64.83	S-SCLNSTR
1041607	12/30/2010	S-IDRAIN	PRIOR AVE	UNIVERSITY AVE	1	134.88	S-SCLNSTR
1041608	12/30/2010	S-IDRAIN	COMO AVE	EUSTIS ST	1	179.82	S-SCLNSTR
1041609	12/30/2010	S-IDRAIN	HAMPDEN AVE	RAYMOND AVE	1	134.88	S-SCLNSTR
1041611	12/30/2010	S-IDRAIN	3RD AVE	PEDERSEN ST	2	197.38	S-SCLNSTR

1041613	12/30/2010	S-IDRAIN	ARCADE ST	COTTAGE AVE	2	153.57	S-SCLNSTR
1041614	12/30/2010	S-IDRAIN	WHITE BEAR AVE	BURNS AVE	1	32.90	S-SCLNSTR
1041615	12/30/2010	S-IDRAIN	1340 FAIRMOUNT AVE	HAMLINE AVE	2	134.88	S-SCLNSTR
1041616	12/30/2010	S-IDRAIN	WHITE BEAR AVE	LARPENTEUR AVE	6	131.57	S-SCLNSTR
1041619	12/30/2010	S-IDRAIN	MINNEHAHA AVE	BIRMINGHAM ST	6	115.12	S-SCLNSTR
1041620	12/30/2010	S-IDRAIN	1984 NOKOMIS AVE	RUTH ST	2	66.83	S-SCLNSTR
1041623	12/30/2010	S-IDRAIN	HAMLINE AVE	THOMAS AVE	2	131.40	S-SCLNSTR
1041625	12/30/2010	S-IDRAIN	FAIRMOUNT AVE	ST ALBANS ST	2	43.24	S-SCLNSTR
1041626	12/30/2010	S-IDRAIN	MINNEHAHA AVE	LEXINGTON PKWY	2	131.40	S-SCLNSTR
1041627	12/30/2010	S-IDRAIN	OXFORD ST	GRAND AVE	2	43.24	S-SCLNSTR
1041628	12/30/2010	S-IDRAIN	SELBY AVE	ARUNDEL ST	1	86.44	S-SCLNSTR
1041629	12/30/2010	S-IDRAIN	PORTLAND AVE	DALE ST	1	43.24	S-SCLNSTR
1041630	12/30/2010	S-IDRAIN	MARSHALL AVE	ST ALBANS	2	43.24	S-SCLNSTR
1041631	12/30/2010	S-IDRAIN	UNIVERSITY AVE	OXFORD ST	3	43.24	S-SCLNSTR
1041637	12/30/2010	S-IDRAIN	CASE AVE	DESOTO ST	3	89.09	S-SCLNSTR
1041638	12/30/2010	S-IDRAIN	GRAND AVE	PASCAL ST	1	40.92	S-SCLNSTR
1041639	12/30/2010	S-IDRAIN	FLANDRAU ST	HAWTHORNE AVE	1	89.09	S-SCLNSTR
1041642	12/31/2010	S-IDRAIN	CRETIN AVE	94	1	129.25	S-SCLNSTR
1041647	12/30/2010	S-IDRAIN	CHELTON AVE	TATUM ST	2	103.09	S-SCLNSTR
1041650	12/30/2010	S-IDRAIN	VILLARD AVE	RETURN CT	2	85.88	S-SCLNSTR
1041651	12/30/2010	S-IDRAIN	BOHLAND AVE	CLEVELAND AVE	1	42.95	S-SCLNSTR
1041654	12/30/2010	S-IDRAIN	MARION ST	WAYZATA ST	2	98.56	S-SCLNSTR
1041655	12/30/2010	S-IDRAIN	LAUREL AVE	WESTERN AVE	1	197.13	S-SCLNSTR
1041656	12/31/2010	S-IDRAIN	GROTTO ST	MARSHALL AVE	5	314.83	S-SCLNSTR S-SCLNSTR
1041657	12/30/2010	S-IDRAIN	FAIRVIEW AVE	BERKELEY AVE	1	42.95	S-SCLNSTR
1041660	12/30/2010	S-IDRAIN	FAIRVIEW AVE	GRAND AVE	1	85.88	S-SCLNSTR
1041661	12/30/2010	S-IDRAIN	STANFORD AVE	WHEELER ST	2	42.95	S-SCLNSTR
1041662	12/30/2010	S-IDRAIN	WHEELER ST	STANFORD AVE	1	42.95	S-SCLNSTR
1041663	12/30/2010	S-IDRAIN	WHEELER ST	ST CLAIR AVE	2	42.95	S-SCLNSTR
1041664	12/30/2010	S-IDRAIN	SELBY AVE	WILDER ST	2	134.88	S-SCLNSTR
1041665	12/30/2010	S-IDRAIN	CLEVELAND AVE	PORTLAND AVE	2	67.46	S-SCLNSTR
1041666	12/30/2010	S-IDRAIN	83 ARLINGTON AVE	PARK ST	1	98.56	S-SCLNSTR
1041667	12/30/2010	S-IDRAIN	1788 BENSON AVE	ELWAY ST	2	134.88	S-SCLNSTR
1041668	12/30/2010	S-IDRAIN	RICE ST	IVY AVE	1	98.56	S-SCLNSTR
1041670	12/30/2010	S-IDRAIN	COOK AVE	GALTIER ST	4	66.83	S-SCLNSTR
1041671	12/30/2010	S-IDRAIN	HAGUE AVE	WHEELER ST	2	134.88	S-SCLNSTR
1041672	12/30/2010	S-IDRAIN	HAMLINE AVE	ENGLEWOOD AVE	2	134.88	S-SCLNSTR
1041673	12/30/2010	S-IDRAIN	RANDOLPH AVE	SNELLING AVE	2	200.47	S-SCLNSTR

1041675	12/30/2010	S-IDRAIN	188 PLATO BLVD	OHIO ST	1	136.83	S-SCLNSTR
1041676	12/30/2010	S-IDRAIN	ST ALBANS ST	UNIVERSITY	1	86.44	S-SCLNSTR
1041677	12/30/2010	S-IDRAIN	OXFORD ST	UNIVERSITY AVE	2	86.44	S-SCLNSTR
1041679	12/30/2010	S-IDRAIN	ARUNDEL ST	UNIVERSITY AVE	2	151.27	S-SCLNSTR
1041680	12/30/2010	S-IDRAIN	GROTTO ST	ASHLAND AVE	2	64.42	S-SCLNSTR
1041682	12/30/2010	S-IDRAIN	SELBY AVE	MILTON ST	1	64.42	S-SCLNSTR
1041686	12/31/2010	S-IDRAIN	DAYTON AVE	CHATSWORTH ST	1	194.49	S-SCLNSTR
1041689	12/31/2010	S-IDRAIN	SHIELDS AVE	HERSCHEL ST	1	133.65	S-SCLNSTR
1041690	12/31/2010	S-IDRAIN	PASCAL ST	ROBLYN AVE	1	66.83	S-SCLNSTR
1041693	12/30/2010	S-IDRAIN	5 IRIS PL	LYNNHURST AVE	2	193.24	S-SCLNSTR
1041695	12/30/2010	S-IDRAIN	SNELLING	SUMMIT AVE	1	69.92	S-SCLNSTR
1041697	12/30/2010	S-IDRAIN	SNELLING AVE	PALACE AVE	1	69.92	S-SCLNSTR
1041698	12/30/2010	S-IDRAIN	SNELLING AVE	BAYARD AVE	1	69.92	S-SCLNSTR
1041699	12/30/2010	S-IDRAIN	RACE ST	ALBION	1	42.95	S-SCLNSTR
1041705	12/31/2010	S-IDRAIN	FAIRVIEW AVE	LINCOLN AVE	4	129.25	S-SCLNSTR
1041706	12/31/2010	S-IDRAIN	FAIRVIEW AVE	DAYTON AVE	1	387.73	S-SCLNSTR
1041708	12/31/2010	S-IDRAIN	MINNEHAHA AVE	SIMPSON ST	2	129.25	S-SCLNSTR
1041709	12/31/2010	S-IDRAIN	MINNEHAHA AVE	HAMLINE AVE	1	133.65	S-SCLNSTR
1041712	12/31/2010	S-IDRAIN	THOMAS AVE	CHATSWORTH ST	1	64.83	S-SCLNSTR
1041721	12/31/2010	S-IDRAIN	1742 CONWAY ST	WHITE BEAR AVE	2	249.18	S-SCLNSTR
1041724	12/30/2010	S-IDRAIN	UPPER AFTON RD	BATTLE CREEK RD	1	32.90	S-SCLNSTR
1041725	12/30/2010	S-IDRAIN	VALLEYSIDE DR	RUTH ST	2	65.78	S-SCLNSTR
1041726	12/30/2010	S-IDRAIN	FLANDRAU ST	MARGARET ST	2	254.76	S-SCLNSTR
1041745	12/30/2010	S-IDRAIN	1742 MINNEHAHA AVE	RUTH ST	1	34.06	S-SCLNSTR
1041750	12/30/2010	S-IDRAIN	3RD ST	HANCOCK ST	1	34.06	S-SCLNSTR
1041753	12/30/2010	S-IDRAIN	3RD ST	FOREST ST	2	68.12	S-SCLNSTR
TOTAL					995	132464.69	

Number Of Rows: 511

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City of Saint Paul

Catch Basins Repaired by Date and Associated Costs

Search Parameters

Start Date: 01/01/2010
End Date: 12/31/2010

Results

Sr No	Finished	Problem Code	Street	Cross Street	Catch Basin Count	Amount	Activity
1000209	01/05/2010	S-ICOVER	FLANDRAU ST	AMES AVE	1	119.14	S-SREPSTR
1000239	03/23/2010	S-RREPAIR	FLANDRAU ST	AMES AVE	1	146.80	S-SREPSTR
1001403	01/19/2010	S-ISTR	WABASHA ST	5TH & 6TH	1	173.48	S-SREPSTR
1001642	01/20/2010	S-ISTR	SEMINARY AVE	OXFORD ST	1	793.09	S-SREPSTR
1002847	04/02/2010	S-RREPAIR	60 EMPIRE DR	JACKSON ST	1	2529.09	S-SREPSTR
1005385	02/24/2010	S-ISTR	FAIRVIEW AVE	BEECHWOOD AVE	1	152.40	S-SREPSTR
1006506	03/25/2010	S-RREPAIR	CAYUGA ST	LORIENT ST	1	447.77	S-SREPSTR
1006668	06/18/2010	S-RREPAIR	1640 IVY AVE	KENNARD ST	1	1032.15	S-SREPSTR
1006816	04/15/2010	S-RREPAIR	30 DARLENE ST	UPPER AFTON RD	1	4907.34	S-SREPSTR
1007520	04/12/2010	S-RREPAIR	2101 CONWAY ST	PEDERSEN ST	1	3181.61	S-SREPSTR
1007522	05/26/2010	S-RREPAIR	2083 SCENIC PL	PEDERSEN ST	1	6412.25	S-SREPSTR
1007523	04/05/2010	S-RREPAIR	DAYTON AVE	DALE ST	1	1829.91	S-SREPSTR
1007525	03/19/2010	S-RREPAIR	917 DAYTON AVE	MILTON ST	1	189.76	S-SINSSITE S-SREPSTR
1007526	05/20/2010	S-RREPAIR	ORANGE AVE	DANFORTH ST	1	2383.96	S-SREPSTR
1007528	04/14/2010	S-RREPAIR	AVON ST	WHEELOCK PKWY	1	1983.29	S-SREPSTR
1007664	04/16/2010	S-RREPAIR	1413 ENERGY PARK DR	SNELLING AVE	1	7809.77	S-SREPSTR
1007742	03/19/2010	S-RREPAIR	GALTIER ST	HATCH AVE	1	483.29	S-SREPSTR S-SREPSTR
1007782	05/19/2010	S-RREPAIR	775 NEBRASKA AVE	WEIDE ST	1	1364.64	S-SREPSTR
1007901	03/31/2010	S-ISTR	ENERGY PARK DR	SNELLING AVE	1	4096.92	S-SREPSTR
1007997	03/21/2010	S-ICOVER	MARYLAND AVE	ARUNDEL ST	1	67.73	S-SREPSTR
1008251	04/06/2010	S-RREPAIR	THOMAS AVE	DUNLAP ST	1	2431.64	S-SREPSTR
1008601	03/25/2010	S-CJET	JOHNSON PKWY	BUSH AVE	1	608.55	S-SCLNSTR S-SREPSTR
1008616	03/25/2010	S-CJET	CAYUGA ST	LORIENT ST	1	303.86	S-SREPSTR
1008648	03/26/2010	S-ISTR	ARKWRIGHT ST	MAGNOLIA AVE	2	1562.30	S-SREPSTR S-SCLNSTR
1008752	03/31/2010	S-RREPAIR	WHEELOCK PKWY	FRANK (VAC)	1	1226.20	S-SREPSTR
1008796	05/05/2010	S-RREPAIR	JESSAMINE AVE	LEXINGTON PKWY	1	2650.57	S-SREPSTR
1008967	03/29/2010	S-RREPAIR	NORTON ST	LAWSON AVE	1	1782.64	S-SREPSTR

1009055	06/08/2010	S-RREPAIR	EAST SHORE DR	JOHNSON PKWY	1	6699.58	S-SREPSTR
1009137	03/30/2010	S-RREPAIR	RANDOLPH AVE	FAIRVIEW AVE	1	228.76	S-SREPSTR
1009138	05/05/2010	S-RREPAIR	RANDOLPH AVE	FAIRVIEW AVE	1	153.38	S-SREPSTR
1009139	03/30/2010	S-RREPAIR	RANDOLPH AVE	FAIRVIEW AVE	1	116.32	S-SREPSTR
1009143	05/06/2010	S-RREPAIR	RANDOLPH AVE	WHEELER ST	1	109.06	S-SREPSTR
1009144	05/19/2010	S-RREPAIR	RANDOLPH AVE	PRIOR AVE	1	44.13	S-SREPSTR
1009145	05/19/2010	S-RREPAIR	RANDOLPH AVE	PRIOR AVE	1	223.72	S-SREPSTR
1009146	05/20/2010	S-RREPAIR	RANDOLPH AVE	KENNETH ST	1	50.07	S-SREPSTR
1009147	05/26/2010	S-RREPAIR	2053 RANDOLPH AVE	CLEVELAND AVE	1	84.38	S-SREPSTR
1009169	04/21/2010	S-RREPAIR	HAMLINE AVE	CONCORDIA AVE	1	4536.74	S-SREPSTR
1009208	03/30/2010	S-RREPAIR	SIBLEY ST	SHEPARD RD	7	477.39	S-SREPSTR
1009209	03/30/2010	S-RREPAIR	JACKSON ST	SHEPARD RD	5	165.83	S-SREPSTR
1009220	05/19/2010	S-RREPAIR	RANDOLPH AVE	DAVERN ST	1	50.17	S-SREPSTR
1009241	05/21/2010	S-RREPAIR	MARYLAND AVE	JACKSON ST	1	105.94	S-SREPSTR
1009242	06/08/2010	S-RREPAIR	MARYLAND AVE	JACKSON ST	1	123.44	S-SREPSTR
1009244	05/21/2010	S-RREPAIR	MARYLAND AVE	LORIENT ST	1	116.69	S-SREPSTR
1009245	05/21/2010	S-RREPAIR	MARYLAND AVE	LORIENT ST	1	93.94	S-SREPSTR
1009458	03/31/2010	S-ICOVER	SUMMIT AVE	AVON ST	1	14.32	S-SREPSTR
1009460	05/11/2010	S-RREPAIR	PRIOR AVE	PORTLAND AVE	1	1720.58	S-SREPSTR
1009667	04/01/2010	S-ICOVER	GOODRICH AVE	HOWELL ST	1	139.80	S-SREPSTR
1009811	04/28/2010	S-RREPAIR	IDAHO AVE	MCAFEE ST	1	261.75	S-SREPSTR S-SINSSITE
1009832	05/05/2010	S-RREPAIR	PASCAL ST	ASHLAND AVE	1	457.29	S-SREPSTR
1009974	04/05/2010	S-ISTR	CLEVELAND AVE	HIGHLAND PKWY	1	122.40	S-SREPSTR
1009980	04/05/2010	S-ICOVER	LAFOND AVE	OXFORD ST	1	95.95	S-SREPSTR
1009981	04/05/2010	S-RREPAIR	MONTANA AVE	WEIDE ST	1	518.34	S-SREPSTR
1010063	05/05/2010	S-RREPAIR	LAFOND AVE	OXFORD ST	1	242.21	S-SREPSTR
1010220	04/07/2010	S-RREPAIR	SHERBURNE AVE	MARION ST	1	1068.86	S-SREPSTR
1010385	05/03/2010	S-RREPAIR	CRETIN AVE	FORD PKWY	1	4783.70	S-SREPSTR
1010556	04/30/2010	S-RREPAIR	RIVER PARK PLAZA	FILLMORE AVE	6	735.65	S-SREPSTR
1010755	05/26/2010	S-RREPAIR	CLEVELAND AVE	MISS RIVER BLVD	1	3585.27	S-SREPSTR
1010756	05/06/2010	S-RREPAIR	PEDERSEN ST	SCENIC PL	1	4845.63	S-SREPSTR
1010887	04/20/2010	S-RREPAIR	1843 ELEANOR AVE	FAIRVIEW AVE	1	237.42	S-SREPSTR
1010894	04/12/2010	S-RREPAIR	1080 PAYNE AVE	MAGNOLIA AVE	1	119.14	S-SREPSTR

1010921	04/20/2010	S-RREPAIR	1081 PAYNE AVE	MAGNOLIA AVE	1	893.10	S-SREPSTR
1011066	05/05/2010	S-RREPAIR	JAMES AVE	WHEELER ST	1	314.09	S-SREPSTR
1011190	04/23/2010	S-RREPAIR	ARCADE ST	HYACINTH AVE	1	4417.47	S-SREPSTR
1011258	05/03/2010	S-RREPAIR	PASCAL ST	ST ANTHONY AVE	1	4284.81	S-SREPSTR
1011287	05/05/2010	S-RREPAIR	WHITE BEAR AVE	4TH ST	1	4695.78	S-SREPSTR
1011592	05/25/2010	S-RREPAIR	BURNS AVE	ENGLISH ST	1	3507.77	S-SREPSTR
1011593	05/19/2010	S-RREPAIR	MARYLAND AVE	DANFORTH ST	1	2212.08	S-SREPSTR
1011698	05/26/2010	S-RREPAIR	THOMAS AVE	WESTERN AVE	1	2629.59	S-SREPSTR
1011774	04/20/2010	S-RREPAIR	261 CHESTER ST		2	213.77	S-SREPSTR
1011796	05/28/2010	S-RREPAIR	PASCAL ST	OSCEOLA AVE	1	2366.27	S-SREPSTR
1012346	05/12/2010	S-RREPAIR	1075 PIERCE BUTLER RTE	LEXINGTON AVE	1	627.12	S-SREPSTR
1012570	05/26/2010	S-ISTR	SUMMIT AVE	WHEELER ST	1	1134.37	S-SINSSITE S-SREPSTR
1012664	05/28/2010	S-RREPAIR	DUKE ST	ST CLAIR AVE	1	3684.97	S-SREPSTR
1012809	06/08/2010	S-RREPAIR	1620 AMES AVE	KINGSFORD ST	1	1495.34	S-SREPSTR
1012837	06/18/2010	S-RREPAIR	ST ALBANS ST	PORTLAND AVE	1	2800.37	S-SREPSTR
1013054	05/28/2010	S-RREPAIR	SARGENT AVE	SYNDICATE ST	1	2999.91	S-SREPSTR
1013055	05/28/2010	S-RREPAIR	SARGENT AVE	SYNDICATE ST	1	1005.99	S-SREPSTR
1013058	07/07/2010	S-RREPAIR	PASCAL ST	GOODRICH AVE	1	2362.45	S-SREPSTR
1013257	05/19/2010	S-RREPAIR	SARATOGA ST	ST CLAIR AVE	1	1427.97	S-SREPSTR
1013327	04/30/2010	S-RREPAIR	OXFORD ST	LAFOND AVE	1	100.91	S-SREPSTR
1013374	05/28/2010	S-RREPAIR	STONEBRIDGE BLVD	STANFORD CT	1	2191.57	S-SREPSTR
1013375	05/27/2010	S-RREPAIR	PRIOR AVE	ST CLAIR AVE	1	2160.24	S-SREPSTR
1013442	05/03/2010	S-ICOVER	AGATE ST	COOK AVE	1	38.90	S-SREPSTR
1014003	07/21/2010	S-RREPAIR	ESCANABA	NOKOMIS AVE	1	2930.65	S-SREPSTR
1014263	07/23/2010	S-RREPAIR	MARYLAND AVE	35 E	1	449.58	S-SREPSTR
1014268	12/09/2010	S-RREPAIR	MARYLAND AVE	LORIENT ST	1	403.51	S-SREPSTR
1014612	06/18/2010	S-RREPAIR	LAFAYETTE RD	UNIVERSITY AVE	1	3307.11	S-SREPSTR
1014693	05/12/2010	S-ICOVER	LAWSON AVE	WESTERN AVE	1	97.88	S-SREPSTR
1014708	06/07/2010	S-RREPAIR	MARYLAND AVE	35 E	1	5336.61	S-SREPSTR
1014709	06/29/2010	S-RREPAIR	MARYLAND AVE	JACKSON ST	1	4078.77	S-SREPSTR
1014710	06/16/2010	S-RREPAIR	MARYLAND AVE	JACKSON ST	1	3931.19	S-SREPSTR
1014712	07/06/2010	S-RREPAIR	MARYLAND AVE	JACKSON ST	1	3634.85	S-SREPSTR
1014777	07/07/2010	S-RREPAIR	WYCLIFF ST	CAPP RD	1	2343.35	S-SREPSTR
1014778	06/10/2010	S-RREPAIR	MARYLAND AVE	JACKSON ST	1	8917.62	S-SREPSTR
1014779	07/07/2010	S-RREPAIR	SUBURBAN AVE	WINTHROP ST	1	3773.38	S-SREPSTR
1014780	06/23/2010	S-RREPAIR	MARYLAND AVE	35 E	2	6457.98	S-SREPSTR
1014781	06/23/2010	S-RREPAIR	MARYLAND AVE	35 E	1	2450.32	S-SREPSTR

1014810	05/28/2010	S-RREPAIR	1722 MONTANA AVE	FLANDRAU ST	1	1451.64	S-SREPSTR
1014883	05/27/2010	S-RREPAIR	MCKNIGHT RD	BURNS AVE	1	93.04	S-SREPSTR
1014884	05/27/2010	S-RREPAIR	2245 BURNS AVE	MCKNIGHT RD	1	407.09	S-SREPSTR
1014885	07/07/2010	S-RREPAIR	DAVERN ST	SHERIDAN AVE	1	3157.95	S-SREPSTR
1014886	05/27/2010	S-RREPAIR	2245 BURNS AVE	MCKNIGHT RD	1	46.07	S-SREPSTR
1014887	05/27/2010	S-RREPAIR	SUBURBAN AVE	BURNS AVE	1	90.86	S-SREPSTR
1014888	06/02/2010	S-RREPAIR	SUBURBAN AVE	BURNS AVE	1	363.12	S-SREPSTR
1014889	06/03/2010	S-RREPAIR	2041 BURNS AVE	RUTH ST	1	67.62	S-SREPSTR
1014891	06/03/2010	S-RREPAIR	RUTH ST	BURNS AVE	1	267.20	S-SREPSTR
1014892	06/04/2010	S-RREPAIR	RUTH ST	BURNS AVE	1	141.18	S-SREPSTR
1014893	06/10/2010	S-RREPAIR	BURNS AVE	RUTH ST	1	480.83	S-SREPSTR
1014894	06/18/2010	S-RREPAIR	BURNS AVE	RUTH ST	1	2405.88	S-SREPSTR
1014895	06/02/2010	S-RREPAIR	BURNS AVE	PEDERSON	1	97.44	S-SREPSTR
1014981	07/07/2010	S-RREPAIR	1178 REANEY AVE	DULUTH ST	1	2303.89	S-SREPSTR
1014982	07/21/2010	S-RREPAIR	1240 BEECH ST	ATLANTIC ST	1	2647.46	S-SREPSTR
1014986	07/07/2010	S-RREPAIR	1296 OSCEOLA AVE	SYNDICATE ST	1	2037.58	S-SREPSTR
1015105	06/08/2010	S-RREPAIR	JEFFERSON AVE	FAIRVIEW AVE	2	246.88	S-SREPSTR
1015119	07/06/2010	S-RREPAIR	EUSTIS ST	COMO AVE (300' S OF COMO E SIDE OF STRT)	1	5101.96	S-SREPSTR
1015122	07/13/2010	S-RREPAIR	IDAHO AVE	ARUNDEL ST	1	3000.18	S-SREPSTR
1015226	05/17/2010	S-IHOLE	DUCHESS ST	SIMS AVE	1	52.48	S-SREPSTR
1015549	05/19/2010	S-IHOLE	SUMMIT AVE	WILDER ST	1	150.69	S-SREPSTR
1015606	05/21/2010	S-RREPAIR	2118 JULIET AVE	FINN ST	1	495.53	S-SREPSTR
1015779	05/26/2010	S-RREPAIR	DAVERN ST	PALACE AVE	1	345.26	S-SREPSTR
1015796	06/10/2010	S-RREPAIR	FRANK ST	REANEY AVE	1	1914.07	S-SREPSTR S-SREPSTR
1015821	05/20/2010	S-ISTR	1878 ROBLYN AVE	FERDINAND ST	1	97.88	S-SREPSTR
1015925	05/26/2010	S-RREPAIR	456 MACALESTER ST	JAMES AVE	1	233.43	S-SREPSTR
1015926	06/09/2010	S-RREPAIR	FRANK ST	REANEY AVE	2	3849.73	S-SREPSTR
1016069	07/02/2010	S-RREPAIR	PASCAL ST	CHARLES AVE	1	2292.16	S-SREPSTR
1016183	09/16/2010	S-RREPAIR	2041 BURNS AVE	RUTH ST	1	3053.47	S-SREPSTR
1016191	09/10/2010	S-RREPAIR	BURNS AVE	WINTHROP ST	1	1737.33	S-SREPSTR
1016192	09/16/2010	S-RREPAIR	BURNS AVE	WINTHROP ST	1	2729.03	S-SREPSTR
1016193	09/16/2010	S-RREPAIR	BURNS AVE	WINTHROP ST	1	1893.32	S-SREPSTR
1016194	09/16/2010	S-RREPAIR	BURNS AVE	WINTHROP ST	1	3014.95	S-SREPSTR
1016206	09/16/2010	S-RREPAIR	BURNS AVE	PEDERSON	1	1869.05	S-SREPSTR
1016281	07/15/2010	S-RREPAIR	GRAND AVE	LEXINGTON AVE	1	213.55	S-SREPSTR
1016283	07/15/2010	S-RREPAIR	GRAND AVE	LEXINGTON AVE	1	169.39	S-SREPSTR

1016285	07/16/2010	S-RREPAIR	GRAND AVE	LEXINGTON AVE	1	211.23	S-SREPSTR
1016286	07/16/2010	S-RREPAIR	GRAND AVE	LEXINGTON AVE	1	209.13	S-SREPSTR
1016287	07/16/2010	S-RREPAIR	GRAND AVE	OXFORD ST	1	103.50	S-SREPSTR
1016637	07/09/2010	S-RREPAIR	FORD PKWY	FAIRVIEW AVE	2	5096.05	S-SREPSTR
1016673	06/01/2010	S-RREPAIR	WHEELOCK PKWY	GREENBRIER ST	1	200.62	S-SREPSTR
1016842	06/01/2010	S-ICOVER	DUNLAP ST	UNIVERSITY AVE	1	127.42	S-SREPSTR
1016981	06/02/2010	S-ICOVER	UNIVERSITY AVE	AURORA AVE	1	337.76	S-SREPSTR
1017073	06/02/2010	S-RREPAIR	FAIRVIEW AVE	HEWITT AVE	1	146.19	S-SREPSTR
1017205	06/03/2010	S-RREPAIR	LAFOND AVE	OXFORD ST	1	550.71	S-SREPSTR
1017224	08/23/2010	S-RREPAIR	GRAND AVE	OXFORD ST	1	2535.51	S-SREPSTR
1017243	08/12/2010	S-RREPAIR	GRAND AVE	MILTON ST	1	3308.44	S-SREPSTR
1017319	07/26/2010	S-RREPAIR	SMITH AVE	WYOMING ST	1	3391.62	S-SREPSTR
1017320	06/28/2010	S-RREPAIR	CHEROKEE AVE	ANNAPOLIS ST	1	889.66	S-SREPSTR
1017342	06/22/2010	S-RREPAIR	881 ARCADE ST	WELLS ST	9	1621.82	S-SREPSTR
1017625	06/08/2010	S-RREPAIR	12TH ST	JACKSON ST	1	531.87	S-SREPSTR
1017737	07/13/2010	S-RREPAIR	1626 DAYTON AVE	FRY ST	1	4643.35	S-SREPSTR
1017894	06/11/2010	S-IDRAIN	OSCEOLA AVE	SYNDICATE ST	2	455.14	S-SREPSTR S-SCLNSTR
1017909	07/13/2010	S-RREPAIR	FAIRVIEW AVE	HILLCREST AVE	4	2156.97	S-SREPSTR
1018101	06/15/2010	S-RREPAIR	262 ARLINGTON AVE	GALTIER ST	1	255.08	S-SREPSTR
1018102	07/26/2010	S-RREPAIR	GERANIUM AVE	WALSH ST	1	4058.43	S-SREPSTR
1018336	06/14/2010	S-ICOVER	EDGERTON ST	HYACINTH AVE	1	149.07	S-SREPSTR
1018462	07/09/2010	S-RREPAIR	RANDOLPH AVE	WOODLAWN AVE	1	1807.59	S-SREPSTR
1019197	07/06/2010	S-RREPAIR	187 BIGLOW LN	TIMBERLAKE RD	1	230.98	S-SREPSTR
1019275	06/24/2010	S-RREPAIR	TIMBERLAKE RD	BIGLOW LN	1	689.59	S-SREPSTR
1019344	07/26/2010	S-RREPAIR	648 BURLINGTON RD	WINTHROP ST	1	2112.98	S-SREPSTR
1019349	07/26/2010	S-RREPAIR	623 BURLINGTON RD	WINTHROP ST	1	1347.24	S-SREPSTR
1019353	07/27/2010	S-RREPAIR	EDGCUMBE RD	HAMLINE AVE	1	2574.73	S-SREPSTR
1019394	06/28/2010	S-RREPAIR	1938 GRAND AVE	PRIOR AVE	1	411.15	S-SREPSTR
1019518	06/24/2010	S-ISTR	1192 REANEY	ATLANTIC ST	1	62.28	S-SREPSTR
1019519	06/28/2010	S-RREPAIR	WILSON AVE	HAZEL ST	1	170.00	S-SREPSTR
1019521	07/02/2010	S-RHOLE	WILSON AVE	HAZEL ST	1	795.53	S-SREPSTR
1019522	07/21/2010	S-RREPAIR	1144 COMO AVE	LEXINGTON AVE	1	2325.42	S-SREPSTR S-SREPSTR
1019551	07/02/2010	S-RREPAIR	MARION ST	RAVOUX ST	1	263.35	S-SREPSTR
1019654	07/15/2010	S-RREPAIR	UNIVERSITY	PRIOR AVE	1	5102.70	S-SREPSTR

			AVE				
1019655	07/20/2010	S-RREPAIR	THOMAS AVE	OXFORD ST	1	1254.61	S-SREPSTR
1019656	07/20/2010	S-RREPAIR	THOMAS AVE	CHATSWORTH ST	1	1679.03	S-SREPSTR
1019868	06/30/2010	S-RREPAIR	MINNESOTA ST	7TH ST	1	2163.15	S-SREPSTR
1019872	10/11/2010	S-RREPAIR	ROBERT ST	CESAR CHAVEZ ST	1	3321.04	S-SREPSTR
1019874	08/10/2010	S-RREPAIR	CONGRESS ST	WABASHA ST	1	2994.03	S-SREPSTR
1019881	10/11/2010	S-RREPAIR	577 STATE ST	KING ST	1	1575.36	S-SREPSTR
1019973	06/29/2010	S-ISTR	WATSON AVE	EDGCUMBE RD	1	228.83	S-SREPSTR
1020040	08/23/2010	S-CJET	1317 BURNS AVE	ENGLISH ST	1	3652.33	S-SREPSTR S-SCLNSTR
1020042	07/19/2010	S-RREPAIR	MARION ST	ATWATER ST	2	1756.84	S-SREPSTR
1020241	08/13/2010	S-RREPAIR	7TH ST	ALBION	1	1417.74	S-SREPSTR
1020259	11/03/2010	S-RREPAIR	COMMERCIAL ST	4TH AVE	1	1856.32	S-SREPSTR
1020278	07/26/2010	S-RREPAIR	DAVERN ST	STANFORD AVE	1	1133.55	S-SREPSTR
1020417	10/20/2010	S-RREPAIR	422 PIERCE ST	SHIELDS AVE	1	1316.45	S-SREPSTR
1020658	07/22/2010	S-RREPAIR	KLAINERT ST	TIMBERLAKE	1	369.35	S-SREPSTR
1020659	10/22/2010	S-RREPAIR	1544 TIMBERLAKE RD	KLAINERT	1	2038.68	S-SREPSTR
1020723	07/12/2010	S-RREPAIR	JACKSON ST	PENNSYLVANIA AVE	1	437.90	S-SREPSTR
1020724	11/17/2010	S-RREPAIR	CENTRAL AVE	CHATSWORTH ST	2	3408.94	S-SREPSTR
1021225	07/14/2010	S-RREPAIR	PAYNE AVE	BEAUMONT ST	2	1529.08	S-SREPSTR S-SCLNSTR
1021447	07/13/2010	S-ICOVER	FRONT AVE	GALTIER ST	1	71.23	S-SREPSTR
1021450	07/23/2010	S-RREPAIR	ALBEMARLE ST	ATWATER ST	1	3604.45	S-SREPSTR
1021517	07/21/2010	S-RREPAIR	GRIGGS ST	BLAIR AVE	1	681.95	S-SREPSTR
1021518	07/15/2010	S-RREPAIR	1878 GOODRICH AVE	HOWELL ST	1	642.01	S-SREPSTR
1021551	07/27/2010	S-RREPAIR	195 UNIVERSITY AVE	MARION ST	2	1968.22	S-SREPSTR
1021553	07/28/2010	S-RREPAIR	JOHN ST	8TH ST	1	2565.16	S-SREPSTR
1021726	07/19/2010	S-RREPAIR	SIMS AVE	ARCADE ST	1	1248.34	S-SREPSTR
1021899	11/01/2010	S-RREPAIR	NORTH PARK DR	FAYE ST	1	1045.08	S-SREPSTR
1021900	10/20/2010	S-RREPAIR	NORTH PARK DR	MCKNIGHT RD	1	947.92	S-SREPSTR
1021974	08/16/2010	S-RREPAIR	849 WINTHROP ST	SPRINGSIDE DR	1	6639.12	S-SREPSTR
1022333	10/28/2010	S-RREPAIR	UNIVERSITY AVE	ST ALBANS ST	2	4922.52	S-SREPSTR
1022508	07/29/2010	S-RREPAIR	FAIRVIEW AVE	FORD PKWY	1	2503.14	S-SREPSTR
1022509	07/29/2010	S-RREPAIR	FAIRVIEW AVE	PINEHURST AVE	1	2056.54	S-SREPSTR
1022510	07/28/2010	S-RREPAIR	FAIRVIEW AVE	FORD PKWY	1	2926.71	S-SINSSITE S-SREPSTR
1022511	08/23/2010	S-RREPAIR	FAIRVIEW AVE	JUNO AVE	1	2613.26	S-SREPSTR

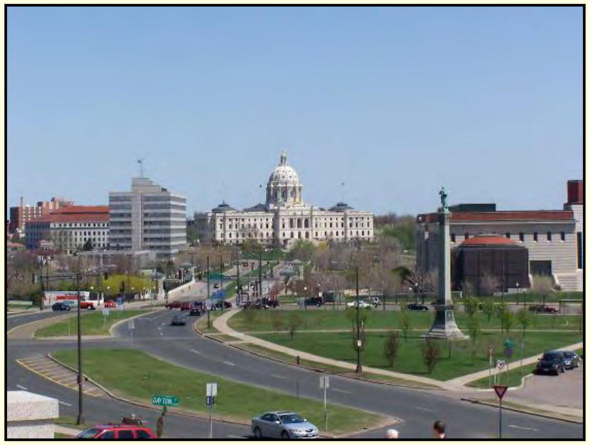
1022537	10/20/2010	S-RREPAIR	571 STATE ST	STEVENS ST	1	912.37	S-SREPSTR
1022828	04/22/2011	S-RREPAIR	3RD ST	BIRMINGHAM ST	1	1208.63	S-SREPSTR
1022865	04/23/2011	S-RREPAIR	HAZEL ST	NEBRASKA AVE	1	1832.41	S-SREPSTR
1022878	07/23/2010	S-ISTR	BAKER ST	CHIPPEWA AVE	1	189.76	S-SREPSTR
1022879	11/04/2010	S-RREPAIR	BAKER ST	CHIPPEWA AVE	1	674.79	S-SREPSTR
1023091	11/04/2010	S-RREPAIR	2200 CONWAY AVE	HOWARD ST	1	1779.00	S-SREPSTR
1023216	11/23/2010	S-RREPAIR	1096 SNELLING AVE	EDGCUMBE RD	1	707.81	S-SREPSTR
1023459	10/29/2010	S-RREPAIR	1701 PALACE AVE	DAVERN ST	1	1079.76	S-SREPSTR
1023626	11/10/2010	S-RREPAIR	SUNNY SLOPE LN	EDGCUMBE RD	3	1705.13	S-SREPSTR
1024013	10/13/2010	S-RREPAIR	915 HATCH AVE	COLNE ST	1	646.51	S-SREPSTR
1024015	10/25/2010	S-RREPAIR	RICE ST	ARLINGTON AVE	1	621.18	S-SREPSTR S-SINSSTR
1024301	09/13/2010	S-RREPAIR	855 JESSAMINE AVE	ARCADE ST	1	2376.87	S-SREPSTR
1024408	08/06/2010	S-RREPAIR	GRAND AVE	AVON ST	1	743.97	S-SREPSTR
1024655	08/23/2010	S-RREPAIR	1317 BURNS AVE	ENGLISH ST	1	101.32	S-SREPSTR
1025275	10/01/2010	S-ROTHER	SHEPARD RD	WASHINGTON ST	4	1806.96	S-SREPSTR
1025551	08/16/2010	S-ICOVER	ORANGE AVE	EDGERTON ST	1	47.45	S-SREPSTR
1025594	09/02/2010	S-RREPAIR	1512 ALBEMARLE ST	NEBRASKA AVE	1	3302.03	S-SREPSTR
1025600	09/20/2010	S-RREPAIR	SIMPSON ST	MINNEHAHA AVE	1	1080.83	S-SREPSTR
1025755	09/13/2010	S-RREPAIR	MISS RIVER BLVD	ELSIE	1	6806.65	S-SREPSTR
1025756	09/16/2010	S-RREPAIR	MISS RIVER BLVD	ELSIE	1	2055.68	S-SREPSTR
1025944	10/11/2010	S-RREPAIR	DUNLAP ST	LAFOND AVE	1	288.75	S-SREPSTR
1026082	09/17/2010	S-RREPAIR	PELHAM BLVD	MYRTLE ST	1	4418.56	S-SREPSTR
1026111	10/15/2010	S-ROTHER	BLAIR AVE	GROTTO ST	1	2583.66	S-SREPSTR
1026321	08/23/2010	S-ICOVER	BIRCH ST	BOXWOOD AVE	1	142.34	S-SREPSTR
1026937	08/26/2010	S-ICOVER	SYNDICATE	EDMUND AVE	1	47.45	S-SREPSTR
1027091	08/27/2010	S-ICOVER	HAMPDEN AVE	HERSEY ST	1	239.41	S-SINSSITE S-SREPSTR
1027142	09/01/2010	S-RREPAIR	GORMAN AVE	STEVENS ST	1	402.67	S-SREPSTR S-SREPSTR
1028011	09/07/2010	S-ICOVER	ARKWRIGHT ST	MARYLAND AVE	1	45.52	S-SREPSTR
1028459	09/21/2010	S-RREPAIR	191 7TH PL	SIBLEY ST	1	660.39	S-SREPSTR
1028464	09/14/2010	S-RREPAIR	BLAIR AVE	SYNDICATE ST	1	580.61	S-SREPSTR
1028560	09/20/2010	S-RREPAIR	ST CLAIR AVE	FAIRVIEW AVE	3	518.64	S-SREPSTR
1028601	04/22/2011	S-RREPAIR	748 BURR ST	MINNEHAHA AVE	2	3882.35	S-SREPSTR
1028602	10/06/2010	S-RREPAIR	2360 DAYTON AVE	MISS RIVER BLVD	1	742.81	S-SREPSTR
1028603	11/30/2010	S-RREPAIR	EARL ST	FREMONT ST	2	2090.80	S-SREPSTR

1029048	09/23/2010	S-RREPAIR	UPPER AFTON RD	BURNS AVE	1	593.03	S-SREPSTR
1029172	09/20/2010	S-RREPAIR	280 SUMMIT AVE	NINA ST	2	129.69	S-SREPSTR
1029289	10/12/2010	S-RREPAIR	1845 UNIVERSITY AVE	FAIRVIEW AVE	1	1460.08	S-SREPSTR
1029508	04/23/2011	S-RREPAIR	EUCLID ST	MENDOTA ST	1	1351.64	S-SREPSTR
1029830	04/22/2011	S-RREPAIR	NOKOMIS AVE	RUTH ST	1	1301.65	S-SREPSTR
1029831	04/22/2011	S-RREPAIR	NOKOMIS AVE	TEWANNA PL	1	1785.35	S-SREPSTR
1029864	11/30/2010	S-RREPAIR	1258 MARION ST	ORANGE AVE	1	1500.29	S-SREPSTR
1029865	10/08/2010	S-RREPAIR	CASE AVE	DESOTO ST	1	555.51	S-SREPSTR
1030040	04/22/2011	S-RREPAIR	ST ALBANS ST	THOMAS AVE	1	1416.48	S-SREPSTR
1030080	10/01/2010	S-RREPAIR	2003 JEFFERSON AVE	DAVERN ST	2	264.55	S-SINSSTR S-SREPSTR
1030161	04/22/2011	S-RREPAIR	1669 RACE ST	ALASKA AVE	1	1231.03	S-SREPSTR
1030307	11/24/2010	S-RREPAIR	LAWSON AVE SE	PAYNE AVE	1	1492.01	S-SREPSTR
1030332	09/27/2010	S-RREPAIR	10TH ST	MINNESOTA ST	1	135.13	S-SREPSTR
1030675	04/23/2011	S-RREPAIR	1060 LORIENT ST	ARLINGTON AVE	1	1781.94	S-SREPSTR
1030989	10/05/2010	S-RREPAIR	SHEPARD RD	CHESTNUT ST	94	11326.90	S-SREPSTR S-SREPSTR S-SREPSTR S-SREPSTR S-SREPSTR
1031439	10/06/2010	S-RREPAIR	CEDAR ST	4TH AVE	1	1079.06	S-SREPSTR
1031499	10/25/2010	S-RREPAIR	WHITE BEAR AVE	HOYT AVE	1	524.75	S-SREPSTR
1031667	11/10/2010	S-RREPAIR	1517 ST CLAIR AVE	SARATOGA ST	1	1878.95	S-SREPSTR
1031669	11/30/2010	S-RREPAIR	MISS RIVER BLVD	DAYTON AVE	1	2536.70	S-SREPSTR
1032377	11/02/2010	S-RREPAIR	5TH ST	BROADWAY ST	1	865.37	S-SREPSTR
1032550	12/07/2010	S-RREPAIR	MAIN ST	6TH ST	2	382.45	S-SREPSTR S-SREPSTR
1032551	12/06/2010	S-RREPAIR	MAIN ST	9TH ST	1	128.84	S-SREPSTR
1032858	10/25/2010	S-RREPAIR	1138 CHURCHILL ST	COMO AVE	1	168.85	S-SREPSTR
1033353	04/18/2011	S-RREPAIR	1232 BREEN ST	HAWTHORNE AVE	1	2006.11	S-SREPSTR
1034149	10/25/2010	S-ISTR	JUNO AVE	WHEELER ST	1	65.78	S-SREPSTR
1034279	04/21/2011	S-RREPAIR	935 WESTGATE DR	TERRITORIAL RD	1	2105.93	S-SREPSTR
1034408	10/26/2010	S-ISTR	8TH ST	WACOUTA ST	2	65.78	S-SREPSTR
1034698	11/12/2010	S-RREPAIR	720 CYPRESS ST	MINNEHAHA AVE	1	1500.03	S-SREPSTR
1034699	04/22/2011	S-RREPAIR	721 CYPRESS ST	MINNEHAHA AVE	1	2012.52	S-SREPSTR
1034700		S-RREPAIR	1207 HAMLINE AVE	COMO AVE	1	2181.80	S-SREPSTR
1034885	11/29/2010	S-RREPAIR	AYD MILL RD	GRAND AVE	1	2700.75	S-SREPSTR
1034886	12/02/2010	S-RREPAIR	AYD MILL RD	GRAND AVE	1	3575.31	S-SREPSTR
1034991	04/23/2011	S-RREPAIR	451 TOTEM RD	BURLINGTON	1	2086.22	S-SREPSTR

				RD			
1035208	04/23/2011	S-RREPAIR	MARYLAND AVE	KENT ST	1	1002.64	S-SREPSTR
1035466	11/02/2010	S-ROTHER	KELLOGG BLVD	BROADWAY ST	1	48.23	S-SREPSTR
1036104	04/23/2011	S-RREPAIR	436 EDMUND AVE	ARUNDEL ST	1	3050.84	S-SREPSTR
1036141	04/18/2011	S-RREPAIR	460 WHITALL ST	DESOTO ST	2	3408.58	S-SREPSTR
1036513	11/10/2010	S-RREPAIR	CHAMBER ST	LARPENTEUR AVE	1	450.21	S-SREPSTR
1037007	11/18/2010	S-RREPAIR	7TH ST	CEDAR ST	1	2482.17	S-SREPSTR
1037370	11/17/2010	S-ICOVER	WALSH ST	ORANGE AVE	1	113.67	S-SREPSTR
1037428	12/02/2010	S-RREPAIR	DOUSMAN ST	BANFIL ST	1	2494.65	S-SREPSTR
1037488	11/22/2010	S-RREPAIR	LIVINGSTON AVE	BELVIDERE ST	1	1710.56	S-SREPSTR
1037492	11/23/2010	S-RREPAIR	WALSH ST	ORANGE AVE	1	216.56	S-SREPSTR
1037593	11/23/2010	S-RREPAIR	FAIRMOUNT AVE	SYNDICATE ST	1	1773.04	S-SREPSTR
1037608	11/18/2010	S-ISTR	765 MARGARET ST	7TH ST	1	2339.99	S-SREPSTR
1037610	04/21/2011	S-RREPAIR	DAYTON AVE	HERSCHEL ST	1	2253.06	S-SREPSTR
1037611	04/21/2011	S-RREPAIR	DAYTON AVE	ALDINE ST	1	2801.12	S-SREPSTR
1037614	04/21/2011	S-RREPAIR	DAYTON AVE	PIERCE ST	1	2096.69	S-SREPSTR
1037616		S-RREPAIR	765 MARGARET ST	7TH ST	1	25.77	S-SREPSTR
1037768	04/23/2011	S-RREPAIR	787 JOHNSON PKWY	ROSS AVE	1	1826.21	S-SREPSTR
1037769	12/06/2010	S-RREPAIR	GERANIUM AVE	MATILDA ST	2	4953.94	S-SREPSTR
1037899	11/22/2010	S-ISTR	HOYT AVE	LEXINGTON PKWY	1	113.11	S-SREPSTR
1038672	11/30/2010	S-ICOVER	PASCAL ST	ALBANY AVE	1	131.57	S-SREPSTR
1039262	12/03/2010	S-ICOVER	WHEELER ST	SUMMIT AVE	1	24.86	S-SREPSTR
1039506	12/06/2010	S-ICOVER	409 LAFOND AVE	WESTERN AVE	1	98.69	S-SREPSTR
1040981	12/21/2010	S-ICOVER	HAWTHORNE AVE	ARCADE ST	1	56.91	S-SREPSTR
1041336	01/03/2011	S-RREPAIR	SNELLING AVE	ASHLAND AVE	1	89.92	S-SREPSTR
1041701	04/21/2011	S-RREPAIR	SNELLING AVE	SUMMIT AVE	1	304.07	S-SINSSTR S-SREPSTR
TOTAL					438	475017.43	

Number Of Rows: 293

View as Excel
Printed On: 08/23/2011



St. Paul's Water Quality Initiatives

Vision

- City of St. Paul Striving to be the "Most Livable City in America".
- Water Quality Improvement is a Primary Goal
  - Storm Water Treatment
  - Storm Water Infiltration/Volume Control
- Goals Include Working with City Departments and Residents to Find Localized, Sustainable Solutions to Storm Water Treatment.
- Opportunities to Utilize Open and/or Public Space to Meet and Exceed Sustainability Goals.
- Combine Efforts with Adjacent Projects to Save Time & Money.

Components of Initiative

1. **Volume Reduction Inventory**

   Goal: Development of a long term strategy to construct storm water improvements on opportunity sites.

2. **Storm Water Modeling**

   Goal: Identify the hydraulic/hydrologic properties of the City's existing storm sewer system and locations where improvements are needed.

3. **2010 RSVP Storm Water Study**

   Goal: Identify potential water quality BMPs to be constructed as part of the three RSVP projects in 2010.

4. **Water Quality Improvement Feasibility Studies**

   Goal: Identification of feasible options to provide water quality treatment in specific locations within the City (ex. College Park).

5. **Public Education**

   Goal: Encourage downspouts to be routed to pervious areas and provide technical information on rain gardens/rain barrels.

Water Resource Challenges

(External Forces)

- MPCA
  - NPDES Program
  - SWPPP/Phase I/Phase II
  - Non-Degradation
  - TMDL
- Watersheds
  - CRWD
  - MWMO
  - RWMWD
  - LMRWMO
- BWSR
  - 8410-Metropolitan Surface Water Management Act
  - Wetland Management Planning
  - Wetland Conservation Act (WCA)
- USACE
  - Wetlands
- MDNR
  - Public Waters/Wetlands
  - Shoreland Rules
- Met Council
  - Comprehensive Plan
- **City of St. Paul**
  - **Our Vision/Goals**

4

Water Resource Challenges

- Water Quality: TMDL’s – Lake Pepin
  - Anticipate 20-30% Reduction in Phosphorous and Sediment load delivered to the Mississippi River

- Volume Control : “Nondegradation” rules
  - Volume control to 1988 discharge levels or up to a 1” volume reduction standard;
  - Reduction of phosphorus, sediment and possible heavy metals to 1988 levels or potentially more restrictive.

- New Construction Storm water Permit Requirements
  - Volume and water quality requirements within 1 mile of impaired waters
  - All exposed soils stabilized within 7 days
  - Additional training needs
  - Concrete washout containment.

Water Resource Challenges

- Quantifiable water quality and volume reductions measured and enforced by the MPCA through the City storm water permit

- Revised construction storm water permit requirements

- Watershed District plans and standards
  - Affect all projects > 1 acre including street reconstruction projects
  - Affect projects < 1 acre (proposed new rule)
  - CRWD Rule C.3(c):"Stormwater runoff volume retention shall be achieved onsite in the amount equivalent to the runoff generated from one inch rainfall over the impervious surfaces of the development."

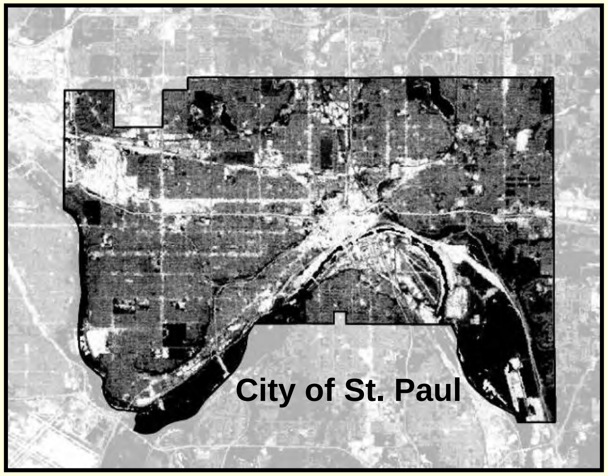
City Wide Infiltration Costs

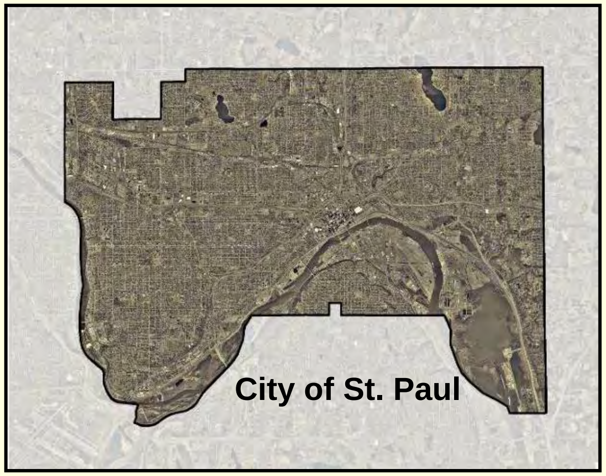
St. Paul
Total Impervious Area*

15,359 acres

Cost to Infiltrate 1.0"
Rainfall Volume City Wide**

$460 Million





*Taken from U of M 2002 Remote Sensing Analysis

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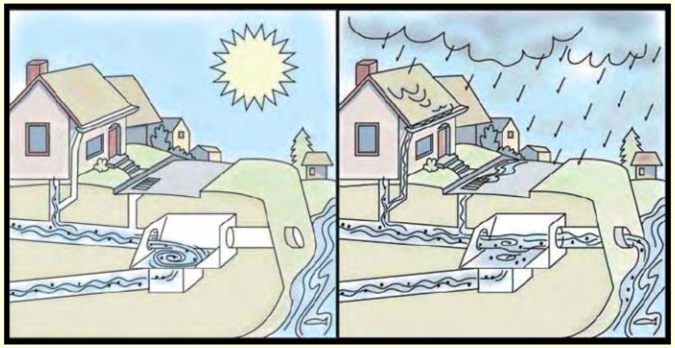
** Based on CRWD $30k Per Acre Cap on Costs – Assumes Treatment Provided to Entire City.

Combined Sewer Overflow (CSO) Project

- St. Paul Sewer Separation Program
  - Cost: $165 Million
  - 10+ Years
- Chicago and Portland have not completed sewer separation – plan to utilize small scale BMPs:
  - Downspout Disconnections
  - Rain Gardens
  - Permeable Alleys
  - Green Roofs
  - Public Outreach and Education
  - Localized Sewer Separation/CSO Control



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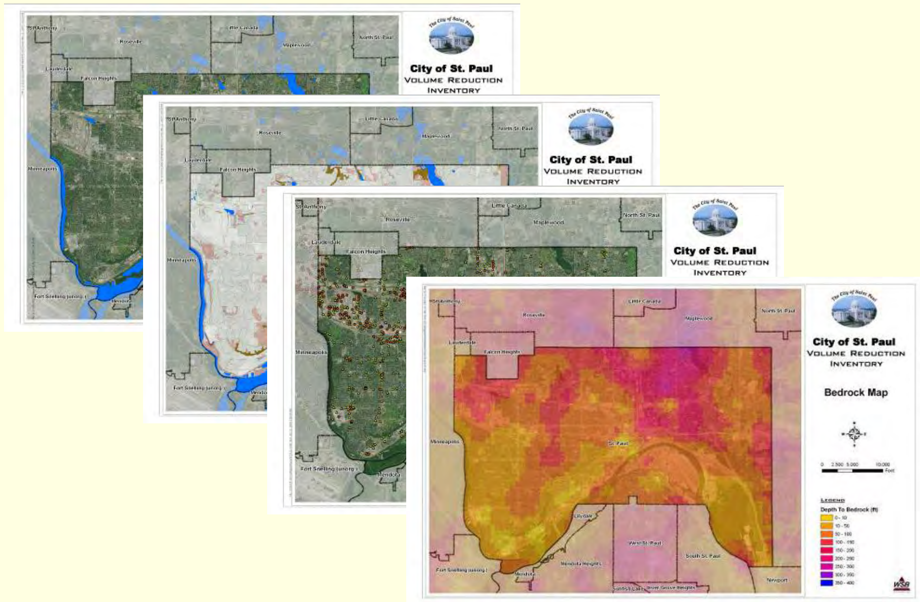
Volume Reduction Inventory

- Inventory will target public property
  - City, County, State, ROW, Schools, Parks
- Identify existing natural infiltration areas
  - Murray High School (College Park Subwatershed)
- Identify opportune locations for storm water treatment BMPs:
  - Topography
  - Underlying Soils
  - Depth to Bedrock
  - Pollutant Hot Spots
  - Ground Water



Volume Reduction Inventory

- Evaluate several BMPs:
  - Infiltration Systems (Rock Trenches, Infiltration Chambers, etc.)
  - Bio-retention/Evapo-transpiration (Raingardens, Silva Cells, etc.)
  - Water Reuse/Irrigation
- Establish Volume Reduction Credits with Watershed Districts
  - Maintain Positive Credit Balance
- Cost Savings of Maintenance
- Identify Potential Partnership Opportunities and Roles

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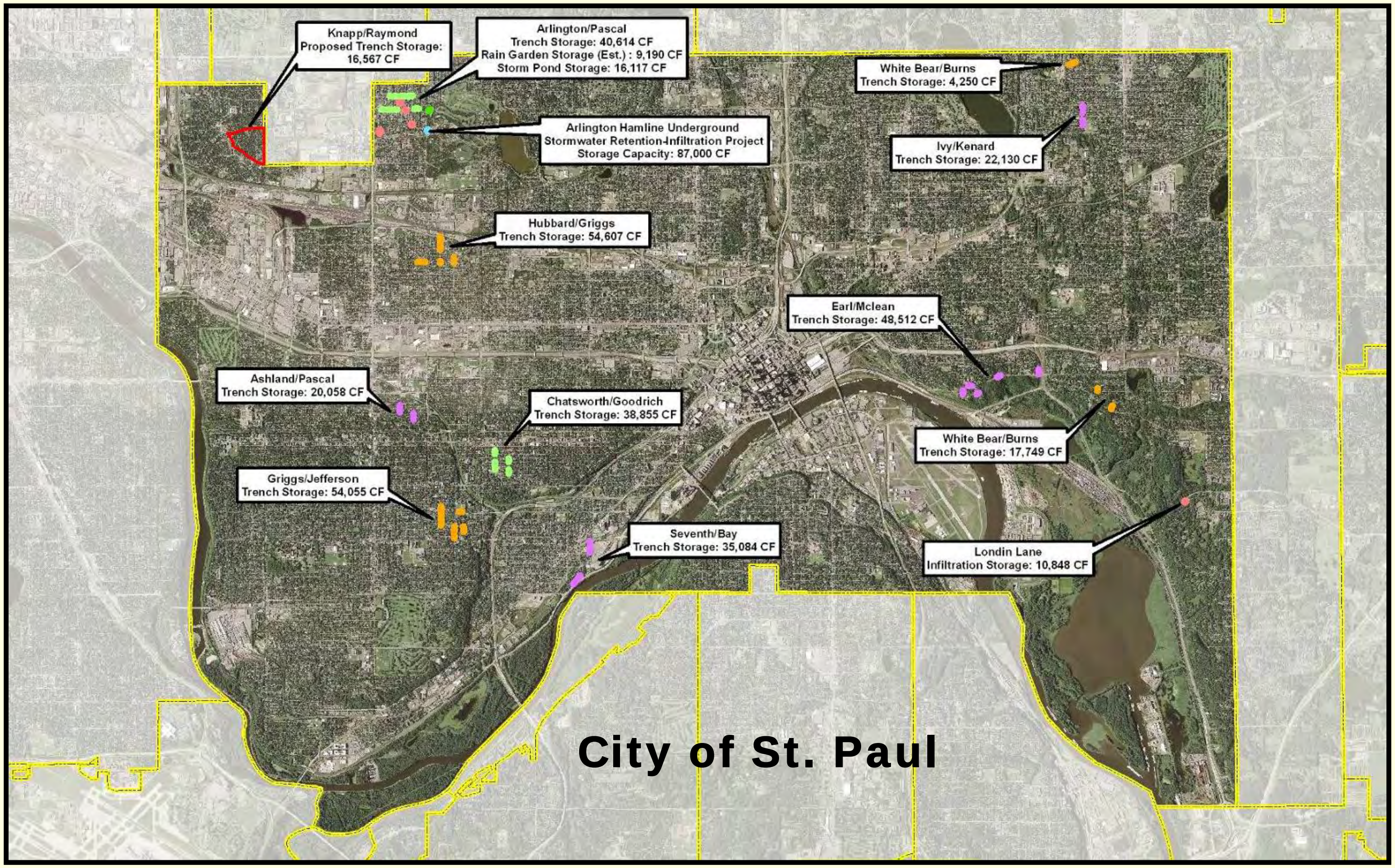
Volume Reduction Inventory

(Existing Infiltration BMPs)



Current Infiltration Volume Credit Balance with CRWD = **-21,404** cf

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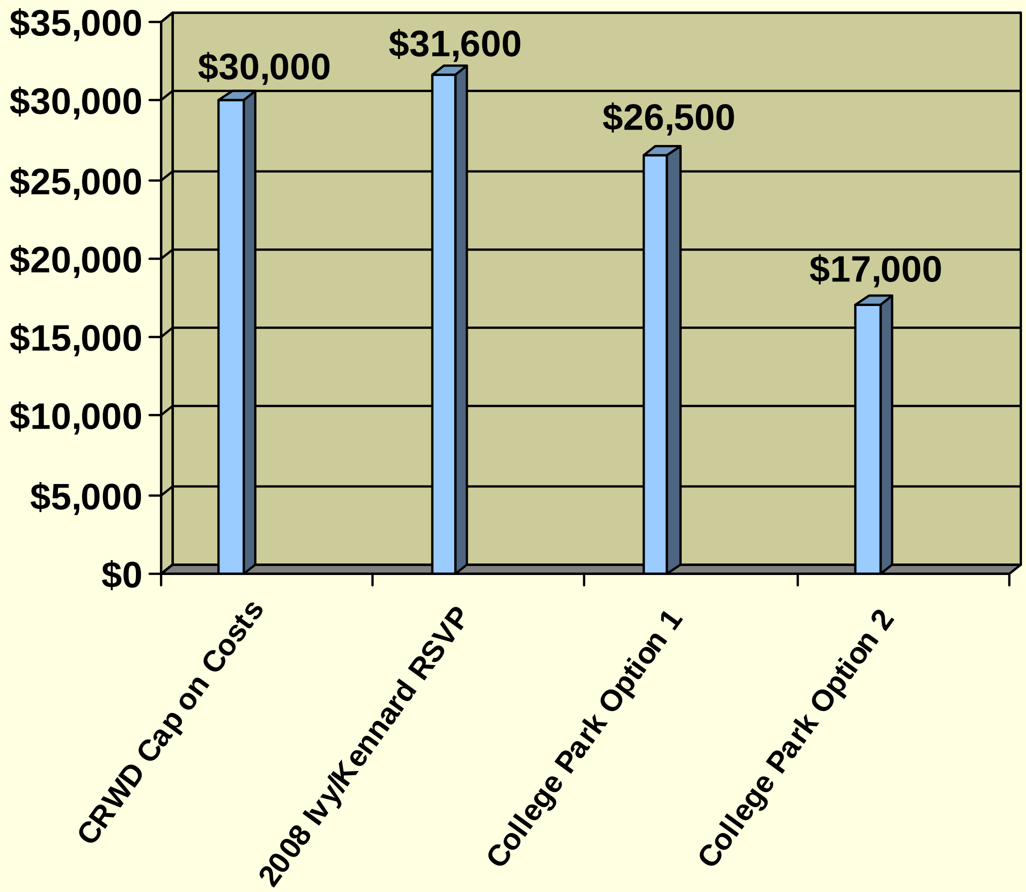
Volume Reduction Inventory

(BMP Costs)



Opportunity Locations
Can Save 15-45%
Or $69 - $207 Million

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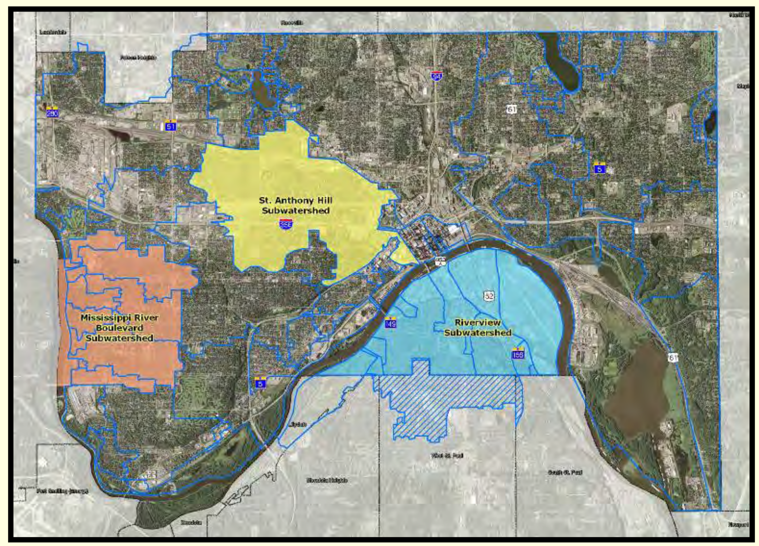
Storm Water Modeling

- Utilize XPSWMM to construct detailed models of three major subwatersheds:
  - Mississippi River Boulevard
  - Riverview
  - St. Anthony Hill
- Utilize P8 and XPSWMM to model pollutant loading to identify where BMPs may be most effective
- Modeling Analysis will identify:
  - Potential Flooding Hotspots
  - Pipe and Inlet Restrictions
  - Ideal locations to reduce volume
- Calibration of models will be based on monitoring data (CRWD)



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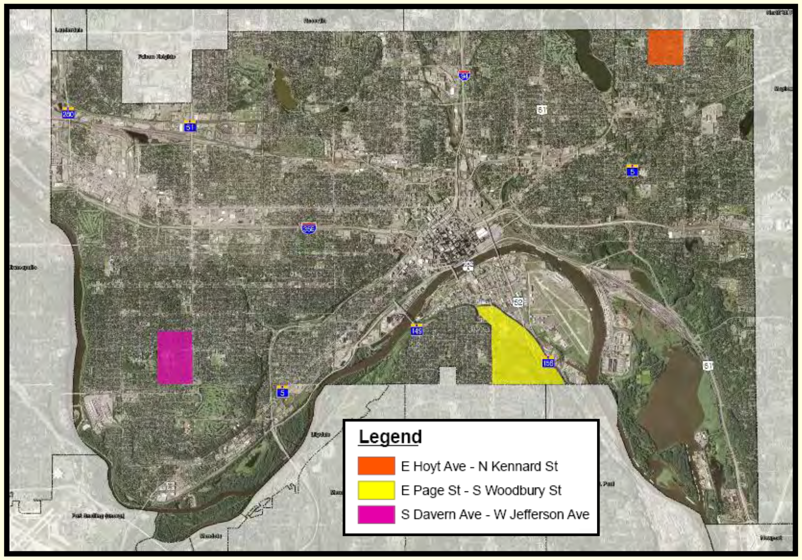
2010 RSVP Storm Water Studies

- Three 2010 RSVP Projects in three separate subwatersheds:
  - Hoyt/Kennard
  - Page/Woodbury
  - Davern/Jefferson

- Construction of BMPs concurrent with street reconstruction

- Consideration of Green Infrastructure Technologies:
  - Pervious Road Surfaces
  - Bio-retention
  - Green Roofs
  - Silva Cells
  - Etc.



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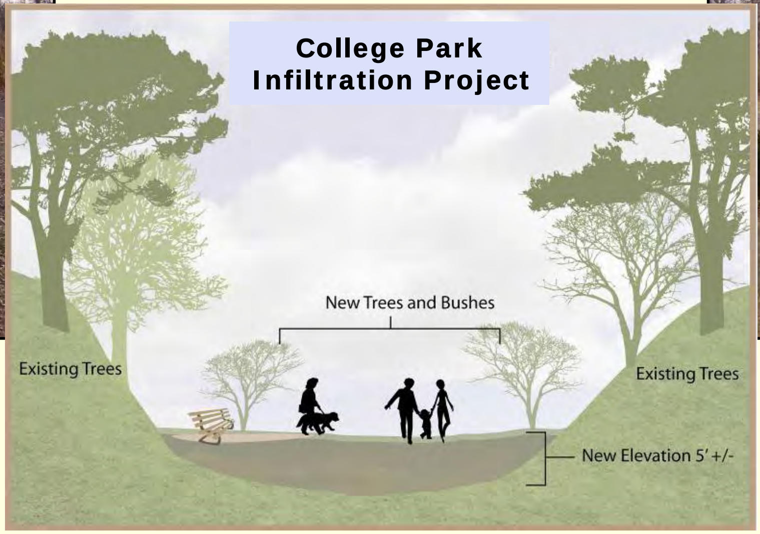
Water Quality Feasibility Studies
(College Park)

- Increase Park Functionality and Eliminate Wet Conditions by Raising Bottom Elevation of Park
- Replace Trail Section Along West Edge of Park
- Generate Infiltration Credit Bank for Future Projects to Draw From (100,000 to 150,000 cf)



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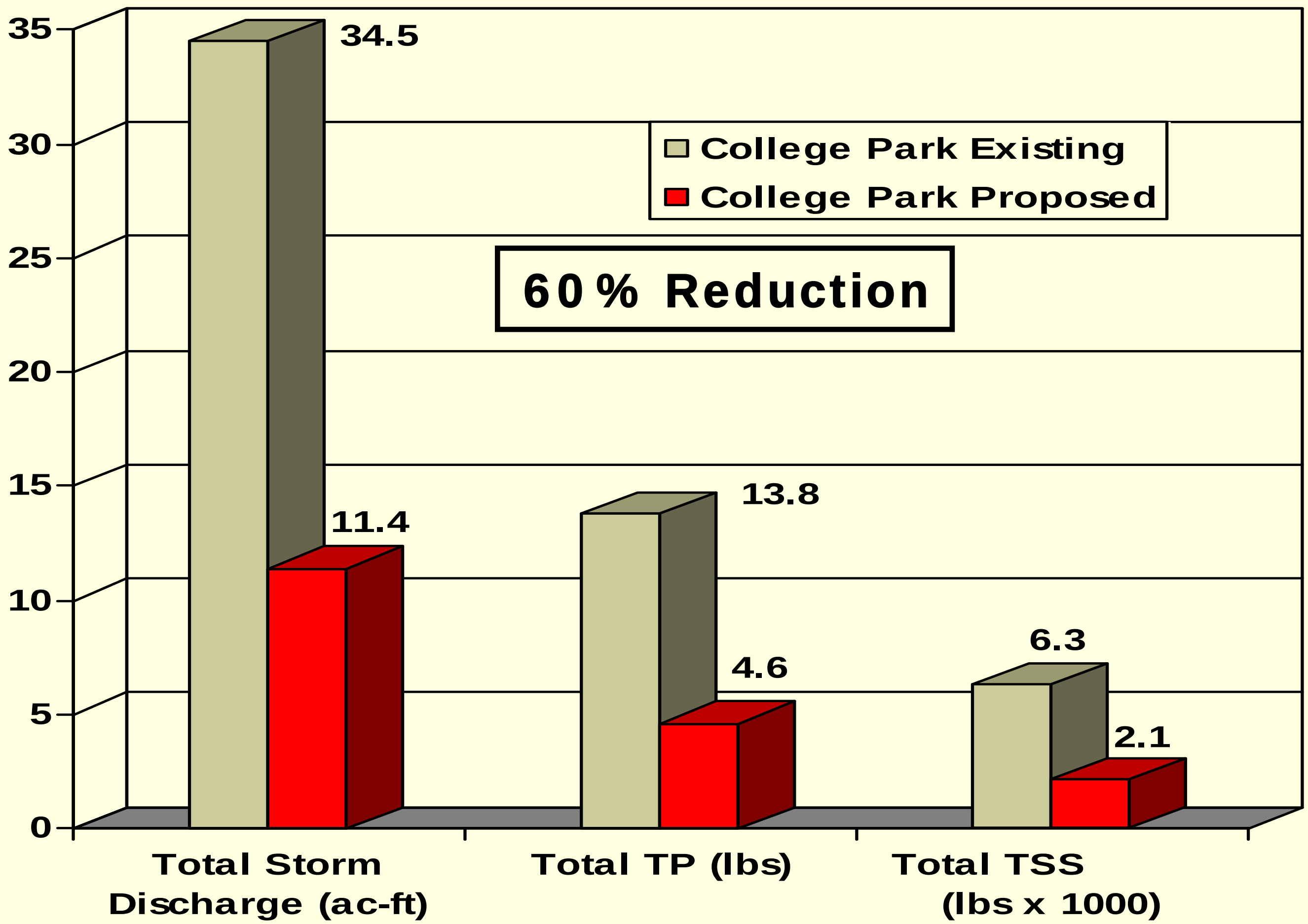
Water Quality Feasibility Studies

(College Park Anticipated WQ Impact)



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*Analysis Uses Average Concentrations Based on CRWD Monitoring Data

Water Quality Feasibility Studies

(Possible Partnerships – Parks CIB)

- Furness Parkway Improvements
- Trillium Site Development
  - Educational Opportunities
- Fitzgerald Park
- Outdoor Court Restoration Program
- Others

SUSTAINABLE BUILDING POLICY FOR NEW MUNICIPAL AND HRA OWNED BUILDINGS IN THE CITY OF SAINT PAUL

This policy applies to any planning, design, construction, and commissioning, of municipal or HRA owned facilities financed by the City of Saint Paul or HRA and those buildings utilized by the City's Executive Departments, the Saint Paul Public Library, or the Saint Paul Parks and Recreation Department.

The sustainable building policy also applies to the construction of new facilities or buildings in which the City or HRA will become the sole tenant, regardless of whether the City or HRA owns the building.

The sustainable building policy does apply to City and HRA owned parking structures and parking lots as well as to any addition to an existing building that includes a new heating/ventilation/air conditioning (HVAC) system.

The City and HRA must choose for the project one of the following rating systems and levels with which to minimally comply:

Commercial Projects:
- LEED New Construction (NC) 3 Silver, or
- Green Globes, 2 globes, or
- State Guidelines Building, Benchmarking and Beyond (B3) compliant, or
- Saint Paul Port Authority Green Design Review (as applicable)

Residential Projects:
- LEED for Homes (H) or LEED NC1 Silver, or
- Minnesota GreenStar, Silver, or
- Green Communities, Minnesota Overlay Compliant

The following mandatory requirements, established in the 2009 Sustainable Building Policy as the "Saint Paul Overlay," must be met within the chosen rating system:

1. Predicted energy use shall meet Minnesota Sustainable Building 2030 (SB 2030) "Energy Standards" for new buildings. The conditions for meeting the "Energy Standards" are subject to the "Cost Effectiveness" Protocol of SB 2030.
2. Predicted use of potable water in the building must be at least 30% below EPA Policy act of 1990.
3. Predicted water use for landscaping must be at least 50% less than a traditionally irrigated site using typical water consumption for underground irrigation systems standards.
4. Actual solid waste of construction materials, excluding demolition waste, must be at least 75% recycled or otherwise diverted from landfills.
5. Indoor Environmental Quality (IEQ) must be addressed through the following strategies:
    a. Ventilation based on ASHRAE 62.1-2004 or meet the minimum requirements of Sections 4 through 7 of ASHRAE Standard 62.1-2007
    b. Construction IEQ management plan

c. Low-emitting materials
d. Thermal comfort

6. Storm Water Management Requirements:
   a. Site Eligibility: Sites with ¼ acre or more of total land disturbance
   b. Rate Control: 1.64 cubic feet per second (cfs) /acres disturbed
   c. Water Quality Management: For a 2 year, 24-hour rainfall event, provide treatment systems designed to remove 80% of the average annual post development Total Suspended Solids (TSS) and remove 60% of the average annual post development Total Phosphorus (TP), by implementing Best Management Practices (BMPs) outlined in "Urban Small Sites Best Management Practices" handbook (Metropolitan Council), "Protecting Water Quality in Urban Areas" handbook (Minnesota Pollution Control Agency), or the "Minnesota Storm Water Manual" (Minnesota Pollution Control Agency). All BMP treatment systems for the subject site shall include safety factors, maintenance, and a back-up plan in case of failure. All manufactured devices require independent laboratory testing to confirm product claims.
   d. Volume Control/Infiltration: Maintain or increase infiltration rates from pre-project site conditions.
   e. Operation and Maintenance: All practices must have an Operation and Maintenance plan.
7. Predicted greenhouse gas emissions must be reported to the Minnesota Sustainable Building 2030 database by the design team or building owner.
8. Annually, actual energy data for the project must be submitted to the Minnesota Sustainable Building 2030 database by the building owner or by the building's utility service provider(s) with permission of the owner.

Each project's compliance with the sustainable building policy must be verified in accordance with the verification method specified by the selected rating system.

The requirements of the policy may be waived, in whole or in part, by the HRA Board of Commissioners and City Council after consideration of the advantages and disadvantages of a waiver, and upon showing a compelling public purpose.

This policy applies to projects for which schematic design is initiated after July 1, 2010.

Saint Paul Sustainable Building Policy for Private Development

This policy applies to the planning, design, construction, and commissioning of any new construction project receiving more than $200,000 in City and/or HRA funding.

City and/or HRA funding is defined as money originating from Community Development Block Grant (CDBG), Tax Increment Financing (TIF), HOME Investment Partnership Program (HOME), Multi-Family Housing Revenue Bonds, federal Low Income Housing Tax Credits (LIHTC), other federal, state, and Metropolitan Council funding programs, HRA funds, any City of Saint Paul funds, including STAR, from any combination of loans, grants, land writedown or other funding vehicles.

The Policy does apply to parking structures and parking lots and any addition to an existing building that includes a new heating/ventilation/air conditioning (HVAC) system. The Policy does not otherwise apply to existing structures.

The Developer must choose for the project one of the following rating systems and levels with which to minimally comply:

<u>Commercial Projects</u>:
- LEED New Construction (NC) 3, Silver or
- Green Globes, 2 globes or
- State Guidelines Building Benchmarking and Beyond (B3) Compliant or
- Saint Paul Port Authority Green Design Review (as applicable)

<u>Residential Projects</u>:
- LEED for Homes (H) or LEED NC 3, Silver or
- Minnesota Green Star, Silver or
- Green Communities, Minnesota Overlay Compliant

The following mandatory requirements, known as the “Saint Paul Overlay,” must be met within the Developer’s chosen rating system:

1. Predicted energy use shall meet Minnesota Sustainable Building 2030 (SB 2030) “Energy Standards” for new buildings. The conditions for meeting the “Energy Standards” are subject to the “Cost Effectiveness” Protocol of SB 2030.
2. Predicted use of potable water in the building must be at least 30% below EPA Policy Act of 1990.
3. Predicted water use for landscaping must be at least 50% less than a traditionally irrigated site using typical water consumption for underground irrigation systems standards.
4. Actual solid waste of construction materials, excluding demolition waste, must be at least 75% recycled or otherwise diverted from landfills.
5. Indoor Environmental Quality (IEQ) must be addressed through the following strategies:

a. ventilation based on ASHRAE 62.1-2004 or meet the minimum requirements of Sections 4 through 7 of ASHRAE Standard 62.1-2007
b. construction IEQ management plan
c. low-emitting materials
d. thermal comfort

6. Storm Water Management Requirements:
   a. Site Eligibility: Sites with ¼ acre or more of total land disturbance
   b. Rate Control: 1.64 cubic feet per second (cfs) /acres disturbed
   c. Water Quality Management: For a 2 year, 24-hour rainfall event, provide treatment systems designed to remove 80% of the average annual post development Total Suspended Solids (TSS) and remove 60% of the average annual post development Total Phosphorus (TP), by implementing Best Management Practices (BMPs) outlined in "Urban Small Sites Best Management Practices" handbook (Metropolitan Council), "Protecting Water Quality in Urban Areas" handbook (Minnesota Pollution Control Agency), the "Minnesota Storm water Manual" (Minnesota Pollution Control Agency). All BMP treatment systems for subject site need to include safety factors, maintenance, and a back-up plan in case of failure. All manufactured devices require independent laboratory testing to confirm product claims.
   d. Volume Control/ Infiltration: Maintain or increase infiltration rates from pre-project site conditions.
   e. Operation and maintenance: All practices must have an O and M plan.
7. Predicted greenhouse gas emissions must be reported to the Minnesota Sustainable Building 2030 database by the design team or building owner.
8. Annually, actual energy data for the project must be submitted to the Minnesota Sustainable Building 2030 database, by the building owner or by the building's utility service provider(s) with permission of the owner.

Each project's compliance with the Green Building Policy must be verified, in accordance with the verification method specified by the Developer-selected rating system.

In the event of notification of non-compliance, and reasonable opportunity to cure, the City will refer the project to the Sustainable Building Technical Committee, which will consider remedial action, and make recommendations to the HRA Executive Director or his/her designee. Upon a recommendation from the Sustainable Building Technical Committee, the HRA Executive Director or his/her designee may require remedial action, limited to the amount of funds granted to the Developer.

The requirements of the Policy may be waived, in whole or in part, by the HRA Board or the City Council after consideration of the advantages and disadvantages of a waiver, and upon showing by the Developer a compelling public purpose.

The Policy will apply to projects for which schematic design is initiated after July 1, 2010.

To assist the Developer comply with the Policy, whether the Developer is required to comply or is doing so voluntarily, the City will:

1. Provide, at no additional cost to the Developer, a Sustainability Facilitator within PED to help guide each project through the development process, ensuring adherence to the Policy.
2. At the Developer's request, help identify sustainable design experts with in-depth experience on specific issues, whether site, building, or operational.
3. Work with Xcel Energy to provide, at no cost to the Developer, energy modeling in the design stage for all participating projects meeting Xcel Energy's requirements.
4. Work with District Energy to assist with energy modeling and other analysis and assistance during the design stage for all participating projects meeting District Energy's requirements.
5. At the Recipient's request, help developers locate building commissioning agents to verify performance against design requirements.
6. Negotiate, as part of a Development Agreement, signage and labeling for compliant buildings both during and post-construction.

ARTICLE III. - 63.300. OFF-STREET PARKING FACILITY STANDARDS AND DESIGN

Sec. 63.301. - Off-street parking facility standards and design.

Wherever the off-street parking requirements in article II, parking requirements, of this chapter require the building of an off-street facility, or where a VP vehicular parking district is provided, or where any off-street parking facility is built, such off-street parking facilities shall be laid out, constructed and maintained in accordance with the following standards and design.

Sec. 63.302. - Site plan review.

A site plan shall be submitted for review as outlined in section 61.402. In addition, the following shall be submitted:

(a) Ownership of all lots or parcels intended for use as parking;
(b) Indication of all structures or facilities to be served by the off-street parking facility;
(c) All applications and plans for shared parking facilities;
(d) Location and direction of drainage for stormwater runoff; and
(e) Location and design of stormwater management features such as stormwater landscaping, rain gardens, bio-retention areas, swales, infiltration trenches, sand filters, and porous pavement, including construction details where applicable.

Applications for building permits that involve changing any parking space to another use shall include the following information:

(1) All uses, structures or facilities served by such off-street parking spaces;
(2) Total number of parking spaces accessory to such uses, structures or facilities; and
(3) Number of parking spaces proposed to be changed to another use.

(C.F. No. 10-403, § 1, 6-16-10)

Sec. 63.303. - Parking location, residential.

Residential off-street parking shall consist of an off-street parking facility or parking spaces as defined in this code. Parking spaces for one- and two-family dwelling units shall be located on the same zoning lot that they are intended to serve. Parking spaces for buildings containing three (3) or more dwelling units shall be on the same zoning lot, part of a shared parking arrangement pursuant to section 63.206(d), in a VP vehicular parking district, or in an abutting zoning lot in the same or less restrictive zoning district.

When residential parking is provided as part of a shared parking arrangement, the shared parking facility shall be clearly designated with an identification sign as described in section 64.401(j) and located within five hundred (500) feet of the building it is intended to serve, measured from the nearest point of the building to the nearest point of the off-street parking facility.

(C.F. No. 10-403, § 1, 6-16-10)

Sec. 63.304. - Parking location, nonresidential.

Off-street parking for other than residential use shall be either:

(a) On the same zoning lot as the building it is intended to serve; or

(b) In a VP vehicular parking district within the same or a less restrictive zoning district as the principal use or within a more restrictive zoning district providing the principal use is also an allowed use in that zone. This parking shall be located within three hundred (300) feet of the building it is intended to serve, measured from the nearest point of the building to the nearest point of the off-street parking lot; or

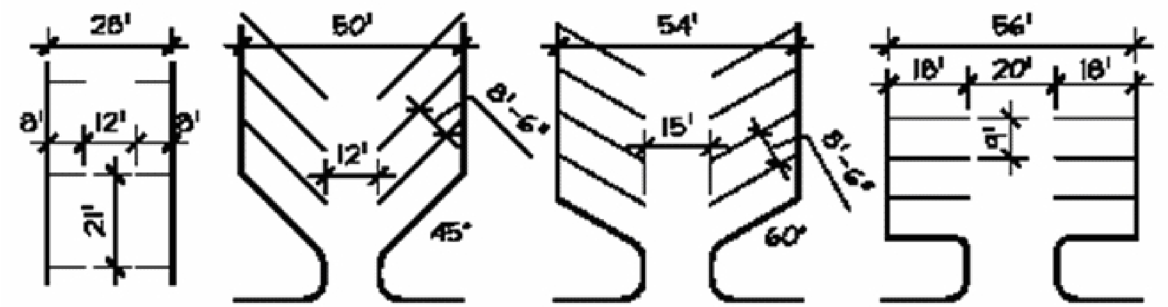
(c) Part of a shared parking arrangement pursuant to section 63.206(d) or a shared commercial parking arrangement in an institutional lot pursuant to section 65.732. The shared parking facility shall be clearly designated with an identification sign as described in section 64.401(j) and located within five hundred (500) feet of the building it is intended to serve, measured from the nearest point of the building to the nearest point of the off-street parking facility.

(C.F. No. 10-403, § 1, 6-16-10)

Sec. 63.305. - Minimum layout dimensions.

Pattern	Parking Space Width	Parking Space Length	Maneuvering Lane Width
Parallel Parking	8 ft.	21 ft.	12 ft.
30° - 53°	8 ft., 6 in.	18 ft.	12 ft.
54° - 74°	8 ft., 6 in.	18 ft.	15 ft.
75° - 90°	9 ft.	18 ft.	20 ft.

The front two (2) feet of the standard parking space may be landscaped (instead of paved) with ground cover plants which the vehicle can overhang. Landscaped portions of parking spaces count toward parking lot interior landscaping requirements and overall site landscaping requirements, but do not count toward perimeter landscaping requirements.



Parking Space Pattern

(C.F. No. 10-403, § 1, 6-16-10)

Sec. 63.306. - Compact spaces.

Accessory parking facilities may designate up to fifty (50) percent of the spaces for compact cars only, in which case, the minimum layout dimensions may be reduced to eight (8) feet in width and sixteen (16) feet in length. Compact spaces shall be designated by signs with a minimum of one (1) sign per every four (4) compact spaces.

Commercial parking facilities may designate any number of compact parking spaces.

Sec. 63.307. - Accessible parking spaces and passenger loading zones.

Parking spaces and passenger loading zones for persons with disabilities shall be designed in accordance with the provisions of the Accessibility Guidelines for Buildings and Facilities of the Americans with Disabilities Act (ADA).

(C.F. No. 10-403, § 1, 6-16-10)

Sec. 63.308. - Maneuvering lanes.

Access to all off-street parking facilities shall be provided by a maneuvering lane so that any vehicle leaving or entering the facility from or onto a public street shall be traveling forward except in the following circumstances:

(a) Parking for one- and two-family structures;

(b) Parking facilities with seven (7) or fewer parking spaces where the applicant can establish, in the review of a site plan application, that allowance of alley access would not create or aggravate an unsafe condition;and

(c) As provided in section 63.309

Driveways for one- and two-family dwellings shall be a minimum of eight (8) feet in width.

(C.F. No. 10-403, § 1, 6-16-10)

Sec. 63.309. - Stacked parking.

Stacked parking shall be allowed in any off-street parking facility whenever an attendant is present. Space for any maneuvering of vehicles must be provided in the attended parking facility.

Sec. 63.310. - Entrances and exits.

Adequate entrances and exits to and from the parking facility shall be provided by means of clearly defined and limited drives. The number of curb cuts shall be minimized, and shared curb cuts for adjacent parking areas are encouraged. When driveways no longer lead to legal off-street parking, the driveway and curb cut shall be removed and landscaping and curbing shall be restored.

(a) Entrances and exits to and from a parking facility on residentially zoned land shall not be across land in a more restrictive residential zoning district.

(b) Entrances and exits to and from a parking facility in a commercial or industrial zoning district shall not be across land in a residential district.

(c) Entrances and exits to and from all parking facilities located in land zoned other than RL -RT2 shall be at least twenty-five (25) feet from any adjoining property in RL—RT2 zoning districts.

(d) Entrances and exits to and from a parking facility shall be at least thirty (30) feet from the point of intersection of curblines of two (2) or more intersecting streets.

(e) *Alley access from residential property.* Off-street parking facilities in residential zoning districts shall be permitted access to an alley except where it is determined in the review of a site plan application that permitting alley access may be harmful to the public peace, health and safety.

For parking facilities of seven (7) or fewer parking spaces, the spaces may be directly off of the alley and the maneuvering lane may include the alley.

Uses prohibited alley access elsewhere in the zoning code shall not be permitted alley access by the provisions of this section.

(f) *Alley access from nonresidential property.* Off-street parking facilities in nonresidential zoning districts abutting residentially zoned land across an alley shall be denied alley access except where the applicant can establish, in the review of a site plan application, that allowance of alley access would not create or aggravate an unsafe condition and one (1) or more of the following conditions exist:

(1)

Alternatives to alley access are unsafe due to traffic volumes, traffic speeds, proximity to an intersection, steep slopes, a blind pedestrian crossing, or some other unsafe condition;

(2) The location of existing structures on the property prohibits access to the street;

(3) A comprehensive plan or a neighborhood plan approved by the city council recommends that new off-street parking facilities be located in the rear of development sites or discourage additional curb cuts or driveways across sidewalks; or

(4) The number of parking spaces in the off-street parking facility is seven (7) or fewer.

If a new alley access is proposed which will serve eight (8) or more parking spaces, notice to adjacent property owners and opportunity for them to comment shall be provided in the manner set forth in section 61.402(b)(5).

For parking facilities of seven (7) or fewer parking spaces, the spaces may be directly off of the alley and the maneuvering lane may include the alley.

Uses prohibited alley access elsewhere in the zoning code shall not be permitted alley access by the provisions of this section.

(g) Entrances and exits to and from a parking facility shall be at least five (5) feet from existing or planned boulevard trees.

(C.F. No. 09-1286, § 3, 12-23-09; C.F. No. 10-403, § 1, 6-16-10; Ord. No. 11-27, § 1, 4-20-11)

Sec. 63.311. - Wheel stops.

Provisions shall be made to prevent vehicles from damaging or overhanging adjacent property or public rights-of-way, or damaging required landscaping by use of such devices as curbs, wheel stops, or other protective barriers. A two-foot landscaped vehicle overhang is allowed in accordance with section 63.305, minimum layout dimensions.

(C.F. No. 10-403, § 1, 6-16-10)

Sec. 63.312. - Setback.

Except as otherwise provided in section 66.442(a) or section 66.431(b) off-street parking spaces shall not be within a required front or side yard and shall be a minimum of four (4) feet from any lot line. For housing on Irvine Avenue, a guest parking space may be provided on the driveway or elsewhere. If it is provided elsewhere, a guest parking area is exempt from setback requirements for parking spaces and it may be paved with gravel.

(C.F. No. 10-403, § 1, 6-16-10)

Sec. 63.313. - Visual screening.

For off-street parking facilities that adjoin a residential use or zoning district, a visual screen shall be provided and maintained as required in section 63.114, Visual screens. For off-street parking facilities that abut a residential use or zoning district across an alley, one (1) of the following shall be provided and maintained as determined by the zoning administrator as part of site plan review:

(a) A visual screen as required in section 63.114, visual screens; or

(b) An ornamental metal fence or other non-screening, durable fence where security concerns make this preferable to a visual screen.

(Ord. No. 11-27, § 1, 4-20-11)

Sec. 63.314. - Landscaping.

For any parking facility, other than structured parking, landscaping shall be provided to buffer the facility from adjacent properties and from the public right-of-way; reduce the visual glare and heat effects of large expanses of pavement; and provide areas for the retention and absorption of stormwater runoff. All required yards and any underdeveloped space shall be landscaped using materials such as trees, shrubs, sod, groundcover plants, or stormwater landscaping as required in section 63.319, stormwater runoff, and defined in section 60.213.

Any landscaped area shall be planted and maintained in accordance with section 63.115, Landscaping and plant materials. All parking and loading areas (including drive-through facilities, outdoor auto sales and rental, pump island service areas and stacking spaces) adjoining public streets or sidewalks shall provide:

(a) *Perimeter landscape.* A landscaped yard at least four (4) feet wide along the public street or sidewalk. If vehicles overhang the yard, an additional three (3) feet of width shall be provided.

(b)

Screening landscape. In all districts except industrial districts, screening shall be provided consisting of a masonry wall or decorative fence (not including chain link) supplemented with landscape material, forming a screen a minimum of three (3) feet in height, a maximum of four and one-half (4½) feet in height not including trees, and not less than fifty (50) percent opaque.

(c) *Interior landscape.* Parking facilities with more than twenty (20) parking spaces or six thousand (6,000) square feet of paving, whichever is less, shall provide fifteen (15) square feet of interior landscaped area for every one hundred (100) square feet of paving. Interior landscaping may not substitute for perimeter landscaping, but may join perimeter landscaping as long as it extends at least four (4) feet into the parking area from the perimeter landscape line.

(d) *Tree plantings.* A minimum of at least one (1) shade tree shall be planted for every five (5) parking spaces in a surface parking lot. Trees shall be planted within the perimeter landscaping and any required interior landscaping. Each tree shall be planted in landscaped areas or in the center of unpaved tree wells of at least three (3) feet in soil depth and one hundred (100) square feet in area as measured from the interior edge of curbing or paving, with a minimum dimension of four (4) feet wide. A soil volume of greater than five hundred (500) cubic feet per tree with a minimum planting dimension of eight (8) feet is recommended for improved tree health and survival.

(e) *Internal walkways.* Parking facilities with more than one hundred twenty-five thousand (125,000) square feet of paved area shall provide internal walkways that divide the parking lot into smaller areas no greater than fifty-five thousand (55,000) square feet. Internal walkways shall be a minimum width of four (4) feet and should connect primary buildings on the site with access to parking areas and the public sidewalk system on adjacent streets. With the exception of walkway/driveway crossings, walkways should be separated from vehicle parking or maneuvering areas by grade, different paving material, or landscaping. Internal sidewalks shall meet the requirements of applicable accessibility standards and other design and construction standards adopted by the city.

(C.F. No. 10-403, § 1, 6-16-10)

Sec. 63.315. - Maintenance.

All areas of all off-street parking facilities shall be kept in a good state of repair and free from refuse and debris. Required parking areas shall be cleared of snow within a reasonable time.

(C.F. No. 10-403, § 1, 6-16-10)

Sec. 63.316. - Paving.

All parking spaces, driveways and off-street parking facilities shall be paved with standard or pervious asphalt or concrete, or with brick, concrete or stone pavers, or material comparable to the adjacent street surfacing, in accordance with specifications of the zoning administrator, within one (1) year of the date of the permit except as provided in section 61.402(e). For one-family and two-family dwellings, driveway pavement may be limited to wheel tracks at least two (2) feet wide.

For one-family through four-family dwellings, and for townhouses with garage doors that face and front on a public street, driveways in front yards shall be no more than twelve (12) feet in width, except that a driveway may be up to four (4) feet wider than the garage door within 30 feet of the garage door. The total amount of paving for surface parking spaces for one-family and two-family dwellings shall not exceed fifteen (15) percent of the lot area or one thousand (1000) square feet, whichever is less.

(C.F. No. 09-1286, § 3, 12-23-09)

Sec. 63.317. - Parking structures.

(a) The ground floor facade abutting any public street or walkway shall be designed and architecturally detailed in a manner consistent with nearby commercial or office buildings.

(b) The design of upper floors shall ensure that sloped floors do not dominate the appearance of the facade.

(c) Windows or openings shall be provided that echo those of surrounding buildings.

(d) Entrance drives to structured parking (including underground parking) shall be located and designed to minimize interference with pedestrian movement. Pedestrian walks shall be continued across driveways.

(e) The appearance of structured parking entrances shall be minimized so that they do not dominate the street frontage of a building. Possible techniques include recessing the entry; extending portions of the structure over the entry; using screening and landscaping to soften the appearance of the entry; using the smallest curb cut and driveway possible; and subordinating the parking entrance (compared to the pedestrian entrance) in terms of size, prominence, location and design emphasis.

Sec. 63.318. - Lighting.

All parking facilities, including bicycle parking, shall be illuminated to a level to allow safe, secure access to the parking facility and within it. Light fixtures on the top level of parking structures shall be set back from the edge so that they are not visible from the adjoining street. All parking facility illumination shall conform to the provisions of section 63.116, exterior lighting.

(C.F. No. 10-403, § 1, 6-16-10)

Sec. 63.319. - Stormwater runoff.

(a) Stormwater drainage from off-street parking facilities of greater than one-quarter (¼) of an acre of total disturbed area into public sewers shall be controlled so that peak stormwater discharge rates from the site for all storms up to and including the critical 100-year frequency will not exceed:

$Q = 1.64 \times A$

where Q = the maximum acceptable discharge rate in cubic feet per second and A = the site area in acres.

Parking facilities shall be designed in accordance with best management practices to comply with required local and regional water quality, volume, and rate control standards. These standards include but are not limited to chapter 52, stormwater runoff. Parking lots shall also abide by operation and maintenance regulation as specified by local and regional authorities.

(b) For sites with greater than one-quarter (¼) of an acre of total disturbed area, when the minimum required parking as determined in section 63.207(a) is constructed as surface parking and is exceeded by more than four (4) parking spaces, the following provisions for stormwater management shall apply unless otherwise regulated in an overlay zoning district:

(1) Thirty (30) square feet of stormwater landscaping shall be provided per parking space over the minimum required parking. Stormwater landscaping shall be designed to include an under drain system if stormwater landscaping is located in areas with hydrologic soil type C (Sandy clay loam).

(2) Stormwater landscaping shall not be required if located in areas with hydrologic soil type D (Clay); groundwater or bedrock within three (3) feet of the bottom of the infiltration area; nearby wells or utilities; or potential contamination.

(c) For parking facilities with greater than one (1) acre of total disturbed area, other local, state, and regional regulations also apply.

(C.F. No. 10-403, § 1, 6-16-10)

DEPARTMENT OF SAFETY AND INSPECTIONS
Bob Kessler, Director

CITY OF SAINT PAUL
Christopher B. Coleman, Mayor

375 Jackson Street, Suite 220
Saint Paul, Minnesota 55101-1806

***Telephone**: 651-266-9090*
***Facsimile**: 651-266-9124*
***Web**: www.stpaul.gov/dsi*

Standard Operating Procedures for Erosion and Sediment Control Complaint

1) Someone sees an erosion and sediment control issue (dirt on street, etc).
- They should call the City Complaints Office: 651-266-8989

2) Complaint is passed on from Complaints Office to Senior Building Inspector (651-266-9021)

3) Building Inspector follows up on complaint using DSI Erosion and Sediment Control Worksheet

4) If Building Inspector determines source is from the Public Right-of-Way (ROW) or from City Construction Projects the complaint will be forwarded to the Public Works Inspectors –
- For Private Utility Construction in ROW: 651-487-7250 (General Number for ROW Permit Section)
- For City Construction Projects: 651-266-6081 (Street Engineering Construction Division)

Public Works Inspector will inspect and follow up accordingly

5) First Inspection
- DSI Erosion and Sediment Control Worksheet completed
- If site is non-compliant: Building Inspector issues immediate verbal order, if possible, or issues a written order if no one is on site, to address situation, sets a compliance date based on the nature of the complaint, and notes details of non-compliance in Worksheet

6) Second Inspection
- Building Inspector Conducts 2nd inspection of site after compliance date
- 2nd DSI Erosion and Sediment Control Worksheet completed
- If continued non-compliance: Building Inspector issues written orders, sets a new compliance date based on the nature of the complaint, and notes details of non-compliance in Worksheet

7) Third Inspection
- Building Inspector Conducts 3rd inspection of site after compliance date
- 3rd DSI Erosion and Sediment Control Worksheet completed
- If continued non-compliance, proceed with stopping construction work at the site, or submitting the violation to the City Attorney for potential prosecution, or pursue abatement if sediment crosses boundary of the site and project is greater than 1 acre.

DEPARTMENT OF SAFETY AND INSPECTIONS
Bob Kessler, Director

CITY OF SAINT PAUL
Christopher B. Coleman, Mayor

375 Jackson Street, Suite 220
Saint Paul, Minnesota 55101-1806

Telephone: *651-266-9090*
Facsimile: *651-266-9124*
Web: *www.stpaul.gov/dsi*

Erosion and Sediment Control Worksheet

Property Address:

Inspector:

Permit # (if applicable):

Inspection Date:

Re-inspection Date:

Inspection Type:

Size of Site:

Inspection Results

Sewer Inlet Protection:

Comments:

Street Condition:

Comments:

Rock Entrance:

Comments:

Concrete Washout Area:

Comments:

Silt Fence/Sediment Control:

Comments:

Stock Pile Erosion Control:

Comments:

Site Erosion Control:

Comments:

Corrective Action:

Comments:

CITY OF SAINT PAUL
Christopher B. Coleman, Mayor

Public Works
Right-of Way Division

Telephone: 651-266-6151
Facsimile: 651-266-9765
Email: PW-ROWpermits@ci.stpaul.mn.us

EROSION AND SEDIMENT CONTROL FOR UTILITY PROJECTS IN THE RIGHT-OF-WAY

It is essential to prevent dirt, debris, oils and other waste from entering storm drains or water resources.

Erosion and sediment control devices are **REQUIRED** for any utility construction or grading project that will result in significant land disturbing activity in the public right-of-way.

- Sediment control practices (inlet protection and perimeter control /silt fence) must be installed **BEFORE** any land disturbance activities begin.
- Temporary land stabilization practices should be installed:
  - o Daily over all temporary stockpiles on or near street (including plastic cover and temporary down drains); *and*,
  - o Within 7 days after work is completed over all disturbed areas not on or near the street (including temporary seeding of spoil piles though seeding and mulching).

Refer to the Mn/DOT Pocketbook Guide (June 2009) for guidance to preventing pollutants from leaving construction sites. Note: general operations, including dewatering and concrete washout, begin on page 57.
http://www.dot.state.mn.us/environment/pdf_files/erosion-sediment-control-handbook.pdf

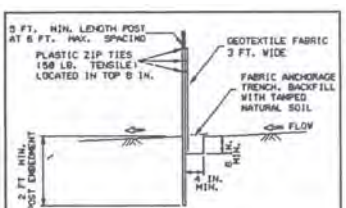


Figure 2

SILT FENCE
Silt fence is used as perimeter control to keep sediment on-site and away from areas you want to protect. For work in the right-of-way, silt fence can be installed between the top of the curb and the disturbed boulevard.

TEMPORARY SEEDING AND MULCHING OR PLASTIC COVER
Temporary seeding and mulching is to quickly provide temporary cover that will protect the soil from erosion until establishment of permanent stabilization. Applicable areas include any topsoil stockpiles and any areas disturbed by grading activities.

For areas that must be stabilized each day (located on or near the street) plastic cover should be used instead.

STORM DRAIN INLET PROTECTION
Storm drain inlet protection prevents sediment from entering a storm drain by surrounding or covering the inlet with a filtering material. This allows sediment-laden runoff to pond and settle before entering the storm drain.

The type of filter used will depend on inlet type (curb inlet or drop inlet), slope, and amount of flow. Some commercial inlet filters are placed in front of or on top of an inlet, others are placed inside the inlet and under the grate.

DAILY AND AS-NEEDED STREET SWEEPING
Street sweeping is used to clean the pavement and curb-line area on a regular basis to remove sediment, debris, and other pollutants from road and parking lot surfaces that are a potential source of pollution to waterways.

CITY OF SAINT PAUL
Christopher B. Coleman, Mayor

Public Works
Right-of-Way Division

Telephone: 651-487-7250
Fax: 651-487-7245

ROW Erosion and Sediment Control Worksheet

Project:

Project File No.:

Property Address:

Inspection Date:

Re-inspection Date:

Inspection Type:

Size of Site:

Inspection Results

Sewer Inlet Protection:

Comments:

Street Condition:

Comments:

Silt Fence/Sediment Control:

Comments:

Stock Pile On or Near Street:

Comments:

Stock Pile Not On or Near Street:

Comments:

Corrective Action:

Comments:

University of Minnesota Erosion and Stormwater Certification Program

Construction Storm Water Update
City of St. Paul
Jan 29, 2010

Shahram (Shane) Missaghi
University of Minnesota
763-509-5527

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City of St. Paul

GOALS and QUESTIONS

List what you want to get out of this class (<u>your goals</u>):

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________

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Construction Storm Water Update
City of St. Paul

Agenda

- General Concepts
- Prevention
- Erosion & Erosion Control
- Sediment & Sediment Control
- Hot Issues
- <u>Resources</u>
- Q & A

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City of St. Paul

What are we dealing with?

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What is the problem?

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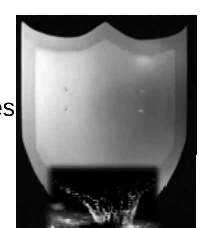
City of St. Paul

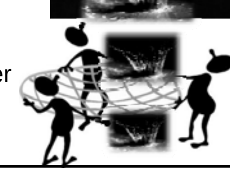
Erosion is:

- the displacement of soil particles



Sediment is:

- soil particles carried by water



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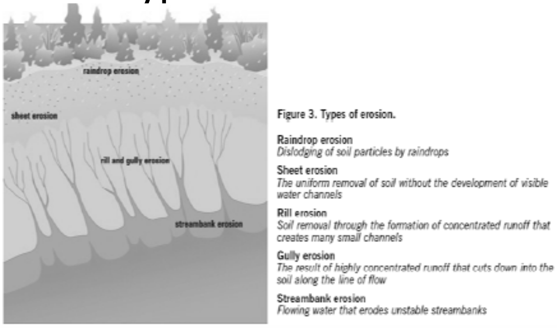
Types of Erosion:



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How big of an issue is erosion (sedimentation)?

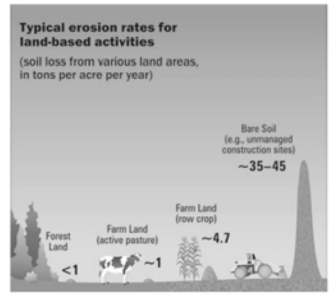

Figure 2. Typical erosion rates from land-based activities. (Dunne, T. and L. Leopold, 1978; NRCS, 2000; NRCS, 2006; ASCE and WEF, 1992)

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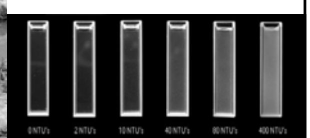
An example of turbidity…

What does it look like?



NTU = Nephelometric Turbidity Units

http://waterontheweb.org/under/waterquality/art/claycomposite.jpg

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Effect of turbidity on fish

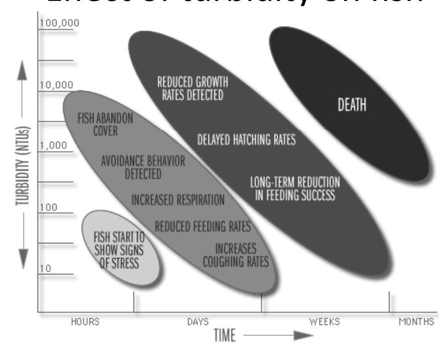

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Figure adapted from: Turbidity: A Water Quality Measure

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Erosion is:

- the displacement of soil particles

Erosion Control

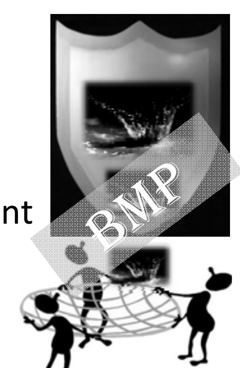
Keep in place or Cover

Sediment is:

- soil particles carried by water

Sediment Control

Filter or Settle



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CITY OF SAINT PAUL

EROSION AND SEDIMENT CONTROL FOR UTILITY PROJECT IN THE RIGHT-OF-WAY

Erosion and sediment control devices are required for any utility construction or grading project that will result in significant land disturbing activity in the public right of way. Sediment control practices (inlet protection and perimeter control (silt fence)) must be installed **BEFORE** any land disturbance activities begin **and** temporary land stabilization practices, should be installed over all temporary stockpiles on or near street daily (including plastic cover and temporary down drains) and after work is completed over all disturbed areas not on or near the street within 7 days (including temporary seeding of spoil piles though seeding and mulching). Street and curb line should be sweep daily and as-needed to prevent sediment from entering catch basins. Sediment control devices may have to be staged to provide appropriate protection as the project progresses. Listed below are some examples of sediment and erosion control devices and land stabilization practices.

SILT FENCE
Silt fence is generally used as perimeter control to keep sediment on-site and away from areas you want to protect. The most common types used are Machine-sliced and Heavy duty. In right-of-ways could be installed between top of curb and disturbed boulevard.

TEMPORARY SEEDING AND MULCHING OR PLASTIC COVER
Temporary seeding and mulching is establishment of temporary cover on all disturbed areas by seeding with fast-growing annual vegetation followed by application of straw, hydraulic mulch or other organic materials to provide a protective cover. The purpose of temporary seeding and mulching is to quickly provide temporary cover that will protect the soil from erosion until establishment of permanent stabilization. Applicable areas include any topsoil stockpiles and any areas disturbed by grading activities. For areas that must be stabilized each day (located on or near the street) plastic cover should be used instead.

STORM DRAIN INLET PROTECTION
Storm drain inlet protection prevents sediment from entering a storm drain by surrounding or covering the inlet with a filtering material. This allows sediment-laden runoff to pond and settle before entering the storm drain. Several types of filters are commonly used for inlet protection, the type of filter used will depend on inlet type (curb inlet, drop inlet), slope, and amount of flow. Some commercial inlet filters are placed in front of or on top of an inlet, others are placed inside the inlet and under the grate.

DAILY AND AS-NEEDED STREET SWEEPING
Street Sweeping is to clean the pavement and curb-line area on a regular basis to minimize pollutant export to receiving waters. These cleaning practices are designed to remove sediment, debris, and other pollutants from road and parking lot surfaces that are a potential source of pollution impacting urban waterways.

TEMPORARY PIPE DOWNDRAIN
A temporary pipe down drain conveys runoff down slopes or in curb line in a pipe so that runoff will not cause erosion. Pipe down drains are installed where concentrated flow would drain onto a temporary spoil pile or disturbed slope.

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What are the NPDES requirements? (box 24, 25,…)

- Implement construction practices that minimize erosion
- Protect all exposed soil areas within 14 days
- Provide stabilization of drainage ditches within 200 lineal feet from the property edge, or from the discharge to any surface water

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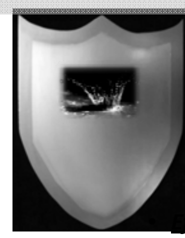
What tools do we have?
Erosion Control

BMP



- *Cost*
- *Maintenance*
- ***Effectiveness***/*Field Fitting*

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BMP TECHNIQUES

- Scheduling and Staging
- Smooth-rough grading
- Cat tracking
- Concurrent area stabilization
- Rapid stabilization
- Permanent seeding into temporarily stabilized areas
  - Applying fertilizers and conditioners

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Smooth-rough grading

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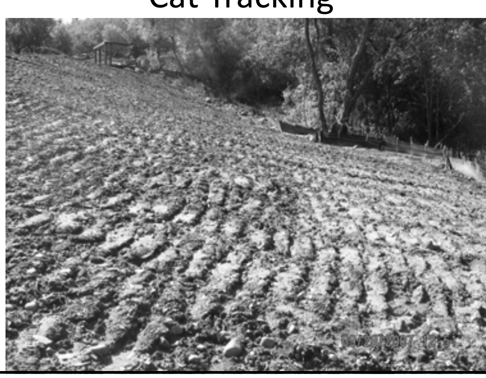
Cat Tracking



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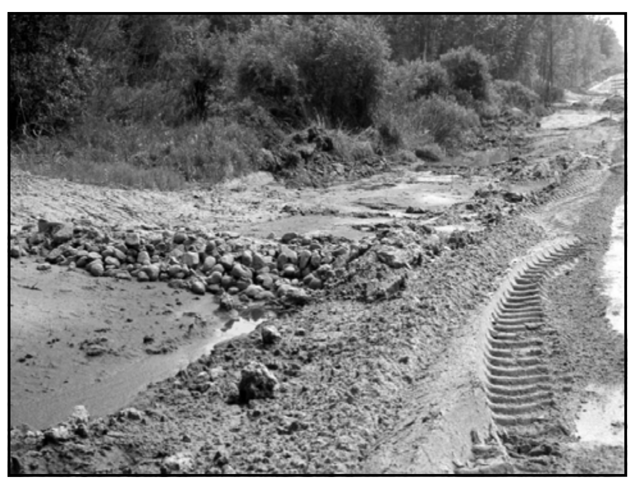
Rapid Stabilization Methods

- Method 1 Straw, disk anchored
- Method 2 Straw, hydromulch anchored
- Method 3 Hydromulch
- Method 4 Blanket
- Method 5 Rock


bobcat
864



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BMP
PRODUCTS

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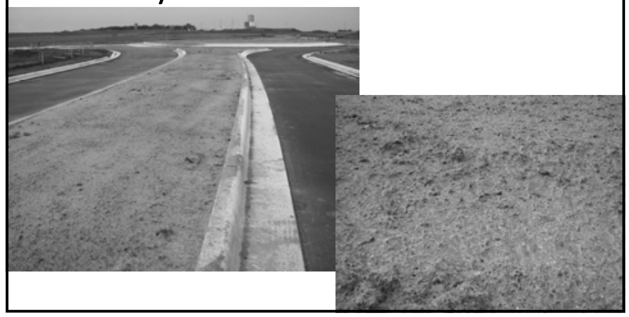
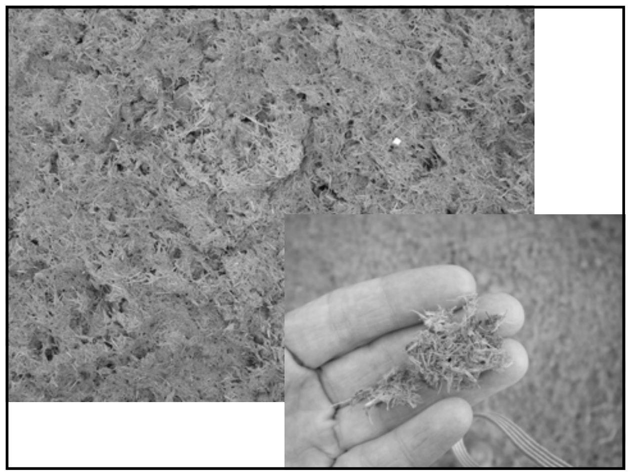
City of St. Paul

Hydraulic Soil Stabilizers





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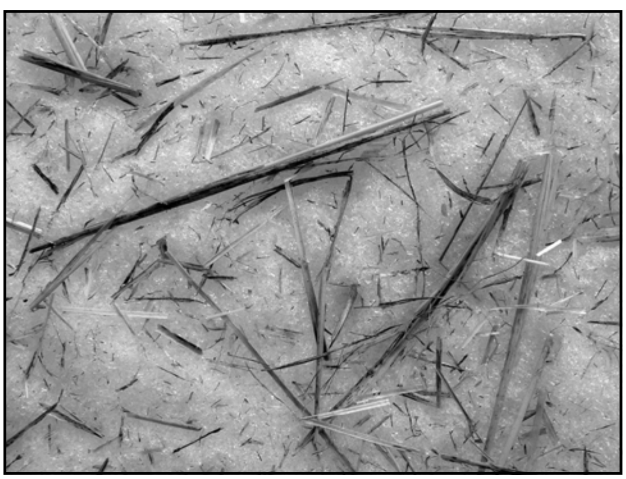
Mulch (techniques)

Winter Mulching



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Erosion Control Blankets

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Winter Erosion Control Blanket

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Sod

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Plastic

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Riprap

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Temporary Down Drains

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Compost

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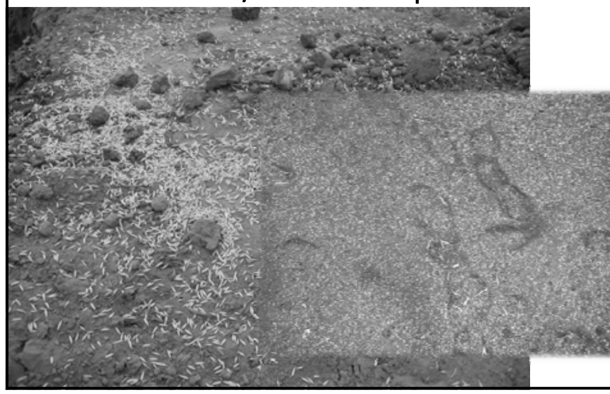
City of St. Paul

Seed / with Compost



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Existing Vegetation (**Prevention**)

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What tools do we have?
Sediment Control

- *Cost*
- ***Maintenance***
- *Effectiveness/Field Fitting*

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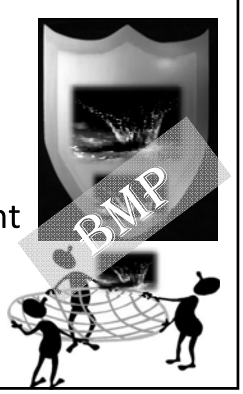
Erosion is:
- the displacement of soil particles

Erosion Control
Keep in place or Cover

Sediment is:
- soil particles carried by water

Sediment Control
Filter or Settle



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What are the NPDES requirements? (box #, #, ? ?)

•Minimize sediment from entering surface waters
•Establish down gradient perimeters
•Protect inlets
•Provide energy dissipation to pipe outlets

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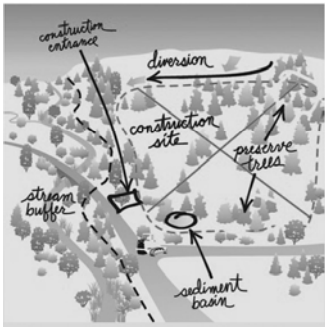
Where can we find sediment controls?

- Perimeter
- Inlets
- Culverts
- Ditches



Example sketch identifying various points to address in the SWPPP.

Exit Points!

Construction Storm Water Update
City of St. Paul

Sediment Control Techniques and Products

Construction Storm Water Update
City of St. Paul

Perimeter

Construction Storm Water Update
City of St. Paul

What are the different types of s... fence?

- M
- H
- S
- P

Construction Storm Water Update
City of St. Paul

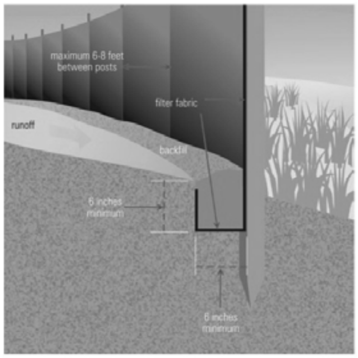


Figure 12. Illustration of proper techniques to use in installing silt fence.

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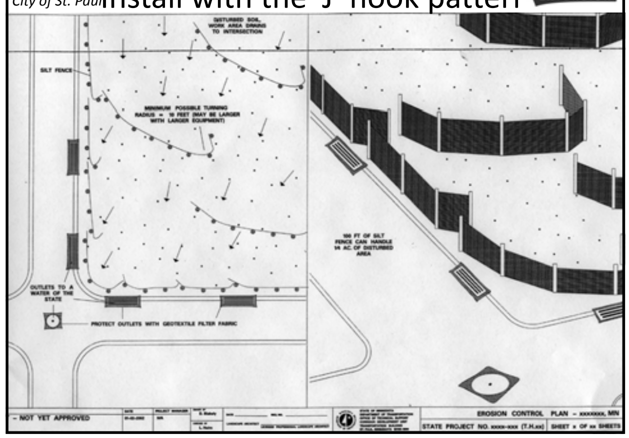
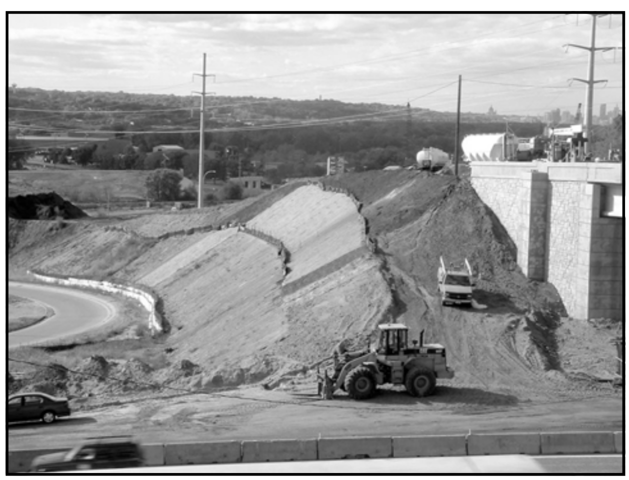
Install on the contour

Construction Storm Water Update
City of St. Paul

Install with the 'J' hook patterr

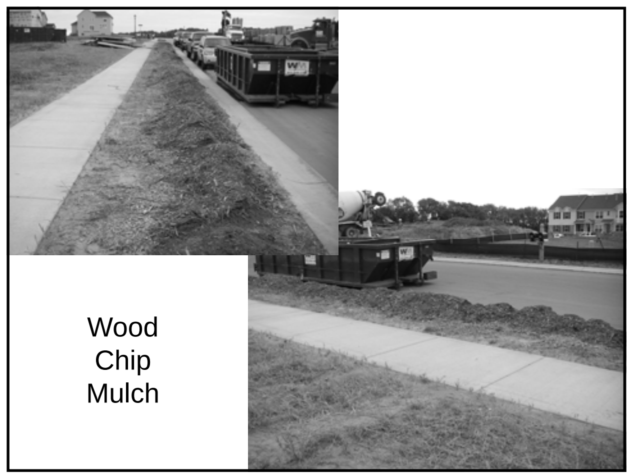





What can we use besides silt fence?


Is this bmp functioning properly?


Bales



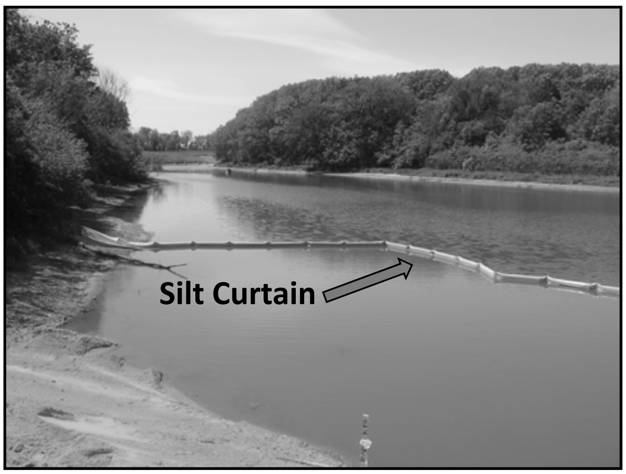
Filter Strips/Buffers

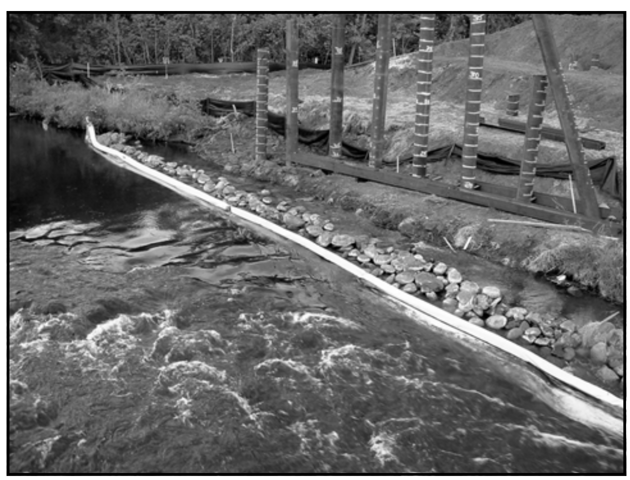
Compost

Filter Strips/Buffers

Sod

Blanket





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City of St. Paul

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Inlet Protection

Sec

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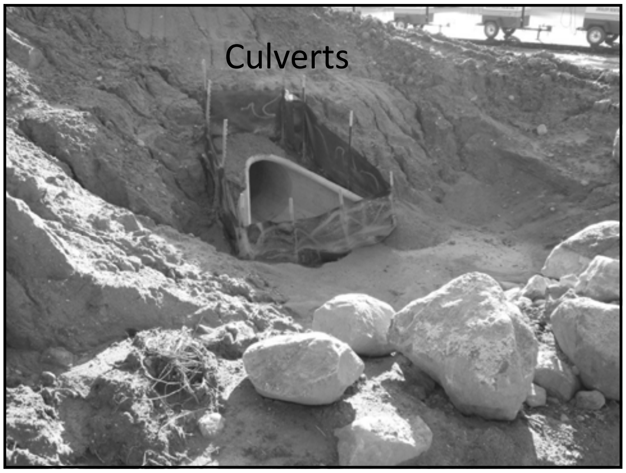
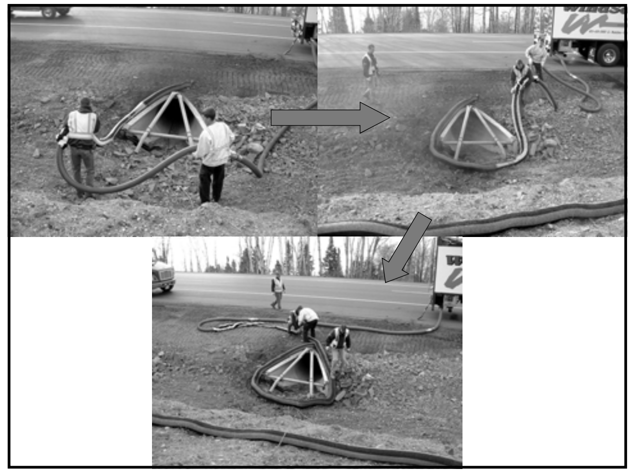
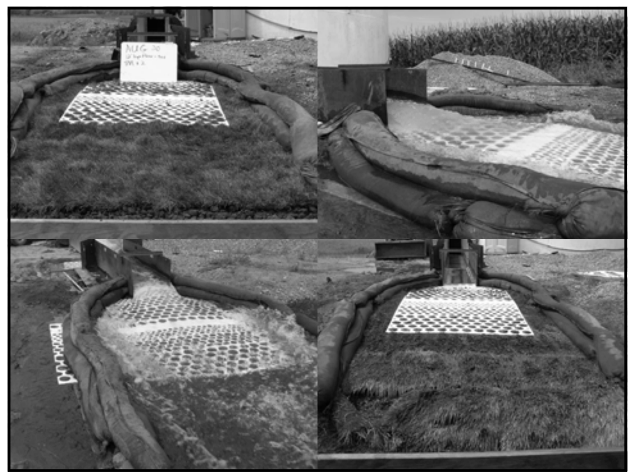
City of St. Paul

Redundant BMPs


LANGE
INDUSTRIES


Culverts



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City of St. Paul
Silt Fence
Ditch Checks

Bioroll Blanket System

Construction Storm Water Update
City of St. Paul

University of Minnesota Extension

PRACTICE

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Construction Storm Water Update
City of St. Paul

Rock Check

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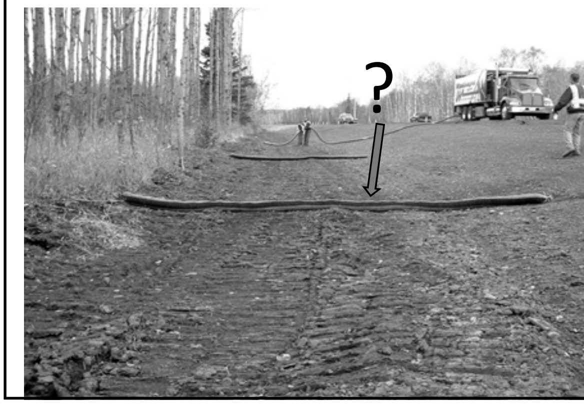
City of St. Paul



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City of St. Paul

Is this blanket installed correctly?

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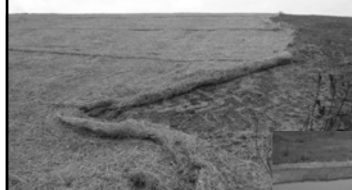
City of St. Paul



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City of St. Paul

Do you think this application was appropriate?

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How would you fix this slope?

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City of St. Paul

Existing Vegetation (**Prevention**)

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City of St. Paul

Special Issues

1. ____________________________
2. ____________________________
3. ____________________________
4. ____________________________
5. ____________________________

Construction Storm Water Update
City of St. Paul

Special Issues

Issue	Comments
Are non-enforcement site visits worthwhile?	Scheduled (notified) weekly site visits
Road sediment…how much is too much?	1. Box 28; 2. Part IV.E.4.d 3. Part IV.E.4.f 4. "evidence of off-site sediment tracking onto paved surfaces" 5. "If sediment escapes the construction site, off-site accumulations of sediment must be removed in a manner and at a frequency sufficient to **minimize** off-site impacts (e.g., fugitive sediment in streets could be washed into storm sewers by the **next** rain and/or pose a safety hazard to users of public streets)"

Construction Storm Water Update
City of St. Paul
Special Issues

Minnesota Pollution Control

Concrete Washout Guidance
NPDES/SDS Construction Stormwater Permit Requirements

Construction Storm Water Update
City of St. Paul

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Special Issues

Issue	Comments
If the road/area is under construction what are the standards/expectations?	Part IV.E.4.d: 24 Hrs.
If the area is not in compliance before we start, should we take pictures prior to starting to demonstrate the condition of the area?	YES.
how to protect catch basins ?	

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Construction Storm Water Update
City of St. Paul

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Special Issues

Minnesota Pollution Control Agency

Major changes to the 2008 Construction Stormwater Permit – NPDES/SDS

wq-strm2-42 • August 2008

innesota's Construction

section include new requirements for the

New training requirements

New training requirements are added. Required for all permitted projects after

Concrete washouts

Erosion-prevention practices

1/10 140

Construction Storm Water Update
City of St. Paul

UNIVERSITY OF MINNESOTA EXTENSION

Special Issues

Issue	Comments
big question - can't sediment control be just to stay within the project area vs not move at all-and still achieve goal?	1. Well,…. 2. It is the rule 3. The 1st line of defense is Erosion Control-(Dissolved)

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Construction Storm Water Update
City of St. Paul

UNIVERSITY OF MINNESOTA EXTENSION

Special Issues

Minnesota Pollution Control Agency

Construction Stormwater Permit

Training Requirements

wq-strm2-31 • January 2009

SWPPP

The owner of the project must ensure that training has been received by individuals who are:

- Preparing the SWPPP (typically the project engineer or consultant)
- Overseeing implementation of, revising, and amending the SWPPP and performing

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Construction Storm Water Update
City of St. Paul

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Resources

Campuses: Twin Cities Crookston Duluth Morris Rochester Other Locations

http://www.erosion.umn.edu/

myU One Stop

College of Food, Agricultural and Natural Resource Sciences > Department of Bioproducts and Biosystems Engineering

Erosion and Stormwater Management Certification Program

Welcome

Construction sites, municipalities, and industrial facilities are subject to National Pollutant Discharge Elimination System (NPDES) regulations. We offer comprehensive training for designers, inspectors, contractors, and other staff involved with these sites and regulations.

News

MECA Annual Conference in St. Cloud on March 11 &12 to include Industrial Stormwater Permit Information

The Minnesota Erosion Control Association (MECA) annual conference will in St. Cloud this year on March 11 and 12, 2010.

Courses

Registration is Now Open for 2009-2010 Courses

Registration for the 2009-2010 training season is now open. Schedule of Courses

Read about the expiration statement on your ca

Provisional certification

Industrial Stormwater Permit Training

Technical Resources

Here's a list of online resources relating to permitting, regulations, etc.

Resources relating to courses

Plants for Stormwater Design

Ordering Information

2009 Pocketbook guide now available!

Ordering information

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Construction Storm Water Update
City of St. Paul

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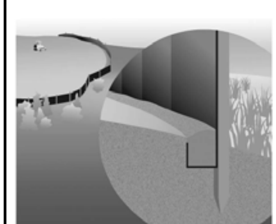
Resources



Stormwater Construction Inspection Guide

Minnesota Pollution Control Agency

August 2008

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University of Minnesota Erosion and Stormwater Certification Program

University of Minnesota
EXTENSION

Construction Storm Water Update
City of St. Paul
Jan 29, 2010

Shahram (Shane) Missaghi
University of Minnesota
763-509-5527

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1/29/10 Erosion Control Training

NAME	DEPT.	Ph. #
Phil Belfiori	DSI	(651) 266-9112
H. HARE	PW	612 889 2963
Dick Robillard	PW	651-485-1688
Bill McDonald	PW ROW	651 485-0419
David V Kenyon	DSI	651-266-9024
Dale Jones	PW Streets	651-292-6600
DON STEIN	PW ROW	" 487-7226
Jim Hahn	"	485-0417
BRENT GILLEN	"	485 4263
Robert Brown	P.W. Street Maintenance	292-6600
Greg Tanem	PW Street Mnte	487-4645
Keith Thompson	PW Street Maint	651 283-2799
Mike Jak	Sewer Mtc	558-2285
EUSEBIO PEREZ	P.W. ST. MAINT.	651-783-6171
Ellen Stewart	Parks Design + Construction	651 266-6380
Don Varney	Parks " "	651 266-6427
Kathleen Anglo	Parks Design	651.266.6368
Joe Buzicky	Parks-Operations	651-632-2419
Long Yang	P.W. ROW.	651-487-4701
Henry Chung	P.W-ROW	651-485-0414
Bill Awker	P.W. Sewer Utility	651-266-6241
JonPaul Ashton	WATER	651-266-6886
Pat Lowry	Sewers	651-266-6251
JEFF STROBEL	SEWER MTC.	651-558-2285
Tom Johnston	Sewers	651 266-6173
STUART F. Simon	(SEWER) 700	266 6252

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1/29/10 (2)

Name	Dept.	Phone
Larry Ackerman	Sewers	651.266.6250
Cy Rosel	Parks + Rec	651-632-2412
Alison Bunge	Parks + Rec	
NATHAN JOHNSON	Park + Rec	651-632-2458
MEGHAN MANHATTON	Parks	632-2459
Adam Robbins	Parks	632-2457
Jim Seeger	DSI	266-9046
ANNE WEBER	PW	266-6245
PETE GALLAGHOR	STREET ENG.	266-6085
Michael Van Beusekom	Construction/St. Design	266-6083
BILL PESEK	PARKS	266-6419
Bryan Murphy	Parks	266 6411
DAVID RONZANI	PARKS	266 6410
ALICE Messer	Parks	266-6412
Jim Weeks	Street Maintenance	292-6600
DEREK Hollanitsch	Parks & Rec	(651)325-6977
JAMES MILLER	CONTRACT SVS	632-2449
John Ross	Water	266-6801
SHARON HAMILTON	P.W. RIGHT-OF-WAY	651-485-0418
KARIN MISIEWICZ	PARKS	651-632-2413
Darryl Mangan	Parks + Rec.	651-772-6147
Diane Voyda	PARKS	651-632-2421
Eric Stewart	PARKS	651.632.2421
Tom Nagel	Parks	651-632-2456
Cory Frauenmeier	Parks	(651) 292-7012
Deborah D. Williams	PARKS	651 292-7012
TERRI TIMMONS	PARKS	651-248-3210

1/29/10 (3)

Name	Dept	Phone
Joe Ehrlich	DSI	266-9028
Greg Johnson	DSI	266-9029
Pat Voyda	Parks	632-2418
Skip Saete	"	632-2435
David Tank	DSI	266-9620
Dave LeRoux	Parks & Rec	775-7678
Ryan Thole	Parks & Rec	632-2435
Brian Johnson	Parks & Rec	248-9088
Kevin Nelson	Public Works - Street Maint.	292-6600
Jeff Schichel	streets	"
Ernest Walker	streets	"

4

NAME	DEPT.	PHONE
RON GANJE	- PARKS -	266-6925
Mike Palm	DSI	266-9025
Steve UBL	DSI -	266-9021
DOUG DRUSCH	PW STREETS	292-6600
David Luckow	PW Streets	292-6600

SPILL REPORTING FORM

City of Saint Paul - Department of Parks and Recreation

INSTRUCTIONS

EMPLOYEE: Form should be filled out as completely as possible, on the same day as the spill occurred, by the individual involved in the spill. Describe all the events in as much detail as possible, especially the cleanup activities. If you have any questions regarding this form, contact your supervisor, or Environmental Services staff (651-632-5111). When completed, return form to your supervisor.

SUPERVISOR: Please return form as soon as possible to Adam Robbins, Como Central Service Facility.

Date of Spill:____________________ Name (PRINT):____________________________________

Time of spill:____________________ Supervisor:____

Section:________________________ Phone number to reach you:__________________________

What was spilled?:____

How much was spilled?:____

Did the spill flow into a sewer? If yes, what type of sewer (sanitary, storm or unknown)?

What type of surface did the spill occur on (soil, concrete, etc)?:

Location of Spill (Be specific- address, intersection, exact location):

Describe what was happening when the spill occurred:

What caused the spill (overfill, broken line, etc)? Be specific:

Describe how the spill was cleaned up:

How were the spill cleanup materials disposed of?:

List the names of other employees involved in the spill or cleanup:

Was the MN Duty Officer called (651-649-5451)? _____________________________________

If yes: Who called?______________________________ Date___________ Time_____________

Duty Officer Report #:_____________________PCA Spill #_____________________________

Employee Signature:____

\\Atlantis\STP-PWUsers\SewerUtility\annew\My Documents\Home\Annew\EPA Audit\EPA Audit Report\Robbins\Spill Reporting Form.doc
3/8/2010

Spill Kit Instructions

Stop source of spill, if it can be safely done. If not, immediately call the Minnesota Duty Officer.

Contain spill. Wear gloves. Your first priority is to protect the spill from flowing into a storm sewer or drain. Use the 3” x 4’ socks to create a barrier between the spill storm sewers/drains. Use the pillows to absorb pools of contained material (up to a half gallon per pillow). Small spills can be cleaned up with the absorbent pads.

Contact your supervisor or Environmental Services staff as soon as it is safe/practical to do so. If neither are available, contact the MN Duty Officer.

Complete a spill report form for all spills, **regardless of size**. The Minnesota Duty Officer must be notified for:

Petroleum (gasoline, diesel, hydraulic fluid, oil) spills of unknown amounts or over 5 gallons
Non-petroleum (antifreeze, pesticides, etc) spills of any amount

Phone Numbers
Environmental Services – (651) 632-5111
MN Duty Officer – (651) 649-5451

Disposal of used materials:
Used socks, pads and pillows should be placed in yellow hazardous waste bags found in the spill kit. Materials used to soak up petroleum spills should be disposed of in the 55 gallon barrel marked “Used Oil Sorbents” in the fuel shed at the Como Central Service Facility. For instructions on how to dispose of materials used to clean up non-petroleum substances, contact your supervisor or Environmental Services staff.

Replace used spill kit items promptly. All materials found in your spill kit are available from the Storeroom at the Como Central Service Facility.

FACILITY SPILL KIT INVENTORY	qty	type
	30	17"x19" pads
kit absorbs ~8 gallons	3	3"x4' socks
	4	2"x10"x10" pillows
	4	Hazardous Waste Bags
	2	Pair Nitrile Gloves
	4	Spill Reporting Forms

VEHICLE SPILL KIT INVENTORY	qty	type
	10	17"x19" pads
kit absorbs ~5 gallons	2	3"x4' socks
	2	Hazardous Waste Bags
	1	Pair Nitrile Gloves
	4	Spill Reporting Forms

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SAINT PAUL PARKS AND RECREATION

POLICY

DEPARTMENT

NUMBER: DIV. 4.4.2

PLACEMENT: Physical Resource Management

EFECTIVE DATE: 03/2010

UPDATED: 03/10

SUBJECT: Water Protection Policy

PURPOSE: To protect natural water bodies through the use of best management practices by all employees working near rivers, streams, lakes, ponds, and/or near storm sewers and impervious surfaces that lead to such water.

SCOPE: All Parks and Recreation employees.

POLICY STATEMENT:
As stewards of the environment, employees will take all precautionary measures to protect local water resources. The Department is committed to maintaining compliance with applicable environmental laws and regulations and to continually improve operations to prevent pollution of waterways that can harm local ecosystems and public health. This policy applies to any intentional act or unintentional act resulting from poor or neglectful work practices.

PROCEDURES (AND/OR REQUIREMENTS, EXPECTATIONS):

1. No dirt, silt, vegetation, organic material, debris, or other foreign materials will be deposited into any river, lake, stream, pond, or into any sewer system that leads to such water.

2. Employees will not blow, broom, sweep, whip, or shovel anything including dirt, silt, sand, debris, weeds, or other organic material into such body of water.

3. While performing work near such water, all debris will be picked up and removed from the site to be properly disposed of. In the event that an employee is not sure of proper disposal, the Supervisor should be called immediately.

4. No dirt, grass, organic material, debris or other foreign materials shall be intentionally deposited onto streets or other impervious surfaces without a plan for its immediate removal. This includes anything that may enter the sewer system. Exception: Sand/salt/deicers approved for controlling snow and ice when used appropriately.

5. When sweeping boulevards or edging curbs, a plan is required to immediately remove all dirt and debris deposited into the street. This may mean coordinating the clean up with Public Works or other street sweepers prior to the start of the job. If rain is expected, work should be delayed.

SAINT PAUL PARKS AND RECREATION

POLICY

DEPARTMENT

REQUIRED ITEMS AND/OR RELATED INFORMATION:

SECTION MANAGER'S RESPONSIBILITIES	**SUPERVISOR'S RESPONSIBILITIES**	**EMPLOYEE'S RESPONSIBILITIES**
Ensure all employees under his/her jurisdiction are aware of this policy and procedures.	Advise all employees of this policy and procedures.	Adhere to the policy.
Ensure that supervisors in his/her section enforce this policy and procedures.	Ensure that employees follow this policy and procedures.	Follow the procedures.
	Issue warnings or initiate disciplinary action as needed to ensure employee compliance.	Ask for additional training if needed.

Owner: Karin Misiewicz, Parks Supervisor **Next Review Date:** 02/11

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DEPARTMENT OF PUBLIC WORKS
Policy and Procedures
Water Protection
Number:_____ Effective Date: November 1, 2010, Revision Date:

POLICY STATEMENT:
As stewards of the environment, employees will take all precautionary measures to protect local water resources. The Department of Public Works is committed to maintaining compliance with applicable environmental laws and regulations and to continually improve operations to prevent pollution of waterways that can harm local ecosystems and public health. This policy applies to any intentional act or unintentional act resulting from poor or neglectful work practices.

PROCEDURES (AND/OR REQUIREMENTS, EXPECTATIONS):

1. No dirt, silt, vegetation, organic material, debris, or other foreign materials will be deposited into any river, lake, stream, pond, or into any sewer system that leads to such water.

2. Employees will not blow, broom, sweep, whip, or shovel anything including dirt, silt, sand, debris, weeds, or other organic material into such body of water.

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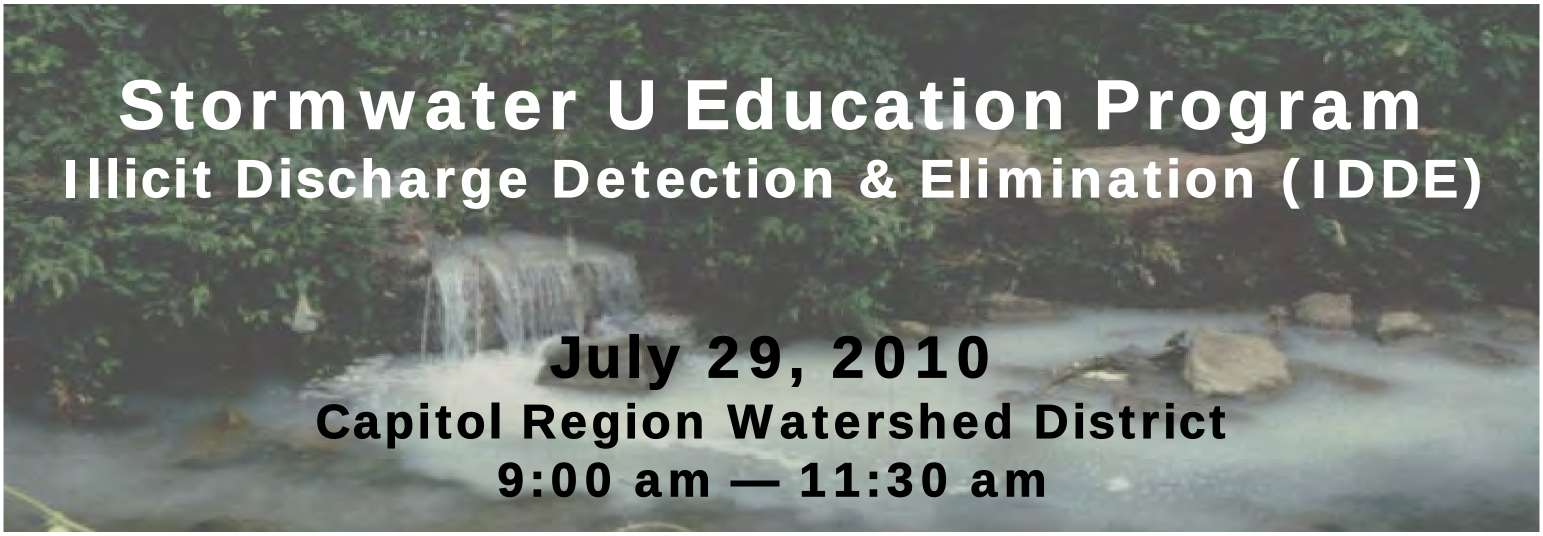
5. When sweeping streets or edging curbs, a plan is required to immediately remove all dirt and debris deposited into the street. This may mean coordinating the clean up with other street sweepers prior to the start of the job. If rain is expected, work should be delayed.

Policy Approval:

____
Rich Lallier, Public Works Director

Date: November 1, 2010

Owner: Rich Lallier	**Next Review Date:** November 1, 2010



Stormwater U Education Program

Illicit Discharge Detection & Elimination (IDDE)

July 29, 2010

Capitol Region Watershed District

9:00 am — 11:30 am

Why should you attend?

Illicit discharge is anything except rain water and exempt discharges that enter into storm sewer system. The NPDES MS4 Stormwater permit requires development and implementation of an IDDE program. Are you responsible for inspecting storm sewer pipes and responding to complaints? Are you involve with your NPDES MS4 Stormwater permit. Then this workshop is for you and it will cover topics on illicit discharge relevant to the Minnesota Pollution Control Agency NPDES Municipal Separate Storm Sewer Permit. This event will provide a basic overview of IDDE, how to approach a suspected illicit discharge, and how to respond to suspected discharges. Attendees of this workshop will qualify for 2 PDHs.

Who should attend?

This seminar is specifically designed for the City of St. Paul and those cities located within the Capital Region Watershed District. All staff responsible for NPDES MS4 Stormwater Permit compliance and the municipal maintenance staff who are routinely in the field will benefit from this training.

Date and Time

Thursday, July 29, 2010
9:00 am - 11:30 am

Location

Capitol Region Watershed District
1410 Energy Park Drive- Suite #4
St. Paul, MN 55108

Agenda

- **Definition of Illicit Discharge**
- **Identification of Pollutants**
- **Tracking Pollutant Sources**
- **Response Procedures**

Fees

This workshop is free of charge to all participants.

Speakers

Attendees of this event will hear from Shahram Missaghi, who has worked with several municipalities and counties before training with the University of Minnesota. Attendees will also hear from John Chapman, who is the director of the Erosion and Stormwater Management Program.

Workshop Sponsors

Thanks to workshop sponsors Capitol Region Watershed District and the City of St. Paul Sewers Division.

University of Minnesota Extension

Capitol Region Watershed District
Energy Park Plaza, 1410 Energy Park Dr., Suite 4, St. Paul, MN 55108
Phone (651) 644-8888 Fax (651) 644-8894 www.capitolregionwd.org

University of Minnesota Erosion and Stormwater Management Program

Saint Paul
The Most Livable City in America

University of Minnesota

Erosion and Stormwater Management Certification Program

University of Minnesota
EXTENSION

Illicit Discharge Management Work Book

Department of Bioproducts and Biosystems Engineering

http://www.erosion.umn.edu
http://www.extension.umn.edu/stormwater

Minnesota Department of Transportation

Minnesota Pollution Control Agency

Erosion and Stormwater Management Certification Program

Illicit Discharge Management Work Book

Table of Contents

Illicit Discharge Detection & Elimination Training

July 29, 2010

Name	~~MS4~~ City	Address	Email
ERIC STEWART	ST. PAUL	1100 N. HAMLINE AV ST PAUL MN 55108	ERIC.STEWART@CI.STPAUL.MN.US
Pat Dolan	Roseville	2660 Civic Center Dr.	Pat.dolan@ci.roseville.mn.us
Gretchen Carlson	Roseville	" "	gretchen.carlson@ci.roseville.mn.us
Sandra Richie	St. Paul	1100 No Hamline	trboss2@msn.com
Skip Saete	" "	" " "	skip.saete@ci.stpaul.mn.us
WAYNE SOKOLA	ST PAUL	1056 HATCH AVE. ST. PAUL, MN 55103	captx2k@hotmail.com
Rich Panteliss	St Paul	1100 N. Hamline	—
Long Yang	P.W Row St. Paul	899 Dale St. N	—
Jim Hehn	" " "	" " "	—
Dolly Ludden	St Paul Reg. Water	1900 Rice St.	dolly.ludden@ci.stpaul.mn.us
Josh Dix	Roseville	1140 ~~Rosety~~ Woodhill Drive	josh.dix@ci.roseville.mn.us
Allen Knoll	Roseville	2660 CIVIC CENTER DR	AllenBK12@live.com
PAT Ryder	ST Paul Parks	1100 N hamline	
TIM MAGGI	ST PAUL PARKS	1100 HAMLINE	—
Adam Robbins	St paul Parks	" "	adam.robbins@ci.stpaul.mn.us
Alice Messer	St Paul Parks	25 West 4th St.	alice.messer@ci.stpaul.mn.us
BRIAN TOURTELOTTE	" " "	" "	BRIAN.TOURTELOTTE@CI.STPAUL.MN.US
Matt Solheid	St. Paul	1100 Hamline Ave N.	Matthew.Solheid@ci.stpaul.mn.us
Kris Hageman	"	25 W 4th ST. 1000 CHA.	Kris.Hageman@ci.stpaul.mn.us
Van-Anh Thai	U of M	501 23rd Ave SE, Mpls.	vathai@umn.edu
Andy Phelan	"	"	andyph@umn.edu

Illicit Discharge Detection & Elimination Training

July 29, 2010

Name	MS4/City	Address	Email
Leanna Shaff	Saint Paul	375 Jackson St #220 St Paul 55101	leanna.shaff@ci.stpaul.mn.us
Tom McPherson	Saint Paul Police dept.	367 Grove St. st Paul, mn	Tommcpherson@ci.stpaul.mn.us
Deborah D. Williams	St. Paul Parks	1100 N Hamline st. Paul 55108	deb.williams@ci.stpaul.mn.us
Cory Franzmeier	Saint Paul Parks	1100 Hamline Ave Saint Paul 55108	cory.franzmeier@ci.stpaul.mn.us
SHARON HAMILTON	ST PAUL R-O-W	899 N. DALE ST, ST PAUL 55103	sharon.hamilton@ci.stpaul.mn.us
Holly Porter	ST Paul Parks & Rec	1100 N Hamline ST Paul 55108	holly_porter11@yahoo.com
PAT Voyda	" "	" "	Pvoyda@stpaul.mn.us.
TERRI TIMMONS	ST. PAUL PARK & REC	1100 N HAMLINE ST. PAUL 55108	TERRI.TIMMONS@CI.STPAUL.MN.US
Bud Beck	St. Paul Parks & Rec	1100 N. Hamline " "	None
Mike Finn	St Paul Parks Rec	1100 N Hamline " "	"
John Hanratty	St. PAUL P R	1100 N HAmline	
Nate Edwards	St. Paul City	" " "	nate.edwards@ci.stpaul.mn.us
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Jerry Strauss	SPRWS	1900 Rice Street	jerry.strauss@ci.
KENNETH SCHROEPFER	ROSEVILLE	2660 CIVIC CENTER DR.	
CHAD FIERSTINE	Roseville	2660 Civic Center	C_Fierstine@Hotmail
KARIN MISIEWICZ	ST. PAUL	1100 N HAMLINE AVE 55108	Karin.misiewicz@ci.stpaul.mn.us
Diane Voyda	ST. PAUL	1100 N Hamline Ave 55108	
Darryl Mangan	St. Paul	1100 Hamline Ave N. 55108	Darryl.Mangan@ci.stpaul.mn.us
Ron Hall	ST. Paul	1100 Hamline Ave N 55108	Ron.Hall@ci.stpaul.mn.us
Tom Hagel	St. Paul	1100 Hamline Ave N 55108	tom.hagel@ci.stpaul.mn.us

Illicit Discharge Detection & Elimination Training

July 29, 2010

all need workbooks

Name	MS4	Address	Email
Josh Williams	St. Paul	25 W 4th St. St Paul 55102	josh.williams@ci.stpaul.mn.us
Yaya Diatta	St Paul	375 Jackson	yaya.diatta@ci.stpaul.mn.us
ANGIE WIESE	ST. PAUL - DSI	375 JACKSON SUITE 220	angie.wiese@ci.stpaul.mn.us

Illicit Discharge Detection & Elimination Training

July 29, 2010

Name	~~MSA~~ City	Address	Email
Tony Thung	Roseville	2660 Civic Center Dr.	tony.thung@ci.roseville.mn.us
LARRY Zangs	St Paul	City St Paul 375 Jackson	larry.zangs@ci.stpaul.mn.us
John F. Blackstone, P.E.	Saint Paul	1900 Rice Street	john.f.blackstone@ci.stpaul.mn.us

Illicit Discharge Detection & Elimination Training

July 29, 2010

Name	~~MS4~~ City	Address	Email
Joel Boggs	St Paul	375 Jackson	[illegible] ci.stpaul.mn.us
Denise Kispeet	City of St. Paul - Parks	Highland National Golf	denise.kispert@ci.stpaul.mn.us
Alan Rupnow	Ramsey Cnty PW	1425 Paul Kirkwold Dr, Arden Hills 55112	alan.rupnow@co.ramsey.mn.us
Jim Bloom	ST PAUL	375 JACKSON	JIM.BLOOM@CI.STPAUL.MN.US
Steve UBL	ST. PAUL	375 JACKSON	STEPHEN.UBL@CI.STPAUL.MN.US
Bob Luger	Roseville	2660 Civic Ctr	Bigbob161@yahoo.com
Bill McDonald	St Paul	St Paul Traffic Operations 899 N Dale St St Paul, MN 55103	
Anne Hunt	SAINT PAUL	Mayor's office	
ANNE WEBER	SAINT PAUL	PW	

Introduction to Illicit Discharge Management

University of Minnesota

SAINT PAUL

The Most Livable City in America

Capitol Region Watershed District

University of Minnesota EXTENSION

Scope of Program

- Introduce basic concepts of illicit discharge in Stormwater
- Discuss basic field and outfall identification of illicit discharges
- Tracing discharges to their source
- Fundamentals of responding to illicit discharges (call 911)

Scope of Program

Minnesota Pollution Control Agency http://www.pca.state.mn.us/ 748

Home > Water > Water Types and Programs > Stormwater

Stormwater Program

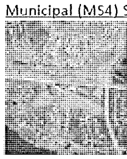
The surest way to improve water quality in Minnesota is to better manage stormwater. Unmanaged stormwater can have devastating consequences on the quality of lakes, streams and rivers we enjoy. Stormwater often contains oil, chemicals, excess phosphorous, toxic metals, litter, and disease-causing organisms. In addition, stormwater frequently overwhelms streams and rivers, scours streambanks and river bottoms and hurts or eliminates fish and other aquatic organisms.

To better manage stormwater across the state, the MPCA administers the requirements of the federal Clean Water Act in addition to its own State Disposal System requirements. At the MPCA, the Stormwater Program includes three general stormwater permits: the Municipal Separate Storm Sewer Permit, the Construction Stormwater Permit and the Industrial Stormwater Permit. Each program administers a general permit (and in some cases, individual permits) that incorporates federal and state requirements for Minnesota stormwater management.

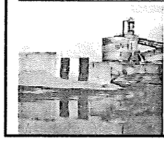
Scope of Program

Municipal Separate Storm Sewer System (MS4)

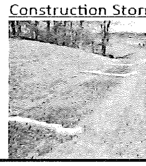
Municipal (MS4) Stormwater



Industrial Stormwater



Construction Stormwater

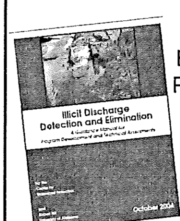


Scope of Program

Basically, the MS4 general permit requires the MS4 operator or owner to create a Stormwater Pollution Prevention Program with six important components:

1. Public education and outreach, which includes teaching citizens about better stormwater management
2. Public participation. Include citizens in solving stormwater pollution problems. This includes a required public annual meeting and an annual report.
3. A plan to detect and eliminate illicit discharges to the stormwater system (like chemical dumping and wastewater connections)
4. Construction-site runoff controls
5. Post-construction runoff controls
6. Pollution prevention and municipal "good housekeeping" measures, like covering salt piles and street-sweeping.

Reference



Illicit Discharge Detection and Elimination – A Guidance Manual for Program Development and Technical Assessments

October 2004, 2006

Center for Watershed Protection and Robert Pitt

Basic Definition

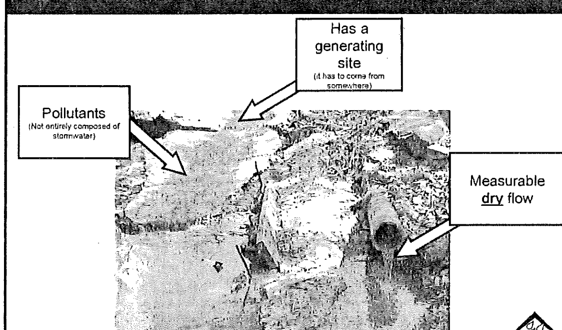
- Illicit Discharge – A storm drain with measurable flow containing pollutants or pathogens in dry weather

(this is not a regulatory definition)

Basic Definition

140 CFR 122.26(b)(2):
any discharge to an MS4 that **<u>is not composed entirely of stormwater</u>**, except allowable discharges pursuant to an NPDES permit, including those resulting from fire fighting activities.

What is an Illicit Discharge?



What is NOT an Illicit Discharge?

The City has identified and evaluated the following categories of non-stormwater discharges (as defined in Part V.G.3.e):

.... Water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration, uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetland, de-chlorinated swimming pool discharges, and street wash water, discharges or flows from fire fighting activities....

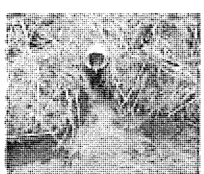
The City has determined the above referenced sources of non-stormwater discharge to be **insignificant** pollutant contributors to the MS4 system.

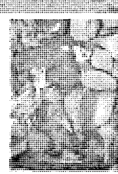
Discharge Frequency

- Continuous
  - Easy to track, high pollutant load
- Intermittent
  - More difficult to track
- Transitory
  - Most difficult to track, depending on the pollutant – can have severe impacts

Flow Types

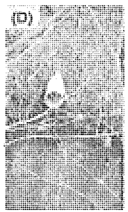
- Sewage
- Liquid waste
- Tap water
- Landscape irrigation
- Groundwater/ springs

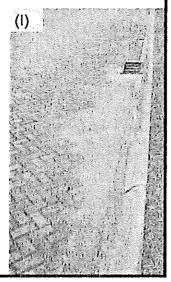




Flow Entry Method

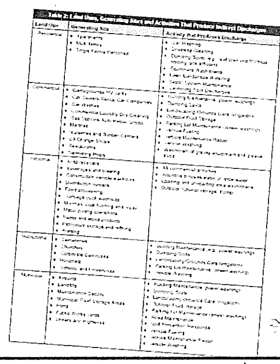
- Direct (D)
  - Sewage, Industrial, or commercial cross connection
  - Straight pipe (into ditch)
- Indirect (I)
  - Ground water seepage
  - Spills at inlet
  - Dumping at inlet
  - Outdoor washing
  - Irrigation



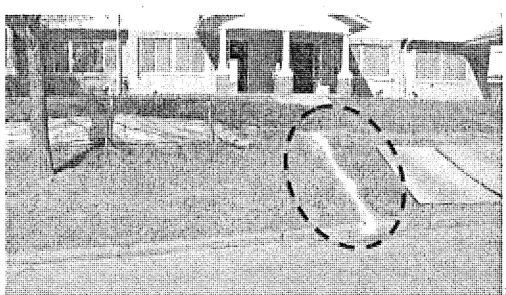


Sources

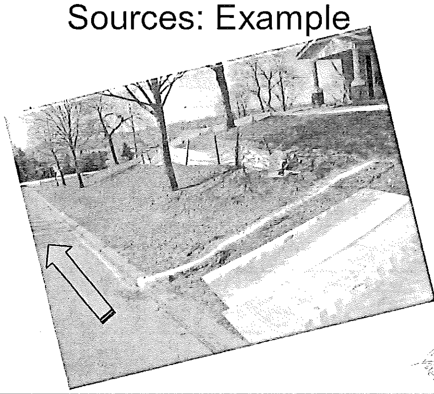
- Residential
- Commercial
- Industrial
- Institutional
- Municipal



Sources: Example



Sources: Example



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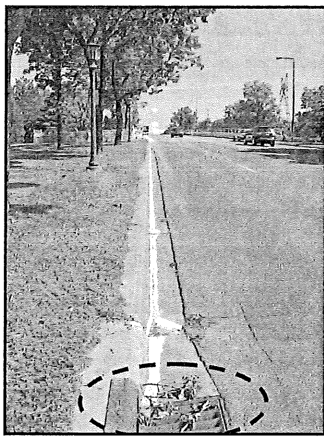

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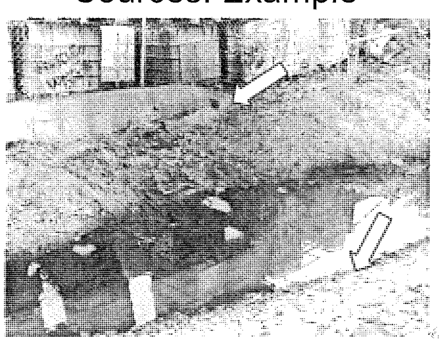

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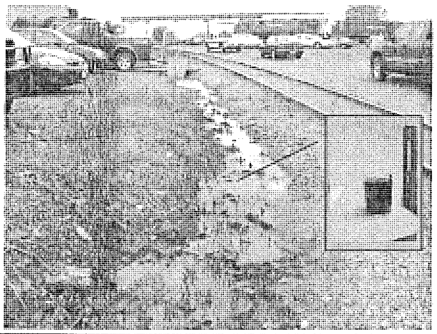

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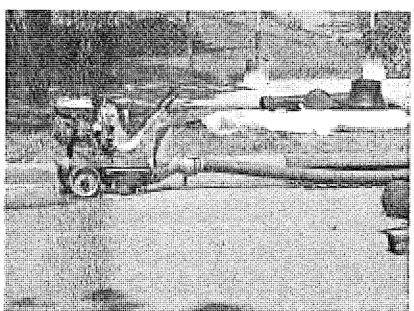

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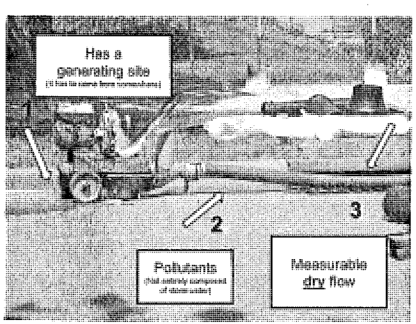
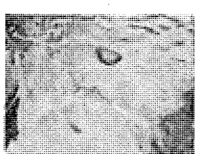


Table 2: Land Uses, Generating Sites and Activities That Produce Indirect Discharges

Land Use	Generating Site	Activity that Produces Discharge
Residential	• Apartments • Multi-family • Single Family Detached	• Car Washing • Driveway Cleaning • Dumping/Spills (e.g., leaf litter and RV/boat holding tank effluent) • Equipment Washdowns • Lawn/Landscape Watering • Septic System Maintenance • Swimming Pool Discharges
Commercial	• Campgrounds/RV parks • Car Dealers/Rental Car Companies • Car Washes • Commercial Laundry/Dry Cleaning • Gas Stations/Auto Repair Shops • Marinas • Nurseries and Garden Centers • Oil Change Shops • Restaurants • Swimming Pools	• Building Maintenance (power washing) • Dumping/Spills • Landscaping/Grounds Care (irrigation) • Outdoor Fluid Storage • Parking Lot Maintenance (power washing) • Vehicle Fueling • Vehicle Maintenance/Repair • Vehicle Washing • Washdown of greasy equipment and grease traps
Industrial	• Auto recyclers • Beverages and brewing • Construction vehicle washouts • Distribution centers • Food processing • Garbage truck washouts • Marinas, boat building and repair • Metal plating operations • Paper and wood products • Petroleum storage and refining • Printing	• All commercial activities • Industrial process water or rinse water • Loading and un-loading area washdowns • Outdoor material storage (fluids)
Institutional	• Cemeteries • Churches • Corporate Campuses • Hospitals • Schools and Universities	• Building Maintenance (e.g., power washing) • Dumping/Spills • Landscaping/Grounds Care (irrigation) • Parking Lot Maintenance (power washing) • Vehicle Washing
Municipal	• Airports • Landfills • Maintenance Depots • Municipal Fleet Storage Areas • Ports • Public Works Yards • Streets and Highways	• Building Maintenance (power washing) • Dumping/Spills • Landscaping/Grounds Care (irrigation) • Outdoor Fluid Storage • Parking Lot Maintenance (power washing) • Road Maintenance • Spill Prevention/Response • Vehicle Fueling • Vehicle Maintenance/Repair • Vehicle Washing

Pollutant Fingerprints

- Identification



Tracking

- Age of utilities may be more important than land use
- Inventory and mapping of all outfalls is critical data
- Monitoring may be used
- Tracking the pollutant to the source – detective work

Capitol Region Watershed District

EXTENSION

Capitol Region Watershed District

The Most Livable City in America

Basic Field and Outfall Identification

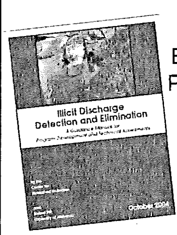
Shahram (Shane) Missaghi
952-221-1333
Water Resources Management & Policy

University of Minnesota
EXTENSION

Scope of Program

- Introduce basic concepts of illicit discharge in Stormwater
- **Discuss basic field and outfall identification of illicit discharges**
- Tracing discharges to their source
- Fundamentals of responding to illicit discharges (call 911)

Reference



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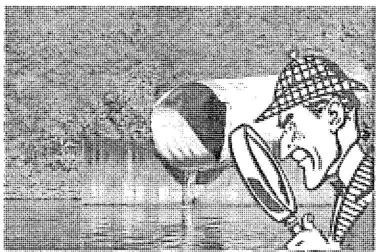
Center for Watershed Protection and Robert Pitt

Searching for Illicit Discharge Problems in the Field- Chapter 7 & 11



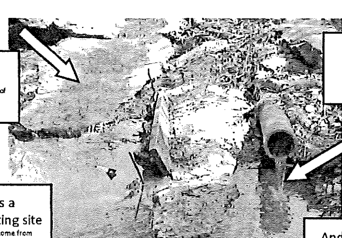
Shahram (Shane) Missaghi
952-221-1333
Water Resources Management & Policy

University of Minnesota
EXTENSION

Searching for Illicit Discharge Problems
Why?

140 CFR 122.26(b)(2):
any discharge to an MS4 that **<u>is not composed entirely of stormwater</u>**, except allowable discharges pursuant to an NPDES permit, including those resulting from fire fighting activities.

Searching for Illicit Discharge Problems
What makes it an Illicit Discharge?



Searching for Illicit Discharge Problems

What makes it Not an Illicit Discharge?

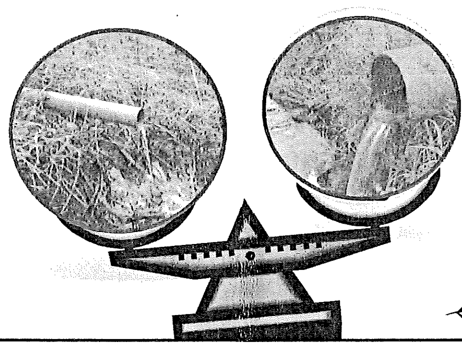
The City has identified and evaluated the following categories of non-stormwater discharges (as defined in Part V.G.3.e):

.... Water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration, uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetland, de-chlorinated swimming pool discharges, and street wash water, discharges or flows from fire fighting activities....

The City has determined the above referenced sources of non-stormwater discharge to be insignificant pollutant contributors to the MS4 system.

Searching for Illicit Discharge Problems

Is there a water quality issue (pollutants)?



Searching for Illicit Discharge Problems

Our Task Is:

Illicit Discharge

Detection

&

Elimination

Searching for Illicit Discharge Problems

What are we looking for?

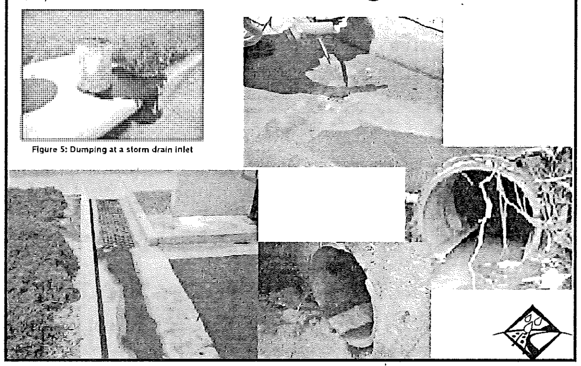
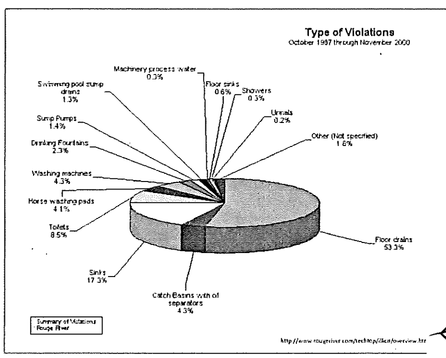


Figure 5: Dumping at a storm drain inlet

Searching for Illicit Discharge Problems

What are we looking for? Sources.



Searching for Illicit Discharge Problems

Where should we look?

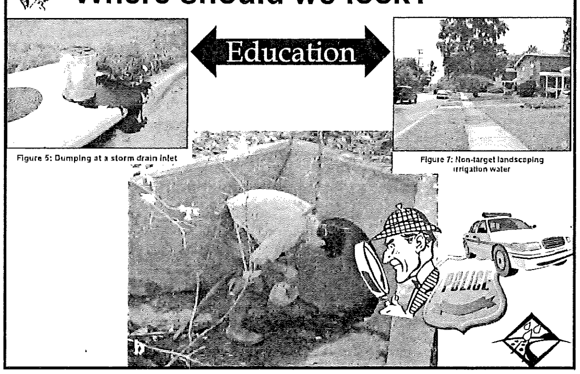
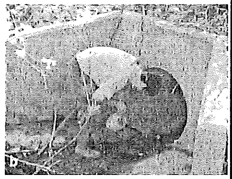


Figure 5: Dumping at a storm drain inlet

Figure 7: Non-target landscaping irrigation water

Searching for Illicit Discharge Problems
Search for Illicit Discharge Problems in the Field



Purpose:

Detective work to conduct rapid field screening at outfalls to characterize flow:

"Outfall Reconnaissance Inventory"

Searching for Illicit Discharge Problems
Outfall Reconnaissance Inventory

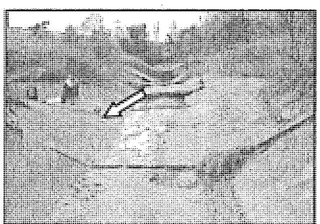


Figure 19: Walk all streams and constructed open channels

ORI Starts with a "walk" to identify all susceptible Outfalls.

Relying on our sense of :

Vision & Smell

to do the detection

(no tasting or touching!)

Searching for Illicit Discharge Problems
ORI's basic tools

Table 20: Field Screening for an IDDE Program

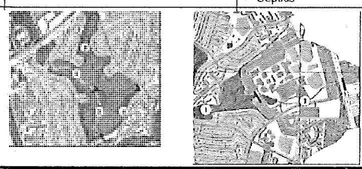
Step	Strategies
Step 1 Acquire necessary mapping equipment and staff	• Use basic street maps or detailed maps from initial assessment • Minimal field equipment required; use a portable spectrophotometer if desired • Two staff per crew with basic field training required; more specialized staff or training is optional
Step 2 Determine when to conduct field screening	• During dry season and leaf off conditions • After a dry period of at least 48 hours • Low groundwater levels
Step 3 Identify where to conduct field screening (based on desktop assessment)	• Minimal: integrate field screening with broader watershed or stream assessments **What's the history???** • Clustered: screen drainage areas ranking High and Medium first for illicit discharge potential • Severe: screen all outfalls systematically
Step 4 Conduct field screening	• Mark and photograph all outfalls • Record outfall characteristics • Simple monitoring at flowing outfalls • Take flow sample at outfalls with likely problems • Deal with major problems immediately **If found call XXX-XXXX**

Searching for Illicit Discharge Problems
Details of **Field Walk, Screening, ORI**

#1

Table 30: Resources Needed to Conduct the ORI

Need Area	Minimum Needed	Optional but Helpful
Mapping	• Roads • Streams • Past complaints, • List of permitted discharges • Fire dept., HazWaste, 1st Respond	• Known problem areas • Major land uses • Outfalls • Specific industries • Storm drain network • SIC-coded buildings • Septics



Searching for Illicit Discharge Problems
Details of **Field Walk, Screening, ORI**

#2

Field Equipment	• 5 one-liter sample bottles • Backpack • Camera (preferably digital) • Cell phones or hand-held radios • Clip boards and pencils • Field sheets • First aid kit • Flash light or head lamp • GPS unit • Spray paint (or other marker) • Surgical gloves • Tape measure & Ruler • Temperature probe • Waders (snake proof where necessary) • Watch with a second hand	• Portable Spectrophotometer and reagents (can be shared among crews) • Insect repellant • Machete/clippers • Sanitary wipes or biodegradable soap • Wide-mouth container to measure flow • Test strips or probes (e.g., pH and ammonia)

Searching for Illicit Discharge Problems
Details of **Field Walk, Screening, ORI**

#3

Staff:

- Buddy Rule (2 per crew)
- Fliers explaining the project to citizens
- Be Seen Safety Vest City Logo
- Know who to call-*"what if I find something?"*

City of Saint Paul staff should contact the City Public Works 24 hour office at

(651) 292 -6600

Searching for Illicit Discharge Problems
Survey (FILLING OUT THE FORM!)

Section 1: Background Data

Use your storm sewer system ID

Subwatershed	Outfall ID
Today's date	Time (Military)
Investigators	Form completed by
Temperature (°F) / Rainfall (in.) Last 24 hours	Last 48 hours
Latitude / Longitude	GPS Unit / GPS LMK #
Camera	Photo #s

Land Use in Drainage Area (Check all that apply)

Generating Site

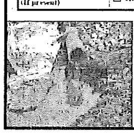
- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☐ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: ______
- Known Industries: ______

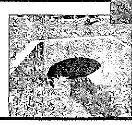
Notes (e.g., origin of outfall, if known)

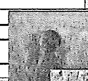
Searching for Illicit Discharge Problems
Survey: Know your outfall description

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ Closed Pipe	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other ______	☐ Circular ☐ Eliptical ☐ Box ☐ Other ____	☐ Single ☐ Double ☐ Triple ☐ Other ____	Diameter/Dimensions: ______	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other ____	☐ Trapezoid ☐ Parabolic ☐ Other ____		Depth ____ Top Width: ____ Bottom Width ____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☐ Yes ☐ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				





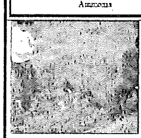


Searching for Illicit Discharge Problems
Survey: Know your outfall description

Section 3: Quantitative Characterization

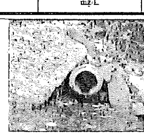
MS4 Inventory?

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

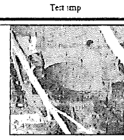


Outfall fully submerged by debris

Fully submerged: Can't see outfall



Trickle Flow: Very narrow stream of water



Moderate Flow: Steady stream, but very shallow depth

Searching for Illicit Discharge Problems
ORI: Taking Samples: Top 10

1. **Where** to collect samples
2. **When** to collect samples
3. Sample bottle **preparation**
4. Sample **collection** technique
5. **Storage** and preservation of samples
6. Sample **labeling** and chain of custody plan
7. **Q**uality **a**ssurance/control samples
8. **Safety** considerations
9. ____________________
10. ____________________________

Searching for Illicit Discharge Problems
ORI: Taking Samples

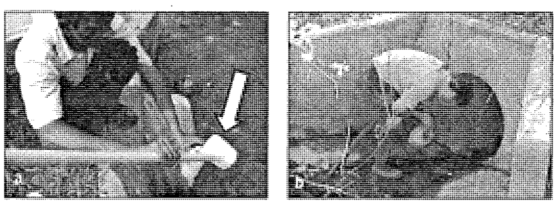


Figure G.1: A dipper (a) is helpful when the outfall is hard to reach. A milk jug (b) can be used to collect samples from shallow flow.

Searching for Illicit Discharge Problems
ORI: Taking Samples

Methods to isolate intermittent discharges in the storm drain network Sandbags

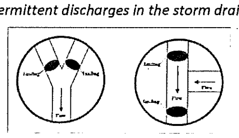
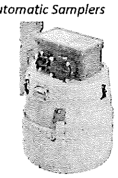


Figure 59: Example sandbag placement (Source: Jewell, 2001)

Automatic Samplers



Optical Brightener Monitoring (OBM) traps

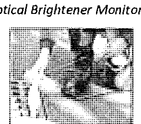
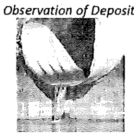


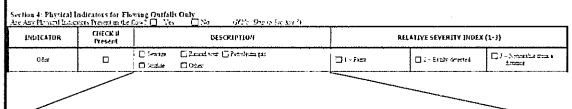
Figure 60: Optical Brightener Placement in the Storm Drain
(Source: Sargent and Castonguay, 1998)

Observation of Deposits or Stains



Searching for Illicit Discharge Problems

Survey by Sensory Indicators: Odor, Color, Turbidity & Floatables



DESCRIPTION

☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas

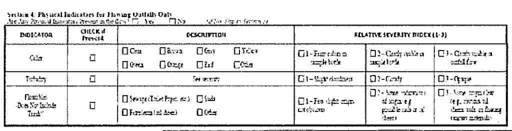
☐ Sulfide ☐ Other:

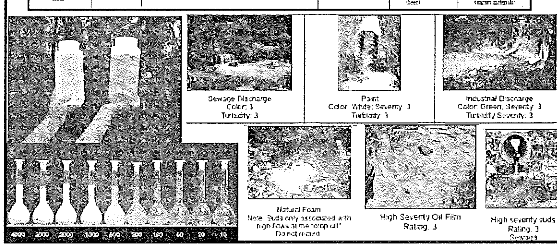
Sewage Discharge
Color: 3
Turbidity: 3

High Severity Oil Film
Rating: 3

Searching for Illicit Discharge Problems

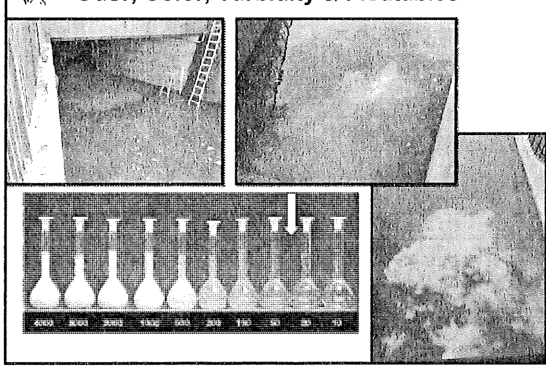
Survey by Sensory Indicators: Odor, Color, Turbidity & Floatables





Searching for Illicit Discharge Problems

Survey by Sensory Indicators: Odor, Color, Turbidity & Floatables



Searching for Illicit Discharge Problems
Some Markers & Their Fingerprints

Markers	
Ammonia	Color
Boron	pH (< 6-7 <)
Chlorine	Turbidity (> 25-100 ; 1000)
Detergents	Fluoride
E. coli.	Smell
Fluorescence	Potassium
Conductivity (> 2,000)	Surface Tension
Turbidity	Surfactants

Searching for Illicit Discharge Problems
Some Markers & Their Fingerprints

Table F1: Summary of Research Indicators Used for Identifying Inappropriate Discharges into Storm Drainage

Paramater Group	Comments	Recommendation
Coprostanol and other fecal sterol compounds	Used to indicate presence of sanitary sewage	Possibly useful. Expensive analysis with GC/MSD. Not specific to human wastes or recent contamination. Most useful when analyzing particulate fractions of wastewaters or sediments
Specific detergent compounds (LAS, fabric whiteners, and perfumes)	Used to indicate presence of sanitary sewage	Possibly useful. Expensive analyses with HPLC. A good and sensitive confirmatory method
Pharmaceuticals (colfibric acid, aspirin, ibuprofen, steroids, illegal drugs, etc.)	Used to indicate presence of sanitary sewage	Possibly useful. Expensive analyses with HPLC. A good and sensitive confirmatory method
Caffeine	Used to indicate presence of sanitary sewage	Not very useful. Expensive analyses with GC/MSD. Numerous false negatives, as typical analytical methods not suitably sensitive.
DNA profiling of microorganisms	Used to identify sources of microorganisms	Likely useful, but currently requires extensive background information on likely sources in drainage. Could be very useful if method can be simplified, but with less specific results.
UV absorbance at 228 nm	Used to identify presence of sanitary sewage	Possibly useful, if UV spectrophotometer available. Simple and direct analyses. Sensitive to varying levels of sanitary sewage, but may not be useful with dilute solutions. Further testing needed to investigate sensitivity in field trials.
Stable isotopes of oxygen	Used to identify major sources of water	May be useful in area having distant domestic water sources and distant groundwater recharge areas. Expensive and time consuming procedure. Can not distinguish between wastewaters if all have common source

GC/MSD - Gas Chromatography/Mass Selective Detector
HPLC - High Performance Liquid Chromatography

Searching for Illicit Discharge Problems
Fingerprints of Major Sources

Source	Marker (Fingerprint)
Shallow Groundwater	Hardness, pH
Wash Water	Detergents
Tap Water	Fluoride Sometimes Hardness
Sewage	E. Coli; Detergents (Fluorescence) High Ammonia (> 50 mg/L) / Potassium Ratio (> 20 mg/L)

Searching for Illicit Discharge Problems
Fingerprints of Major Sources

Table E1.1: Tap Water Reference ("Library") Samples

Sample number	Sampling Location	Date	pH	Spec. cond. (µS/cm)	Temp. (°F)	Turb. (NTU)	Color (APHA Platinum Cobalt Units)	F (mg/L)	Hard. (mg/L CaCO3)	Detergent (mg/L as MBAS)	Fluorescence (raw signal strength)	Fluorescence (mg/L as "Tide")
1	B.B Comer Hall	5/17/2002	5.19	132	N/A	N/A	0	0.97	53.5	0	N/A	N/A
2	Rose Towers	5/17/2002	7.92	145	N/A	N/A	0	0.97	58.4	0	N/A	N/A
3	H.C Comer Hall	5/17/2002	6.46	125	N/A	N/A	0	0.98	50.5	0	N/A	N/A
4	Rec Centre	5/17/2002	8.11	130	N/A	N/A	0	0.72	54.3	0	N/A	N/A
5	Coleman Coliseum	5/17/2002	8.26	130	N/A	N/A	0	0.94	72.3	0	N/A	N/A
6												
7												
8												
9												
10												
11												
12												

Table E1.4: Laundry Reference ("Library") Samples, CONT.

Sample number	Sampling Location	Date	K (mg/L)	NH_3 (mg/L as N)	NH_3/K (ratio)	B (mg/L)	Total Coliforms (MPN/100 mL)	E. coli (MPN/100 mL)	Enterococci (MPN/100 mL)
1	Renee's House (unknown)	11/3/2002	2	1.10	0.55	N/A	N/A	N/A	N/A
2	Renee's House (unknown)	12/14/2002	2	0.89	[illegible]	N/A	N/A	N/A	N/A
3	Renee's House (unknown)	5/11/2003	7	2.50	0.35	3.53	293.9	<1	<1
4	Renee's House (unknown)	5/11/2003	4	0.50	0.12	0.38	<1	<1	<1
5	Renee's House (unknown)	5/11/2003	15	0.53	[illegible]	3.67	<1	<1	<1

Table E1.5: Sewage (Dry Weather) Reference ("Library") Samples

Sample number	Sampling Location	Date	pH	Spec. cond (µS/cm)	Temp (°F)	Turb. (NTU)	Color (APHA Platinum Cobalt Units)	F (mg/L)	Hard. (mg/L CaCO3)	Detergent (mg/L as MBAS)	Fluorescence (raw signal strength)	Fluorescence (mg/L as "Tide")
1	Tuscaloosa WWTP (Dry Season)	12/18/2002	6.44	780	N/A	122	>100	0.54	36	10	N/A	240
2	Tuscaloosa WWTP (Dry Season)	1/9/2003	6.58	2100	N/A	306	>100	0.74	42	10	N/A	159
3	Tuscaloosa WWTP (Dry Season)	1/15/2003	6.42	1500	N/A	233	>100	0.64	52	12.5	N/A	142
4	Tuscaloosa WWTP (Dry Season)	3/11/2003	6.9	1,090	N/A	53.6	>100	0.58	58	10	N/A	139
5	Tuscaloosa WWTP (Dry Season)	5/18/2003	7.1	540	N/A	200	70	0.55	55	9	114406	254
6	Tuscaloosa WWTP (Dry Season)	6/2/2003	6.89	1090	N/A	128	100	0.62	42	8	116847	237
Mean			6.73	1215	-	155	>100	0.595	50	9.7	115126	213
Standard Deviation			0.29	553	-	38	-	0.072	13	1.66	1015	57
COV			[illegible]	[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Searching for Illicit Discharge Problems
Fingerprints of Industrial Sources

Table K.1: Chemical and Physical Properties of Industrial Non-Storm Water Discharges

Industrial Categories Major Classifications SIC Group Numbers	Odor	Color	Turbidity	Floatables	Debris and Stains	Structural Damage	Vegetation	pH	Total Dissolved Solids
34 Fabricated Metal Products	Detergents, Rotten Eggs	Brown to Black	High	Dirt, Grease, Oils, Sand, Clay Dust	Gray to Black	Low	Inhibited	Wide Range	High
32 Stone, Clay, Glass, and Concrete Products	Wet Clay, Mud, Detergents	Brown to Reddish-Brown	Mod.	Glass Particles Dust from Clay or Stone	Gray to Light Brown	Low	Normal	Basic	Low
Chemical Manufacture									
28 Chemicals & Allied Products									
2812 Alkalies and Chlorine	Strong Halogen or Chlorine, Pungent, Burning	Alkalies – NA; Chlorine - Yellow to Green	Low	NA	Alkalies – White Carbonate Scale Chlorine - NA	High	Highly Inhibited	Basic	High
2816 Inorganic Pigments	NA	Various	High	Low Potential	Various	Low	Highly Inhibited	Wide Range	High
282 Plastic Materials and Synthetics	Pungent, Fishy	Various	High	Plastic Fragments, Pieces of Synthetic Products	Various	Low	Inhibited	Wide Range	High
283 Drugs	NA	Various	High	Gelatin Byproducts for Capsulating Drugs	Various	Low	Highly Inhibited	Normal	High
284 Soap, Detergents & Cleaning Preparations	Sweet or Flowery	Various	High	Oils, Grease	Gray to Black	Low	Inhibited	Basic	High
285 Paints, Varnishes, Lacquers, Enamels and Allied	Latex - Ammonia SB - Dependent Upon Solvent (Paint	Various	High	Latex - NA	Gray to Black	Low	Inhibited	Latex-Basic	High

Searching for Illicit Discharge Problems
Markers & Fingerprints a summary

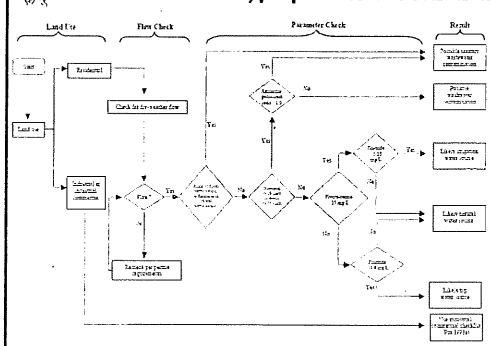


Figure H.1 Complete Flow Chart (including Additional Confirmatory Parameters) from Tuscaloosa, Alabama

Searching for Illicit Discharge Problems
Markers & Fingerprints Model

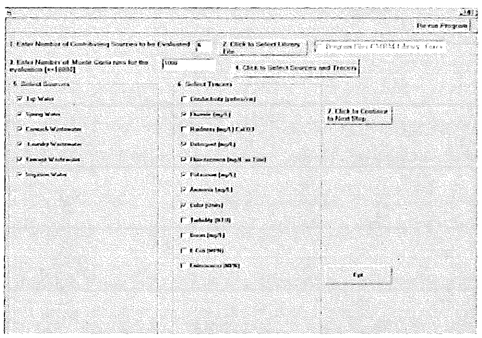
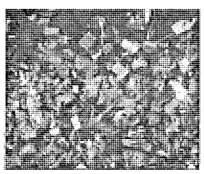
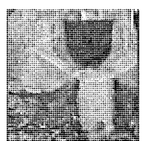


Figure I.1: Form-1 (Model inputs)

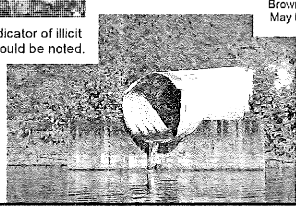
Searching for Illicit Discharge Problems
Physical Markers



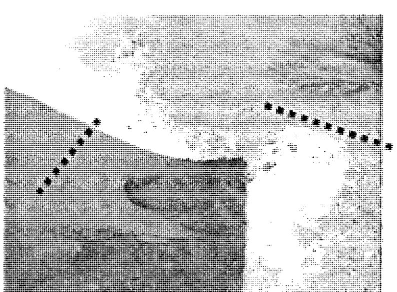
Trash is not an indicator of illicit discharges, but should be noted.



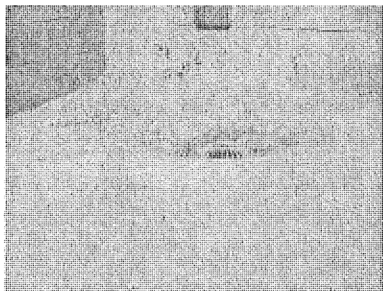
Brownish stain of unclear origin. May be from degradation of the brick infrastructure.



Searching for Illicit Discharge Problems
Physical Markers:

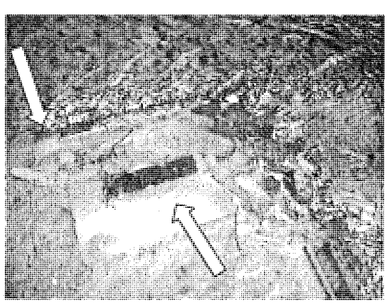


Searching for Illicit Discharge Problems
Physical Markers:

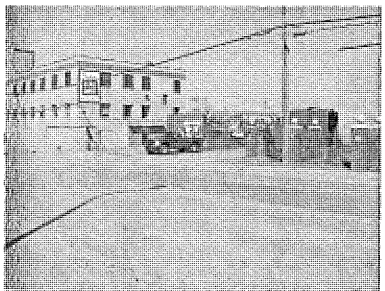


Searching for Illicit Discharge Problems
Physical Markers:

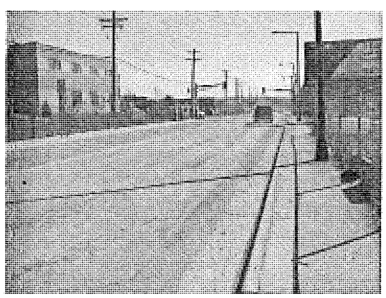
Searching for Illicit Discharge Problems
Physical Markers:



Searching for Illicit Discharge Problems
Physical Markers: Indirect?

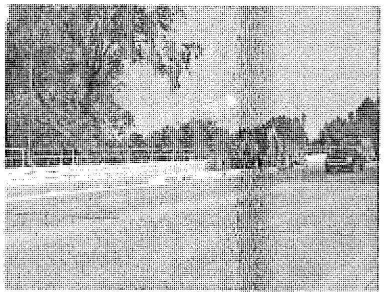


Searching for Illicit Discharge Problems
Physical Markers:

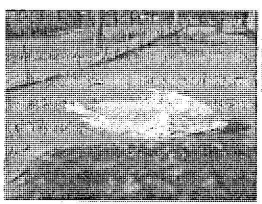


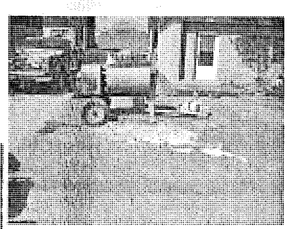
Searching for Illicit Discharge Problems
Physical Markers:

Searching for Illicit Discharge Problems
Physical Markers:

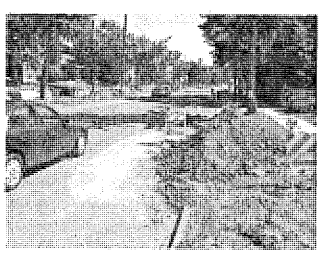


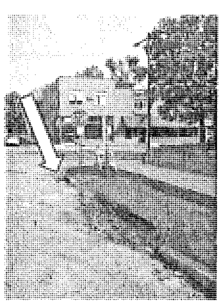
Searching for Illicit Discharge Problems
Physical Markers:



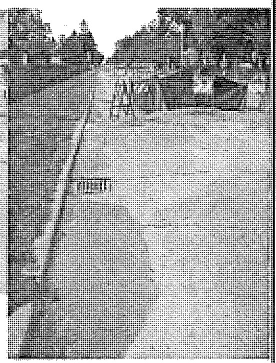


Searching for Illicit Discharge Problems
Physical Markers:





Searching for Illicit Discharge Problems
Physical Markers:



Searching for Illicit Discharge Problems
Physical Markers:

Searching for Illicit Discharge Problems
Physical Markers for Manhole

- Presence of flow
- Colors; • Odors
- Floatable materials
- Deposits or stains (intermittent flows)

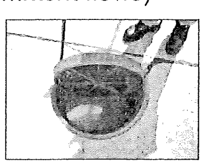
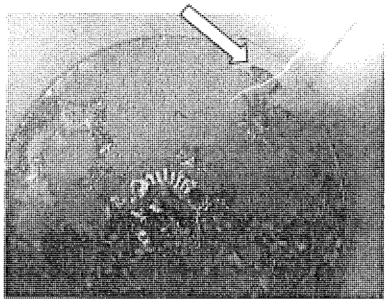


Figure 55: Manhole observation (left) indicates a sewage discharge. Source is identified at an adjacent sewer manhole that overflowed into the storm drain system (right).

Searching for Illicit Discharge Problems
Physical Markers for Manhole



Searching for Illicit Discharge Problems
Cold Climate Markers

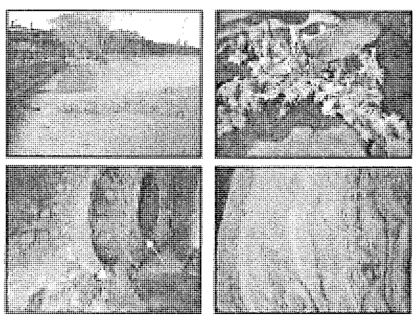


Figure 41: Cold climate indicators of illicit discharges

Searching for Illicit Discharge Problems
Issues!

Source Related
- Periodic nature
- Illegal dumping & connection
- one-time dischargers
- After-hours discharges

Infrastructure Related	Program Related
•Access (building, stream, outfall, traffic)	•Map accuracy
•Complexity of system	•Timeliness of complaint
•groundwater	•Insufficient staff
•Blended flow types	•Lack of expertise
•Old, improper & multiple Connections	•laboratory analysis
	•Unreliable indicators

Searching for Illicit Discharge Problems
Summary: IDDE

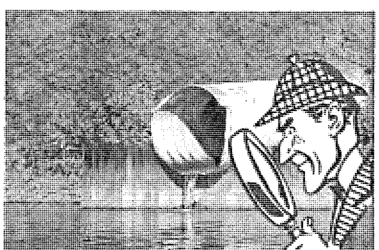
Pollutants
(Not entirely composed of stormwater)

Measurable **dry** flow

Has a generating site
(it has to come from somewhere)

And improper sanitary sewer connection

Searching for Illicit Discharge Problems in the Field



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Water Resources Management & Policy

University of Minnesota
EXTENSION

Tracing Pollutants to the Source

SAINT PAUL
The Most Livable City In America

Capitol Region Watershed District

University of Minnesota
EXTENSION

Four Approaches

- Storm Drain Network Investigation
- Drainage Area Investigation
- On-Site Investigation
- Septic System Investigation

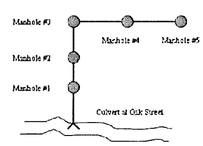
Storm Drain Network

- Work up from the outfall testing manholes
  - Narrow source, small areas, simple network
- Test manholes at strategic junctions
  - Narrow source, more complex networks
- Work down from upper network towards likely source
  - Multiple sources, large areas, complex networks

Exercise 1 Storm Drain Network

Instructions: Working in groups of 2-3, use the map of the storm drain network and the observations provided to identify the probable location of the pollution source

Storm Drain Network Map



Observations

Tuesday 3:55pm – your boss informs you a resident has called in. They see white foam in the creek and it appears to be coming out of a pipe near Oak Street. Your boss has asked you to check it out

You check the weather records and see it has not rained for 3 days. Pulling out your set of utility maps, you see this is a simple network, and a storm drain network investigation working up for the outfall is likely the best approach. You grab the appropriate equipment, as listed in the class materials, and head to the site

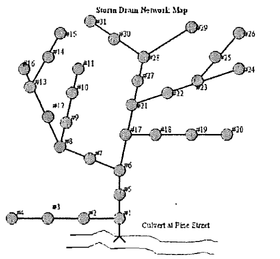
Parking the truck at Oak Street and walking down to the culvert at the edge of the creek you confirm there is white foam in the creek and coming out of the culvert. You take photos and document your observations.

Opening up the manholes, you see the following:
Manhole #1 – white foam in the pipe invert
Manhole #2 – white foam in the pipe invert
Manhole #3 – white foam in the pipe invert
Manhole #4 – Dry
Manhole #5 – Dry
Where is the likely location of the white foam source?

Exercise 2 Storm Drain Network

Instructions: Working in groups of 2-3, use the map of the storm drain network and the observations provided to identify the probable location of the pollution source

Storm Drain Network Map



Observations

- Friday 2:35pm – your boss informs you a resident has called in. They see oily sheen in the creek and it appears to be coming out of a pipe near Pine Street. Your boss has asked you to check it out.
- You check the weather records and see it has not rained for 3 days. Pulling out your set of utility maps, you see this is a complex network. You grab the appropriate equipment, as listed in the class materials, and head to the site.
- Parking the truck at Pine Street and walking down to the culvert at the edge of the creek you confirm there is an oily sheen in the creek and coming out of the culvert. You poke it with a stick and the sheen comes back together. You take photos and document your observations
- The set of manhole cards gives observations at each location. Attempt to locate the source by using as few manhole cards as possible. Note your order of card choice

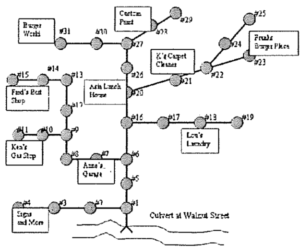
Drainage Area

- Drive around watershed looking for source
- For small watersheds
- Discharge has a distinct character linked to probable source
- Follow up with on-site testing

Exercise 3 Drainage Area

Instructions: Working in groups of 2-3, use the map of the drainage area and the observations provided to identify the probable location of the pollution source.

Storm Drain Map with Local Businesses



Observations

- Monday 9:35pm – a resident has called in for the third day. They see oily sheen in the creek and it appears to be coming out of a pipe near Walnut Street about the same time every night. Your boss has asked you to check it out.

On-Site Investigation

- Finding the exact source (not very effective for indirect discharges)
- Techniques
  - Dye
  - Video
  - Smoke

Table 56: Techniques to Locate the Discharge

Technique	Best Applications	Limitations
Dye Testing	• Discharge limited to a very small drainage area (<10 properties is ideal) • Discharge probably caused by a connection from an individual property • Commercial or industrial land use	• May be difficult to gain access to some properties
Video Testing	• Continuous discharges • Discharge limited to a single pipe segment • Communities who own equipment for other investigations	• Relatively expensive equipment • Cannot capture non-flowing discharges • Often cannot capture discharges from pipes submerged in the storm drain
Smoke Testing	• Cross-connection with the sanitary sewer • Identifying other underground sources (e.g., leaking storage techniques) caused by damage to the storm drain	• Poor notification to public can cause alarm • Cannot detect all illicit discharges

Septic System Investigation

- Homeowner Survey
  - Inspect systems
- Remote sensing (satellite or aerial photography)

Questions?

Response to Discharge

Contact Trained Personnel Equipped to Handle Emergencies

City of Saint Paul staff should contact the City Public Works 24 hour office at

(651) 292 -6600

Use your judgment...

Discussion Items

- Non emergency conditions
- Contact MPCA
  - 651 649 5451
  - 800 422 0798
- Authority to Enter
- Ordinances
- Collecting evidence for legal action

Friends of the Mississippi River
360 North Robert • Suite 400 • Saint Paul, MN 55101• 651/ 222-2193 • www.fmr.org

Working to protect the Mississippi River and its watershed in the Twin Cities area

City of St. Paul Water Quality Education Project
2010 Final Report

Submitted by Friends of the Mississippi River
December 20, 2010

Storm Drain Stenciling

In 2010 Friends of the Mississippi River coordinated the stenciling of 3,448 storm drains and the distribution of 13,586 door hangers in partnership with 1,498 volunteers from school groups, community groups, and residents of the City of St. Paul, contributing 2,988 hours of volunteer work. A list of the 50 groups and event dates with goals achieved is attached to this report. All groups stenciled within the City of St. Paul – maps for each group are available upon request. The number of volunteers this year, as well as flyers distributed and drains stenciled, exceeded the goals set out in the contract. This was due to favorable stenciling weather throughout the season, a returning staff coordinator from 2009, larger church summer groups, and increased demand from the community for a service-learning component to their various programs.

Storm drain stenciling was promoted using the following means:

- Emailing past participants from past four years in FMR database
- Email communication to St. Paul schools in FMR database
- Presentation to teachers attending spring 2010 NPS Big River Journey teacher workshop
- Presentation to teachers attending fall 2010 NPS Big River Journey teacher workshop
- Posting on FMR's website and announcements in FMR's email newsletter *Mississippi Messages*

FMR staff coordinated the purchase, storage, and maintenance of storm drain stenciling supplies and door hangers for the 2010 season. An inventory of supplies at the end of the 2010 season:

November 2010 Inventory					
Supplies	**Quant.**	**Supplies**	**Quant.**	**Supplies**	**Quant.**
STENCILS:		Traffic Cones	23	Pairs of Gloves	21
Mississippi River	73	Safety Vests	81	Trash Bags	333
Lake	16	Clipboards	39	Cans of Paint	72
Creek	23	Safety Glasses	42	Doorhangers	800
Spanish	15	Wire Brushes	20		
Somali	14	Wisk Brooms	31		
Hmong	19	Buckets	27		

Educational Programming

FMR's Program Assistant, Meghan Dudle, provided a 30-45 minute educational program on urban runoff pollution to each of the **50** St. Paul stenciling groups. Staff also made 8 extra education presentations to 261 students from 8 schools in order to broaden student knowledge about urban non-point source pollution. Staff additionally presented at the River Gorge Earth Day Clean Up in a less structured, tabling driven manner where 263 attendees were present. Combined, staff completed 9 extra education presentations. Extended water quality lessons are group-specific and classroom-driven, but may include demonstrations, experimentations, or discussions about any of the following: the water cycle; wastewater; storm water management; non-point source pollution prevention; urban lawn and garden care; or the role of plants in water quality. Students may observe and trace the movement of water on land and pavement or learn about innovative approaches to managing storm water runoff.

Presentations were made to the following groups:

5/12/10 Admission Possible-Harding High School
80 High School Students
80 Hours

9/29/10 Children's Water Festival
7 classrooms from 7 different schools, 7 presentations, 181 students
90.5 hours

Litter Clean-ups

FMR staff organized four litter pick-up events this spring in St. Paul. Two of these clean-ups were along the shoreline of the Mississippi River and one was along the shoreline of Lake Como. The remaining event was in a residential neighborhood and focused on litter near stormdrains. FMR provided gloves and bags, and coordinated trash collection through the City of St Paul Parks and Recreation Department.

4/30/2010 - Minnesota Conservation Corps, Home Energy Squad
13 volunteers, 26 hours
North Hidden Falls Park, St. Paul

5/10/2010 - AmeriCorps, AmeriWeek
35 volunteers, 35 hours
Como Park and Lake, St. Paul

5/12/2010 - Admission Possible at Harding High School
80 volunteers, 80 hours
Harding High School Neighborhood

6/11/2010 - Royal Bank of Canada Employees
100 volunteers, 200 hours
Crosby Farm Park, St. Paul

TOTAL Volunteers: 228
TOTAL Volunteer Hours: 341

Colors of a River – History of Pollution on the Mississippi

National Park Service Historian and Cultural Resources Program Manager Dr. John Anfinson gave a presentation on the history of river pollution, entitled "Colors of a River." The presentation was followed by a panel of experts who took questions from the audience about water quality issues today. The panel consisted of CRWD Water Resource Specialist Anna Eleria, FMR Watershed Program Director Trevor Russell, USGS Hydrologist and Water Quality Specialist Dr. Richard Kiesling and Met Council Environmental Services Director of Plant Services Larry Rogacki.

- 139 people attended the event, which was held at an auditorium at St. Catherine University in St. Paul, on November 4, 2010

Community Workshops - Watershed Friendly Yardcare

FMR's River Stewardship Coordinator Karen Solas presented the watershed protection workshop Gardening for a Rainy Day: Native Plants, Rain Gardens, & Lawncare for Water Quality. The workshop focused on urban homeowner education: alternative lawncare practices, landscaping with native plant species, the proper use of lawn fertilizer, rain barrels, backyard composting, and soil testing were discussed using a powerpoint presentation. The workshop also introduced the concept of rain gardens and provided information about resources for homeowners interested in exploring this as an innovative stormwater management technique. A variety of printed materials and resource information was made available to participants to take home. The workshops were promoted in part through a partnership with St. Paul Community Education (also see Outreach section of repor)

The content was presented to 26 community members at two workshops in St. Paul:

- Ramsey High, March 16, 2010 (15 participants)
- Como Senior High, April 20, 2010 (11 participants)

Planning for the workshops included research on city stormwater permitting, site selection and soil excavation for rain gardens, benefits of and techniques for composting in residential gardens, and the impact of stormwater pollutants on water quality. Staff also compiled a host of printed materials to be distributed at the workshops.

Rain Garden Workshops

FMR staff planned and coordinated two rain garden workshops for community members, Putting Down Roots: Rain Gardens in Residential Settings. Landscape ecologist Wade Johnson from Ramsey Conservation District led the workshops. The presentation included information on where a rain garden should be placed, soil preparation, plant selection, and other nuances of rain garden construction. Printed materials about rain gardens and other related topics were made available for participants to take home, and a copy of the Blue Thumb Guide to Raingardens – Design and Installation for Homeowners in the Upper Midwest was provided for each attendee, on behalf of Capitol Region Watershed District.

Rain garden workshops were presented to 34 community members at two St. Paul locations:

- Ramsey High, April 13, 2010 (10 participants)
- Homecroft Elementary, September 23, 2010 (24 participants)

FMR also hosted a tour of St. Paul raingardens on August 21, 2010, co-led by Melissa Baker of Capitol Region Watershed District (CRWD) and Andy Schilling of Ramsey Conservation District. The tour featured raingardens constructed by CRWD and St. Paul's Department of Public Works in a subwatershed of Como Lake as part of the Arlington Pascal Stormwater Improvement Project. Thirty-three community members attended the tour.

Outreach

Participants for the workshops, tour and "Colors …" presentation were recruited using the following means:

- Emailing to St. Paul neighborhood contacts, city council members and planning districts
- Emailing to all St. Paul FMR contacts
- Emailing to garden clubs (workshops and tour) and history contacts ("Colors…")
- Community Education catalogs mailed to St. Paul residents (workshops)
- Postcard to active FMR St. Paul contacts ("Colors…")
- Posting on FMR's website and announcements in FMR's *Mississippi Messages*
- Press releases via fax and/or email to daily and community newspapers
- Announcements on various online event calendars: Mississippi National River and Recreation Area/National Park Service, Minnesota Environmental Partnership, MNOEA's Next Step, TwinCities.com/PioneerPress/Zvents, BlueThumb (as needed), Do It Green, TC Daily Planet, Northern Gardener, Forum of Women in the Environmental Field.

PLEASE DON'T POLLUTE

DRAINS TO

MISSISSIPPI RIVER

Have you seen this message near a storm drain?

Community volunteers have posted this message on storm drains in your neighborhood to remind you to keep pollutants off the streets, driveways and sidewalks and out of storm drains.

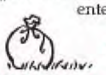
Storm drains are part of the storm sewer system which carries water from rainfall and snowmelt directly from your neighborhood to our local rivers, lakes, streams and wetlands.

This water becomes polluted when it picks up things like grass clippings, leaves, pesticides, motor oil, trash and pet waste and flushes them into storm drains.

Remember ...

Never dump anything into a storm drain!

Stormwater is NOT treated by a waste-water treatment plant, and therefore it is a direct route for pollutants to enter our waterways.



What You Can Do ...

Use zero-phosphorus fertilizer and follow proper application procedures. Sweep spilled fertilizer off of paved surfaces.

Avoid pesticides and other lawn chemicals or use them responsibly - keep them off of paved surfaces.

Keep leaves and grass clippings out of the street - compost or bag them for disposal.

Keep your vehicle tuned up and clean up any oil leaks or spills from paved surfaces.

Wash your car on the lawn or at a carwash—not in the driveway or street.

Pick up pet wastes.

Don't litter.

Dispose of paint and other household hazardous wastes properly - NEVER down a storm drain!

For more information on how to dispose of or recycle yard trimmings and hazardous wastes...

Call 651/633-EASY

To volunteer for the storm drain stenciling project with Friends of the Mississippi River...

Call 651/222-2193

Co-sponsored by the City of St. Paul Public Works and Friends of the Mississippi River.

Printed on 30% post-consumer recycled paper

Artwork courtesy of Nora Wilgen and St. Paul Neighborhood Energy Consortium.

MAY 2002

METRO WATERSHED PARTNERS
& The Clean Water MN Media Campaign

2010 Annual Program Report

WATERSHED
PARTNERS

MINNESOTA WATER
LET'S KEEP IT CLEAN

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Introduction

Metro WaterShed Partners is a coalition of more than sixty public, private and non-profit organizations in the Twin Cities metro area. Through collaborative educational outreach, the Partners promote a public understanding that inspires people to take action to protect and improve their local water resources. Since 1997, the Partners have cooperated through educational projects, networking, and resource-sharing.

WATERSHED PARTNERS

In 2010, we remained a viable collective of mutually supporting watershed educators that create and implement effective educational programs. In response to our fund-raising letter, members contributed $20,537.50 this year to support our monthly meetings, exhibit checkout, administrative support and state fair outreach.

Leadership

The work of **Metro WaterShed Partners** is guided by a steering committee that includes a diverse mix of stormwater education professional from cities, watersheds, non-profit organizations, and government agencies. The 2010 Steering Committee members:

Angie Hong - Washington Conservation District
Anne Weber - City of St. Paul
Carrie Mack – Ramsey Washington Metro Watershed District
Denise Leezer – Minnesota Pollution Control Agency
Jen Dullum - City of Farmington
Joan Nephew – Freshwater Society
Lyndon Torstenson - National Park Service, Mississippi National River & Recreation Area
Trevor Russell - Friends of the Mississippi River
Tracy J. Fredin – Hamline University

2010 Accomplishments

Networking and Sharing Resources

The WaterShed Partners hold monthly meetings that provide members a place and means for gathering and sharing information, generating ideas, and coordinating, collaborating, and supporting watershed education programs.

At each meeting, an expert in the field of watershed management, education, marketing, legislation or issues-based outreach gives a presentation on the work they are doing and how it relates to Watershed education and outreach.

In 2010, WaterShed Partners held eleven meetings that were attended by an average of twenty members. The presenters at our 2010 meetings are listed below.

2010 WaterShed Partners
Meetings and Presentations

January	Louis Smith, Clean Water Council	Clean Water Council Recommendations
February	Connie Fortin, president of Fortin Consulting, an environmental consulting firm.	Winter snow and ice management – reducing environmental impacts
March	Glenn Skuta, MPCA	Moving to a Watershed Approach to Accomplish the Mission of Clean Water
April	Dr. Christie Manning, Visiting Assistant Professor of Environmental Studies at Macalester College	The Psychology of Sustainable Behavior
May	Jenny Winkelman, Education and Outreach Manager at MWMO	The Nature of Water DVD
June	Irene Jones, Friends of the Mississippi River: "Above the Falls" planning and development activities Rep. Kate Knuth: legislative session updates including water, environmental, and Legacy Act Karen Kobey from Three Rivers Park District: wildlife and nature of the river in the Coon Rapids Dam and North Mississippi areas, activities of Three Rivers Park District along the river	Third Annual Boat Outing, this year on the Minneapolis Queen
July	SUMMER BREAK	
August	Faye Sleeper, Co-Director of the University of Minnesota's Water Resources Center	Findings and Issues of the Education Technical Team of the MN Water Sustainability Framework.
September	April Rust, Project WET (Water Education for Teachers) Coordinator for the Minnesota Department of Natural Resources	Water Ways: A Minnesota Water Primer and Project WET Companion
October	Karlyn Eckman, Senior Research Associate at the U of M Water Resources Center	Evaluating outcomes of water quality projects on target audiences.
November	Panelists: Faye Sleeper, Co-Director of the Water Resources Center, University of Minnesota Peggy Knapp, Fresh Water Society Dick Brooks, Action Media Ron Kroese, McKnight Foundation Jean Wagenius, MN State Representative Cliff Aichinger, Ramsey-Washington Metro Watershed District	Watershed Education Roundtable Discussion: The Role of Education in Protecting and Improving Minnesota's Water
December	End of the year potluck	

WaterShed Partners listserve

The Metro Watershed Partners list serve is a forum for information sharing to a wider audience that includes watershed educators, legislators and industry professionals throughout the state.

In 2010, the Metro WaterShed Partners list serve continued to provide more than one hundred user-members with an effective tool for promoting educational programs, sharing information about professional programs, and exchanging information with other watershed educators, legislators and businesses. This year, we updated our list serve software, which added additional functionality and more up-to-date technology for information sharing. The new email address for the list serve is watershedpartners@listserv.hamline.edu. If you would like to be added to the list serve, send a request to Jana Larson at jlarson25 at hamline.edu.

Education and Outreach

The WaterShed interactive exhibits provide learning opportunities about metropolitan watersheds and about human connections to rivers and water through everyday actions. Two museum-quality tabletop exhibits are brought by WaterShed Partners to community events and locations throughout the metro area.

In addition, our interactive multi-media program “Water Down the Drain” is available on kiosks and iMacs. Six modules introduce the user to a watershed perspective of the landscape and provide information about the impacts of impervious surfaces and pollution on our waterways.

The WaterShed Partners have an exhibit at the Minnesota Department of Natural Resources Education Building at the Minnesota State Fair. Approximately 50,000 people engage with the Watershed displays and interactive kiosks each year.

We had our newly re-designed “What is a Watershed?” table top display at the fair this year, which included a state-wide watershed map to the exhibit. (See image below.)

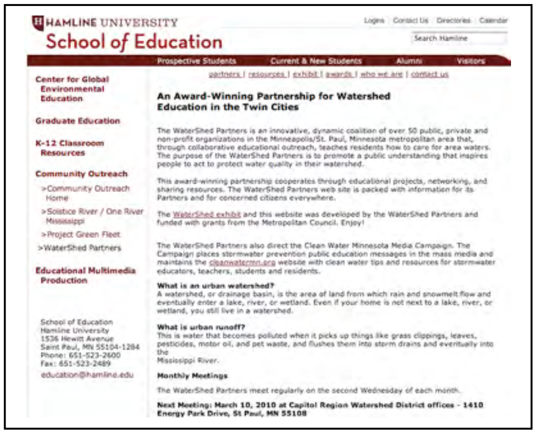
The exhibits committee continued to work on developing a permanent interactive exhibit for the State Fair this year. Work also continued on identifying sources of funding and possible partners to help with exhibit development and production.

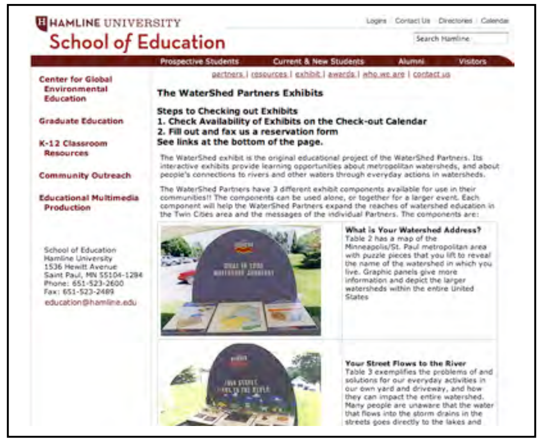
If you are interested in checking out one of our table top exhibits for an event in your community, you can find more information and a check-out form at http://www.hamline.edu/education/environmental/cgee/watershed/exhibit/index.html

WaterShed Partners website

This year we updated our Watershed Partners website and got a new shortcut url: www.hamline.edu/cgee/watershed

The website continues to act as the primary archive of meeting minutes, agendas and presentations for the watershed partners, along with a list of our activities and achievements, descriptions of our exhibits, and information for new and continuing members of the WaterShed Partners.





2010 Media Campaign Report

Introduction

The **Clean Water Minnesota Media Campaign** is a stormwater education collaboration of cities, counties, and water management organizations.

By working together we have developed and delivered innovative stormwater education messages to the Twin Cities metro area and beyond. Our collaboration has allowed us to put storm water pollution prevention messages on radio, television and billboards -- a feat that wouldn't be possible for any of our partners individually!

MINNESOTA WATER
LET'S KEEP IT CLEAN

Media Campaign Leadership

Friends of the Mississippi River and Hamline University's Center for Global Environmental Education (CGEE) partnered to manage the 2010 Clean Water Minnesota Media Campaign. The lead staff were Trevor Russell, Watershed Program Director with Friends of the Mississippi River, and Jana Larson from the Center for Global Environmental Education at Hamline University.

The work of the Clean Water Minnesota Media Campaign is overseen by the WaterShed Partners steering committee. In addition, we hold annual meetings for stakeholders to advise us on how best to serve the needs of supporting MS4s.

2010 Accomplishments

In 2010, the Clean Water Minnesota Media Campaign conducted a variety of stormwater pollution prevention education and outreach activities.

Throughout the year the Clean Water Minnesota Media Campaign created an estimated **19,263,954** total impressions across multiple media formats, in addition to our PSAs at the Minnesota State Fair and our www.cleanwatermn.org online activities. Thanks to a large donation in airtime from Comcast, this represents about a 60% increase over our media impressions in 2009.

Radio Public Service Announcements (PSAs)

MN Public Radio (MPR)

Dates: June 1 – June 30, 2010
Placements: Streaming PSAs on KNOW (91.1FM)
Total Investment: $600.00
Total Impressions: 50,154
Audience: Statewide

The Clean Water MN Media Campaign runs statewide PSA's on Minnesota Public Radio in part because surveys of MPR listeners show that they are much more likely to take action on environmental messages they hear on MPR than any other radio listeners in Minnesota.

The CWMN Media Campaign ran streaming online 'gateway' PSAs ran on KNOW (91.1) from June 1st through June 30th. The streaming PSA's made an estimated 50,154 impression in 2010.

Our Minnesota Public radio PSA's featured the following message:

"Programming is supported by Metro Watershed Partners. Rain carries yard waste and pollution through storm drains to lakes and rivers, turning them green with algae. Clean Streets mean clean water. More at clean water m n dot org."

Twins Radio Network

Dates: April 30 - May 31, 2010
Placements: 30 in-game ads, plus 5 bonus pool rotation ads.
Total Investment: $8,250.00
Total Impressions: 1,000,000
Audience: Twin City Metro Area

Twins games were broadcast on 1500 ESPN Twin Cities during the 2010 regular season.

Alternating between a male and female voice for each announcement, the following ad played during Minnesota Twins baseball games:

"Rummmmm (lawnmower sound) When mowing keep grass clippings off of streets and out of storm drains. Clippings contain phosphorus and that turns lakes and rivers green with algae. Cleaner streets mean cleaner water for all Minnesotans. Visit "clean-water-m-n-dot-org"

According to the latest 2010 Scarborough Research release, commercials on Twins Radio reached approximately one-third of the Twin Cities adult population. This amounts to exposure to over 1 million adults within the Twin Cities metro area.

Television Public Service Announcements (PSAs)

Comcast Spotlight Cable Television PSAs
Dates: September 20 – October 24, 2010
Placements: 151 paid 30-Second TV PSAs plus 2,540 bonus spots, provided free of charge by Comcast
Total Investment: $$19,231.25
Total Impressions: 886,000 – plus approximately ten million additional impressions with the bonus spots run by Comcast
Audience: Statewide

In 2010, Clean Water Minnesota ran 151 paid 30-seconds PSAs on the following networks: A&E, ENT, ABC Family, Food, Fox News, FX, History, Headline News, TBS, TV Land, Travel, ESPN and Fox Sports

As part of their public service commitment, Comcast ran our PSA an additional 2,540 times on the following networks: AEN, AMC, ANPL, BET, BRVO, Big Ten Network, CMDY, CNBC, CNN, CMTV, COOK, DIY, DISC, DHLT, ENN, ESPN, ESP2, ESPC, ENT, ABC Family, FBN, FOOD, Fox Sports North, Fox News, FX, G4, GAC, GOLF, HALL, Headline News, HIST, HGTV, LIFE, LOGO, MSNBC, MTV, NFL, NGC, OXYG, SOAP, SPDN, TBSC, TNT, TLC, TVL, TRU, The Weather Channel, SYFY, Spike, Versus, VH1, WE, USA

Channel 45 KSTC Television PSAs
Dates: May 6 - June 10 & August 3 – 31, 2010
Placements: Channel 45 (Statewide)

Total Investment: $4,975.00
Total Impressions: 537,000
Audience: Statewide

The CWMN Media Campaign partnered with Channel 45 KSTC TV for two television PSA campaigns.

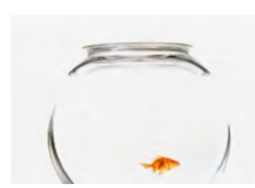
Our 2010 media activities kicked off on May 3rd with the launch of a 5-week Channel 45 KSTC TV campaign. The CWMN campaign ran 165 30-second PSAs on multiple Channel 45 TV programs. Channel 45, unlike other TV mediums, reaches 100% of TV households in Minnesota, giving our campaign a statewide reach in 2010. This campaign resulted in an estimated 375,000 listener impressions.

Our late-season Channel 45 KSTC campaign included an additional 50 PSA's in August. Beginning the week of August 3rd, and concluding on August 31st, the Clean Water MN Media Campaign ran 10 spots per week on Channel 45 KSTC TV. This campaign resulted in an estimated 162,500 additional media impressions.

Both the ComCast Cable and Channel 45 television campaign featured the following public service announcements:

<u>"Plop" Fish Bowl PSA – 30 seconds</u>

Adapted from a PSA produced by the City of Austin, Texas, "Plop" features a fish bowl that becomes increasingly contaminated as common stormwater pollutants 'plop' into the fish bowl.



"Curbside storm drains connect to our lakes and rivers.

If your car drips oil or antifreeze on the ground - it washes into storm drains . . . and into our lakes and rivers.

If you spread lawn fertilizer into the street (plop) – or are not careful with yard and garden pesticides (plop) - they wash into storm drains too. And when you don't pick up after your pet (plop)…..well you get the picture. Cleaner streets mean cleaner water for all Minnesotans. Visit www-clean-water-m-n-dot-org."

<u>"Fowl Water" Rubber Ducky PSA – 30 seconds</u>

Adapted from a PSA produced by the City of San Diego, California, the "Fowl Water" PSA uses a flock of rubber duckies to dramatize how stormwater pollutants move from our neighborhoods into our water.

Voiced by outdoor journalist Ron Shara, the PSA was produced and aired by the Clean Water Minnesota Media Campaign in 2006.

"If stormwater pollution was simply rubber duckies, it wouldn't matter what went down our storm drains. But it does! Because stormwater pollution is not rubber duckies. It's trash, oil, cigarette butts, and pet waste flowing untreated to the sea our lakes and rivers. That's not good for any of us. So take a minute for clean water – rake up, sweep up and pick up. Cleaner streets mean cleaner water – for all Minnesotans. Visit www-clean-water-m-n-dot-org."

<u>Distribution of "Fowl Water" and "Plop" DVDs</u>

Copies of the "Plop" and "Fowl Water" DVDs were distributed to 4 municipalities and other MS4s. The DVDs were made available to be played on community cable television stations, on television monitors in public buildings, and at educational events.
.

<u>Local Athletics & Entertainment Partnership</u>

St. Paul Saints

Dates: May 1 – August 31, 2010
Placements: 96 30-second television PSAs
Total Investment: $2,500.00
Total Impressions: 1,152,000
Audience: Seven-county metro area

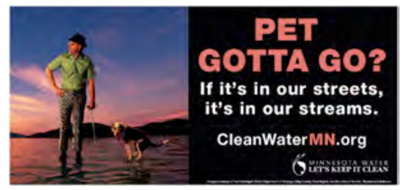
The Clean Water MN Media Campaign ran TV PSAs during the Saints games during the 2010 season. The TV PSA ran 96 times on both Channel 45 KSTC TV and Municipal Community Cable stations across the metro and beyond.

This campaign generated an estimated 1.2 million media impressions during the 4 months of airtime. For more information on the St. Paul Saints, visit the website at: http://www.saintsbaseball.com/

Outdoor Billboards

ClearChannel Outdoor Billboards

Dates: May 3 – May 30, 2010 (*or later in some cases)*
Placements: 12 billboards in 6 metro counties
Total Investment: $9,200.00
Total Impressions: 6,638,800
Audience: Seven-county metro area



The billboard campaign featured billboards focusing on urban stormwater pollution sources: pet-waste, car-washing and lawn-care

The ads ran at multiple locations in Anoka, Ramsey, Hennepin, Washington, Dakota and Carver Counties, and were targeted to maximize total overall exposure throughout the Metro area.

This campaign resulted in an estimated 6.6 million impressions during the 4-week campaign.

State Fair PSA's:
AJ Indoor Minnesota State Fair Bathroom Stall Ads

Dates: August 26 to September 6, 2010
Placements: 22 bathroom stall posters ads during the 2010 Minnesota State Fair
Total Investment: $1,500.00

The bathroom stall poster ad campaign featured poster images similar to our billboard campaign images (see above), used with permission from the Cities of Seattle, Bellevue and Tacoma, Washington.

Ads were placed in restroom facilities located nearby the Eco-Experience and Minnesota Department of Natural Resources buildings and ran for the duration of the 2010 MN State Fair.

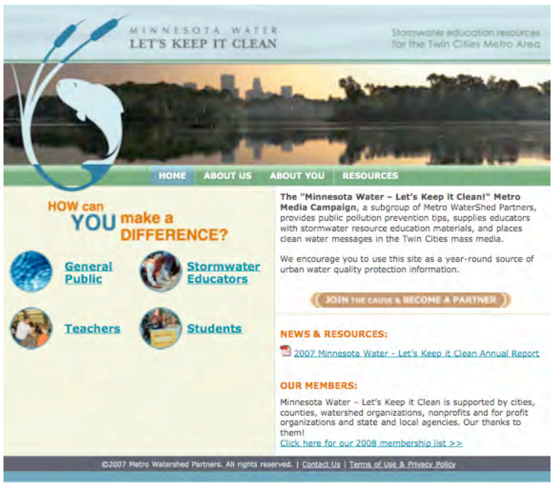
Attendance at this year's MN State Fair was 1,776,211.

Online Stormwater Pollution Prevention Education at www.cleanwatermn.org

Annual website hosting and maintenance = $1,038.64

Website address: www.cleanwatermn.org

In 2010, the Clean Water Minnesota Media Campaign continued to maintain augment the resources for Stormwater educators on our www.cleanwatermn.org website.



These resources include:

- Minnesota MS4 Toolkit: the Minnesota MS4 Toolkit was developed in partnership with the Minnesota Pollution Control Agency and the Washington Conservation District. Launched in spring 2009, the toolkit serves as a one-stop-shop for municipal stormwater pollution prevention education materials.

- Clean Water MN Quarterly e-Newsletter: The Clean Water MN e-Newsletter is delivered as a quarterly electronic newsletter to all campaign members. Each newsletter features a suite of ready-to-run materials, season-specific stormwater education materials including press releases, brochures, photos, print ads and other education products. All materials are free for member use in publications, websites and other public education efforts.

- Document Upload Tool: launched in fall 2009, the document upload tool allows MS4 educations and other stormwater pollution prevention experts to upload documents, brochures, posters, images and other resources directly into the MS4 Toolkit for others to use. This allows all of Minnesota's stormwater pollution prevention education community to share successful education materials with their peers.

- Image Gallery: For our new image gallery, we have created high quality, seasonally appropriate images of water friendly behaviors for use in water education materials. We have also begun to populate the gallery with images donated by our partners and friends. Our hope is to create a stellar resource of free downloadable images for use in print and web resources that focus on water education. If you own the copyright to an image you would like to share, please contact us and/or use the document upload tool.

Thanks for doing your part in another great year of Watershed Education and Outreach!

Media Program Contacts

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Center for Global Environmental Education
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Phone: 651-523-2812
Email: jlarson25@hamline.edu

Trevor Russell
Media Campaign Coordinator
Watershed Program Director
Friends of the Mississippi River
360 North Robert Street, Saint Paul, MN 55101
Phone: 651-222-2193, ext. 18
Email: trussell@fmr.org

2010 Financial Report

In response to our fund-raising letters, members contributed $ 20,537.50 to the WaterShed Partners to support our meetings, state fair outreach, adminstration, and exhibit maintenance, development and checkout. Supporting members of the Clean Water Minnesota Media Campaign gave $ 62,962.50 to purchase media time to distribute our stormwater PSAs on local radio and TV stations and on billboards throughout the metro area.

Supporting Members of the Metro Watershed Partners and the Clean Water Minnesota Media Campaign

City of Andover
Bassett Creek Watershed Management Commission
City of Bloomington
Capitol Region Watershed District
Carnelian Marine Watershed District
Carver County
City of Columbia Heights
City of Eagan
City of Eden Prairie
City of Excelsior
Hennepin County
City of Hilltop
City of Lauderdale
Lower Mississippi Watershed Management District
City of Minnetonka
Mississippi National River and Recreation Area, National Park Service
City of North St. Paul
Prior Lake Spring Lake Watershed District
Rice Creek Watershed District
Ramsey Washington Metro Watershed District
South Washington Watershed District
City of St. Louis Park
City of St. Paul

Supporting Members of Clean Water Minnesota Media Campaign

City of Plymouth
Vermillion River Watershed Joint Powers Organization
City of Woodbury

Supporting Members of the Metro Watershed Partners

City of Rochester

2010 WaterShed Partners Financial Report

REVENUE	Inkind	Cash	Total
Balance as of 1/1/2010		$10,681.00	
1. WaterShed Partner Coordination	$34,953.00	$10,000.00	$44,953.00
2. Watershed Partner Exhibit	$19,500.00	$10,537.00	$30,037.00
3. Media Campaign		$62,962.00	$62,962.00
Total Revenue	**$54,453.00**	**$83,499.00**	**$137,952.00**
Total Assets		**$94,180.00**	
EXPENSES			
1. WaterShed Partner Coordination/Administration	**In-kind**	**Cash /Expenditure**	**Total**
Principle Investigator	$2,500.00	1,500.00	$4,000
Program Facilitator	$5,000	$8,000.00	$13,000
Steering Committee	$16,000		$16,000
Web site maintenance/list serve	$2,000		$2,000
Materials/supplies/operating expenses	$2,400		$2,400
Accounting/indirect fees	$7,053		$7,053
Subtotal	**$34,953.00**	**$9,500.00**	**$44,453**
2. WaterShed Exhibit Implementation			
WaterShed exhibit coordination		4,733.97	$4,734
Staffing of events (Including State Fair)	$15,000	263	$15,263
WaterShed van	$4,000		$4,000
Watershed Exhibit Development		4,049.75	$4,050
Exhibit Maintenance	$500	372.5	$873
Magnolia Blossom and Roundtable Expenses		1,478.67	$1,479
Storage/checkout	$4,000		$4,000
Subtotal	**$19,500.00**	**$10,897.89**	**$30,397.89**
3. Clean Water MN Media Campaign			
Clean Water MN Website URL, Hosting and Maintenance		$1,038.64	$1,038.64
St. Paul Saints TV & Radio PSAs		$2,500.00	$2,500.00
MPR Radio Underwriting PSAs		$600.00	$600.00
Clear Channel Billboards		$9,200.00	$9,200.00
KSTC Channel 45 Television PSAs		$4,975.00	$4,975.00
Comcast Spotlight Cable Television PSAs		$19,231.25	$19,231.25
AJ Indoor – Bathroom Stall Ads at State Fair		$1,500.00	$1,500.00
Twins Baseball Radio Ads		$8,250.00	$8,250.00
Printing & Postage		$175.08	$175.08
Meeting Expenses		$208.01	$208.01
Campaign Coordination		$11,890	$11,890
Fiscal Agency Fee, Hamline University		$4,000	$4,000
Subtotal	**$0.00**	**$63,567.98**	**$63,567.98**
TOTAL 2010 Expenditures	**$54,453.00**	**$83,965.87**	**$138,418.87**
2010 OVERVIEW			
2010 Revenue and beginning 2010 balance		**$94,180.00**	
2010 expenses		**$83,965.87**	
2010 ending balance and carryover to 2011		**$10,214.13**	

You may be fertilizing more than your grass.

The storm drain in your street is a link to our lakes and rivers. The choices you make when caring for your lawn directly affect water quality.

A common cause of lake and river pollution is phosphorus runoff. In response to this, Minnesota has a law restricting the use of phosphorus lawn fertilizer. Although phosphorus is important for grass growth, many lawns have adequate soil phosphorus and do not need further phosphorus fertilization. If you suspect your lawn is in need of phosphorus, soil test first to make sure before using a phosphorus lawn fertilizer.

Phosphorus turns lakes and rivers green. Phosphorus stimulates the growth of algae in lakes and rivers. This crowds out other water plants and reduces oxygen available to fish. The result is unattractive, foul-smelling water that is bad for fish, wildlife, and humans.

Nitrogen, not phosphorus, greens up grass. Phosphorus-free lawn fertilizer still contains nitrogen, the plant nutrient that greens up grass.

To keep our lakes and rivers healthy, we need to manage phosphorus carefully. Read on to learn how you can reduce phosphorus runoff from lawn fertilizers and other sources!

Minnesota Phosphorus Lawn Fertilizer Law – January 1, 2005

Fertilizers containing phosphorus cannot be used on lawns in Minnesota unless the following exceptions apply:

- **A new lawn is being established by seeding or laying sod.**
- **Soil testing shows need for phosphorus fertilization.**
- **Fertilizer is being applied to a golf course by trained staff.**

For soil testing information, contact the University of Minnesota Soil Test Lab at 612-625-3101 or visit them at their http://soiltest.coafes.umn.edu website.

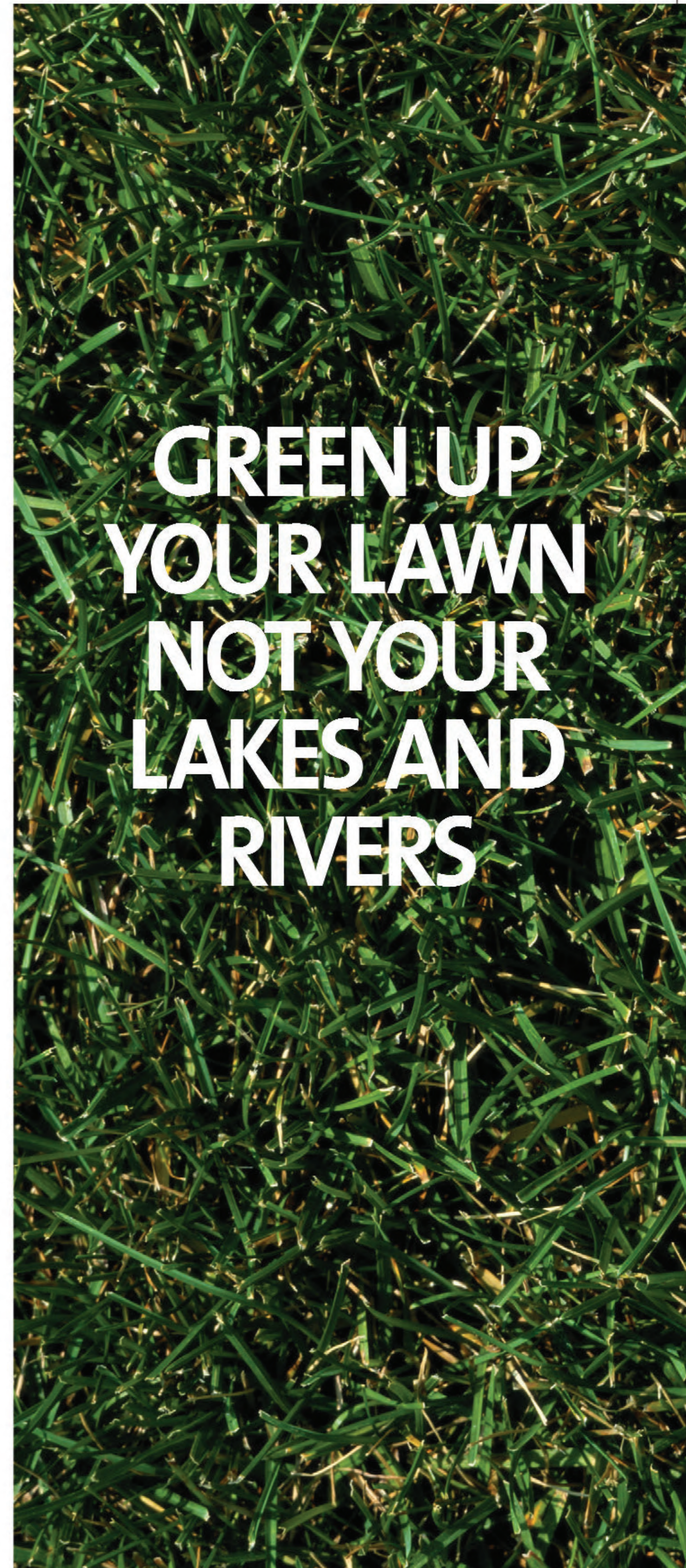
Look for the middle number!
A string of three numbers on a fertilizer bag shows its analysis – the middle number being phosphate (phosphorus) content. A "zero in the middle" means phosphorus-free fertilizer.

More information on the law is available at the Minnesota Department of Agriculture website www.mda.state.mn.us; click on "Water & Land" then on "Lawn Care & Water Quality."

MINNESOTA WATER
LET'S KEEP IT CLEAN

www.cleanwatermn.org

PRINTED ON PROCESSED-CHLORINE-FREE, 100% POST-CONSUMER, RECYCLED PAPER WITH SOY-BASED INK BY A MINNESOTA GREAT PRINTER. 12/04



Anything that enters a storm drain goes directly to a local lake or river.

It does not go to a waste water treatment facility.

Do you know you live on waterfront property? You do if there is a storm drain nearby! Storm drains carry runoff water directly to lakes and rivers. Whatever washes off your yard and street runs directly into these waters. That includes lawn fertilizer, grass clippings, pet waste, and tree leaves and seeds – all sources of phosphorus, the plant nutrient that turns lakes and rivers green with algae.

Keep your runoff clean!

Keep our lakes and rivers clean!

REMOVE LEAVES FROM THE STREET

- Rake leaves, seeds and grass clippings out of the street and gutter.
- Compost on site, bag for collection, or take to community compost program.

PREVENT EROSION

- Phosphorus attaches to soil. Keep soil from washing into the street.

FERTILIZE THE LAWN, NOT THE LAKES AND RIVERS

- Choose a zero-phosphorus fertilizer. Many lawns have adequate soil phosphorus and will remain healthy without adding more.
- If you think your lawn needs phosphorus, test your soil first. For information call INFO-U at 612-624-2200, message 468 or visit *www.extension.umn.edu*.
- Sweep spilled fertilizer off paved surfaces.
- Remember, compost and manure contain phosphorus too.

CLEAN UP AFTER PETS

- Scoop the poop. Pet waste contains phosphorus as well as harmful bacteria.
- Don't feed the geese.

KEEP THE PAVEMENT CLEAN

Sweep up grass clippings, soil, fertilizer, sand and salt from driveways, sidewalks, and streets.

12th Annual

Free Family Festival!

Saturday,
May 21, 2011
10:00 am - 2:00 pm
Lake Phalen
Park Pavilion
St. Paul

Voyageur canoe rides for the family

Entertainment Schedule

10:00	Parade with Students, Clowns, Mascots and our new theme song!
10:00 - Noon	Live Raptor Display

Continuous Activities

On the Water:
- Fishing lessons, fish demos by MDNR and Asian Outdoor Heritage
- Voyageur canoe rides by Wilderness Inquiry

New This Year:
- Raindrop Mystery Tour
- Rainbarrel Exhibit
- Discovery Hunt for Geocachers
- Friends of WaterFest Tent

Around the Lake Phalen Park Pavilion:
- Shoreland restoration site near fishing pier
- Student exhibits of science projects, art, and service projects
- Professional exhibits of landscaping and shorelands, watersheds and ecosystems
- Clowns, art and games
- Environmental computer games
- Street sweeper, snow plow and MnDOT demonstrations
- Plant give-away and rain garden demo
- Hot and cold food and beverages for sale
- 5K self-timed run/walk

Sponsors:

Ramsey-Washington Metro Watershed District · Saint Paul – The Most Livable City in America · BARR · MAPLEWOOD – Together We Can · RAMSEY COUNTY

and many other sponsors, service providers and exhibitors listed at www.rwmwd.org

For more information, www.rwmwd.org or call 651-792-7950

Council File # 08-1400
Green Sheet # 3065215

9

RESOLUTION
CITY OF SAINT PAUL, MINNESOTA

Presented by ______________________________

WHEREAS, Saint Paul's commitment to become the Most Livable City in America is grounded in our environmental stewardship and protection of our valuable water resources; and

WHEREAS, Saint Paul affirms that improving water quality is a high priority for the City, because of our lakes and our location on the Mississippi River, and

WHEREAS, the City recognizes that each citizen is a critical player to achieving the City's mission and improving water quality; and

WHEREAS, the Saint Paul City Council recognizes that proper water resource management, flood control and construction site erosion control are essential to ensure a safe and liable environment for all residents of the City; and

WHEREAS, the City is required to revise its storm water permit to include how the City will develop and implement a water resource protection program; and

WHEREAS, the City is working with the Minnesota Pollution Control Agency and other stakeholders to establish goals and standards to address the upcoming changes in water resource regulations affecting the city; and

WHEREAS, the Capitol Region Watershed District (CRWD) and the Ramsey-Washington Metro Watershed District (RWMWD) have recently revised their permitting rules and are in the process of revising their management plans in which the City is required to adopt; and

WHEREAS, voters of the State of Minnesota have recently passed the **Clean Water, Land and Legacy Amendment which will provide for additional opportunities to fund water resources management projects; and**

WHEREAS, the City desires to become more competitive related to receiving funding from our federal, state and local partners; and

WHEREAS, the City has recently hired the position of Water Resources Coordinator to provide greater capacity in taking proactive steps with regard to managing the City's water resources and protecting our natural environment, including the Mississippi River;

NOW, THEREFORE BE IT RESOLVED, that the City of Saint Paul is committed to working in partnership with stakeholders and citizens to achieve stewardship and protection of our valuable water resources; and

BE IT FURTHER RESOLVED, that the City will take necessary steps to implement the City's water resources protection strategy. Some actions the City intends to move forward with include:

(a) Developing a City Water Resource Working Group to establish an internal training and communication frameworks
(b) Coordinating revisions to the City's Storm Water Permit and amendments to City ordinances;
(c) Developing a strategy to successfully compete for the State's **Clean Water, Land and Legacy Amendment dollars,**

08-1400

BE IT FINALLY RESOLVED, staff will provide the City Council with a progress report on the City's water resource protection strategy in Spring, 2009.

	Yeas	Nays	Absent
Bostrom	✓		
Carter	✓		
Harris	✓		
Helgen	✓		
Lantry	✓		
Stark			✓
Thune	✓		
	6	0	1

Adopted by Council: Date 12/23/2008

Adoption Certified by Council Secretary

By: Mary Erickson

Approved by Mayor: Date 12/29/2008

By: Nancy P. Homans

Requested by Department of:

Mayor's Office

By: [signature]

Approved by the Office of Financial Services

By: na

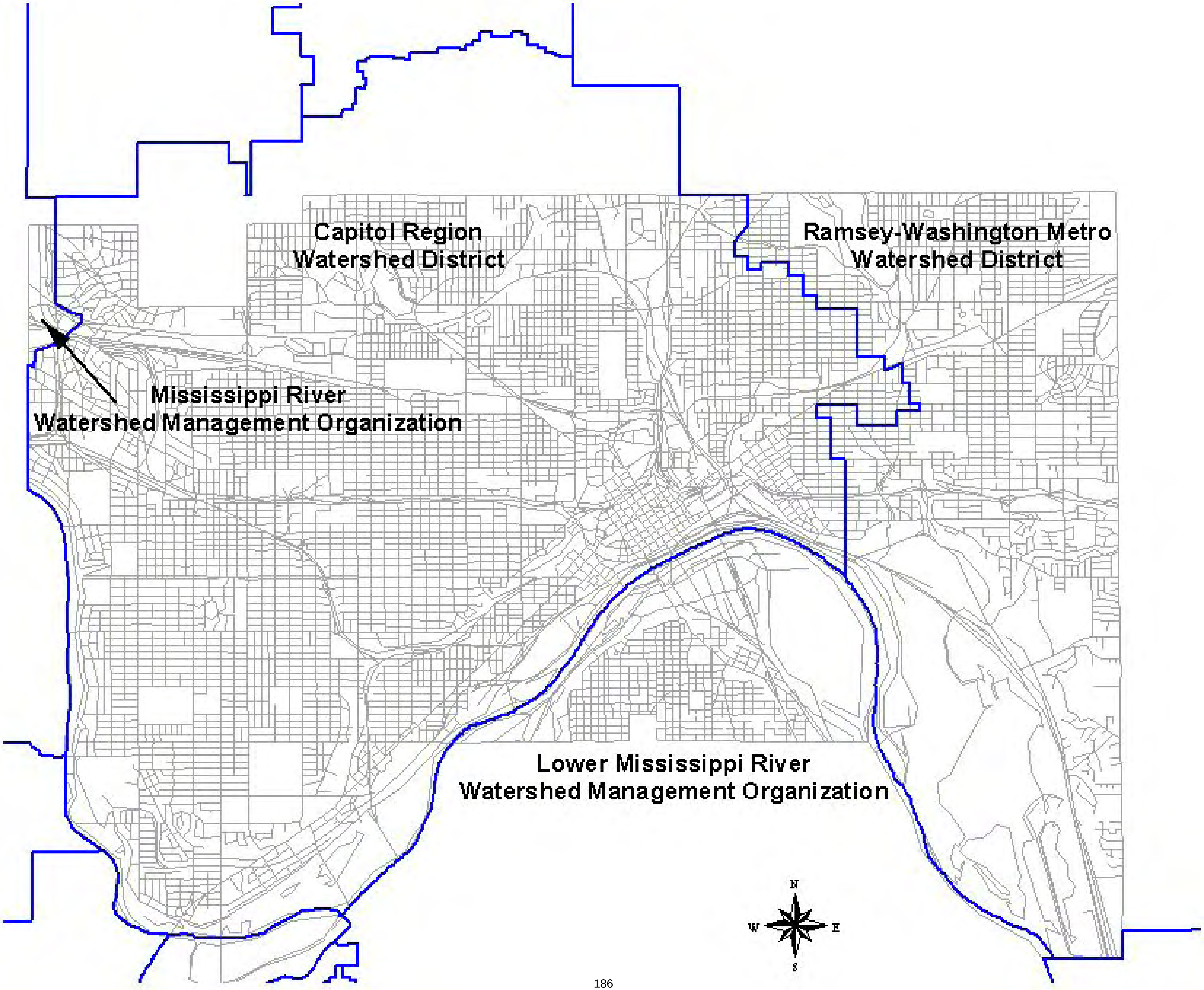
Approved by City Attorney

By: Virginia D. Palmer

Approved by Mayor for Submission to Council

By: [signature]

Watershed Organizations in Saint Paul



The City of Saint Paul

Stormwater Modeling Watershed Locations
Stormwater Modeling
Volume Reduction Inventory
2010 RSVP Stormwater Study
City of St. Paul, MN

Legend

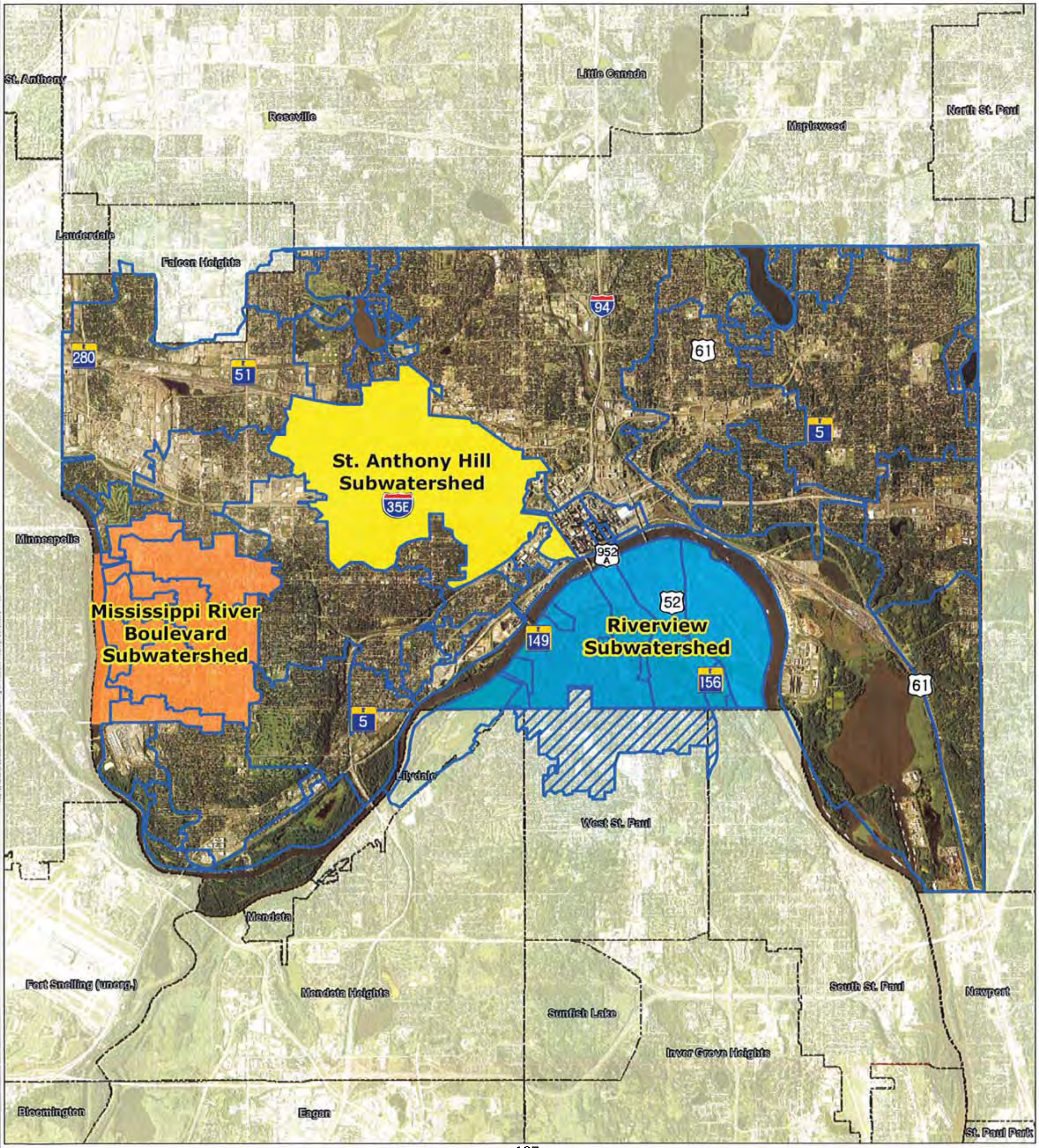
Subwatershed Boundaries

Portion of West St. Paul Drains to Riverview Watershed

N W E S

Feet
0 7,500 15,000

WSB & Associates, Inc.



MISSISSIPPI RIVER BOULEVARD SUBWATERSHED

STORM WATER MODELING REPORT

CITY OF ST. PAUL, MINNESOTA

DECEMBER 2010

Prepared by:

WSB & Associates, Inc.
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55416

CERTIFICATION

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly licensed professional engineer under the laws of the State of Minnesota.

Todd E. Hubmer, PE

Date: Lic. No. 24043

Quality Control Review Completed By:

Rich Hibbard, EIT

Date: Cert. No. 131812

TABLE OF CONTENTS

1.0 INTRODUCTION/BACKGROUND

The Mississippi River Boulevard subwatershed is located on the west edge of the City of St. Paul. It consists of approximately 2,206 acres of predominantly residential and institutional land use with an overall impervious surface coverage of about 45%. Residential parcel sizes are 1/8 acres on average. Major institutional areas include the following:

- University of St. Thomas
- St. Catherine University
- MaCalaster College

These areas typically consist of parking lots, large buildings and large open areas including athletic fields. St. Catherine University utilizes a pond and infiltration basins to treat storm water.

Storm water runoff is directed to storm sewer inlets via curb and gutter and flows though a network of storm sewer systems. Seven major systems carry storm water through this subwatershed. Each system crosses under Mississippi River Boulevard prior to discharging to the Mississippi River which flows north to south along the west edge of the subwatershed. These storm sewer systems have been identified by the name of an adjacent parallel street for the purposes of this report. These are listed below:

- Ford Parkway
- Hartford Avenue
- Jefferson Avenue
- Lincoln Avenue
- Portland Avenue
- Marshall Avenue
- Princeton Avenue

Figure 1 below shows the seven major storm sewer systems within the Mississippi River Boulevard subwatershed:

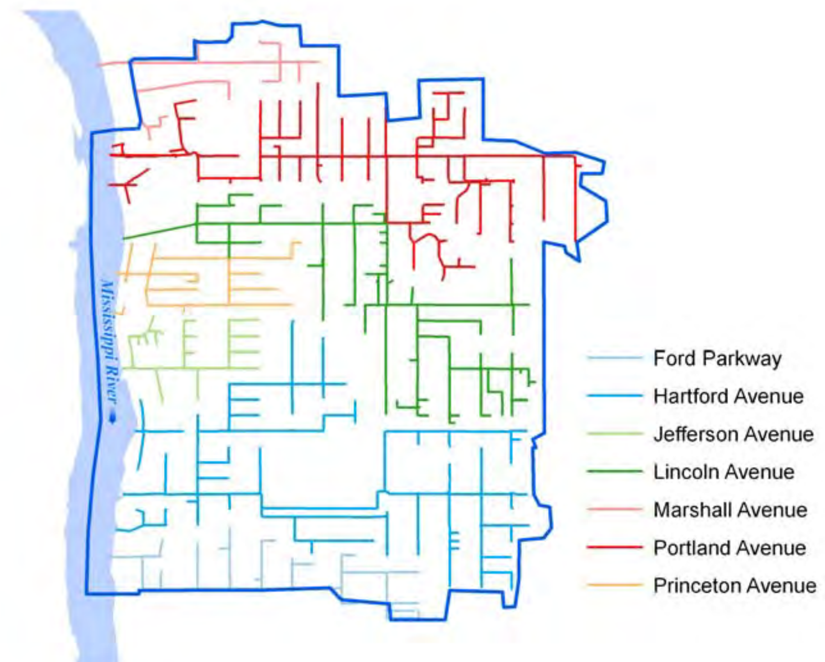


Figure 1: Major Storm Sewer Systems

2.0 PURPOSE/GOALS

As part of a City-wide effort to reduce and treat storm water discharges to the Mississippi River, the City of St. Paul is developing an inventory of storm water models for key areas throughout the City. As redevelopment of land and improvements to public streets and utilities occur in the future, City Staff will utilize these models to plan improvements to the existing storm water system by identifying the following:

- under capacity storm sewer features
- existing flooding locations and sources
- opportunity locations for storm water treatment BMPs
- quantity of storm water volume reduced by new BMPs
- increase of storm water quality by new BMPs

The Mississippi River Boulevard subwatershed is a key area with respect to the City's storm sewer system, because it contains seven separate storm sewer discharge points and represents a significant portion of the City's drainage to the Mississippi River. At least two Residential Street Vitality Program (RSVP) projects are scheduled to be constructed in this area over the next 2 to 3 years.

The models created as part of this effort are intended to be "Living" constructs of the City's storm water system. It is anticipated that these models will be modified as needed over the years by City Staff to improve their usefulness, reliability, and relevance as new construction or reconstruction of storm water features occurs and additional storm water monitoring data provides new insight into the behavior of the system allowing for additional calibration of the models.

P8 (Program for Predicting Polluting Particle Passage thru Pits, Ponds, and Puddles) and XP-SWMM (Stormwater Wastewater Management Model by XP Software, Inc.) software were utilized for this project. These programs are capable of simulating continuous rainfall events to estimate water quantity and quality.

The P8 program utilizes measured rainfall and pollutant particle data to estimate pollutant loads over defined drainage areas and removal efficiencies of in place ponds and other BMPs.

XP-SWMM simulates storm water flow through complex networks of storm sewer piping, natural channels and street overflow routes. Storage of storm water in the modeled system allows this program to help identify locations in the system where flooding is anticipated to occur.

3.0 PROCEDURES AND METHODS

This section outlines the procedures and methods used to develop the XP-SWMM and P8 models for the Mississippi River Boulevard Subwatershed. The following data sources were utilized to construct the models described in this report:

- City strip maps and asbuilt records
- City GIS shapefile data
- St. Catherine Surface Water Management Study
- St. Catherine University asbuilt records
- MaCalaster College survey records
- Capitol Region Water Quality Monitoring Reports (2005 – 2009)

3.1 Hydraulic Analysis (XP-SWMM)

XP-SWMM version 12.0 was used to build the storm water model as part of this analysis. XP-SWMM software utilizes simultaneous routing to calculate hydraulic conditions for the whole model during each time increment. This allows the model to account for system interactions such as tail water conditions and surcharging. The following describes the procedures used to develop the model in XP-SWMM:

Storm Water Routing

Each element was given a unique identification number that correspond to its location. **Figures 2-8** show the layout of the subwatershed delineations and the subwatershed IDs which are each represented by a node in the model. Subwatershed IDs correspond to node ID numbers utilized in the City's CAD inventory of the storm sewer system. Link numbers included in the model (not shown on the figures) also correspond to the City's existing naming convention.

In general, nodes were placed at street intersections to account for locations where storm sewers typically converge and where there is higher likelihood of flooding issues. Additional nodes were placed between intersections when significant changes in pipe slope are present in the existing storm sewer. Links connect each node in the model based on asbuilt information.

Subwatersheds tributary to each node in the model were delineated in GIS using 1 foot contour and storm sewer shapefile data in ArcGIS.

Overland (Street) Flow Routes

To maintain the total storm water runoff volume within the model, the hydraulics layer model input included a dual system of pipe flow and overland flow routes within the subwatershed in the event that the storm sewer system capacity was exceeded. In most cases surcharged storm water will flow through the street. The section geometry of these street flow routes was simulated by applying the following dimensions to street widths of 30, 40, and 50 feet in the model:

- 2% crown slope
- 6-inch curb height
- 5% boulevard slope

Design Storms
Global storm events were modeled for this analysis. These storms included the 1-inch, 2-inch, 2-year, 5-year, 10-year, and 100-year SCS Type II 24-hour storm events. The following table illustrates the rainfall depths modeled for each of the design storms:

Table 1: Global Storm Events

Storm Event	Annual Return Frequency	Rainfall Depth (in.)
2-year	50%	2.8
5-year	20%	3.6
10-year	10%	4.2
100-year	1%	5.9

These values correspond with those published by the U.S. Department of Agriculture Soil Conservation Service for the Minneapolis/St. Paul metro area.

Impervious Surface Coverage
An inventory of impervious surfaces was conducted throughout the study area using GIS. 2006 high resolution aerial photography and available planemetric data were used to measure indirectly connected impervious and directly connected impervious surfaces.

Directly Connected Impervious: Any hard surface from which runoff is conveyed with little or no opportunity for reduction due to infiltration or other losses before being routed to downstream collection and conveyance systems.

Indirectly Connected Impervious: Any hard surface as defined above from which runoff passes over pervious surfaces being subjected to infiltration losses prior to discharging to the storm water conveyance system.

Streets, parking lots, driveways, and large buildings were identified as directly connected impervious. Residential buildings and other impervious surfaces surrounded by pervious surfaces were identified as indirectly connected.

Time of Concentration
Since most drainage areas in the model are very similar in impervious makeup and size, times of concentrations were generalized as follows:

- Tc of 15 minutes was applied to subcatchments representing indirectly connected impervious and pervious area.
- Directly connected impervious area subcatchments utilized a Tc of 7 minutes which is generally accepted as the minimum Tc by Mn/DOT.

Times of concentration were calculated independently for larger subcatchment areas that are not typical such as parks and airports. This was done by summing the travel time of sheet flow (up to 150 feet), shallow concentrated, and concentrated flows from the most hydraulically distant point in the subwatershed to the node.

Soils

Current Ramsey County Soil Survey data was analyzed in ArcView to determine infiltrating characteristics of individual subwatersheds. Based on this analysis all underlying soils were assumed to have infiltration properties of hydrologic soil group B, with the exception of the wetland areas.

Composite Curve Numbers

A distinction between directly connecting and indirectly connected impervious runoff was simulated by using two subcatchments for each node in the model. Subcatchment 1 included the total pervious area and indirectly connected impervious area as a percentage of the total. This subcatchment represented a composite of the pervious and indirectly connected impervious areas. Subcatchment 2 included the directly connected impervious as the total area being 100% impervious. This approach was used to more accurately simulate runoff from streets and other directly connected surfaces during rain events less than 2.0 inches.

Energy Losses

Entrance and exit losses for all pipe conduits models were standardized with a coefficient of 0.2, which is typical for concrete pipes with groove ends projecting from fill. These coefficients affect pipe flow under outlet control. Inlet control conditions were simulated in the model as well, assuming the same inlet edge. These factors were not applied to storm tunnel conduits, since they are assumed to be continuous and are designed to minimize such losses.

3.2 Water Quality Analysis (P8)

The P8 urban water quality model predicts the generation and transportation of storm water runoff pollutants within the City. This model can estimate pollutant loadings, concentrations, and removal efficiencies for basins subject to single or continuous rainfall events. The model is capable of simulating the performance of a variety of treatment devices including swales, buffer strips, detention ponds, flow splitters, infiltration basins, and other user-defined devices.

For the purposes of this analysis, base flow conditions were not simulated in the model. Only pollutant loads resulting from rainfall events were computed.

Watershed Characterization

To simulate water quantity in the model, the characterization of the contributing subwatersheds was developed using the same hydrologic properties incorporated into the XP-SWMM analysis. Indirectly connected and directly connected impervious areas were included for each subwatershed based on the same inputs used in the XP-SWMM analysis. For the purposes of this analysis, street sweeping was ignored. A curve number of 69 was used for pervious areas.

Depression storage for residential subwatersheds was set to be 0.026 inches and the impervious runoff coefficient used was 0.783 which are the values recommended by P8 for Medium Density Residential land use with alleys.

Rainfall and Temperature Data

Rainfall and temperature data files used in the model were developed from continuous measurements collected at the Minneapolis/St. Paul Airport between the years 1969 and 1988.

Pollutant Characterization

The pollutant loading in storm water runoff is determined by the specific distribution of pollutant particle size in P8. The NURP50 particle distribution was used to estimate pollutant loads in the model. This distribution is based primarily on the findings of the Nationwide Urban Runoff Program.

Table 2: NURP50 Particle Distribution

Particle Class	TSS (mg/kg)	TP (mg/kg)
Dissolved	0	99,000
10th Percentile	1,000,000	3,850
30th Percentile	1,000,000	3,850
50th Percentile	1,000,000	3,850
80th Percentile	1,000,000	0

Calibration

Storm water monitoring data collected by the Capitol Region Watershed District from 2005 to 2009 in the East Kittsondale and Phalen Creek subwatersheds was used to calibrate the model. It was assumed that pollutant loading from the Mississippi River Boulevard subwatershed would be similar to these subwatersheds, because they have similar composition of land use and impervious surface.

Since the sizes of the subwatersheds and the time periods during which monitoring was conducted in the subwatersheds from year to year are different, the assumption that pollutant loads are directly proportional to runoff volume was made to provide a basis for comparing the results of the model to the monitoring data. Pollutant loads were divided by runoff volume to calculate the unit loading for each subwatershed and time period. The average unit loads for all five years of the two subwatersheds were compared to average unit loads from the model to evaluate whether the model results were reasonable.

The results of the initial run of the model using the NURP50 particle distribution, revealed unit loads for TSS and TP to be low with respect to the unit loads of the monitoring data. Scale factors were applied to the model's particle distribution file to adjust the results to be within the range of values for the two monitored subwatersheds. The particle composition file as shown above was scaled up by factors of 2.5 and 1.2 for TSS and TP respectively. **Table 3** below summarizes the comparison calculations which resulted from this calibration exercise. **Appendix G** provides a complete table of data used to develop this comparison.

Table 3: Annual Average Unit Pollutant Load Comparison Summary (2005-2009)

Subwatershed Name	Tributary Area (ac)	Impervious Percentage	Flow Yield (cf/ac/in)	TSS Yield-Volume (lbs/af)	TP Yield-Volume (lbs/af)
East Kittsondale	1,116	46%	1,204	693.5	1.194
Phalen Creek	1,443	50%	877	944.4	1.305
Mississippi River Blvd	2,206	45%	799	798.1	1.208

4.0 RESULTS/OBSERVATIONS

This section provides a discussion for the results of the XP-SWMM and P8 model simulations. The hydraulic analysis addresses significant flooding areas and the water quality analysis predicts the average annual pollutant loads and the performance of existing treatment infrastructure.

4.1 Hydraulic Analysis (XP-SWMM)

Tables 4 and **5** provide the total storm water runoff volumes and maximum discharge rates from each storm sewer system based on the results of the XP-SWMM model:

Table 4: Total Runoff Volume (cu-ft)

Subwatershed	1-inch storm event	2-inch storm event	2-year storm event	5-year storm event	10-year storm event	100-year storm event
Ford	180,582	571,469	968,689	1,408,201	1,756,407	2,797,586
Hartford	410,513	1,505,280	2,708,809	4,078,952	5,180,329	8,519,088
Jefferson	73,961	289,982	532,569	810,560	1,034,692	1,715,868
Lincoln	319,405	1,166,557	2,075,872	3,100,409	3,919,095	6,385,419
Marshall	111,482	381,237	668,398	991,681	1,250,105	2,029,454
Portland	368,582	1,313,059	2,332,928	3,486,279	4,410,164	7,201,382
Princeton	78,123	298,586	544,585	825,982	105,693	1,741,303
TOTAL	1,542,648	5,526,170	9,831,850	14,702,064	17,656,485	30,390,100

Table 5: Peak Discharge Rate at Outfall (cfs)

Subwatershed	2-year storm event	5-year storm event	10-year storm event	100-year storm event
Ford	231	361	442	614
Hartford	599	761	798	861
Jefferson	155	218	278	487
Lincoln	412	446	449	453
Marshall	178	237	242	255
Portland	448	453	457	461
Princeton	132	188	218	316

Flooding was evaluated as part of this analysis. Flooding occurring as a result of limited catch basin inlet capacity has been evaluated separately from flooding occurring as a result of limited storm sewer pipe capacity. The tables in **Appendix D** list the results of the catch basin analysis. This analysis assumes a constant rate of discharge per catch basin within each subwatershed. Runoff rates that exceeded the calculated combined catch basin inlet capacity are highlighted in red.

To determine which areas may flood due to pipe restrictions, the depth of water above the manhole rim (surcharge depth) was calculated in the model. These results were tabulated and are found in **Appendix B**. Surcharging simulated in the model accounts for flooding resulting from limitations in pipe capacity only as opposed to catch basin grate clogging, insufficient number of grates, etc. A discussion of storm sewer surcharging is provided below according to major storm sewer systems. The 5-year storm event is the City's standard event for designing storm sewer. For this reason, nodes which experience surcharging of 0.5 feet deep or higher during the 5-year storm event are discussed in detail below and shown in **Figures 2** thru **8** in **Appendix A**.

Ford Avenue Storm Sewer Flooding

Nodes 103707 and 103730 are located along the Ford Parkway storm sewer, between Mount Curve Boulevard and Cretin Avenue. The storm sewer along Ford Parkway near this location reduces in diameter from 54” to 48”. The resulting decrease in inlet capacity causes water to surcharge the storm sewer and contribute to flooding. The capacity of the system increases at the next intersection to the west where it connects to a segment of the tunnel system. Additional analysis may be conducted along this storm sewer to determine the effect that the existing reducer pipes located along the system at this location has on inlet capacity.

Hartford Avenue Storm Sewer Flooding

Flooding that occurs along the final segments of the Hartford Avenue storm sewer at Nodes 104333 and 104334 may be attributed to decreases in pipe size and slope between Mount Curve Boulevard and Mississippi River Boulevard. Pipe size decreases from 90” to 78” at Node 104334 and increases to 84” at the next structure downstream (Node 104333). In addition, the slopes of the 78” and 84” pipes are 3.65% and 0.3% respectively.

Node 104956 is located along the 48” Bayard Avenue storm sewer at its intersection with Cleveland Avenue. This system merges with the 72” Hartford Avenue system north of this location and continues westward as a 78” pipe. High flows from the Hartford Avenue system cause backflow in the Bayard Avenue system, causing flooding at this location.

Nodes 104813, 104760, and 104761 are located along the Hartford Avenue storm sewer system between Fairview Avenue and Wheeler Avenue. This 60” storm sewer merges with the 42” storm sewer at the intersection of Fairview Avenue and Hartford Avenue. During large storm events surcharged storm water floods this intersection and flows between homes westward to the St. Catherine University campus. The storm sewer merge and limitations in the Hartford Avenue storm sewer capacity may contribute to flooding in this location.

Node 104525 is located along the 72” trunk storm sewer system which runs along the south edge of the St. Catherine University property. This location receives surcharged storm water flows from the intersection of Fairview Avenue and Hartford Avenue.

Jefferson Avenue Storm Sewer Flooding

Nodes 104393 and 104511 are located along Cretin Avenue at its intersections with Jefferson Avenue and Juliet Avenue. These nodes receive surcharged storm water from the Hartford Avenue storm sewer system at the intersection of Juliet Avenue and Finn Street. Surcharged storm water flows to these nodes via Juliet Avenue and contributes to flooding.

Lincoln Avenue Storm Sewer Flooding

Node 160295 is located along the 66” Lincoln Avenue storm sewer at its intersection with Finn Street. The storm sewer becomes close to the surface at this point reducing the head potential and flow capacity of the system. As a result storm water surcharges the system and flows through the street at this point during large storm events.

Node 102944 is a low point located at the intersection of Cretin Avenue and Grand Avenue. Surcharged storm water from node 160295 makes its way to this location and contributes to flooding. Backflow from the Lincoln Avenue system contributes to flooding in this location during large storm events as well. Surcharged storm water exits this location via the St. Thomas campus parking lot.

Node 137559 represents an alley low point between Fairmount Avenue and Princeton Avenue. 12” storm sewer connects this low point to the 24” storm sewer under Prior Street. Backflow from the 24” storm sewer contributes to flooding in this area. The nearest overland overflow route for this area is through residential properties along Fairmount Avenue. Garages and homes may be impacted by this flooding.

Flooding is simulated in the model along the 84” trunk storm sewer line under Fairview Avenue from Saint Claire Avenue to Lincoln Avenue which includes Nodes 1003, 1005, 105508, 105509, 105511, 105516, and105574. Three separate storm sewer systems (27”, 30”, and 72”) converge at the intersection of Fairview Avenue and Saint Claire Avenue. The Fairview Avenue system consists of 84” equivalent horizontal elliptical and arch pipe. This system lies close to the surface with its most shallow point being about 1 foot from surface to the crown of the pipe. Flooding depths predicted by the model are anticipated to impact numerous homes along Fairview Avenue.

Nodes 105512, 105501, 105521,105208, and 105627 represent low points in alleys adjacent to the Fairview Avenue system mentioned above. Storm sewer connecting these alleys to the 84” trunk line under Fairview Avenue all experience backflow resulting from tailwater at the downstream connections.

Significant flooding in the street is observed along Howell Avenue from Jefferson Avenue to Saint Claire Avenue (Nodes 104698, 621743, 621744, 105269, 105270, and 105367). The existing storm sewer under Howell Avenue increases in size from 42” to 72”. This stretch of Howell Avenue is lower in elevation than four parallel streets with parallel storm sewer systems between Fairview Avenue and Snelling Avenue. As a result, street overflows from the parallel streets are directed to this street segment causing flooding.

Nodes 104532 and 166346 represent low points in the alleys of three separate city blocks between Snelling Avenue and Macalester Avenue. 18” storm sewer running under these blocks connects to the 42” trunk line under Jefferson Avenue. High flows through the 42” trunk line backflow into the alley storm sewer increasing flooding volumes.

Node 138857 is a low point in the alley south of Jefferson Avenue between Brimhall Street and Saratoga Street. This node receives backflow from the downstream system along Jefferson Avenue, because the surface elevation is below downstream nodes. Flooding may impact adjacent garage structures.

Marshall Avenue Storm Sewer Flooding
The model shows no surcharging over 0.5 feet during the 5-year storm event.

Portland Avenue Storm Sewer Flooding
Nodes 110588 and 110641 are located at the intersection of Mississippi River Boulevard and Exeter Place. Drainage from this location flows through a 36” pipe which connects to the 90” trunk line under Portland Avenue. This 90” pipe reduces in size to a 66” pipe near the intersection of Exeter Place and Cretin Avenue. As a result of this capacity reduction, backflow occurs in this 36” pipe during large storm events contributing to overflow in the street along Otis Place.

Node 110746, located along Mississippi River Boulevard, receives overflow from Node 110588 mentioned above. The storm sewer in this area consists of a 15” pipe which is not able to accommodate the flows being directed to this area.

Nodes 110753 and 110754 are located along Mississippi River Boulevard south of Summit Avenue. These nodes are part of a small separate storm sewer system whose outfall is a 16” CIP pipe which is positioned at a steep slope down the side of the bluffs. The model simulates significant surcharge flows directed to this system through the streets. These surcharge flows occur as a result of the storm sewer size reduction at Exeter Place and Cretin Avenue.

Node 111218 is a low point along an alley between Ashland Avenue and Portland Avenue. A 12” pipe carries drainage to the 84” trunk line along Portland Avenue. Flow from this trunk line produces backflow through the alley storm sewer causing this area to flood. Multiple residential garages adjacent to this area are at risk during large storm events.

Node 111276 is a low point at the intersection of Cleveland Avenue and Ashland Avenue. Drainage is carried away from this point via a 54” storm sewer pipe which connects to the 84” trunk line at Portland Avenue. Flows from this 84” pipe produce backflows in this 54” pipe during the 5-year event and greater. The low manhole rim at this location is 181.93. The nearest overflow elevation is estimated to be 184.00 and is located to the east on the University of St. Thomas parking lot. Overflow is directed towards the University buildings in this location. Flooding depths simulated by the model in this area are anticipated to impact residential structures and adjacent University buildings.

Nodes 111251 and 111185 are located along the 78” trunk storm sewer under Portland Avenue between Prior Avenue and Howell Street. The bury depth of this storm sewer becomes more shallow in this location. The crown of the pipe at Node 111185 is about 3.7 feet below the surface. The crown of the pipe upstream of this node is about 9 feet below the surface. This decrease in head potential may contribute to flooding in these nodes.

Node 111073 is located along Portland Avenue storm sewer at its intersection with Wheeler Street. A 48”, 21”, and 60” storm sewer merge into a 66” storm sewer which continues westward. This merge and overall limited capacity in the Portland Avenue system contribute to flooding in this location.

Node 110971 is located at the intersection of Summit Avenue Service Road and Pierce Avenue. Flooding is caused by a reduction in flow capacity in the 42” system which flows northward to the Portland Avenue system from this location. The reduction in capacity in the storm sewer is caused by multiple factors including limitations in the downstream Portland Avenue system, reduction in storm sewer slope, and reduction in head potential at this location.

Node 105336 is a low point along a residential alley south of Grand Avenue between Wheeler Street and Cambridge Street. A 12” storm sewer pipe carries runoff from the alley westward to a 24” pipe along Wheeler Street. The downstream tailwater may contribute to flooding in this location. Multiple residential garages adjacent to this area are at risk during large storm events.

Node 142665 is a low point along an alley south of Portland Avenue between Pascal Avenue and Albert Avenue. A 12” pipe carries drainage to the 36” storm sewer along Pascal Avenue. Flow from the Pascal Avenue system produces backflow through the alley storm sewer causing this area to flood. Multiple residential garages adjacent to this area are at risk during large storm events.

Princeton Avenue Storm Sewer Flooding
The model shows no surcharging over 0.5 feet during the 5-year storm event.

4.2 Water Quality Analysis (P8)

The Mississippi River Boulevard subwatershed is limited with respect the number of storm water management BMPs available to treat storm water runoff prior to discharge to the Mississippi River. There are no BMPs within this subwatershed that provide substantial removal of pollutants through the system aside from a few wet and dry detention ponds within the airport.

The model has been constructed to calculate the total pollutant loads within each of the seven major storm sewer systems within the Mississippi River Boulevard subwatershed. The results of the water quality modeling in P8 within the study area provide average annual pollutant loads over a 20 year period (1968 – 1988). These results are shown in **Tables 6** and **7** and in **Appendix G**:

Table 6: Average Annual Pollutant Loading (1969-1988)

Subwatershed Name	Tributary Area (ac)	Runoff (ac-ft/yr)	TSS (lbs/yr)	TP (lbs/yr)
Ford	186	155.8	122,099	186.1

Hartford	633	405.7	347,206	520.5
Jefferson	128	78.8	66,930	99.9
Lincoln	451	311.4	257,349	386.7
Marshall	143	84.2	73,776	109.2
Portland	536	372.1	305,286	459.5
Princeton	129	81.2	68,376	102.2
TOTAL	**2,206**	**1,489.2**	**1,241,022**	**1,864.1**

Table 7: Average Annual Device Removals (1969-1988)

Device Name	**Subwatershed Name**	**Discharges To**	**Tributary Area (ac)**	**TSS (lbs/yr)**	**TP (lbs/yr)**
Dew Drop Pond	Hartford	Out	13.1	4,900	4.7
Infiltration Basin SC9	Hartford	Out	2.3	1,902	3.2
Infiltration Basin SC10	Hartford	SC9	14.9	7,760	10.5

*These values may be subtracted from the corresponding subwatershed loads in Table 6 to calculate annual average output to the Mississippi River.

5.0 CONCLUSIONS/RECOMMENDATIONS

As the City moves forward with efforts to improve water quality within the Mississippi River Boulevard Subwatershed, the results of this analysis may be used as a tool for measuring success. The data presented in this report serves as a starting point. Upon considering the long term feasibility of implementing City and regulatory goals for volume reduction and storm water treatment BMPs throughout the study area, the City may utilize the models developed in this study to quantify the environmental impact that may be expected as a result.

5.1 Model Limitations

Some caution must be taken when analyzing the results presented in the XP-SWMM and P8 models, as the accuracy of the models is somewhat limited based on the assumptions made. A discussion of these limitations follows:

1. The XP-SWMM model developed for this analysis does not take into account catch basin inlet capacity. As a result, the model may under estimate the amount of storm water flow through the street in some cases where catch basin inlet capacity or clogging is an issue.

2. Storm water flows simulated in XP-SWMM as overflow through the street does not account for flow resulting from direct rainfall and subcatchment surface run-on. Only storm water that surcharges the subsurface systems or is received by a connecting street or channel is simulated to flow through these conduits. However, these flows are anticipated to be negligible in most cases.

3. Storm sewer base flows resulting from ground water inflow and other sources are not simulated in the XP-SWMM model. However, these flows are anticipated to be negligible during design storm events.

4. Generalized assumptions were made in the XP-SWMM model for parameters such as times of concentration, curve numbers, head losses, and roughness coefficients to streamline the modeling effort as described previously. It is expected that these assumed parameters may not be appropriate for every subwatershed feature. However, significant time and effort may be invested in the future to fine tune these parameters if desired. This can be done in areas of concern or where modeled results do not match observed conditions.

5.2 Future Calibration

At this time no substantial "real world" data is available for this subwatershed to evaluate the accuracy of the model. To further refine the XP-SWMM and P8 models, additional empirical measurements may be conducted in the future. Continuous monitoring of storm sewer flow and rainfall will provide a comparison for calibrating the model. Such a comparison will provide an indication whether the assumptions made as part of this analysis need to be modified so that the models simulate actual conditions more accurately.

5.3 Recommendations

The following recommendations may be implemented using the information provided by this report:

1. Prioritize major storm sewer systems for flow monitoring, calibration, and verification of input parameters.

2. Prioritize areas for implementing storm water treatment devices.

3. Evaluate potential flooding areas identified by the model and develop a strategy for addressing flooding risk through volume reduction or storm sewer modifications.

4. Model and analyze other major subwatersheds within the City and continue to identify potential concern areas which may be addressed by future capital improvement projects.

ST. ANTHONY HILL SUBWATERSHED

STORM WATER MODELING REPORT

CITY OF ST. PAUL, MINNESOTA

DECEMBER 2010

Prepared by:

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Minneapolis, MN 55416

CERTIFICATION

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly licensed professional engineer under the laws of the State of Minnesota.

Todd E. Hubmer, PE

Date: Lic. No. 24043

Quality Control Review Completed By:

Rich Hibbard, EIT

Date: Cert. No. 131812

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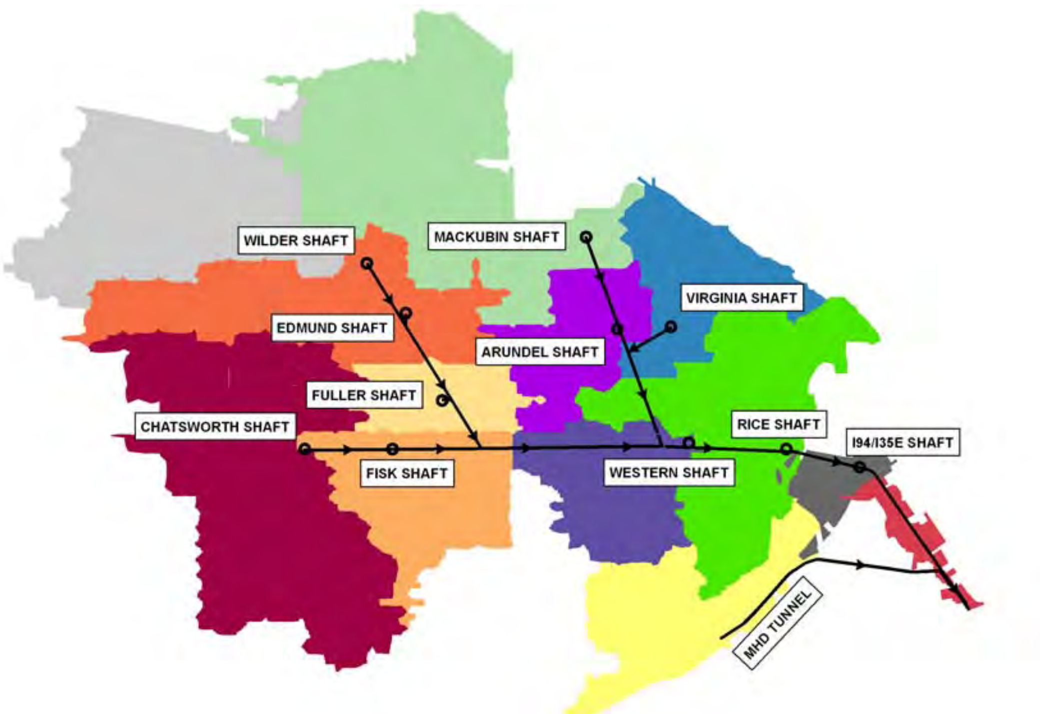
1.0 INTRODUCTION/BACKGROUND

The St. Anthony Hill subwatershed consists of nearly 2,700 acres of residential, commercial and industrial land use entirely within the city limits of St. Paul. The primary conveyance system for this drainage area is the St. Peter – Rondo Storm Tunnel which lies over 100 feet underground within the St. Peter sandstone rock formation. The tunnel is circular in shape and ranges from 10 to 12 feet in diameter. Beginning at Chatsworth Street, the main tunnel runs west to east along the Interstate 94 corridor (formerly Rondo Street) and along St. Peter Street through downtown. The St. Albans Tunnel and the Western Tunnel merge into the St. Peter – Rondo on its north side. A 6 foot diameter tunnel owned and maintained by Mn/DOT referred to as the M.H.D. Tunnel connects with the St. Peter – Rondo tunnel nearly 200 feet upstream of its outfall. The outfall of the St. Peter – Rondo tunnel lies beneath Shepard Road on the west side of the Wabasha Bridge and discharges to the Mississippi River at the riverbank, northwest of Harriet Island.

Storm water runoff within the St. Anthony Hill subwatershed flows though a network of storm sewer pipes and enters the St. Peter – Rondo Storm tunnel system via drop shaft structures positioned along its length. The St. Anthony Hill subwatershed is broken down into 13 separate drainage areas. These drainage areas include those tributary to each drop shaft as listed and shown on the image below:

- Arundel
- Chatsworth
- Downtown
- Edmund
- Fisk
- Fuller
- Mackubin
- MHD Tunnel
- Rice
- Virginia
- Western
- Wilder
- I94/I35E



Major Storm Sewer Systems

2.0 PURPOSE/GOALS

As part of a City-wide effort to reduce and treat storm water discharges to the Mississippi River, the City of St. Paul is developing an inventory of storm water models for key areas throughout the City. As redevelopment of land and improvements to public streets and utilities occur in the future, City Staff will utilize these models to plan improvements to the existing storm water system by identifying the following:

- under capacity storm sewer features
- existing flooding locations and sources
- opportunity locations for storm water treatment BMPs
- quantity of storm water volume reduced by new BMPs
- increase of storm water quality by new BMPs

The St. Anthony Hill subwatershed is a key area with respect to the City's storm sewer system, because it includes the one of the City's largest and deepest storm tunnel systems, the St. Peter – Rondo Storm Tunnel. Also, at least three Residential Street Vitality Program (RSVP) projects are scheduled to be constructed in this subwatershed over the next 2 to 3 years.

The models created as part of this effort are intended to be "Living" constructs of the City's storm water system. It is anticipated that these models will be modified as needed over the years by City Staff to improve their usefulness, reliability, and relevance as new construction or reconstruction of storm water features occurs and additional storm water monitoring data provides new insight into the behavior of the system allowing for additional calibration of the models.

P8 (Program for Predicting Polluting Particle Passage thru Pits, Ponds, and Puddles) and XP-SWMM (Stormwater Wastewater Management Model by XP Software, Inc.) software were utilized for this project. These programs are capable of simulating continuous rainfall events to estimate water quantity and quality.

The P8 program utilizes measured rainfall and pollutant particle data to estimate pollutant loads over defined drainage areas and removal efficiencies of in place ponds and other BMPs.

XP-SWMM simulates storm water flow through complex networks of storm sewer piping, natural channels and street overflow routes. Storage of storm water in the modeled system allows this program to help identify locations in the system where flooding is anticipated to occur.

3.0 PROCEDURES AND METHODS

This section outlines the procedures and methods used to develop the XP-SWMM and P8 models for the St. Anthony Hill Subwatershed. The following data sources were utilized to construct the models described in this report:

- City strip maps and asbuilt records
- Sewer Utility Data Service (SUDS) sewer connection records
- City GIS shapefile data
- MnDOT maps and asbuilt records
- Central Corridor Light Rail Transit Project plans dated 02/24/10
- Capitol Region Water Quality Monitoring Reports (2005 – 2009)

3.1 Hydraulic Analysis (XP-SWMM)

XP-SWMM version 12.0 was used to build the storm water model as part of this analysis. XP-SWMM software utilizes simultaneous routing to calculate hydraulic conditions for the whole model during each time increment. This allows the model to account for system interactions such as tail water conditions and surcharging. The following describes the procedures followed to develop the model in XP-SWMM:

Storm Water Routing

Each element was given a unique identification number that corresponds to the element's location. **Figures 2-14** show the layout of the subwatershed delineations and the subwatershed IDs which are each represented by a node in the model. Subwatershed IDs correspond to node ID numbers utilized in the City's CAD inventory of the storm sewer system. Link numbers included in the model (not shown on the figures) also correspond to the City's existing naming convention.

In general, nodes were placed at street intersections to account for locations where storm sewers typically converge and where there is higher likelihood of flooding issues. Additional nodes were placed between intersections when significant changes in pipe slope are present in the existing storm sewer. Links connect each node in the model based on asbuilt information.

Subwatersheds tributary to each node in the model were delineated in GIS using 1 foot contour and storm sewer shapefile data in ArcGIS.

Overland (Street) Flow Routes

To maintain the total storm water runoff volume within the model, the hydraulics layer model input included a dual system of pipe flow and overland flow routes within the subwatershed in the event that the storm sewer system capacity was exceeded. In most cases surcharged storm water will flow through the street. The section geometry of these street flow routes was simulated by applying the following dimensions to street widths of 30, 40, and 50 feet in the model:

- 2% crown slope
- 6-inch curb height
- 5% boulevard slope

Design Storms
Global storm events were modeled for this analysis. These storms included the 1-inch, 2-inch, 2-year, 5-year, 10-year, and 100-year SCS Type II 24-hour storm events. The following table illustrates the rainfall depths modeled for each of the design storms:

Table 1: Global Storm Events

Storm Event	Annual Return Frequency	Rainfall Depth (in.)
2-year	50%	2.8
5-year	20%	3.6
10-year	10%	4.2
100-year	1%	5.9

These values correspond with those published by the U.S. Department of Agriculture Soil Conservation Service for the Minneapolis/St. Paul metro area.

Impervious Surface Coverage
An inventory of impervious surfaces was conducted throughout the study area using GIS. 2006 high resolution aerial photography and available planemetric data were used to measure indirectly connected impervious and directly connected impervious surfaces.

Directly Connected Impervious: Any hard surface from which runoff is conveyed with little or no opportunity for reduction due to infiltration or other losses before being routed to downstream collection and conveyance systems.

Indirectly Connected Impervious: Any hard surface as defined above from which runoff passes over pervious surfaces being subjected to infiltration losses prior to discharging to the storm water conveyance system.

Streets, parking lots, driveways, and large buildings were identified as directly connected impervious. Residential buildings and other impervious surfaces surrounded by pervious surfaces were identified as indirectly connected.

Time of Concentration
Since most drainage areas in the model are very similar in impervious makeup and size, times of concentrations were generalized as follows:

- Tc of 15 minutes was applied to subcatchments representing indirectly connected impervious and pervious area.
- Directly connected impervious area subcatchments utilized a Tc of 7 minutes which is generally accepted as the minimum Tc by Mn/DOT.

Times of concentration were calculated independently for larger subcatchment areas that are not typical such as parks and airports. This was done by summing the travel time of sheet flow (up to 150 feet), shallow concentrated, and concentrated flows from the most hydraulically distant point in the subwatershed to the node.

Soils
Current Ramsey County Soil Survey data was analyzed in ArcView to determine infiltrating characteristics of individual subwatersheds. Based on this analysis all underlying soils were assumed to have infiltration properties of hydrologic soil group B, with the exception of the wetland areas.

Composite Curve Numbers
A distinction between directly connecting and indirectly connected impervious runoff was simulated by using two subcatchments for each node in the model. Subcatchment 1 included the total pervious area and indirectly connected impervious area as a percentage of the total. This subcatchment represented a composite of the pervious and indirectly connected impervious areas. Subcatchment 2 included the directly connected impervious as the total area being 100% impervious. This approach was used to more accurately simulate runoff from streets and other directly connected surfaces during rain events less than 2.0 inches.

Energy Losses
Entrance and exit losses for all pipe conduits models were standardized with a coefficient of 0.2, which is typical for concrete pipes with groove ends projecting from fill. These coefficients affect pipe flow under outlet control. Inlet control conditions were simulated in the model as well, assuming the same inlet edge. These factors were not applied to storm tunnel conduits, since they are assumed to be continuous and are designed to minimize such losses.

3.2 Water Quality Analysis (P8)

The P8 urban water quality model predicts the generation and transportation of storm water runoff pollutants within the City. This model can estimate pollutant loadings, concentrations, and removal efficiencies for basins subject to single or continuous rainfall events. The model is capable of simulating the performance of a variety of treatment devices including swales, buffer strips, detention ponds, flow splitters, infiltration basins, and other user-defined devices.

For the purposes of this analysis, base flow conditions were not simulated in the model. Only pollutant loads resulting from rainfall events were computed.

Watershed Characterization
To simulate water quantity in the model, the characterization of the contributing subwatersheds was developed using the same hydrologic properties incorporated into the XP-SWMM analysis. Indirectly connected and directly connected impervious areas were included for each subwatershed based on the same inputs used in the XP-SWMM analysis. For the purposes of this analysis, street sweeping was ignored. A curve number of 69 was used for pervious areas.

Depression storage for residential subwatersheds was set to be 0.026 inches and the impervious runoff coefficient used was 0.783 which are the values recommended by P8 for Medium Density Residential land use with alleys.

Rainfall and Temperature Data
Rainfall and temperature data files used in the model were developed from continuous measurements collected at the Minneapolis/St. Paul Airport between the years 1969 and 1988.

Pollutant Characterization
The pollutant loading in storm water runoff is determined by the specific distribution of pollutant particle size in P8. The NURP50 particle distribution was used to estimate pollutant loads in the model. This distribution is based primarily on the findings of the Nationwide Urban Runoff Program.

Table 2: NURP50 Particle Distribution

Particle Class	TSS (mg/kg)	TP (mg/kg)
Dissolved	0	99,000
10^{th} Percentile	1,000,000	3,850
30^{th} Percentile	1,000,000	3,850
50^{th} Percentile	1,000,000	3,850
80^{th} Percentile	1,000,000	0

Calibration
Storm water monitoring data collected by the Capitol Region Watershed District from 2005 to 2009 in the East Kittsondale and Phalen Creek subwatersheds was used to calibrate the model. It was assumed that pollutant loading from the St. Anthony Hill subwatershed would be similar to these subwatersheds, because they have similar composition of land use and impervious surface.

Since the sizes of the subwatersheds and the time periods during which monitoring was conducted in the subwatersheds from year to year are different, the assumption that pollutant loads are directly proportional to runoff volume was made to provide a basis for comparing the results of the model to the monitoring data. Pollutant loads were divided by runoff volume to calculate the unit loading for each subwatershed and time period. The average unit loads for all five years of the two subwatersheds were compared to average unit loads from the model to evaluate whether the model results were reasonable.

The results of the initial run of the model using the NURP50 particle distribution, revealed unit loads for TSS and TP to be low with respect to the unit loads of the monitoring data. Scale factors were applied to the model's particle distribution file to adjust the results to be within the range of values for the two monitored subwatersheds. The particle composition file as shown above was scaled up by factors of 2.5 and 1.2 for TSS and TP respectively. **Table 3** summarizes the comparison calculations which resulted from this calibration exercise. **Appendix G** provides a complete table of data used to develop this comparison.

Table 3: Annual Average Unit Pollutant Load Comparison Summary (2005-2009)

Subwatershed Name	Tributary Area (ac)	Impervious Percentage	Flow Yield (cf/ac/in)	TSS Yield-Volume (lbs/af)	TP Yield-Volume (lbs/af)
East Kittsondale	1,116	46%	1,519	770.7	1.257
Phalen Creek	1,443	50%	844	992.3	1.305
St. Anthony Hill	**2,683**	**50%**	**1,083.2**	**805.9**	**1.216**

4.0 RESULTS/OBSERVATIONS

This section provides a discussion for the results of the XP-SWMM and P8 model simulations. The hydraulic analysis addresses significant flooding areas and the water quality analysis predicts the average annual pollutant loads and the performance of existing treatment infrastructure.

4.1 Hydraulic Analysis (XP-SWMM)

Tables 4 and **5** provide the total storm water runoff volumes and maximum discharge rates from each storm sewer system based on the results of the XP-SWMM model:

Table 4: Total Runoff Volume (cu-ft)

Subwatershed	1-inch storm event	2-inch storm event	2-year storm event	5-year storm event	10-year storm event	100-year storm event
Arundel	142,586	412,576	678,827	970,653	1,200,821	1,886,278
Chatsworth	507,256	1,487,990	2,457,815	3,521,325	4,360,206	6,858,341
Downtown	82,104	187,156	274,198	362,675	429,666	621,369
Edmund	223,341	735,399	1,264,005	1,852,452	2,320,008	3,721,436
Fisk	180,987	552,784	930,515	1,349,379	1,681,766	2,677,518
Fuller	105,170	307,023	503,250	716,705	884,299	1,380,992
I94/I35E	65,044	162,411	252,632	349,471	425,138	648,858
MHD Tunnel	169,845	510,321	855,918	1,239,346	1,543,802	2,456,755
Mackubin	376,499	1,136,709	1,906,518	2,759,342	3,435,867	5,462,268
Rice	439,485	1,134,478	1,777,875	2,465,965	3,001,924	4,579,689
Virginia	190,266	524,460	844,995	1,192,473	1,464,970	2,272,085
Western	187,136	515,836	833,816	1,180,085	1,452,384	2,261,385
Wilder	242,773	819,.319	1,429,610	2,116,448	2,665,541	4,321,837
TOTAL	**2,912,492**	**7,667,143**	**14,009,974**	**20,076,319**	**24,866,392**	**39,148,811**

Table 5: Peak Discharge Rate at Outfall (cfs)

Storm Event	Max Flow Rate (cfs)
2-year	3,210
5-year	4,287
10-year	4,502
100-year	4,728

Flooding was evaluated as part of this analysis. Flooding occurring as a result of limited catch basin inlet capacity has been evaluated separately from flooding occurring as a result of limited storm sewer pipe capacity. The tables in **Appendix D** list the results of the catch basin analysis. This analysis assumes a constant rate of discharge per catch basin within each subwatershed. Runoff rates that exceeded the calculated combined catch basin inlet capacity are highlighted in red.

To determine which areas may flood due to pipe restrictions, the depth of water above the manhole rim (surcharge depth) was calculated in the model. These results were tabulated and are found in **Appendix B**. Surcharging simulated in the model accounts for flooding resulting from limitations in pipe capacity only as opposed to catch basin grate clogging, insufficient number of grates, etc. A discussion of storm sewer surcharging is provided below according to major storm sewer systems. The 5-year storm event is the City's standard event for designing storm sewer. For this reason, nodes which experience surcharging of 0.5 feet deep or higher during the 5-year storm event are discussed in detail below and shown in **Figures 2** thru **14** in **Appendix A**.

Arundel Shaft Subwatershed

Node 117136 represents a storm sewer junction at a low point along Lafond Avenue between Mackubin Street and Arundel Street. Node 117125 is a catch basin manhole at a low point along the alley north of Thomas Avenue between Mackubin Street and Arundel Street. Node 115392 is a catch basin at a low point along the alley west of Arundel Street between Edmund Avenue and Charles Avenue. During large storm events, the hydraulic gradeline in the downstream storm sewer reaches an elevation slightly higher than the top of casting elevation of these nodes. This prevents storm water from exiting these nodes during the peak of the storm and causes backflow resulting in flooding. Multiple structures may be impacted by flooding at nodes 117127 and 115392. Installing backflow preventers at these locations may help address these issues.

Node 113227 represents the collection point for a 12.8 acre drainage area at the intersection of Central Avenue and Kent Street. This location is effectively land locked, with the nearest overflow located to the west approximately 9 feet above the top of casting elevation. With no street overflow route, surcharged storm water ponds in this location until sufficient capacity is available to convey the flow. The downstream storm sewer downsizes from 30" diameter to 24" diameter. The storm sewer may experience a decrease in flow capacity along this location.

Chatsworth Shaft Subwatershed

Node 113013 represents the collection point for an 11.6 acre drainage area at the intersection of Central Avenue and Kent Street. The nearest overflow for storm water is located to the south approximately 3 feet above the top of casting elevation. This location receives surcharged storm water from the adjacent streets in four directions including some storm water from University Avenue. The flooding elevations simulated in the model may reach homes adjacent to this intersection.

Node 143852 is a catch basin at a low point along the alley located north of University Avenue between Chatsworth Street and Milton Street. Flow capacity of the 12" storm sewer which diverts drainage away from this location is limited during large storm events due to the downstream tailwater conditions created by the 18" storm sewer running south to north along Chatsworth Street. The flooding elevations simulated in the model are anticipated to reach garages along the alley, homes and the commercial building on the south side of the alley.

Node 113465 is a low point, located at the intersection of Central Avenue and Chatsworth Street, which has an overflow elevation about 1 foot above the top of casting elevation. Surcharged storm water that reaches the overflow to the west along Central Avenue is discharged to the same low point. Insufficient downstream pipe capacity may be the cause of flooding in this location.

Nodes 112067, 112075, and 112974 are located in order from south to north along Oxford Street between Dayton Avenue and Carroll Avenue. When the storm sewer system along Oxford Avenue, which increases in size from 42” to 60” diameter, reaches capacity, storm water flows north through the street to Node 112979 which is a low point at Carroll Avenue. The storm sewer continues north to Concordia Avenue and heads east to Chatsworth Street. At this location, the storm sewer converges with the Chatsworth Street system prior to connecting into the Chatsworth Shaft. The combination of this convergence and the presence of a tailwater condition at the Chatsworth Shaft cause flooding along Oxford Avenue. Flooding at these nodes reaches over 2 feet during the 100-year storm event at which point it begins to threaten homes adjacent to Oxford Avenue. The Oxford Community Center park provides some flood storage for this area. However, it may be insufficient to eliminate the risks of flooding.

Nodes 112600 and 621899 are located along a 36” storm sewer system under Milton Street between Summit Avenue and Laurel Avenue. Tailwater conditions created by limitations in pipe capacity along the Milton Street storm sewer system downstream contribute to flooding in this location, which reaches over 3 feet during the 100-year storm event. Structures adjacent to this location which may be at risk of being impacted by this flooding include the William Michael College of Law, St. Clement’s Episcopal Church, and multiple homes along Milton Street.

Downtown Shaft Subwatershed
The model shows no surcharging over 0.5 feet during the 5-year storm event.

Edmund Shaft Subwatershed
The 60” storm sewer along Edmund Avenue merges with a 36” pipe from the north and a 24” pipe from the south at the intersection of Edmund Avenue and Victoria Street. These pipes combine flows which drain to the east via a 66” storm sewer pipe. This merge appears to reduce flow in the 60” pipe and generates backward flow during large storms which appears to contribute to flooding upstream of this intersection. Another factor contributing to flooding upstream of this intersection may be the tailwater condition in the Edmund Shaft which connects to the St. Albans storm tunnel. The upstream nodes that are affected by these conditions represent low points along the storm sewer system which lie at lower elevations than the surface of this intersection and the Edmund Shaft.

Node 115514 is a low point in an alley west of Syndicate Street between Lafond Avenue and Thomas Avenue. The 15” diameter storm sewer conveying drainage from this location connects to the upstream end of the Syndicate Street storm sewer system. The emergency overflow elevation for this low point is nearly 2 feet above the top of casting elevation of the node. Backflow in the Syndicate Street storm sewer is shown to occur in the model during storm events larger than and including the 5 year storm. Homes and garage structures are at risk to flooding in this location as a result.

Node 116024 is a low point at the intersection of Thomas Avenue and Chatsworth Avenue. The top of casting elevation of this node is nearly 7 feet below the top of casting elevation at the Edmund Avenue/Victoria Street storm sewer merge. Negative flow through the 30” diameter storm sewer which conveys drainage southward to the Edmund

Avenue storm sewer system contributes to flooding in this location which has the potential to reach nearly 4 feet in depth during the 100 year storm event and flood many homes adjacent to this intersection.

Node 145537 is a low point in the alley northwest of Node 116024 described previously. Flooding in this area coincides with flooding at Node 116024 since they are very close in proximity and hydraulically connected by storm sewer and street flow routes.

Node 115705 is located at the intersection of Thomas Avenue and Oxford Avenue. Negative flows during storm events larger than and including the 5 year storm contribute to flooding in this location. Surcharged storm water is conveyed along Thomas Avenue eastward to Node 116024 described previously. Homes and other buildings adjacent to this intersection may be at risk of being flooded.

Nodes 621859, 165596, and 143877 are low points in different alleys whose top of casting elevations lie between 3 and 8 feet below the surface elevation of the Edmund Avenue/Victoria Street storm sewer merge, which is located downstream to the east. This merge is likely a contributor of flooding in these locations all of which receive negative flows during large storm events. Building structures adjacent to these alleys may be at risk as a result of flooding.

Fisk Shaft Subwatershed Flooding
The model shows no surcharging over 0.5 feet during the 5-year storm event.

Fuller Shaft Subwatershed Flooding
The model shows no surcharging over 0.5 feet during the 5-year storm event.

Mackubin Shaft Subwatershed Flooding
Node 116127 is located in the alley north of Pierce Butler Route between Avon Street and Grotto Street. This location is a low point south of a large industrial operation which receives drainage from nearly 15 acres of land along the south side of the BNSF Railroad and from a storm water runoff collection point on the south side of the Calvary Cemetery. The 24” diameter storm sewer in this location connects to the 60” trunk storm sewer along Pierce Butler Route. High flows from this 60” pipe generates backflow in the 24” pipe which contributes to flooding in this location.

Nodes 116112 and 145608 are low points in alleys located south of Pierce Butler Route between Avon Street and Grotto Street. These locations receive backflow from the 60” trunk storm sewer mentioned previously at their connections along Grotto Street. Flooding in both locations reaches over 2 feet in depth during the 100 year storm event. At this elevation, there are many structures which are at risk of being flooded, including some homes.

Node 116061 is located at the intersection of Englewood Avenue and Avon Street and represents the upstream end of a 24” storm sewer pipe which connects to the 60” trunks storm sewer along Pierce Butler Route. High flows within this 60” trunk line generate backflow in the 24” pipe preventing storm water from draining away from this location at times and contributing to flooding. Surcharged storm water from this location is discharged to the east along Englewood Avenue towards Grotto Street.

Node 116078 is located at the intersection of Minnehaha Avenue and St. Albans Street on the south side of the West Minnehaha Recreation Center. This location is a low point in the road with an emergency overflow elevation located at least 2 feet above the top of casting elevation of this junction. The connecting storm sewer in this location is the 78" trunk storm sewer line flowing north to south from a junction in the West Minnehaha Recreation Center athletic fields where the 60" Pierce Butler Route storm sewer and the 66" Dale Street storm sewer merge together. High flows from these two storms contribute to this flooding in this location and in the West Minnehaha Recreation Center athletic fields to the north of this location.

Node 115865 is located at the intersection of Van Buren Avenue and Mackubin Street. The model simulates a high tailwater condition within the Western storm tunnel which may contribute to flooding in this location. Surcharged storm water from this location heads north to Minnehaha Avenue where it discharges out of the system to the north.

Node 117159 is located along Blair Avenue between Mackubin Street and Arundel Street. The tailwater condition in the Mackubin Shaft contributes to flooding in this location and generates some backflow through the Blair Avenue storm sewer.

MHD Tunnel Subwatershed Flooding

Node 622245 is a low point along Irvine Avenue. Two 15" storm sewer pipes merge into a single 15" pipe at this location. As a result of this merge, storm water surcharges the system and flows to the adjacent parallel storm sewer.

Node 622293 is located at the intersection of Grand Avenue and Pleasant Avenue. A 21" storm sewer and a 30" storm sewer pipe converge at this location and connect to the I-35E system via a 36" storm sewer pipe. The storm sewer upstream of the 30" pipe running under Ramsey Street is 36" in diameter. The decrease in pipe diameter along this system decreases its capacity by nearly half. As a result, storm water surcharges and flows through the street.

Rice Shaft Subwatershed Flooding

Node 115323 is located a block north of University Avenue at the intersection of Galtier Street and Sherburne Avenue. This location is a low point in the street which experiences flooding up to nearly 2 feet during the 100 years storm event. Nodes 115316 and 114971 are located at the intersection of University Avenue and Marion Street. Storm sewer conveys runoff from this location east to Marion Street and connects to the 48" storm sewer system which continues southward. Prior to connecting to a combined sewer line which lies beneath the Sears property, this 48" storm sewer reduces to 36" inches in diameter near Fuller Avenue. This reduction in inlet capacity contributes to flooding in these locations.

Node 194-103 and 115175 are located east of the intersection of Marion Street and eastbound I-94. Storm sewer runs west to east under I-94 and connects to the St. Peter –

Rondo Storm Tunnel near John Ireland Blvd. Flooding occurs at these locations due to limitations in the capacity of this system and due to contributions of significant flows from the John Ireland Blvd system. Storm water surcharges the John Ireland system due to a decrease in pipe size and inlet capacity. water flows to Node I94-103 and 115175 via the eastbound I-94 off ramp.

Nodes 115100, 115101, 115351, 115352 are located at the intersection of St. Anthony Avenue and Rice Street. This location is a low point in the street. A 42" diameter storm sewer pipe and a 48" diameter storm sewer pipe merge at this location into a single 42" diameter pipe. This pipe connects to the St. Peter – Rondo Storm Tunnel. These systems represent the Sears property and Rice Street storm sewer systems. This decrease in pipe size causes flooding. Surcharge storm water pools in the road at this location and then flows through the street westward to the St. Anthony Avenue system.

Virginia Shaft Subwatershed Flooding

Node 116993 is located along the 36" Como Avenue storm sewer between Marion Street and Galtier Street adjacent to the Scheffer Playground in North Frogtown. This stretch of Como Avenue and the Scheffer Playground are a low point. This area has a surface elevation nearly 10 feet below the surface of the Virginia Street Shaft. A tailwater condition exists at the Virginia Shaft which contributes to flooding in this area. In addition, this location receives a large amount of surcharged storm water from surrounding nodes.

Node 117057 is located at the intersection of Van Buren Avenue and Farington Street and is adjacent to the Como Avenue low point described previously. A 30" storm sewer pipe carries drainage to the west along Van Buren Avenue. The ground surface at this node lies slightly below the Como Avenue low point and is influenced by the same tailwater condition. Floodwaters in this location reach over 2 feet in depth, at which point adjacent homes are at high risk of being impacted.

Western Shaft Subwatershed Flooding

Node 114245 is at a low point along Arundel Street between Dayton Avenue and Selby Avenue. This low area is nearly 4 feet below the lowest adjacent intersection to the east, making it susceptible to the tailwater conditions of the downstream storm sewer. Flooding resulting from the 100-year storm may reach over 1 foot in depth and has the potential to impact multiple homes adjacent to Arundel Street.

Node 115237 is located near the intersection of Western Avenue and Concordia Avenue. The storm sewer along Western Avenue decreases in diameter from 42" to 30". This decrease in capacity causes storm water to surcharge the system and flow through the street in this location.

Wilder Shaft Subwatershed Flooding

Nodes 115621 and 115807 are located along Dunlap Street between Hubbard Avenue and Seminary Avenue. A 54" diameter storm sewer line flows between these nodes from north to south beneath Dunlap Street. This portion of Dunlap receives a considerable amount of street overflow volume from the west during large storm events. In addition, street overflow entering the storm sewer downstream of Node 115807 at the intersection of Dunlap Street and Englwood Avenue appears to generate backflow in the 54" storm sewer along Dunlap Street contributing to flooding at both nodes. Surcharged storm water from Node 115807 flows through the street to the east towards Lexington Avenue contributing to flooding in the Central Lutheran School play field depression.

Nodes 620460 and 115809 are located east of the Central Lutheran School play field depression at the intersection of southbound Lexington Avenue and Seminary Avenue. This location receives large volumes of surcharges storm water from Seminary Avenue to the east. The storm sewer which flows south along Lexington in this location backs up and flows in reverse direction contributing to flooding at this node. Surcharged storm water from this node also flows to the Central Lutheran School play field depression.

I94/I35E Subwatershed Flooding
The model shows no surcharging over 0.5 feet during the 5-year storm event.

4.2 Water Quality Analysis (P8)

The St. Anthony Hill subwatershed is limited with respect the number of storm water management BMPs available to treat storm water runoff prior to discharge to the Mississippi River. There are no regional BMPs within this subwatershed that provide substantial removal of pollutants through the system.

The model has been constructed to calculate the total pollutant loads within each of the 13 major storm sewer systems within the St. Anthony subwatershed. The results of the water quality modeling in P8 within the study area provide average annual pollutant loads over a 20 year period (1968 – 1988) and are shown below in **Table 6** and in **Appendix G**:

Table 6: Average Annual Pollutant Loading (1969-1988)

Subwatershed Name	Tributary Area (ac)	Runoff (ac-ft)	TSS (lbs)	TP (lbs)
Arundel	125	112.2	86,486	132.4
Chatsworth	459	401.8	312,420	477.1
Downtown	32	54.2	37,319	59.0
Edmund	255	184.7	150,841	227.3
Fisk	179	144.1	113,899	173.2
Fuller	85	74.9	58,270	89.0
I94/I35E	40	46.9	34,098	53.1
MHD Tunnel	170	139.0	109,328	166.4
Mackubin	443	325.3	262,198	396.4
Rice	290	323.5	238,299	369.4
Virginia	146	145.3	109,613	168.8
Western	147	141.2	107,150	164.7
Wilder	312	217.5	178,525	268.7
TOTAL	**2,683**	**2,310.6**	**1,798,446**	**2,745.5**

5.0 CONCLUSIONS/RECOMMENDATIONS

As the City moves forward with efforts to improve water quality within the St. Anthony Hill Subwatershed, the results of this analysis may be used as a tool for measuring success. The data presented in this report serves as a starting point. Upon considering the long term feasibility of implementing City and regulatory goals for volume reduction and storm water treatment BMPs throughout the study area, the City may utilize the models developed in this study to quantify the environmental impact that may be expected as a result.

5.1 Model Limitations

Some caution must be taken when analyzing the results presented in the XP-SWMM and P8 models, as the accuracy of the models is somewhat limited based on the assumptions made. A discussion of these limitations follows:

1. The XP-SWMM model developed for this analysis does not take into account catch basin inlet capacity. As a result, the model may under estimate the amount of storm water flow through the street in some cases where catch basin inlet capacity or clogging is an issue.

2. Storm water flows simulated in XP-SWMM as overflow through the street does not account for flow resulting from direct rainfall and subcatchment surface run-on. Only storm water that surcharges the subsurface systems or is received by a connecting street or channel is simulated to flow through these conduits. However, these flows are anticipated to be negligible in most cases.

3. Storm sewer base flows resulting from ground water inflow and other sources are not simulated in the XP-SWMM model. However, these flows are anticipated to be negligible during design storm events.

4. Generalized assumptions were made in the XP-SWMM model for parameters such as times of concentration, curve numbers, head losses, and roughness coefficients to streamline the modeling effort as described previously. It is expected that these assumed parameters may not be appropriate for every subwatershed feature. However, significant time and effort may be invested in the future to fine tune these parameters if desired. This can be done in areas of concern or where modeled results do not match observed conditions.

5.2 Future Calibration

At this time no substantial “real world” data is available for this subwatershed to evaluate the accuracy of the model. To further refine the XP-SWMM and P8 models, additional empirical measurements may be conducted in the future. Continuous monitoring of storm sewer flow and rainfall will provide a comparison for calibrating the model. Such a comparison will provide an indication whether the assumptions made as part of this analysis need to be modified so that the models simulate actual conditions more accurately.

5.3 Recommendations

The following recommendations may be implemented using the information provided by this report:

1. Prioritize major storm sewer systems for flow monitoring, calibration, and verification of input parameters.

2. Prioritize areas for implementing storm water treatment devices.

3. Evaluate potential flooding areas identified by the model and develop a strategy for addressing flooding risk through volume reduction or storm sewer modifications.

4. Model and analyze other major subwatersheds within the City and continue to identify potential concern areas which may be addressed by future capital improvement projects.

RIVERVIEW SUBWATERSHED

STORM WATER MODELING REPORT

CITY OF ST. PAUL, MINNESOTA

DECEMBER 2010

Prepared by:

WSB & Associates, Inc.
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55416

CERTIFICATION

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly licensed professional engineer under the laws of the State of Minnesota.

Todd E. Hubmer, PE

Date: Lic. No. 24043

Quality Control Review Completed By:

Rich Hibbard, EIT

Date: Cert. No. 131812

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1.0 INTRODUCTION/BACKGROUND

The Riverview subwatershed consists of approximately 3,326 acres within the Lower Mississippi River Watershed Management Organization. It represents the City's west side and includes drainage areas from adjacent communities to the south, including Mendota Heights, West St. Paul, and South St. Paul. The land use is characterized primarily by dense urban land uses, including residential, industrial, commercial, highway, and airport.

Storm water runoff is directed to storm sewer inlets via curb and gutter and flows though a network of storm sewer systems. Eight major systems carry storm water through this subwatershed, and each discharges into the Mississippi River which flows west to east along the north edge of the subwatershed. These storm sewer systems have been identified by the street parallel to their outfall or by their location of discharge for the purposes of this report. These are listed below and shown on **Figure 1**:

- Baker
- Chester
- Custer
- Harriet Island
- Holman Field Airport
- Holman Field Wetland
- Riverview District
- To South St. Paul

The topography of this subwatershed changes in elevation by nearly 300 feet. The elevation drops drastically along the middle of the subwatershed, which is characterized by steep bluffs. The topography of the low areas at the bottom of the bluffs tends to be much more flat than that of the areas above the bluffs. Historically located within floodplain, improvements have been constructed over the years to protect these low areas from flooding by the Mississippi River. These areas consist primarily of commercial and industrial land use. The U.S. Army Corps of Engineers has constructed a system of levees, gatewells, and pump stations along the river to hold back flood waters and provide adequate drainage to the area during large storm events.

A large wetland complex is located within the Riverview subwatershed south of the St. Paul Downtown (Holman Field) Airport. This wetland receives drainage from TH-52, the airport, and a mix of residential, industrial and commercial land uses.

A significant flood relief project was undertaken by the City in 2005 along Concord Street which discharges to the Holman Field wetland. This system consists of a 48" RCP storm sewer and is intended to receive stormwater runoff that surcharges the Riverview District tunnel system along State Street. This improvement is simulated in the XP-SWMM model developed as part of this analysis.

The Holman Field Airport is also included in this model. However, since the City does not own or operate the storm sewer within this area and the airport has developed an independent hydrologic model, the detail included in the model developed for this report includes only surface runoff results. Pipe networks and ponding systems within the airport were not included in the model. As a result, discharge rates for the airport are expected to be lower than those presented in this report as a result of ponding and pipe restrictions.

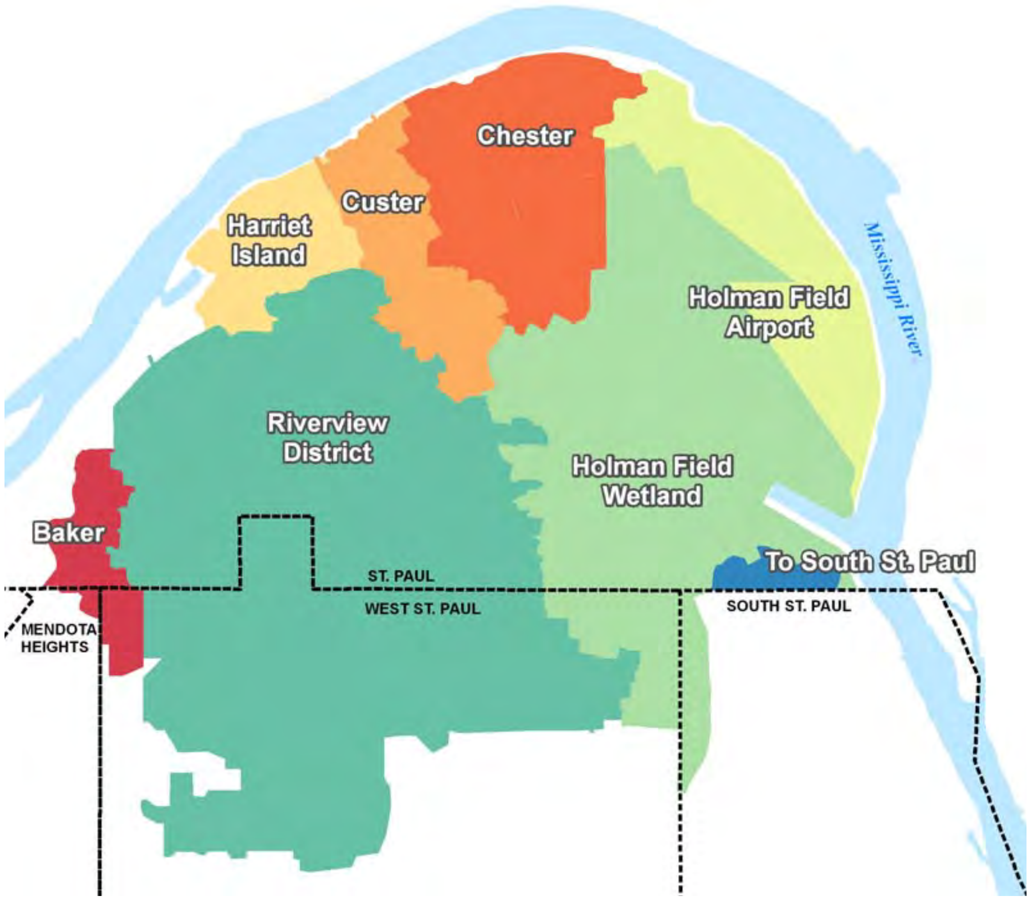


Figure 1 - Major Storm Sewer Systems of Riverview Subwatershed

2.0 PURPOSE/GOALS

As part of a City-wide effort to reduce and treat storm water discharges to the Mississippi River, the City of St. Paul is developing an inventory of storm water models for key areas throughout the City. As redevelopment of land and improvements to public streets and utilities occur in the future, City Staff will utilize these models to plan improvements to the existing storm water system by identifying the following:

- under capacity storm sewer features
- existing flooding locations and sources
- opportunity locations for storm water treatment BMPs
- quantity of storm water volume reduced by new BMPs
- increase of storm water quality by new BMPs

Residential Street Vitality Program (RSVP) projects are scheduled to be constructed in this subwatershed over the coming years. This modeling analysis will provide the City with a tool for coordinating correction of drainage issues with these projects.

The models created as part of this effort are intended to be “Living” constructs of the City’s storm water system. It is anticipated that these models will be modified as needed over the years by City Staff to improve their usefulness, reliability, and relevance as new construction or reconstruction of storm water features occurs and additional storm water monitoring data provides new insight into the behavior of the system allowing for additional calibration of the models.

P8 (Program for Predicting Polluting Particle Passage thru Pits, Ponds, and Puddles) and XP-SWMM (Stormwater Wastewater Management Model by XP Software, Inc.) software were utilized for this project. These programs are capable of simulating continuous rainfall events to estimate water quantity and quality.

The P8 program utilizes measured rainfall and pollutant particle data to estimate pollutant loads over defined drainage areas and removal efficiencies of in place ponds and other BMPs.

XP-SWMM simulates storm water flow through complex networks of storm sewer piping, natural channels and street overflow routes. Storage of storm water in the modeled system allows this program to help identify locations in the system where flooding is anticipated to occur.

3.0 PROCEDURES AND METHODS

This section outlines the procedures and methods used to develop the XP-SWMM and P8 models for the Riverview Subwatershed. The following data sources were utilized to construct the models described in this report:

- City strip maps and asbuilt records
- Sewer Utility Data Service (SUDS) sewer connection records
- City GIS shapefile data
- MnDOT maps and asbuilt records
- St. Paul District – Corps of Engineers asbuilt records
- Capitol Region Water Quality Monitoring Reports (2005 – 2009)

3.1 Hydraulic Analysis (XP-SWMM)

XP-SWMM version 12.0 was used to build the storm water model as part of this analysis. XP-SWMM software utilizes simultaneous routing to calculate hydraulic conditions for the whole model during each time increment. This allows the model to account for system interactions such as tail water conditions and surcharging. The following describes the procedures used to develop the model in XP-SWMM:

Storm Water Routing

Each element was given a unique identification number that correspond to its location. **Figures 2-9** show the layout of the subwatershed delineations and the subwatershed IDs which are each represented by a node in the model. Subwatershed IDs correspond to node ID numbers utilized in the City's CAD inventory of the storm sewer system. Link numbers included in the model (not shown on the figures) also correspond to the City's existing naming convention.

In general, nodes were placed at street intersections to account for locations where storm sewers typically converge and where there is higher likelihood of flooding issues. Additional nodes were placed between intersections when significant changes in pipe slope are present in the existing storm sewer. Links connect each node in the model based on asbuilt information.

Subwatersheds tributary to each node in the model were delineated in GIS using 1 foot contour and storm sewer shapefile data in ArcGIS.

Overland (Street) Flow Routes

To maintain the total storm water runoff volume within the model, the hydraulics layer model input included a dual system of pipe flow and overland flow routes within the subwatershed in the event that the storm sewer system capacity was exceeded. In most cases surcharged storm water will flow through the street. The section geometry of these street flow routes was simulated by applying the following dimensions to street widths of 30, 40, and 50 feet in the model:

- 2% crown slope
- 6-inch curb height
- 5% boulevard slope

Design Storms
Global storm events were modeled for this analysis. These storms included the 1-inch, 2-inch, 2-year, 5-year, 10-year, and 100-year SCS Type II 24-hour storm events. The following table illustrates the rainfall depths modeled for each of the design storms:

Table 1: Global Storm Events

Storm Event	Annual Return Frequency	Rainfall Depth (in.)
2-year	50%	2.8
5-year	20%	3.6
10-year	10%	4.2
100-year	1%	5.9

These values correspond with those published by the U.S. Department of Agriculture Soil Conservation Service for the Minneapolis/St. Paul metro area.

Impervious Surface Coverage
An inventory of impervious surfaces was conducted throughout the study area using GIS. 2006 high resolution aerial photography and available planemetric data were used to measure indirectly connected impervious and directly connected impervious surfaces.

Directly Connected Impervious: Any hard surface from which runoff is conveyed with little or no opportunity for reduction due to infiltration or other losses before being routed to downstream collection and conveyance systems.

Indirectly Connected Impervious: Any hard surface as defined above from which runoff passes over pervious surfaces being subjected to infiltration losses prior to discharging to the storm water conveyance system.

Streets, parking lots, driveways, and large buildings were identified as directly connected impervious. Residential buildings and other impervious surfaces surrounded by pervious surfaces were identified as indirectly connected.

Time of Concentration
Since most drainage areas in the model are very similar in impervious makeup and size, times of concentrations were generalized as follows:

- Tc of 15 minutes was applied to subcatchments representing indirectly connected impervious and pervious area.
- Directly connected impervious area subcatchments utilized a Tc of 7 minutes which is generally accepted as the minimum Tc by Mn/DOT.

Times of concentration were calculated independently for larger subcatchment areas that are not typical such as parks and airports. This was done by summing the travel time of sheet flow (up to 150 feet), shallow concentrated, and concentrated flows from the most hydraulically distant point in the subwatershed to the node.

Soils
Current Ramsey County Soil Survey data was analyzed in ArcView to determine infiltrating characteristics of individual subwatersheds. Based on this analysis all underlying soils were assumed to have infiltration properties of hydrologic soil group B, with the exception of the wetland areas.

Composite Curve Numbers
A distinction between directly connecting and indirectly connected impervious runoff was simulated by using two subcatchments for each node in the model. Subcatchment 1 included the total pervious area and indirectly connected impervious area as a percentage of the total. This subcatchment represented a composite of the pervious and indirectly connected impervious areas. Subcatchment 2 included the directly connected impervious as the total area being 100% impervious. This approach was used to more accurately simulate runoff from streets and other directly connected surfaces during rain events less than 2.0 inches.

Energy Losses
Entrance and exit losses for all pipe conduits models were standardized with a coefficient of 0.2, which is typical for concrete pipes with groove ends projecting from fill. These coefficients affect pipe flow under outlet control. Inlet control conditions were simulated in the model as well, assuming the same inlet edge. These factors were not applied to storm tunnel conduits, since they are assumed to be continuous and are designed to minimize such losses.

3.2 Water Quality Analysis (P8)

The P8 urban water quality model predicts the generation and transportation of storm water runoff pollutants within the City. This model can estimate pollutant loadings, concentrations, and removal efficiencies for basins subject to single or continuous rainfall events. The model is capable of simulating the performance of a variety of treatment devices including swales, buffer strips, detention ponds, flow splitters, infiltration basins, and other user-defined devices.

For the purposes of this analysis, base flow conditions were not simulated in the model. Only pollutant loads resulting from rainfall events were computed.

Watershed Characterization
To simulate water quantity in the model, the characterization of the contributing subwatersheds was developed using the same hydrologic properties incorporated into the XP-SWMM analysis. Indirectly connected and directly connected impervious areas were included for each subwatershed based on the same inputs used in the XP-SWMM analysis. For the purposes of this analysis, street sweeping was ignored. A curve number of 69 was used for pervious areas.

Depression storage for residential subwatersheds was set to be 0.026 inches and the impervious runoff coefficient used was 0.783 which are the values recommended by P8 for Medium Density Residential land use with alleys.

Rainfall and Temperature Data

Rainfall and temperature data files used in the model were developed from continuous measurements collected at the Minneapolis/St. Paul Airport between the years 1969 and 1988.

Pollutant Characterization

The pollutant loading in storm water runoff is determined by the specific distribution of pollutant particle size in P8. The NURP50 particle distribution was used to estimate pollutant loads in the model. This distribution is based primarily on the findings of the Nationwide Urban Runoff Program.

Table 2: NURP50 Particle Distribution

Particle Class	TSS (mg/kg)	TP (mg/kg)
Dissolved	0	99,000
10th Percentile	1,000,000	3,850
30th Percentile	1,000,000	3,850
50th Percentile	1,000,000	3,850
80th Percentile	1,000,000	0

Calibration

Storm water monitoring data collected by the Capitol Region Watershed District from 2005 to 2009 in the East Kittsondale and Phalen Creek subwatersheds was used to calibrate the model. It was assumed that pollutant loading from the Riverview subwatershed would be similar to these subwatersheds, because they have similar composition of land use and impervious surface.

Since the sizes of the subwatersheds and the time periods during which monitoring was conducted in the subwatersheds from year to year are different, the assumption that pollutant loads are directly proportional to runoff volume was made to provide a basis for comparing the results of the model to the monitoring data. Pollutant loads were divided by runoff volume to calculate the unit loading for each subwatershed and time period. The average unit loads for all five years of the two subwatersheds were compared to average unit loads from the model to evaluate whether the model results were reasonable.

The results of the initial run of the model using the NURP50 particle distribution, revealed unit loads for TSS and TP to be low with respect to the unit loads of the monitoring data. Scale factors were applied to the model's particle distribution file to adjust the results to be within the range of values for the two monitored subwatersheds. The particle composition file as shown above was scaled up by factors of 2.5 and 1.2 for TSS and TP respectively.

The overall Riverview subwatershed pollutant loads were anticipated to be lower than the pollutant loads of the monitored subwatersheds because of the treatment that much of it receives by the Holman Field wetland complex and the large amount of open space within the airport. The Custer and Riverview District subwatersheds are included in this comparison, because they do not receive any treatment and have similar impervious percentages to the monitored subwatersheds. **Table 3** below summarizes the comparison calculations which resulted from this calibration exercise. **Appendix G** provides a complete table of data used to develop this comparison.

Table 3: Annual Average Unit Pollutant Load Comparison Summary (2005-2009)

Subwatershed Name	Tributary Area (ac)	Impervious Percentage	Flow Yield (cf/ac/in)	TSS Yield-Volume (lbs/af)	TP Yield-Volume (lbs/af)
East Kittsondale	1,116	46%	1,204	693.5	1.194
Phalen Creek	1,443	50%	877	944.4	1.305
Custer	330	60%	1,833	805.8	1.216
Riverview District	1,447	42%	1,305	800.2	1.212
Riverview (Overall)	3,326	45%	1,143	682.3	1.087

4.0 RESULTS/OBSERVATIONS

This section provides a discussion for the results of the XP-SWMM and P8 model simulations. The hydraulic analysis addresses significant flooding areas and the water quality analysis predicts the average annual pollutant loads and the performance of existing treatment infrastructure.

4.1 Hydraulic Analysis (XP-SWMM)

Tables 4 and **5** provide the total storm water runoff volumes and maximum discharge rates from each storm sewer system based on the results of the XP-SWMM model:

Table 4: Total Runoff Volume (cu-ft)

Subwatershed	1-inch storm event	2-inch storm event	2-year storm event	5-year storm event	10-year storm event	100-year storm event
Baker	58,796	210,536	377,042	567,102	720,206	1,185,583
Chester	564,746	1,384,044	2,132,466	2,931,064	3,553,157	5,387,114
Custer	241,448	631,631	1,006,145	1,414,009	1,735,145	2,691,511
Harriet Island	151,954	416,999	680,520	971,628	1,202,557	1,895,219
Holmen Field Wetland	751,538	2,456,558	4,229,633	6,212,476	7,792,833	12,547,813
Holmen Field Airport	131,418	548,171	1,021,852	1,568,394	2,010,838	3,361,297
Riverview District	1,1173,978	3,890,103	6,745,076	9,950,025	12,508,940	20,218,205
To South St. Paul	16,464	66,253	121,312	184,278	235,064	389,713
TOTAL	**13,090,342**	**9,604,295**	**16,314,046**	**23,798,976**	**29,758,740**	**47,676,455**

Table 5: Peak Discharge Rate at Outfall(s) (cfs)

Subwatershed	2-year storm event	5-year storm event	10-year storm event	100-year storm event
Baker	35	35	35	35
Chester	623	760	899	1,035
Custer	237	350	420	495
Harriet Island	178	245	297	379
Holmen Field Wetland	153	287	417	858
Riverview District	1,207	1,254	1,270	1,287

Flooding was evaluated as part of this analysis. Flooding occurring as a result of limited catch basin inlet capacity has been evaluated separately from flooding occurring as a result of limited storm sewer pipe capacity. The tables in **Appendix D** list the results of the catch basin analysis. This analysis assumes a constant rate of discharge per catch basin within each subwatershed. Runoff rates that exceeded the calculated combined catch basin inlet capacity are highlighted in red.

To determine which areas may flood due to pipe restrictions, the depth of water above the manhole rim (surcharge depth) was calculated in the model. These results were tabulated and are found in **Appendix B**. Surcharging simulated in the model accounts for flooding resulting from limitations in pipe capacity only as opposed to catch basin grate clogging, insufficient number of grates, etc. A discussion of storm sewer surcharging is provided below according to major storm sewer systems. The 5-year storm event is the City's standard event for designing storm sewer. For this reason, nodes which experience surcharging of 0.5 feet deep or higher during the 5-year storm event are discussed in detail below and shown in **Figures 2** thru **9** in **Appendix A**.

Baker System Flooding

Nodes 108839, 108838, 108840, and109037 represent a series of manhole structures at the top of the bluff at the intersection of Baker Street and Chippewa Avenue. The storm sewer transitions from a 27" diameter pipe to a 16" pipe with a slope over 50%. Insufficient inlet capacity at the 16" causes water to pool in the street during large storm events and spill over the curb and down the bluff.

Chester System Flooding

Node 122578 and 110505 represent low points along Eaton Street near its intersection with State Street. Since these areas are sags in the road, surcharged water must pool in the road until it gets high enough to spill over the high point and continue on to the nearest inlet downstream. Surcharging may be caused by a limitation in the capacity of the downstream 24" RCP storm as it continues north of Eaton Street under State Street. Discharging to this pipe are both a 12 inch and a 24 inch pipe.

Node 123082 represents a catch basin and private connection between the Atlas Cold Storage/Summit Foods building off of Chester Street and the Riverview levee along Airport Road. The surface elevation at this location is the lowest point along this segment of storm sewer until it reaches Alabama Street, nearly 3,000 feet downstream. As a result, a back flow condition exists in this pipe during the 5-, 10-, and 100-year storm events. It is unknown whether a backflow preventer exists as part of this system.

Custer System Flooding

Node 110394 is a manhole in the park on the west side of the Torre De San Miguel Homes. Slope of the storm sewer changes from about 23% to about 1%. This causes water to surcharge the structure.

Node 110458 is a storm sewer junction along Congress Street between Wabasha Street and Concord Street. Flooding is caused by high surcharge flows coming from the Wabasha Street system.

Harriet Island System Flooding

The model shows no surcharging over 0.5 feet during the 5-year storm event.

Holman Field Airport System Flooding

The model does not contain sufficient detail to analyze flooding for this subwatershed.

Holman Field Wetland System Flooding

The model simulates storm water surcharging the Riverview District storm tunnel at the intersection of Stevens Street and State Street (Node 161066) and entering the Holman Field Wetland System. Storm water flows via overland street flow on State Street to Concord Avenue at a rate of about 130 cfs during the 10-year storm event and nearly 800 cfs during the 100-year storm event.

Improvements constructed in 2005 along Concord Street include a separate 48” RCP storm sewer which receives much of this overflow. Multiple grate catchment structures which span the width of the street capture the surcharged storm water. The capacity of this system is approximately 300 cfs. As result, during the 100-year storm event, the remaining surcharged storm water is routed southeast along Concord Street and Northeast along State Street. The model simulates some storage of these flows under the assumption that it is able to flow into the El Rio Vista Recreation Center athletic fields. However, the majority of these surcharged flows are eventually routed to the low point at the intersection of Bancroft Avenue and Robie Street (Node 122449). Flooding at this low location does not occur until the 10-year storm event. Flooding depths reach about 1 foot and 4 feet during the 10-year and 100-year storm events respectively. During the 100-year storm event, multiple houses are at risk to significant flooding.

Node 122296 is located at the top of the bluff at the intersection of Page Street and Andrew Street. This node receives surcharge flows from the storm sewer at the intersection of Andrew Street and Sidney Street. As a result, water pools in the street during large storm events and spills over the curb and down the bluff.

Insufficient pipe capacity causes surcharging along the northbound TH-52 off-ramp at nodes 122402 and 122400. Nodes 122399 and CSWRS-6 are located at the intersection of Concord Street and the northbound TH-52 off-ramp. During the 5-year storm event surcharged storm water from TH-52 flows north along the northbound off-ramp over a relatively steep slope. Once it reaches Concord Street, the flow rate through the street remains relatively the same. However, the depth of flow is deeper since the slope decreases considerably. The overflow is conveyed via overland street flow on Concord Street to Kansas Avenue where additional capacity in two parallel storm sewer systems reduces the depth.

Node 122253 is a catch basin manhole along TH-52 at the Belvidere Street overpass. This structure is located at the bottom of a steep hill. The storm sewer transitions from a steep slope to a much more gradual slope. As a result, surcharging occurs. The flooding depths simulated by the model at this node are artificially high, because this node is simulated to be sealed. The resulting high water elevations reflect the head pressure.

Riverview District System Flooding

Flooding at nodes 109067, 109149, 109140, 166753, 109158, 109162, 109219, 161049, 109195, 109273, 190200, 109223, 109151, and 108766 is caused by insufficient pipe capacity in the trunk storm sewer system which flows northward along Dodd Road and Stryker Avenue. This system connects to the Riverview District storm tunnel at the intersection of Stevens Street and Hall Avenue. The model does not suggest a tailwater condition from the storm tunnel. The trunk storm sewer along Stryker Avenue consists of a 66” RCP pipe and a 72” equivalent horizontal elliptical pipe. Two lateral connections contribute flow to this system without an increase in pipe size. These include 48” RCP and 21” RCP storm sewer pipes. High surcharge flows are propagated along Stryker Avenue to as far as Robie Street during large storm events.

Node 106560 represents a storm sewer junction along Bidwell Street between Winona Street and Annapolis Street. The storm sewer downsizes from a 60” to a 48” diameter pipe at this location. As a result, storm water surcharges this node and flows northward along Bidwell Street.

Nodes 109206 and 109207 represent storm sewer junctions along the Bidwell Street system between Sydney Street and Belvedere Street. The storm sewer depth drops from about 25 feet to about 13 feet in this location. As a result, the upstream hydraulic gradeline causes storm water to surcharge the system here.

Node 109640 represents a junction in the Riverview District storm tunnel at Water Street. This node is located at the bottom of the bluff. The depth of the tunnel changes from about 160 feet to about 15 feet in this location. As a result, the upstream hydraulic gradeline causes storm water to surcharge the system here.

Nodes 106644, 106670, 106660, 106669, 109511, 109501, 109382, 109381, 109591, 109589, 109586, 109581, 109582, 109584, and 109547 represent storm sewer junctions along Robert Street and State Street. Flooding originates at the intersection of Annapolis Street and Livingston Avenue where three storm sewer pipes converge. One of these pipes is a 30” pipe which receives drainage from West St. Paul. Insufficient pipe capacity in the Livingston Avenue storm sewer causes over 100 cfs to flow through the street eastward to the Robert Street storm sewer during the 5-year storm event. This flow is propagated along Robert Street and State Street because the storm sewer systems function at capacity during the 5-year storm event. This flooding may be addressed by increasing the capacity of the Livingston Avenue storm sewer.

Nodes 110477 and 110475 represent junctions along the Wabasha Street storm sewer system. The storm sewer decreases in diameter from 27” to 18”, then increases to 24” between George Street and Congress Street. This does not provide sufficient increases in the capacity of the system to accommodate additional flows being received along Wabasha Street. In addition, the system receives significant surcharge flows from the Hall Avenue storm sewer to the west.

4.2 Water Quality Analysis (P8)

The Riverview subwatershed is limited with respect the number of storm water management BMPs available to treat storm water runoff prior to discharge to the Mississippi River. There are no BMPs within this subwatershed that provide substantial removal of pollutants through the system aside from a few wet and dry detention ponds within the airport.

The model has been constructed to calculate the total pollutant loads within each of the 8 major storm sewer systems within the Riverview subwatershed. The results of the water quality modeling in P8 within the study area provide average annual pollutant loads over a 20 year period (1968 – 1988). These results are shown below in **Tables 6** and **7** and in **Appendix G**:

Table 6: Average Annual Pollutant Loading (1969-1988)

Subwatershed Name	Tributary Area (ac)	Runoff (ac-ft/yr)	TSS (lbs/yr)	TP (lbs/yr)

Baker	91	55.7	47,139	70.4
Chester	330	434.5	320,864	497.1
Custer	176	192.7	146,432	225.0
Harriet Island	130	127.2	98,471	150.5
Holman Field Airport	262	147.3	130,466	192.6
Holman Field Wetland	860	561.6	468,269	701.9
Riverview District	1,447	1,470.7	1,127,901	1731.4
To South St. Paul	30	32.4	25,310	38.7
TOTAL	**3,326**	**3,022.1**	**1,976,138**	**3,237.9**

Table 7: Average Annual Device Removals (1969-1988)

Device Name	Subwatershed Name	Discharges To	Tributary Area (ac)	TSS (lbs/yr)	TP (lbs/yr)
HF1	Holman Field Wetland	HF2	385.6	251,872	243.2
HF8	Holman Field Wetland	HF2	83.2	52,778	54.4
HF11	Holman Field Wetland	HF2	96.2	22,739	15.9
HF2	Holman Field Wetland	Mississippi R.	139.8	36,500	30.5
Overall HF	**Holman Field Wetland**	**Mississippi R.**	**139.8**	**363,889**	**344.0**
Mud Lake	Riverview District	Mississippi R.	34.2	13,194	13.4
Lily Lake	Riverview District	Mississippi R.	22.3	11,630	12.3

*These values may be subtracted from the corresponding subwatershed loads in Table 6 to calculate annual average output to the Mississippi River.

5.0 CONCLUSIONS/RECOMMENDATIONS

As the City moves forward with efforts to improve water quality within the Riverview Subwatershed, the results of this analysis may be used as a tool for measuring success. The data presented in this report serves as a starting point. Upon considering the long term feasibility of implementing City and regulatory goals for volume reduction and storm water treatment BMPs throughout the study area, the City may utilize the models developed in this study to quantify the environmental impact that may be expected as a result.

5.1 Model Limitations

Some caution must be taken when analyzing the results presented in the XP-SWMM and P8 models, as the accuracy of the models is somewhat limited based on the assumptions made. A discussion of these limitations follows:

1. The XP-SWMM model developed for this analysis does not take into account catch basin inlet capacity. As a result, the model may under estimate the amount of storm water flow through the street in some cases where catch basin inlet capacity or clogging is an issue.

2. Storm water flows simulated in XP-SWMM as overflow through the street does not account for flow resulting from direct rainfall and subcatchment surface run-on. Only storm water that surcharges the subsurface systems or is received by a connecting street or channel is simulated to flow through these conduits. However, these flows are anticipated to be negligible in most cases.

3. Storm sewer base flows resulting from ground water inflow and other sources are not simulated in the XP-SWMM model. However, these flows are anticipated to be negligible during design storm events.

4. Generalized assumptions were made in the XP-SWMM model for parameters such as times of concentration, curve numbers, head losses, and roughness coefficients to streamline the modeling effort as described previously. It is expected that these assumed parameters may not be appropriate for every subwatershed feature. However, significant time and effort may be invested in the future to fine tune these parameters if desired. This can be done in areas of concern or where modeled results do not match observed conditions.

5.2 Future Calibration

At this time no substantial “real world” data is available for this subwatershed to evaluate the accuracy of the model. To further refine the XP-SWMM and P8 models, additional empirical measurements may be conducted in the future. Continuous monitoring of storm sewer flow and rainfall will provide a comparison for calibrating the model. Such a comparison will provide an indication whether the assumptions made as part of this analysis need to be modified so that the models simulate actual conditions more accurately.

5.3 Recommendations

The following recommendations may be implemented using the information provided by this report:

1. Prioritize major storm sewer systems for flow monitoring, calibration, and verification of input parameters.

2. Prioritize areas for implementing storm water treatment devices.

3. Evaluate potential flooding areas identified by the model and develop a strategy for addressing flooding risk through volume reduction or storm sewer modifications.

4. Model and analyze other major subwatersheds within the City and continue to identify potential concern areas which may be addressed by future capital improvement projects.

Pollutant Loading Comparison
Mississippi River Boulevard Subwatershed P8 Analysis
City of St. Paul, MN

East Kittsondale: 1,116 acres - Highly Residential 46% Impervious (CRWD MONITORING RESULTS)

Year	Time Period	Rainfall** (in.)	Discharge (cf)	Flow Yield (cf/ac/in)	TSS (lbs)	TSS Yield-Volume (lbs/af)	TP (lbs)	TP Yield-Volume (lbs/af)
2005	4/28 - 11/15	30.19	21,125,831	627	228,519	471.2	373	0.769
2006	4/11 - 11/7	19.77	25,397,422	1,151	421,821	723.5	861	1.477
2007	4/19 - 11/13	24.93	45,045,199	1,619	1,134,452	1,097.0	1,236	1.195
2008	4/8 - 11/12	17.66	24,635,756	1,250	447,299	790.9	898	1.588
2009	3/30 - 12/22	20.05	30,705,350	1,372	271,189	384.7	662	0.939
Arithmetic Mean				**1,203.9**		**693.5**		**1.194**
Standard Deviation				366.9		282.0		0.347

Phalen Creek: 1,443 acres - Industrial, Commercial, Residential Mix - 50% Impervious (CRWD MONITORING RESULTS)

Year	Time Period	Rainfall** (in.)	Discharge (cf)	Flow Yield (cf/ac/in)	TSS (lbs)	TSS Yield-Volume (lbs/af)	TP (lbs)	TP Yield-Volume (lbs/af)
2005	5/4 - 11/18	30.49	28,075,754	638	937,202	1,454.1	993	1.541
2006	4/27 - 11/7	19.35	14,451,216	518	409,501	1,234.4	518	1.561
2007	7/11 - 11/21	18.75	25,260,005	934	415,784	717.0	536	0.924
2008	4/18 - 11/14	16.64	29,007,153	1,208	375,408	563.7	796	1.195
2009	4/23 - 12/11	19.19	30,113,506	1,087	520,356	752.7	902	1.305
Arithmetic Mean				**877.0**		**944.4**		**1.305**
Standard Deviation				293.0		379.9		0.264

Mississippi River Boulevard: 2,206 - Residential and Institutional - 45% Impervious (P8 MODEL RESULTS)

Year	Time Period	Rainfall** (in.)	Discharge (cf)	Flow Yield (cf/ac/in)	TSS (lbs)	TSS Yield-Volume (lbs/af)	TP (lbs)	TP Yield-Volume (lbs/af)
2005	5/1 - 11/30	25.55	45,071,532	800	736,554	711.9	1,151	1.112
2006	5/1 - 11/30	17.69	30,818,700	790	500,816	707.9	784	1.108
2007	5/1 - 11/30	26.39	56,793,528	976	1,269,694	973.8	1,829	1.403
2008	5/1 - 11/30	15.53	22,372,416	653	465,430	906.2	682	1.328
2009	5/1 - 11/30	18.40	31,537,440	777	500,076	690.7	788	1.089
Arithmetic Mean				**799.0**		**798.1**		**1.208**
Standard Deviation				115.2		132.0		0.146

**Rainfall Data Source: Minneapolis/St. Paul Airport

Pollutant Loading Comparison
St. Anthony Hill Subwatershed P8 Analysis
City of St. Paul, MN

East Kittsondale: 1,116 acres - Highly Residential 46% Impervious (CRWD MONITORING RESULTS)

Year	Time Period	Rainfall** (in.)	Discharge (cf)	Flow Yield (cf/ac/in)	TSS (lbs)	TSS Yield-Volume (lbs/af)	TP (lbs)	TP Yield-Volume (lbs/af)
2005	4/28 - 11/15	30.19	21,125,831	627	228,519	471.2	373	0.769
2006	4/11 - 11/7	19.77	25,397,422	1,151	421,821	723.5	861	1.477
2007	4/19 - 11/13	24.93	45,045,199	1,619	1,134,452	1,097.0	1,236	1.195
2008	4/8 - 11/12	17.66	24,635,756	1,250	447,299	790.9	898	1.588
2009	3/30 - 12/22	20.05	30,705,350	1,372	271,189	384.7	662	0.939
Arithmetic Mean				**1,203.9**		**693.5**		**1.194**
Standard Deviation				366.9		282.0		0.347

Phalen Creek: 1,443 acres - Industrial, Commercial, Residential Mix - 50% Impervious (CRWD MONITORING RESULTS)

Year	Time Period	Rainfall** (in.)	Discharge (cf)	Flow Yield (cf/ac/in)	TSS (lbs)	TSS Yield-Volume (lbs/af)	TP (lbs)	TP Yield-Volume (lbs/af)
2005	5/4 - 11/18	30.49	28,075,754	638	937,202	1,454.1	993	1.541
2006	4/27 - 11/7	19.35	14,451,216	518	409,501	1,234.4	518	1.561
2007	7/11 - 11/21	18.75	25,260,005	934	415,784	717.0	536	0.924
2008	4/18 - 11/14	16.64	29,007,153	1,208	375,408	563.7	796	1.195
2009	4/23 - 12/11	19.19	30,113,506	1,087	520,356	752.7	902	1.305
Arithmetic Mean				**877.0**		**944.4**		**1.305**
Standard Deviation				293.0		379.9		0.264

St. Anthony Hill: 2,683 - Industrial, Commercial, Residential Mix - 50% Impervious (P8 MODEL RESULTS)

Year	Time Period	Rainfall** (in.)	Discharge (cf)	Flow Yield (cf/ac/in)	TSS (lbs)	TSS Yield-Volume (lbs/af)	TP (lbs)	TP Yield-Volume (lbs/af)
2005	5/1 - 11/30	25.55	73,703,520	1,075	1,207,981	713.9	1,886	1.115
2006	5/1 - 11/30	15.92	45,568,116	1,067	827,193	790.7	1,255	1.200
2007	5/1 - 11/30	26.39	88,605,396	1,251	1,801,893	885.8	2,655	1.305
2008	5/1 - 11/30	15.53	39,600,396	950	839,145	923.1	1,224	1.346
2009	5/1 - 11/30	18.4	52,921,044	1,072	869,731	715.9	1,357	1.117
Arithmetic Mean				**1,083.2**		**805.9**		**1.216**
Standard Deviation				107.7		96.1		0.107

**Rainfall Data Source: Minneapolis/St. Paul Airport

Pollutant Loading Comparison
Riverview Subwatershed P8 Analysis
City of St. Paul, MN

East Kittsondale: 1,116 acres - Highly Residential 46% Impervious (CRWD MONITORING RESULTS)

Year	Time Period	Rainfall** (in.)	Discharge (cf)	Flow Yield (cf/ac/in)	TSS (lbs)	TSS Yield-Volume (lbs/af)	TP (lbs)	TP Yield-Volume (lbs/af)
2005	4/28 - 11/15	30.19	21,125,831	627	228,519	471.2	373	0.769
2006	4/11 - 11/7	19.77	25,397,422	1,151	421,821	723.5	861	1.477
2007	4/19 - 11/13	24.93	45,045,199	1,619	1,134,452	1,097.0	1,236	1.195
2008	4/8 - 11/12	17.66	24,635,756	1,250	447,299	790.9	898	1.588
2009	3/30 - 12/22	20.05	30,705,350	1,372	271,189	384.7	662	0.939
Arithmetic Mean				**1,203.9**		**693.5**		**1.194**
Standard Deviation				366.9		282.0		0.347

Phalen Creek: 1,443 acres - Industrial, Commercial, Residential Mix - 50% Impervious (CRWD MONITORING RESULTS)

Year	Time Period	Rainfall** (in.)	Discharge (cf)	Flow Yield (cf/ac/in)	TSS (lbs)	TSS Yield-Volume (lbs/af)	TP (lbs)	TP Yield-Volume (lbs/af)
2005	5/4 - 11/18	30.49	28,075,754	638	937,202	1,454.1	993	1.541
2006	4/27 - 11/7	19.35	14,451,216	518	409,501	1,234.4	518	1.561
2007	7/11 - 11/21	18.75	25,260,005	934	415,784	717.0	536	0.924
2008	4/18 - 11/14	16.64	29,007,153	1,208	375,408	563.7	796	1.195
2009	4/23 - 12/11	19.19	30,113,506	1,087	520,356	752.7	902	1.305
Arithmetic Mean				**877.0**		**944.4**		**1.305**
Standard Deviation				293.0		379.9		0.264

Chester Subwatershed: 330 - Industrial, Commercial - 60% Impervious (P8 MODEL RESULTS)

Year	Time Period	Rainfall** (in.)	Discharge (cf)	Flow Yield (cf/ac/in)	TSS (lbs)	TSS Yield-Volume (lbs/af)	TP (lbs)	TP Yield-Volume (lbs/af)
2005	5/1 - 11/30	25.55	15,677,244	1,859	264,154	734.0	409	1.137
2006	5/1 - 11/30	17.69	9,787,932	1,677	187,151	832.9	280	1.246
2007	5/1 - 11/30	26.39	17,323,812	1,989	299,500	753.1	461	1.158
2008	5/1 - 11/30	15.53	9,125,820	1,781	197,560	943.0	287	1.368
2009	5/1 - 11/30	18.4	11,295,108	1,860	198,610	765.9	304	1.172
Arithmetic Mean				**1,833.2**		**805.8**		**1.216**
Standard Deviation				115.1		85.3		0.095

Riverview District Subwatershed: 1,447 - Highly Residential - 42% Impervious (P8 MODEL RESULTS)

Year	Time Period	Rainfall** (in.)	Discharge (cf)	Flow Yield (cf/ac/in)	TSS (lbs)	TSS Yield-Volume (lbs/af)	TP (lbs)	TP Yield-Volume (lbs/af)
2005	5/1 - 11/30	25.55	48,909,168	1,323	810,340	721.7	1,263	1.125
2006	5/1 - 11/30	17.69	30,326,472	1,185	556,117	798.8	842	1.210
2007	5/1 - 11/30	26.39	57,094,092	1,495	1,121,032	855.3	1,668	1.273
2008	5/1 - 11/30	15.53	27,015,912	1,202	561,134	904.8	824	1.329
2009	5/1 - 11/30	18.4	35,244,396	1,324	582,928	720.5	909	1.123
Arithmetic Mean				**1,305.8**		**800.2**		**1.212**
Standard Deviation				124.3		81.4		0.091

Overall Riverview Subwatershed: 3,326 - Airport, Highway, Industrial, Commercial, Residential Mix - 45% Impervious (P8 MODEL RESULTS)

Year	Time Period	Rainfall** (in.)	Discharge (cf)	Flow Yield (cf/ac/in)	TSS (lbs)	TSS Yield-Volume (lbs/af)	TP (lbs)	TP Yield-Volume (lbs/af)
2005	5/1 - 11/30	25.55	98,149,392	1,155	1,385,229	614.8	2,278	1.011
2006	5/1 - 11/30	17.69	60,792,336	1,033	950,088	680.8	1,512	1.083
2007	5/1 - 11/30	26.39	116,566,560	1,328	1,926,032	719.7	3,043	1.137
2008	5/1 - 11/30	15.53	53,901,144	1,044	964,898	779.8	1,475	1.192
2009	5/1 - 11/30	18.4	70,562,844	1,153	998,804	616.6	1,638	1.011
Arithmetic Mean				**1,142.6**		**682.3**		**1.087**
Standard Deviation				118.8		70.3		0.079

**Rainfall Data Source: Minneapolis/St. Paul Airport

Cooperative Approach

NPDES Permit MN0061263 identifies a "revised stormwater monitoring and analysis program" as a submittal to supplement the City of Saint Paul's Stormwater Management Program (SWMP). The SWMP identifies tasks and timelines for planned activities over a 5-year period which satisfies Permit requirements. Similarly, the stormwater monitoring and analysis program described below identifies tasks and timelines for planned activities over the Permit period, consistent with the framework implementing the SWMP.

The City's stormwater monitoring and analysis program will utilize a cooperative approach. To the extent feasible, the City will develop, and as necessary continue to develop, and implement a cooperative monitoring, analysis and reporting effort with partners.

Program Activities

The City is required to "make reasonable efforts to standardized methods for monitoring protocols and load calculation methodologies among cooperating agencies." The Permit emphasizes load calculations and includes five purposes for data collection and analysis as part of the Annual Report (V.C.7.c.1). Thus the first year of the program includes an approach to critically examine data analysis methods.

As stated in V.C.7.c.2.iv, loading calculations for seven parameters are required for the continuous monitoring stations. The City must choose five sites that employ data loggers to record continuous flows (per V.C.7.e.1). For those five sites, in addition to the seven parameters used for loading calculations, a broader range of parameters also must be sampled in the field.

Monitoring and Analysis Loading Calculation Parameters for Annual Report:

Total phosphorus	Total suspended solids (TSS)
Total Kjeldahl nitrogen	Volatile suspended solids (VSS)
Nitrate + nitrite nitrogen	Inorganic suspended solids (ISS)
Chloride	*Note: ISS= TSS – VSS*

Activities planned for calendar year 2012 are below. Although listed sequentially, these activities will be implemented concurrently through the year.

- Develop written guidance for selection of five prioritized sites (V.C.7.e) and other sites to comprise a minimum of ten (V.C.7.d)
    - Identify pitfalls and issues with large outfall monitoring; limitations with respect to seasonality (winter)
    - Recommendations for monitoring and prioritization. Address TMDL considerations.

- Discuss/set cooperative monitoring program for implementation in 2013
    - Establish suitable co-monitoring approach based on recommended monitoring site locations and available resources
        - Contact/coordinate with partners identified in V.C.7.a
        - Convene meetings as necessary during 2012
        - Address site locations, program gaps, overlaps, and QAPP considerations
    - Develop Memorandum of Agreement for data sharing, cost sharing or other arrangements
    - Operating cost budgeting for 2013
- Ascertain relative robustness of data analysis methods.
    - Perform FLUX (or similar) analysis on historic data (2005-2010) for major river outfalls
        - Flow, Loads, FWMC (TP, TSS at minimum), runoff coefficient, etc.
        - Define error or Coefficient of Variability (COV)
        - Determine Relative Percent Difference (RPD) with previously published analyses
    - Perform data analysis for 2011
        - Include in annual report due June 2012 (covering CY 2011, so blend of permit implementation.)

Activities planned for calendar year 2013

- Begin cooperative monitoring program;
- Perform data analysis for 2012
    - Include in annual report due June 2012 (covering CY 2012, so new permit)
    - Would not reflect City's monitoring program per se

On-Going Implementation

CY Activity

2014 – Continue cooperative monitoring program; 2013 data analysis due June 2014

2015 – Continue cooperative monitoring program; 2014 data analysis due June 2015

2016 – Continue cooperative monitoring program; 2015 data analysis due June 2016

Outfall Inventory

Outfall	Location	Watershed	Pipe Size	Acres
	Bridal Veil Creek			
005	South of Buford	Bridal Veil	42"	
	Mississippi River			
010	Eustis	St. Anthony Park	tunnel	2467
020	Lotus	Miss. River Blvd.	tunnel	31
030	Marshall	Miss. River Blvd.	tunnel	121
040	West Kittsondale	West Kittsondale	tunnel	977
050	Otis	Miss. River Blvd.	tunnel	14
060	Portland Ave	Miss. River Blvd.	tunnel	508
070	Summit	Miss. River Blvd.	16" cast iron	30
080	Goodrich	Miss. River Blvd.	tunnel	456
090	Princeton	Miss. River Blvd.	tunnel	150
095	Berkeley	Miss. River Blvd.	24"	
100	Jefferson	Miss. River Blvd.	tunnel	139
110	Randolph	Miss. River Blvd.	tunnel	39
115	Hartford	Miss. River Blvd.	tunnel	580
120	Scheffer	Miss. River Blvd.	tunnel	8
130	Highland Parkway	Miss. River Blvd.	tunnel	165
135	Hidden Falls	Hidden Falls	48"	269
140	Sheridan	Davern	tunnel	145
145	West 7th	Davern	30"	30
150	Davern	Davern	tunnel	963
151	Watergate Marina	Crosby	21"	

Outfall Inventory

Outfall	Location	Watershed	Pipe Size	Acres
156	Elway	Crosby	60"	
158	Elway	Crosby	90"	820
160	Otto	E. Kittsondale	tunnel	177
170	Bay	E. Kittsondale	tunnel	1699
180	Sumac	West 7th	tunnel	8
190	Drake	West 7th	tunnel	158
195	Fountain Cave	West 7th	42"	39
200	Richmond	West 7th	20"	142
201	Richmond	West 7th	42"	
206	Western	West 7th	30"	98
210	Smith -1992	Good/West	tunnel	424
220	Sherman	Downtown	48"	41
230	Chestnut	Downtown	27"	82
240	Eagle	Downtown	3'x5' brick	77
~~250~~	~~Ontario~~ abandoned	~~Downtown~~	~~24"~~	
260	Market	Downtown	24"	
270	St. Peter	St. Anthony Hill	tunnel	2653
280	Cedar	Downtown	tunnel	
290	Minnesota	Downtown	tunnel	115
295	Robert	Downtown	tunnel	5
300	Jackson	Downtown	36"	27
310	Sibley	Downtown	48"	10
~~315~~	~~Wacouta~~	~~Downtown~~	~~12"~~	~~10~~

Outfall Inventory

Outfall	Location	Watershed	Pipe Size	Acres
320	Broadway	Downtown	7'x8' concrete	115
325	Troutbrook	Troutbrook	dual 10'	4025
330	Plum	Phalen Creek	tunnel	1406
340	Urban	Urban	48" brick	328
343	Warner and Childs	Pig's Eye	24"	
346	Warner and Childs	Pig's Eye	18"	
350	Beltline (RWMWD's)	Beltline	9'	3524
~~352~~	~~off Child's Road~~	~~Pig's Eye~~	~~12"~~	
~~354~~	~~off Child's Road~~	~~Pig's Eye~~	~~12"~~	
~~356~~	~~off Child's Road~~	~~Pig's Eye~~	~~12"~~	
360	Battle Creek	Pig's Eye	36"	
365	Wyoming	Riverview	30" culvert	8
380	Page and Barge Ch Rd	Riverview	42"	69
385	Robie and Witham	Riverview	54"	
390	Robie and Kansas	Riverview	42"	264
400	Airport	Riverview	12"	
405	Chester St	Riverview	tunnel	326
407	Eva St	Riverview	36"	
410	Custer St	Riverview	tunnel	188
420	Moses St	Riverview	5'6"	95
430	Belle	Riverview	2-36"x40"	37
440	Riverview	Riverview	2-77"x121"	801
460	Chippewa and Baker	Riverview	16"	71

Outfall Inventory

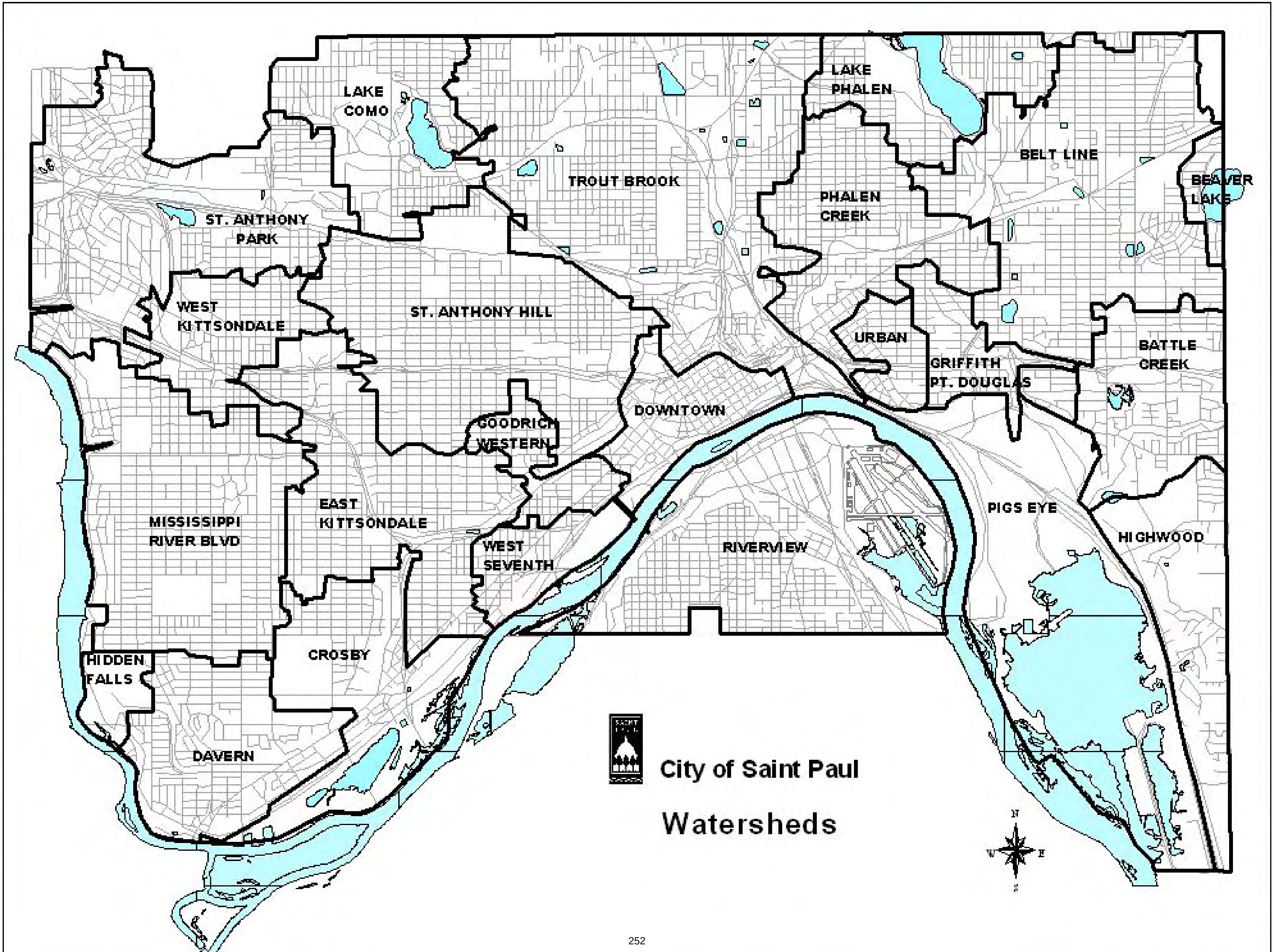
Outfall	Location	Watershed	Pipe Size	Acres
	Upper Lake			
152	Springfield	Crosby	15"	
	Crosby Lake			
153	Rankin	Crosby	27"	
154	Homer	Crosby	30"	
155	Leland	Crosby	30"	
	Fairview North Pond			
500	Tatum & Pierce Butler	St. Anthony Park	6'	
510	Pierce Butler & Aldine	St. Anthony Park	54"	
	Lake Como			
520	Arlington & Chelsea	Como	60"	310
530	Chatsworth North	Como	36"	201
540	Milton North	Como	36"	79
550	Parkview East	Como	18"	17
560	Ivy East	Como	18"	24
570	Wheelock Pkwy East	Como	24"	23
580	Rose East	Como	36"	30
590	Victoria South	Como	30"	49
600	Chatsworth South	Como	24"	75
610	Horton West	Como	15"	311
620	Park West	Como	36"	50

Outfall Inventory

Outfall	Location	Watershed	Pipe Size	Acres
	Loeb Lake			
630	Jessamine	Troutbrook	36"	
	Lake Phalen			
680	Arlington West	Phalen	72"	380
690	Blomquist South	Phalen	36"	71
700	Arlington East	Phalen	42"	209
710	between Hoyt & Neb.	Phalen	42"	69
720	Larpenteur East	Phalen	84"	17
	Beaver Lake			
726	Lacrosse	Beaver	15"	
728	Ames	Beaver	15"	
730	Rose North	Beaver	42"	67
740	McKnight North	Beaver	21"	22
	Suburban Pond			
---	Suburban & VanDyke (RWMWD's)	Battle Creek	102"	
750	Suburban & WB Ave	Battle Creek	27"	
760	Suburban & Hazel	Battle Creek	54"	
	Little Pig's Eye Lake			
770	near fish hatchery	Griffith/Pt. Douglas	72"	
	Pig's Eye Lake			
780	Burlington	Highwood	66"	
784	Winthrop @ Lower Afton	Highwood	30"	

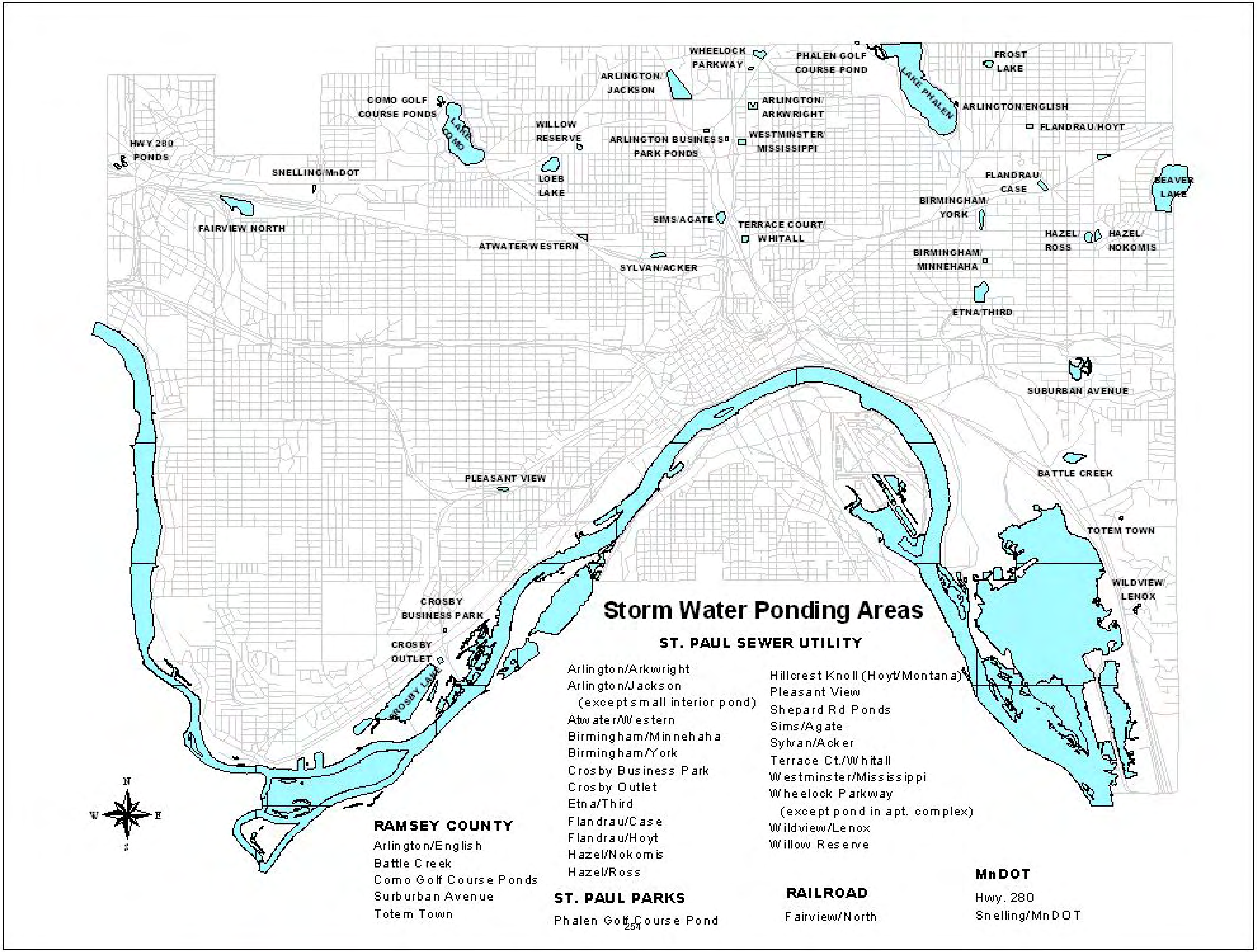
Outfall Inventory

Outfall	Location	Watershed	Pipe Size	Acres
786	Morningside @ Lower Afton	Highwood	18"	
790	Springside Drive	Highwood	33"	
791	Highwood	Highwood	48"	
	Battle Creek			
~~800~~	~~N. Park Drive & Faye~~	~~Battle Creek~~	~~33"~~	
808	Sandralee	Battle Creek	24"	
810	Ruth	Battle Creek	42"&73-1/2" arch	
812	Warren	Battle Creek	18"	
814	Cutler	Battle Creek	24"	
816	Nelson	Battle Creek	24"	
818	Winthrop & Larry Ho	Battle Creek	30"	
820	Winthrop & N. Park Dr	Battle Creek	36"	
825	Michael N	Battle Creek	33"	
826	Michael S	Battle Creek	30"	
830	McKnight & N. Park Dr	Battle Creek	36"	
836	A Street	Battle Creek	18"	


LAKE COMO
LAKE PHALEN
BELT LINE
BEAVER LAKE
TROUT BROOK
PHALEN CREEK
ST. ANTHONY PARK
WEST KITTSONDALE
ST. ANTHONY HILL
URBAN
BATTLE CREEK
GRIFFITH PT. DOUGLAS
DOWNTOWN
GOODRICH WESTERN
EAST KITTSONDALE
PIGS EYE
MISSISSIPPI RIVER BLVD
HIGHWOOD
WEST SEVENTH
RIVERVIEW
CROSBY
HIDDEN FALLS
DAVERN
City of Saint Paul
Watersheds
N
W
E
S

Watershed Inventory

Watershed	WS#	Area (acres)	Population (2000 Census)	Percent Impervious	Runoff Coefficient
Beaver Lake	1	278	2,070	31	0.33
Belt Line	2	2,882	30,994	56	0.55
Lake Phalen	3	995	7,626	41	0.42
Trout Brook	4	3,959	37,665	63	0.62
Lake Como	5	1,240	9,753	47	0.47
St. Anthony Park	6	2,467	13,140	70	0.68
Phalen Creek	7	1,406	18,418	64	0.62
St. Anthony Hill	8	2,542	36,410	66	0.64
Griffith/Pt. Douglas	9	458	5,264	63	0.61
W. Kittsondale	10	847	7,732	69	0.67
Urban	11	339	4,491	58	0.57
Battle Creek	12	1,089	8,201	54	0.54
Downtown	13	669	6,097	78	0.75
E. Kittsondale	14	1,870	18,353	64	0.62
Mississippi River Blvd.	15	2,373	27,251	59	0.58
Goodrich/Western	16	424	5,010	64	0.63
Pigs Eye	17	2,995	913	39	0.40
Riverview	18	2,658	14,860	58	0.57
Highwood	19	1,139	5,216	50	0.50
W. Seventh	20	450	2,543	61	0.60
Crosby	21	1,446	8,804	45	0.45
Davern	22	1,277	6,628	56	0.55
Hidden Falls	23	237	1,263	56	0.55
Total		34,040	278,706		



Storm Water Ponding Areas
ST. PAUL SEWER UTILITY
Arlington/Arkwright
Arlington/Jackson
(except small interior pond)
Atwater/Western
Birmingham/Minnehaha
Birmingham/York
Crosby Business Park
Crosby Outlet
Etna/Third
Flandrau/Case
Flandrau/Hoyt
Hazel/Nokomis
Hazel/Ross
Hillcrest Knoll (Hoyt/Montana)
Pleasant View
Shepard Rd Ponds
Sims/Agate
Sylvan/Acker
Terrace Ct./Whitall
Westminster/Mississippi
Wheelock Parkway
(except pond in apt. complex)
Wildview/Lenox
Willow Reserve
RAMSEY COUNTY
Arlington/English
Battle Creek
Como Golf Course Ponds
Surburban Avenue
Totem Town
ST. PAUL PARKS
Phalen Golf Course Pond
RAILROAD
Fairview/North
MnDOT
Hwy. 280
Snelling/MnDOT
WHEELOCK PARKWAY
PHALEN GOLF COURSE POND
FROST LAKE
ARLINGTON/ JACKSON
COMO GOLF COURSE PONDS
LAKE COMO
LAKE PHALEN
ARLINGTON/ ARKWRIGHT
ARLINGTON/ENGLISH
FLANDRAU/HOYT
WILLOW RESERVE
HWY 280 PONDS
ARLINGTON BUSINESS PARK PONDS
WESTMINSTER/ MISSISSIPPI
SNELLING/MnDOT
LOEB LAKE
FLANDRAU/ CASE
BEAVER LAKE
BIRMINGHAM/ YORK
FAIRVIEW NORTH
SIMS/AGATE
TERRACE COURT/ WHITALL
HAZEL/ ROSS
HAZEL/ NOKOMIS
ATWATER/WESTERN
BIRMINGHAM/ MINNEHAHA
SYLVAN/ACKER
ETNA/THIRD
SUBURBAN AVENUE
PLEASANT VIEW
BATTLE CREEK
TOTEM TOWN
WILDVIEW/ LENOX
CROSBY BUSINESS PARK
CROSBY OUTLET
CROSBY LAKE
N
E
S
W

City of Saint Paul

Storm Water Ponding Area Inventory

Ponding Area	**Drainage Area (acres)**	**Population 2000 Census**	**Pond Area (acres)**	**Storage Capacity (Acre-feet**
Arlington/Arkwright	302.3	4001	5	20.4
Arlington/Jackson	699.4	6562	14.5	75.6
Atwater/Western	127.3	1230	2.7	13.3
Birmingham/Minnehaha	41.0	457	0.9	2.5
Birmingham/York	146.5	2050	2.2	9.5
Crosby Business Park	39.6	198	1	5.52
Crosby Outlet	866.0	6295	5.5	40.6
Etna/Third	244.0	2457	4.7	25.1
Flandrau/Case	95.2	1331	0.7	3
Flandrau/Hoyt	479.5	4582	1.9	20.8
Hazel/Nokomis	73.0	511	2.3	6.3
Hazel/Ross	67.8	949	4	3.8
Pleasant View	164.5	2053	2.3	14.5
Sims/Agate	174.6	1357	5.3	12.8
Sylvan/Acker	376.9	3617	2.1	11.7
Terrace Ct./Whitall	4.7	28	0.5	0.5
Westminister/Mississippi	123.4	1912	2.2	10.1
Wheelock Parkway	19.0	265	1.3	1.7
Wildview/Lenox	19.3	111	0.73	2.2
Willow Reserve	372.1	3669	20.3	42.6
Total	4436.2	43633.6		

Drainage area only includes area in St. Paul.

Storage capacity is for a 100 year storm in acre-feet.

Storm Water Ponding Areas by Watershed Area

Beaver Lake	None
Belt Line	Birmingham/Minnehaha Birmingham/York Etna/Third Flandrau/Hoyt Flandrau/Case Hazel/Nokomis Hazel/Ross Hillcrest Knoll (Hoyt/Montana)
Lake Phalen	Arlington/English Phalen Golf Course Pond
Trout Brook	Arlington/Jackson Arlington/Arkwright Atwater/Western Sims/Agate Sylvan/Acker Terrace Ct./Whitall Westminster/Mississippi Wheelock Parkway Willow Reserve
Lake Como	Como Golf Course Ponds
St. Anthony Park	Fairvew/North Highway 280 Snelling/MnDOT
Phalen Creek	None
St. Anthony Hill	None
Griffith/ Pt. Douglas	None
W. Kittsondale	None
Urban	None
Battle Creek	Battle Creek Surburban Avenue
Downtown	None

E. Kittsondale	Pleasant View
Mississippi River Blvd.	None
Goodrich/ Western	None
Pigs Eye	None
Riverview	None
Highwood	Totem Town Wildview/Lenox
W. Seventh	None
Crosby	Crosby Business Park Crosby Outlet
Davern	None
Hidden Falls	None

NPDES/SDS PERMITTED FACILITIES IN ST PAUL (Non-storm water discharges)

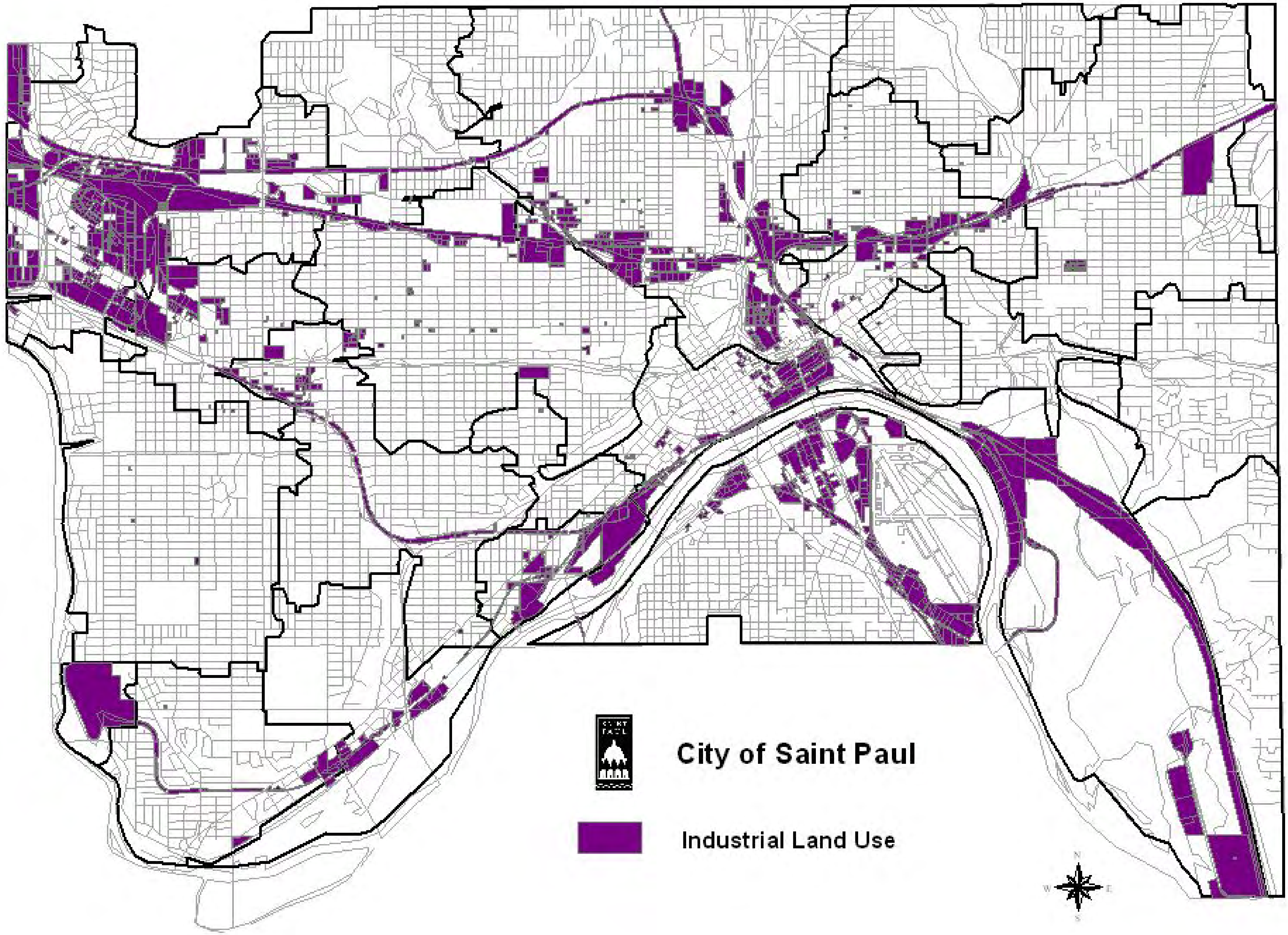
Permit #	Permittee	Facility Address	Waterbody	Use	Type of Discharge
MN0062669	Archdiocese of St. Paul/Minneapolis	226 Summit Ave. St. Paul, MN 55102	Miss R	Religious Organization	Industrial
MN0053988	Ashland Chemical Inc.	395 James Ave. St. Paul, MN 55102	Miss R	Mixed, Manufac. Liq. Gas Prod.	Industrial
MN0058246	Buckbee Mears	245 E. 6th St. St. Paul, MN 55101	Miss R	Plating and Polishing	Industrial
MN0059765	Captain Ken's Foods Inc.	344 S. Robert St. St. Paul, MN 55107	Miss R	Canned specialties	Industrial
MNG790065	Conoco Philips Petroleum Co	1817 Randolph Ave. St. Paul, MN 55105	Miss. R.	Gasoline Service Stations	Groundwater pumpout
MN0000612	Diamond Products Co.	310 E. 5th St. St. Paul, MN 55101	Miss R	Perfumes, cosmetics, toilet prep	Industrial
MN0064696	Flint Hill Resources	P.O. Box 64596 St. Paul, MN 55164	Miss. R		Industrial
MN0002178	Ford Motor Co.	966 S. Miss. River Blvd. St. Paul, MN 55116	Miss. R	Motor vehicles & car bodies	Industrial
MNG255013	Gross-Given Mfg. Co.	75 W. Plato Blvd. St. Paul, MN 55107	Miss R	Automatic merchandising machine	Noncontact cooling water
MNG250041	Mann Theatres Grandview	1830 Grand Ave. St. Paul, MN 55105	Miss R	Motion picture theater	Noncontact cooling water
MNG250040	Mann Theatres Highland	760 S. Cleveland St. Paul, MN 55116	Miss R	Motion picture theater	Noncontact cooling water

NPDES/SDS PERMITTED FACILITIES IN ST PAUL (Non-storm water discharges)

Permit #	Permittee	Facility Address	Waterbody	Use	Type of Discharge
MN0025470	Metro Council	230 E. 5th St. St. Paul, MN 55102	Miss R	H20, sew, pipe & com. & powr	Domestic
MNG790115	Metro Council Metro Transit	400 Snelling Ave. N. St. Paul, MN 55114	Miss R		Groundwater pumpout
MN0054640	Minnesota Brewing Co./ Gopher State	882 W. 7th St. St. Paul, MN 55102	Miss. R	Malt beverages	Industrial
MN0053571	NSP High Bridge	501 Shepard Rd. St. Paul, MN 55102	Miss. R	Heavy construction, nec.	Dredging
MN000084	NSP High Bridge Plant	501 Shepard Rd St. Paul, MN 55102	Miss. R	Electrical services	Industrial
MNG255066	Pearson Candy Co.	2140 W. 7th St. St. Paul, MN 55116	Miss R	Salted & roasted nuts & seeds	Noncontact cooling water
MNG990031	Peavey Red Rock Term.	1061 Red Rock Rd. St. Paul, MN 55119	Miss. R.		Dredging
MNG250100	St. Paul Pioneer Press	345 Cedar St. St. Paul, MN 55101	Miss R	Newspaper: publishing & print	Noncontact cooling water
MN0054577	St. Paul Pioneer Press	#1 Ridder Circle St. Paul, MN 55107	Miss R	Newspaper: publishing & print	Industrial
MN0054739	St. Paul Port Authority	1500 Energy Pk. Dr. St. Paul, MN 55108	Miss R	Steam & air conditioning sup	Industrial
MNG250072	St. Paul River Centre	143 W. 4th St. St. Paul, MN 55102	Miss R	Prof. Sports clubs and promoters	Noncontact cooling water

NPDES/SDS PERMITTED FACILITIES IN ST PAUL (Non-storm water discharges)

Permit #	Permittee	Facility Address	Waterbody	Use	Type of Discharge
MN0045829	St. Paul Water Utility	1900 N. Rice St. Roseville, MN 55113	Troutbrook	Water supply	Water Treatment
MN0002968	United Hospitals Inc.	333 N. Smith Ave. St. Paul, MN 55102	Miss R	Gen. medical/ surgical hospital	Industrial
MN0050580	USCOE River dredging Construction & Ops.	190 5th St. E. St. Paul, MN 55101	Miss. R	Heavy construction, nec.	River dredging
MN0066303	US Bank National Assoc.	60 Livingston St. S. St. Paul, MN 55107	Miss R		Industrial
MN0059277	Versa Companies	867 Forest St. St. Paul, MN 55106	Miss R	Gray iron foundries	Industrial
MN0048984	Waldorf Corp.	2250 Wabash Ave. St. Paul, MN 55114	Miss R	Corrugated/solid fiber boxes	Industrial
MN0062031	St. Paul Commercial- Galtier	175 E. 5th St. St. Paul, MN 55101	Miss R	Operators of apartment buildings	Industrial
MN0057606	Zeller-World Trade	30 E. 7th St. St. Paul, MN 55101	Miss R	Operators of nonresidential buildings	Industrial
MN0049816	3M St. Paul	Building 21-2W-05	Miss R	Surgical & medical instruments	Industrial
MNG255045	528 Partnership LLP	345 E. Plato Blvd. St. Paul, MN 55107	Miss. R	Commercial print, Lithographic	Noncontact cooling water


City of Saint Paul
Industrial Land Use

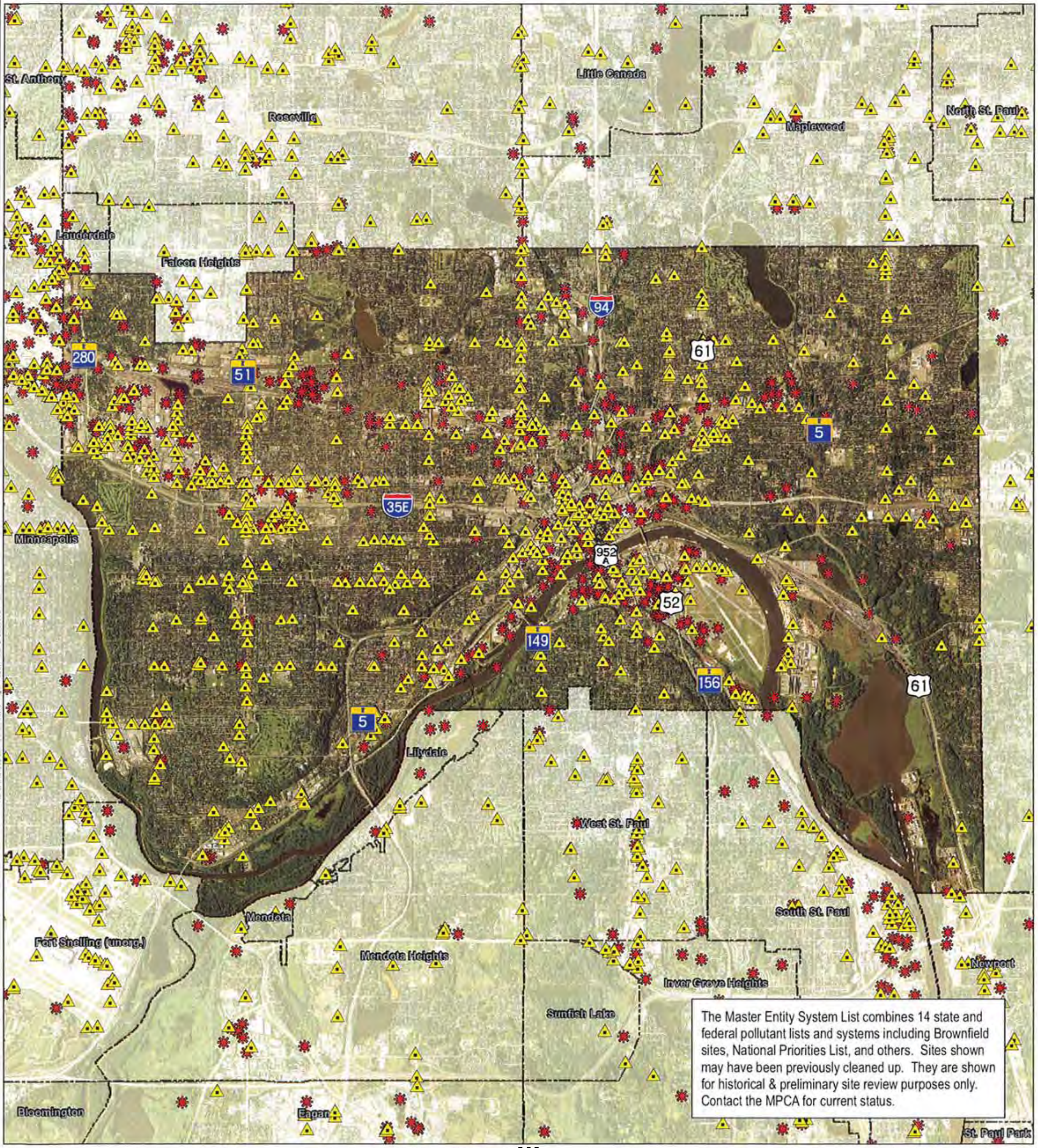
Pollutant Source Locations
Stormwater Modeling
Volume Reduction Inventory
2010 RSVP Stormwater Study
City of St. Paul, MN

Legend

- Leaking Underground Storage Tank
- Pollution Source Locations

N W E S

0 7,500 15,000 Feet



Customer-Focused Environmental & Industrial Solutions

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www.baywest.com * info@baywest.com

LIMITED STORMWATER INVESTIGATION REPORT

OF

EAST KITTSONDALE SUBWATERSHED
ST PAUL, MINNESOTA

BAY WEST PROJECT NO.J090498

September 16, 2010

Prepared by:
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Prepared for:
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1.0 INTRODUCTION

1.1 Purpose

The purpose of this limited stormwater investigation (SI) was to identify the source of an illicit discharge characterized by elevated *Escherichia coli* (*E. coli)* bacteria concentrations within the East Kittsondale Subwatershed in St. Paul, Minnesota (Study Area). The SI was completed on behalf of the City of Saint Paul (City) Sewer Division. This report documents the findings, opinions and conclusions of the investigation.

Bay West, at the request of the City of St Paul, proposed a storm drain network investigative approach involving progressive sampling at connecting points along the primary stormwater main within the Study Area to identify the source(s) of the illicit discharge.

1.2 Scope

Bay West performed the following specific activities during this limited SI:

- Prepared work-specific Health & Safety Plans;
- Conducted an historical file review and data compilation summarizing all previous sampling/rain/Study Area characteristic data to identify possible sources of *E. coli*;
- Completed a field survey prior to the field work to identify potential sewer access and safety issues at the proposed sampling points within the Study Area;
- Conducted a land use survey on the day of sampling to attempt to characterize land uses within the Study Area to document potential sources of *E. Coli* bacteria (bird nesting areas, etc);
- Collected six stormwater samples in November 2009, as part of the initial sampling event and submitted these samples to the Minnesota Department of Health (MDH) for *E. coli* bacterial analysis by Standard Method (SM) 9223, Quantitray [most probable number (MPN)]. Collected temperature, pH, dissolved oxygen, oxidation-reduction potential, conductivity, and turbidity readings at each sampling location. Emailed a summary of the findings and recommendations for additional sampling to the City on December 3, 2009;
- Collected one stormwater sample in December 2009, from the southwestern branch of the subwatershed and submitted the sample to the Metro Council wastewater laboratory for *E. coli* bacterial analysis by the same method as above. Collected field parameters for this sample as described above;
- Collected three stormwater samples from the Carroll Avenue neighborhood in February 2010 in response to a report of steam emanating from a storm catch basin. The three stormwater samples were submitted to the Metro Council wastewater laboratory for *E. coli* bacterial analysis by the same method as above;

- Walked the stormwater main and collected seven stormwater samples in May 2010. Submitted the samples to the Metro Council wastewater laboratory for *E. coli* bacterial analysis by the same method as above. Field parameters were collected at each sampling location as described above; and
- Summarized the investigation findings, conclusions, and recommendations within this report.

2.0 BACKGROUND INFORMATION

2.1 Study Area Location and Description

The East Kittsondale sub-watershed (Study Area) is one of 15 sub-watersheds within the Capital Region Watershed District (CRWD). The CRWD encompasses approximately 40 square miles and includes portions of the cities of Falcon Heights, Lauderdale, Maplewood, Roseville and St. Paul. Portions of the Study Area are located within Sections 2, 3, 4 and 10 of Township 28 North, Range 23 West and Sections 33 and 34 of Township 29 North, Range 23 West. The Study Area comprises mixed residential and commercial land use. The ground surface within the Study Area consists primarily of various impervious materials (i.e., concrete and/or asphalt) with a small number of park/playground areas and athletic fields. A Study Area Location Map and Study Area Detail Map are presented as **Figure 1** and **Figure 2**, respectively.

2.2 Study Area Ownership

The stormwater system was constructed and is maintained by the City of St Paul Public Works Department, Sewer Utility Division.

2.3 Potential and Known Contaminant Source Areas/Previous Investigations

This summary of previous investigations and contamination within the Study Area was compiled based on information from the following sources:

- CRWD Citizen Advisory Committee meeting minutes May 2009;
- Email from Bruce Elder, Sewer Utility Manager with the City, dated October 8, 2009, summarizing stormwater sampling data for the locations within the Study Area between March and July 2009; and
- CRWD report entitled *East Kittsondale Stormwater Quality Update* dated April 2, 2010, provided to Bay West on April 28, 2010,

According to these sources, the CRWD had reported illicit discharges of *E. coli* bacteria within the Study Area. In 2008, the majority of stormwater samples collected by CRWD personnel from sampling locations within the CRWD during storm events exceeded the Minnesota Department of Health (MDH) surface water maximum standard (standard) for *E. coli* bacteria [1,260 colony forming units (cfu) per 100 milliliters (ml)] with many concentrations one order of magnitude higher. During dry weather conditions, however, the baseline stormwater samples collected from the sub-watersheds within the CRWD except for the East Kittsondale sub-watershed reported *E. coli* concentrations below the standard. The *E. coli* concentrations reported at East Kittsondale during base flow conditions exceeded the standard. Samples collected from within the East Kittsondale sub-watershed during the fall dry-weather season reported *E. coli* concentrations two orders of magnitude higher than the standard. Based on the 2008 results, the CRWD recommended the development and implementation of an illicit discharge detection and elimination (IDDE) program for the East Kittsondale sub-watershed to evaluate the source(s) of the high *E. coli* bacteria concentrations.

Between March and December 2009, 34 of the 36 samples collected by CRWD personnel reported *E. coli* concentrations exceeding the standard. The sampling results are summarized in **Table 1** below. CRWD attempted to categorize the discharge as sanitary wastewater, wash water, natural water, and/or irrigation water; however, while wash water was identified as the most likely source, this could not be verified.

During CRWD's December 22, 2009 dry weather sampling event, CRWD staff noted an increase in water flow and level within the Study Area, and that the water color had changed to black. The water samples collected yielded *E. coli* concentrations exceeding 150,000 cfu/100ml. CRWD personnel also reported that since spring 2008, white fungal masses were observed attached to the bottom of the storm sewer within the Study Area.

For 2009, *E. Coli* bacteria were detected at concentrations exceeding the standard for all but two events as summarized in **Table 1** below. It should be noted that there are two predominant methods that can be used to quantify *E. coli* concentrations. MPN values are estimates (statistical in nature) where the number of organisms is expected to be high, while plate counts are direct counts of living organisms expressed in colony-forming units per milliliter (CFU/mL). Numbers of organisms in the original sample are determined by the use of standard MPN tables.

Table 1 – Historical *E. coli* Analytical Results

Date	Storm/Base Event	*E.Coli* (MPN/100ml)	MDH Surface Water Max. Std. (CFU/100ml)
3/30/2009	Base Grab	**32,700**	1,260
3/31/2009	Base Grab	**7,400**	1,260
4/7/2009	Base Grab	**9,700**	1,260
4/23/2009	Base Grab	**8,500**	1,260
5/11/2009	Base Grab	**4,100**	1,260
5/28/2009	Base Grab	**10,700**	1,260
6/3/2009	Base Grab	**6,200**	1,260
6/11/2009	Base Composite	**148,300**	1,260
6/16/2009	Base Grab	**6,300**	1,260
7/1/2009	Base Composite	**20,100**	1,260
7/13/2009	Base Grab	**2,000**	1,260
7/16/2009	Base Composite	**39,100**	1,260
7/21/2009	Storm Composite	**10,900**	1,260
7/22/2009	Base Grab	**30,500**	1,260
7/28/2009	Base Composite	**1,733**	1,260
8/04/2009	Base Grab	**7,500**	1,260
8/12/2009	Base Grab	**6,300**	1,260
8/18/2009	Base Grab	**6,300**	1,260
8/19/2009	Storm Composite	**24,300**	1,260
8/20/2009	Storm Composite	**86,500**	1,260
8/27/2009	Base Grab	**20,300**	1,260
8/27/2009	Base Composite	**20,300**	1,260

Date	Storm/Base Event	*E.Coli* (MPN/100ml)	MDH Surface Water Max. Std. (CFU/100ml)
9/03/2009	Base Grab	76	1,260
9/09/2009	Base Grab	**12,100**	1,260
9/16/2009	Base Grab	**25,900**	1,260
9/23/2009	Base Grab	62	1,260
9/25/2009	Storm Composite	**14,500**	1,260
9/29/2009	Base Grab	**121,100**	1,260
10/01/2009	Storm Composite	**18,700**	1,260
10/01/2009	Storm Composite	**7,400**	1,260
10/19/2009	Base Grab	**19,500**	1,260
10/28/2009	Base Grab	**18,700**	1,260
10/02/2009	Base Grab	**12,100**	1,260
11/10/2009	Base Grab	**172,300**	1,260
12/22/2009	IDDE Grab	**307,600**	1,260
12/22/2009	Base Grab	**166,400**	1,260

Notes:
MPN = Most Probable Number
ml = milliliter
MDH = Minnesota Department of Health
CFU = colony forming unit
Bold = concentration exceeds the MDH Surface Water Maximum Standard

2.4 Geologic and Hydrogeologic Setting

Based on the storm sewer drawings provided to Bay West by the City, the East Kittsondale subwatershed is drained by a primary stormwater pipe approximately five feet to nine feet in diameter, with the pipe diameter increasing in the direction of the flow from north to south. Based on the United States Geological Survey (USGS) *St. Paul West, Minnesota* topographic map, the elevation of the Study Area ranges between 913 and 926 feet above mean sea level (amsl). The Site and surrounding area exhibit generally level topography with a gradual downward slope to the south towards the Mississippi River.

3.0 STORMWATER INVESTIGATION

The stormwater sampling was conducted in general accordance with U.S. Environmental Protection Agency (EPA) National Pollution Discharge Elimination System (NPDES) Stormwater Sampling Guidance Document (1992) http://www.epa.gov/npdes/pubs/owm0093.pdf.

3.1 Sampling Events and Results

Between November 2009 and May 2010, Bay West conducted four sampling events as summarized below to identify the source of the illicit discharge. All four sampling events were completed following a 72-hour dry period (i.e. period without a storm event). For the purpose of this limited SI and in accordance with EPA guidance, a storm event is described as an event producing 0.1 inch or more of precipitation (rain).

Bay West identified 15 initial sampling locations (SS-1 through SS-15) based on a desktop review of available sewer maps and verbal discussions between Bay West and the City. Five of the 15 proposed sampling points were located within secondary stormwater branches for rapid source determination, while the ten remaining proposed sampling points were placed along the main sewer at various locations, including the outfalls of secondary stormwater branches, in an attempt to narrow-down possible source(s) of the illicit discharge. As outlined below, not all sampling locations were accessible. Photos of a number of the sampling locations are provided in **Appendix 1**. Copies of the field sampling sheets are presented in **Appendix 2**.

The stormwater samples collected were analyzed for *E. coli* bacteria using SM 9223 by Quantitray (MPN) by either the MDH laboratory or the Metropolitan Council wastewater laboratory. A summary of the groundwater analytical results is presented in **Table 2 below**. Copies of the laboratory analytical reports are presented in **Appendix 3**.

3.1.1 November 2009 Sampling

On November 16, 2009 following a 72-hour dry weather period, Bay West collected six stormwater samples (SS-1, SS-2, SS-3, SS-4, SS-5 and SS-7). Sample locations are identified on **Figure 3A**.

While conducting a pre-sampling reconnaissance survey of the proposed sampling points, Bay West observed that many of the proposed sampling locations (SS-6A, SS-6B, SS-10 through SS-14) were inaccessible or unsafe due to heavy traffic. Two of the proposed sampling locations (SS-7 and SS-8) could not be found during the field reconnaissance; therefore, Bay West collected one alternate stormwater sample, identified as SS-7A, from the secondary stormwater pipe at the intersection of North Griggs Street and Portland Avenue. Two samples (SS-1 and SS-4) were collected under Bay West's confined space entry permit. The remaining samples were collected from the surface using a telescoping sampling pole. Five of the six samples collected (SS-1 through SS-4 and SS-7) were analyzed for field parameters, including dissolved oxygen (DO), temperature, pH, conductivity (ORP), and turbidity (NTU), prior to being submitted to the MDH analytical laboratory. Sample SS-

5 was not analyzed for these parameters due to inadequate water flow at the sampling location, even after the placement of a temporary sandbag dam in an attempt to increase the water level.

The MDH did not dilute the samples as requested by Bay West; therefore, the maximum limit was reported as >2,400 MPN/100ml. Three samples (SS-1, SS-2 and SS-5) had this result denotation. The *E. coli* concentrations reported for samples SS-3, SS-4 and SS-7 were less than 750 MPN/100ml. The field parameters for stormwater collected during this event were similar for all five locations.

3.1.2 December 2009 Sampling

The analytical results for the November 2009 sampling event suggested that the most likely source of the illicit discharge was the southwestern secondary branch near sampling locations SS-2, SS-3 and SS-5. Bay West collected one confirmation sample at location SS-2 from the surface using a telescoping sampling pole. The sample was submitted to the Metropolitan Council wastewater laboratory for *E. coli* analysis. This sample was also analyzed for field parameters. Bay West was not able to collect confirmation water samples from either SS-3 or SS-5 due to limited stormwater flow. The November 2009 sample locations are identified on **Figure 3B**.

E. coli was detected in sample SS-2 at a concentration of 2,420 MPN/100ml, exceeding the standard; however, compared to historical *E. coli* concentrations detected at location SS-1, this result was most likely not associated with the illicit discharge. Field parameters measured during the December 2009 event were similar to those reported at SS-1 during the November 2009 event.

3.1.3 February 2010 Sampling

On the afternoon of February 19, 2009, Pat Cahanes with the City's Sewer Division contacted Bay West and reported that a resident in the Carroll Avenue area had reported steam emanating from a stormwater catch basin. Bay West immediately mobilized to the area and collected one water sample (SS-16) from the catch basin in question (Photo #8). Bay West collected two additional water samples from the intersection between Carroll Avenue and Paschal Avenue. One sample (SS-15W) was collected from the western inlet of the pipe and a second sample (SS-15S) was collected from the southern inlet of the pipe. The three samples were collected from the surface using a telescopic sampling pole. Visual inspection of the three sampling locations indicated that the water was clear and had no noticeable odor. Sample locations are identified on **Figure 3C**.

E. coli was detected in each of the three samples; however, one location (SS-15W) reported an *E. coli* concentration (1,300 MPN/100ml) that exceeded the standard. Based on sample preservation requirements/holding time constraints for *E. coli* analysis, the samples needed to be transported directly to the lab in a timely manner. As a result, there was insufficient time remaining to collect the field parameters during the sampling event.

3.1.4 May 2010 Sampling

Due to the limited sampling data collected during the prior sampling events and the limited access to aboveground sampling points, Bay West recommended and the City concurred that the May sampling event would be best conducted within the primary stormwater main. On May 18, 2010, two Bay West technicians entered the primary storm sewer main at location SS-1, accompanied by two City personnel. Bay West collected stormwater samples at each pipe that discharged to the stormwater sewer, while City personnel surveyed and photographed the storm sewer. Bay West and City personnel exited the sewer main via location SS-6B. Ingress and egress was completed using the City's truck-mounted one-person cage and cable system.

In total, seven water samples were collected. Sample DS-1 was collected at CRWD/Bay West sample location SS-1. Samples DS-2 through DS-7 were each collected at the outfalls from the secondary stormwater branches to the primary stormwater main. Samples were also analyzed for field parameters. Stormwater at six of the seven sampling locations was described as clear with no odor or other evidence of illicit discharge. The stormwater at sample location DS-3, however, was described as grey and turbid with a sewage-like odor and small fragments of food. Due to the discovery of the likely source of illicit discharge and low-flow conditions north of location DS-7, Bay West ceased stormwater sampling activities beneath the intersection of Hamline Avenue North and Laurel Avenue. Sample locations for the May 2010 event are presented on **Figure 3D**.

E. coli was detected above the laboratory reporting limit in six of the seven samples collected. *E. coli* concentrations exceeding the standard were detected at DS-1 (32,800 MPN/100ml), DS-3 (866,400 MPN/100ml), and DS-7 (2,000 MPN/100ml). As noted in Section 3.1.4, the water at location DS-3 was grey and turbid with a sewage-like odor and food fragments. Field parameters measured at location DS-3 yielded higher temperature and turbidity readings and lower conductivity readings when compared to the remaining six samples collected during this event.

Table 2 – Bay West *E. coli* Analytical Results

Sample ID	Collection Date	E.Coli (MPN)/100ml	pH	DO (mg/L)	ORP (mV)	^oC	Turbidity (NTU)	Sampling Method	Laboratory
SS-1	11/16/2009	**> 2,400**	7.08	47.10	228.5	12.55	13.9	Confined Space	MDH
SS-2	11/16/2009	**> 2,400**	7.72	12.14	134.3	11.66	18.6	Surface	MDH
SS-3	11/16/2009	710	8.61	8.89	140.6	11.60	55.9	Surface	MDH
SS-4	11/16/2009	650	7.85	11.94	228.7	11.05	11.0	Confined Space	MDH
SS-5	11/16/2009	**> 2,400**	**Inadequate Sample Volume**					Surface	MDH
SS-7A	11/16/2009	12	7.49	8.37	179.9	13.25	10.3	Surface	MDH
SS-2	12/9/2009	**2,420**	7.49	11.21	146.7	9.04	15.2	Surface	MDH
SS-16	2/19/2010	2.0	**Due to time restrictions, samples were not analyzed for field parameters**					Surface	Metro C
SS-15W	2/19/2010	**1,300**						Surface	Metro C
SS-15S	2/19/2010	14						Surface	Metro C
DS-1	5/18/2010	**32,800**	7.90	8.38	272.5	12.22	7.0	Confined Space	Metro C
DS-2	5/18/2010	137	8.28	11.24	257.7	11.52	9.1	Confined Space	Metro C
DS-3	5/18/2010	**866,400**	7.10	8.16	-105.8	14.26	116.9	Confined Space	Metro C
DS-4	5/18/2010	36	8.10	11.57	174.5	11.57	2.3	Confined Space	Metro C
DS-5	5/18/2010	<1.0	7.74	11.22	60.0	11.19	5.4	Confined Space	Metro C
DS-6	5/18/2010	4.0	7.99	12.71	233.7	11.12	2.2	Confined Space	Metro C
DS-7	5/18/2010	**2,000**	7.96	11.90	223.3	10.92	11.1	Confined Space	Metro C

Bold = Result exceeds the MDH surface water maximum standard of 1,240 mpn/100ml.
SS = Stormwater sample
DS = Discharge sample
MPN = Most Probable Number
DO = Dissolved Oxygen
ORP = Oxidation Reduction Potential
NTU = Nephelometric Turbidity Units
MDH = Minnesota Department of Health
Metro C = Metropolitan Council Wastewater Laboratory

4.0 DISCUSSION

Bay West sampled the stormwater within the East Kittsondale Subwatershed on four occasions between November 2009 and May 2010. *E coli* bacteria were detected in one or more stormwater samples collected during each sampling event. A concentration of *E. coli* bacteria indicative of an illicit discharge was reported at location DS-3 during the May 2010 event. This sample was collected adjacent to the intersection of Ayd Mill Road and St. Clair Avenue.

The City conducted an additional investigation of the area in question and tracked the illicit discharge source to a property upstream of the DS-3 monitoring location. Details specific to the nature of the illicit discharge were not made available to Bay West.

5.0 CONCLUSIONS

Based on the results of the SI, Bay West makes the following conclusions:

- Based on visual observations and analytical results, an illicit discharge to the East Kittsondale Subwatershed stormwater system was identified near sample location DS-3.
- Additional investigation of the area conducted by the City identified the source of the illicit discharge as a property upstream of the DS-3 monitoring location. Currently, the City and the property owner(s) are taking corrective actions to eliminate this illicit discharge.

6.0 STANDARD OF CARE

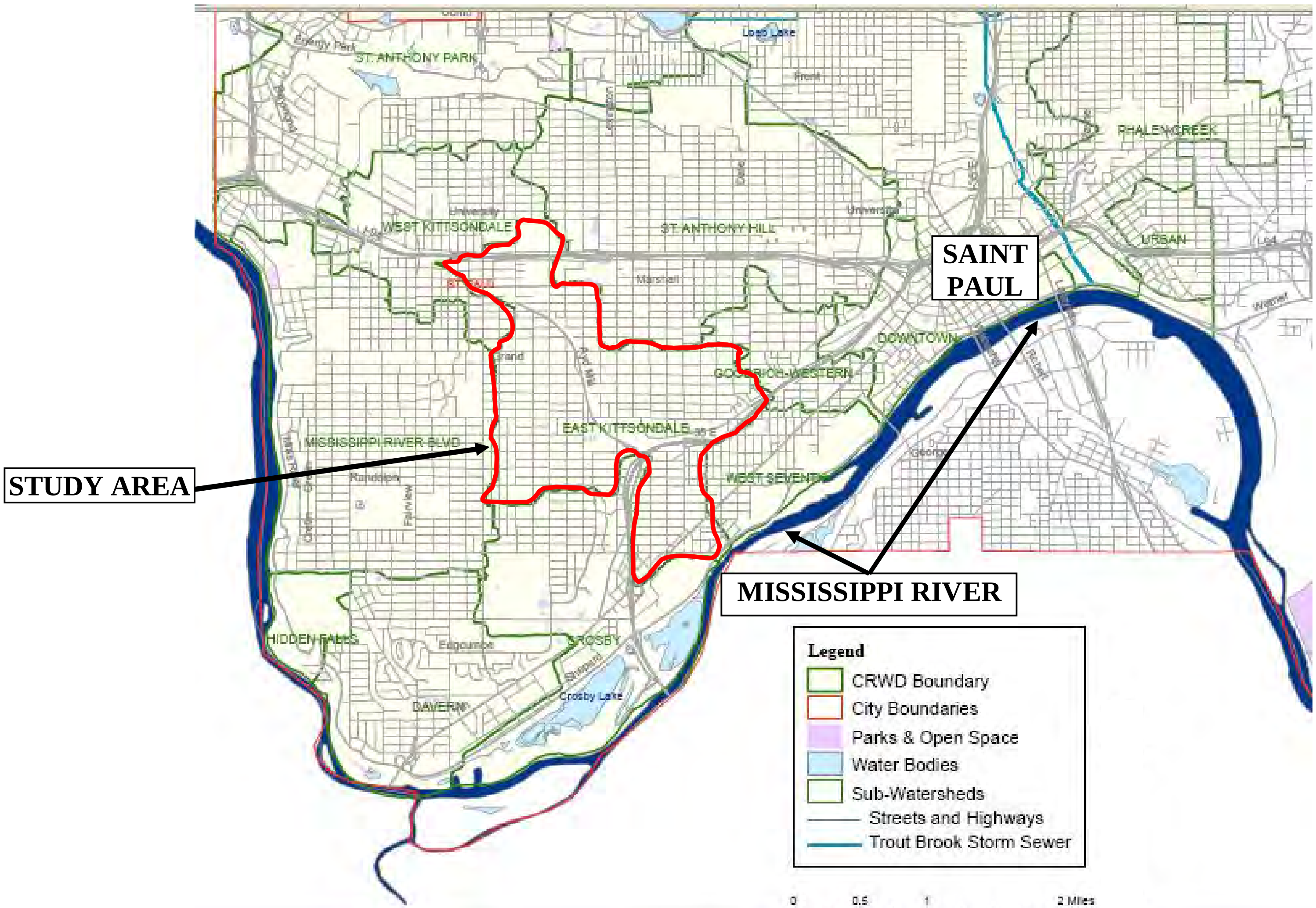
The findings contained in this stormwater investigation report for the East Kittsondale Subwatershed located in Saint Paul, Ramsey County, Minnesota, are based upon observations made and information obtained and reviewed at the time of the investigation. If variations from these findings are found in the future, Bay West may be contacted to provide a supplemental assessment. The opinions were arrived at in accordance with accepted engineering practices at this time and location. This limited SI was conducted in a manner consistent with the level of care and skill ordinarily practiced by environmental consulting professional(s) currently providing similar services under similar circumstances. Other than this, no warranty is implied or intended.

Prepared by: ______________________________
Killian Condon
Environmental Scientist

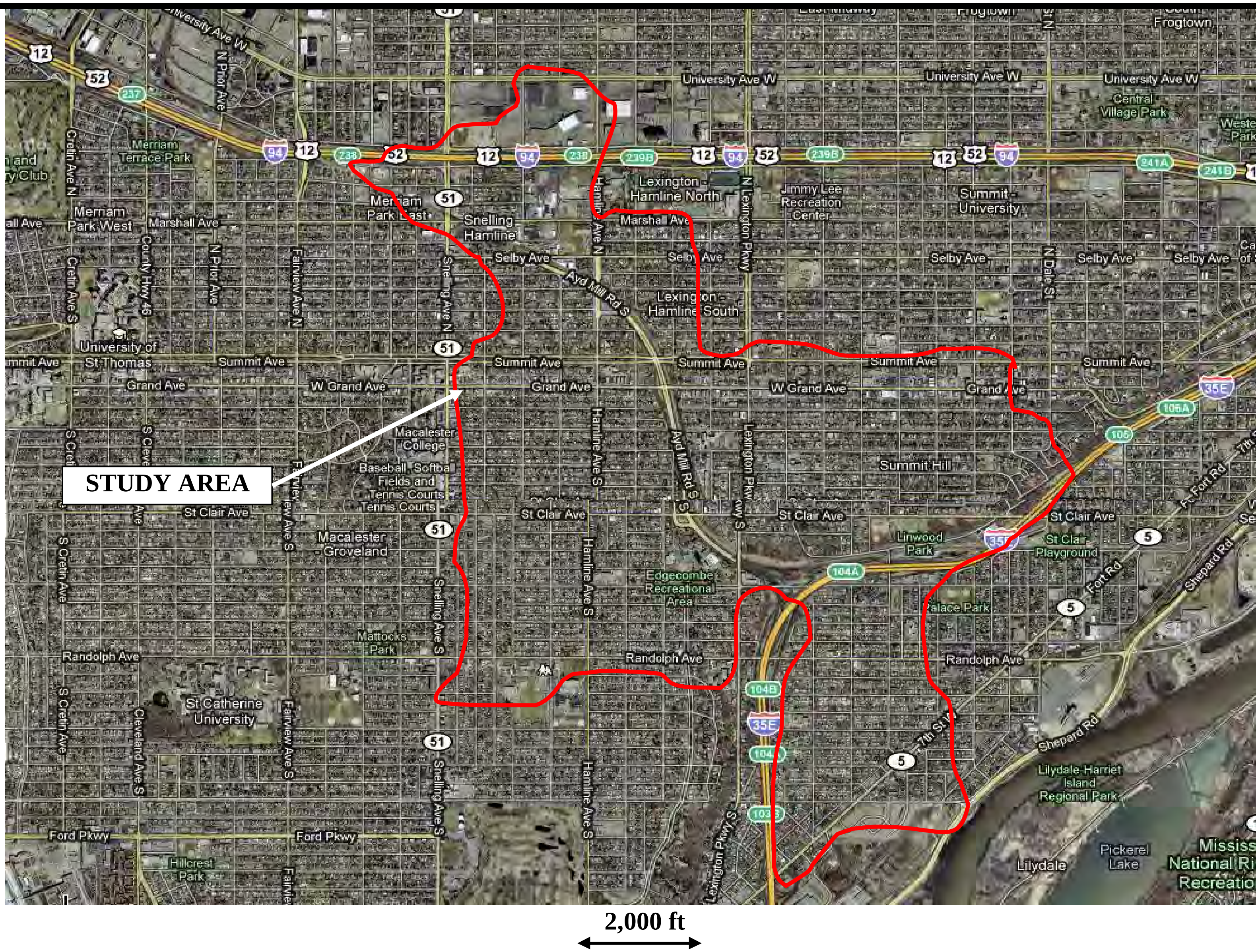
Reviewed by: ______________________________
Bryan Murdock
Environmental and Industrial Services Manager

Date: September 16, 2010

Figures



PROJECT NO: J090498		Bay West Customer-Focused Environmental & Industrial Solutions **5 Empire Drive** **St. Paul, Minnesota 55103** **651-291-0456**	**FIGURE 1** STUDY AREA LOCATION MAP EAST KITTSONDALE SUB-WATERSHED ST PAUL, MINNESOTA *Map provided by CRWD*
DRAWN BY: KC	DATE: 08-02-2010		
DESIGNED BY: Bay West	REVIEWED BY: MS		



PROJECT NO: J090498	
DRAWN BY: KC	DATE: 08-03-2010
DESIGNED BY: Bay West	REVIEWED BY: MM/MS

Bay West
Customer-Focused Environmental & Industrial Solutions

5 Empire Drive
St. Paul, Minnesota 55103
651-291-0456

FIGURE 2

STUDY AREA DETAIL MAP

EAST KITTSONDALE SUB-WATERSHED
ST PAUL, MINNESOTA

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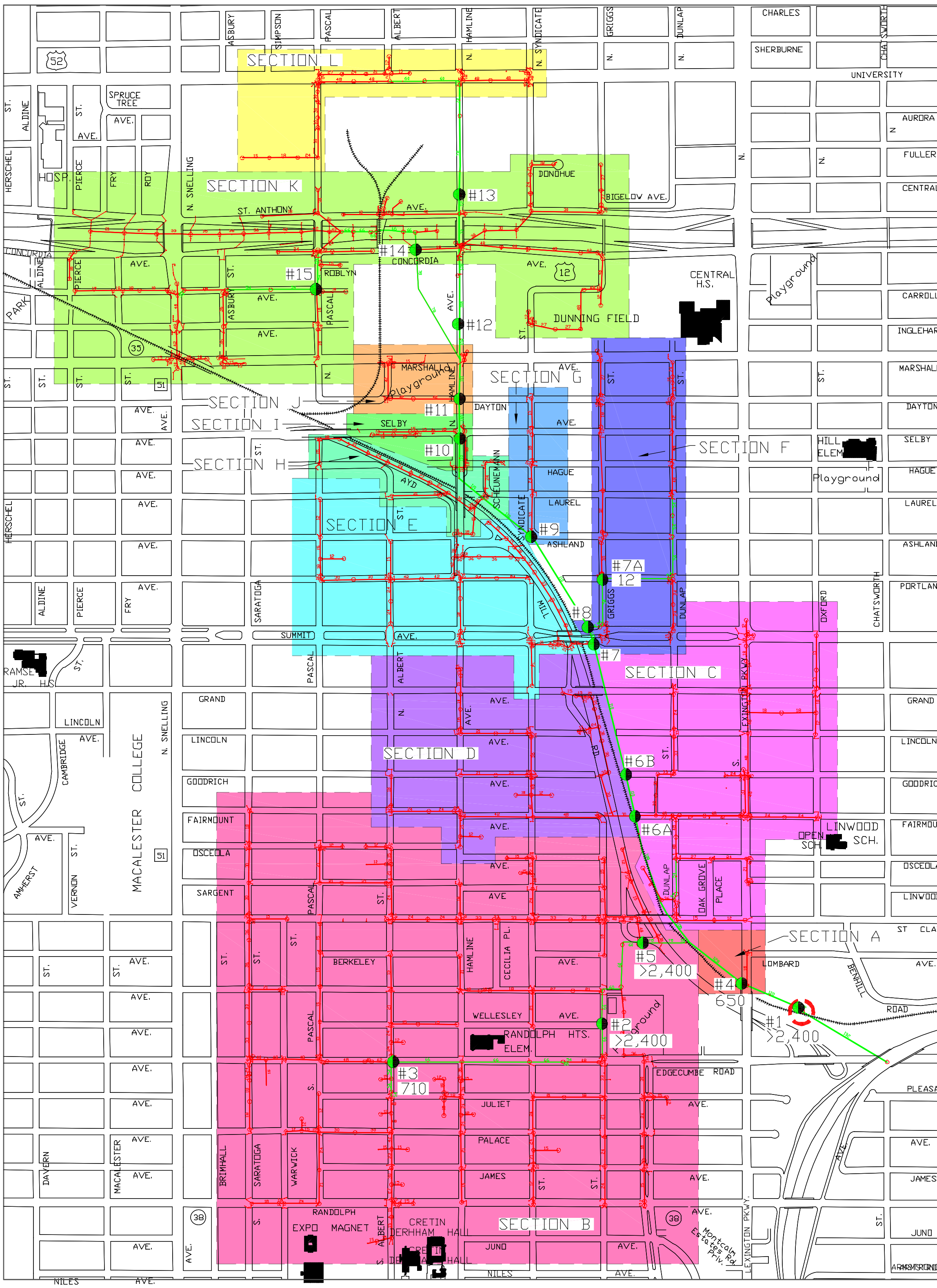
KITTSONDALE SPIRAL SHAFT STORM PIPE NETWORK



LEGEND

SAMPLE LOCATION

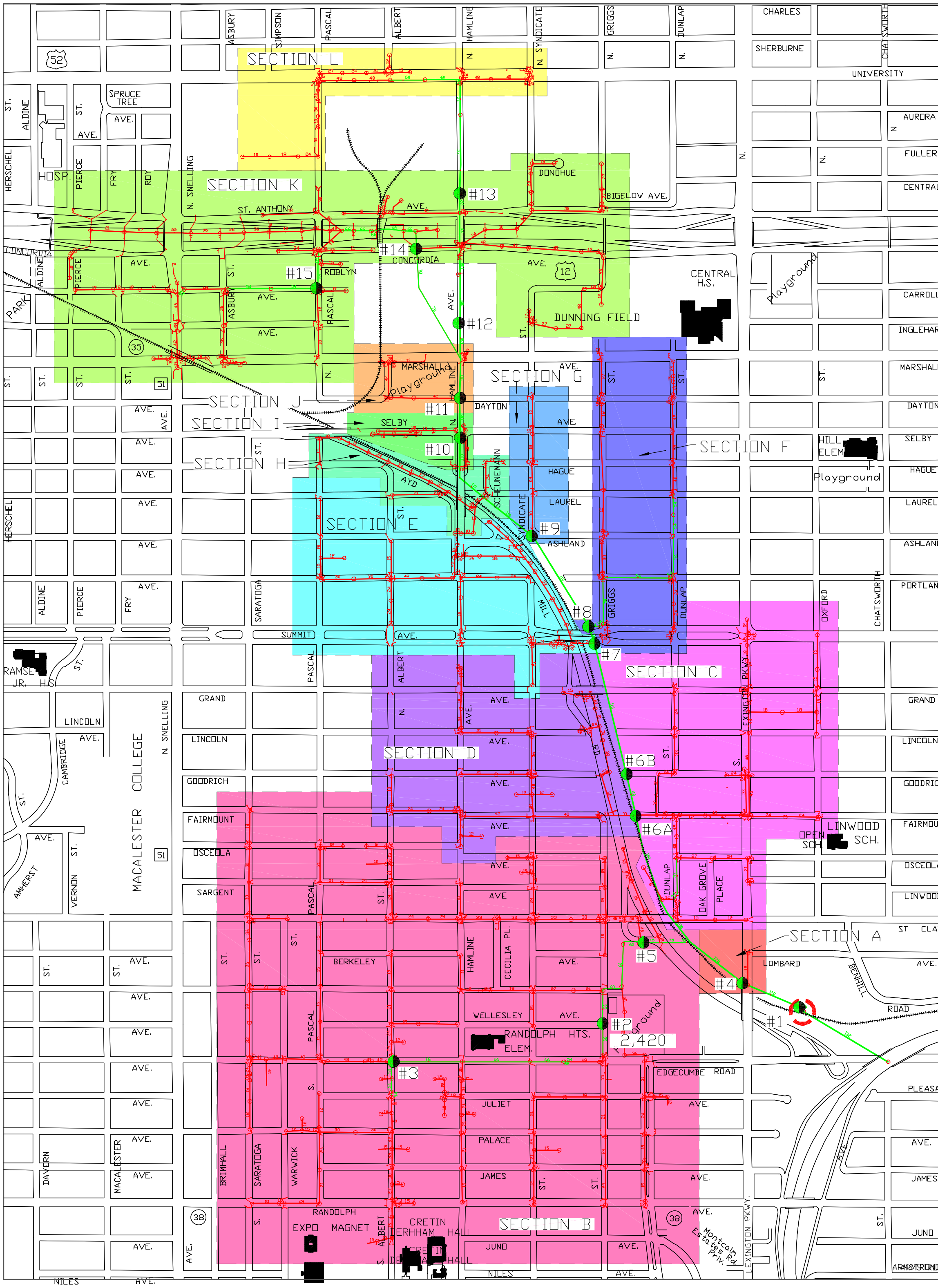
0 600 1,200

APPROXIMATE SCALE (FEET)

N

ENGR'G	DATE	Bay West — Customer-Focused Environmental & Industrial Solutions	
DRAWN			
REV.			
PROJECT NAME	EAST KITTSONDALE SI		
TITLE	SAMPLING LOCATION MAP (NOV. 2009)		
DWG. NO. 090498	SCALE AS SHOWN	FIGURE # 3A	

KITTSONDALE SPIRAL SHAFT STORM PIPE NETWORK



LEGEND

SAMPLE LOCATION

0 600 1,200
APPROXIMATE SCALE (FEET)

N

ENGR'G	DATE	Bay West Customer-Focused Environmental & Industrial Solutions
DRAWN		
REV.		
PROJECT NAME		EAST KITTSONDALE SI
TITLE		SAMPLING LOCATION MAP (DEC. 2009)
DWG. NO. 090498	SCALE AS SHOWN	FIGURE # 3B

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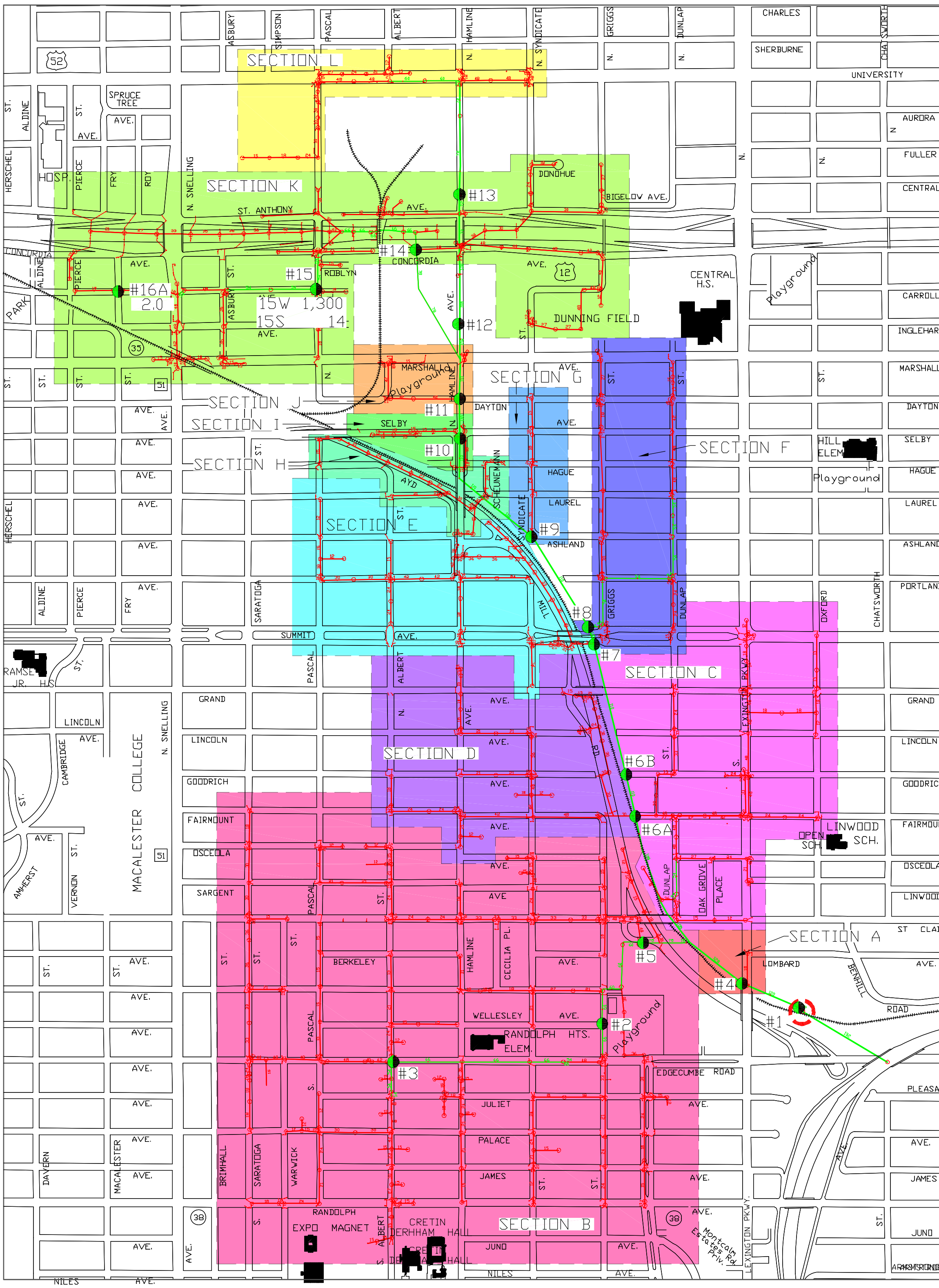
KITTSONDALE SPIRAL SHAFT STORM PIPE NETWORK



LEGEND

SAMPLE LOCATION

0 600 1,200

APPROXIMATE SCALE (FEET)

N

ENGR'G	DATE	Bay West Customer-Focused Environmental & Industrial Solutions
DRAWN		
REV.		
PROJECT NAME	EAST KITTSONDALE SI	
TITLE	SAMPLING LOCATION MAP (FEB. 2010)	
DWG. NO. 090498	SCALE AS SHOWN	FIGURE # 3C

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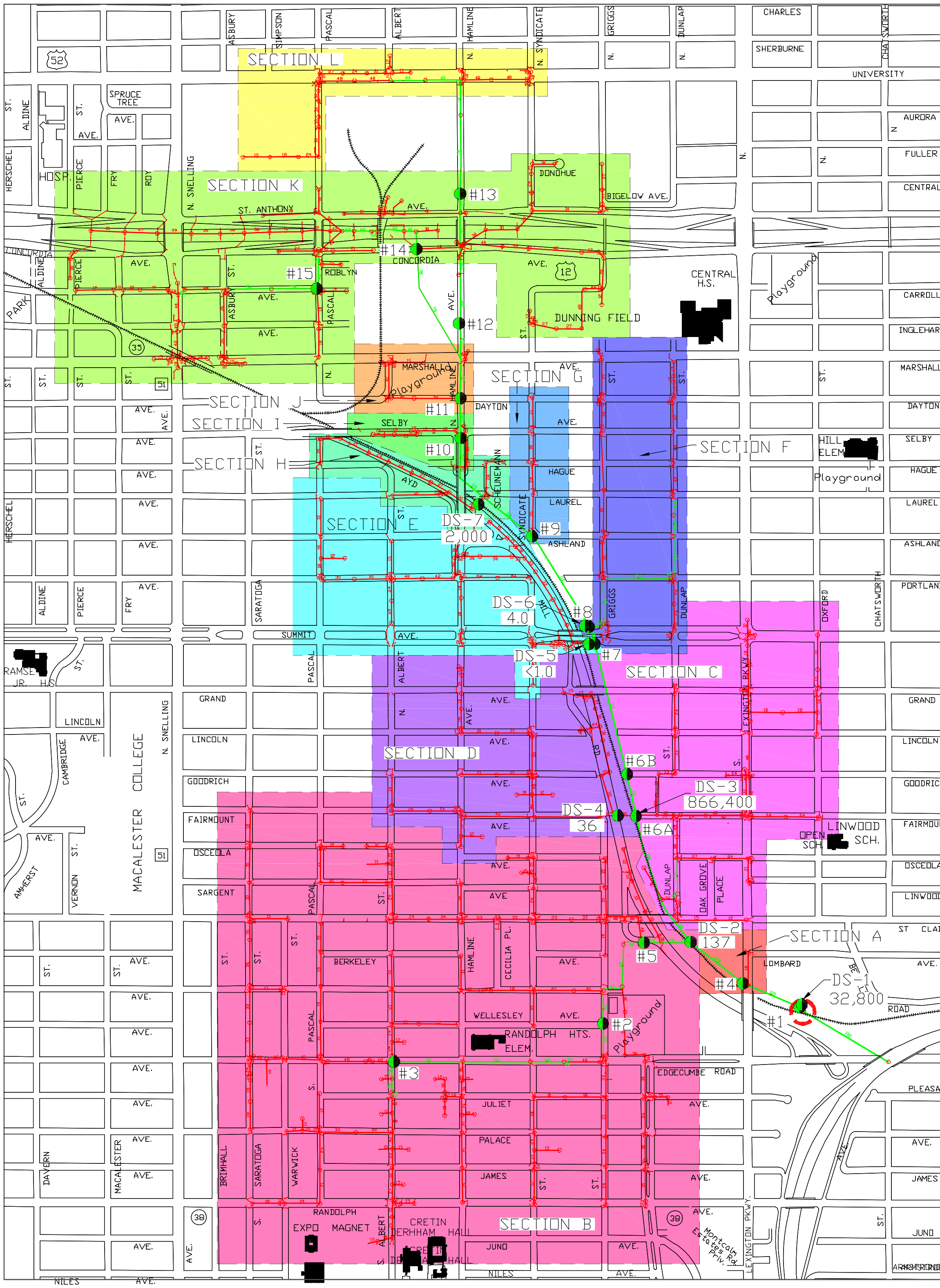
KITTSONDALE SPIRAL SHAFT STORM PIPE NETWORK



LEGEND

SAMPLE LOCATION

0 600 1,200

APPROXIMATE SCALE (FEET)

N

ENGR'G	DATE	Bay West Customer-Focused Environmental & Industrial Solutions
DRAWN		
REV.		
PROJECT NAME		EAST KITTSONDALE SI
TITLE		SAMPLING LOCATION MAP (MAY. 2010)
DWG. NO. 090498	SCALE AS SHOWN	FIGURE # 3D

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Appendix 1

Photographic Log

Photo 1:	Facing down
View of:	SS-1 where samples SS-1 and DS-1 were collected. CRWD Sampling location.

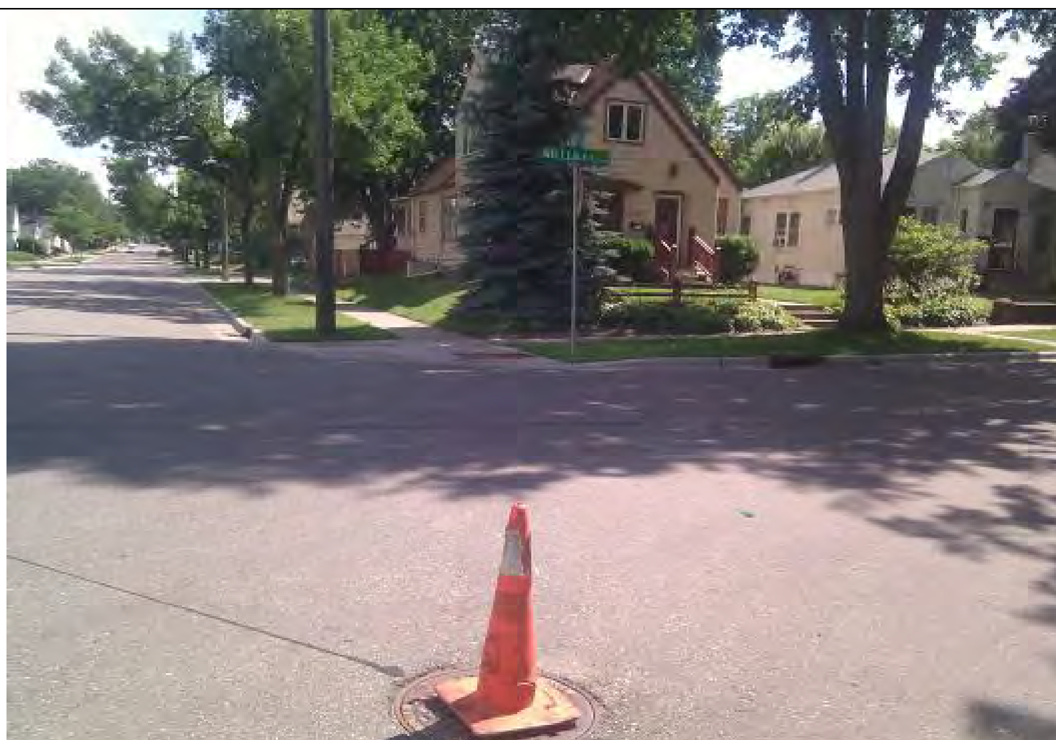

Photo 2:	Facing south
View of:	SS-2 which flows south to north. Sampling point located at intersection of Griggs Street and Wellesley Avenue.

Photo 3:	Facing south
View of:	SS-4 sampling point. Confined space required. Located near the Ayd Mill Road overpass and Lexington Parkway intersection.

Photo 4:	Facing southeast
View of:	SS-5 where samples SS-5 and DS-2 were collected. Located at onramp for Ayd Mill Road south of St. Clair Avenue.

Photo 5:	Facing west
View of:	SS-6B where Bay West and the City exited the stormwater sewer during the May 2010 sampling event. Located at Ayd Mill Road and Goodrich Avenue.

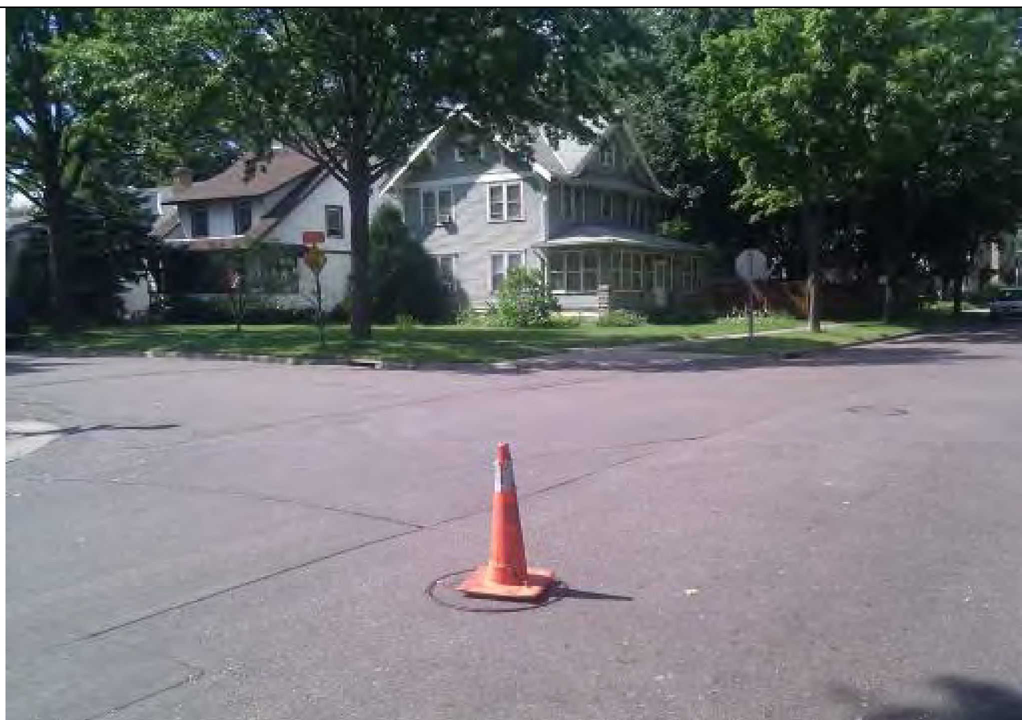

Photo 6:	Facing northwest
View of:	SS-7A sampling point. Alternative location to SS-7 and SS-8 as neither were found. Located at intersection between Griggs Avenue and Portland Avenue.

Photo 7:	Facing west
View of:	SS-9 sampling point. No access to stormsewer main. Located at western end of Ashland Avenue adjacent to Ayd Mill Road.

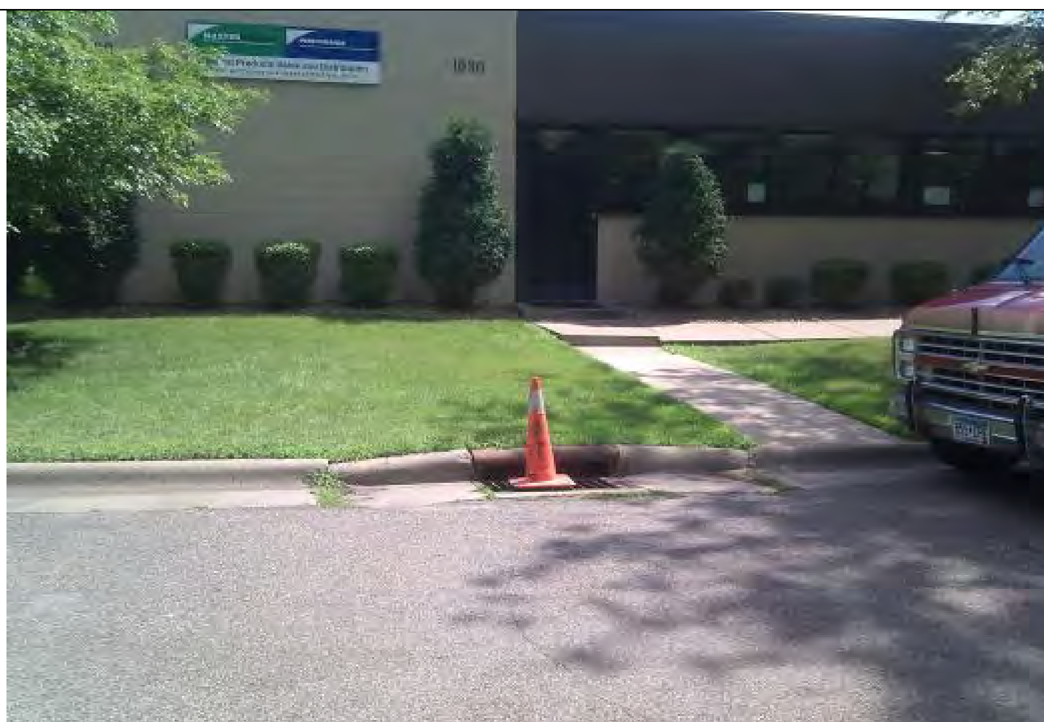

Photo 8:	Facing south
View of:	SS-16 collected from Carroll Avenue.

Photo 9:	Facing south
View of:	SS-15 sampling point at intersection between Paschal Avenue and Carroll Avenue. SS-15S and SS-15W also collected at this location.

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Appendix 2

Field Sampling Sheets

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Bay West

OUTFALL RECONNAISSANCE / SAMPLE COLLECTION FORM

1 – Background			
City: St. Paul	Watershed: CRWD	Date: 11/6/09	
Sub watershed: East Kittsondale		Time: 10:15am	
Watershed District: CRWD		Outfall ID: #1	
Temperature: 45 F		Inspector/Sampler Initials: JC	
GPS Coordinates:	Lat: N/A	Long: N/A	
Rainfall (inches):	24 Hr - 0	48 Hr - 0	
Land use in Drainage Area (Circle choice(s))			
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):			
Comments/Notes: near residedential near railroad tracks			

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch): closed			
Flow Present: Y / N	Flow Description (e.g. trickle): 2' wide fast flow		
Material (e.g. RCP, steel, etc):	Shape: circle	Submerged: Y / N	In Soil / Water
Dimensions (inches)			
Diameter: 3.0	Depth: 30'	Top Width: 2.5-3.0	Bottom Width:
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain): none
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain):
Turbidity (Scale 1 (clear) – 10 (black)): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain): none
Comments/Notes:

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain):
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain):
Vegetation (If yes describe extent):
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain):
Comments/Notes:

4 – Sample Collection		
Sample collected: Y / N	Source: Pool / Flow	Flow trap used: Y / N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s): #1	Collection Time(s): 10:15 am	
Comments/Notes:		

Bay West

Outfall Reconnaissance / Sample Collection Form

1 – Background			
City: St. Paul	Watershed: CRWD	Date: 11-10-09	
Sub watershed: East Kittsondale		Time: 14 05	
Watershed District: CRWD		Outfall ID: SS-2	
Temperature:	45 F	Inspector/Sampler Initials: K.C.	
GPS Coordinates:	Lat:	Long:	
Rainfall (inches):	24 Hr -	48 Hr -	
Land use in Drainage Area (Circle choice(s))			
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):			
Comments/Notes:			

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch):			
Flow Present: Y / N		Flow Description (e.g. trickle): trickle	
Material (e.g. RCP, steel, etc):		Shape:	Submerged: Y / N In Soil / Water
Dimensions (inches)			
Diameter:	Depth:	Top Width:	Bottom Width:
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain): None
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain):
Turbidity (Scale 1 (clear) – 10 (black)): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain): None
Comments/Notes:

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain): Good.
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain): None.
Vegetation (If yes describe extent): None.
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain): No pool.
Comments/Notes:

4 – Sample Collection		
Sample collected: Y / N	Source: Pool / Flow	Flow trap used: Y / N
~~Flow trap type~~: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s): SS-2	Collection Time(s): 14:05	
Comments/Notes:		

Bay West

Outfall Reconnaissance / Sample Collection Form

1 – Background			
City: St. Paul	Watershed: CRWD	Date: 11-16-09	
Sub watershed: East Kittsondale		Time: 14:56	
Watershed District: CRWD		Outfall ID: SS-3	
Temperature: 45 F		Inspector/Sampler Initials: KR	
GPS Coordinates:	Lat:	Long:	
Rainfall (inches):	24 Hr -	48 Hr -	
Land use in Drainage Area (Circle choice(s))			
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):			
Comments/Notes:			

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch):			
Flow Present: Y / N	Flow Description (e.g. trickle):		
Material (e.g. RCP, steel, etc)	Shape:	Submerged: Y / N In Soil / Water	
Dimensions (inches)			
Diameter: 66"59"	Depth:	Top Width:	Bottom Width:
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain): None
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain): Brown
Turbidity (Scale 1 (clear) – 10 (black)): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain):
Comments/Notes:

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain): gd.
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain): None
Vegetation (If yes describe extent): None.
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain):
Comments/Notes:

4 – Sample Collection		
Sample collected: Y / N	Source: Pool / Flow	Flow trap used: Y / N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s): SS-3	Collection Time(s): 14:30	
Comments/Notes:		

Bay West

Outfall Reconnaissance / Sample Collection Form

#4

1 – Background			
City: St. Paul	Watershed: CRWD	Date: 11/16/07	
Sub watershed: East Kittsondale		Time: 11:00 am	
Watershed District: CRWD		Outfall ID: #4	
Temperature:	45 F	Inspector/Sampler initials: JC	
GPS Coordinates:	Lat: N/A	Long: N/A	
Rainfall (inches):	24 Hr - ~~N/A~~ 0	48 Hr - N 0	
Land use in Drainage Area (Circle choice(s))			
Industrial - Residential - ~~Commercial~~ - Agricultural - ~~Open space~~ - Undeveloped - Other (explain):			
Comments/Notes: ~~along a train track~~			

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch): closed storm sewer			
Flow Present: Y N	Flow Description (e.g. trickle): river		
Material (e.g. RCP, steel, etc):	Shape: circle	Submerged: Y / N	In Soil / Water
Dimensions (inches)			
Diameter: 2.5 - 3.0	Depth: 45'	Top Width: 2.5 - 3.0	Bottom Width: 2.5 - 3
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain): supplied air
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain):
Turbidity (Scale 1 (clear) – 10 (black)): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain): None
Comments/Notes:

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain):
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain):
Vegetation (If yes describe extent):
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain):
Comments/Notes:

4 – Sample Collection		
Sample collected: Y N	Source: Pool / Flow	Flow trap used: Y N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s): #4	Collection Time(s): 11:30 am	
Comments/Notes:		

Bay West

OUTFALL RECONNAISSANCE / SAMPLE COLLECTION FORM

1 – Background			
City: St. Paul	Watershed: CRWD	Date: 11/16/09	
Sub watershed: East Kittsondale		Time: 13:05	
Watershed District: CRWD		Outfall ID: SS-5	
Temperature:	45 F	Inspector/Sampler Initials:	
GPS Coordinates:	Lat: —	Long: —	
Rainfall (inches):	24 Hr – —	48 Hr - —	
Land use in Drainage Area (Circle choice(s))			
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):			
Comments/Notes:			

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch): Storm Drain			
Flow Present: Y / N	Flow Description (e.g. trickle):		
Material (e.g. RCP, steel, etc):	Shape:	Submerged: Y / N	In Soil / Water
Dimensions (inches)			
Diameter: ~ 36 ft	Depth: ~ 18 ft	Top Width: 3 ft	Bottom Width: 6 ft
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain): None
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain): Clear
Turbidity (Scale 1 (clear) – 10 (black): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain): Small Dirt particulate
Comments/Notes:

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain):
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain):
Vegetation (If yes describe extent):
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain):
Comments/Notes:

4 – Sample Collection		
Sample collected: Y / N	Source: Pool / Flow	Flow trap used: Y / N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe): Sand-Bag		
Sample ID(s): SS-5	Collection Time(s): 13:06	
Comments/Notes:		

Bay West

OUTFALL RECONNAISSANCE / SAMPLE COLLECTION FORM

#9

1 – Background		
City: St. Paul	Watershed: CRWD	Date: 11/16/09
Sub watershed: East Kittsondale		Time:
Watershed District: CRWD		Outfall ID: #9
Temperature: 50° F		Inspector/Sampler Initials: JC
GPS Coordinates:	Lat: N/A	Long: N/A
Rainfall (inches):	24 Hr - 0	48 Hr - 0
Land use in Drainage Area (Circle choice(s))		
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):		
Comments/Notes:		

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch): closed (storm sewer)			
Flow Present: Y N	Flow Description (e.g. trickle):		
Material (e.g. RCP, steel, etc):	Shape: circle	Submerged: Y / N	In Soil / Water
Dimensions (inches)			
Diameter: 3.5'	Depth: 15'	Top Width: 3	Bottom Width: 3
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) - Petroleum – Other (explain):
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain):
Turbidity (Scale 1 (clear) – 10 (black): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain): None
Comments/Notes: trickle

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain):
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain):
Vegetation (If yes describe extent):
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain):
Comments/Notes:

4 – Sample Collection		
Sample collected: Y N	Source: Pool / Flow	Flow trap used: Y N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s):	Collection Time(s):	
Comments/Notes:		

Bay West

Outfall Reconnaissance / Sample Collection Form

1 – Background			
City: St. Paul	Watershed: CRWD	Date:	
Sub watershed: East Kittsondale		Time: 12:40	
Watershed District: CRWD		Outfall ID: SS-7	
Temperature: 50F		Inspector/Sampler Initials: KC	
GPS Coordinates:	Lat:	Long:	
Rainfall (inches):	24 Hr - None	48 Hr - None	
Land use in Drainage Area (Circle choice(s))			
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):			
Comments/Notes:			

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch):			
Flow Present: Y / N		Flow Description (e.g. trickle):	
Material (e.g. RCP, steel, etc):	Shape:	Submerged: Y / N	In Soil / Water
Dimensions (inches)			
Diameter:	Depth:	Top Width:	Bottom Width:
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain): None
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain):
Turbidity (Scale 1 (clear) – 10 (black)): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain): dirt
Comments/Notes:

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain):
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain):
Vegetation (If yes describe extent):
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain):
Comments/Notes: ponded / small flow

4 – Sample Collection		
Sample collected: Y / N	Source: Pool ~~Flow~~ Slow flow	Flow trap used: Y / N
~~Flow trap type:~~ OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s): SS-7	Collection Time(s): 12:40	
Comments/Notes:		

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Bay West

OUTFALL RECONNAISSANCE / SAMPLE COLLECTION FORM

1 – Background			
City: St. Paul	Watershed: CRWD	Date: 12/9/2009	
Sub watershed: E. Kittsondale		Time: 09:30	
Watershed District: CRWD		Outfall ID: SS-2	
Temperature:		Inspector/Sampler Initials: K.C.	
GPS Coordinates:	Lat: See attached Map	Long:	
Rainfall (inches):	24 Hr -	48 Hr -	
Land use in Drainage Area (Circle choice(s))			
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):			
Comments/Notes:			

2 – Outfall				
Type (e.g. closed/open pipe or drainage ditch):				
Flow Present: Y / N		Flow Description (e.g. trickle):		
Material (e.g. RCP, steel, etc):		Shape:	Submerged: Y / N	In Soil / Water
Dimensions (inches)				
Diameter:	Depth:	Top Width:	Bottom Width:	
Comments/Notes:				

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) - Petroleum - Other (explain):
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain):
Turbidity (Scale 1 (clear) – 10 (black): 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain):
Comments/Notes:

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked - Peeling liner - Other (explain):
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain):
Vegetation (If yes describe extent):
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain):
Comments/Notes:

4 – Sample Collection		
Sample collected: Y / N	Source: Pool / Flow Slight flow	Flow trap used: Y / N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s): SS-2	Collection Time(s): 09:30	
Comments/Notes: Weak flow.		

Bay West

OUTFALL RECONNAISSANCE / SAMPLE COLLECTION FORM

1 – Background			
City: St. Paul	Watershed: CRWD	Date: 2-19-10	
Sub watershed: East Kittsondale		Time: 13:20	
Watershed District: CRWD		Outfall ID: SS-1	
Temperature: 25 F		Inspector/Sampler Initials: K.P. + K.C.	
GPS Coordinates:	Lat:	Long:	
Rainfall (inches):	24 Hr -	48 Hr -	
Land use in Drainage Area (Circle choice(s))			
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain)			
Comments/Notes:			

~~2 – Outfall~~			
Type (e.g. closed/open pipe or drainage ditch): Manhole Observation.			
Flow Present: Y / N		Flow Description (e.g. trickle): None.	
Material (e.g. RCP, steel, etc):	Shape: Cir	Submerged: Y / N	In Soil / Water
Dimensions (inches)			
Diameter: 18" Depth: 48"		Top Width: 2"	Bottom Width: 7
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain):
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain):
Turbidity (Scale 1 (clear) – 10 (black): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain):
Comments/Notes:

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain):
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain):
Vegetation (If yes describe extent): None.
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain): None
Comments/Notes:

4 – Sample Collection		
Sample collected: Y / N	Source: Pool / Flow	Flow trap used: Y / N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s):	Collection Time(s):	
Comments/Notes: No flow. Dry. Not Sampled. This point at start of system		

Bay West

Outfall Reconnaissance / Sample Collection Form

1 – Background	
City: St. Paul Watershed: CRWD	Date: 2/19/10
Sub watershed: East Kittsondale	Time: 13:30
Watershed District: CRWD	Outfall ID: SS-B2
Temperature: 25 F	Inspector/Sampler Initials: K.P. KeL.
GPS Coordinates: Lat:	Long:
Rainfall (inches): 24 Hr -	48 Hr -
Land use in Drainage Area (Circle choice(s)):	
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):	
Comments/Notes:	

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch): Closed / Manhole			
Flow Present: Y / N	Flow Description (e.g. trickle): Pooled		
Material (e.g. RCP, steel, etc.):	Shape:	Submerged: Y / N	In Soil / Water
Dimensions (inches)			
Diameter:	Depth:	Top Width:	Bottom Width:
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain):
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain):
Turbidity (Scale 1 (clear) – 10 (black): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain):
Comments/Notes:

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain): Gd.
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain): None
Vegetation (If yes describe extent): No
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain): light brown
Comments/Notes: No odor or color. Clear Sample.

4 – Sample Collection		
Sample collected: Y / N	Source: Pool / Flow	Flow trap used: Y / N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s): SS-2.	Collection Time(s): 13:30.	
Comments/Notes: Bio-chem parameters not collected due to quick sampling time & drop-off @ lab by 14:30		

Bay West

Outfall Reconnaissance / Sample Collection Form

1 – Background			
City: St. Paul	Watershed: CRWD	Date: 2-19-10	
Sub watershed: East Kittsondale		Time: 13:55	
Watershed District: CRWD		Outfall ID: SS-3-W	
Temperature: 23		Inspector/Sampler Initials: K.C.	
GPS Coordinates:	Lat: See attached Map	Long:	
Rainfall (inches):	24 Hr -	48 Hr -	
Land use in Drainage Area (Circle choice(s))			
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):			
Comments/Notes:			

2 – Outfall				
Type (e.g. closed/open pipe or drainage ditch):				
Flow Present: Y / N		Flow Description (e.g. trickle):		
Material (e.g. RCP, steel, etc):		Shape:	Submerged: Y / N	In Soil / Water
Dimensions (inches)				
Diameter:	Depth:	Top Width:	Bottom Width:	
Comments/Notes:				

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) - Petroleum - Other (explain): None
Color (circle as appropriate): Clear - Brown - Yellow - Green - Black - Orange - Other (explain):
Turbidity (Scale 1 (clear) - 10 (black): 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10
Floating matter (circle as appropriate): Sewage - Petroleum - Suds - Other (explain): None.
Comments/Notes: Appears to be associated w/ snow melt

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked - Peeling liner - Other (explain):
Deposits/Staining (circle as appropriate): Oil - Flow Line - Paint - Other (explain):
Vegetation (If yes describe extent):
Pool water quality (circle as appropriate): Odor - Suds - Non-trash floatables - Petroleum - Other (explain):
Comments/Notes:

4 – Sample Collection		
Sample collected: Y / N	Source: Pool / Flow	Flow trap used: Y / N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s):	Collection Time(s): 13:55	
Comments/Notes: Gd Flow From both connector pipes. Natural parameters not collected due to quick turnaround time to lab (14:30)		

Bay West

OUTFALL RECONNAISSANCE / SAMPLE COLLECTION FORM

1 – Background		
City: St. Paul	Watershed: CRWD	Date: 2-19-10
Sub watershed: East Kittsondale		Time: 14:00
Watershed District: CRWD		Outfall ID: SS-3-5
Temperature: 23		Inspector/Sampler Initials: K.C.
GPS Coordinates:	Lat: See attached Map	Long:
Rainfall (inches):	24 Hr -	48 Hr -
Land use in Drainage Area (Circle choice(s))		
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):		
Comments/Notes:		

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch):			
Flow Present: Y / N	Flow Description (e.g. trickle):		
Material (e.g. RCP, steel, etc):	Shape:	Submerged: Y / N	In Soil / Water
Dimensions (inches)			
Diameter:	Depth:	Top Width:	Bottom Width:
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain):
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain):
Turbidity (Scale 1 (clear) – 10 (black)): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain):
Comments/Notes: Appears to be associated w/ snow melt.

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain):
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain):
Vegetation (If yes describe extent):
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain):
Comments/Notes:

4 – Sample Collection		
Sample collected: Y / N	Source: Pool / Flow	Flow trap used: Y / N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s): SS-3-5		Collection Time(s): 14:00
Comments/Notes: Gd flow from both connector pipes. Natural parameters not collected due to quick turnaround time to lab (1:50)		

Bay West

OUTFALL RECONNAISSANCE / SAMPLE COLLECTION FORM

1 – Background			
City: St. Paul	Watershed: CRWD	Date: 5/18/10	
Sub watershed: East Kittsondale		Time:	
Watershed District: CRWD		~~Outfall ID~~: Sample point #1	
Temperature: 75		Inspector/Sampler Initials: JL	
GPS Coordinates:	Lat: NA	Long: NA	
Rainfall (inches):	24 Hr - 0	48 Hr - 0	
Land use in Drainage Area (Circle choice(s))			
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):			
Comments/Notes:			

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch):			
Flow Present: Y / N	Flow Description (e.g. trickle): 6" of 9' in diameter pipe		
Material (e.g. RCP, steel, etc):	Shape:	Submerged: Y / N	In Soil / Water
Dimensions (inches)			
Diameter:	Depth:	Top Width:	Bottom Width:
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain): None
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain):
Turbidity (Scale 1 (clear) – 10 (black): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 1 0
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain): None
Comments/Notes:

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain):
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain):
Vegetation (If yes describe extent):
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain):
Comments/Notes:

4 – Sample Collection		
Sample collected Y / N	Source: Pool / Flow	Flow trap used: Y / N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s): DS-1	Collection Time(s): 10:2	
Comments/Notes:		

Bay West

OUTFALL RECONNAISSANCE / SAMPLE COLLECTION FORM

1 – Background		
City: St. Paul	Watershed: CRWD	Date: 5/18/10
Sub watershed: East Kittsondale		Time:
Watershed District: CRWD		~~Outfall ID:~~ Sample point #2
Temperature: 75		Inspector/Sampler Initials: JL
GPS Coordinates:	Lat: NA	Long: NA
Rainfall (inches):	24 Hr - 0	48 Hr - 0
Land use in Drainage Area (Circle choice(s))		
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):		
Comments/Notes:		

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch):			
Flow Present: Y / N	Flow Description (e.g. trickle):		
Material (e.g. RCP, steel, etc):	Shape:	Submerged: Y / N	In Soil / Water
Dimensions (inches)			
Diameter:	Depth:	Top Width:	Bottom Width:
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain): None
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain):
Turbidity (Scale 1 (clear) – 10 (black): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain): minimal
Comments/Notes: clear

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain):
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain):
Vegetation (If yes describe extent):
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain):
Comments/Notes:

4 – Sample Collection		
Sample collected: Y / N	Source: Pool / Flow	Flow trap used: Y / N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s): DS-2	Collection Time(s): 10:36	
Comments/Notes:		

Bay West

OUTFALL RECONNAISSANCE / SAMPLE COLLECTION FORM

1 – Background		
City: St. Paul	Watershed: CRWD	Date: 5/18/10
Sub watershed: East Kittsondale		Time:
Watershed District: CRWD		~~Outfall ID:~~ Sample points #3
Temperature: 75		Inspector/Sampler Initials: JL
GPS Coordinates:	Lat: NA	Long: NA
Rainfall (inches):	24 Hr - 0	48 Hr - 0
Land use in Drainage Area (Circle choice(s))		
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):		
Comments/Notes:		

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch):			
Flow Present: Y / N	Flow Description (e.g. trickle): 1/4 inch of water by 2'		
Material (e.g. RCP, steel, etc):	Shape:	Submerged: Y / N	In Soil / Water
Dimensions (inches)			
Diameter:	Depth:	Top Width:	Bottom Width:
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain): ~~Sewer~~ Sewage
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain): Grey
Turbidity (Scale 1 (clear) – 10 (black): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain):
Comments/Notes: Asian food odor

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain):
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain):
Vegetation (If yes describe extent):
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain):
Comments/Notes:

4 – Sample Collection		
Sample collected: Y / N	Source: Pool / Flow	Flow trap used: Y / N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s): DS-3	Collection Time(s): 11:05	
Comments/Notes:		

Bay West

OUTFALL RECONNAISSANCE / SAMPLE COLLECTION FORM

1 – Background			
City: St. Paul	Watershed: CRWD	Date: 5/18/10	
Sub watershed: East Kittsondale		Time:	
Watershed District: CRWD		Outfall ID: 4 (Sample Location)	
Temperature: 75		Inspector/Sampler Initials: JL	
GPS Coordinates:	Lat: NA	Long: NA	
Rainfall (inches):	24 Hr - 0	48 Hr - 0	
Land use in Drainage Area (Circle choice(s))			
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):			
Comments/Notes:			

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch):			
Flow Present: Y / N	Flow Description (e.g. trickle):		
Material (e.g. RCP, steel, etc):	Shape:	Submerged: Y / N	In Soil / Water
Dimensions (inches)			
Diameter:	Depth:	Top Width:	Bottom Width:
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain):
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain):
Turbidity (Scale 1 (clear) – 10 (black): 1 - 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain): NA
Comments/Notes: Clear after sample Pt 3

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain):
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain):
Vegetation (If yes describe extent):
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain):
Comments/Notes:

4 – Sample Collection		
Sample collected: Y / N	Source: Pool / Flow	Flow trap used: Y / N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s): DS - 4	Collection Time(s): 4:14	
Comments/Notes:		

Bay West

OUTFALL RECONNAISSANCE / SAMPLE COLLECTION FORM

1 – Background		
City: St. Paul	Watershed: CRWD	Date: 5/18/10
Sub watershed: East Kittsondale		Time:
Watershed District: CRWD		Outfall ID: 5 (sample location)
Temperature: 75		Inspector/Sampler Initials: JL
GPS Coordinates:	Lat: NA	Long: NA
Rainfall (inches):	24 Hr - 0	48 Hr - 0
Land use in Drainage Area (Circle choice(s))		
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):		
Comments/Notes:		

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch):			
Flow Present: Y / N	Flow Description (e.g. trickle):		
Material (e.g. RCP, steel, etc):	Shape:	Submerged: Y / N	In Soil / Water
Dimensions (inches)			
Diameter:	Depth:	Top Width:	Bottom Width:
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain):
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain):
Turbidity (Scale 1 (clear) – 10 (black)): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain):
Comments/Notes: clear after sample Pt 3

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain):
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain):
Vegetation (If yes describe extent):
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain):
Comments/Notes:

4 – Sample Collection		
Sample collected: Y / N	Source: Pool / Flow	Flow trap used: Y / N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s): DS - 5	Collection Time(s): 11:40	
Comments/Notes:		

Bay West

Outfall Reconnaissance / Sample Collection Form

1 – Background		
City: St. Paul	Watershed: CRWD	Date: 5/18/10
Sub watershed: East Kittsondale		Time:
Watershed District: CRWD		Outfall ID: 6 (Sample location)
Temperature: 75		Inspector/Sampler Initials: JL
GPS Coordinates:	Lat: NA	Long: NA
Rainfall (inches):	24 Hr - 0	48 Hr - 0
Land use in Drainage Area (Circle choice(s))		
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):		
Comments/Notes:		

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch):			
Flow Present: Y / N	Flow Description (e.g. trickle):		
Material (e.g. RCP, steel, etc):	Shape:	Submerged: Y / N	In Soil / Water
Dimensions (inches)			
Diameter:	Depth:	Top Width:	Bottom Width:
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain):
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain):
Turbidity (Scale 1 (clear) – 10 (black): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 1 0
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain):
Comments/Notes: clear after sample pt 3

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain):
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain):
Vegetation (If yes describe extent):
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain):
Comments/Notes:

4 – Sample Collection		
Sample collected: Y / N	Source: Pool / Flow	Flow trap used: Y / N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s): DS-6	Collection Time(s): 11:50	
Comments/Notes:		

Bay West

OUTFALL RECONNAISSANCE / SAMPLE COLLECTION FORM

1 – Background		
City: St. Paul	Watershed: CRWD	Date: 5/18/10
Sub watershed: East Kittsondale		Time:
Watershed District: CRWD		Outfall ID: 7 (Sample location)
Temperature: 75		Inspector/Sampler Initials: JL
GPS Coordinates:	Lat: NA	Long: NA
Rainfall (inches):	24 Hr - 0	48 Hr - 0
Land use in Drainage Area (Circle choice(s))		
Industrial - Residential - Commercial - Agricultural - Open Space - Undeveloped - Other (explain):		
Comments/Notes:		

2 – Outfall			
Type (e.g. closed/open pipe or drainage ditch):			
Flow Present: Y / N	Flow Description (e.g. trickle):		
Material (e.g. RCP, steel, etc):	Shape:	Submerged: Y / N	In Soil / Water
Dimensions (inches)			
Diameter:	Depth:	Top Width:	Bottom Width:
Comments/Notes:			

3A – Physical Description Flowing Water
Odor (circle as appropriate): Sewage - Sulfide (rotten eggs) – Petroleum – Other (explain):
Color (circle as appropriate): Clear – Brown – Yellow – Green – Black – Orange – Other (explain):
Turbidity (Scale 1 (clear) – 10 (black)): 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9 – 10
Floating matter (circle as appropriate): Sewage – Petroleum – Suds – Other (explain):
Comments/Notes: Clear after sample pt 3

3B – Physical Description Non-Flowing Water (Flowing where appropriate)
Outfall condition (circle as appropriate): Corroded - Cracked – Peeling liner – Other (explain):
Deposits/Staining (circle as appropriate): Oil – Flow Line – Paint – Other (explain):
Vegetation (If yes describe extent):
Pool water quality (circle as appropriate): Odor – Suds – Non-trash floatables – Petroleum – Other (explain):
Comments/Notes:

4 – Sample Collection		
Sample collected: Y / N	Source: Pool / Flow	Flow trap used: Y / N
Flow trap type: OBM - Caulk Dam - Sand Bags - Other (describe):		
Sample ID(s): DS-7	Collection Time(s): 12:16	
Comments/Notes:		

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Appendix 3

Laboratory Analytical Reports

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MINNESOTA
MDH
DEPARTMENT OF HEALTH

Protecting, maintaining and improving the health of all Minnesotans

Report Date: 20-NOV-2009

Client Name: Bay West
Project Code: LN
Project Name: MISCELLANEOUS

Samples: 200934529 — 200934534

Report To: Killian Condon
Bay West
5 Empire Dr.
Saint Paul, MN 55101

The MDH Public Health Laboratory performs chemical, bacteriological and radiological analyses of environmental samples including water, waste water, sediment, air, soil and hazardous material. The laboratory provides testing services in accordance with standard operating procedures referencing approved methodology and defined in Standard Methods for the Examination of Water and Wastewater, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods:EPA SW-846, and 40 Code of Federal Regulation (CFR) parts 136, 141, and 261. In cases where analytes of interest do not have corresponding EPA approved methodology, the MDH Public Health Laboratory uses in-house methods that have undergone rigorous validation and documentation.

The results within this report are in compliance with the terms and conditions stated in the standard operation procedures, reference methodologies, and quality assurance project plan; unless otherwise narrated in the attached report.

Release of the data contained in this report has been authorized by laboratory management and is verified with the following signature affirmation. Thank you for using the MDH Public Health Laboratory. If you have any questions regarding this report, please call us at 651.201.5300.

Sincerely,

Suzanne Skorich

Suzanne Skorich
Environmental Laboratory, Quality Assurance Officer

Minnesota Department Of Health - Environmental Laboratory

Final Report - Client Copy- Report Of Analytical Results

Program: **LN**
Program Name: **MISCELLANEOUS**
Request No: **361562**

Date Received: **16-NOV-2009**
Date Generated: **20-NOV-2009**

Samples: 200934529 - 200934534

Date Reported: **20-NOV-2009**

Report To: Name: **Bay West**
Address: **5 Empire Dr.**
City, State, Zip: **Saint Paul, MN, 55101**

Bill ID	Project or Location Name	City,Town, Township
B2283	EAST KITTSONDALE	-

Sample Type	Collector Name
-	KILLIAN CONDON

Sample No: **200934529**

Receiving Comments: **P.O. 29966;SAMPLE ALL FOR E.COLI;9223 BY QUANTITRAY(MPN)**

Field No.	Collect Dt	Coll Time	Sampling Point
SS-1	16-NOV-2009	1000	1

****************************** SAMPLE RESULTS ******************************

Unit: BACTICHEM Reviewed By **PJB** on **20-NOV-09**

	Result Codes	Result	Rept Level	Units	Analysis Date
335 SM 9223 MPN -E Coli QT	>	2,400	1	MPN/100 ml	16-NOV-09

Sample No: **200934530**

Receiving Comments: -

Field No.	Collect Dt	Coll Time	Sampling Point
SS-2	16-NOV-2009	1405	2

****************************** SAMPLE RESULTS ******************************

Unit: BACTICHEM Reviewed By **PJB** on **20-NOV-09**

	Result Codes	Result	Rept Level	Units	Analysis Date
335 SM 9223 MPN -E Coli QT	>	2,400	1	MPN/100 ml	16-NOV-09

Minnesota Department Of Health - Environmental Laboratory

Final Report - Client Copy- Report Of Analytical Results

Program: **LN**
Program Name: **MISCELLANEOUS**
Request No: **361562**

Date Received: **16-NOV-2009**
Date Generated: **20-NOV-2009**

Samples: 200934529 - 200934534

Date Reported: **20-NOV-2009**

Report To: Name: **Bay West**
Address: **5 Empire Dr.**
City, State, Zip: **Saint Paul, MN, 55101**

Bill ID	Project or Location Name	City,Town, Township
B2283	EAST KITTSONDALE	-

Sample Type	Collector Name
-	KILLIAN CONDON

Sample No: **200934531**

Receiving Comments: -

Field No.	Collect Dt	Coll Time	Sampling Point
SS-3	16-NOV-2009	1430	3

****************************** SAMPLE RESULTS ******************************

Unit: BACTICHEM Reviewed By **PJB** on **20-NOV-09**

	Result Codes	Result	Rept Level	Units	Analysis Date
335 SM 9223 MPN -E Coli QT		710	1	MPN/100 ml	16-NOV-09

Sample No: **200934532**

Receiving Comments: -

Field No.	Collect Dt	Coll Time	Sampling Point
SS-4	16-NOV-2009	1115	4

****************************** SAMPLE RESULTS ******************************

Unit: BACTICHEM Reviewed By **PJB** on **20-NOV-09**

	Result Codes	Result	Rept Level	Units	Analysis Date
335 SM 9223 MPN -E Coli QT		650	1	MPN/100 ml	16-NOV-09

Minnesota Department Of Health - Environmental Laboratory

Final Report - Client Copy- Report Of Analytical Results

Program: **LN**
Program Name: **MISCELLANEOUS**
Request No: **361562**

Date Received: **16-NOV-2009**
Date Generated: **20-NOV-2009**

Samples: 200934529 - 200934534

Date Reported: **20-NOV-2009**

Report To: Name: **Bay West**
Address: **5 Empire Dr.**
City, State, Zip: **Saint Paul, MN, 55101**

Bill ID	Project or Location Name	City,Town, Township
B2283	EAST KITTSONDALE	-

Sample Type	Collector Name
-	KILLIAN CONDON

Sample No: **200934533**

Receiving Comments: -

Field No.	Collect Dt	Coll Time	Sampling Point
SS-5	16-NOV-2009	1305	5

****************************** SAMPLE RESULTS ******************************

Unit: BACTICHEM Reviewed By **PJB** on **20-NOV-09**

	Result Codes	Result	Rept Level	Units	Analysis Date
335 SM 9223 MPN -E Coli QT	>	2,400	1	MPN/100 ml	16-NOV-09

Sample No: **200934534**

Receiving Comments: -

Field No.	Collect Dt	Coll Time	Sampling Point
SS-7	16-NOV-2009	1240	7

****************************** SAMPLE RESULTS ******************************

Unit: BACTICHEM Reviewed By **PJB** on **20-NOV-09**

	Result Codes	Result	Rept Level	Units	Analysis Date
335 SM 9223 MPN -E Coli QT		12	1	MPN/100 ml	16-NOV-09

200934529 thru 200934534

MDH Chain of Custody

Minnesota Department of Health
Chemical Laboratory
717Delaware Street S.E.
Minneapolis, Minnesota 55440

Public Health Laboratory

№ 21277

MDH 1000

Client/Agency Bay West

Project Name East kittsondale

Site ID #1 - #7

Program Code (2 letters) ___

Contact Name Killian co[redacted]

Contact Phone # 651-291-3441

Report to Killianc@baywest.com

5 Empire Dr
St. Paul, Mn 55101

Address if Needed

Potential Hazard: Yes/No/Unknown (Circle One)

If Yes: Chemical/Biological/Other________(Circle One)

Standard/Civil/Criminal Chain of Custody (Circle One)

Sampled By (Print) Killian Condon

Affiliation Bay West

Sampler Signature

Phone 651-291-3441

Item #	Field ID	Sample Source/Point	Collection Date MM/DD/YYYY	Time (24 Hour Clock)	MDH Sample Number (Lab Use Only)	Matrix	General (None)	Nutrient (H2SO4)	Metals (HNO3)	VOC	Semivol	DRO	GRO	See attached	E.Coli	SAMPLER COMMENTS
1	SS1	#1	11/16/2009	10:00	34529	WT									X	P.O. 29966
2	SS-2	#2		14:05	530										X	Sample all for E.Coli
3	SS-3	#3		14:30	531										X	9223 by Quanti tray (MPN)
4	SS-4	#4		11:15	532										X	
5	SS-5	#5		13:05	533										X	
6	SS-7	#7		12:40	534										X	
7																
8																
9																
10																

SAMPLER COMMENTS:
RECEIVING COMMENTS:
LAB TEMP 3° C

SEAL INTACT: YES / NO

ITEM NO.	RELINQUISHED BY/AFFIALIATION		TIME	DATE	ACCEPTED BY/AFFIALIATION	TIME	DATE
	Killian Condon	BayWest	1545	11-16-2009	Sarah Tanguell	1540	11-16-09

RF017407

White Lab Copy   Yellow Client Copy   Pink Submitter Copy

INSTRUCTIONS FOR FILLING OUT THE MDH CHAIN OF CUSTODY FORM

1. **Potential Hazard** - Identify potential hazard by circling one of the choices (Yes, No, Unknown).
2. **If Yes** - Circle one of the choices.
3. **Standard/Civil/Other/Criminal Chain of Custody (C of C)** - The "Standard" Chain of Custody is used for routine samples. The "Civil" and "Criminal" Chain of Custodies are used for samples which have the potential to be used in court cases. There is an additional charge assigned for Civil and Criminal Chain of Custody samples.
4. **Client/Agency** - Print the Client/Agency who should receive the results.
5. **Project Name/#** - Print the project and/or cost code number here.

   Site ID - Print the site ID number.
6. **Program Code(2 letters)** - Budget Code found in the MDH Chemical Laboratory Handbook.
7. **Contact Name** -Who to contact regarding questions about the samples.
8. **Contact Phone** - Phone number of the contact person.
9. **MDH XXXXX** - Minnesota Department of Health C of C number. **DO NOT WRITE OVER OR CHANGE THIS NUMBER.**
10. **Report to** - Print the name and address of the client to receive the report only if these are special arrangement samples and/or have a LN program code.
11. **Sampled by (Print)**- Sampler(s) please print your name here.
12. **Affiliation/Phone** - Print Agency or Firm you are collecting these samples for.

    Phone - Sampler's phone number.
13. **Sampler Signature** - Sampler(s) please sign your name.
14. **Field** - Identification on bottles must match this identification (numbers or letters).
15. **Sampling Point/Source** - Words or numbers used to identify the site.
16. **Date** - Month, day and year collected (example 01/13/97).
17. **Time** - Military Time (24 hour clock) for the hour and minute the sample was collected. A.M. = 0000-1200; 0110 would be 1:10 a.m.
    P.M. = 1201-2400; 2200 would be 10:00 p.m.
18. **MDH Sample Number (Lab use only)**- **Please Do not write in this area.** This is for MDH lab use only.
19. **Matrix** - Sample type, i.e.,water,soil,air,fish,sludge,pig manure, etc.
20. **Number of Containers** - By bottle type the number of containers submitted for each site.
21. **Total # of Containers** - For each site please place the total number of bottles submitted.(??)
22. **See Attached** - Please place a check mark in the vertical boxed area for those samples which have an attached parameter sheet.(??)
23. **Slanted box area** - Those samples not requiring an additional parameter sheet, list the analytes and test codes requested for each sample. Please note: If there are numerous analytes an additional parameter sheet is requested.(??)
24. **Sampler Comments** - Please use this space to indicate any possible "HOT SAMPLES","GAS/FUEL OIL ODOR", or a METALS sample that was FILTERED.
    Use the second area of sampler comments if needed.
25. **Receiving Comments - DO NOT write in this space.**
26. **Lab Temp** - BOD or fecal coliform samples; record temperature reading from sampling cooler upon delivery to MDH Sample Entry area - thermometer is by the sink in room 502B.
27. **Seal intact Yes/No**- For MDH use only. **Do not write in this area.**
28. **Item No.**- Indicate which Field/Site# you have submitted to MDH Laboratory for analysis by item number.(??)
29. **Relinquished By/Affiliation** - Sampler signature and company/agency.
30. **Date** - Date sample relinquished.
31. **Time** - Time samples relinquished to the MDH Chemical Lab.
32. **Accepted By/Affiliation** - Courier delivering your samples to MDH Laboratory sign here. Also sign the" Relinquished By/ Affiliation" line when the samples are delivered to the MDH Chemical Laboratory. The samples will be signed for upon receipt at MDH Laboratory by a designated Chem Lab Chain of Custody Custodian.
33. **Date** -Date samples delivered or given to courier.
34. **Time** - Time samples delivered to MDH Laboratory or given to the courier.
35. **White Copy of form to Client** - White copy of the Chain of Custody with the results reported to the client.
    Yellow Copy of form to MDH Lab - For MDH Lab use.
    Pink Copy of Form to Sampler - Given to the person delivering the sample.

```
           AD-HOC JOB SUMMARY REPORT                18-DEC-2009 13:10
 -------------------------------------------------------------------------
| PROJECT NUMBER.JOB: 5540-09-01.1            ACCOUNT: 137-001             |
| DESCRIPTION: City of St. Paul: Storm Water Monitoring Administered       |
|               by BayWest                                                 |
| PROJECT START DATE:  8-DEC-2009   PROJECT END DATE: 31-DEC-2009          |
 -------------------------------------------------------------------------
SEND DATA TO: FUCHSDC
 =========================================================================
  E_KITTSON            #2                          ID NUM: 1892299
  MATRIX: LIQ        9-DEC-2009 09:30 TO:  9-DEC-2009 09:30  REP ID: A

  ECOLI-MPNT    E. coli                     2420 mpn/100 ml       A  NVA1
 =========================================================================

NOTE: All results have their current status displayed.
        Status A is authorized
               E is entered
               M is result entered and modified
               X is cancelled


        NVA:  Number of values averaged.

        ~ means approximate.  Value in non-quantitative range.
```

```
           AD-HOC JOB SUMMARY REPORT               25-FEB-2010 11:55
 -----------------------------------------------------------------------
| PROJECT NUMBER.JOB: 5540-09-01.2            ACCOUNT: 137-001          |
| DESCRIPTION: City of St. Paul: Storm Water Monitoring Administered    |
|              by BayWest                                               |
| PROJECT START DATE:  8-DEC-2009   PROJECT END DATE: 31-DEC-2010       |
 ----------------------------------------------------------------------
SEND DATA TO: FUCHSDC
 ========================================================================
  E_KITTSON  SS-3       South                          ID NUM: 1907718
  MATRIX: LIQ        19-FEB-2010 14:00 TO: 19-FEB-2010 14:00  REP ID: A

  ECOLI-MPNT    E. coli                    14 mpn/100 ml         E  NVA1
 ========================================================================
  E_KITTSON  SS-3       West                           ID NUM: 1907719
  MATRIX: LIQ        19-FEB-2010 13:55 TO: 19-FEB-2010 13:55  REP ID: A

  ECOLI-MPNT    E. coli                    1300 mpn/100 ml       E  NVA1
 ========================================================================
  E_KITTSON  SS-2                                      ID NUM: 1907720
  MATRIX: LIQ        19-FEB-2010 13:30 TO: 19-FEB-2010 13:30  REP ID: A

  ECOLI-MPNT    E. coli                    2 mpn/100 ml          E  NVA1
 ========================================================================

NOTE: All results have their current status displayed.
      Status A is authorized
             E is entered
             M is result entered and modified
             X is cancelled


        NVA:  Number of values averaged.

        ~ means approximate.  Value in non-quantitative range.
```

```
           AD-HOC JOB SUMMARY REPORT                 8-JUN-2010 11:27
 ---------------------------------------------------------------------
| PROJECT NUMBER.JOB: 5540-09-01.3            ACCOUNT: 137-001          |
| DESCRIPTION: City of St. Paul: Storm Water Monitoring Administered    |
|              by BayWest                                               |
| PROJECT START DATE:  8-DEC-2009   PROJECT END DATE: 31-DEC-2010       |
 ---------------------------------------------------------------------
SEND DATA TO: FUCHSDC
 ==========================================================================
                       DS-1                         ID NUM: 1928371
  MATRIX: LIQ       18-MAY-2010 10:20 TO: 18-MAY-2010 10:20  REP ID: A

  ECOLI-MPNT    E. coli                     32800 mpn/100 ml      A  NVA1
 ==========================================================================
                       DS-2                         ID NUM: 1928372
  MATRIX: LIQ       18-MAY-2010 10:36 TO: 18-MAY-2010 10:36  REP ID: A

  ECOLI-MPNT    E. coli                     137 mpn/100 ml        A  NVA1
 ==========================================================================
                       DS-3                         ID NUM: 1928373
  MATRIX: LIQ       18-MAY-2010 11:04 TO: 18-MAY-2010 11:04  REP ID: A

  ECOLI-MPNT    E. coli                     866400 mpn/100 ml     A  NVA1
 ==========================================================================
                       DS-4                         ID NUM: 1928374
  MATRIX: LIQ       18-MAY-2010 11:14 TO: 18-MAY-2010 11:14  REP ID: A

  ECOLI-MPNT    E. coli                     36 mpn/100 ml         A  NVA1
 ==========================================================================
                       DS-5                         ID NUM: 1928375
  MATRIX: LIQ       18-MAY-2010 11:40 TO: 18-MAY-2010 11:40  REP ID: A

  ECOLI-MPNT    E. coli                     <1 mpn/100 ml         A  NVA1
 ==========================================================================
                       DS-6                         ID NUM: 1928376
  MATRIX: LIQ       18-MAY-2010 11:50 TO: 18-MAY-2010 11:50  REP ID: A

  ECOLI-MPNT    E. coli                     4 mpn/100 ml          A  NVA1
 ==========================================================================
                       DS-7                         ID NUM: 1928377
  MATRIX: LIQ       18-MAY-2010 12:16 TO: 18-MAY-2010 12:16  REP ID: A

  ECOLI-MPNT    E. coli                     2000 mpn/100 ml       A  NVA1
 ==========================================================================

NOTE: All results have their current status displayed.
        Status A is authorized
               E is entered
               M is result entered and modified
               X is cancelled


        NVA:  Number of values averaged.

        ~ means approximate.  Value in non-quantitative range.
```

```
           AD-HOC JOB SUMMARY REPORT             25-FEB-2010 11:55
 -------------------------------------------------------------------------
| PROJECT NUMBER.JOB: 5540-09-01.2            ACCOUNT: 137-001            |
| DESCRIPTION: City of St. Paul: Storm Water Monitoring Administered      |
|              by BayWest                                                 |
| PROJECT START DATE:  8-DEC-2009   PROJECT END DATE: 31-DEC-2010         |
 -------------------------------------------------------------------------
SEND DATA TO: FUCHSDC
 ==========================================================================
  E_KITTSON  SS-3       South                       ID NUM: 1907718
  MATRIX: LIQ       19-FEB-2010 14:00 TO: 19-FEB-2010 14:00  REP ID: A

  ECOLI-MPNT    E. coli                   14 mpn/100 ml         E  NVA1
 ==========================================================================
  E_KITTSON  SS-3       West                        ID NUM: 1907719
  MATRIX: LIQ       19-FEB-2010 13:55 TO: 19-FEB-2010 13:55  REP ID: A

  ECOLI-MPNT    E. coli                   1300 mpn/100 ml       E  NVA1
 ==========================================================================
  E_KITTSON  SS-2                                   ID NUM: 1907720
  MATRIX: LIQ       19-FEB-2010 13:30 TO: 19-FEB-2010 13:30  REP ID: A

  ECOLI-MPNT    E. coli                   2 mpn/100 ml          E  NVA1
 ==========================================================================

NOTE: All results have their current status displayed.
      Status A is authorized
             E is entered
             M is result entered and modified
             X is cancelled


        NVA:  Number of values averaged.

        ~ means approximate.  Value in non-quantitative range.
```

```
           AD-HOC JOB SUMMARY REPORT                18-DEC-2009 13:10
 -------------------------------------------------------------------------
| PROJECT NUMBER.JOB: 5540-09-01.1             ACCOUNT: 137-001           |
| DESCRIPTION: City of St. Paul: Storm Water Monitoring Administered      |
|              by BayWest                                                 |
| PROJECT START DATE:  8-DEC-2009   PROJECT END DATE: 31-DEC-2009         |
 -------------------------------------------------------------------------
SEND DATA TO: FUCHSDC
 ==========================================================================
  E_KITTSON            #2                          ID NUM: 1892299
  MATRIX: LIQ        9-DEC-2009 09:30 TO:  9-DEC-2009 09:30  REP ID: A

  ECOLI-MPNT    E. coli                    2420 mpn/100 ml       A  NVA1
 ==========================================================================

NOTE: All results have their current status displayed.
        Status A is authorized
               E is entered
               M is result entered and modified
               X is cancelled


        NVA:  Number of values averaged.

        ~ means approximate.  Value in non-quantitative range.
```

```
          AD-HOC JOB SUMMARY REPORT                 8-JUN-2010 11:27
 -----------------------------------------------------------------------
| PROJECT NUMBER.JOB: 5540-09-01.3            ACCOUNT: 137-001          |
| DESCRIPTION: City of St. Paul: Storm Water Monitoring Administered    |
|              by BayWest                                               |
| PROJECT START DATE:  8-DEC-2009   PROJECT END DATE: 31-DEC-2010       |
 -----------------------------------------------------------------------
SEND DATA TO: FUCHSDC
 ========================================================================
                       DS-1                           ID NUM: 1928371
 MATRIX: LIQ        18-MAY-2010 10:20 TO: 18-MAY-2010 10:20  REP ID: A

 ECOLI-MPNT    E. coli                     32800 mpn/100 ml      A  NVA1
 ========================================================================
                       DS-2                           ID NUM: 1928372
 MATRIX: LIQ        18-MAY-2010 10:36 TO: 18-MAY-2010 10:36  REP ID: A

 ECOLI-MPNT    E. coli                     137 mpn/100 ml        A  NVA1
 ========================================================================
                       DS-3                           ID NUM: 1928373
 MATRIX: LIQ        18-MAY-2010 11:04 TO: 18-MAY-2010 11:04  REP ID: A

 ECOLI-MPNT    E. coli                     866400 mpn/100 ml     A  NVA1
 ========================================================================
                       DS-4                           ID NUM: 1928374
 MATRIX: LIQ        18-MAY-2010 11:14 TO: 18-MAY-2010 11:14  REP ID: A

 ECOLI-MPNT    E. coli                     36 mpn/100 ml         A  NVA1
 ========================================================================
                       DS-5                           ID NUM: 1928375
 MATRIX: LIQ        18-MAY-2010 11:40 TO: 18-MAY-2010 11:40  REP ID: A

 ECOLI-MPNT    E. coli                     <1 mpn/100 ml         A  NVA1
 ========================================================================
                       DS-6                           ID NUM: 1928376
 MATRIX: LIQ        18-MAY-2010 11:50 TO: 18-MAY-2010 11:50  REP ID: A

 ECOLI-MPNT    E. coli                     4 mpn/100 ml          A  NVA1
 ========================================================================
                       DS-7                           ID NUM: 1928377
 MATRIX: LIQ        18-MAY-2010 12:16 TO: 18-MAY-2010 12:16  REP ID: A

 ECOLI-MPNT    E. coli                     2000 mpn/100 ml       A  NVA1
 ========================================================================

NOTE: All results have their current status displayed.
        Status A is authorized
               E is entered
               M is result entered and modified
               X is cancelled


        NVA:  Number of values averaged.

        ~ means approximate.  Value in non-quantitative range.
```