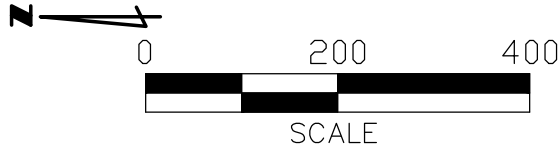


CITY OF FRONTENAC

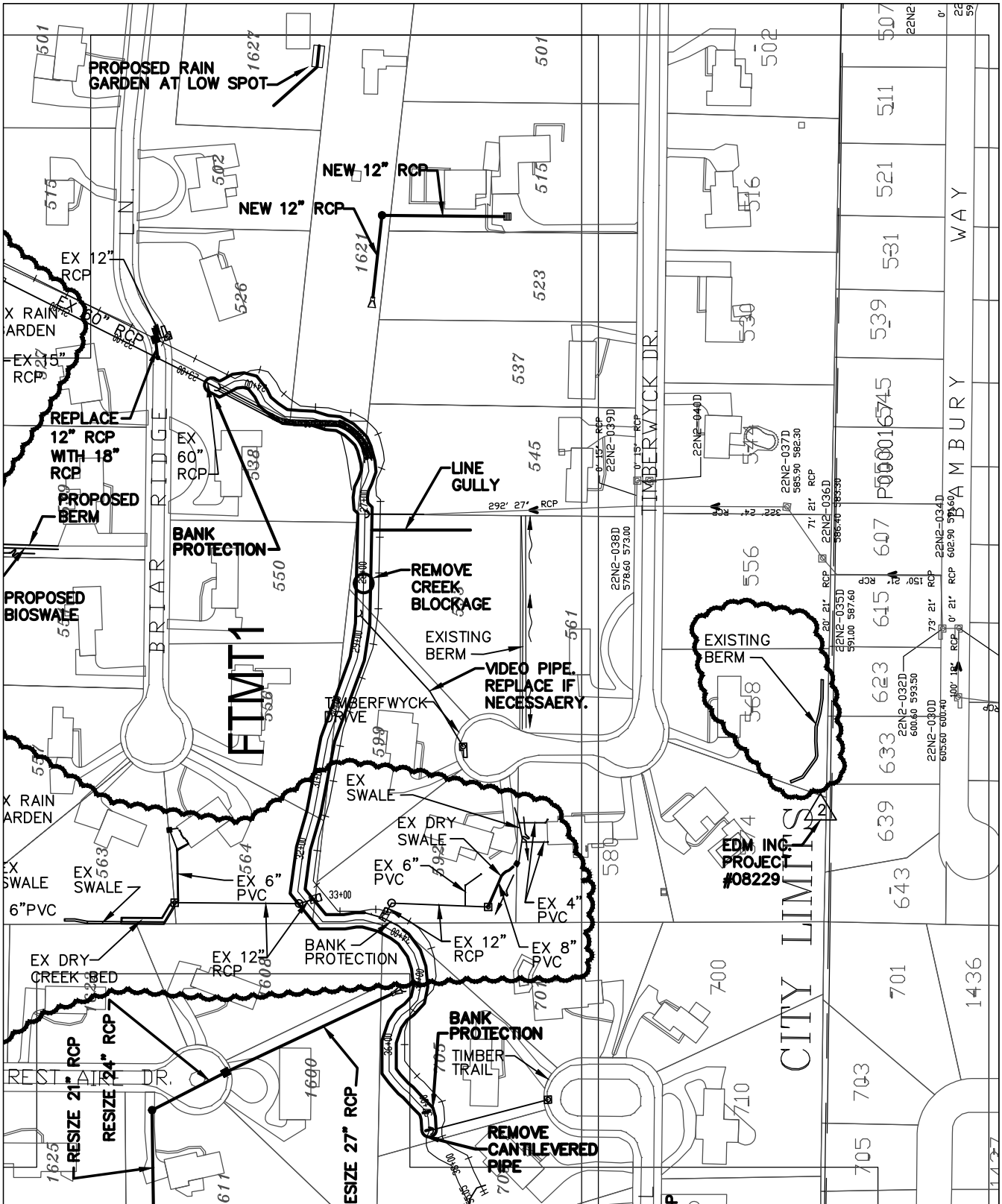
STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
 Consulting Engineers
 220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



UPDATE NO.	DATE
1	11/12/08
2	4/5/13

FIGURE NO. 1-1A



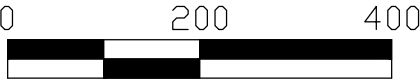
CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN



EDM Incorporated
Consulting Engineers

220 Mansion House Center
St. Louis, Missouri 63102
Phone (314) 231-5485 Fax (314) 231-8167
edm@edm-inc.com



SCALE

UPDATE NO. _____

DATE _____



4/5/13

FIGURE NO. 1-1B

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name:	FIGURE 1-1 OVERLAND FLOW				
Solutions By:	EDM INC.			DATE: 10/18/2013	
<hr/>					
Problem:	Yard erosion at Q48 - 539 Briar Ridge				
Strategy:	1) Install berm to direct water to existing swale on back property line. 2) Add Bioswale to infiltrate runoff and protect natural channels.				
				1) Alternative 1	2) Alternative 1
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's
New Berm	LF	97	\$25	\$2,425	\$2,425
Regrade Back Property Line	LS	1	\$3,000	\$3,000	\$3,000
Bioswale	LF	98	\$90	\$0	\$8,820
Subtotal				\$5,425	\$14,245
Total Benefit Points				30	40
Individual Benefit Point Ratio				2.64	1.33
Estimated Increased Property Values				\$2,000	\$3,000
<hr/>					
Problem:	Street ponding at low spot on Briar Ridge Ln.				
Strategy:	1) Replace under sized 12" RCP with new 18" RCP				
				1) Alternative 1	2) Alternative 1
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's
Double Inlet	EA	1	\$3,150	\$3,150	\$3,150
18" RCP CLASS III	LF	26	\$129	\$3,361	\$3,361
Subtotal				\$6,511	\$6,511
Total Benefit Points				25	25
Individual Benefit Point Ratio				1.83	1.83
Estimated Increased Property Values				\$0	\$0
<hr/>					
Problem:	Yard ponding at Q313 - 1627 N.Geyer Rd. and driveway ponding at Q401 - 515 Timberwyck Dr.				
Strategy:	1) Add Rain Garden to infiltrate runoff and protect natural channels.				
				1) Alternative 1	2) Alternative 1
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's
Single Inlet	EA	1	\$1,850	\$1,850	\$1,850
Manhole	EA	1	\$1,500	\$1,500	\$1,500
12" RCP CLASS III	LF	286	\$116	\$33,193	\$33,193
12" FES	EA	1	\$1,100	\$1,100	\$1,100
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000
Subtotal				\$1,850	\$1,850
Total Benefit Points				45	45
Individual Benefit Point Ratio				11.60	11.60
Estimated Increased Property Values				\$2,000	\$2,000
<hr/>					
Total				\$13,786	\$22,606
Utility Relocation			20%	\$2,757	\$4,521
Clearing			5%	\$689	\$1,130
Mobilization			4%	\$551	\$904
Total with Percent Allowances				\$17,784	\$29,162
Contingency			25%	\$4,446	\$7,291
Probable Construction Cost Estimate				\$22,230	\$36,453
Design Engineering and Geotechnical			30%	\$20,000	\$20,000
Total Conceptual Cost Estimate				\$43,000	\$57,000
Total Benefit Points				150	160
Total Benefit Point Ratio				3.49	2.80

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 1-1 OVERLAND

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-1 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 1-1 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-1 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
	Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65			
	Basement (1 lot per structure)*	250	0	200		50			
	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50			
	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N			
	Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25			
	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12			
	Yard Flooding (1 per lot) <i>Address: Q401-515 Timberwyck; Q313-1627 N. Geyer</i>	10	2	6		0		20	
	2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
	Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25			
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address: Briar Ridge Ln.</i>	No. Ponds:		1	Points/pond:	5		5	
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:	20			
	2.3. Yard Erosion (1 per lot) <i>Address: Q48-539 Briar Ridge</i>	No. Lots:		1	Points/lot:	10		10	
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age							0	
			TOTAL PROBLEM POINTS						35

FIGURE 1-1 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-1 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	2	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	1.48	PER 100 LF	10	15
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				5
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			5
TOTAL SOLUTION POINTS					125
TOTAL BENEFIT POINTS					160

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

57

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

2.80

Place "X" in one box below:

MSD Project
 Project by Others

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 1-1 - CHANNEL FTMT1
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Creek incision, bank erosion and gully formation SR 3, MSD 18, Q400, Q49, Q47, Q44, Q406, 564, 558, 550, 538, 526 Briar Ridge Lane and 545, 593, 599, 592 Timberwyck, 701 & 705 Timber Trail, and 1600 & 1609 Forest Aire Dr., Yard Flooding at Q399 599 Timberwyck

Strategy: 1) Install bank protection, Station 23+50 to 37+25 (1,375LP). Remove cantilevered pipe at Station 37+25 Line 150' long gully at station 27+00 (right descending bank) with blocks and pavers. Remove blockage in creek at station 28+00, clean out and video storm pipe at station 28+50, replace if necessary.

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (L)	LF	1375	\$300	\$412,500	\$0
Soft stabilization (L)	LF	1375	\$200	\$0	\$275,000
Geomorphic Study	Ea.	3	\$10,000	\$0	\$30,000
Remove pipe	Ea.	1	\$1,000	\$1,000	\$1,000
Line gully	LF	150	\$35	\$5,250	\$5,250
Remove blockage	Ea.	1	\$1,000	\$1,000	\$1,000
Clean out pipe	Ea.	1	\$2,000	\$2,000	\$2,000
Video pipe	Ea.	1	\$2,000	\$2,000	\$2,000
12" RCP Class III	LF	158	\$54	\$8,532	\$8,532
Subtotal				\$423,750	\$316,250
Total				\$423,750	\$316,250
Utility Relocation			20%	\$84,750	\$63,250
Clearing			5%	\$21,188	\$15,813
Mobilization			4%	\$16,950	\$12,650
Total with Percent Allowances				\$546,638	\$407,963
Contingency			25%	\$136,659	\$101,991
Probable Construction Cost Estimate				\$683,297	\$509,953
Design Engineering and Geotechnical			30%	\$204,989	\$152,986
Total Conceptual Cost Estimate				\$889,000	\$663,000
Benefit Points				615	1,100
Benefit/Cost Ratio				0.69	1.66

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-1 Channel FTMT1 - Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot						
1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots			
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 1-1 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-1 Channel FTMT1 - Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q399 599 Timberwyck</i>	10	1	6		0		10
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:			Points/pond:		5		
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20		
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:			Points/lot:		10		
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
	TOTAL PROBLEM POINTS							10	

FIGURE 1-1 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-1 Channel FTMT1 - Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	12	Points per Add'l Proj.:	50 600
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	28	PER 100 LF	10	280
	Riffle Pool Complex	14	PER 100 LF	10	140
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements			13	5
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		Yes	65
TOTAL SOLUTION POINTS					1090
TOTAL BENEFIT POINTS					1100

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

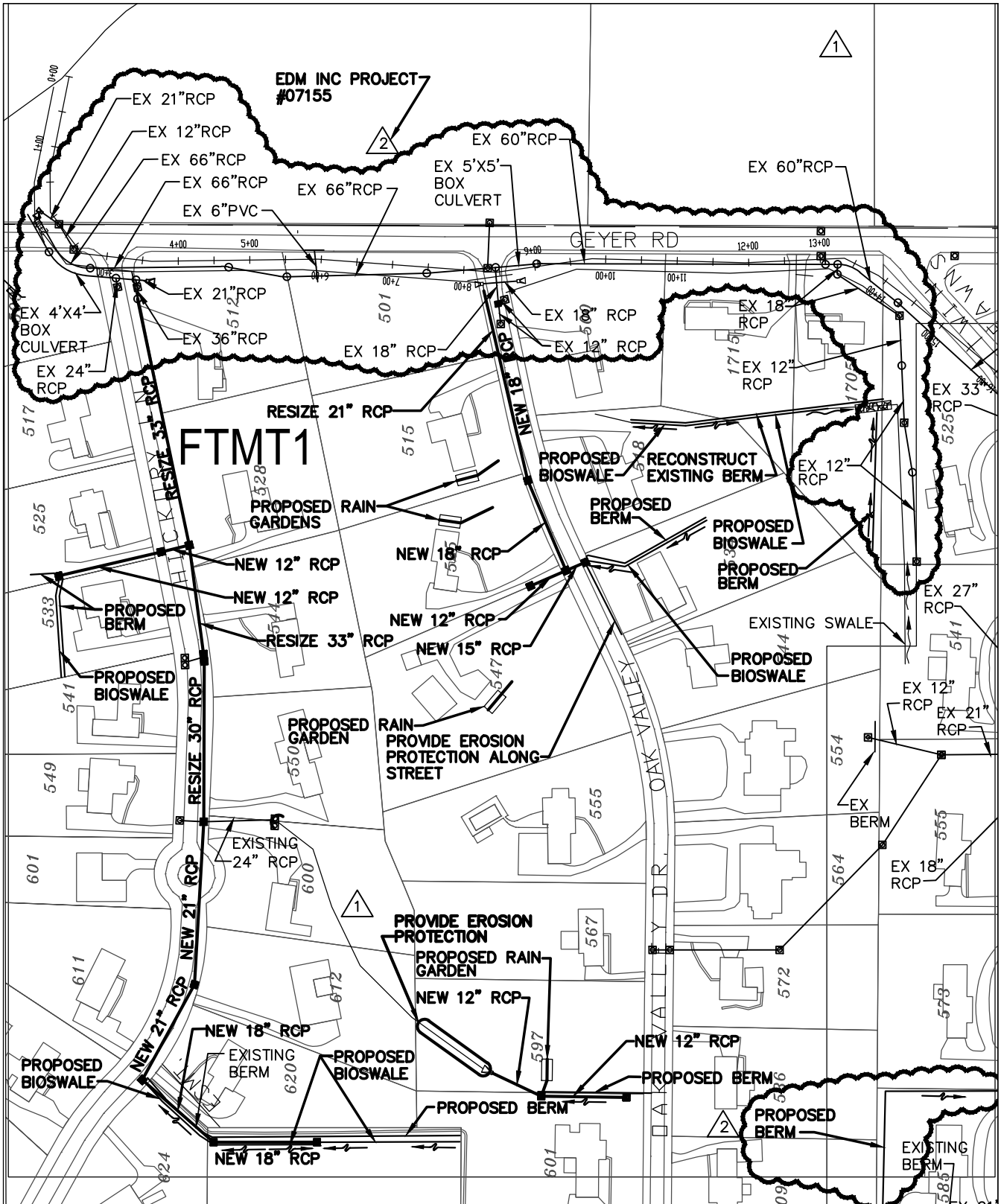
TOTAL COST IN THOUSANDS= **\$663**

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= **1.66**

Place "X" in one box below:

MSD Project
 Project by Others

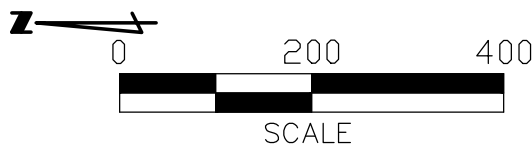
FIGURE 1-1 CHANNEL Alt 2



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
 Consulting Engineers
 220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



UPDATE NO.	DATE
1	11/12/08
2	4/5/13

FIGURE NO. 1-2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 1-2 OVERLAND FLOW
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard ponding at Q260 - 620 Hickory Ln and yard ponding and erosion at Q248 - 531 Hickory Ln.

Strategy: 1) Install berm to catch overland flow and direct to inlet and pipe system. 2) Add Bioswale to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Area Inlet	EA	3	\$1,750	\$5,250	\$5,250
Single Inlet	EA	5	\$1,850	\$9,250	\$9,250
Double Inlet	EA	1	\$3,150	\$3,150	\$3,150
12" RCP CLASS III	LF	187	\$116	\$21,703	\$21,703
18" RCP CLASS III	LF	277	\$129	\$35,811	\$35,811
21" RCP CLASS III	LF	380	\$137	\$52,018	\$52,018
30" RCP CLASS III	LF	224	\$163	\$36,566	\$36,566
33" RCP CLASS III	LF	531	\$174	\$92,622	\$92,622
New Berm	LF	764	\$25	\$19,100	\$19,100
Bioswale	LF	591	\$90	\$0	\$53,190
Subtotal				\$275,470	\$328,660
Total Benefit Points				55	114
Individual Benefit Point Ratio				0.10	0.17
Estimated Increased Property Values				\$9,000	\$10,000

Problem: Yard ponding and yard erosion at Q337-597 Oak Valley Dr.

Strategy: 1) Install berm to catch overland flow and direct to inlet and pipe system. 2) Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Area Inlet	EA	2	\$1,750	\$3,500	\$3,500
12" RCP CLASS III	LF	195	\$116	\$22,632	\$22,632
12" FES	EA	5	\$1,100	\$5,500	\$5,500
Erosion Protection	LF	111	\$100	\$11,100	\$11,100
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$42,732	\$52,732
Total Benefit Points				20	20
Individual Benefit Point Ratio				0.22	0.18
Estimated Increased Property Values				\$0	\$2,000

Problem: Yard ponding and erosion at MSD7 - 525 Twin Fawns Rd.

Strategy: 1) Install inlets and pipe system to collect water.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Inlet	EA	2	\$1,850	\$3,700	\$3,700
Manhole	EA	2	\$1,500	\$3,000	\$3,000
12" RCP CLASS III	LF	347	\$116	\$40,273	\$40,273
15" RCP CLASS III	LF	115	\$124	\$14,292	\$14,292
15" FES	EA	1	\$1,200	\$1,200	\$1,200
Erosion Protection	LS	1	\$2,000	\$2,000	\$2,000
Subtotal				\$64,465	\$64,465
Total Benefit Points				40	40
Individual Benefit Point Ratio				0.30	0.30
Estimated Increased Property Values				\$5,000	\$5,000

Total **\$382,667** **\$445,857**

Utility Relocation	20%	\$76,533	\$89,171
Clearing	5%	\$19,133	\$22,293
Mobilization	4%	\$15,307	\$17,834
Total with Percent Allowances		\$493,640	\$575,155
Contingency	25%	\$123,410	\$143,789
Probable Construction Cost Estimate		\$617,050	\$718,944
Design Engineering and Geotechnical	30%	\$185,115	\$215,683
Total Conceptual Cost Estimate		\$803,000	\$935,000
Total Benefit Points		180	249
Total Benefit Point Ratio		0.22	0.27

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-2 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 1-2 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-2 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING							
	2.1.1. Structure Flooding							
	Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
	Basement (1 lot per structure)*	250	0	200		50		
	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
	Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
	Yard Flooding (1 per lot) <i>Address: Q260-620 Hickory; Q248-531 Hickory; MSD7-525 Twin Fawns; Q337-597 Oak Valley Dr.</i>	10	4	6		0		40
	2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
	Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:	0	Points/pond:		5		
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20		
	2.3. Yard Erosion (1 per lot) <i>Address: Q248-531 Hickory; MSD7-525 Twin Fawns; Q337-597 Oak Valley Dr.</i>	No. Lots:	3	Points/lot:		10		30
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
	Points for Age							0
	TOTAL PROBLEM POINTS							70

FIGURE 1-2 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-2 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	2	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	5.91	PER 100 LF	10	59
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			10
TOTAL SOLUTION POINTS					179
TOTAL BENEFIT POINTS					249

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

935

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.27

Place "X" in one box below:

MSD Project
 Project by Others

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 1-2 OVERLAND FLOW STRUCTURAL FLOODING
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Basement Flooding 585 Twin Fawns

Strategy: 1) Install berm to catch overland flow and direct to inlet and pipe system.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's
New Berm	LF	316	\$25	\$7,900	\$7,900
Subtotal				\$7,900	\$7,900
Total Benefit Points				250	250
Individual Benefit Point Ratio				15.10	15.10

Problem: Yard ponding at Q342 - 547 Oak Valley Dr., Q340 - 518 Oak Valley Dr., Q314 - 1705 Geyer Rd. and yard erosion at Q338 - 534 Oak Valley Dr. and yard ponding and garage flooding at Q341 - 525 Oak Valley Dr.

Strategy: 1) Install berm to catch overland flow and direct to inlet and pipe system. 2) Add Bioswale and Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's
Single Area Inlet	EA	5	\$1,750	\$8,750	\$8,750
12" RCP CLASS III	LF	54	\$116	\$6,267	\$6,267
15" RCP CLASS III	LF	29	\$124	\$3,604	\$3,604
18" RCP CLASS III	LF	389	\$129	\$50,290	\$50,290
21" RCP CLASS III	LF	21	\$137	\$2,875	\$2,875
New Berm	LF	538	\$25	\$13,450	\$13,450
New Swale	LF	265	\$18	\$4,770	\$4,770
Rain Garden	EA	3	\$10,000	\$0	\$30,000
Bioswale	LF	460	\$90	\$0	\$41,400
Subtotal				\$90,006	\$161,406
Total Benefit Points				160	221
Individual Benefit Point Ratio				0.85	0.65
Estimated Increased Property Values				\$9,000	\$13,000

Total **\$97,906** **\$169,306**

Utility Relocation	20%	\$19,581	\$33,861
Clearing	5%	\$4,895	\$8,465
Mobilization	4%	\$3,916	\$6,772

Total with Percent Allowances **\$126,299** **\$218,405**

Contingency 25% \$31,575 \$54,601

Probable Construction Cost Estimate **\$157,873** **\$273,006**

Design Engineering and Geotechnical 30% \$47,362 \$81,902

Total Conceptual Cost Estimate **\$206,000** **\$355,000**

Total Benefit Points **410** **506**

Total Benefit Point Ratio **1.99** **1.43**

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-2 Structural with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 1-2 STRUCURAL ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-2 Structural with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)* <i>Address: 585 Twin Fawns</i>	250	1	200		50		250
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address: Q341-525 Oak Valley</i>	100	1	75		25		100
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q342-547 Oak Valley; Q340-518 Oak Valley; Q314-1705 Geyer; Q341-525 Oak Valley</i>	10	4	6		0		40
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:	0	Points/pond:		5		
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20		
		2.3. Yard Erosion (1 per lot) <i>Address: QQ338-534 Oak Valley</i>	No. Lots:	1	Points/lot:		10		10
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							0
	TOTAL PROBLEM POINTS								400

FIGURE 1-2 STRUCURAL ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-2 Structural with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	6.1	PER 100 LF	10	61
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			35
TOTAL SOLUTION POINTS					106
TOTAL BENEFIT POINTS					506

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

355

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.43

Place "X" in one box below:

MSD Project

Project by Others

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 1-2 - CHANNEL FTMT1
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Creek incision/erosion SR2, MSD 19, Q242, Q336 - 512 Hickory Lane and 501 Oak Valley Drive. Erosion at Hickory Lane and Geyer and at Oak Valley Drive and Geyer and garage threatened by erosion - Q336.

Strategy: 1) Install bank protection from station 3+70 to 8+30 (460 LF)

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (L)	LF	460	\$300	\$138,000	\$0
Soft stabilization (L)	LF	460	\$200	\$0	\$92,000
Geomorphic Study	Ea.	1	\$10,000	\$0	\$10,000
Subtotal				\$138,000	\$102,000
Total				\$138,000	\$102,000
Utility Relocation			20%	\$27,600	\$20,400
Clearing			5%	\$6,900	\$5,100
Mobilization			4%	\$5,520	\$4,080
Total with Percent Allowances				\$178,020	\$131,580
Contingency			25%	\$44,505	\$32,895
Probable Construction Cost Estimate				\$222,525	\$164,475
Design Engineering and Geotechnical			30%	\$66,758	\$49,343
Total Conceptual Cost Estimate				\$290,000	\$214,000
Benefit Points				94	254
Benefit/Cost Ratio				0.32	1.19

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-2 Channel FTMT1, Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: Geyer <i>Address: Near Oakvalley and Near Hickory</i>		35		25		6	2	12		
Residential Road: Hickory <i>Address: 512 Hickory</i>		20		12	1	3		12		

FIGURE 1-2 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-2 Channel FTMT1, Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		Points/pond:		5			
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20			
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		Points/lot:		10			
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
TOTAL PROBLEM POINTS							24		

FIGURE 1-2 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-2 Channel FTMT1, Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	1	Points per Add'l Proj.:	50 50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	10	PER 100 LF	10	100
	Riffle Pool Complex	5	PER 100 LF	10	50
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements	2			20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		YES	10
TOTAL SOLUTION POINTS					230
TOTAL BENEFIT POINTS					254

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

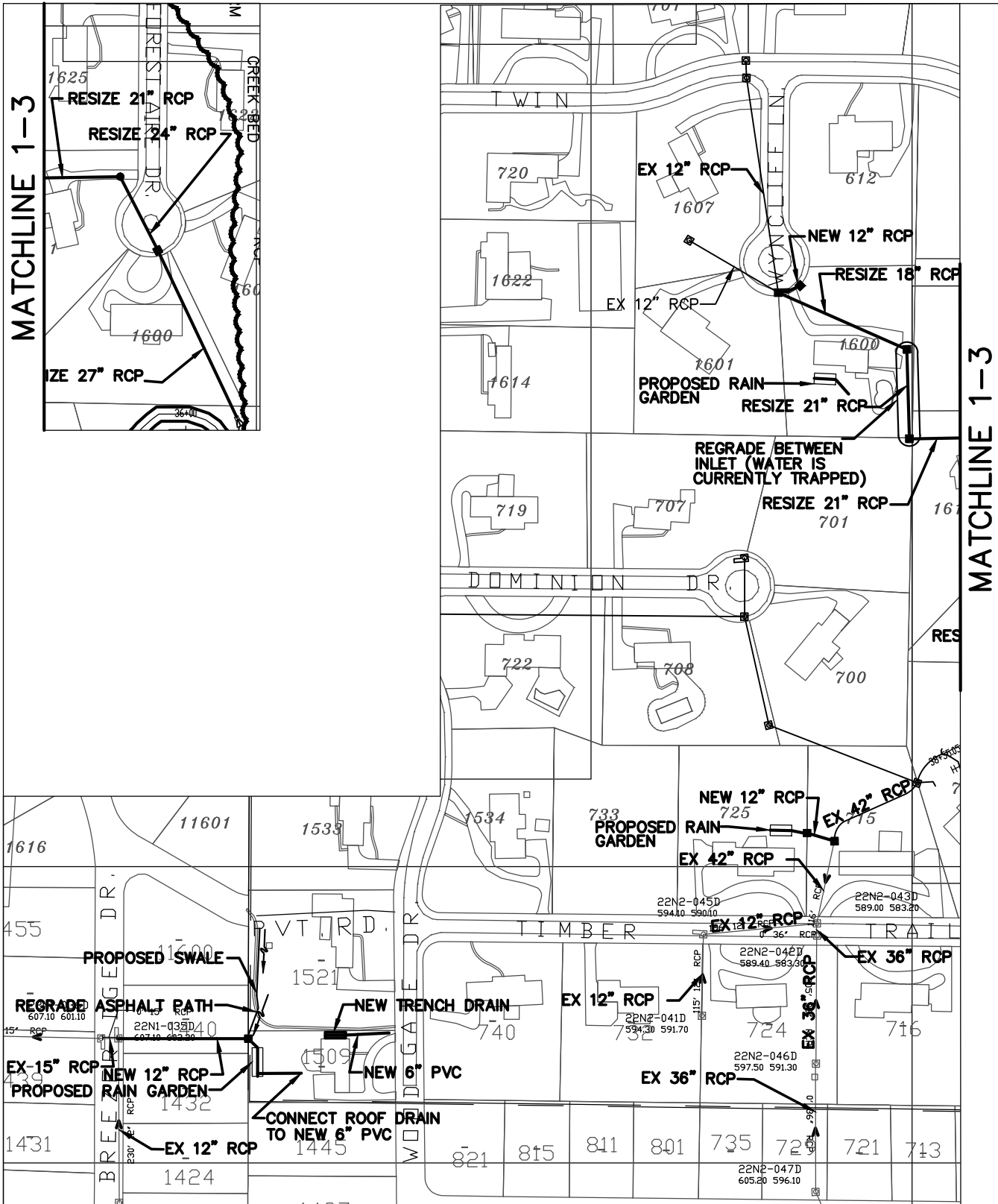
TOTAL COST IN THOUSANDS= 214

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 1.19

Place "X" in one box below:

MSD Project
 Project by Others

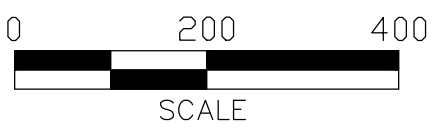
FIGURE 1-2 CHANNEL Alt 2



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM Incorporated
 Consulting Engineers
 220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



UPDATE NO. _____ DATE _____
 FIGURE NO. 1-3

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 1-3 OVERLAND FLOW
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard ponding at Q402 - 725 Timber Trail
Strategy: 1) Install inlet and pipe system to collect water. Attach to existing system. 2) Add rain garden to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Area Inlet	EA	2	\$1,750	\$3,500	\$3,500
12" RCP CLASS III	LF	40	\$116	\$4,642	\$4,642
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$8,142	\$18,142
Total Benefit Points				30	35
Individual Benefit Point Ratio				1.76	0.92

Estimated Increased Property Values **\$0** **\$2,000**

Problem: Yard ponding at Q436 - 1600 Wynclyff Ln.
Strategy: 1) Install inlet and pipe system to collect water. Replace undersized existing system. 2) Add rain garden to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Area Inlet	EA	3	\$1,750	\$5,250	\$5,250
Single Inlet	EA	1	\$1,850	\$1,850	\$1,850
Double Inlet	EA	1	\$3,150	\$3,150	\$3,150
Manhole	EA	1	\$1,500	\$1,500	\$1,500
12" RCP CLASS III	LF	17	\$116	\$1,973	\$1,973
18" RCP CLASS III	LF	196	\$129	\$25,339	\$25,339
21" RCP CLASS III	LF	302	\$137	\$41,341	\$41,341
24" RCP CLASS III	LF	116	\$144	\$16,646	\$16,646
27" RCP CLASS III	LF	257	\$150	\$38,578	\$38,578
27" FES	EA	1	\$1,700	\$1,700	\$1,700
Erosion Protection	LS	1	\$3,000	\$3,000	\$3,000
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$140,327	\$150,327
Total Benefit Points				30	35
Individual Benefit Point Ratio				0.10	0.11

Estimated Increased Property Values **\$0** **\$2,000**

Problem: Yard ponding at Q434 - 1521 Woodgate Dr. and Q432 - 1509 Woodgate Dr.
Strategy: 1) Install inlet and pipe system to collect water. Regrade swale by asphalt path and direct towards new inlet. Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Area Inlet	EA	1	\$1,750	\$1,750	\$1,750
12" RCP CLASS III	LF	181	\$116	\$21,007	\$21,007
6" PVC	LF	61	\$24	\$1,464	\$1,464
Trench Drain	LF	28	\$100	\$2,800	\$2,800
Grading along asphalt path	LF	152	\$20	\$3,040	\$3,040
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000
Subtotal				\$40,061	\$40,061
Total Benefit Points				45	45
Individual Benefit Point Ratio				0.54	0.54

Estimated Increased Property Values **\$5,000** **\$5,000**

Total **\$188,530** **\$208,530**

Utility Relocation	20%	\$37,706	\$41,706
Clearing	5%	\$9,427	\$10,427
Mobilization	4%	\$7,541	\$8,341
Total with Percent Allowances		\$243,204	\$269,004
Contingency	25%	\$60,801	\$67,251
Probable Construction Cost Estimate		\$304,005	\$336,255
Design Engineering and Geotechnical	30%	\$91,201	\$100,876
Total Conceptual Cost Estimate		\$396,000	\$438,000
Total Benefit Points		160	180
Total Benefit Point Ratio		0.40	0.41

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 1-3 OVERLAND

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-3 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 1-3 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-3 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q402-725 Timber Trail; Q436-Wyncliff; Q434-1521 Woodgate; Q432-1509 Woodgate</i>	10	4	6		0		40
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:	5		
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:	20		
		2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		0	Points/lot:	10		
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
Points for Age							0		
TOTAL PROBLEM POINTS							40		

FIGURE 1-3 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 1-3 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	2	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	1.5	PER 100 LF	10	15
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			15
TOTAL SOLUTION POINTS					140
TOTAL BENEFIT POINTS					180

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

438

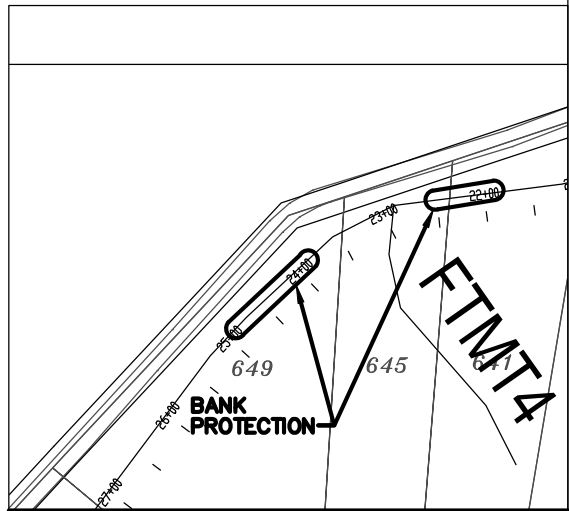
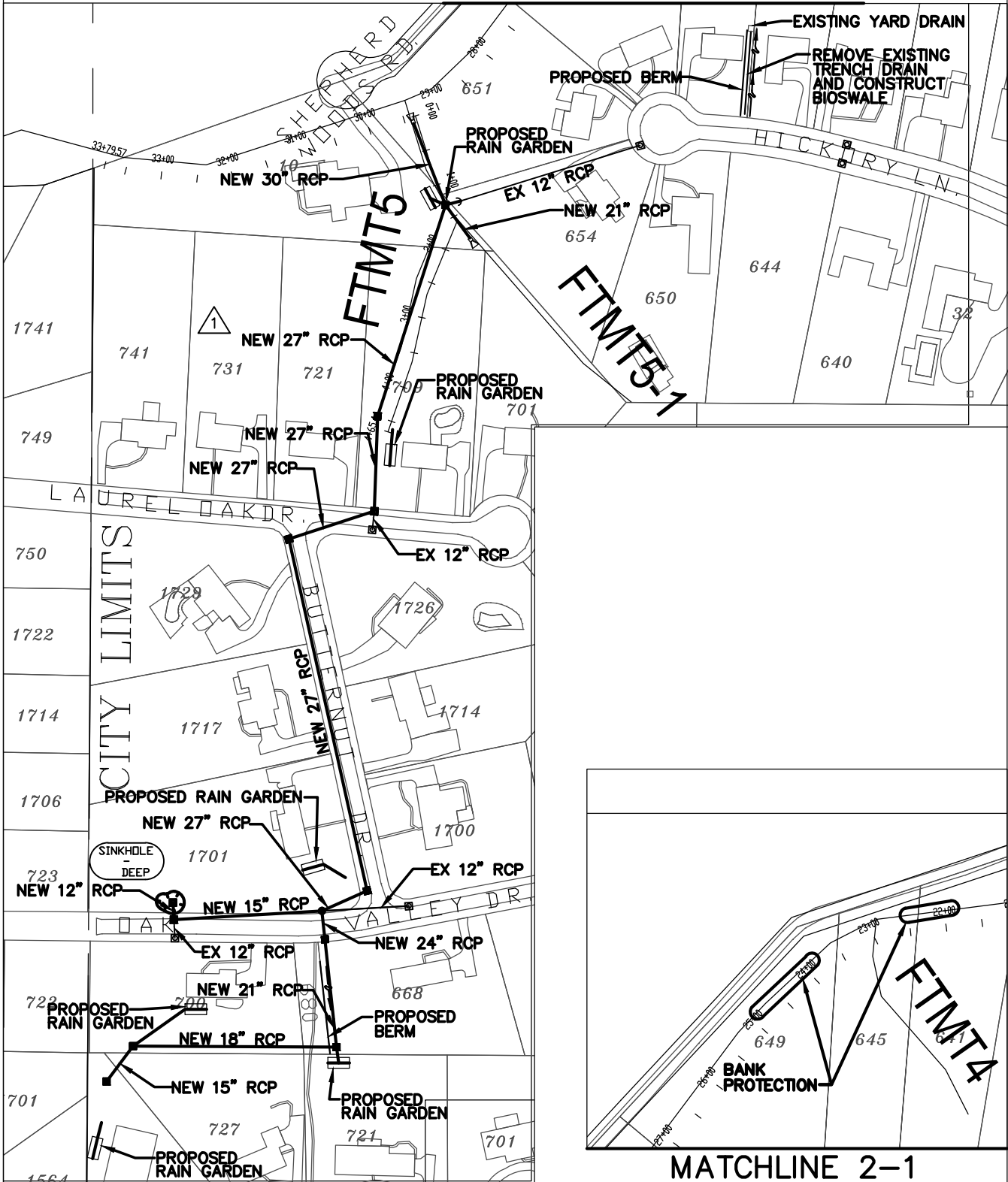
BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.41

Place "X" in one box below:

MSD Project
 Project by Others

MATCHLINE 2-1

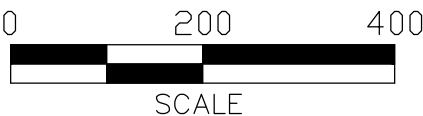


MATCHLINE 2-1

CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
 Consulting Engineers
 220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



UPDATE NO.	DATE
▲	11/12/08

FIGURE NO. 2-1

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 2-1 OVERLAND FLOW
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard ponding at Q266 - 645 Hickory Ln.
Strategy: 1) Remove existing trench drain and install berm to direct water towards existing inlet. 2) Add Bioswale to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
New Berm	LF	118	\$25	\$2,950	\$2,950
Regrade Yard	LS	1	\$2,000	\$2,000	\$2,000
Bioswale	LF	115	\$90	\$0	\$10,350
Subtotal				\$4,950	\$15,300
Total Benefit Points				30	42
Individual Benefit Point Ratio				2.89	1.29
Estimated Increased Property Values				\$2,000	\$3,000

Problem: Yard ponding at Q435 - 1637 Woodgate Dr., Q413 - 727 Twin Fawn Dr., Q345 - 700 Oak Valley Dr., Q346 - 668 Oak Valley Dr., and FR8 - 1701 Butter Nut Dr.
Strategy: 1) Install berm to catch overland flow and direct to inlet and pipe system. Place inlets at two existing sink holes and pipe downstream. 2) Add Bioswale and Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Area Inlet	EA	10	\$1,750	\$17,500	\$17,500
Manhole	EA	1	\$1,500	\$1,500	\$1,500
12" RCP CLASS III	LF	24	\$116	\$2,785	\$2,785
15" RCP CLASS III	LF	267	\$124	\$33,183	\$33,183
18" RCP CLASS III	LF	282	\$129	\$36,457	\$36,457
21" RCP CLASS III	LF	235	\$137	\$32,169	\$32,169
24" RCP CLASS III	LF	39	\$144	\$5,597	\$5,597
27" RCP CLASS III	LF	1132	\$150	\$169,925	\$169,925
30" RCP CLASS III	LF	122	\$163	\$19,915	\$19,915
21" FES	EA	1	\$1,500	\$1,500	\$1,500
30" FES	EA	1	\$1,900	\$1,900	\$1,900
Junction Chamber	LS	1	\$15,000	\$15,000	\$15,000
Erosion Protection	LS	1	\$5,000	\$5,000	\$5,000
Asphalt	SY	1380	\$65	\$89,700	\$89,700
Rain Garden	EA	6	\$10,000	\$0	\$60,000
Subtotal				\$432,131	\$492,131
Total Benefit Points				75	105
Individual Benefit Point Ratio				0.08	0.10
Estimated Increased Property Values				\$26,000	\$32,000

Total **\$437,081** **\$507,431**

Utility Relocation	20%	\$87,416	\$101,486
Clearing	5%	\$21,854	\$25,372
Mobilization	4%	\$17,483	\$20,297
Total with Percent Allowances		\$563,834	\$654,585
Contingency	25%	\$140,958	\$163,646
Probable Construction Cost Estimate		\$704,792	\$818,232
Design Engineering and Geotechnical	30%	\$211,438	\$245,470
Total Conceptual Cost Estimate		\$917,000	\$1,064,000
Total Benefit Points		135	202
Total Benefit Point Ratio		0.15	0.19

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 2-1 OVERLAND

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-1 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50				
1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot						
1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots			
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 2-1 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-1 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q266-645 Hickory; Q435-1637 Woodgate; Q413-727 Twin Fawn; Q345-700 Oak Valley; Q346-668 Oak Valley; FR8-1701 Butter Nut</i>	10	6	6		0		60
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:	0	Points/pond:		5		
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20		
		2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:	0	Points/lot:		10		
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							15
		TOTAL PROBLEM POINTS							75

FIGURE 2-1 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-1 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	1	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	4.15	PER 100 LF	10	42
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			25
TOTAL SOLUTION POINTS					127
TOTAL BENEFIT POINTS					202

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

1064

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.19

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 2-1 OVERLAND ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: Figure 2-1 CHANNEL FTMT5 and Two-Mile Creek
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Creek erosion and yard flooding at Q286 - 709 Laurel Oaks Drive. Creek erosion (yard and street) and street and yard flooding Q387, MSD 25 - 10 Shepherd Woods Drive.

Strategy: 1) Install bank protection on FTMT5 from station 0+00 to 4+65, install bank protection on 90LF at Two-Mile Drive at 10 Shepherd Woods Drive. Clean out creek east of gabion wall at 10 Shepherd Woods Drive.

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (S)	LF	465	\$225	\$104,625	\$0
Soft stabilization (S)	LF	465	\$125	\$0	\$58,125
Geomorphic Study	Ea.	1	\$10,000	\$0	\$10,000
Hard stabilization (L)	LF	90	\$300	\$27,000	\$0
Soft stabilization (L)	LF	90	\$200	\$0	\$18,000
Geomorphic Study	Ea.	1	\$10,000	\$0	\$10,000
Clean out creek	Ea.	1	\$10,000	\$10,000	\$10,000
Subtotal				\$141,625	\$106,125

Total				\$141,625	\$106,125
Utility Relocation			20%	\$28,325	\$21,225
Clearing			5%	\$7,081	\$5,306
Mobilization			4%	\$5,665	\$4,245
Total with Percent Allowances				\$182,696	\$136,901
Contingency			25%	\$45,674	\$34,225
Probable Construction Cost Estimate				\$228,370	\$171,127
Design Engineering and Geotechnical			30%	\$68,511	\$51,338
Total Conceptual Cost Estimate				\$297,000	\$223,000
Benefit Points				110	290
Benefit/Cost Ratio				0.37	1.30

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-1 Channel FTMT5 and Two Mile Creek , Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25		
		Basement (1 lot per structure) <i>Address:</i>	200		100		15		
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
		Yard Flooding (1 per lot) <i>Address: 10 Shepherd Woods Drive, 709 Laurel Oaks Drive</i>	10	2	5		0	20	
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1		
		1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)						
		Habitable structures, residential (1 lot per structure) <i>Address:</i>	Pts. for Ratio > 0.70 300	No. Lots	Pts. for Ratio 0.36 - 0.70 200	No. Lots	Pts. for Ratio 0.15- 0.35 50	No. Lots	
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend		lots	10 points per lot				
	1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
	Arterial Road: <i>Address:</i>	Pts. for Ratio > 0.70 75	No. Lots	Pts. for Ratio 0.36 - 0.70 50	No. Lots	Pts. for Ratio 0.15- 0.35 12	No. Lots		
	Collector Road: <i>Address:</i>	35		25		6			
	Residential Road: <i>Address: 10 Shepherd Woods Drive</i>	20	1	12		3	20		

FIGURE 2-1 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-1 Channel FTMT5 and Two Mile Creek , Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
	Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65			
	Basement (1 lot per structure)* <i>Address:</i>	250		200		50			
	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50			
	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N							
	Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25			
	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12			
	Yard Flooding (1 per lot) <i>Address:</i>	10		6		0			
	2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
	Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25			
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		Points/pond:		5			
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20			
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		Points/lot:		10			
2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)				
Points for Age									
		TOTAL PROBLEM POINTS						40	

FIGURE 2-1 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-1 Channel FTMT5 and Two Mile Creek , Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	1	Points per Add'l Proj.:	50 50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	11	PER 100 LF	10	110
	Riffle Pool Complex	6	PER 100 LF	10	60
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		Yes	10
TOTAL SOLUTION POINTS					250
TOTAL BENEFIT POINTS					290

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

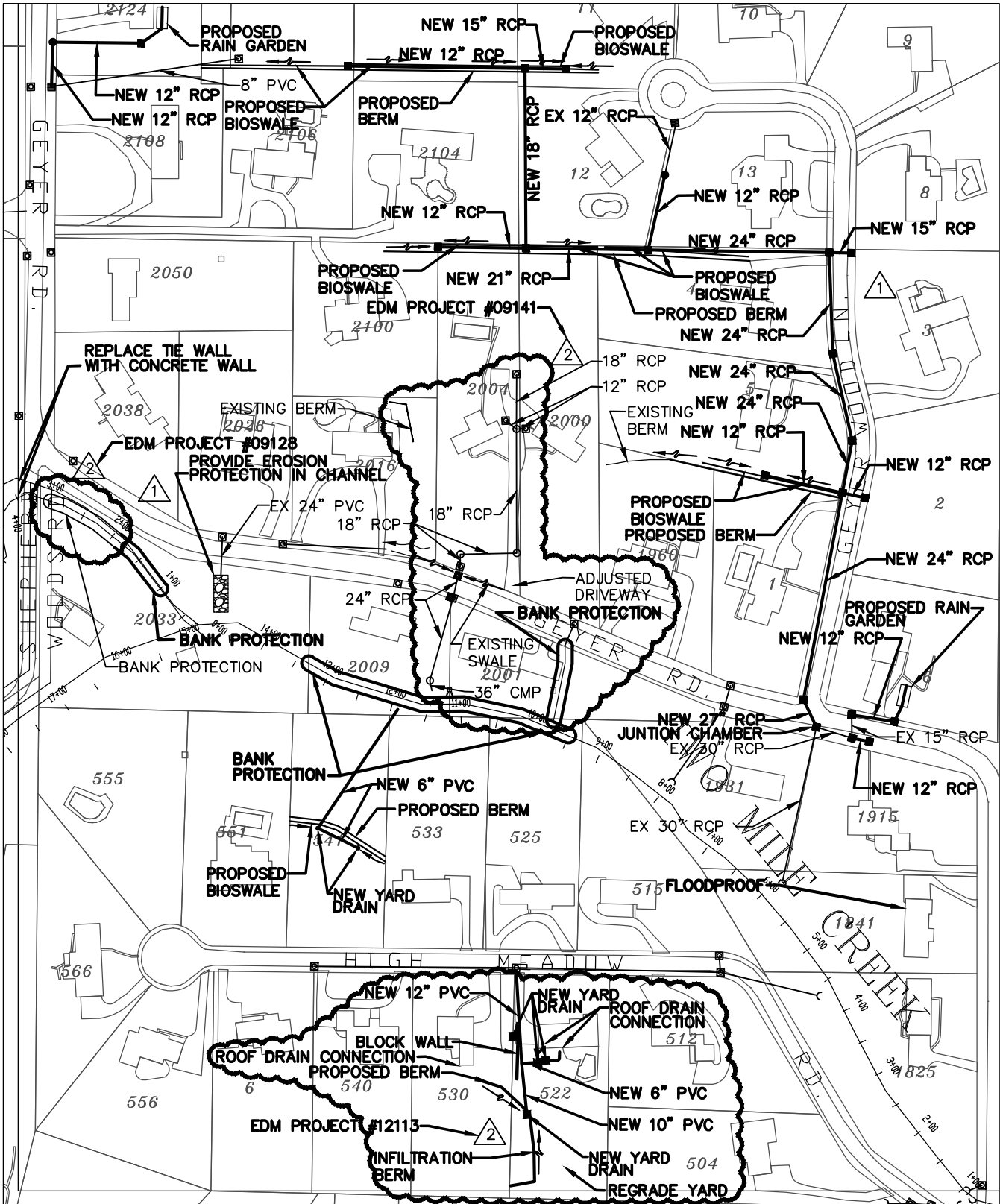
TOTAL COST IN THOUSANDS= 223

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 1.30

Place "X" in one box below:

MSD Project
 Project by Others

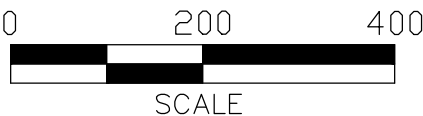
FIGURE 2-1 CHANNEL Alt 2



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
 Consulting Engineers
 220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



UPDATE NO.	DATE
1	11/12/08
2	4/5/13

FIGURE NO. 2-2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 2-2 OVERLAND FLOW
Solutions By: EDM INC. DATE: 10/18/2013
Problem: Yard and driveway ponding at Q207 - 6 Geyer Wood Ln. and yard ponding at Q315 - 1915 N. Geyer Rd.
Strategy: 1) Install inlet and pipe system. Replace undersized stormwater system 2) Add Rain Garden to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Inlet	EA	5	\$1,850	\$9,250	\$9,250
12" RCP CLASS III	LF	83	\$116	\$9,633	\$9,633
15" RCP CLASS III	LF	86	\$124	\$10,688	\$10,688
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$29,571	\$39,571
Total Benefit Points				40	45
Individual Benefit Point Ratio				0.65	0.54
Estimated Increased Property Values				\$4,000	\$6,000

Problem: Yard erosion at Q274 - 541 High Meadow Rd.
Strategy: 1) Install berm to catch overland flow and direct to inlet and pipe system. 2) Add Bioswale to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Yard Drain	EA	2	\$500	\$1,000	\$1,000
6" PVC	LF	263	\$24	\$6,312	\$6,312
Bioswale	LF	149	\$90	\$0	\$13,410
Subtotal				\$7,312	\$20,722
Total Benefit Points				30	45
Individual Benefit Point Ratio				1.96	1.03
Estimated Increased Property Values				\$0	\$0

Problem:	Yard ponding at Q327 - 2026 North Geyer Rd. , Q326 - 2016 North Geyer Rd., Q325 - 2106 North Geyer Rd., Q317 - 1960 North Geyer Rd., and Q210 - 5 Geyer Wood Ln. Yard erosion at Q326 - 2016 North Geyer Rd.				
Strategy:	1) Install berms to catch overland flow and direct to inlet and pipe system. 2) Add Bioswale to infiltrate runoff and protect natural channels.				
				1) Alternative 1	2) Alternative 1
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's
Single Area Inlet	EA	18	\$1,750	\$31,500	\$31,500
Manhole	EA	1	\$1,500	\$1,500	\$1,500
12" RCP CLASS III	LF	705	\$116	\$81,822	\$81,822
15" RCP CLASS III	LF	89	\$124	\$11,061	\$11,061
18" RCP CLASS III	LF	252	\$129	\$32,579	\$32,579
21" RCP CLASS III	LF	171	\$137	\$23,408	\$23,408
24" RCP CLASS III	LF	887	\$144	\$127,285	\$127,285
27" RCP CLASS III	LF	42	\$150	\$6,305	\$6,305
New Berm	LF	1232	\$25	\$30,800	\$30,800
Grading	LS	1	\$30,000	\$30,000	\$30,000
Juntion Chamber	LS	1	\$15,000	\$15,000	\$15,000
Asphalt Pavement (TBR&R)	SY	124	\$67	\$8,308	\$8,308
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Bioswale	LF	1185	\$90	\$0	\$106,650
Subtotal				\$399,567	\$516,217
Total Benefit Points				60	154
Individual Benefit Point Ratio				0.07	0.14
Estimated Increased Property Values				\$10,000	\$12,000
Total				\$436,450	\$576,510

Problem:	Yard ponding and erosion at Q329 - 2124 North Geyer Rd.				
Strategy:	1) Install inlet and pipe system. Connect to existing system 2) Add Rain				
				1) Alternative 1	2) Alternative 1
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's
Single Area Inlet	EA	1	\$1,750	\$1,750	\$1,750
Manhole	EA	1	\$1,500	\$1,500	\$1,500
12" RCP CLASS III	LF	186	\$116	\$21,587	\$21,587
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$24,837	\$34,837
Total Benefit Points				330	335
Individual Benefit Point Ratio				6.34	4.59
Estimated Increased Property Values				\$8,000	\$10,000
Utility Relocation			20%	\$87,290	\$115,302
Clearing			5%	\$21,823	\$28,826
Mobilization			4%	\$17,458	\$23,060
Total with Percent Allowances				\$563,021	\$743,698
Contingency			25%	\$140,755	\$185,925
Probable Construction Cost Estimate				\$703,776	\$929,623
Design Engineering and Geotechnical			30%	\$211,133	\$278,887
Total Conceptual Cost Estimate				\$915,000	\$1,209,000
Total Benefit Points				260	429
Total Benefit Point Ratio				0.28	0.35

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 2-2 OVERLAND

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-2 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 2-2 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-2 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q207-6 Geyer Wood; Q315-1915 N. Geyer; Q327-2026 N. Geyer; Q326-2016 N. Geyer; Q325-2106 N. Geyer; Q317-1960 N. Geyer; Q210-5 Geyer Wood</i>	10	8	6		0		80
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:	0	Points/pond:		5		
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20		
		2.3. Yard Erosion (1 per lot) <i>Address: Q274-541 High Meadow; Q326-2016 N. Geyer; Q329-2124NGeyer</i>	No. Lots:	3	Points/lot:		10		30
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
	Points for Age							0	
	TOTAL PROBLEM POINTS							110	

FIGURE 2-2 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-2 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	3	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	11.85	PER 100 LF	10	119
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			50
TOTAL SOLUTION POINTS					319
TOTAL BENEFIT POINTS					429

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

1209

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.35

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 2-2 OVERLAND ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 2-2 OVERLAND FLOW STRUCTURAL FLOODING
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard ponding and basement flooding at Q268 - 522 High Meadow Ln.
Deteriorated wood tie wall upstream of the culvert at the entrance of Shepherd Woods Rd.

Strategy: 1) Install berm to catch overland flow and direct to inlet and pipe system.
Replace undersized stormwater system. 2) Add Bioswale to infiltrate runoff and protect natural channels. Replace the existing tie wall with new concrete wall and install a new guardrail.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Yard Drain	EA	4	\$500	\$2,000	\$2,000
Roof Drain Connection	EA	3	\$200	\$600	\$600
6" PVC	LF	104	\$24	\$2,496	\$2,496
10" PVC	LF	72	\$45	\$3,240	\$3,240
12" PVC	LF	129	\$47	\$6,063	\$6,063
New Berm	LF	70	\$25	\$1,750	\$1,750
Block Wall	FSF	91	\$45	\$4,095	\$4,095
Provide Erosion Protection	LS	1	\$3,000	\$3,000	\$3,000
Regrade Lawn	SY	70	\$15	\$1,050	\$1,050
Bioswale	LF	172	\$90	\$0	\$15,480
Reinforced Concrete	CY	15	\$800	\$12,000	\$12,000
Guardrail	LF	100	\$25	\$2,500	\$2,500
Landscaping	LS	1	5,500	\$5,500	\$5,500
Subtotal				\$44,294	\$59,774
Total Benefit Points				335	350

Individual Benefit Point Ratio **3.61** **2.79**
Estimated Increased Property Values **\$7,000** **\$8,000**

Problem: Yard ponding and basement/garage flooding at Q329 - 2124 North Geyer Rd.

Strategy: 1) Install inlet and pipe system. Connect to existing system 2) Add Rain

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Area Inlet	EA	1	\$1,750	\$1,750	\$1,750
Manhole	EA	1	\$1,500	\$1,500	\$1,500
12" RCP CLASS III	LF	186	\$116	\$21,587	\$21,587
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$24,837	\$34,837
Total Benefit Points				330	335

Individual Benefit Point Ratio **6.34** **4.59**
Estimated Increased Property Values **\$8,000** **\$10,000**

Problem: Yard ponding and basement flooding at Q318-2001 North Geyer Rd. and yard

Strategy: 1) Install inlet and pipe system. Connect to existing system 2) Add Rain

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Inlet	EA	2	\$1,850	\$3,700	\$3,700
24" FES	EA	1	\$1,600	\$1,600	\$1,600
Flood protection (2009 N. Geyer)	LS	1	\$60,000	\$60,000	\$60,000
Asphalt Pavement (TBR&R)	SY	20	\$67	\$1,340	\$1,340
Subtotal				\$91,466	\$91,466
Total Benefit Points				380	380
Individual Benefit Point Ratio				1.46	1.46
Estimated Increased Property Values				\$0	\$0

Total **\$44,294** **\$59,774**

Utility Relocation	20%	\$8,859	\$11,955
Clearing	5%	\$2,215	\$2,989
Mobilization	4%	\$1,772	\$2,391
Total with Percent Allowances		\$57,139	\$77,108
Contingency	25%	\$14,285	\$19,277
Probable Construction Cost Estimate		\$71,424	\$96,386
Design Engineering and Geotechnical	30%	\$21,427	\$28,916
Total Conceptual Cost Estimate		\$93,000	\$126,000
Total Benefit Points		1,040	1,070
Total Benefit Point Ratio		11.18	8.49

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 2-2 STRUCTURAL

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-2 Structural with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address: 2009 North Geyer</i>	200		100	1	15		100	
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 2-2 STRUCTURAL ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-2 Structural with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)* <i>Address: Q268-522 High Meadow; Q329-2124 N. Geyer; Q318 - 2001 North Geyer Rd</i>	250	3	200		50		750
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				Y	50	50
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q268-522 High Meadow; Q329-2124 N. Geyer; Q324-2009 N. Geyer, Q318 - 2001 North Geyer</i>	10	4	6		0		40
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:	0	Points/pond:		5		
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20		
		2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:	0	Points/lot:		10		
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
	Points for Age							0	
	TOTAL PROBLEM POINTS							940	

FIGURE 2-2 STRUCTURAL ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-2 Structural with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	2	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	2.01	PER 100 LF	10	20
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			10
TOTAL SOLUTION POINTS					130
TOTAL BENEFIT POINTS					1070

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

126

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

8.49

Place "X" in one box below:

	MSD Project
	Project by Others

FIGURE 2-2 STRUCTURAL ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 2-2 CHANNEL - Two-Mile Creek
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Erosion along Two Mile Creek at Q324-2009 N. Geyer Road and Q318-2001 N. Geyer Road.
Erosion along a Tributary to Two-Mile Creek at 2033 N. Geyer Road.

Strategy: 1) Install bank protection on Two-Mile Creek from station 9+50 to station 13+32 (382 LF) and on a Tributary to Two-Mile Creek from station 1+00 to 1+85 (85 LF).

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (L)	LF	467	\$300	\$140,100	\$0
Soft stabilization (L)	LF	467	\$200	\$0	\$93,400
Geomorphic Study	Ea.	2	\$10,000	\$0	\$20,000
Clean out creek	Ea.	1	\$10,000	\$10,000	\$10,000
Subtotal				\$150,100	\$123,400
Total				\$150,100	\$123,400
Utility Relocation			20%	\$30,020	\$24,680
Clearing			5%	\$7,505	\$6,170
Mobilization			4%	\$6,004	\$4,936
Total with Percent Allowances				\$193,629	\$159,186
Contingency			25%	\$48,407	\$39,797
Probable Construction Cost Estimate				\$242,036	\$198,983
Design Engineering and Geotechnical			30%	\$72,611	\$59,695
Total Conceptual Cost Estimate				\$315,000	\$259,000
Benefit Points				165	255
Benefit/Cost Ratio				0.52	0.98

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-2 Channel - Two Mile Creek , Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address: 2009 N. Geyer Road</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address: 2</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
1.2.2. No. of lots (from 1.2.1) on outside of bend		2	lots	10 points per lot			20			
1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots			
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address: North Geyer Road</i>		35		25	1	6	25			
Residential Road: <i>Address:</i>		20			1	3				

FIGURE 2-2 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-2 Channel - Two Mile Creek , Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:			Points/pond:		5		
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20		
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:			Points/lot:		10		
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
	TOTAL PROBLEM POINTS							45	

FIGURE 2-2 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-2 Channel - Two Mile Creek , Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	2	Points per Add'l Proj.:	50 100
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	8	PER 100 LF	10	80
	Riffle Pool Complex	4	PER 100 LF	10	40
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		YES	15
TOTAL SOLUTION POINTS					255
TOTAL BENEFIT POINTS					300

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS= 259

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 1.16

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 2-2 CHANNEL Alt 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 2-2S CHANNEL STRUCTURAL FLOODING - Two-Mile Creek
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Creek floods basement at 1841 N. Geyer Road, Yard erosion at 2001 Geyer
Strategy: 1) Install flood protection at 1841 N. Geyer, and riprap swale at 2001 Geyer.

Description	Unit	Quantity	Unit Cost	ALT 1
Flood protection (1841 N. Geyer)	Ea.	1	\$20,000	\$20,000
Soft stabilization (S)	LF	105	\$125	\$13,125
Subtotal				\$33,125
Total				\$33,125
Utility Relocation			20%	\$6,625
Clearing			5%	\$1,656
Mobilization			4%	\$1,325
Total with Percent Allowances				\$42,731
Contingency			25%	\$10,683
Probable Construction Cost Estimate				\$53,414
Design Engineering and Geotechnical			30%	\$20,000
Total Conceptual Cost Estimate				\$74,000
Benefit Points				180
Benefit/Cost Ratio				2.43

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-2S Channel - Two Mile Creek , Alternate 1

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address: 1841 N. Geyer Road</i>	200		100	1	15		100	
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address: 2009 N. Geyer Road</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2			
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1			
		1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)							
			Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots		
		Habitable structures, residential (1 lot per structure) <i>Address:</i>	300		200		50			
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25			
	Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50				
	1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot					
	1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)									
		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots			
	Arterial Road: <i>Address:</i>	75		50		12				
	Collector Road: <i>Address:</i>	35		25		6				
	Residential Road: <i>Address:</i>	20		12		3				

FIGURE 2-2S CHANNEL Alt 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-2S Channel - Two Mile Creek , Alternate 1

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
	Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65			
	Basement (1 lot per structure)* <i>Address:</i>	250		200		50			
	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50			
	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N							
	Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25			
	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12			
	Yard Flooding (1 per lot) <i>Address:</i>	10		6		0			
	2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
	Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25			
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		Points/pond:		5			
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20			
	2.3. Yard Erosion (1 per lot) <i>Address: 2001 Geyer</i>	No. Lots:		1	Points/lot:		10	10	
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
Points for Age									
TOTAL PROBLEM POINTS							110		

FIGURE 2-2S CHANNEL Alt 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 2-2S Channel - Two Mile Creek , Alternate 1

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	1	Points per Add'l Proj.:	50 50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		NO	
TOTAL SOLUTION POINTS					70
TOTAL BENEFIT POINTS					180

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

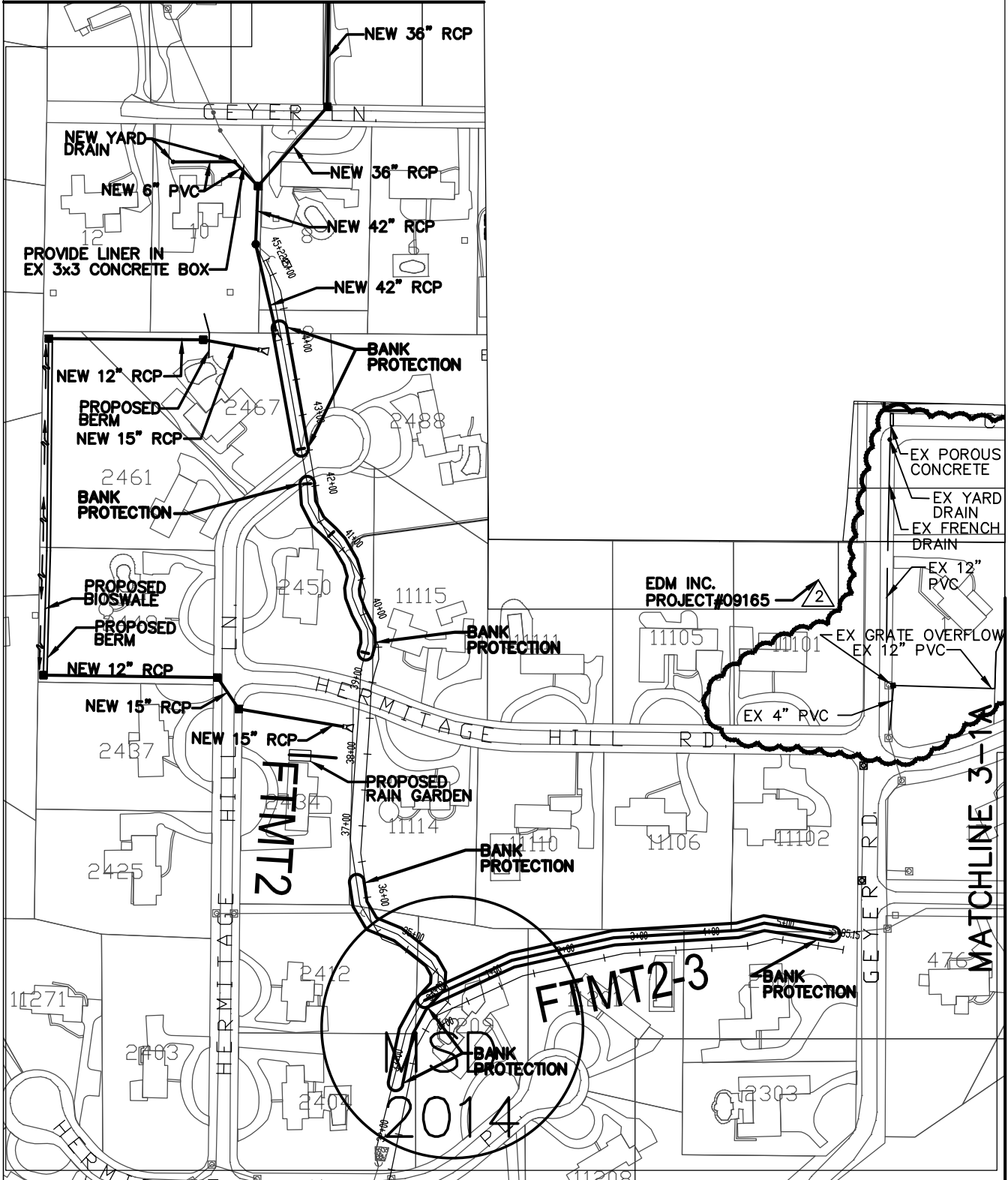
TOTAL COST IN THOUSANDS= 74

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 2.43

Place "X" in one box below:

MSD Project
 Project by Others

MATCHLINE 3-1B



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN



EDM Incorporated
Consulting Engineers

220 Mansion House Center
St. Louis, Missouri 63102
Phone (314) 231-5485 Fax (314) 231-8167
edm@edm-inc.com



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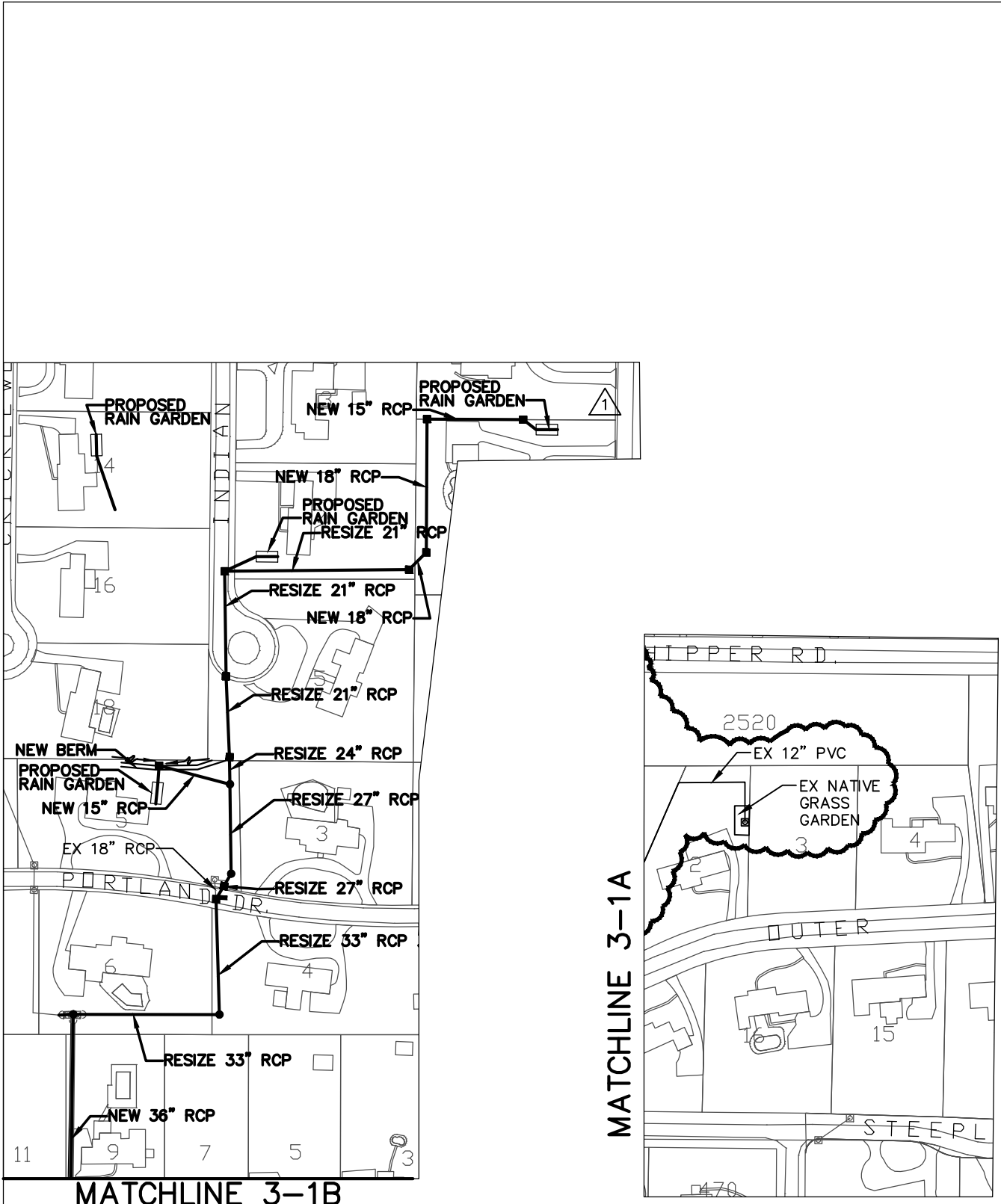
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UPDATE NO. DATE



4/5/13

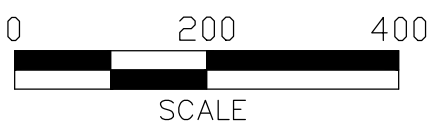
FIGURE NO. 3-1A



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
 Consulting Engineers
 220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



UPDATE NO.	DATE
1	11/12/08

FIGURE NO. 3-1B

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 3-1 OVERLAND FLOW
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard erosion and ponding at Q430 - 10 West Geyer Ln. and Q360 - 5 Portland Dr. and yard ponding at Q431-9 West Geyer Ln. and Q334-2709 N. Geyer Rd.

Strategy: 1) Line existing box culvert to prevent water from causing erosions at joints and install yard drains to fix yard ponding in the front yard. Install berm to catch overland flow and direct to inlet and pipe system. Replace undersized stormwater system . 2) Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1 With
				Without BMP's	BMP's
Single Inlet	EA	1	\$1,850	\$1,850	\$1,850
Single Area Inlet	EA	8	\$1,750	\$14,000	\$14,000
Double Inlet	EA	1	\$3,150	\$3,150	\$3,150
Manhole	EA	2	\$1,500	\$3,000	\$3,000
Large Diameter Manhole	EA	3	\$6,000	\$18,000	\$18,000
Large Diameter Inlet	EA	2	\$6,000	\$12,000	\$12,000
15" RCP CLASS III	LF	236	\$124	\$29,330	\$29,330
18" RCP CLASS III	LF	220	\$129	\$28,442	\$28,442
21" RCP CLASS III	LF	516	\$137	\$70,635	\$70,635
24" RCP CLASS III	LF	38	\$144	\$5,453	\$5,453
27" RCP CLASS III	LF	166	\$150	\$24,918	\$24,918
33" RCP CLASS III	LF	364	\$174	\$63,493	\$63,493
36" RCP CLASS III	LF	521	\$186	\$96,927	\$96,927
42" RCP CLASS III	LF	204	\$215	\$43,815	\$43,815
42" FES	EA	1	\$2,600	\$2,600	\$2,600
Yard Drain	EA	2	\$500	\$1,000	\$1,000
6" PVC	LF	132	\$24	\$3,168	\$3,168
3x3 Box Culvert Liner	LF	94	\$70	\$6,580	\$6,580
Grading	LS	1	\$10,000	\$10,000	\$10,000
New Berm	LF	148	\$25	\$0	\$3,700
Rain Garden	EA	3	\$10,000	\$0	\$30,000
Erosion Protection	LS	1	\$30,000	\$30,000	\$30,000
Subtotal				\$468,361	\$502,061
Total Benefit Points				80	95
Individual Benefit Point Ratio				0.08	0.09
Estimated Increased Property Values				\$21,000	\$28,000

Problem: Yard erosion at Q348 - 1 Outer Ladue Drive, (Q349)
Strategy: 1) Regrade yard to existing area inlet. 2) Add Bioswale to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1 With
				Without BMP's	BMP's
Regrade yard	LS	1	\$4,000	\$4,000	\$4,000
Bioswale	LF	167	\$90	\$0	\$15,030
Subtotal				\$4,000	\$19,030
Total Benefit Points				30	47
Individual Benefit Point Ratio				3.58	1.17
Estimated Increased Property Values				\$1,000	\$3,000

FIGURE 3-1 OVERLAND

Problem:

 Yard ponding at Q231 - 2437 Hermitage Hills Ln. and Q233 - 2467 Hermitage Hills Ln. and yard erosion at Q232 -2434 Hermitage Hills Ln.

Strategy:

1) Install berm to catch overland flow and direct to inlet and pipe system. 2) Add Bioswale and Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1 With
				Without BMP's	BMP's
New Berm	LF	583	\$25	\$14,575	\$14,575
12" RCP CLASS III	LF	455	\$116	\$52,807	\$52,807
15" RCP CLASS III	LF	277	\$124	\$34,426	\$34,426
15" FES	EA	2	\$1,200	\$2,400	\$2,400
Single Area Inlet	EA	5	\$1,750	\$8,750	\$8,750
Erosion Protection	LS	1	\$5,000	\$5,000	\$5,000
Bioswale	LF	458	\$90	\$0	\$41,220
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$117,958	\$169,178
Total Benefit Points				50	101
Individual Benefit Point Ratio				0.20	0.28
Estimated Increased Property Values				\$12,000	\$14,000
Total				\$586,319	\$671,239
Utility Relocation			20%	\$117,264	\$134,248
Clearing			5%	\$29,316	\$33,562
Mobilization			4%	\$23,453	\$26,850
Total with Percent Allowances				\$756,351	\$865,898
Contingency			25%	\$189,088	\$216,474
Probable Construction Cost Estimate				\$945,439	\$1,082,372
Design Engineering and Geotechnical			30%	\$283,632	\$324,712
Total Conceptual Cost Estimate				\$1,230,000	\$1,408,000
Total Benefit Points				210	318
Total Benefit Point Ratio				0.17	0.23

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 3-1 OVERLAND

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-1 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 3-1 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-1 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q430-10 W. Geyer; Q360-5 Portland; Q431-9 W. Geyer; Q231-2437 Hermitage Hills; Q233-2467 Hermitage Hills; Q334-2709 North Geyer</i>	10	6	6		0		60
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:	0	Points/pond:		5		
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20		
		2.3. Yard Erosion (1 per lot) <i>Address: Q430-10 W. Geyer; Q360-5 Portland; Q348-1 Outer Ladue; Q232-2434 Hermitage Hills</i>	No. Lots:	4	Points/lot:		10		40
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							0
		TOTAL PROBLEM POINTS							100

FIGURE 3-1 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-1 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	2	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	8.25	PER 100 LF	10	83
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			25
TOTAL SOLUTION POINTS					218
TOTAL BENEFIT POINTS					318

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

1408

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.23

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 3-1 OVERLAND ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: Figure 3-1 CHANNEL - FTMT2 and FTM2-2
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Channel incision/yard erosion SR-6, MSD-29, 11115 Hermitage Hill Road Q224, 11209 Hermitage Hill Place, Q225, 2404 Hermitage Hill Lane Q230, 2307 N. Geyer Road Q330, 11102, 11106, and 11114 Hermitage Hill Road, 11201 Hermitage Hill Place, 2412, 2434, 2450, 2467 Hermitage Hill Lane

Strategy: 1) Install bank protection on FTMT2 from station 32+50 to 36+00 (350 LF), station 39+20 to 41+80 (260 LF), station 42+30 to 44+00 (170 LF), and on FTMT 2-3 from station 0+00 to 5+85 (585 LF).

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (L)	LF	1,365	\$300	\$409,500	\$0
Soft stabilization (L)	LF	1,365	\$200	\$0	\$273,000
Geomorphic Study	Ea.	4	\$10,000	\$0	\$40,000
Subtotal				\$409,500	\$313,000
Total				\$409,500	\$313,000
Utility Relocation			20%	\$81,900	\$62,600
Clearing			5%	\$20,475	\$15,650
Mobilization			4%	\$16,380	\$12,520
Total with Percent Allowances				\$528,255	\$403,770
Contingency			25%	\$132,064	\$100,943
Probable Construction Cost Estimate				\$660,319	\$504,713
Design Engineering and Geotechnical			30%	\$198,096	\$151,414
Total Conceptual Cost Estimate				\$859,000	\$657,000
Benefit Points				555	1,035
Benefit/Cost Ratio				0.65	1.58

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-1 Channel FTMT2 and FTMT2-3 , Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50				
1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot						
1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots			
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 3-1 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-1 Channel FTMT2 and FTMT2-3 , Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		Points/pond:		5			
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20			
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		Points/lot:		10			
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
			TOTAL PROBLEM POINTS						

FIGURE 3-1 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-1 Channel FTMT2 and FTMT2-3 , Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	11	Points per Add'l Proj.:	50 550
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	28	PER 100 LF	10	280
	Riffle Pool Complex	14	PER 100 LF	10	140
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				5
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			60
TOTAL SOLUTION POINTS					1035
TOTAL BENEFIT POINTS					1035

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

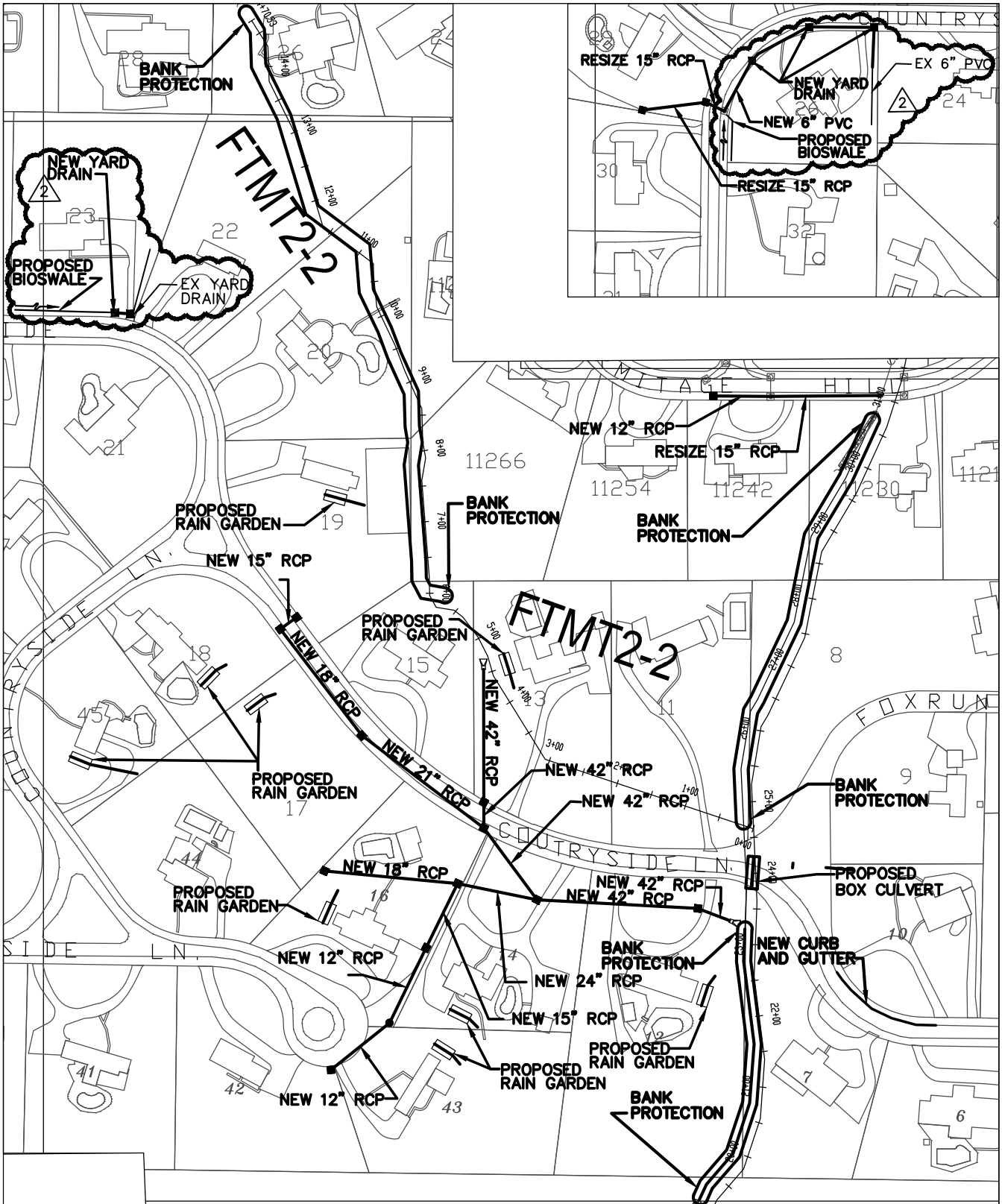
TOTAL COST IN THOUSANDS= 657

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 1.58

Place "X" in one box below:

MSD Project
 Project by Others

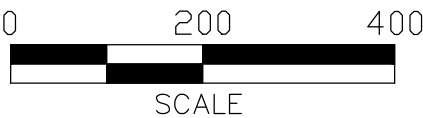
FIGURE 3-1 CHANNEL Alt 2



CITY OF FRONTENAC

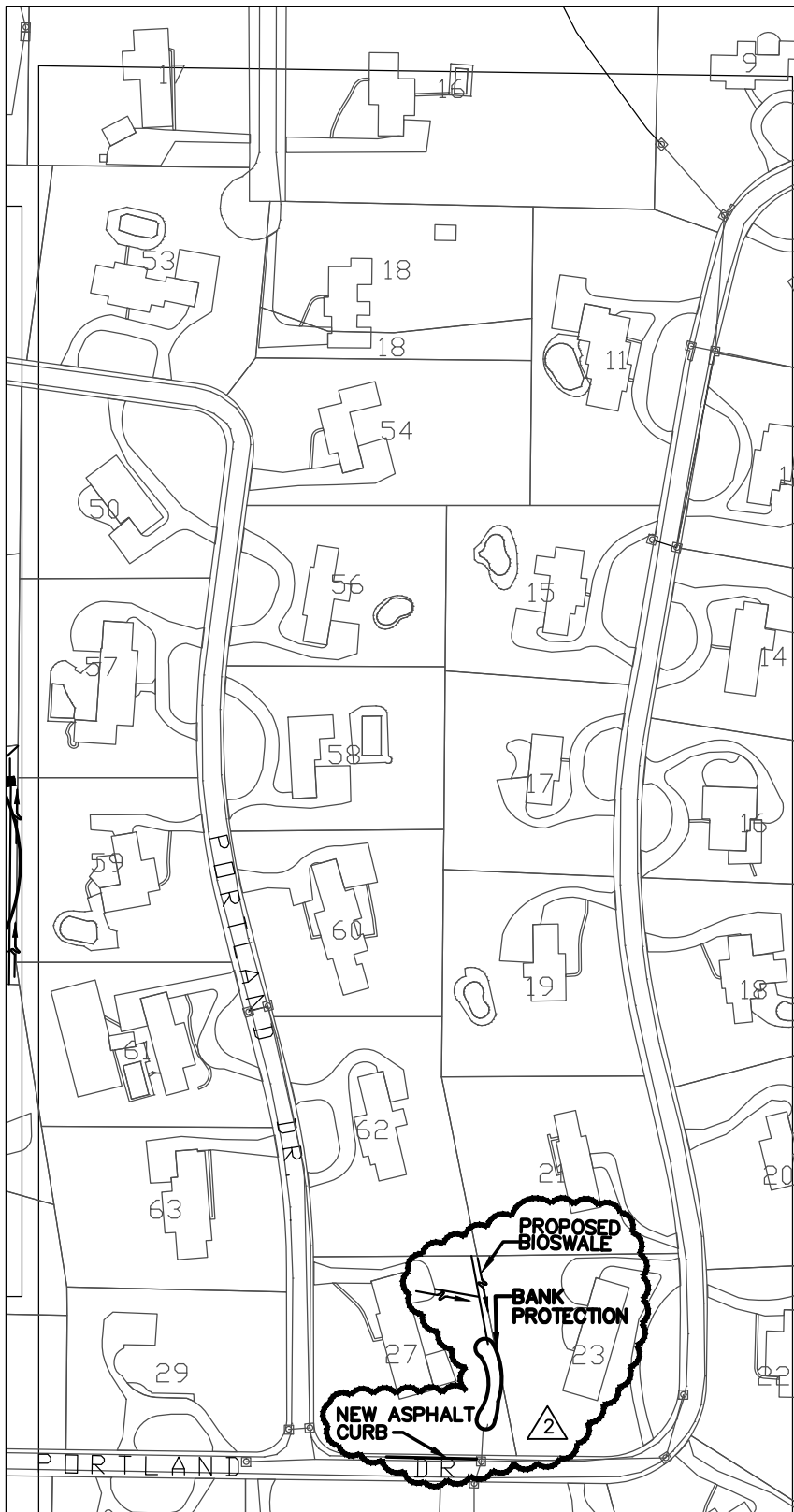
STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

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 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



UPDATE NO.	DATE
1	11/12/08
2	4/5/13

FIGURE NO. 3-2A




 CITY OF FRONTENAC
 

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN



EDM Incorporated
Consulting Engineers

220 Mansion House Center
St. Louis, Missouri 63102
Phone (314) 231-5485 Fax (314) 231-8167
edm@edm-inc.com



0 200 400



SCALE

UPDATE NO. _____ DATE _____



4/5/13

FIGURE NO. 3-2B

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 3-2 OVERLAND FLOW
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard erosion at Q158 - Countryside Ln and yard ponding at Q154 - 26 Countryside Ln and yard flooding 23 Countryside from City.

Strategy: 1) Install inlets to existing system to collect water. Resized undersized storm sewer pipes.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Yard Drain	EA	4	\$500	\$2,000	\$2,000
6" PVC	LF	373	\$24	\$8,952	\$8,952
Bioswale	LF	213	\$90	\$19,170	\$19,170
Single Area Inlet	EA	2	\$1,750	\$3,500	\$3,500
15" RCP CLASS III	LF	130	\$124	\$16,156	\$16,156
Subtotal				\$19,656	\$19,656

Total Benefit Points **50** **50**

Individual Benefit Point Ratio **1.21** **1.21**
Estimated Increased Property Values **\$6,000** **\$6,000**

Problem: Yard ponding and erosion at Q149 - 16 Countryside Ln., Q163 - 11 Countryside Ln.

Strategy: 1) Install inlet and pipe system to collect water. Divert water coming from

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
Single Area Inlet	EA	6	\$1,750	\$10,500	\$10,500
15" RCP CLASS III	LF	28	\$124	\$3,480	\$3,480
18" RCP CLASS III	LF	187	\$129	\$24,175	\$24,175
21" RCP CLASS III	LF	214	\$137	\$29,294	\$29,294
42" RCP CLASS III	LF	346	\$215	\$74,314	\$74,314
42" FES	EA	1	\$2,600	\$2,600	\$2,600
Rain Garden	EA	6	\$10,000	\$0	\$60,000
Subtotal				\$144,364	\$204,364

Total Benefit Points **125** **155**

Individual Benefit Point Ratio **0.41** **0.36**
Estimated Increased Property Values **\$20,000** **\$28,000**

Problem: Storm water running down driveway at Q234 - 11242 Hermitage Hill Place

Strategy: 1) Add inlet and pipe system to collect water and connect to existing storm

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
Single Inlet	EA	1	\$1,850	\$1,850	\$1,850
12" RCP CLASS III	LF	80	\$116	\$9,285	\$9,285
15" RCP CLASS III	LF	155	\$124	\$19,263	\$19,263
Connect to existing culvert	LS	1	\$2,000	\$2,000	\$2,000

Subtotal **\$32,398** **\$32,398**

Total Benefit Points **30** **30**

Individual Benefit Point Ratio **0.44** **0.44**

Estimated Increased Property Values **\$2,000** **\$2,000**

Problem: Yard erosion at 10 Countryside Lane.

Strategy: 1) Add curb to divert water and prevent erosion.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Proposed Curb	LF	165	\$32	\$5,280	\$5,280
Subtotal				\$5,280	\$5,280
Total Benefit Points				30	30
Individual Benefit Point Ratio				2.71	2.71
Estimated Increased Property Values				\$0	\$0

Total **\$201,698** **\$261,698**

FIGURE 3-2 OVERLAND

Utility Relocation	20%	\$40,340	\$52,340
Clearing	5%	\$10,085	\$13,085
Mobilization	4%	\$8,068	\$10,468
Total with Percent Allowances		\$260,191	\$337,591
Contingency	25%	\$65,048	\$84,398
Probable Construction Cost Estimate		\$325,238	\$421,988
Design Engineering and Geotechnical	30%	\$97,571	\$126,596
Total Conceptual Cost Estimate		\$423,000	\$549,000
Total Benefit Points		340	400
Total Benefit Point Ratio		0.80	0.73

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 3-2 OVERLAND

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-2 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2			
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1			
		1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)							
			Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots		
		Habitable structures, residential (1 lot per structure) <i>Address:</i>	300		200		50			
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25			
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50			
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
			Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots		
	1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)									
	Arterial Road: <i>Address:</i>	75		50		12				
	Collector Road: <i>Address:</i>	35		25		6				
	Residential Road: <i>Address:</i>	20		12		3				

FIGURE 3-2 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-2 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q154-26 Countryside; Q149-16 Countryside; Q163-11 Countryside; Q155-42 Countryside; Q153-45 Countryside; 12&23 Countryside; 13 Countryside; Q234-11242 Hermitage Hill</i>	10	9	6		0		90
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:	0	Points/pond:	5				
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:	20				
	2.3. Yard Erosion (1 per lot) <i>Address: Q158-29 Countryside; Q149-16 Countryside; Q163-11 Countryside; Q155-42 Countryside; Q153-45 Countryside; 12 Countryside; 13 Countryside, 10 Countryside</i>	No. Lots:	8	Points/lot:	10			80	
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age							15	
	TOTAL PROBLEM POINTS							185	

FIGURE 3-2 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-2 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	3	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	3	PER 100 LF	10	30
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				5
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			30
TOTAL SOLUTION POINTS					215
TOTAL BENEFIT POINTS					400

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

549

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.73

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 3-2 OVERLAND ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 3-2 OVERLAND FLOW STRUCTURAL FLOODING
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Basement Flooding and street ponding in front of Q152 - 43 Countryside Ln, yard ponding and erosion at Q157 - 14 Countryside Ln
Strategy: 1) Install inlet and pipe system to collect water. Provide 3" overlay at Sisters of Mercy to account for downstream rise due to new storm sewer system 2) Add rain garden to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Manhole	EA	1	\$1,500	\$1,500	\$1,500
Single Area Inlet	EA	5	\$1,750	\$8,750	\$8,750
12" RCP CLASS III	LF	222	\$116	\$25,765	\$25,765
15" RCP CLASS III	LF	100	\$124	\$12,428	\$12,428
24" RCP CLASS III	LF	113	\$144	\$16,216	\$16,216
42" RCP CLASS III	LF	273	\$215	\$58,635	\$58,635
42" FES	EA	1	\$2,600	\$2,600	\$2,600
3" Overlay at Sisters of Mercy	SY	250	\$25	\$6,250	\$6,250
Provide Erosion Protection	LS	1	\$5,000	\$5,000	\$5,000
Rain Garden	EA	3	\$10,000	\$0	\$30,000
Subtotal				\$137,144	\$167,144
Total Benefit Points				285	300
Individual Benefit Point Ratio				0.99	0.86
Estimated Increased Property Values				\$16,000	\$20,000
Total				\$137,144	\$167,144
Utility Relocation			20%	\$27,429	\$33,429
Clearing			5%	\$6,857	\$8,357
Mobilization			4%	\$5,486	\$6,686
Total with Percent Allowances				\$176,915	\$215,615
Contingency			25%	\$44,229	\$53,904
Probable Construction Cost Estimate				\$221,144	\$269,519
Design Engineering and Geotechnical			30%	\$66,343	\$80,856
Total Conceptual Cost Estimate				\$288,000	\$351,000
Total Benefit Points				285	315
Total Benefit Point Ratio				0.99	0.90

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-2 Structural with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 3-2 STRUCTURAL ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-2 Structural with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)* Address: Q152-43 Countryside	250	1	200		50		250
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) Address:	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
		Yard Flooding (1 per lot) Address: Q157-14 Countryside	10	1	6		0		10
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6			
	Traffic obstruction (> 6" of water) on collector street Address:	25		15		2			
	Traffic obstruction (> 6" of water) on residential street Address:	10		6		1			
	Ponding (per ponding area) Address: Q152-43 Countryside	No. Ponds:		1	Points/pond:	5		5	
	2.2. Moderate Risk Erosion of misc. structures Address:	No. Lots:			Points/lot:	20			
	2.3. Yard Erosion (1 per lot) Address: Q157-14 Countryside	No. Lots:		1	Points/lot:	10		10	
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age							0	
	TOTAL PROBLEM POINTS							275	

FIGURE 3-2 STRUCTURAL ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-2 Structural with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	1.5	PER 100 LF	10	15
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			15
TOTAL SOLUTION POINTS					40
TOTAL BENEFIT POINTS					315

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

351

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.90

Place "X" in one box below:

	MSD Project
	Project by Others

FIGURE 3-2 STRUCTURAL ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 3-2 - STREAM CROSSING STRUCTURAL FLOODING **DATE:** 10/18/2013
Solutions By: EDM INC.

Problem: Undersized culvert under Countryside Ln, basement flooding at Q163 - 11 Countryside Ln (Q156)
Strategy: 1) Replace existing undersized twin 36" RCP with new 7'x4' double box culvert designed for 15 YR Storm - Non Diverted Flow. 2) Replace existing undersized twin 36" RCP with new 8'x5' double box culvert designed for 100 YR Storm - Non Diverted Flow. 3) Replace existing undersized twin 36" RCP with new 6'x3' double box culvert designed for 15 YR Storm - Diverted Flow. 4) Replace existing undersized twin 36" RCP with new 7x5 double box culvert designed for 100 YR Storm - Diverted Flow.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	1) Alternative 2	1) Alternative 3	1) Alternative 4
Double 7'x4' box culvert (45 LF)	CY	210	\$600	\$126,000	\$0	\$0	\$0
Double 8'x5' box culvert (45 LF)	CY	250	\$600	\$0	\$150,000	\$0	\$0
Double 6'x3' box culvert (45 LF)	CY	190	\$600	\$0	\$0	\$114,000	\$0
Double 7'x5' box culvert (45 LF)	CY	230	\$600	\$0	\$0	\$0	\$138,000
Restoration	LS	1	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
Associated Erosion Protection	LS	1	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
Subtotal				\$201,000	\$225,000	\$189,000	\$213,000

Total **\$201,000** **\$225,000** **\$189,000** **\$213,000**

Utility Relocation	20%	\$40,200	\$45,000	\$37,800	\$42,600
Clearing	5%	\$10,050	\$11,250	\$9,450	\$10,650
Mobilization	4%	\$8,040	\$9,000	\$7,560	\$8,520

Total with Percent Allowances **\$259,290** **\$290,250** **\$243,810** **\$274,770**

Contingency 25% \$64,823 \$72,563 \$60,953 \$68,693

Probable Construction Cost Estimate **\$324,113** **\$362,813** **\$304,763** **\$343,463**

Design Engineering and Geotechnical 30% \$97,234 \$108,844 \$91,429 \$103,039

Total Conceptual Cost Estimate **\$422,000** **\$472,000** **\$397,000** **\$447,000**

Total Benefit Points **245** **245** **245** **245**

Total Benefit Point Ratio **0.58** **0.52** **0.62** **0.55**

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-2 STREAM CROSSING ALTERNATIVE 3 -15 YR
DIVERTED FLOW

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address: Q163 - 11 Countryside Lane</i>	200	1	100		15		200	
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5	1	1		5		
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 3-2 STREAM ALT3

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-2 STREAM CROSSING ALTERNATIVE 3 -15 YR

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10	0	6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address: Countryside</i>	No. Ponds:		1	Points/pond:	5		5
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:	20		
		2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		0	Points/lot:	10		
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age			15				15
		TOTAL PROBLEM POINTS							225

FIGURE 3-2 STREAM ALT3

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-2 STREAM CROSSING ALTERNATIVE 3 -15 YR

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	0	PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements	4			20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			
TOTAL SOLUTION POINTS					20
TOTAL BENEFIT POINTS					245

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

397

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.62

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 3-2 STREAM ALT3

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 3-2 CHANNEL - FTMT2 and FTMT2-2
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Erosion Q228 - 11230 and 11242 Hermitage Hill Place, Q163-11 Country Side Lane and 8 Foxrun Lane; bank stabilization will be needed when culvert under Country Side is upsized (7 and 12 Countryside Lane), . Yard flooding and erosion MSD-6: 26 Portland, Q369-27Portland, 11266 Hermitage Hill Place, 15, 19, 20, 22 Countryside Lane.

Strategy: 1) Install bank protection on FTMT2 from station 19+00 to 23+00 (400LF), 24+50 to 30+50 (600 LF), FTMT2-2 from station 5+50 to 14+70 (920 LF) and 60 feet upstream of Portland Place.

	Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
	Hard stabilization (L)	LF	1,000	\$300	\$300,000	\$0
	Soft stabilization (L)	LF	1,000	\$200	\$0	\$200,000
	Hard stabilization (S)	LF	1120	\$225	\$252,000	\$0
	Soft stabilization (S)	LF	1120	\$125	\$0	\$140,000
	Bioswale	LF	150	\$90	\$0	\$13,500
Infrastructure	New Swale	LF	150	\$18	\$2,700	\$0
Infrastructure	New Asphalt Curb	LF	100	\$32	\$3,200	\$3,200
	Geomorphic Study	Ea.	4	\$10,000		\$40,000
	Subtotal				\$557,900	\$396,700
	Total				\$557,900	\$396,700
	Utility Relocation			20%	\$111,580	\$79,340
	Clearing			5%	\$27,895	\$19,835
	Mobilization			4%	\$22,316	\$15,868
	Total with Percent Allowances				\$719,691	\$511,743
	Contingency			25%	\$179,923	\$127,936
	Probable Construction Cost Estimate				\$899,614	\$639,679
	Design Engineering and Geotechnical			30%	\$269,884	\$191,904
	Total Conceptual Cost Estimate				\$1,170,000	\$832,000
	Benefit Points				650	1,320
	Benefit/Cost Ratio				0.56	1.59

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-2 Channel FTMT2 and FTMT2-2 , Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) 11266Hermitage Hill Place <i>Address:15,19,20,22Countryside;26,27Portland</i>	10	7	5		0		70	
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2			
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1			
		1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)							
			Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots		
			Habitable structures, residential (1 lot per structure) <i>Address:</i>	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
			Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
			1.2.2. No. of lots (from 1.2.1) on outside of bend		lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots			
		Arterial Road: <i>Address:</i>	75		50		12			
		Collector Road: <i>Address:</i>	35		25		6			
		Residential Road: <i>Address:</i>	20		12		3			

FIGURE 3-2 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-2 Channel FTMT2 and FTMT2-2 , Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: 27Portland</i>	10	1	6		0		10
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:27 Portland</i>	No. Ponds:		1	Points/pond:	5		5
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:	20		
		2.3. Yard Erosion (1 per lot) <i>Addre.27Portland</i>	No. Lots:		1	Points/lot:	10		10
		2.4. Age of Existing System Points for Age	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
TOTAL PROBLEM POINTS							95		

FIGURE 3-2 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-2 Channel FTMT2 and FTMT2-2 , Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	11	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales	1.5	PER 100 LF	10	15
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	40	PER 100 LF	10	400
	Riffle Pool Complex	19	PER 100 LF	10	190
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements			12	5
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		Yes	65
TOTAL SOLUTION POINTS					1225
TOTAL BENEFIT POINTS					1320

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

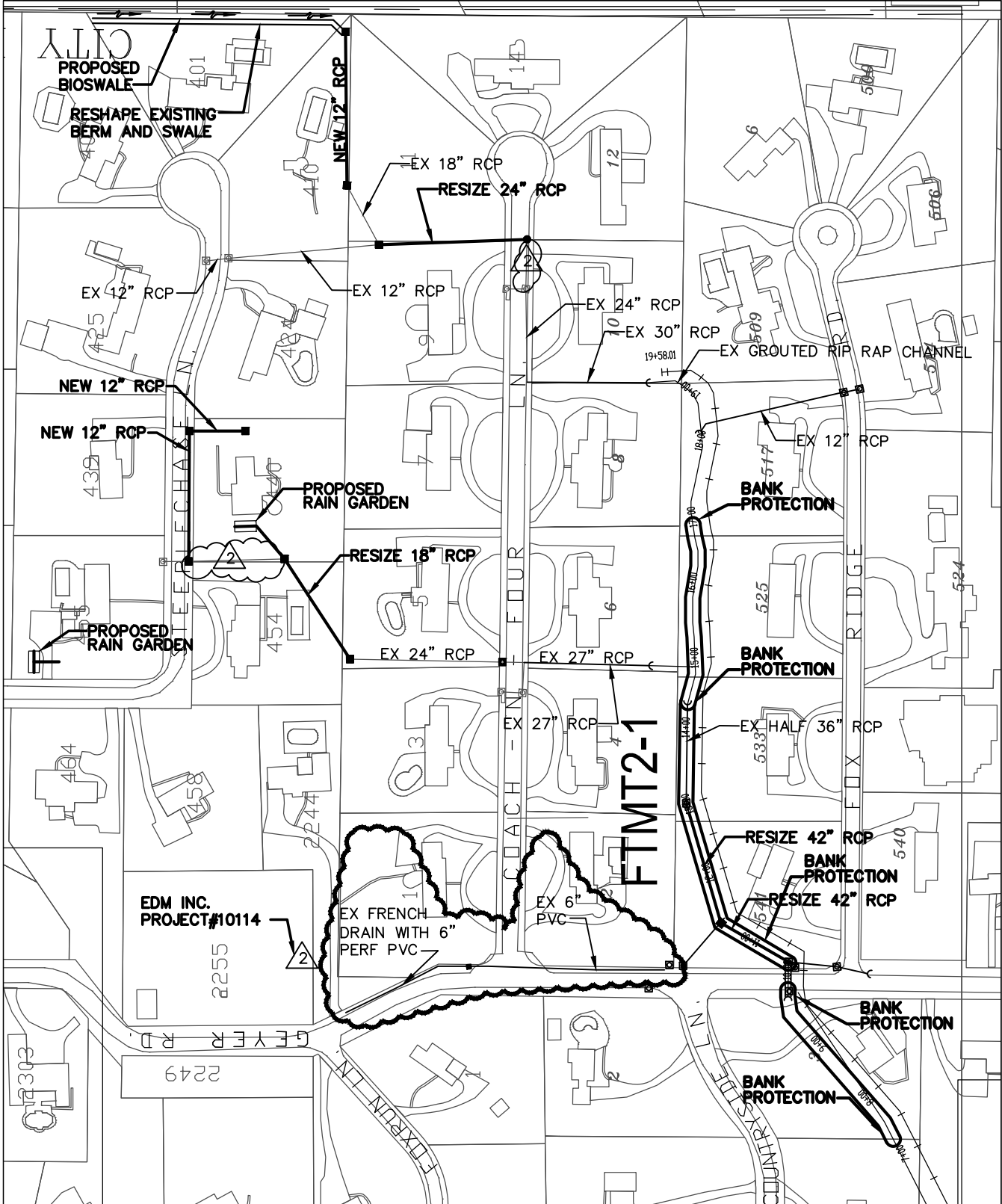
TOTAL COST IN THOUSANDS= 832

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 1.59

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 3-2 CHANNEL Alt 2



STORMWATER SYSTEM MASTER IMPROVEMENT PLAN



EDM Incorporated
Consulting Engineers

220 Mansion House Center
St. Louis, Missouri 63102
Phone (314) 231-5485 Fax (314) 231-8167
edm@edm-inc.com



0 200 400



SCALE

UPDATE NO. DATE



4/5/13

FIGURE NO. 3-3

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 3-3 OVERLAND FLOW
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard ponding at Q389 -401 Steeple Chase Ln.
Strategy: 1) Install berm to catch overland flow and direct to new inlet and pipe system to collect water. Replace undersized system. 2) Add bioswale to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
New Berm	LF	354	\$25	\$8,850	\$8,850
Single Area Inlet	EA	3	\$1,750	\$5,250	\$5,250
Single Inlet	EA	0	\$1,850	\$0	\$0
Manhole	EA	2	\$1,500	\$3,000	\$3,000
12" RCP CLASS III	LF	214	\$116	\$24,837	\$24,837
24" RCP CLASS III	LF	206	\$144	\$29,561	\$29,561
Bioswale	LF	359	\$90	\$0	\$32,310
Subtotal				\$71,498	\$103,808
Total Benefit Points				45	81
Individual Benefit Point Ratio				0.30	0.37
Estimated Increased Property Values				\$2,000	\$4,000

Problem: Yard ponding at Q385 -440 Steeple Chase Ln.
Strategy: 1) Catch water with new inlet and pipe system to collect water. Replace undersized system. 2) Add Rain Garden to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Inlet	EA	2	\$1,850	\$3,700	\$3,700
Single Area Inlet	EA	3	\$1,750	\$5,250	\$5,250
12" RCP CLASS III	LF	260	\$116	\$30,176	\$30,176
18" RCP CLASS III	LF	167	\$129	\$21,590	\$21,590
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$60,715	\$70,715
Total Benefit Points				45	50
Individual Benefit Point Ratio				0.35	0.34
Estimated Increased Property Values				\$5,000	\$7,000

Total				\$132,213	\$174,523
Utility Relocation			20%	\$26,443	\$34,905
Clearing			5%	\$6,611	\$8,726
Mobilization			4%	\$5,289	\$6,981
Total with Percent Allowances				\$170,555	\$225,135
Contingency			25%	\$42,639	\$56,284
Probable Construction Cost Estimate				\$213,194	\$281,419
Design Engineering and Geotechnical			30%	\$63,958	\$84,426
Total Conceptual Cost Estimate				\$278,000	\$366,000
Total Benefit Points				80	131
Total Benefit Point Ratio				0.29	0.36

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-3 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 3-3 OVERLAND A ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-3 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
	Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65			
	Basement (1 lot per structure)*	250	0	200		50			
	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50			
	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N			
	Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25			
	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12			
	Yard Flooding (1 per lot) <i>Address: Q389-401 Steeple Chase; Q385-440 Steeple Chase</i>	10	2	6		0		20	
	2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
	Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25			
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:	0	Points/pond:	5				
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:	20				
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:	0	Points/lot:	10				
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age							0	
	TOTAL PROBLEM POINTS							20	

FIGURE 3-3 OVERLAND A ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-3 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	1	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	4.09	PER 100 LF	10	41
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			10
TOTAL SOLUTION POINTS					111
TOTAL BENEFIT POINTS					131

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

366

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.36

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 3-3 OVERLAND A ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 3-3 OVERLAND FLOW
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard ponding at Q173 - 541 Fox Ridge Rd.
Strategy: 1) Resize undersized storm sewer pipe.

Description	Unit	Quantity	Unit Cost	1) Alternative 1
42" RCP CLASS III	LF	283	\$215	\$60,783
42" FES	EA	1	\$2,600	\$2,600
Single Area Inlet	EA	1	\$1,750	\$1,750
Subtotal				\$65,133
Total Benefit Points				45
Individual Benefit Point Ratio				0.33

Total				\$65,133
Utility Relocation		20%		\$13,027
Clearing		5%		\$3,257
Mobilization		4%		\$2,605
Total with Percent Allowances				\$84,021
Contingency		25%		\$21,005
Probable Construction Cost Estimate				\$105,027
Design Engineering and Geotechnical		30%		\$31,508
Total Conceptual Cost Estimate				\$137,000
Total Benefit Points				45
Total Benefit Point Ratio				0.33

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-3 without BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 3-3 OVERLAND B ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-3 without BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q173-541 Fox Ridge</i>	10	1	6		0		10
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:		5		
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20		
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		0	Points/lot:		10		
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age			15				15	
	TOTAL PROBLEM POINTS							25	

FIGURE 3-3 OVERLAND B ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-3 without BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	0	PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			
TOTAL SOLUTION POINTS					20
TOTAL BENEFIT POINTS					45

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

137000

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.00

Place "X" in one box below:

MSD Project
 Project by Others

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 3-3 OVERLAND FLOW STRUCTURAL FLOODING
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard ponding and garage flooding at Q390 - 455 Steeple Chase Ln

Strategy: 1) Add rain garden to infiltrate runoff and pipe under driveway.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 With BMP's
Rain Garden	EA	1	\$10,000	\$10,000
Subtotal				\$10,000
Total Benefit Points				135
Individual Benefit Point Ratio				6.44
Estimated Increased Property Values				\$2,000

Total **\$10,000**

Utility Relocation			20%	\$2,000
Clearing			5%	\$500
Mobilization			4%	\$400

Total with Percent Allowances **\$12,900**

Contingency 25% \$3,225

Probable Construction Cost Estimate **\$16,125**

Design Engineering and Geotechnical 30% \$20,000

Total Conceptual Cost Estimate **\$37,000**

Total Benefit Points **130**

Total Benefit Point Ratio **3.51**

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-3 Structural with BMP

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 3-3 STRUCTURAL ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-3 Structural with BMP

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address: Q390-455 Steeple Chase</i>	100	1	75		25		100
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q390-455 Steeple Chase</i>	10	1	6		0		10
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:	5			
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:	20			
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		0	Points/lot:	10			
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age							0	
	TOTAL PROBLEM POINTS							110	

FIGURE 3-3 STRUCTURAL ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-3 Structural with BMP

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	0.5	PER 100 LF	10	5
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			5
TOTAL SOLUTION POINTS					20
TOTAL BENEFIT POINTS					130

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

37

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

3.51

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 3-3 STRUCTURAL ALT 1

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 3-3 CHANNEL FTMT2-1
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Damage to property due to erosion MSD 28, Q171-525 Fox Ridge, 533 and 517 Fox Ridge Rd, 4 and 6 Coach and Four Lane. For ALT 3 and 4 add Yard Flooding and erosion: Q173, 541 Fox Ridge Rd.creek erosion MSD-1, 3 Countryside Lane

Strategy: 1) Install bank protection on FTMT2-1 at 3 Country Side (200 LF) and from station 14+50 to 17+00 (250 LF) or from station 10+25 to 17+00 (675 LF).

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2	ALT 3	ALT 4
Hard stabilization (S)	LF	450	\$225	\$101,250	\$0	\$0	\$0
Soft stabilization (S)	LF	450	\$125	\$0	\$56,250	\$0	\$0
Geomorphic Study	Ea.	2	\$10,000	\$0	\$20,000	\$0	\$20,000
Hard stabilization (S)	LF	875	\$225	\$0	\$0	\$196,875	\$0
Soft stabilization (S)	LF	875	\$125	\$0	\$0	\$0	\$109,375
Subtotal				\$101,250	\$76,250	\$196,875	\$129,375
Total				\$101,250	\$76,250	\$196,875	\$129,375
Utility Relocation			20%	\$20,250	\$15,250	\$39,375	\$25,875
Clearing			5%	\$5,063	\$3,813	\$9,844	\$6,469
Mobilization			4%	\$4,050	\$3,050	\$7,875	\$5,175
Total with Percent Allowances				\$130,613	\$98,363	\$253,969	\$166,894
Contingency			25%	\$32,653	\$24,591	\$63,492	\$41,723
Probable Construction Cost Estimate				\$163,266	\$122,953	\$317,461	\$208,617
Design Engineering and Geotechnical			30%	\$48,980	\$36,886	\$95,238	\$62,585
Total Conceptual Cost Estimate				\$213,000	\$160,000	\$413,000	\$272,000
	Benefit Points			270	440	320	625
	Benefit/Cost Ratio			1.27	2.75	0.77	2.30

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-3 Channel FTMT2-1, Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2			
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1			
		1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)							
			Habitable structures, residential (1 lot per structure) <i>Address:</i>	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
			Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend		lots	10 points per lot					
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Arterial Road: <i>Address:</i>	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots		
		Collector Road: <i>Address:</i>	75		50		12			
		Residential Road: <i>Address:</i>	35		25		6			
		Residential Road: <i>Address:</i>	20		12		3			

FIGURE 3-3 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-3 Channel FTMT2-1, Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:			Points/pond:		5		
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20		
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:			Points/lot:		10		
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
			TOTAL PROBLEM POINTS						

FIGURE 3-3 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-3 Channel FTMT2-1, Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	5	Points per Add'l Proj.:	50 250
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	9	PER 100 LF	10	90
	Riffle Pool Complex	5	PER 100 LF	10	50
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		Yes	30
TOTAL SOLUTION POINTS					440
TOTAL BENEFIT POINTS					440

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=

160

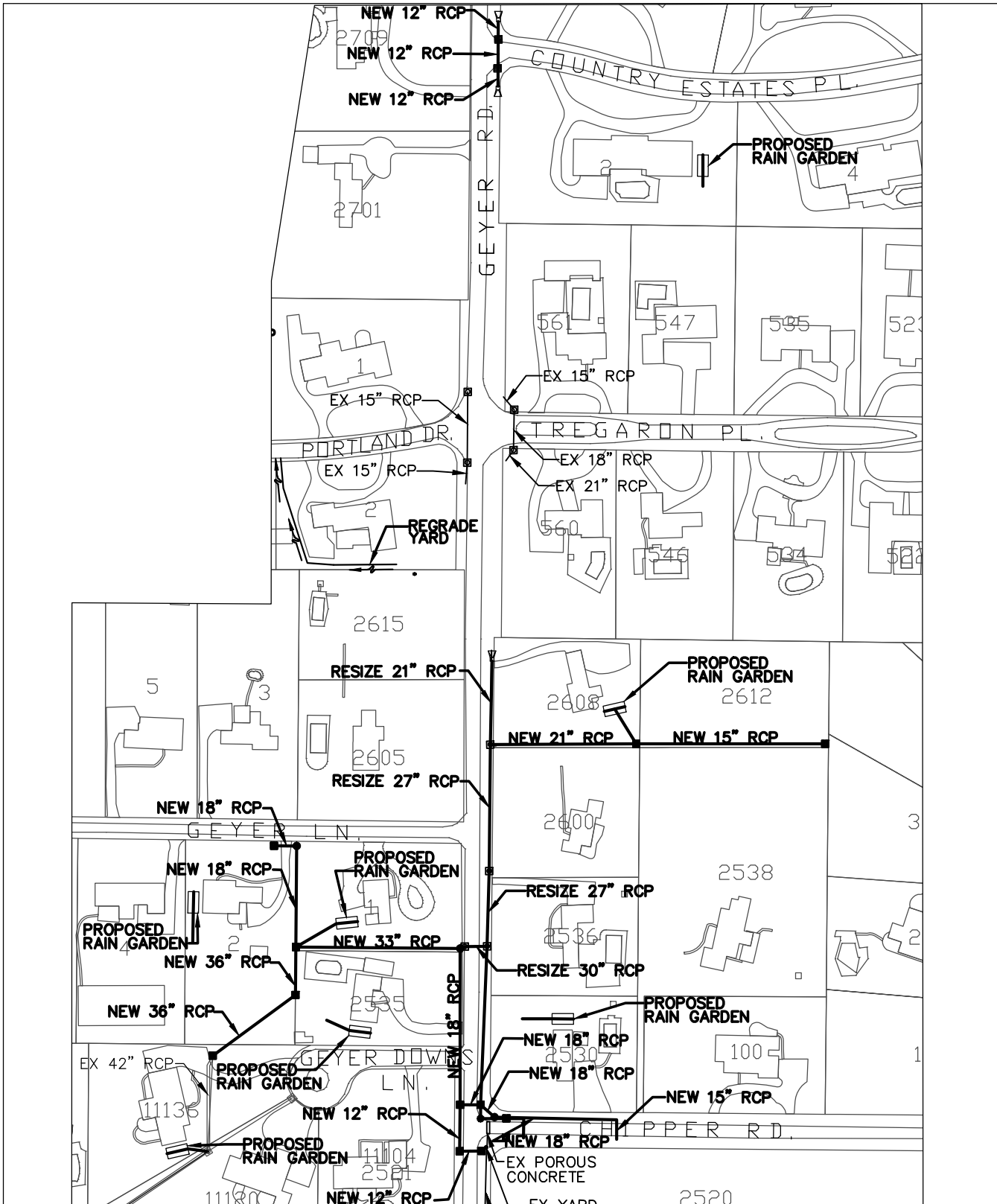
BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

2.75

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 3-3 CHANNEL Alt 2



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN



220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



0 200 400



SCALE

UPDATE NO. _____ DATE _____

FIGURE NO. 3-4

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 3-4 OVERLAND FLOW
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Erosion at Q143 - 2 Country Estates and undersized culvert at Country Estates

Strategy: 1) Replace existing culvert under Country Estates with new culvert 2) Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1 With
				Without BMP's	BMP's
Single Area Inlet	EA	2	\$1,750	\$3,500	\$3,500
12" RCP CLASS III	LF	90	\$116	\$10,445	\$10,445
12" FES	EA	2	\$1,100	\$2,200	\$2,200
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$16,145	\$26,145
Total Benefit Points				35	40
Individual Benefit Point Ratio				1.03	0.73
Estimated Increased Property Values				\$0	\$2,000

Problem: Yard Ponding at Q358 - 2 Portland Drive

Strategy: 1) Regrade yard around house

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1 With
				Without BMP's	BMP's
Regrade yard	LS	1	\$3,000	\$3,000	\$3,000
Subtotal				\$3,000	\$3,000
Total Benefit Points				30	30
Individual Benefit Point Ratio				4.77	4.77
Estimated Increased Property Values				\$1,000	\$1,000

Problem: Yard ponding at Q332 - 2600 N. Geyer Rd., Q316 - 2535 N Geyer Rd. and Q428 - 2 West Geyer Ln., (Q331), (Q88), and (Q208).

Strategy: 1) Install inlets and pipe system to collect water. Connect to existing stormsewer system and resized undersized stormsewer pipes. 2) Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1 With
				Without BMP's	BMP's
Single Inlet	EA	12	\$1,850	\$22,200	\$22,200
Manhole	EA	3	\$1,500	\$4,500	\$4,500
12" RCP CLASS III	LF	95	\$116	\$11,026	\$11,026
15" RCP CLASS III	LF	291	\$124	\$36,165	\$36,165
18" RCP CLASS III	LF	617	\$129	\$79,766	\$79,766
21" RCP CLASS III	LF	321	\$137	\$43,942	\$43,942
27" RCP CLASS III	LF	282	\$150	\$42,331	\$42,331
30" RCP CLASS III	LF	31	\$163	\$5,060	\$5,060
33" RCP CLASS III	LF	230	\$174	\$40,119	\$40,119
36" RCP CLASS III	LF	211	\$186	\$39,254	\$39,254
Rain Garden	EA	4	\$10,000	\$0	\$40,000
Subtotal				\$324,363	\$364,363
Total Benefit Points				55	75
Individual Benefit Point Ratio				0.08	0.10
Estimated Increased Property Values				\$12,000	\$16,000

Total **\$343,509** **\$393,509**

FIGURE 3-4 OVERLAND

Utility Relocation	20%	\$68,702	\$78,702
Clearing	5%	\$17,175	\$19,675
Mobilization	4%	\$13,740	\$15,740
Total with Percent Allowances		\$443,126	\$507,626
Contingency	25%	\$110,782	\$126,907
Probable Construction Cost Estimate		\$553,908	\$634,533
Design Engineering and Geotechnical	30%	\$166,172	\$190,360
Total Conceptual Cost Estimate		\$721,000	\$825,000
Total Benefit Points		170	220
Total Benefit Point Ratio		0.24	0.27

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 3-4 OVERLAND

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-4 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 3-4 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-4 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
	Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65			
	Basement (1 lot per structure)*	250	0	200		50			
	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50			
	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N			
	Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25			
	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12			
	Yard Flooding (1 per lot) <i>Address: Q358-2 Portland; Q332-2260 N. Geyer; Q316-2535 N. Geyer; Q428-2 W. Geyer</i>	10	4	6		0		40	
	2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
	Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25			
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address: Country Estates and Geyer</i>	No. Ponds:		1	Points/pond:	5		5	
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:	20			
	2.3. Yard Erosion (1 per lot) <i>Address: Q143-2 Country Estates</i>	No. Lots:		1	Points/lot:	10		10	
2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)				
Points for Age							15		
TOTAL PROBLEM POINTS								70	

FIGURE 3-4 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 3-4 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY						
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000	
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	2	Points per Add'l Proj.:	50	100
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit		
	Bioswales*	2.5	PER 100 LF	10		25
	Forebays		AC	200		
	Wet Ponds		AC	100		
	Wetlands		AC	50		
	Biostabilization of banks (per bank)		PER 100 LF	10		
	Riffle Pool Complex		PER 100 LF	10		
	4.2. Eliminates combined sewer (per project)		EA	100		
4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)	
	Points for Easements					
	5.2. Recreational/Educational	Yes = 100, no = 0 pts				25
TOTAL SOLUTION POINTS						150
TOTAL BENEFIT POINTS						220

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

825

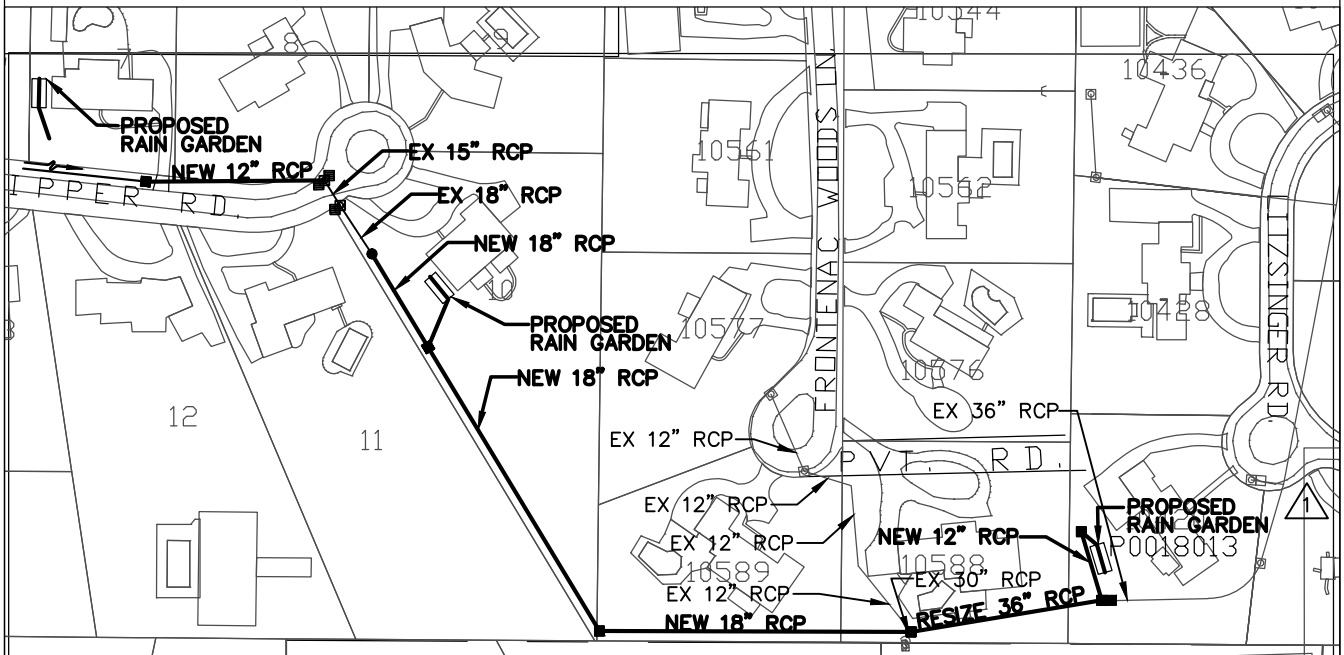
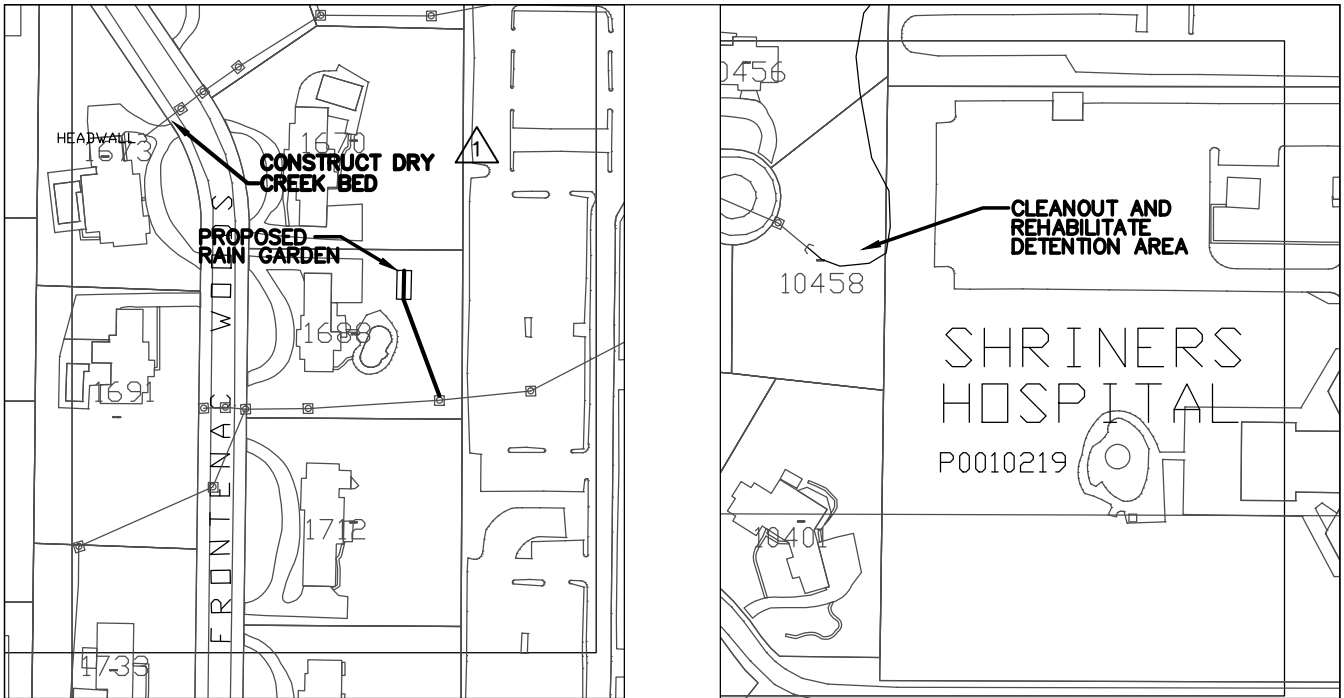
BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.27

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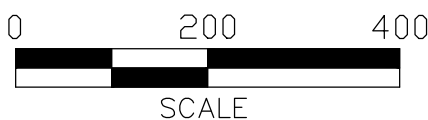
MSD Project
 Project by Others

FIGURE 3-4 OVERLAND ALT 2



STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
 Consulting Engineers
 220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



UPDATE NO. DATE
 ▲ 11/12/08

FIGURE NO. 4-1

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 4-1 OVERLAND FLOW
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard ponding at Q193 - 1688 Frontenac Woods Ln and yard erosion at Q194 - 1673 Frontenac Woods Ln.

Strategy: 1) Add Rain Garden to infiltrate runoff and protect natural channels and construct a dry creek bed to prevent erosion.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Construct Dry Creek Bed	LF	163	\$100	\$16,300	\$16,300
Grading	LS	1	\$5,000	\$5,000	\$5,000
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000
Subtotal				\$31,300	\$31,300
Total Benefit Points				45	45
Individual Benefit Point Ratio				0.69	0.69
Estimated Increased Property Values				\$2,000	\$2,000

Problem: Yard ponding at Q84 - 10 Chipper Rd, Q82 - 7 Chipper Rd., and Q290-10420 Litzinger Road and Yard Erosion at Q198 - 10589 Frontenac Woods Ln.

Strategy: 1) Install inlets pipes to collect stormwater. Replace undersized existing stormwater system 2) Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Area Inlet	EA	4	\$1,750	\$7,000	\$7,000
Double Area Inlet	EA	1	\$3,050	\$3,050	\$3,050
Manhole	EA	1	\$1,500	\$1,500	\$1,500
12" RCP CLASS III	LF	261	\$116	\$30,292	\$30,292
18" RCP CLASS III	LF	783	\$129	\$101,226	\$101,226
36" RCP CLASS III	LF	201	\$186	\$37,394	\$37,394
Grading	LS	1	\$5,000	\$5,000	\$5,000
Rain Garden	EA	3	\$10,000	\$0	\$30,000
Subtotal				\$185,462	\$215,462
Total Benefit Points				65	80
Individual Benefit Point Ratio				0.17	0.18
Estimated Increased Property Values				\$12,000	\$16,000

Problem: Street ponding at Q384 - 2001 S. Lindbergh Blvd.

Strategy: 1) Cleanout and rehabilitate detention area.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Rehabilitate Detention Basin	EA	1	\$60,000	\$60,000	\$60,000
Subtotal				\$60,000	\$60,000
Total Benefit Points				5	5
Individual Benefit Point Ratio				0.04	0.04
Estimated Increased Property Values				\$2,000	\$2,000

Total **\$276,762** **\$306,762**

Utility Relocation	20%	\$55,352	\$61,352
Clearing	5%	\$13,838	\$15,338
Mobilization	4%	\$11,070	\$12,270
Total with Percent Allowances		\$357,023	\$395,723
Contingency	25%	\$89,256	\$98,931
Probable Construction Cost Estimate		\$446,279	\$494,654
Design Engineering and Geotechnical	30%	\$133,884	\$148,396
Total Conceptual Cost Estimate		\$581,000	\$644,000
Total Benefit Points		175	200
Total Benefit Point Ratio		0.30	0.31

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 4-1 OVERLAND

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 4-1 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50				
1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot						
1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots			
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 4-1 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 4-1 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q193-1688 Frontenac Woods; Q84-10 Chipper; Q82-7 Chipper, Q290-10420 Litzsinger</i>	10	4	6		0		40
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address: Q384-2001 S. Lindbergh Blvd</i>	No. Ponds:		1	Points/pond:	5		5
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:	20		
		2.3. Yard Erosion (1 per lot) <i>Address: Q198-10589 Frontenac Woods; Q194-1673 Frontenac Woods Lane</i>	No. Lots:		2	Points/lot:	10		20
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							0
TOTAL PROBLEM POINTS							65		

FIGURE 4-1 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 4-1 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	2	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	2	PER 100 LF	10	20
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			15
TOTAL SOLUTION POINTS					135
TOTAL BENEFIT POINTS					200

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

644

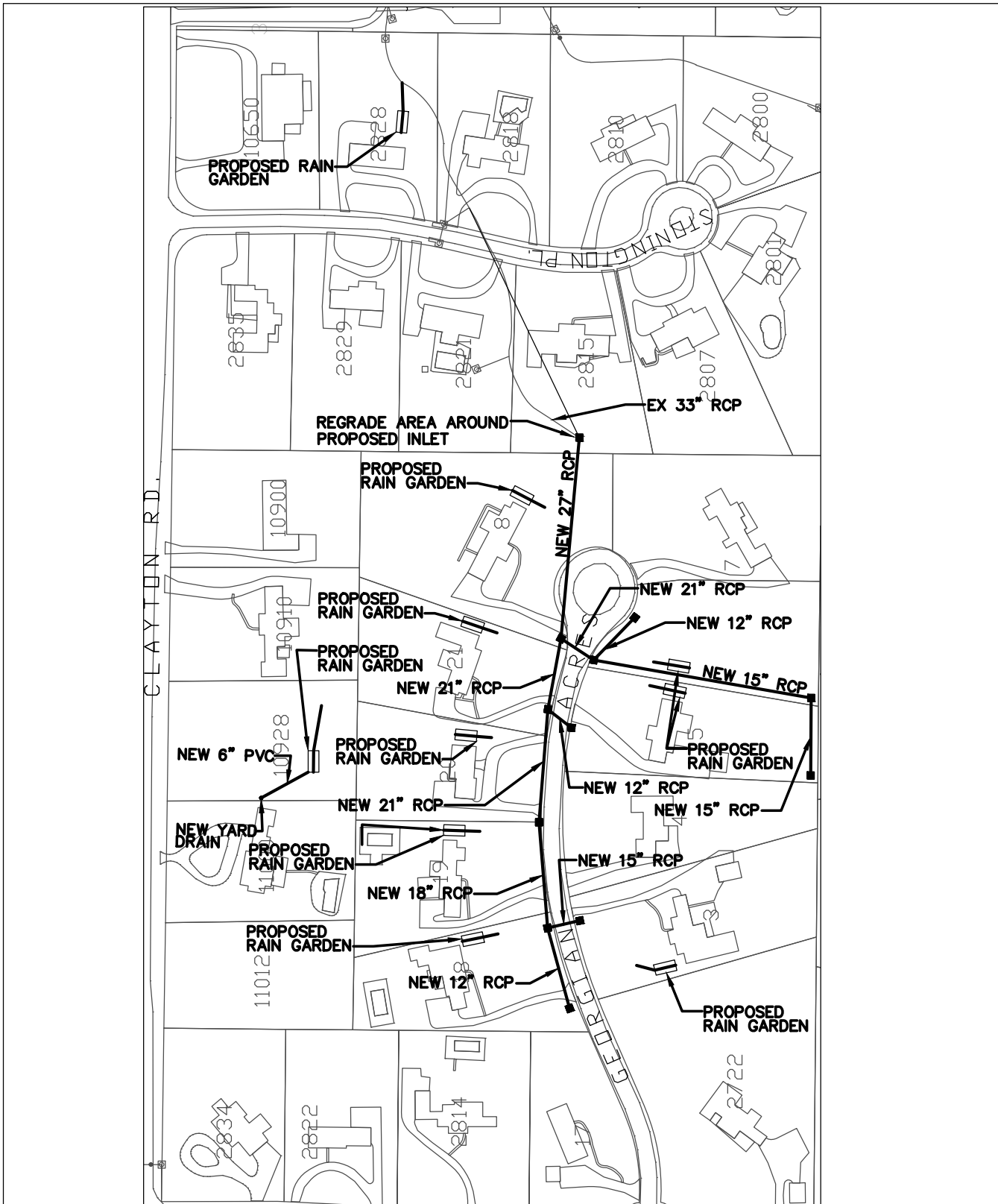
BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.31

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 4-1 OVERLAND ALT 2



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN



EDM Incorporated
Consulting Engineers

220 Mansion House Center
St. Louis, Missouri 63102
Phone (314) 231-5485 Fax (314) 231-8167
edm@edm-inc.com

0 200 400



SCALE

UPDATE NO. _____ DATE _____



FIGURE NO. 4-2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 4-2 OVERLAND FLOW
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard ponding at Q391 - 2815 Sonington Pl and Q200 - 8 Georgian Acres, (Q202)

Strategy: 1) Add inlet and pipe system along Georian Acres to collect water and connect to existing system 2) Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's
Single Area Inlet	EA	10	\$1,750	\$17,500	\$17,500
12" RCP CLASS III	LF	241	\$116	\$27,970	\$27,970
15" RCP CLASS III	LF	463	\$124	\$57,542	\$57,542
18" RCP CLASS III	LF	148	\$129	\$19,133	\$19,133
21" RCP CLASS III	LF	314	\$137	\$42,983	\$42,983
27" RCP CLASS III	LF	282	\$150	\$42,331	\$42,331
Rain Garden	EA	8	\$10,000	\$0	\$80,000
Subtotal				\$207,460	\$287,460
Total Benefit Points				30	70
Individual Benefit Point Ratio				0.07	0.12
Estimated Increased Property Values				\$3,000	\$5,000

Problem: Yard ponding at Q99 - 10928 Clayton Rd.

Strategy: 1) Add yard drain and pipe system to collect runoff and pipe under driveway. 2) Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1 With
Yard Drain	EA	1	\$500	\$500	\$500
6" PVC	LF	75	\$24	\$1,800	\$1,800
Restoration	LS	1	\$3,000	\$3,000	\$3,000
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$5,300	\$15,300
Total Benefit Points				30	35
Individual Benefit Point Ratio				2.70	1.09
Estimated Increased Property Values				\$0	\$2,000

Total				\$212,760	\$302,760
Utility Relocation			20%	\$42,552	\$60,552
Clearing			5%	\$10,638	\$15,138
Mobilization			4%	\$8,510	\$12,110
Total with Percent Allowances				\$274,460	\$390,560
Contingency			25%	\$68,615	\$97,640
Probable Construction Cost Estimate				\$343,076	\$488,201
Design Engineering and Geotechnical			30%	\$102,923	\$146,460
Total Conceptual Cost Estimate				\$446,000	\$635,000
Total Benefit Points				145	235
Total Benefit Point Ratio				0.33	0.37

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 4-2 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 4-2 OVERLAND A ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 4-2 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q391-2815 Stonington; Q200- 8 Georgian Acres; Q392-2828 Stonington; Q99-10928 Clayton</i>	10	3	6		0		30
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:	0	Points/pond:		5		
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20		
		2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:	0	Points/lot:		10		
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							0
	TOTAL PROBLEM POINTS								30

FIGURE 4-2 OVERLAND A ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 4-2 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	2	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	4.5	PER 100 LF	10	45
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			50
TOTAL SOLUTION POINTS					205
TOTAL BENEFIT POINTS					235

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

635

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.37

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 4-2 OVERLAND A ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name:	FIGURE 4-2 OVERLAND FLOW			
Solutions By:	EDM INC.	DATE: 10/18/2013		
<hr style="border-top: 1px dashed black;"/>				
Problem:	Yard ponding at Q392 - 2828 Stonington Pl.			
Strategy:	1) Add Rain Gardens to infiltrate runoff and protect natural channels.			
Description	Unit	Quantity	Unit Cost	1) Alternative 1
Rain Garden	EA	1	\$10,000	\$10,000
Subtotal				\$10,000
Total Benefit Points				35
Individual Benefit Point Ratio				1.67
Estimated Increased Property Values				\$2,000
<hr style="border-top: 1px dashed black;"/>				
Total				\$10,000
Utility Relocation			20%	\$2,000
Clearing			5%	\$500
Mobilization			4%	\$400
Total with Percent Allowances				\$12,900
Contingency			25%	\$3,225
Probable Construction Cost Estimate				\$16,125
Design Engineering and Geotechnical			30%	\$20,000
Total Conceptual Cost Estimate				\$37,000
Total Benefit Points				40
Total Benefit Point Ratio				1.08
Additional Comments:	Conceptual Cost are rounded to the nearest \$1000			

FIGURE 4-2 OVERLAND B

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 4-2 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 4-2 OVERLAND B ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 4-2 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q392-2828 Stonington</i>	10	1	6		0		10
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:		5	
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20	
		2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		0	Points/lot:		10	
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							0
		TOTAL PROBLEM POINTS							10

FIGURE 4-2 OVERLAND B ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 4-2 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	0.5	PER 100 LF	10	5
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements	1			20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			5
TOTAL SOLUTION POINTS					30
TOTAL BENEFIT POINTS					40

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

37

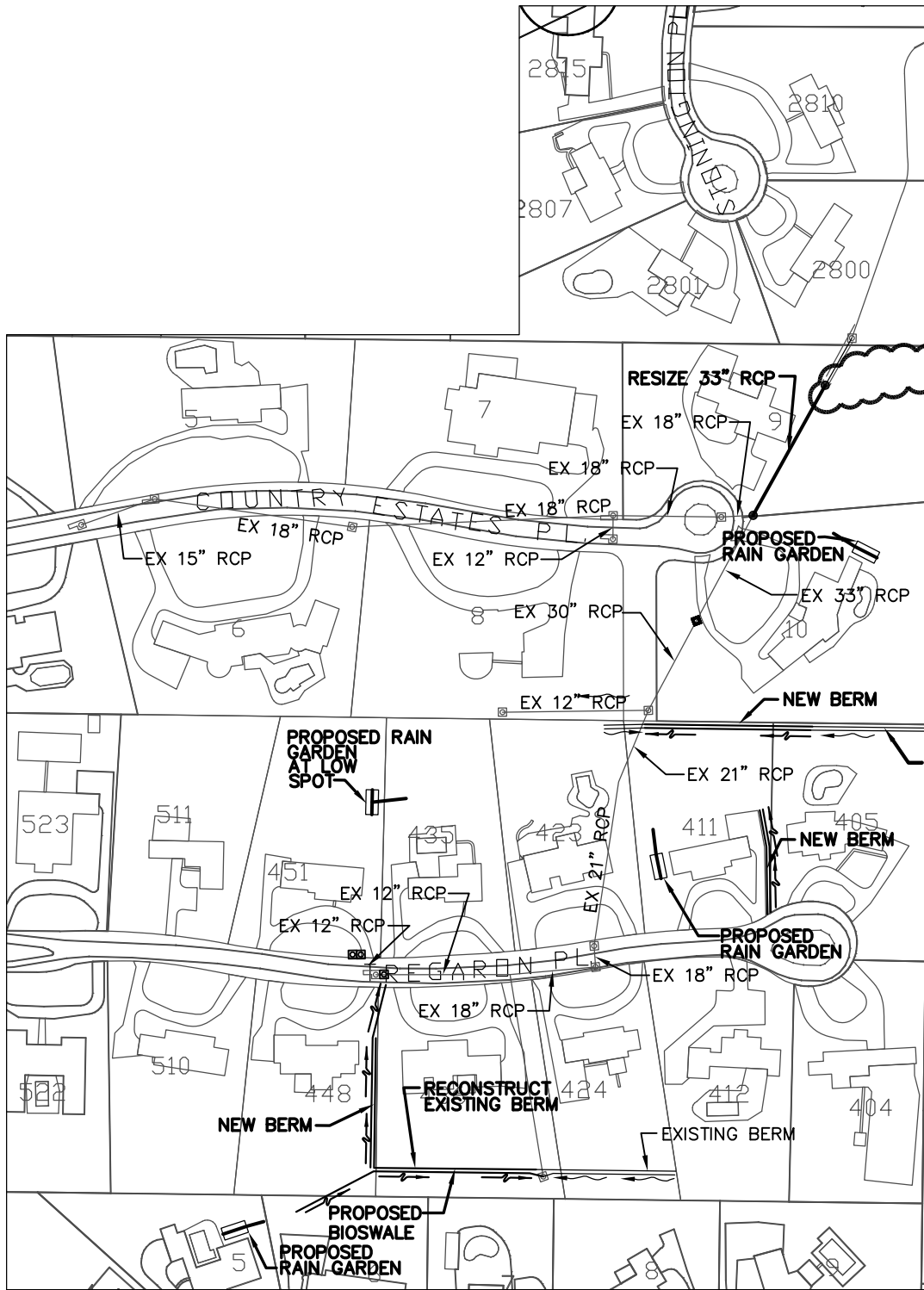
BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.08

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 4-2 OVERLAND B ALT 1



MATCHLINE 4-3B

CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
Consulting Engineers

220 Mansion House Center
St. Louis, Missouri 63102
Phone (314) 231-5485 Fax (314) 231-8167
edm@edm-inc.com



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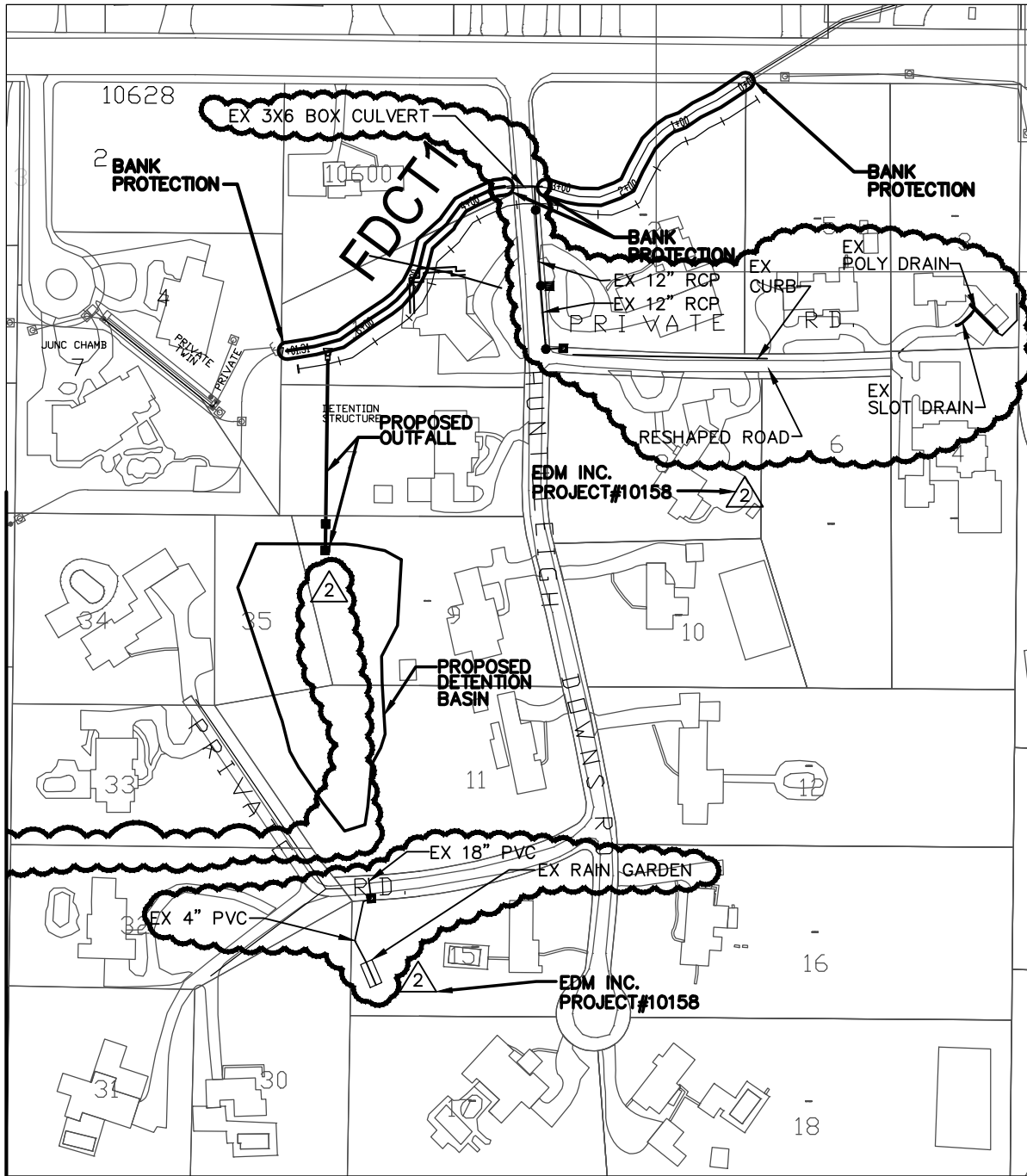


SCALE

UPDATE NO. _____ DATE _____

FIGURE NO. 4-3A

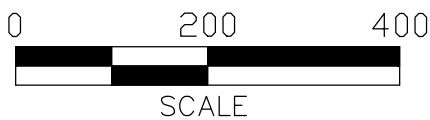
MATCHLINE 4-3A



STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
Consulting Engineers

220 Mansion House Center
St. Louis, Missouri 63102
Phone (314) 231-5485 Fax (314) 231-8167
edm@edm-inc.com



UPDATE NO. _____ DATE _____

FIGURE NO. 4-3B

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 4-3 OVERLAND FLOW
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard ponding at Q80 - 5 Chipper Rd., Q411 - 451 Tregaron Place, Q408 - 436 Tregaron Place and Q407 - 424 Tregaron Place, yard flooding at Q148 - 10 Country Estates, yard erosion at Q146 - 9 Country Estates and Q414 - 423 Tregaron Place. and yard flooding at Q409 - 411 Tregaron Place

Strategy: 1) Install inlet and pipe system to collect water. 2) Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's
Single Area Inlet	EA	1	\$1,750	\$1,750	\$1,750
Manhole	EA	2	\$1,500	\$3,000	\$3,000
New Berm	LF	860	\$25	\$21,500	\$21,500
33" RCP CLASS III	LF	180	\$174	\$31,397	\$31,397
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000
Additonal Grading	LS	1	\$10,000	\$10,000	\$10,000
Erosion Protection	LS	1	\$5,000	\$5,000	\$5,000
Bioswale	LF	196	\$90	\$0	\$17,640
Rain Garden	EA	3	\$10,000	\$0	\$30,000
Subtotal				\$82,647	\$130,287
Total Benefit Points				95	135
Individual Benefit Point Ratio				0.55	0.49
Estimated Increased Property Values				\$24,000	\$40,000

Total **\$82,647** **\$130,287**

Utility Relocation	20%	\$16,529	\$26,057
Clearing	5%	\$4,132	\$6,514
Mobilization	4%	\$3,306	\$5,211

Total with Percent Allowances **\$106,615** **\$168,071**

Contingency	25%	\$26,654	\$42,018
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Probable Construction Cost Estimate **\$133,269** **\$210,088**

Design Engineering and Geotechnical	30%	\$39,981	\$63,027
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Total Conceptual Cost Estimate **\$174,000** **\$274,000**

Total Benefit Points **100** **170**

Total Benefit Point Ratio **0.57** **0.62**

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 4-3 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 4-3 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 4-3 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) Address:	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
		Yard Flooding (1 per lot) Address: Q193-1688 Frontenac Woods; Q80-5 Chipper; Q282-15 Huntleigh Wods; Q280-11 Huntleigh Downs; Q281-9 Huntleigh Downs; Q411-451 Tregaron; Q408-436 Tregaron; Q407-424 Tregaron; Q148-10 Country Estate; Q409-411 Tregaron; Q278-2 Huntleigh Downs	10	6	6		0		60
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. Ponds:	0	Points/pond:	5			
		2.2. Moderate Risk Erosion of misc. structures Address:	No. Lots:		Points/lot:	20			
		2.3. Yard Erosion (1 per lot) Address: Q146-9 Country Estates; Q414-423 Tregaron	No. Lots:	2	Points/lot:	10			20
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
Points for Age							15		
TOTAL PROBLEM POINTS							95		

FIGURE 4-3 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 4-3 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	4	PER 100 LF	10	40
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			35
TOTAL SOLUTION POINTS					75
TOTAL BENEFIT POINTS					170

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

274

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.62

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 4-3 OVERLAND ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 4-3 CHANNEL FDCT1
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Erosion in unmaintained area MSD17 - 1 Huntleigh Downs, 10600 Clayton Road. Yard flooding and erosion Q278 - 2 Huntleigh Downs.

Strategy: 1) Install bank protection on FDTC1 from station 0+00 to 3+00 (300 LF) and from 3+50 to 7+00 (350 LF).

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (S)	LF	650	\$225	\$146,250	\$0
Soft stabilization (S)	LF	650	\$125	\$0	\$81,250
Geomorphic Study	EA	2	\$10,000	\$0	\$20,000
Total				\$146,250	\$101,250
				\$146,250	\$101,250
Utility Relocation					
Clearing			20%	\$29,250	\$20,250
Mobilization			5%	\$7,313	\$5,063
			4%	\$5,850	\$4,050
Total with Percent Allowances				\$188,663	\$130,613
Contingency			25%	\$47,166	\$32,653
Probable Construction Cost Estimate				\$235,828	\$163,266
Design Engineering and Geotechnical			30%	\$70,748	\$48,980
Total Conceptual Cost Estimate				\$307,000	\$213,000
Benefit Points				130	345
Benefit/Cost Ratio				0.42	1.62

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 4-3 Channel FDCT1, Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10	1	5		0		10	
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 4-3 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 4-3 Channel FDCT1, Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		Points/pond:		5			
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20			
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		Points/lot:		10			
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
	TOTAL PROBLEM POINTS							10	

FIGURE 4-3 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 4-3 Channel FDCT1, Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	2	Points per Add'l Proj.:	50 100
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	13	PER 100 LF	10	130
	Riffle Pool Complex	7	PER 100 LF	10	70
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		Yes	15
TOTAL SOLUTION POINTS					335
TOTAL BENEFIT POINTS					345

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

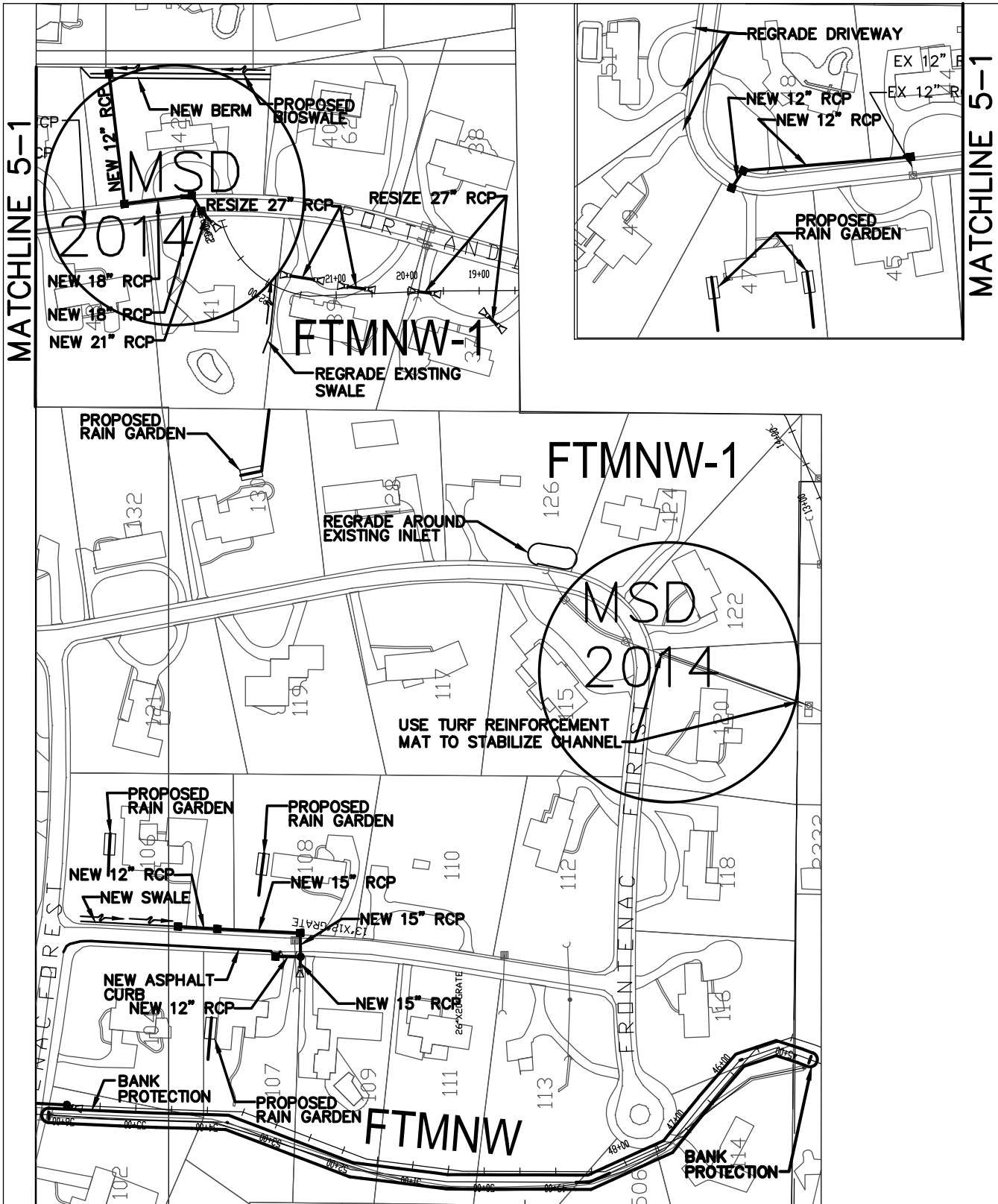
TOTAL COST IN THOUSANDS= 213

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 1.62

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 4-3 CHANNEL Alt 2



CITY OF FRONTENAC

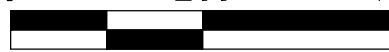
STORMWATER SYSTEM MASTER IMPROVEMENT PLAN



EDM Incorporated
Consulting Engineers

220 Mansion House Center
St. Louis, Missouri 63102
Phone (314) 231-5485 Fax (314) 231-8167
edm@edm-inc.com

0 200 400



SCALE

UPDATE NO. DATE



FIGURE NO. 5-1

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 5-1 OVERLAND FLOW
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard erosion at Q372 - 42 Portland Dr, Q352 - 39 Portland Dr and Q356 - 41 Portland Dr and yard ponding at Q191 - 13- Frontenac Forest and Q374 - 47 Portland Dr.

Strategy: 1) Install inlet and pipe system to collect water. Replace undersized storm sewer pipes. Resize driveway culverts at 37 and 39 Portland Dr. Reshape driveways at 49 and 51 Portland Dr. 2) Add Rain Garden and Bioswale to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Area Inlet	EA	1	\$1,750	\$1,750	\$1,750
Single Inlet	EA	5	\$1,850	\$9,250	\$9,250
Double Inlet	EA	1	\$3,150	\$3,150	\$3,150
New Berm	LF	271	\$25	\$6,775	\$6,775
New Swale	LF	107	\$18	\$1,926	\$1,926
12" RCP CLASS III	LF	448	\$116	\$51,995	\$51,995
18" RCP CLASS III	LF	121	\$129	\$15,643	\$15,643
21" RCP CLASS III	LF	21	\$137	\$2,875	\$2,875
21" FES	EA	1	\$1,500	\$1,500	\$1,500
27" RCP CLASS III	LF	89	\$150	\$13,360	\$13,360
27" FES	EA	8	\$1,700	\$13,600	\$13,600
Reshape Driveway	LS	1	\$3,000	\$3,000	\$3,000
Rain Garden	EA	2	\$10,000	\$0	\$20,000
Bioswale	LF	240	\$90	\$0	\$21,600
Subtotal				\$124,823	\$166,423
Total Benefit Points				75	109
Individual Benefit Point Ratio				0.29	0.31
Estimated Increased Property Values				\$15,000	\$25,000

Problem: Yard erosion at Q189 - 124 Frontenac Forest and Q187 - 120 Frontenac Forest
Strategy: 1) Install a turf reinforcement mat to minimize channel erosion.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Turf Reinforcement Mat	LF	202	\$20	\$4,040	\$4,040
Regrade around inlets	LS	1	\$2,000	\$2,000	\$2,000
Subtotal				\$6,040	\$6,040
Total Benefit Points				40	40
Individual Benefit Point Ratio				3.16	3.16
Estimated Increased Property Values				\$3,000	\$3,000

Total				\$130,863	\$172,463
Utility Relocation			20%	\$26,173	\$34,493
Clearing			5%	\$6,543	\$8,623
Mobilization			4%	\$5,235	\$6,899
Total with Percent Allowances				\$168,814	\$222,478
Contingency			25%	\$42,203	\$55,619
Probable Construction Cost Estimate				\$211,017	\$278,097
Design Engineering and Geotechnical			30%	\$63,305	\$83,429
Total Conceptual Cost Estimate				\$275,000	\$362,000
Total Benefit Points				120	164
Total Benefit Point Ratio				0.44	0.45

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 5-1 OVERLAND

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-1 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 5-1 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-1 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q191-130 Frontenac Forest; Q374-47 Portland</i>	10	2	6		0		20
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:	0	Points/pond:		5		
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20		
		2.3. Yard Erosion (1 per lot) <i>Address: Q372-42 Portland; Q352-39 Portland; Q356-41 Portland; Q189-124 Frontenac Forest; Q187-120 Frontenac Forest</i>	No. Lots:	5	Points/lot:		10		50
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							0
		TOTAL PROBLEM POINTS							70

FIGURE 5-1 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-1 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY						
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000	
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	1	Points per Add'l Proj.:	50	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit		
	Bioswales*	3.4	PER 100 LF	10		34
	Forebays		AC	200		
	Wet Ponds		AC	100		
	Wetlands		AC	50		
	Biostabilization of banks (per bank)		PER 100 LF	10		
	Riffle Pool Complex		PER 100 LF	10		
	4.2. Eliminates combined sewer (per project)		EA	100		
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10			
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)	
	Points for Easements					
	5.2. Recreational/Educational	Yes = 100, no = 0 pts				10
TOTAL SOLUTION POINTS						94
TOTAL BENEFIT POINTS						164

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

362

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.45

Place "X" in one box below:

	MSD Project
	Project by Others

FIGURE 5-1 OVERLAND ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 5-1 OVERLAND FLOW STRUCTURAL FLOODING
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard ponding and basement flooding at Q184 - 107 Frontenac Forest and yard erosion at Q185 - 108 Frontenac Forest.

Strategy: 1) Install inlet and pipe system to collect water. Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Area Inlet	EA	4	\$1,750	\$7,000	\$7,000
Manhole	EA	1	\$1,500	\$1,500	\$1,500
New Swale	LF	131	\$18	\$2,358	\$2,358
New Asphalt Curb	LF	297	\$20	\$5,940	\$5,940
12" RCP CLASS III	LF	90	\$116	\$10,445	\$10,445
15" RCP CLASS III	LF	164	\$124	\$20,382	\$20,382
15" FES	EA	1	\$1,200	\$1,200	\$1,200
Rain Garden	EA	3	\$10,000	\$0	\$30,000
Subtotal				\$48,825	\$78,825
Total Benefit Points				290	305
Individual Benefit Point Ratio				2.83	1.85
Estimated Increased Property Values				\$6,000	\$10,000
Total				\$48,825	\$78,825
Utility Relocation			20%	\$9,765	\$15,765
Clearing			5%	\$2,441	\$3,941
Mobilization			4%	\$1,953	\$3,153
Total with Percent Allowances				\$62,985	\$101,685
Contingency			25%	\$15,746	\$25,421
Probable Construction Cost Estimate				\$78,731	\$127,106
Design Engineering and Geotechnical			30%	\$23,619	\$38,132
Total Conceptual Cost Estimate				\$103,000	\$166,000
Total Benefit Points				270	300
Total Benefit Point Ratio				2.62	1.81

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-1 Structural with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 5-1 STRUCTURE ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-1 Structural with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)* <i>Address: Q184-107 Frontenac Forest</i>	250	1	200		50		250
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q184-107 Frontenac Forest</i>	10	1	6		0		10
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:		5	
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20	
		2.3. Yard Erosion (1 per lot) <i>Address: Q185-108 Frontenac Forest</i>	No. Lots:		1	Points/lot:		10	10
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							0
		TOTAL PROBLEM POINTS							270

FIGURE 5-1 STRUCTURE ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-1 Structural with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	1.5	PER 100 LF	10	15
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			15
TOTAL SOLUTION POINTS					30
TOTAL BENEFIT POINTS					300

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

166

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.81

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 5-1 STRUCTURE ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 5-1 CHANNEL FTMNW
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Damage to property due to erosion MSD-12. Flooding Q184 - 107 Frontenac Forest. Yard flooding and erosion Q186 - 113 Frontenac Forest. Bank erosion SR-5-102, 104, 107, 109, 111,114, 115, and 116 Frontenac Forest. Exposed VCP SR-4.

Strategy: 1) Install bank protection on FTMNW from station 44+50 to 56+00 (1,150 LF). Encase exposed VCP.

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (L)	LF	1,150	\$300	\$345,000	\$0
Soft stabilization (L)	LF	1,150	\$200	\$0	\$230,000
Geomorphic Study	Ea.	2	\$10,000		\$20,000
Concrete encasement	CY	5	\$260	\$1,300	\$1,300
Total				\$346,300	\$251,300
				\$346,300	\$251,300
Utility Relocation					
Clearing			20%	\$69,260	\$50,260
Mobilization			5%	\$17,315	\$12,565
			4%	\$13,852	\$10,052
Total with Percent Allowances				\$446,727	\$324,177
Contingency			25%	\$111,682	\$81,044
Probable Construction Cost Estimate				\$558,409	\$405,221
Design Engineering and Geotechnical			30%	\$167,523	\$121,566
Total Conceptual Cost Estimate				\$726,000	\$527,000
Benefit Points				575	985
Benefit/Cost Ratio				0.79	1.87

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-1 Channel FTMNW, Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:107 and 113 Frontenac Forest</i>	10	2	5		0		20	
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 5-1 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-1 Channel FTMNW, Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		Points/pond:		5			
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20			
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		Points/lot:		10			
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
	TOTAL PROBLEM POINTS							20	

FIGURE 5-1 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-1 Channel FTMNW, Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	11	Points per Add'l Proj.:	50 550
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	23	PER 100 LF	10	230
	Riffle Pool Complex	12	PER 100 LF	10	120
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				5
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		Yes	60
TOTAL SOLUTION POINTS					965
TOTAL BENEFIT POINTS					985

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS= **527**

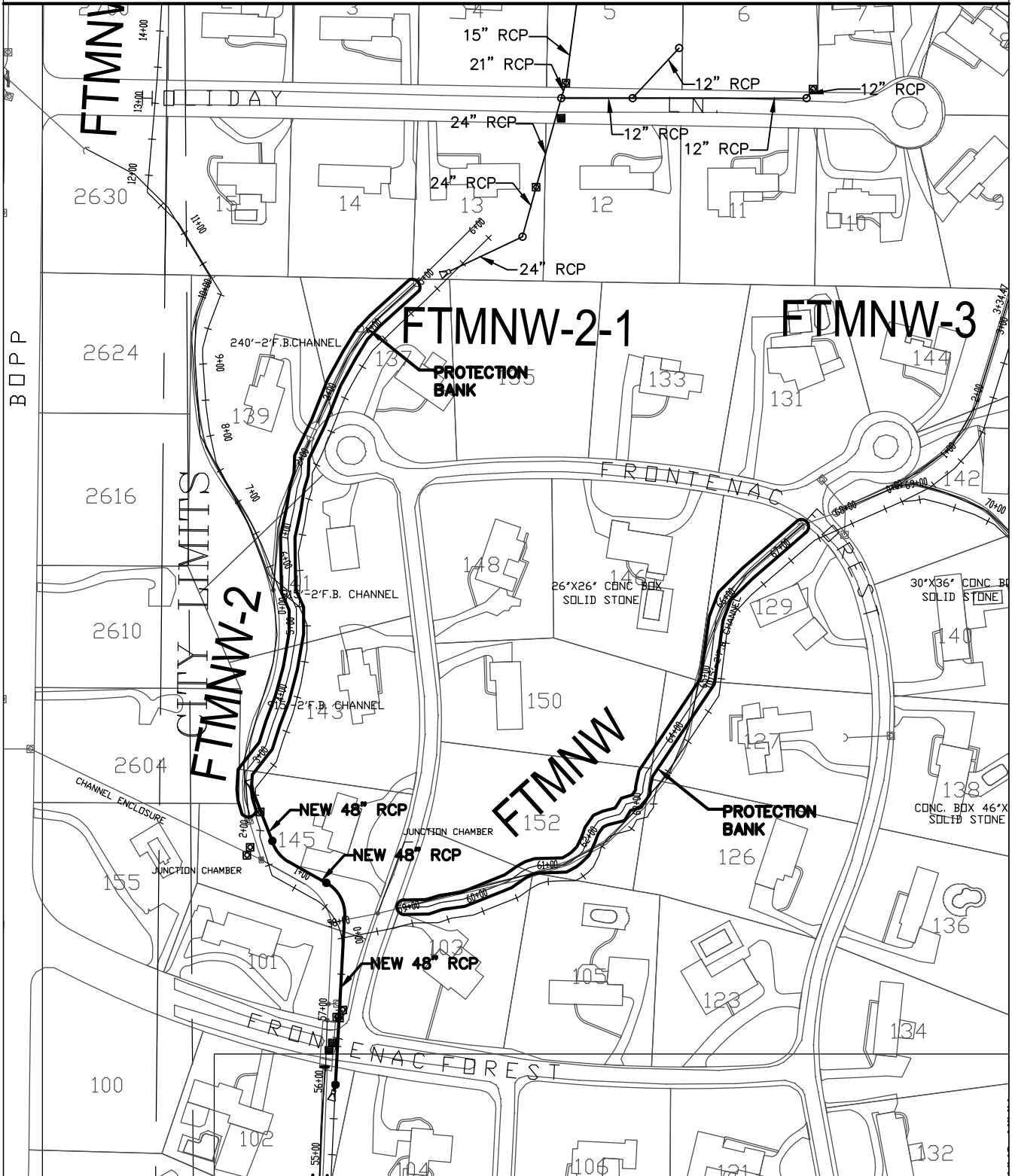
BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= **1.87**

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 5-1 CHANNEL Alt 2

MATCHLINE 5-2B



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN



EDM Incorporated
Consulting Engineers

220 Mansion House Center
St. Louis, Missouri 63102
Phone (314) 231-5485 Fax (314) 231-8167
edm@edm-inc.com



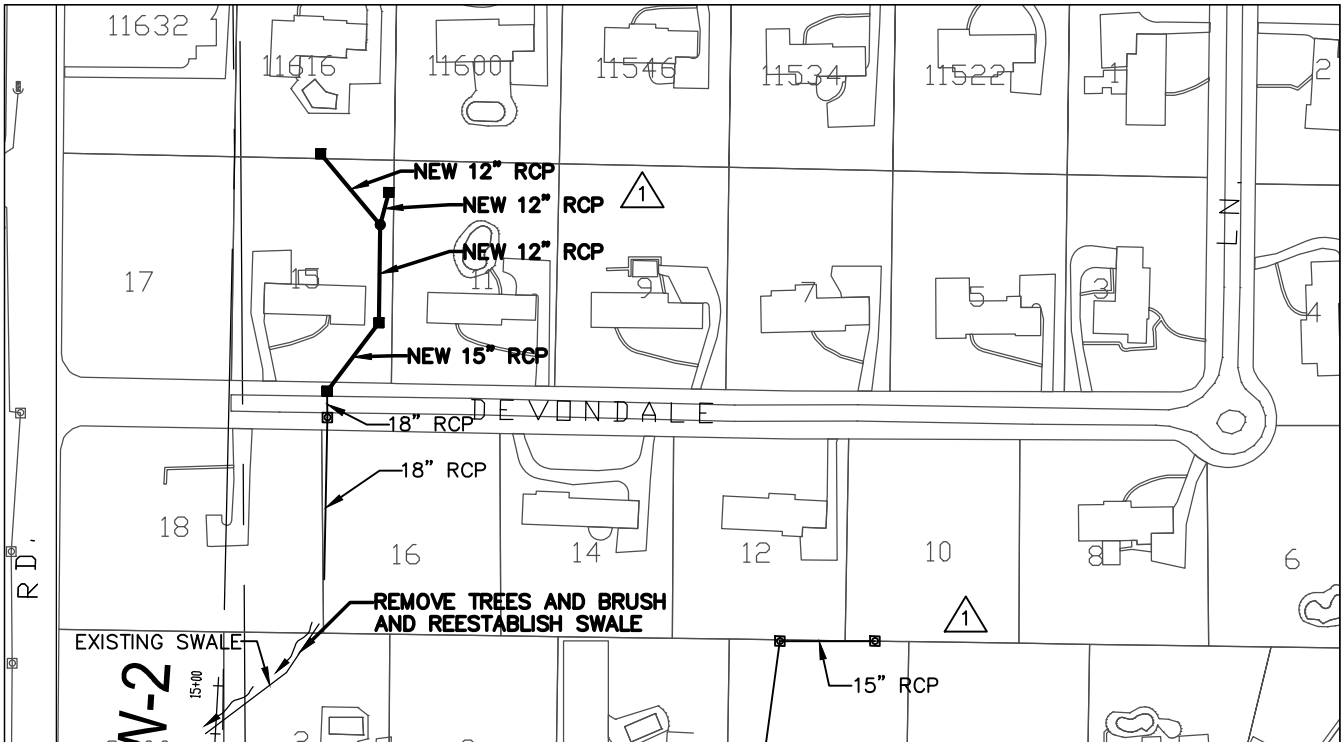
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SCALE

UPDATE NO. DATE
11/12/08

FIGURE NO. 5-2A



MATCHLINE 5-2A



STORMWATER SYSTEM MASTER IMPROVEMENT PLAN



220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



0 200 400



SCALE

UPDATE NO.	DATE
1	11/12/08

FIGURE NO. 5-2B

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 5-2 OVERLAND FLOW
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard ponding at Q165-15 Devondale and Q164-16 Devondale Place
Strategy: 1) Remove brush and reestablish swale at 16 Devondale Lane and install pipe and inlet system to prevent yard ponding at 15 Devondale Lane. 2) Add Rain Garden and Bioswale to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Area Inlet	EA	3	\$1,750	\$5,250	\$5,250
Single Inlet	EA	1	\$1,850	\$1,850	\$1,850
Manhole	EA	1	\$1,500	\$1,500	\$1,500
12" RCP CLASS III	LF	234	\$116	\$27,158	\$27,158
15" RCP CLASS III	LF	90	\$124	\$11,185	\$11,185
Remove Brush	LS	1	\$4,000	\$4,000	\$4,000
Grading	LS	1	\$5,000	\$5,000	\$5,000
Reestablish Swale	LS	1	\$3,000	\$3,000	\$3,000
Rain Garden	LS	1	\$10,000	\$0	\$10,000
Subtotal				\$58,943	\$68,943
Total Benefit Points				40	45
Individual Benefit Point Ratio				0.32	0.31
Estimated Increased Property Values				\$2,000	\$4,000
Total				\$58,943	\$68,943
Utility Relocation			20%	\$11,789	\$13,789
Clearing			5%	\$2,947	\$3,447
Mobilization			4%	\$2,358	\$2,758
Total with Percent Allowances				\$76,037	\$88,937
Contingency			25%	\$19,009	\$22,234
Probable Construction Cost Estimate				\$95,046	\$111,171
Design Engineering and Geotechnical			30%	\$28,514	\$33,351
Total Conceptual Cost Estimate				\$124,000	\$145,000
Total Benefit Points				40	45
Total Benefit Point Ratio				0.32	0.31

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 5-2 OVERLAND

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-2 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 5-2 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-2 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q165-15 Devondale and Q164-16 Devondale</i>	10	2	6		0		20
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:		5		
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20		
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		0	Points/lot:		10		
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age							0	
	TOTAL PROBLEM POINTS							20	

FIGURE 5-2 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-2 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	0.5	PER 100 LF	10	5
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			
TOTAL SOLUTION POINTS					25
TOTAL BENEFIT POINTS					45

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

145

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.31

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 5-2 OVERLAND ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 5-2 OVERLAND FLOW STRUCTURAL FLOODING
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard ponding and basement flooding at Q183 - 101 Frontenac Forest

Strategy: Install a diversion pipe to reduce flow to existing undersized culvert.

Description	Unit	Quantity	Unit Cost	Alternative 1
48" RCP CLASS III	LF	230	\$254	\$58,310
48" FES	EA	2	\$3,200	\$6,400
Manhole	EA	3	\$1,500	\$4,500
Erosion Protection	LS	1	\$10,000	\$10,000
Restoration	LS	1	\$10,000	\$10,000
Subtotal				\$89,210
Total Benefit Points				270
Individual Benefit Point Ratio				1.44
Estimated Increased Property Values				\$10,000

Total **\$89,210**

Utility Relocation	20%	\$17,842
Clearing	5%	\$4,460
Mobilization	4%	\$3,568

Total with Percent Allowances **\$115,080**

Contingency	25%	\$28,770
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Probable Construction Cost Estimate **\$143,850**

Design Engineering and Geotechnical	30%	\$43,155
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Total Conceptual Cost Estimate **\$188,000**

Total Benefit Points **270**

Total Benefit Point Ratio **1.44**

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-2 Structure without BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 5-2 STRUCTURE ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-2 Structure without BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)* <i>Address: Q183-101Frontenac Forest</i>	250	1	200		50		250
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q183-101Frontenac Forest</i>	10	1	6		0		10
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:		5	
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20	
		2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		0	Points/lot:		10	
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							0
TOTAL PROBLEM POINTS							260		

FIGURE 5-2 STRUCTURE ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-2 Structure without BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	0	PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			
TOTAL SOLUTION POINTS					10
TOTAL BENEFIT POINTS					270

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

188

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.44

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 5-2 STRUCTURE ALT 1

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 5-2 CHANNEL FTMNW, FTMNW-2, FTMNW-2-1
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard erosion Q188 & 192 at 129 & 141 Frontenac Forest also EDM-146, 127, 150, 152, 103 Frontenac Forest and 137, 139, 141, 143, and 145 Frontenac Forest, Yard Flooding Q192 141 Frontenac Forest, Q188, Street Flooding Q192 141 Frontenac Forest
Strategy: Install Bank Protection on FTMNW from Station 59+00 to 67+50 (850 LF), on FTMNW-2 from 2+00 to 5+25 (325 LF), and on FTMNW-2-1 from 0+00 to 4+50 (450 LF).

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (S)	LF	1,625	\$225	\$365,625	\$0
Soft stabilization (S)	LF	1,625	\$125	\$0	\$203,125
Geomorphic Study	Ea.	4	\$10,000		\$40,000
Total				\$365,625	\$243,125
				\$365,625	\$243,125
Utility Relocation					
Clearing			20%	\$73,125	\$48,625
Mobilization			5%	\$18,281	\$12,156
			4%	\$14,625	\$9,725
Total with Percent Allowances				\$471,656	\$313,631
Contingency			25%	\$117,914	\$78,408
Probable Construction Cost Estimate				\$589,570	\$392,039
Design Engineering and Geotechnical			30%	\$176,871	\$117,612
Total Conceptual Cost Estimate				\$767,000	\$510,000
Benefit Points				560	1,105
Benefit/Cost Ratio				0.73	2.17

Additional Comments:
 Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-2 Channel FTMNW, FTMNW-2, FTMNW-2-1, Alternate 2

DATE: 10/18/13

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:129 & 141 Frontenac Forest</i>	10	2	5		0		20	
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address: 141 Frontenac Forest</i>	10	1	5		1		10		
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 5-2 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-2 Channel FTMNW, FTMNW-2, FTMNW-2-1, Alternate 2

DATE: 10/18/13

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>141 Frontenac Forest</i>	10	1	6		0		10
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:			Points/pond:		5	
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20	
		2.3. Yard Erosion (1 per lot) <i>Adde. 141 Frontenac Forest</i>	No. Lots:		1	Points/lot:		10	10
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
Points for Age									
TOTAL PROBLEM POINTS							50		

FIGURE 5-2 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 5-2 Channel FTMNW, FTMNW-2, FTMNW-2-1, Alternate 2

DATE: 10/18/13

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	10	Points per Add'l Proj.:	50 500
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	33	PER 100 LF	10	330
	Riffle Pool Complex	16	PER 100 LF	10	160
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		Yes	55
TOTAL SOLUTION POINTS					1055
TOTAL BENEFIT POINTS					1105

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

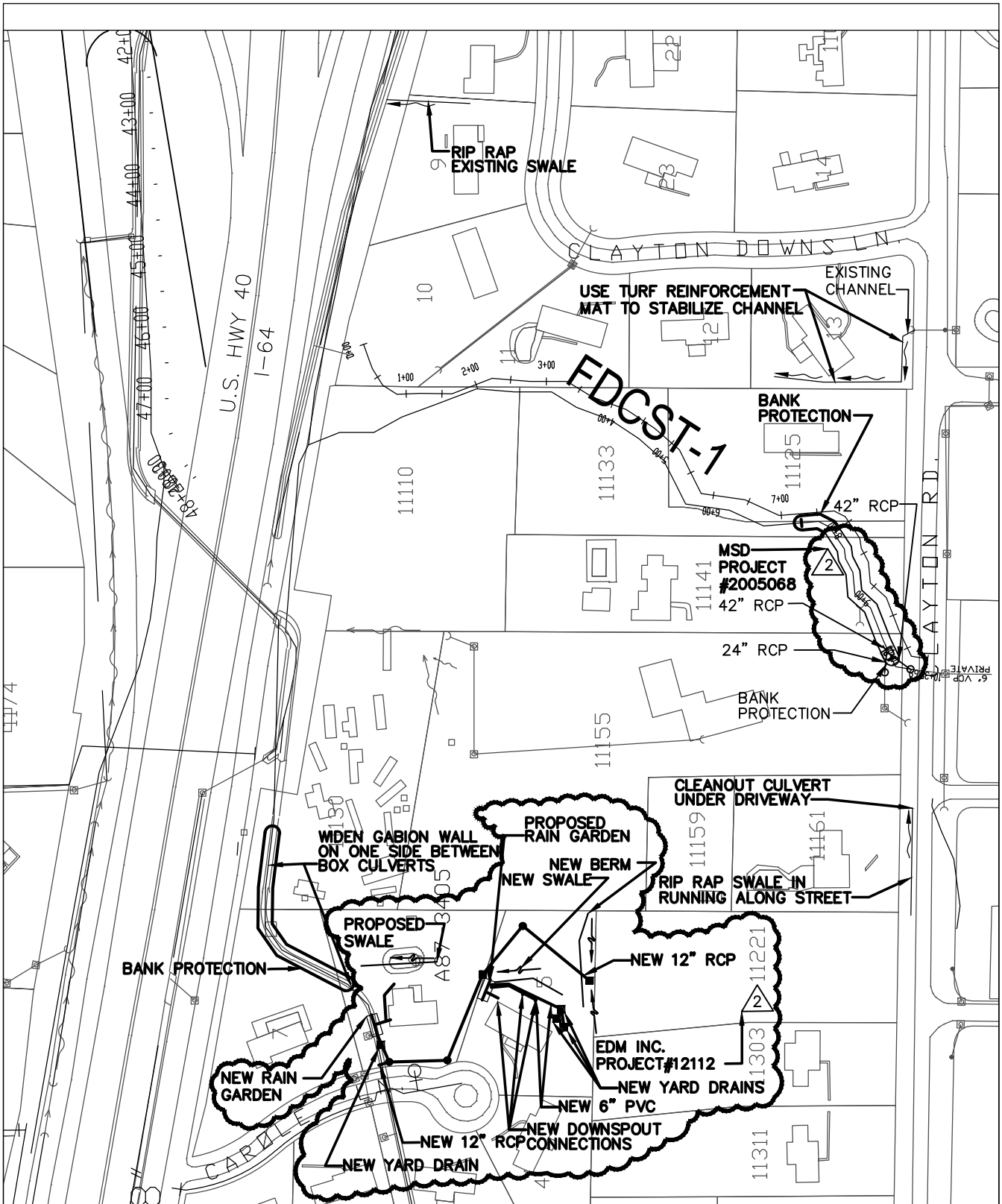
TOTAL COST IN THOUSANDS= 510

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 2.17

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 5-2 CHANNEL Alt 2



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN



220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



0 200 400



SCALE

UPDATE NO. DATE
 2 4/5/2013

FIGURE NO. 6-1

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 6-1 OVERLAND FLOW
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard erosion at Q92 - 9 Clayton Downs
Strategy: 1) Rip Rap existing channel to prevent erosion.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's
Rip Rap Channel	LF	116	\$67	\$7,772
Subtotal				\$7,772
Total Benefit Points				30
Individual Benefit Point Ratio				1.84
Estimated Increased Property Values				\$3,000

Problem: Yard erosion at Q94 - 13 Clayton Downs
Strategy: 1) Install turf reinforcement mat to prevent erosion.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's
Turf Reinforcement Mat	LF	279	\$20	\$5,580
Subtotal				\$5,580
Total Benefit Points				30
Individual Benefit Point Ratio				2.56
Estimated Increased Property Values				\$2,000

Problem: Yard erosion by Clayton Rd. at Q97 - 11161 Clayton Rd.
Strategy: 1) Rip Rap existing channel to prevent erosion.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's
Rip Rap Channel	LF	150	\$67	\$10,050
Subtotal				\$10,050
Total Benefit Points				30
Individual Benefit Point Ratio				1.42
Estimated Increased Property Values				\$3,000

Total	\$23,402
Utility Relocation	20% \$4,680
Clearing	5% \$1,170
Mobilization	4% \$936
Total with Percent Allowances	\$30,189
Contingency	25% \$7,547
Probable Construction Cost Estimate	\$37,736
Design Engineering and Geotechnical	30% \$20,000
Total Conceptual Cost Estimate	\$58,000
Total Benefit Points	140
Total Benefit Point Ratio	2.41

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-1 without BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 6-1 OVERLAND ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-1 without BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10	0	6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:	0	Points/pond:	5				
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:	20				
	2.3. Yard Erosion (1 per lot) <i>Address: Q92-9 Clayton Downs; Q94-13 Clayton Downs; Q97-11161 Clayton</i>	No. Lots:	3	Points/lot:	10			30	
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age							0	
	TOTAL PROBLEM POINTS							30	

FIGURE 6-1 OVERLAND ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-1 without BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	2	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	0	PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			
TOTAL SOLUTION POINTS					110
TOTAL BENEFIT POINTS					140

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

58

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

2.41

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 6-1 OVERLAND ALT 1

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 6-1 OVERLAND FLOW STRUCTURAL FLOODING
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Basement flooding and yard erosion at Q68 - 6 Carole Ln., garage flooding and yard erosion at Q67 - 5 Carole Ln., and yard ponding at Q63 - 7 Carole Ln.

Strategy: 1) Install berm to catch overland flow and direct to inlet and pipe system. Connect to existing box culvert. Add Rain Garden to infiltrate runoff and protect natural channels. 2) Add Bioswale to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's
Single Inlet	EA	2	\$1,850	\$3,700	\$3,700
Manhole	EA	3	\$1,500	\$4,500	\$4,500
New Berm	LF	133	\$25	\$3,325	\$3,325
12" RCP CLASS III	LF	435	\$116	\$50,486	\$50,486
Yard Drain	EA	1	\$500	\$500	\$500
Box Culvert Connection	LS	1	\$2,000	\$2,000	\$2,000
Rain Garden	EA	2	\$10,000	\$20,000	\$20,000
New Swale	LF	106	\$18	\$0	\$1,908
Subtotal				\$84,511	\$86,419
Total Benefit Points				455	484
Individual Benefit Point Ratio				2.57	2.67
Estimated Increased Property Values				\$9,000	\$16,000

Total				\$84,511	\$86,419
Utility Relocation			20%	\$16,902	\$17,284
Clearing			5%	\$4,226	\$4,321
Mobilization			4%	\$3,380	\$3,457
Total with Percent Allowances				\$109,019	\$111,481
Contingency			25%	\$27,255	\$27,870
Probable Construction Cost Estimate				\$136,274	\$139,351
Design Engineering and Geotechnical			30%	\$40,882	\$41,805
Total Conceptual Cost Estimate				\$178,000	\$182,000
Total Benefit Points				400	439
Total Benefit Point Ratio				2.25	2.41

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-1 Structure with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 6-1 STRUCTURE ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-1 Structure with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)* <i>Address: Q68 - 6 Carole</i>	250	1	200		50		250
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address: Q67-5 Carole</i>	100	1	75		25		100
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q63-7 Carole</i>	10	1	6		0		10
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:	0	Points/pond:	5			
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:	20			
		2.3. Yard Erosion (1 per lot) <i>Address: Q68-6 Carole; Q67-5 Carole</i>	No. Lots:	2	Points/lot:	10			20
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
	Points for Age							0	
	TOTAL PROBLEM POINTS							380	

FIGURE 6-1 STRUCTURE ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-1 Structure with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	3.38	PER 100 LF	10	34
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			15
TOTAL SOLUTION POINTS					59
TOTAL BENEFIT POINTS					439

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

182

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

2.41

Place "X" in one box below:

	MSD Project
	Project by Others

FIGURE 6-1 STRUCTURE ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 6-1 CHANNEL FDCST-1
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Open ditch in front yard is deteriorating 11155 Clayton Road, Yard Flooding and Erosion Q63-7 Carole Lane

Strategy: 1) Install bank protection on FDCST-1 from station 7+50 to 8+00 (50 LF) and behind 7 Carole Lane (280 LF).

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (S)	LF	330	\$225	\$74,250	\$0
Soft stabilization (S)	LF	330	\$125	\$0	\$41,250
Geomorphic Study	Ea.	2	\$10,000		\$20,000
Subtotal				\$74,250	\$61,250
Total				\$74,250	\$61,250
Utility Relocation			20%	\$14,850	\$12,250
Clearing			5%	\$3,713	\$3,063
Mobilization			4%	\$2,970	\$2,450
Total with Percent Allowances				\$95,783	\$79,013
Contingency			25%	\$23,946	\$19,753
Probable Construction Cost Estimate				\$119,728	\$98,766
Design Engineering and Geotechnical			30%	\$35,918	\$29,630
Total Conceptual Cost Estimate				\$156,000	\$129,000
Benefit Points				80	175
Benefit/Cost Ratio				0.51	1.36

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-1 Channel FDCST-1, Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address: 7 Carole Lane</i>	10	1	5		0		10	
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 6-1 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-1 Channel FDCST-1, Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		Points/pond:		5			
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20			
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		Points/lot:		10			
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
	TOTAL PROBLEM POINTS							10	

FIGURE 6-1 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-1 Channel FDCST-1, Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	1	Points per Add'l Proj.:	50 50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	6	PER 100 LF	10	60
	Riffle Pool Complex	2	PER 100 LF	10	20
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		Yes	15
TOTAL SOLUTION POINTS					165
TOTAL BENEFIT POINTS					175

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

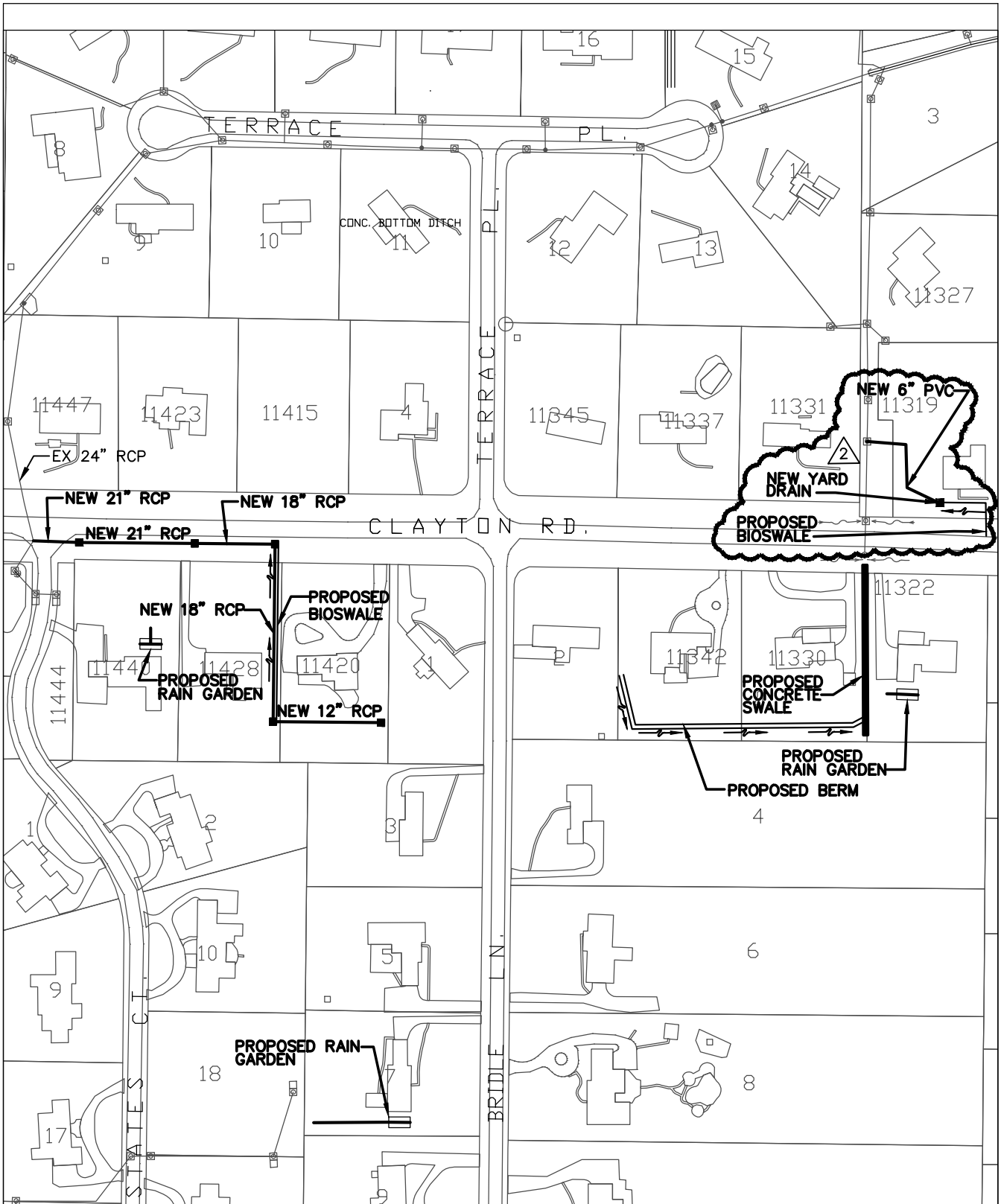
TOTAL COST IN THOUSANDS= 129

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 1.36

Place "X" in one box below:

MSD Project
 Project by Others

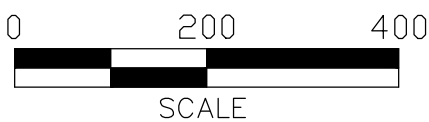
FIGURE 6-1 CHANNEL Alt 2



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
 Consulting Engineers
 220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



UPDATE NO. DATE
 2 4/5/13

FIGURE NO. 6-2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 6-2 OVERLAND FLOW
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard ponding and erosion at Q95 - 11319 Clayton Rd
Strategy: 1) Install swale to existing inlet. 2) Add Bioswale to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's
New Swale	LF	79	\$18	\$1,422	
Regrade Yard	LS	1	\$2,000	\$2,000	\$2,000
Bioswale	LF	110	\$90	\$0	\$9,900
6" PVC	LF	165	\$24	\$3,960	\$3,960
Yard Drain	EA	1	\$500	\$500	\$500
Subtotal				\$7,882	\$16,360
Total Benefit Points				40	51
Individual Benefit Point Ratio				2.42	1.49

Estimated Increased Property Values **\$0** **\$2,000**

Problem: Yard ponding at Q100 - 11322 Clayton Rd. and yard erosion at Q101 - 11342

Strategy: 1) Install an 8' wide concrete swale along property line to existing culvert going

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1 With
8' Wide Concrete Swale	LF	238	\$66	\$15,708	\$15,708
New Berm	LF	393	\$25	\$9,825	\$9,825
Rain Garden	EA	1	\$10,000	\$0	\$10,000

Subtotal				\$25,533	\$35,533
Total Benefit Points				40	45
Individual Benefit Point Ratio				0.75	0.60

Estimated Increased Property Values **\$0** **\$2,000**

Problem: Yard ponding at Q103 - 11420 Clayton Rd. and Q104 - 11440 Clayton Rd.

Strategy: 1) Install inlet and pipe system to collect water. Tie proposed system into existing

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1 With
Single Area Inlet	EA	5	\$1,750	\$8,750	\$8,750
12" RCP CLASS III	LF	151	\$116	\$17,525	\$17,525
18" RCP CLASS III	LF	360	\$129	\$46,541	\$46,541
21" RCP CLASS III	LF	226	\$137	\$30,937	\$30,937
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Bioswale	LF	238	\$90	\$0	\$21,420

Subtotal				\$103,753	\$135,173
Total Benefit Points				40	69
Individual Benefit Point Ratio				0.18	0.24

Estimated Increased Property Values **\$3,000** **\$6,000**

Problem: Yard ponding at Q50 - 7 Bridle Ln.

Strategy: 1) Add Raingarden to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000

Subtotal				\$10,000	\$10,000
Total Benefit Points				35	35
Individual Benefit Point Ratio				1.67	1.67

Estimated Increased Property Values **\$2,000** **\$2,000**

Total **\$147,168** **\$197,066**

FIGURE 6-2 OVERLAND

Utility Relocation	20%	\$29,434	\$39,413
Clearing	5%	\$7,358	\$9,853
Mobilization	4%	\$5,887	\$7,883
Total with Percent Allowances		\$189,847	\$254,215
Contingency	25%	\$47,462	\$63,554
Probable Construction Cost Estimate		\$237,308	\$317,769
Design Engineering and Geotechnical	30%	\$71,193	\$95,331
Total Conceptual Cost Estimate		\$309,000	\$414,000
Total Benefit Points		240	305
Total Benefit Point Ratio		0.78	0.74

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 6-2 OVERLAND

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-2 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 6-2 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-2 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q95-11319 Clayton; Q100-11322 Clayton; Q103-11420 Clayton; Q104-11440 Clayton; Q50-7 Birdle</i>	10	5	6		0		50
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:	5		
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:	20		
		2.3. Yard Erosion (1 per lot) <i>Address: Q101-11342 Clayton, Q95-11319 Clayton</i>	No. Lots:	2		Points/lot:	10		20
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							0
		TOTAL PROBLEM POINTS							70

FIGURE 6-2 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-2 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	3	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	4.98	PER 100 LF	10	50
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			25
TOTAL SOLUTION POINTS					235
TOTAL BENEFIT POINTS					305

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

414

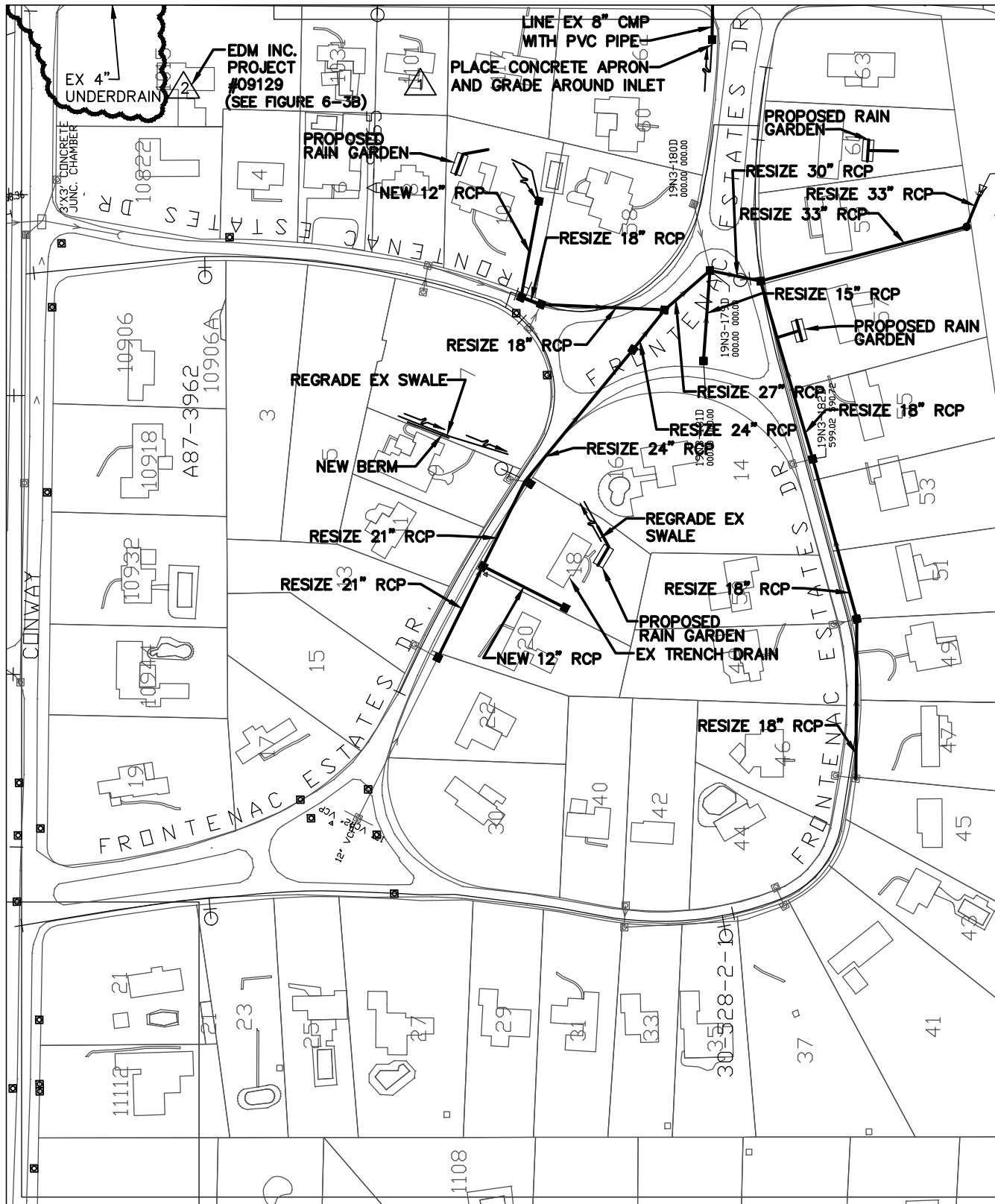
BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.74

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 6-2 OVERLAND ALT 2



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN



EDM Incorporated
Consulting Engineers

220 Mansion House Center
St. Louis, Missouri 63102
Phone (314) 231-5485 Fax (314) 231-8167
edm@edm-inc.com



0 200 400



SCALE

UPDATE NO. DATE

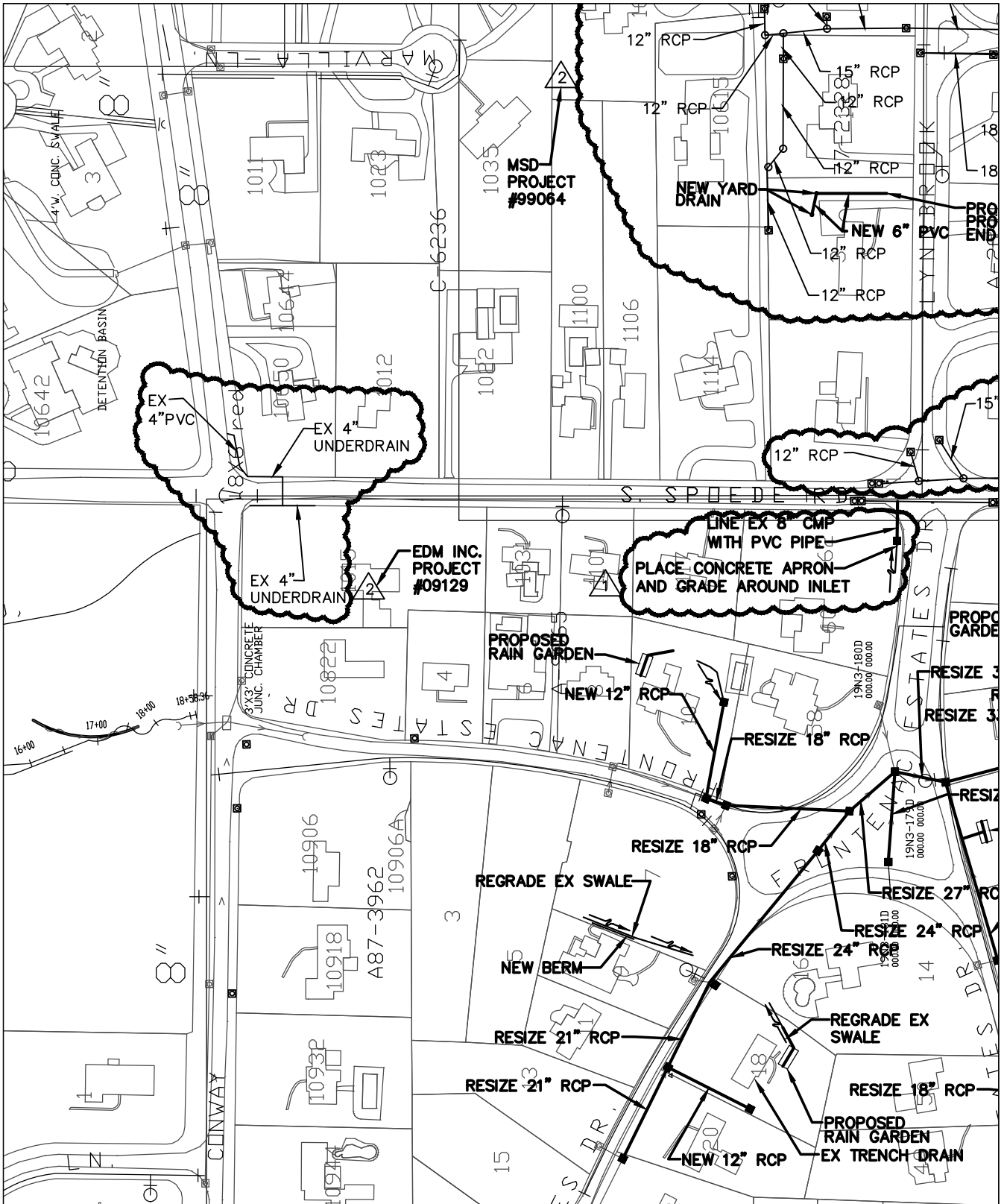


11/12/08



4/5/13

FIGURE NO. 6-3A



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN



EDM Incorporated
Consulting Engineers

220 Mansion House Center
St. Louis, Missouri 63102
Phone (314) 231-5485 Fax (314) 231-8167
edm@edm-inc.com



0 200 400



SCALE

UPDATE NO. DATE

1

11/12/08

2

4/5/13

FIGURE NO. 6-3B

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 6-3 OVERLAND FLOW
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard erosion at Q176 - 10 Frontenac Estates Dr and Q178 - 18 Frontenac Estates Dr and yard ponding at Q177 - 57 Frontenac Estates Dr and Q175 - 61 Frontenac Estates Dr

Strategy: 1) Add inlet and pipe system to collect water and connect to storm sewer system. Resized undersized storm sewer pipes. Add Rain Gardens to infiltrate runoff and protect natural channels. 2) Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Area Inlet	EA	14	\$1,750	\$24,500	\$24,500
12" RCP CLASS III	LF	266	\$116	\$30,872	\$30,872
15" RCP CLASS III	LF	127	\$124	\$15,784	\$15,784
18" RCP CLASS III	LF	915	\$129	\$118,291	\$118,291
21" RCP CLASS III	LF	275	\$137	\$37,645	\$37,645
24" RCP CLASS III	LF	309	\$144	\$44,342	\$44,342
30" RCP CLASS III	LF	84	\$163	\$13,712	\$13,712
30" RCP CLASS III	LF	72	\$163	\$11,753	\$11,753
33" RCP CLASS III	LF	345	\$174	\$60,178	\$60,178
33" FES	EA	1	\$2,000	\$2,000	\$2,000
New Berm	LF	62	\$25	\$1,550	\$1,550
Rain Garden	EA	2	\$10,000	\$20,000	\$20,000
Rain Garden	EA	2	\$10,000	\$0	\$20,000
Subtotal				\$380,627	\$400,627
Total Benefit Points				135	145
Individual Benefit Point Ratio				0.17	0.17
Estimated Increased Property Values				\$9,000	\$17,000

Problem: Erosion at entrance to Frontenac Estates Drive.

Strategy: 1) Provide erosion protection around existing inlet

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Line existing 8" CMP	LF	75	\$30	\$2,250	\$2,250
Grading	LS	1	\$2,000	\$2,000	\$2,000
Concrete Apron	LS	1	\$750	\$750	\$750
Subtotal				\$5,000	\$5,000
Total Benefit Points				30	30
Individual Benefit Point Ratio				2.86	2.86
Estimated Increased Property Values				\$0	\$0

Total **\$385,627** **\$405,627**

Utility Relocation	20%	\$77,125	\$81,125
Clearing	5%	\$19,281	\$20,281
Mobilization	4%	\$15,425	\$16,225

Total with Percent Allowances **\$497,459** **\$523,259**

Contingency	25%	\$124,365	\$130,815
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Probable Construction Cost Estimate **\$621,823** **\$654,073**

Design Engineering and Geotechnical	30%	\$186,547	\$196,222
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Total Conceptual Cost Estimate **\$809,000** **\$851,000**

Total Benefit Points **155** **175**

Total Benefit Point Ratio **0.19** **0.21**

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-3 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 6-3 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-3 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q177-57 Frontenac Estates; Q175-61 Frontenac Estates</i>	10	2	6		0		20
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:		5	
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20	
		2.3. Yard Erosion (1 per lot) <i>Address: Q176-10 Frontenac Estates; Q178-18 Frontenac Estates</i>	No. Lots:		3	Points/lot:		10	30
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							30
		TOTAL PROBLEM POINTS							80

FIGURE 6-3 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-3 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	1	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	2	PER 100 LF	10	20
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				5
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			20
TOTAL SOLUTION POINTS					95
TOTAL BENEFIT POINTS					175

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

851

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.21

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 6-3 OVERLAND ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 6-3 OVERLAND FLOW STRUCTURAL FLOODING
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Garage flooding at Q174 - 9 Frontenac Estates Dr.
Strategy: 1) Regrade existing swale to direct water away from garage.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's
New Swale	LF	237	\$18	\$4,266
Additional Grading and Restoration	LS	1	\$3,500	\$3,500
Subtotal				\$7,766
Total Benefit Points				120
Individual Benefit Point Ratio				7.37
Estimated Increased Property Values				\$1,000
<hr/>				
Total				\$7,766
Utility Relocation			20%	\$1,553
Clearing			5%	\$388
Mobilization			4%	\$311
Total with Percent Allowances				\$10,018
Contingency			25%	\$2,505
Probable Construction Cost Estimate				\$12,523
Design Engineering and Geotechnical			30%	\$20,000
Total Conceptual Cost Estimate				\$33,000
Total Benefit Points				120
Total Benefit Point Ratio				3.64

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-3 Structural without BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 6-3 STRUCTURAL ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-3 Structural without BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address: Q174-9 Frontenac Estates</i>	100	1	75		25		100
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10	0	6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:	5			
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:	20			
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		0	Points/lot:	10			
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age							0	
	TOTAL PROBLEM POINTS							100	

FIGURE 6-3 STRUCTURAL ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-3 Structural without BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	0	PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			
TOTAL SOLUTION POINTS					20
TOTAL BENEFIT POINTS					120

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

33

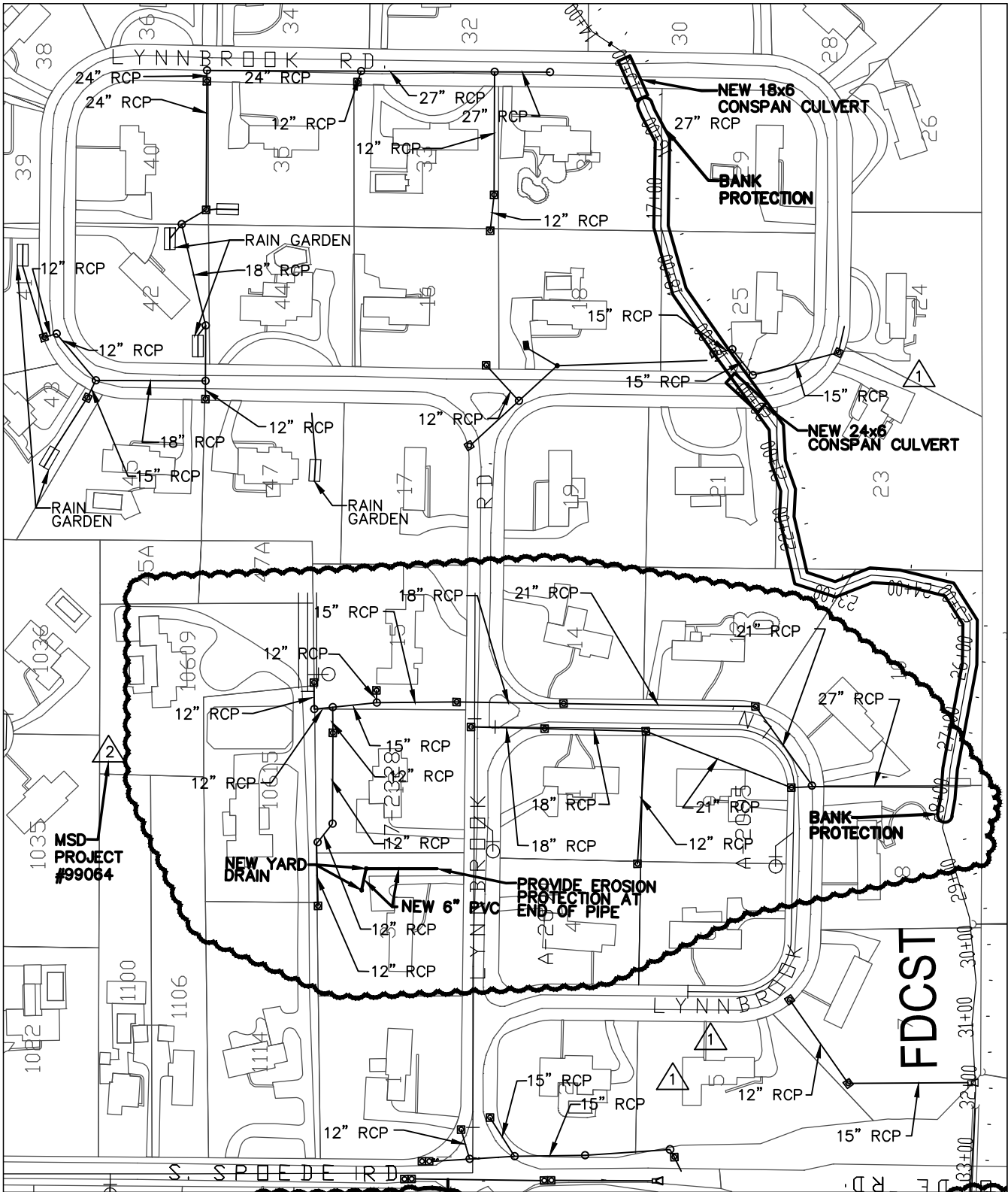
BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

3.64

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 6-3 STRUCTURAL ALT 1



STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
Consulting Engineers

220 Mansion House Center
St. Louis, Missouri 63102
Phone (314) 231-5485 Fax (314) 231-8167
edm@edm-inc.com



0 200 400



SCALE

UPDATE NO.	DATE
1	11/12/08
2	4/5/2013

FIGURE NO. 6-4

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name:	FIGURE 6-4 - STREAM CROSSING			
Solutions By:	EDM INC.	10/18/2013		
<hr style="border-top: 1px dashed black;"/>				
Problem:	Undersized culvertes under Lynnbrook Rd.			
Strategy:	Replace existing twin 60" RCP with new Conspan Culverts			
Description	Unit	Quantity	Unit Cost	Alternative 1
24x6 Conspan Culvert	LF	60	\$3,900	\$234,000
Associated Erosion Protection	LS	1	\$25,000	\$25,000
18x6 Conspan Culvert	LF	60	\$3,900	\$234,000
Associated Erosion Protection	LS	1	\$25,000	\$25,000
Subtotal				\$518,000
Total Benefit Points				60
Individual Benefit Point Ratio				0.06
Estimated Increased Property Values				\$0
<hr style="border-top: 1px dashed black;"/>				
Problem:	Yard Ponding at Q294 - 3 Lynnbrook Rd.			
Strategy:	Add yard drains to collect water and pipe under driveway.			
Description	Unit	Quantity	Unit Cost	Alternative 1
Yard Drain	EA	2	\$500	\$1,000
6" PVC	LF	129	\$24	\$3,096
Restoration	LS	1	\$2,000	\$2,000
Subtotal				\$6,096
Total Benefit Points				30
Individual Benefit Point Ratio				2.35
Estimated Increased Property Values				\$3,000
<hr style="border-top: 1px dashed black;"/>				
Total				\$524,096
Utility Relocation			20%	\$104,819
Clearing			5%	\$26,205
Mobilization			4%	\$20,964
Total with Percent Allowances				\$676,084
Contingency			25%	\$169,021
Probable Construction Cost Estimate				\$845,105
Design Engineering and Geotechnical			30%	\$253,531
Total Conceptual Cost Estimate				\$1,099,000
Total Benefit Points				120
Total Benefit Point Ratio				0.11
Additional Comments:	Conceptual Cost are rounded to the nearest \$1000			

FIGURE6-4 STREAM

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-4 without BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE6-4 STREAM ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-4 without BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q294-3 Lynnbrook</i>	10	1	6		0		10
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address: Lynnbrook Road (2 Locations)</i>	No. Ponds:		2	Points/pond:	5		10	
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:	20			
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		0	Points/lot:	10			
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age							30	
	TOTAL PROBLEM POINTS							50	

FIGURE6-4 STREAM ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-4 without BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	1	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	0	PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			
TOTAL SOLUTION POINTS					70
TOTAL BENEFIT POINTS					120

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

1099

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.11

Place "X" in one box below:

MSD Project
 Project by Others

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 6-4 CHANNEL FDCST
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Creek erosion MSD 20 - 25 Lynnbrook, MSD 21 - 31 Lynnbrook. Creek incision SR-9, Q297, Q298, Q299, Q295 - 10, 12, 21, 23, 25, 18, 29, 31 Lynnbrook.FR-21, Q297 - 31 Lynnbrook.

Strategy: 1) Install bank protection on FDCST from station 15+50 to 19+00 (350 LF) and from 20+50 to 28+00 (750 LF).

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (L)	LF	1,100	\$300	\$330,000	\$0
Soft stabilization (L)	LF	1,100	\$200	\$0	\$220,000
Geomorphic Study	Ea.	3	\$10,000		\$30,000
Subtotal				\$330,000	\$250,000
Total				\$330,000	\$250,000
Utility Relocation					
Clearing			20%	\$66,000	\$50,000
Mobilization			5%	\$16,500	\$12,500
			4%	\$13,200	\$10,000
Total with Percent Allowances				\$425,700	\$322,500
Contingency			25%	\$106,425	\$80,625
Probable Construction Cost Estimate				\$532,125	\$403,125
Design Engineering and Geotechnical			30%	\$159,638	\$120,938
Total Conceptual Cost Estimate				\$692,000	\$525,000
Benefit Points				360	730
Benefit/Cost Ratio				0.52	1.39

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-4 Channel FDCST, Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50				
1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot						
1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots			
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 6-4 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-4 Channel FDCST, Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65			
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50			
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N							
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12			
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0			
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:			Points/pond:		5		
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20		
		2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:			Points/lot:		10		
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
		Points for Age								
				TOTAL PROBLEM POINTS						

FIGURE 6-4 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-4 Channel FDCST, Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	7	Points per Add'l Proj.:	50 350
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	22	PER 100 LF	10	220
	Riffle Pool Complex	11	PER 100 LF	10	110
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements		8		10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		Yes	40
TOTAL SOLUTION POINTS					730
TOTAL BENEFIT POINTS					730

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

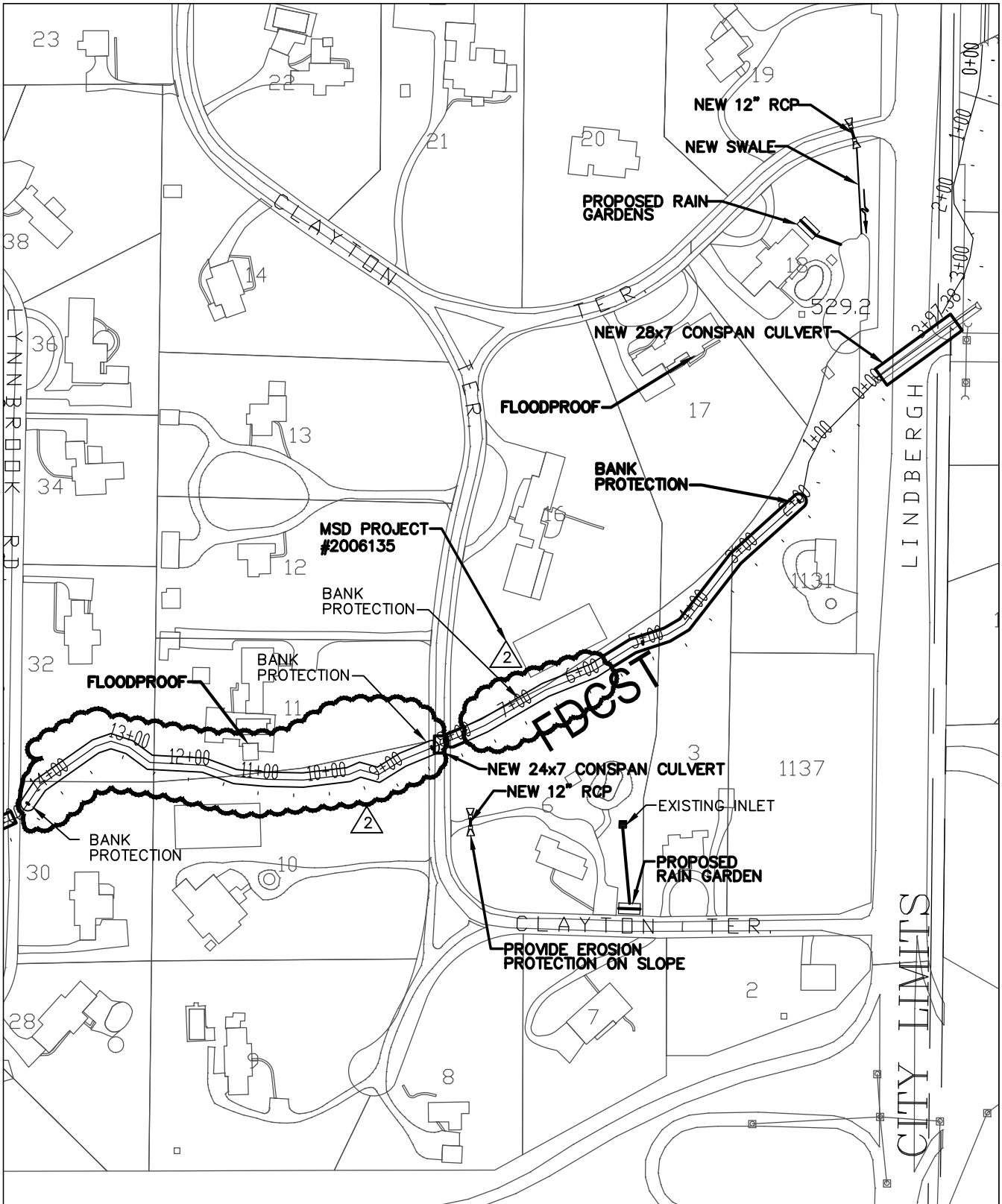
TOTAL COST IN THOUSANDS= 525

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 1.39

Place "X" in one box below:

MSD Project
 Project by Others

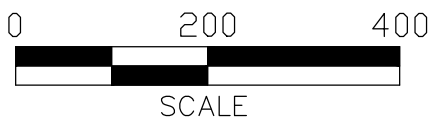
FIGURE 6-4 CHANNEL Alt 2



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
Consulting Engineers
220 Mansion House Center
St. Louis, Missouri 63102
Phone (314) 231-5485 Fax (314) 231-8167
edm@edm-inc.com



UPDATE NO.	DATE
▲	5/2/12
▲	4/5/13
FIGURE NO.	6-5

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 6-5 - STREAM CROSSING
Solutions By: EDM INC. 10/18/2013

Problem: Yard erosion at Q114 - 19 Clayton Terrace and street ponding at the intersection of Lindbergh Blvd. and Clayton Terrace (Q116)
Strategy: Add culvert under Clayton Terrace and grade swale along 18 Clayton Terrace. Add Rain Garden to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	Alternative 1
New Swale	LS	1	\$5,000	\$5,000
Additional Clearing and Grading	LS	1	\$3,000	\$3,000
12" RCP CLASS III	LF	14	\$116	\$1,625
12" FES	EA	2	\$1,100	\$2,200
Rain Garden	EA	1	\$10,000	\$10,000
Subtotal				\$21,825
Total Benefit Points				40
Individual Benefit Point Ratio				0.87
Estimated Increased Property Values				\$2,000

Problem: Undersized culvert under Lindbergh Blvd and an undersized bridge under Clayton Terrace., (Q116)
Strategy: Replace existing bridge and culvert with new Conspan Culverts

Description	Unit	Quantity	Unit Cost	Alternative 1
28x7 Conspan Culvert	LF	130	\$4,000	\$520,000
Associated Erosion Protection	LS	1	\$25,000	\$25,000
24x7 Conspan Culvert	LF	15	\$4,500	\$67,500
Associated Erosion Protection	LS	1	\$25,000	\$25,000
Associated Pavement Replacement	LS	1	\$20,000	\$20,000
Subtotal				\$657,500
Total Benefit Points				34
Individual Benefit Point Ratio				0.02
Estimated Increased Property Values				\$0

Problem: Yard erosion at Q110 - 6 Clayton Terrace
Strategy: Add culvert under driveway. Add Rain Garden to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	Alternative 1
Additional Grading	LS	1	\$2,000	\$2,000
12" RCP CLASS III	LF	10	\$116	\$1,161
12" FES	EA	2	\$1,100	\$2,200
Rain Garden	EA	1	\$10,000	\$10,000
Subtotal				\$15,361
Total Benefit Points				35
Individual Benefit Point Ratio				2.28
Estimated Increased Property Values				\$3,000

Total **\$694,685**

FIGURE 6-5 STREAM

Utility Relocation	20%	\$138,937
Clearing	5%	\$34,734
Mobilization	4%	\$27,787
Total with Percent Allowances		\$896,144
Contingency	25%	\$224,036
Probable Construction Cost Estimate		\$1,120,180
Design Engineering and Geotechnical	30%	\$336,054
Total Conceptual Cost Estimate		\$1,457,000
Total Benefit Points		169
Total Benefit Point Ratio		0.12

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 6-5 STREAM

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-5 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address: 1131Lindbergh</i>	50		25		4	1	4	
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 6-5 STREAM ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-5 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
	Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65			
	Basement (1 lot per structure)*	250	0	200		50			
	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50			
	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N			
	Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25			
	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12			
	Yard Flooding (1 per lot) <i>Address:</i>	10	0	6		0			
	2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
	Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25			
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address: Lindbergh and Clayton Terrace; Lindbergh; Clayton Terrace</i>	No. Ponds:	3.8	Points/pond:	5			19	
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:	20				
	2.3. Yard Erosion (1 per lot) <i>Address: Q114-19 Clayton Terrace; Q110-6 Clayton Terrace</i>	No. Lots:	2	Points/lot:	10			20	
	2.4. Age of Existing System	>50 yrs (30 pts)	26-50 yrs (15 pts)	<25 yrs (0 pts)					
	Points for Age							0	
	TOTAL PROBLEM POINTS								43

FIGURE 6-5 STREAM ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-5 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	2	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	1	PER 100 LF	10	10
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			10
TOTAL SOLUTION POINTS					130
TOTAL BENEFIT POINTS					173

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

1457

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.12

Place "X" in one box below:

	MSD Project
	Project by Others

FIGURE 6-5 STREAM ALT 1

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 6-5 CHANNEL FDCST
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Creek erosion in unmaintained area Q108, MSD9 - 3 Clayton Terrace. Incision and unstable banks SR-8; yard flooding Q108.

Strategy: 1) Install bank protection on FDCST from station 2+00 to 5+50 (350 LF).

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (L)	LF	350	\$300	\$105,000	\$0
Soft stabilization (L)	LF	350	\$200	\$0	\$70,000
Geomorphic Study	Ea.	1	\$10,000		\$10,000
Subtotal				\$105,000	\$80,000
Total				\$105,000	\$80,000
Utility Relocation					
Clearing			20%	\$21,000	\$16,000
Mobilization			5%	\$5,250	\$4,000
			4%	\$4,200	\$3,200
Total with Percent Allowances				\$135,450	\$103,200
Contingency			25%	\$33,863	\$25,800
Probable Construction Cost Estimate				\$169,313	\$129,000
Design Engineering and Geotechnical			30%	\$50,794	\$38,700
Total Conceptual Cost Estimate				\$221,000	\$168,000
Benefit Points				180	320
Benefit/Cost Ratio				0.81	1.90

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-5 Channel FDCST, Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address: 3 Clayton Terrace</i>	10	1	5		0		10	
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 6-5 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-5 Channel FDCST, Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		Points/pond:		5			
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20			
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		Points/lot:		10			
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
	TOTAL PROBLEM POINTS							10	

FIGURE 6-5 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-5 Channel FDCST, Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	3	Points per Add'l Proj.:	50 150
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	7	PER 100 LF	10	70
	Riffle Pool Complex	3	PER 100 LF	10	30
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements	4			20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		Yes	40
TOTAL SOLUTION POINTS					310
TOTAL BENEFIT POINTS					320

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS= 168

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 1.90

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 6-5 CHANNEL Alt 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 6-5 CHANNEL STRUCTURAL FLOODING FDCST
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: 17 Clayton Terrace has first floor flooding and 11 Clayton Terrace has pool house flooding.

Strategy: 1) Flood proof 17 Clayton Terrace and pool house at 11 Clayton Terrace.

Description	Unit	Quantity	Unit Cost	ALT 1
Flood Proof (17 Clayton Terrace)	Ea.	1	\$60,000	\$60,000
Flood Proof (11 Clayton Terrace Pool house)	Ea.	1	\$20,000	\$20,000
Subtotal				\$80,000
Total				\$80,000
Utility Relocation				
Clearing			20%	\$16,000
Mobilization			5%	\$4,000
			4%	\$3,200
Total with Percent Allowances				\$103,200
Contingency			25%	\$25,800
Probable Construction Cost Estimate				\$129,000
Design Engineering and Geotechnical			30%	\$38,700
Total Conceptual Cost Estimate				\$168,000
Benefit Points				245
Benefit/Cost Ratio				1.46

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-5 Structural Flooding Channel FDCST, Alternate 1

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address: 17 Clayton Terrace</i>	300		150	1	25		150	
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:11 Clayton Terrace</i>	50		25	1	4		25	
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50				
1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot						
1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots			
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 6-5S CHANNEL Alt 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-5 Structural Flooding Channel FDCST, Alternate 1

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		Points/pond:		5			
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20			
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		Points/lot:		10			
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
	TOTAL PROBLEM POINTS							175	

FIGURE 6-5S CHANNEL Alt 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 6-5 Structural Flooding Channel FDCST, Alternate 1

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	1	Points per Add'l Proj.:	50 50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements	2			20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			
TOTAL SOLUTION POINTS					70
TOTAL BENEFIT POINTS					245

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=

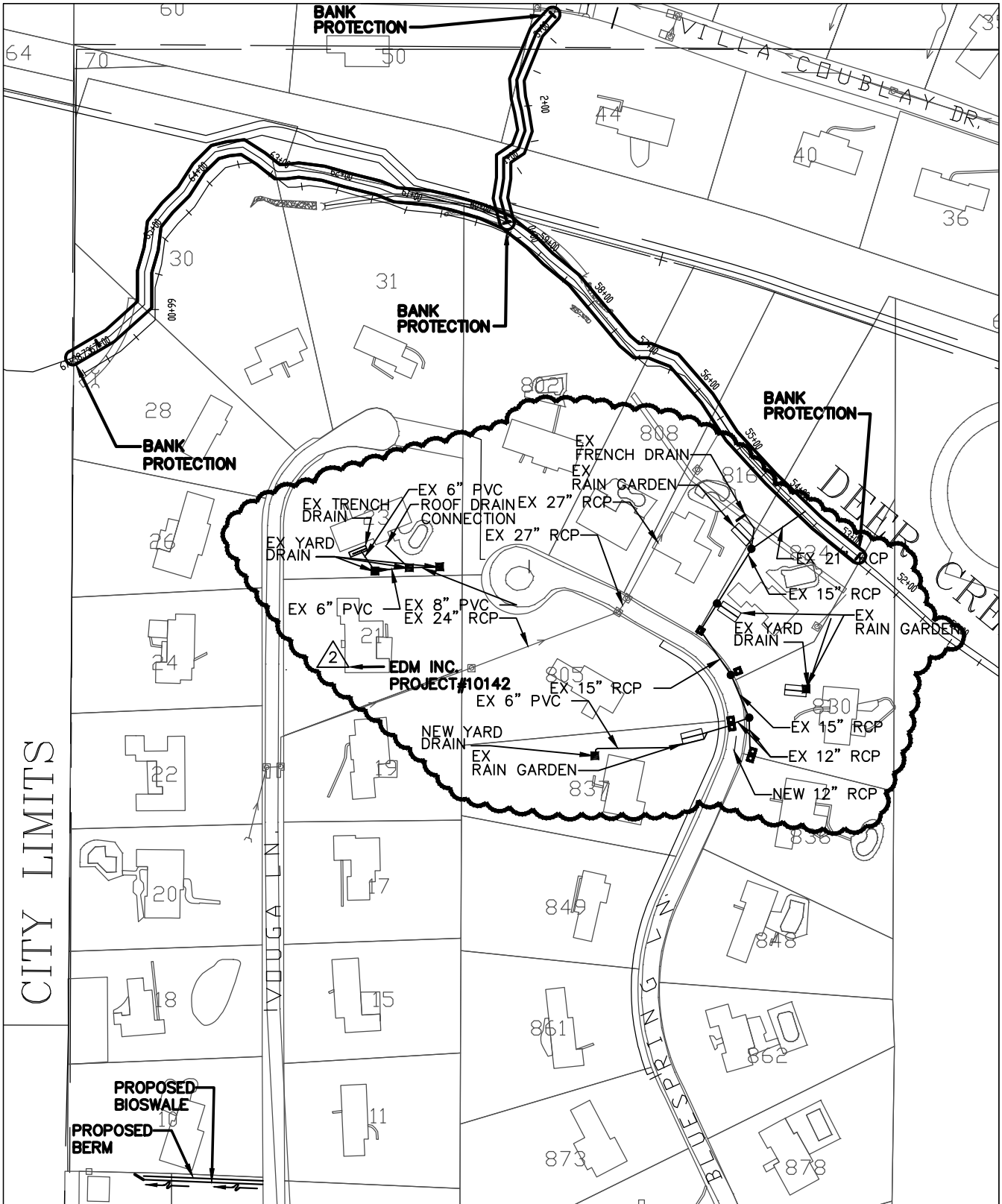
168

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.46

Place "X" in one box below:

	MSD Project
	Project by Others



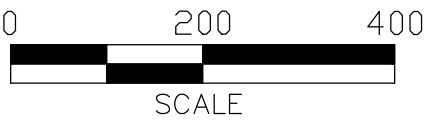
CITY LIMITS

CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
 Consulting Engineers

220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



UPDATE NO.	DATE
△	4/5/13

FIGURE NO. 7-1

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-1 CHANNEL FDC and FDCWR
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Creek erosion, yard flooding, loosing fence Q38 MSD 22 - 802 Blue Spring Lane. Yard flooding Q-35 816 Bluespring. Yard flooding and erosion Q33 - 824 Blue Spring. Yard flooding and erosion Q427 - 28 Vouga Lane. Meandering creek, yard erosion SR7 - 30 and 31 Vouga Lane. Creek Erosion MSD 14 - 44 Villa Coublay.

Strategy: 1) Install bank protection on FDC from station 52+50 to 67+44 (1490 LF). Install bank protection on FDCWR station 0+00 to 3+20 (320 LF).

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (L)	LF	1,810	\$300	\$543,000	\$0
Soft stabilization (L)	LF	1,810	\$200	\$0	\$362,000
Geomorphic Study	Ea.	4	\$10,000		\$40,000
Subtotal				\$543,000	\$402,000
Total				\$543,000	\$402,000
Utility Relocation			20%	\$108,600	\$80,400
Clearing			5%	\$27,150	\$20,100
Mobilization			4%	\$21,720	\$16,080
Total with Percent Allowances				\$700,470	\$518,580
Contingency			25%	\$175,118	\$129,645
Probable Construction Cost Estimate				\$875,588	\$648,225
Design Engineering and Geotechnical			30%	\$262,676	\$194,468
Total Conceptual Cost Estimate				\$1,139,000	\$843,000
Benefit Points				450	1,035
Benefit/Cost Ratio				0.40	1.23

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-1 Channel FDC and FDCWR, Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25		
		Basement (1 lot per structure) <i>Address:</i>	200		100		15		
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
		Yard Flooding (1 per lot) <i>Address: 802, 816, 824 Bluesping Ln, 28 Vouga Ln</i>	10	4	5		0	40	
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1		
		1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)						
		Habitable structures, residential (1 lot per structure) <i>Address:</i>	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend		lots	10 points per lot				
	1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
	Arterial Road: <i>Address:</i>	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots		
	Collector Road: <i>Address:</i>	75		50		12			
	Residential Road: <i>Address:</i>	35		25		6			
	Residential Road: <i>Address:</i>	20		12		3			

FIGURE 7-1 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-1 Channel FDC and FDCWR, Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:			Points/pond:		5		
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20		
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:			Points/lot:		10		
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
	TOTAL PROBLEM POINTS							40	

FIGURE 7-1 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-1 Channel FDC and FDCWR, Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	8	Points per Add'l Proj.:	50 400
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	36	PER 100 LF	10	360
	Riffle Pool Complex	18	PER 100 LF	10	180
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		Yes	45
TOTAL SOLUTION POINTS					995
TOTAL BENEFIT POINTS					1035

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

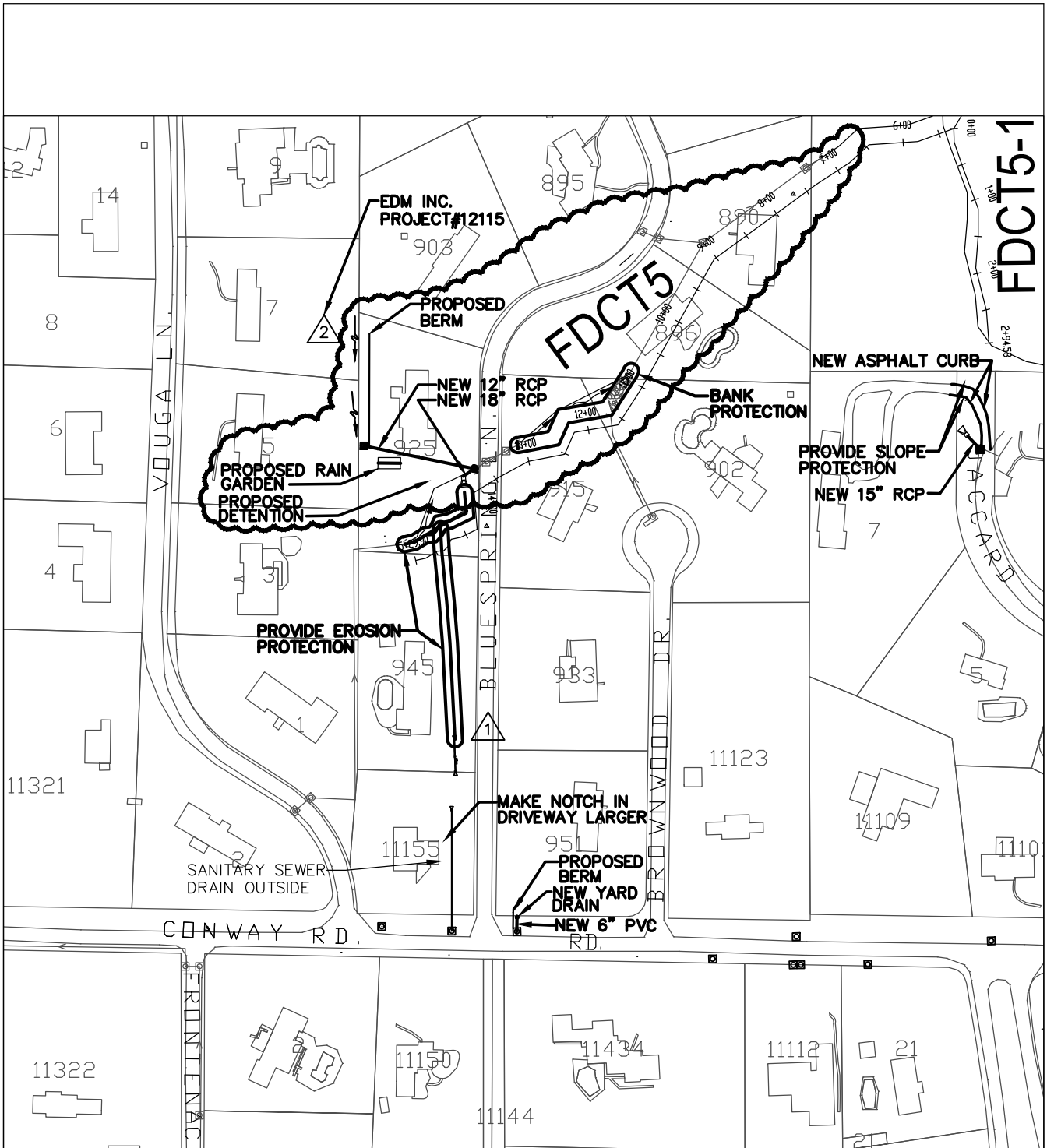
TOTAL COST IN THOUSANDS= 843

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 1.23

Place "X" in one box below:

MSD Project
 Project by Others

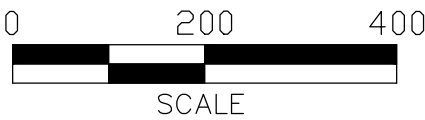
FIGURE 7-1 CHANNEL Alt 2



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
 Consulting Engineers
 220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



UPDATE NO.	DATE
1	11/12/08
2	4/5/13
FIGURE NO.	7-2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-2 OVERLAND FLOW
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard erosion at Q500 - 7 Jaccard Ln
Strategy: 1) Install new inlet and pipe system to catch water.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's
15" RCP CLASS III	LF	25	\$124	\$3,107
15" FES	EA	1	\$1,200	\$1,200
Single Area Inlet	EA	1	\$1,750	\$1,750
Asphalt Curb	LS	224	\$32	\$7,168
Slope Protection	LS	1	\$3,000	\$3,000
Subtotal				\$16,225
Total Benefit Points				30
Individual Benefit Point Ratio				0.88
Estimated Increased Property Values				\$0

Problem: Driveway ponding at Q53 - 951 Brownwood Dr., yard ponding at Q138 - 11155 Conway Rd., and yard erosion at Q43-945 Bluesprings Ln.
Strategy: 1) Connect yard drain to existing inlet at 951 Brownwood Dr and remove portion of block curb along driveway at 11155 Bluespring Ln. Provide erosion protection at 945 Bluesprings Ln

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's
Remove Portion of Block Curb	LS	1	\$300	\$300
New Berm	LF	32	\$25	\$800
Yard Drain	EA	1	\$500	\$500
6" PVC	LF	20	\$24	\$480
Restoration	LS	1	\$1,000	\$1,000
Bank Protection	LF	270	\$100	\$27,000
Connect to Existing Inlet	LS	1	\$500	\$500
Subtotal				\$30,580
Total Benefit Points				50
Individual Benefit Point Ratio				0.78
Estimated Increased Property Values				\$0

Total **\$46,805**

Utility Relocation	20%	\$9,361
Clearing	5%	\$2,340
Mobilization	4%	\$1,872

Total with Percent Allowances **\$60,378**

Contingency	25%	\$15,095
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Probable Construction Cost Estimate **\$75,473**

Design Engineering and Geotechnical	30%	\$22,642
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Total Conceptual Cost Estimate **\$99,000**

Total Benefit Points **110**

Total Benefit Point Ratio **1.11**

Additional Comments:
 Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-2 without BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50				
1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot						
1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots			
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-2 OVERLAND ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-2 without BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q53-951 Brownwood; Q138-11155 Conway</i>	10	2	6		0		20
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address: Q53-951 Brownwood</i>	No. Ponds:	0	Points/pond:		5		
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20		
		2.3. Yard Erosion (1 per lot) <i>Address: Q500 - 7 Jaccard, Q43-945 Bluesprings</i>	No. Lots:	2	Points/lot:		10		20
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							0
		TOTAL PROBLEM POINTS							40

FIGURE 7-2 OVERLAND ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-2 without BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	1	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	0	PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			
TOTAL SOLUTION POINTS					70
TOTAL BENEFIT POINTS					110

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

99

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.11

Place "X" in one box below:

MSD Project
 Project by Others

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-2 OVERLAND FLOW STRUCTURAL FLOODING
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard flooding at Q425 - 9 Vouga Ln, yard erosion at Q41 - 890 Bluespring Ln and basement and yard flooding at Q42 - 925 Bluespring Ln

Strategy: 1) Install berm to catch overland flow and direct to inlet and pipe system. Resize undersized systems. 2) Add Bioswale to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Area Inlet	EA	7	\$1,750	\$12,250	\$12,250
12" RCP CLASS III	LF	151	\$116	\$17,525	\$17,525
18" RCP CLASS III	LF	18	\$129	\$2,327	\$2,327
Rock Blanket	SY	138	\$52	\$7,176	\$7,176
27" RCP CLASS III	LF	0	\$150	\$0	\$0
30" RCP CLASS III	LF	0	\$163	\$0	\$0
18" FES	EA	1	\$1,300	\$1,300	\$1,300
24" FES	EA	2	\$1,600	\$3,200	\$3,200
27" FES	EA	1	\$1,700	\$1,700	\$1,700
30" FES	EA	1	\$1,900	\$1,900	\$1,900
New Berm	LF	150	\$25	\$3,750	\$3,750
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$51,128	\$61,128
Estimated Increased Property Values				\$10,000	\$12,000
Total				\$51,128	\$61,128
Utility Relocation			20%	\$10,226	\$12,226
Clearing			5%	\$2,556	\$3,056
Mobilization			4%	\$2,045	\$2,445
Total with Percent Allowances				\$65,955	\$78,855
Contingency			25%	\$16,489	\$19,714
Probable Construction Cost Estimate				\$82,444	\$98,569
Design Engineering and Geotechnical			30%	\$24,733	\$29,571
Hydraulic Study And Geomorphic Study				\$20,000	\$20,000
Total Conceptual Cost Estimate				\$128,000	\$149,000
Total Benefit Points				305	342
Total Benefit Point Ratio				2.38	2.30

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-2 Structure with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-2 STRUCTURE ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-2 Structure with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)* <i>Address: Q42-925 Bluespring</i>	250	1	200		50		250
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q425-9 Vouga; Q42-925 Bluespring</i>	10	2	6		0		20
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:		5	
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20	
		2.3. Yard Erosion (1 per lot) <i>Address: Q41-890 Bluespring</i>	No. Lots:		1	Points/lot:		10	10
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							15
		TOTAL PROBLEM POINTS							295

FIGURE 7-2 STRUCTURE ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-2 Structure with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	2.74	PER 100 LF	10	27
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			10
TOTAL SOLUTION POINTS					47
TOTAL BENEFIT POINTS					342

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

149

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

2.30

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 7-2 STRUCTURE ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-2 CHANNEL FDCT5
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard flooding and erosion Q36 - 896 Bluespring Lane. Erosion Q52 - 902 Bluespring Lane.
Erosion EDM 915 Bluespring Lane, Q34.

Strategy: 1) Install bank protection on FDCT5 from station 11+00 to 13+00 (200 LF).

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (S)	LF	200	\$225	\$45,000	\$0
Soft stabilization (S)	LF	200	\$125	\$0	\$25,000
Geomorphic Study	Ea.	1	\$10,000		\$10,000
Subtotal				\$45,000	\$35,000
Total				\$45,000	\$35,000
Utility Relocation			20%	\$9,000	\$7,000
Clearing			5%	\$2,250	\$1,750
Mobilization			4%	\$1,800	\$1,400
Total with Percent Allowances				\$58,050	\$45,150
Contingency			25%	\$14,513	\$11,288
Probable Construction Cost Estimate				\$72,563	\$56,438
Design Engineering and Geotechnical			30%	\$21,769	\$20,000
Total Conceptual Cost Estimate				\$95,000	\$77,000
Benefit Points				130	205
Benefit/Cost Ratio				1.37	2.66

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-2 Channel FDCT5, Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address: 896 Bluespring Lane</i>	10	1	5		0		10	
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-2 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-2 Channel FDCT5, Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:			Points/pond:		5		
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20		
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:			Points/lot:		10		
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
	TOTAL PROBLEM POINTS							10	

FIGURE 7-2 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-2 Channel FDCT5, Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	2	Points per Add'l Proj.:	50 100
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	4	PER 100 LF	10	40
	Riffle Pool Complex	2	PER 100 LF	10	20
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		Yes	15
TOTAL SOLUTION POINTS					195
TOTAL BENEFIT POINTS					205

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS= 77

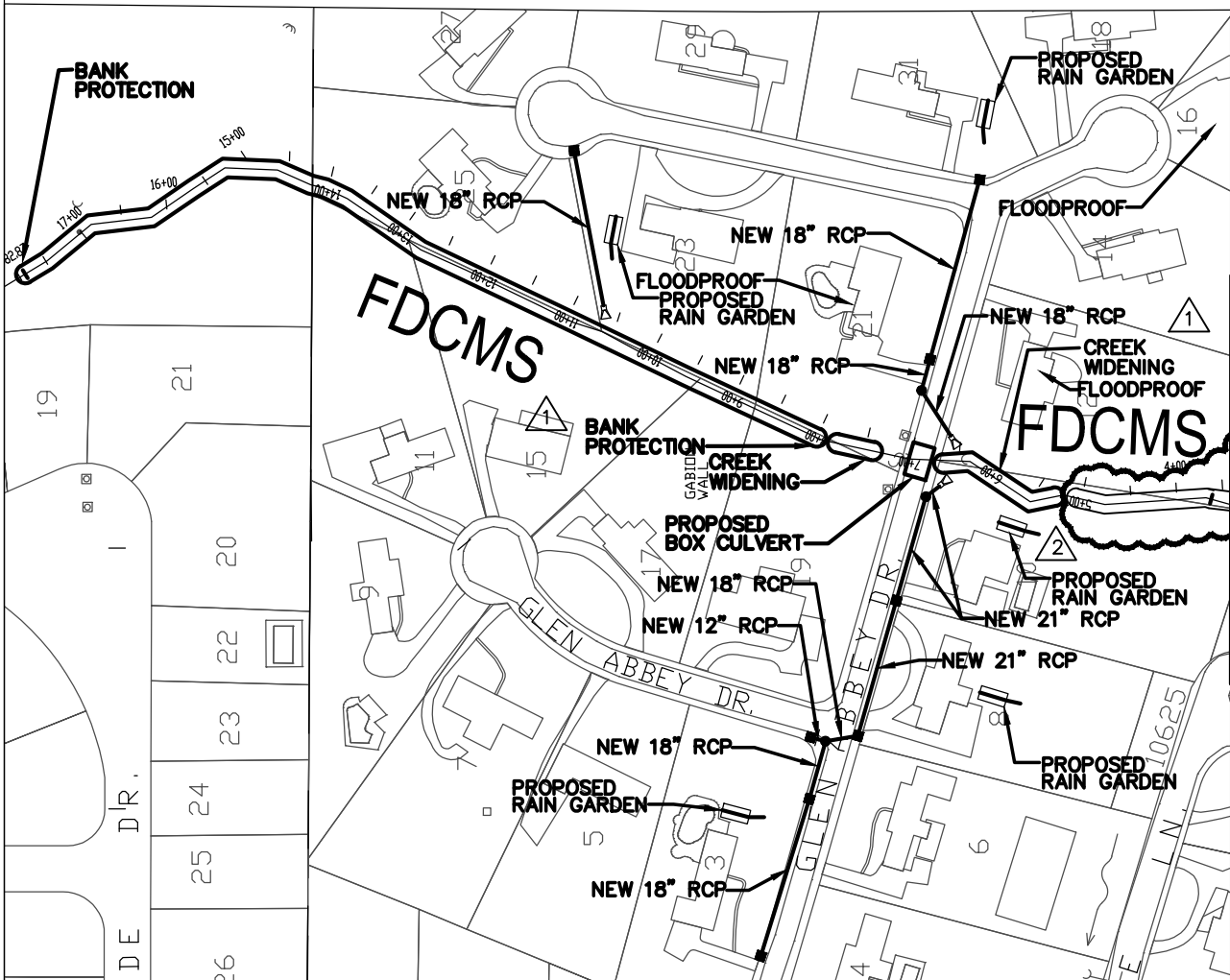
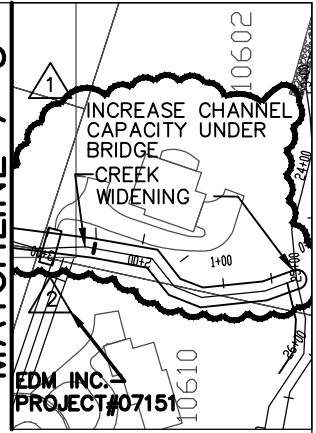
BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 2.66

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 7-2 CHANNEL Alt 2

MATCHLINE 7-3



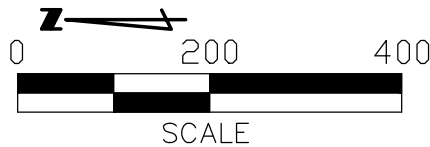
MATCHLINE 7-3



STORMWATER SYSTEM MASTER IMPROVEMENT PLAN



220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-6485 Fax (314) 231-6167
 edm@edm-tno.com



UPDATE NO.	DATE
1	11/12/08
2	10/18/13

FIGURE NO. 7-3

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-3 OVERLAND FLOW
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard erosion at Q220 and Q217 - 25 and 23 Glen Abbey Dr.

Strategy: 1) Install new inlet and pipe system to collect water. 2) Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's
Single Inlet	EA	1	\$1,850	\$1,850	\$1,850
18" RCP CLASS III	LF	171	\$129	\$22,107	\$22,107
18" FES	EA	1	\$1,300	\$1,300	\$1,300
Erosion Protection	LS	1	\$2,000	\$2,000	\$2,000
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$27,257	\$37,257
Total Benefit Points				30	35
Individual Benefit Point Ratio				0.53	0.45
Estimated Increased Property Values				\$10,000	\$12,000

Problem: Yard erosion at Q212 - 14 Glen Abbey Dr., Q218 - 16 Glen Abbey Dr., Q216 - 21 Glen Abbey Dr. and Q223 - 31 Glen Abbey Dr.

Strategy: 1) Install new inlet and pipe system to collect water. 2) Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's
Single Area Inlet	EA	2	\$1,750	\$3,500	\$3,500
Manhole	EA	1	\$1,500	\$1,500	\$1,500
18" RCP CLASS III	LF	296	\$129	\$38,267	\$38,267
18" FES	EA	1	\$1,300	\$1,300	\$1,300
Erosion Protection	LS	1	\$3,000	\$3,000	\$3,000
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$47,567	\$57,567
Total Benefit Points				60	65
Individual Benefit Point Ratio				0.60	0.54
Estimated Increased Property Values				\$8,000	\$10,000

Problem: Yard erosion at Q219 - 8 Glen Abbey Dr. and Q213 - 10 Glen Abbey Dr.

Strategy: 1) Install new inlet and pipe system to collect water. 2) Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's
Single Area Inlet	EA	5	\$1,750	\$8,750	\$8,750
Manhole	EA	2	\$1,500	\$3,000	\$3,000
12" RCP CLASS III	LF	17	\$116	\$1,973	\$1,973
18" RCP CLASS III	LF	279	\$129	\$36,069	\$36,069
21" RCP CLASS III	LF	288	\$137	\$39,424	\$39,424
21" FES	EA	1	\$1,500	\$1,500	\$1,500
Erosion Protection	LS	1	\$3,000	\$3,000	\$3,000
Rain Garden	EA	3	\$10,000	\$0	\$30,000
Subtotal				\$93,716	\$123,716
Total Benefit Points				40	55
Individual Benefit Point Ratio				0.20	0.21
Estimated Increased Property Values				\$5,000	\$9,000

Total **\$168,540** **\$218,540**

FIGURE 7-3 OVERLAND

Utility Relocation	20%	\$33,708	\$43,708
Clearing	5%	\$8,427	\$10,927
Mobilization	4%	\$6,742	\$8,742
Total with Percent Allowances		\$217,417	\$281,917
Contingency	25%	\$54,354	\$70,479
Probable Construction Cost Estimate		\$271,771	\$352,396
Design Engineering and Geotechnical	30%	\$81,531	\$105,719
Total Conceptual Cost Estimate		\$354,000	\$459,000
Total Benefit Points		180	230
Total Benefit Point Ratio		0.51	0.50

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 7-3 OVERLAND

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-3 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-3 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-3 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q199-10459 Garibaldi</i>	10	0	6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:	0	Points/pond:	5			
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:	20			
		2.3. Yard Erosion (1 per lot) <i>Address: Q217-25 Glen Abbey; Q215-23 Glen Abbey; Q212-14 Glen Abbey; Q218-16 Glen Abbey; Q216-21 Glen Abbey; Q223-31 Glen Abbey; Q219-8 Glen Abbey; Q213-10 Glen Abbey</i>	No. Lots:	8	Points/lot:	10			80
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							0
TOTAL PROBLEM POINTS							80		

FIGURE 7-3 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-3 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	2	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	2.5	PER 100 LF	10	25
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			25
TOTAL SOLUTION POINTS					150
TOTAL BENEFIT POINTS					230

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

459

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.50

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 7-3 OVERLAND ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-3 CHANNEL FDCMS
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard erosion Q211 - 19 Glen Abbey; Q215 - 23 Glen Abbey; Q216 - 21 Glen Abbey; Q217 - 25 Glen Abbey. Creek incision and erosion SR10 - 11, 15, 17 Glen Abbey. First Floor Flooding 16 Glen Abbey.

Strategy: Install bank protection on FDCMS from Station 8+00 to 17+50 (950 LF). Conduct project in coordination with Creve Coeur. Project is in Creve Coeur from Station 14+00 to 17+50. Floodproof 16 Glen Abbey.

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (L)	LF	950	\$300	\$285,000	\$0
Soft stabilization (L)	LF	950	\$200	\$0	\$190,000
Geomorphic Study	Ea.	1	\$10,000		\$10,000
Floodproof (16 Glen Abbey)	Ea.	1	\$20,000	\$20,000	\$20,000
Subtotal				\$305,000	\$220,000
Total				\$305,000	\$220,000
Utility Relocation			20%	\$61,000	\$44,000
Clearing			5%	\$15,250	\$11,000
Mobilization			4%	\$12,200	\$8,800
Total with Percent Allowances				\$393,450	\$283,800
Contingency			25%	\$98,363	\$70,950
Probable Construction Cost Estimate				\$491,813	\$354,750
Design Engineering and Geotechnical			30%	\$147,544	\$106,425
Total Conceptual Cost Estimate				\$640,000	\$462,000
Benefit Points				385	895
Benefit/Cost Ratio				0.60	1.94

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-3 Channel FDCMS, Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address: 16 Glen Abbey</i>	300		150		25	1	25	
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2			
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1			
		1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)							
			Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots		
		Habitable structures, residential (1 lot per structure) <i>Address:</i>	300		200		50			
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25			
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50			
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
	1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)									
		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots			
	Arterial Road: <i>Address:</i>	75		50		12				
	Collector Road: <i>Address:</i>	35		25		6				
	Residential Road: <i>Address:</i>	20		12		3				

FIGURE 7-3 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-3 Channel FDCMS, Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		Points/pond:		5			
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20			
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		Points/lot:		10			
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
	TOTAL PROBLEM POINTS							25	

FIGURE 7-3 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-3 Channel FDCMS, Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	7	Points per Add'l Proj.:	50 350
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	31	PER 100 LF	10	310
	Riffle Pool Complex	15	PER 100 LF	10	150
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		Yes	50
TOTAL SOLUTION POINTS					870
TOTAL BENEFIT POINTS					895

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS= 462

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 1.94

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 7-3 CHANNEL Alt 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-3 CHANNEL STRUCTURAL FLOODING - Monsanto Sunswept Creek
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Undersized arch culvert under Glen Abbey Dr. , Undersized channel, Creek floods house Q214 12 and 21 Glen Abbey Drive, Creek Erosion Threatens 10 Glen Abbey

Strategy: 1) Install flood protection at 12 and 21 Glen Abbey Drive
 2) Restore Streambank by regrading from station 5+25 to station 8+00 and replace the existing arch culvert under Glen Abbey Dr. with new 15' x 8' Triple Box Culvert. Design for 15 YR Storm.

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Flood protection	Ea.	2	\$80,000	\$160,000	\$160,000
Replace Arch under Glen Abbey Dr.	CY	290	\$600	\$174,000	\$174,000
Restore Streambank by Regrading	LS	1	\$20,000	\$20,000	\$20,000
Construct 2-Stage Channel	LS	1	\$10,000	\$10,000	\$10,000
Hard stabilization (L)	LF	235	\$300	\$70,500	\$0
Soft stabilization (L)	LF	235	\$200	\$0	\$47,000
Flood Study	Ea.	1	\$15,000	\$15,000	\$15,000
Subtotal				\$449,500	\$426,000
Total				\$449,500	\$426,000
Utility Relocation			20%	\$89,900	\$85,200
Clearing			5%	\$22,475	\$21,300
Mobilization			4%	\$17,980	\$17,040
Total with Percent Allowances				\$579,855	\$549,540
Contingency			25%	\$144,964	\$137,385
Probable Construction Cost Estimate				\$724,819	\$686,925
Design Engineering and Geotechnical			30%	\$217,446	\$206,078
Total Conceptual Cost Estimate				\$943,000	\$894,000
Benefit Points				1690	1790
Benefit/Cost Ratio				1.79	2.00

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-3S Channel - Monsanto Sunswept Creek , Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address: 12 Glen Abbey</i>	300		150	1	25		150
		Basement (1 lot per structure) <i>Address: 21 Glen Abbey</i>	200		100	1	15		100
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0		
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100	10	15		1000
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4		
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5	10	1		50	
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)							
		Habitable structures, residential (1 lot per structure) <i>Address: 10 Glen Abbey (8/20.3)=0.39</i>	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15-0.35	No. Lots	200
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend		2	lots	10 points per lot			20
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
Arterial Road: <i>Address:</i>		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15-0.35	No. Lots		
Collector Road: <i>Address:</i>		75		50		12			
Residential Road: <i>Address:</i>	35		25		6				
Residential Road: <i>Address:</i>	20		12		3				

FIGURE 7-3S CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-3S Channel - Monsanto Sunswept Creek , Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
	Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65			
	Basement (1 lot per structure)* <i>Address:</i>	250		200		50			
	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50			
	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N							
	Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25			
	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12			
	Yard Flooding (1 per lot) <i>Address:</i>	10		6		0			
	2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
	Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25			
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:			Points/pond:		5		
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20		
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:			Points/lot:		10		
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
	TOTAL PROBLEM POINTS								1520

FIGURE 7-3S CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-3S Channel - Monsanto Sunswept Creek , Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	3	Points per Add'l Proj.:	50 150
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	5	PER 100 LF	10	50
	Riffle Pool Complex	3	PER 100 LF	10	30
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements	20			20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			20
TOTAL SOLUTION POINTS					270
TOTAL BENEFIT POINTS					1790

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=

894

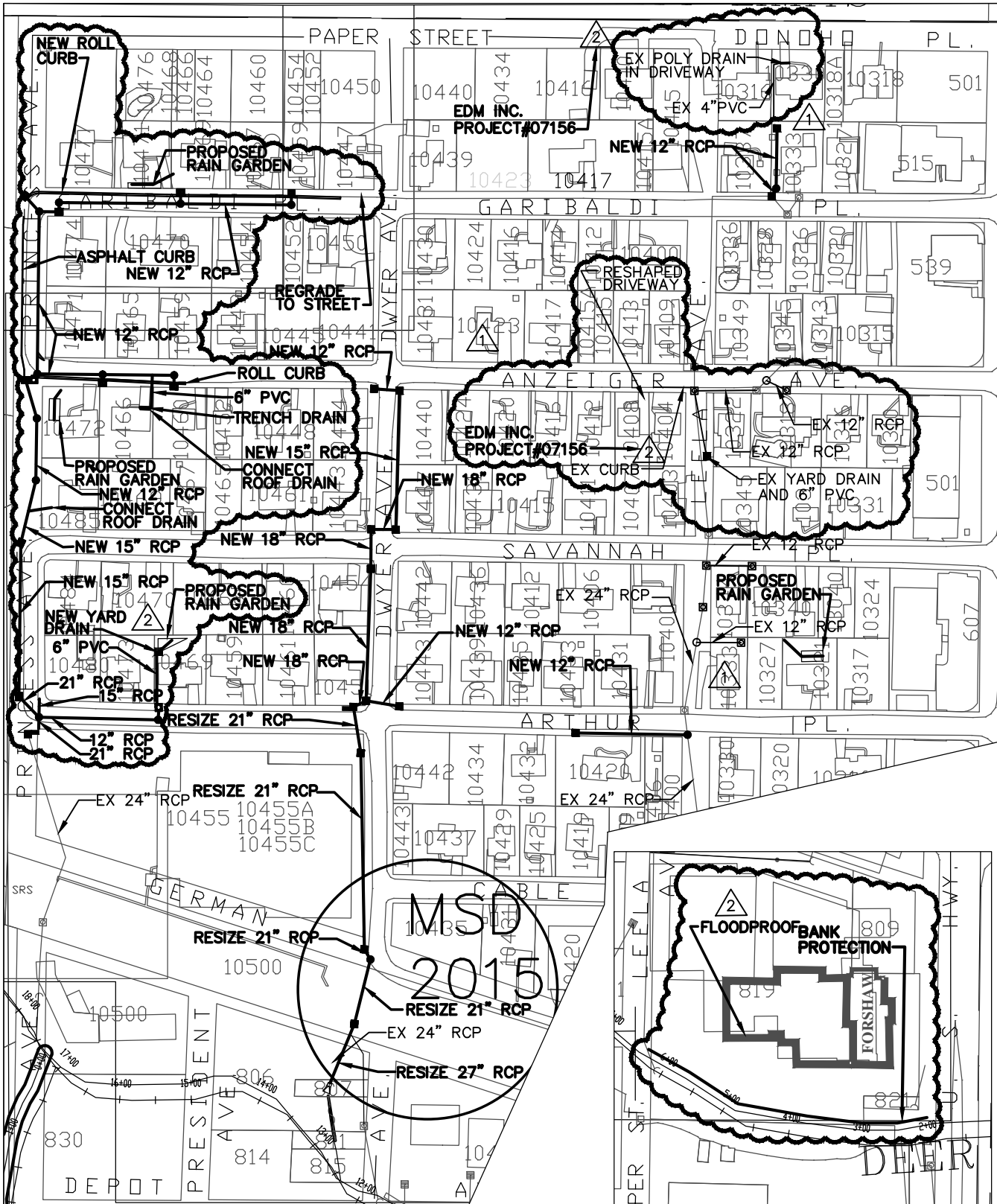
BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

2.00

Place "X" in one box below:

	MSD Project
	Project by Others

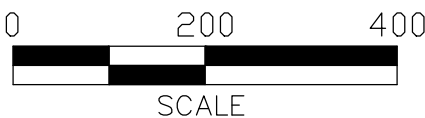
FIGURE 7-3S CHANNEL Alt 2



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
 Consulting Engineers
 220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



UPDATE NO.	DATE
1	11/12/08
2	4/5/13

FIGURE NO. 7-4

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-4 OVERLAND FLOW
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard Ponding at 10333 Garibaldi Place
Strategy: Install inlet and pipe system to collect water.

Description	Unit	Quantity	Unit Cost	Alternative 1
Single Inlet	EA	1	\$1,850	\$1,850
Single Area Inlet	EA	1	\$1,750	\$1,750
Manhole	EA	1	\$1,500	\$1,500
12" RCP CLASS III	LF	97	\$116	\$11,258
Subtotal				\$16,358
Total Benefit Points				50
Individual Benefit Point Ratio				1.46
Estimated Increased Property Values				\$0

Problem: Street ponding along Dwyer Ave. Q20 - 10443 Arthur Pl.
Strategy: Install inlet and pipe system to collect water. Attach to existing system and replace

Description	Unit	Quantity	Unit Cost	Alternative 1
Single Inlet	EA	10	\$1,850	\$18,500
Double Inlet	EA	1	\$3,150	\$3,150
Manhole	EA	1	\$1,500	\$1,500
12" RCP CLASS III	LF	83	\$116	\$9,633
15" RCP CLASS III	LF	194	\$124	\$24,110
18" RCP CLASS III	LF	295	\$129	\$38,138
21" RCP CLASS III	LF	450	\$137	\$61,601
27" RCP CLASS III	LF	89	\$150	\$13,360
27" FES	EA	1	\$1,700	\$1,700
Erosion Protection	LS	1	\$4,000	\$4,000
Subtotal				\$175,691
Total Benefit Points				35
Individual Benefit Point Ratio				0.10
Estimated Increased Property Values				\$3,000

Problem: Yard ponding at Q10 - 10321 Arthur Pl.
Strategy: Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	Alternative 1
Rain Garden	EA	1	\$10,000	\$10,000
Subtotal				\$10,000
Total Benefit Points				35
Individual Benefit Point Ratio				1.67
Estimated Increased Property Values				\$2,000

Problem: Street and Yard Flooding at 10469 Arthur
Strategy: Install rain garden, inlet and pipe system to collect water.

Description	Unit	Quantity	Unit Cost	Alternative 1
Yard Drain	EA	1	\$500	\$500
Single Area Inlet	EA	1	\$1,750	\$1,750
Manhole	EA	1	\$1,500	\$1,500
12" RCP CLASS III	LF	180	\$116	\$20,891
Rain Garden	EA	1	\$10,000	\$10,000
6" PVC	LF	72	\$24	\$1,728
Subtotal				\$36,369
Total Benefit Points				45
Individual Benefit Point Ratio				

Total **\$202,049**

Utility Relocation	20%	\$40,410
Clearing	5%	\$10,102
Mobilization	4%	\$8,082
Total with Percent Allowances		\$260,643
Contingency	25%	\$65,161
Probable Construction Cost Estimate		\$325,804
Design Engineering and Geotechnical	30%	\$97,741
Total Conceptual Cost Estimate		\$424,000
Total Benefit Points		230
Total Benefit Point Ratio		0.54

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 7-4 OVERLAND

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-4 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-4 OVERLAND ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-4 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
	Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65			
	Basement (1 lot per structure)*	250	0	200		50			
	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50			
	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N			
	Attached Garage (1 lot per structure) Address:	100	0	75		25			
	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12			
	Yard Flooding (1 per lot) Address: Q14-Q10-10321 Arthur; 10333 Garibaldi Place, Q199-10469 Arthur	10	3	6		0		30	
	2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
	Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25			
	Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6			
	Traffic obstruction (> 6" of water) on collector street Address:	25		15		2			
	Traffic obstruction (> 6" of water) on residential street Address: Q199 10469 Arthur	10	1	6		1		10	
	Ponding (per ponding area) Address: Dwyer (3 locations)	No. Ponds:		3	Points/pond:	5		15	
	2.2. Moderate Risk Erosion of misc. structures Address:	No. Lots:			Points/lot:	20			
	2.3. Yard Erosion (1 per lot) Address:	No. Lots:		0	Points/lot:	10			
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age							0	
	TOTAL PROBLEM POINTS							55	

FIGURE 7-4 OVERLAND ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-4 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	3	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	1	PER 100 LF	10	10
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements			13	5
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			10
TOTAL SOLUTION POINTS					175
TOTAL BENEFIT POINTS					230

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

424

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.54

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 7-4 OVERLAND ALT 1

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-4 OVERLAND FLOW STRUCTURAL FLOODING B
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Main level flooding at Q379-10469 Savannah Pl and yard erosion at Q382-10485 Savannah Place, Q8-10466 Anzeiger, and Q9-10472 Anzeiger Ave. Yard erosion at Q220 - 27 Glen Abbey Dr. Yard ponding at Q199 - 10459 Garibaldi Pl.

Strategy: Install swale to direct water away from structure and install inlet and pipe system to collect water. Attach to existing system. Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 With BMP's
Single Inlet	EA	8	\$1,850	\$14,800
Manhole	EA	10	\$1,500	\$15,000
Double Inlet	EA	2	\$3,150	\$6,300
12" RCP CLASS III	LF	1029	\$116	\$119,426
15" RCP CLASS III	LF	326	\$124	\$40,515
21" RCP CLASS III	LF	56	\$137	\$7,666
Roll Curb	LF	585	\$40	\$23,400
Asphalt Curb	LF	254	\$32	\$8,128
Clearing	LS	1	\$3,000	\$3,000
Grading	LS	1	\$6,000	\$6,000
Rain Garden	EA	2	\$10,000	\$20,000
Subtotal				\$264,235
Total Benefit Points				580
Individual Benefit Point Ratio				1.05
Estimated Increased Property Values				\$2,000
Total				\$264,235
Utility Relocation			20%	\$52,847
Clearing			5%	\$13,212
Mobilization			4%	\$10,569
Total with Percent Allowances				\$340,863
Contingency			25%	\$85,216
Probable Construction Cost Estimate				\$426,079
Design Engineering and Geotechnical			30%	\$127,824
Total Conceptual Cost Estimate				\$554,000
Total Benefit Points				590
Total Benefit Point Ratio				1.06

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-4 Structural B without BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-4 STRUCTURAL B ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-4 Structural B without BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address: Q379-10469 Savannah</i>	350	1	250		65		350
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				Y	50	50
		Attached Garage (1 lot per structure) <i>Address: Q197-10471 Garibaldi</i>	100	1	75		25		100
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q197-10471 Garibaldi</i>	10	1	6		0		10
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:	5		
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:	20		
		2.3. Yard Erosion (1 per lot) <i>Address: Q9-10472 Anzeiger;Q382-10485Savannah;Q220-27GlenAbbey;Q8-10466Anzeiger;Q197-10471,10469Garibaldi</i>	No. Lots:	6		Points/lot:	10		60
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							0
	TOTAL PROBLEM POINTS								570

FIGURE 7-4 STRUCTURAL B ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-4 Structural B without BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	1	PER 100 LF	10	10
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			
TOTAL SOLUTION POINTS					20
TOTAL BENEFIT POINTS					590

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

554

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.06

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 7-4 STRUCTURAL B ALT 1

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-4 OVERLAND FLOW
Solutions By: EDM INC. DATE: 10/18/2013

Problem: Yard flooding at Q14 - 10420 Arthur Place and Q54 - 10425 Cable Ave.				
Strategy: Install inlet and pipe system to collect water. Attach to existing system.				
Description	Unit	Quantity	Unit Cost	Alternative 1
Single Area Inlet	EA	1	\$1,750	\$1,750
Manhole	EA	1	\$1,500	\$1,500
12" RCP CLASS III	LF	157	\$116	\$18,221
Subtotal				\$21,471
Total Benefit Points				140
Individual Benefit Point Ratio				3.11
Estimated Increased Property Values				\$3,000
Total				\$21,471
Utility Relocation			20%	\$4,294
Clearing			5%	\$1,074
Mobilization			4%	\$859
Total with Percent Allowances				\$27,698
Contingency			25%	\$6,925
Probable Construction Cost Estimate				\$34,623
Design Engineering and Geotechnical			30%	\$20,000
Total Conceptual Cost Estimate				\$55,000
Total Benefit Points				140
Total Benefit Point Ratio				2.55

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-4 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address: Q56-10425 Cable</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-4 STRUCTURAL C ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-4 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address: Q56-10425 Cable</i>	100	1	75		25		100
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q14-10420 Arthur; Q54-10425 Cable</i>	10	2	6		0		20
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:		Points/pond:		5		
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20		
		2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:	0	Points/lot:		10		
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
			Points for Age						0
		TOTAL PROBLEM POINTS							120

FIGURE 7-4 STRUCTURAL C ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-4 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements	1			20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			
TOTAL SOLUTION POINTS					20
TOTAL BENEFIT POINTS					140

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

424

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.33

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 7-4 STRUCTURAL C ALT 1

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-4 CHANNEL FDCT5
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Creek bank erosion north side of Deer Creek Q393 - 825 S. Lindbergh (Forshaw). Infrequent first floor flooding Forshaw warehouse and frequent parking lot flooding.

Strategy: Install bank protection on FDC from Station 2+00 to 6+40 (440 LF). Floodproof Forshaw warehouse.

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (L)	LF	440	\$300	\$132,000	\$0
Soft stabilization (L)	LF	440	\$200	\$0	\$88,000
Geomorphic Study	Ea.	1	\$10,000		\$10,000
Flood Protection	EA	1	\$200,000	\$200,000	\$200,000
Flood Study	EA	1	\$20,000	\$20,000	\$20,000
Subtotal				\$352,000	\$200,000
Total				\$352,000	\$200,000
Utility Relocation			20%	\$70,400	\$40,000
Clearing			5%	\$17,600	\$10,000
Mobilization			4%	\$14,080	\$8,000
Total with Percent Allowances				\$454,080	\$258,000
Contingency			25%	\$113,520	\$64,500
Probable Construction Cost Estimate				\$567,600	\$322,500
Design Engineering and Geotechnical			30%	\$170,280	\$96,750
Total Conceptual Cost Estimate				\$738,000	\$420,000
Benefit Points				195	280
Benefit/Cost Ratio				0.26	0.67

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-3 Channel FDCMS, Alternate 1

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address: 16 Glen Abbey</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:Q-393 825 S. Lindbergh</i>	300		150		25	7	175	
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-4 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-3 Channel FDCMS, Alternate 1

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		Points/pond:		5			
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20			
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		Points/lot:		10			
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
	TOTAL PROBLEM POINTS							175	

FIGURE 7-4 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-3 Channel FDCMS, Alternate 1

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:		Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	4	PER 100 LF	10	40
	Riffle Pool Complex	4	PER 100 LF	10	40
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			5
TOTAL SOLUTION POINTS					105
TOTAL BENEFIT POINTS					280

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

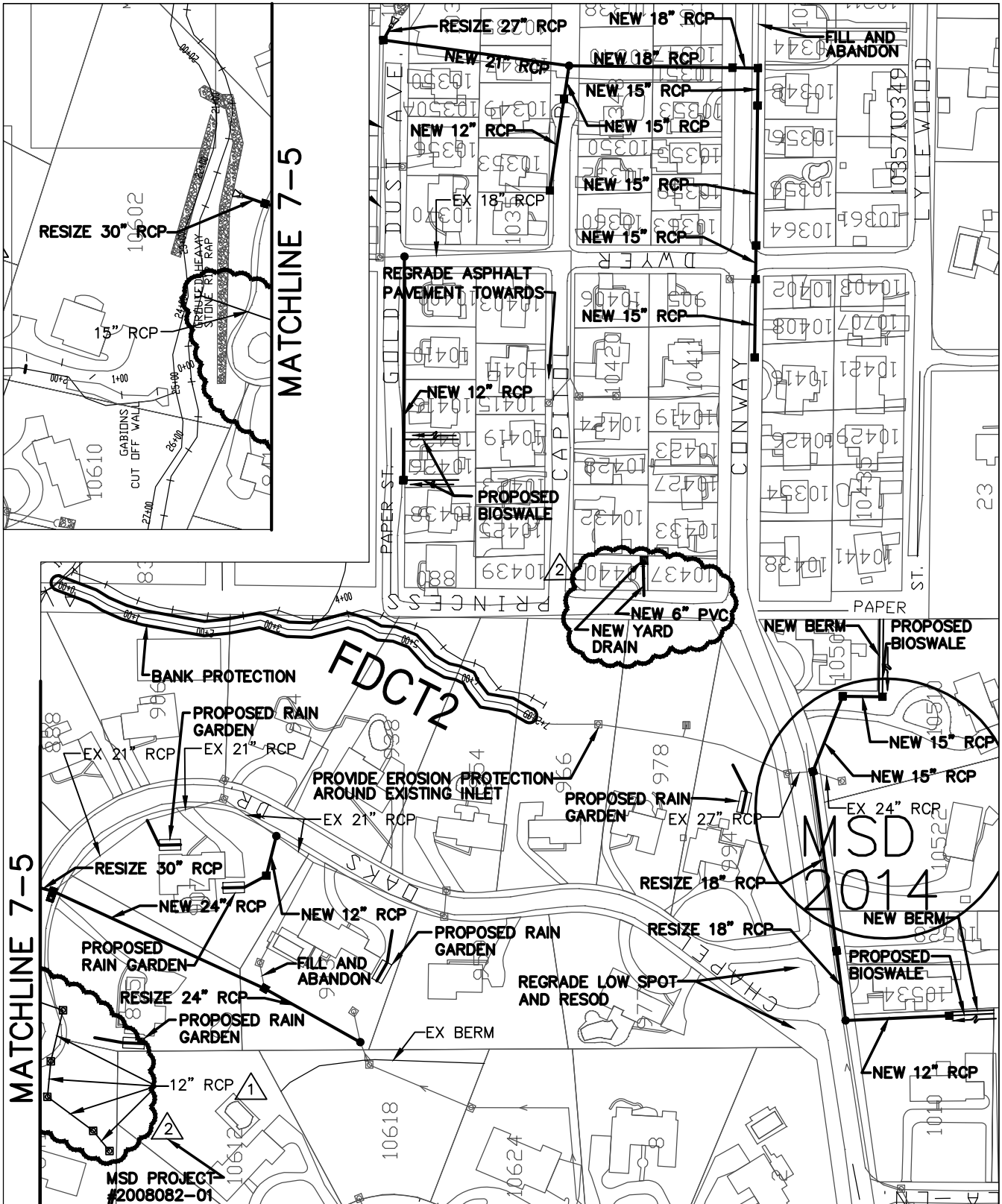
TOTAL COST IN THOUSANDS= 420

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 0.67

Place "X" in one box below:

	MSD Project
	Project by Others

FIGURE 7-4 CHANNEL Alt 2



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN



EDM Incorporated
Consulting Engineers

220 Mansion House Center
St. Louis, Missouri 63102
Phone (314) 231-5485 Fax (314) 231-8167
edm@edm-inc.com



SCALE

UPDATE NO. 2 DATE 4/5/13

FIGURE NO. 7-5

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-5 OVERLAND FLOW
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard Ponding at Q222 - 10422 Gold Dust Ave and street ponding along Conway Rd (Q124)

Strategy: 1) Install inlets and pipe system to collect water. Replace undersized storm sewer pipes. 2) Add Bioswale to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Inlet	EA	7	\$1,850	\$12,950	\$12,950
Manhole	EA	1	\$1,500	\$1,500	\$1,500
12" RCP CLASS III	LF	312	\$116	\$36,211	\$36,211
15" RCP CLASS III	LF	404	\$124	\$50,209	\$50,209
18" RCP CLASS III	LF	264	\$129	\$34,130	\$34,130
Bioswale	LF	154	\$90	\$0	\$13,860
Subtotal				\$135,000	\$148,860
Total Benefit Points				35	50
Individual Benefit Point Ratio				0.12	0.16
Estimated Increased Property Values				\$2,000	\$4,000

Problem: Street and yard ponding at Q55 - 10411 Capitol Place and yard ponding at Q58 - 10403 Capitol Place, (Q56), (Q64)

Strategy: 1) Regrade asphalt steeet towards existing inlet.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Regrade asphalt street toward inlet	LS	1	\$4,000	\$4,000	\$4,000
Subtotal				\$4,000	\$4,000
Total Benefit Points				45	45
Individual Benefit Point Ratio				5.37	5.37
Estimated Increased Property Values				\$3,000	\$3,000

Problem: Yard Erosion at Q74 - 978 Chapel Oaks Dr. and Q77 -994 Chapel Oaks Dr.

Strategy: 1) Regrade around existing inlet. Add Rain Garden to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Regrade around inlet	LS	1	\$3,000	\$3,000	\$3,000
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000
Subtotal				\$13,000	\$13,000
Total Benefit Points				45	45
Individual Benefit Point Ratio				1.65	1.65
Estimated Increased Property Values				\$3,000	\$3,000

Problem: Yard flooding at Q125 - 10504 Conway Rd. and yard ponding at Q132 - 10534 Conway Rd. Street and yard flooding at Q73 - 977 Chapel Oaks Dr.

Strategy: 1) Install inlets and pipe system to collect water. Replace undersized

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Single Inlet	EA	3	\$1,850	\$5,550	\$5,550
Manhole	EA	1	\$1,500	\$1,500	\$1,500
New Berm	LF	161	\$25	\$4,025	\$4,025
12" RCP CLASS III	LF	150	\$116	\$17,409	\$17,409
15" RCP CLASS III	LF	139	\$124	\$17,275	\$17,275
18" RCP CLASS III	LF	391	\$129	\$50,548	\$50,548
Bioswale	LF	161	\$90	\$0	\$14,490
Subtotal				\$96,307	\$110,797
Total Benefit Points				60	76
Individual Benefit Point Ratio				0.30	0.33
Estimated Increased Property Values				\$4,000	\$7,000

FIGURE 7-5 OVERLAND

Problem:					
Yard ponding and erosion at Q71 - 907 Chapel Oaks, and 943 Chapel Oaks, (Q78).					
Strategy:					
1) Install inlets and pipe system to collect water. Replace undersized stormwater pipes 2) Add Rain Gardens to infiltrate runoff and protect natural channels.					
Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's
Single Inlet	EA	3	\$1,850	\$5,550	\$5,550
Double Inlet	EA	1	\$3,150	\$3,150	\$3,150
Manhole	EA	2	\$1,500	\$3,000	\$3,000
12" RCP CLASS III	LF	57	\$116	\$6,615	\$6,615
24" RCP CLASS III	LF	479	\$144	\$68,737	\$68,737
30" RCP CLASS III	LF	61	\$163	\$9,958	\$9,958
12" FES	EA	0	\$1,100	\$0	\$0
30" FES	EA	1	\$1,900	\$1,900	\$1,900
Erosion Protection	LS	1	\$6,000	\$6,000	\$6,000
Additional Regrading	LS	1	\$5,000	\$5,000	\$5,000
Rain Garden	EA	4	\$10,000	\$0	\$40,000
Subtotal				\$109,910	\$149,910
Total Benefit Points				55	80
Individual Benefit Point Ratio				0.24	0.25
Estimated Increased Property Values				\$5,000	\$9,000
Total				\$358,217	\$426,567
Utility Relocation			20%	\$71,643	\$85,313
Clearing			5%	\$17,911	\$21,328
Mobilization			4%	\$14,329	\$17,063
Total with Percent Allowances				\$462,100	\$550,271
Contingency			25%	\$115,525	\$137,568
Probable Construction Cost Estimate				\$577,624	\$687,839
Design Engineering and Geotechnical			30%	\$173,287	\$206,352
Total Conceptual Cost Estimate				\$751,000	\$895,000
Total Benefit Points				380	467
Total Benefit Point Ratio				0.51	0.52
Additional Comments:					
Conceptual Cost are rounded to the nearest \$1000					

FIGURE 7-5 OVERLAND

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-5 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-5 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-5 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q222-10422 Gold Dust; Q55-10411 Capitol; Q58-10403 Capitol; Q125-10504 Conway; Q132-10534 Conway; Q73-977 Chapel Oaks; Q71-907 Chapel Oaks; 943 Chapel Oaks</i>	10	8	6		0		80
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address: Conway; Q55-10411 Capitol; Q73-977 Chapel Oaks</i>	No. Ponds:		3	Points/pond:	5		15
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:	20		
		2.3. Yard Erosion (1 per lot) <i>Address: Q74-978 Chapel Oaks; Q77-994 Chapel Oaks; Q71-907 Chapel Oaks; 943 Chapel Oaks</i>	No. Lots:		4	Points/lot:	10		40
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
Points for Age							15		
TOTAL PROBLEM POINTS							150		

FIGURE 7-5 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-5 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	4	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	6.65	PER 100 LF	10	67
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			40
TOTAL SOLUTION POINTS					317
TOTAL BENEFIT POINTS					467

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

895

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.52

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 7-5 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-5 Structural without BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-5 STRUCTURAL ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-5 Structural without BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address: Q57 - 10440 Capitol</i>	350	0	250		65		
		Basement (1 lot per structure)* <i>Address: Q57 - 10440 Capitol</i>	250	1	200		50		250
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address: Q62-10353 Capitol</i>	100	1	75		25		100
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q57 Capitol, Q60-10349 Capitol; Q221-10350 Gold Dust</i>	10	1	6		0		10
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address: Q57-10440 Capitol, Q60-10349 Capitol</i>	No. Ponds:		2	Points/pond:	5		10
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:	20		
		2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		0	Points/lot:	10		
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							15
TOTAL PROBLEM POINTS							385		

FIGURE 7-5 STRUCTURAL ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-5 Structural without BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	0	PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
5.0 MISC.	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			
TOTAL SOLUTION POINTS					10
TOTAL BENEFIT POINTS					395

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

177

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

2.23

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 7-5 STRUCTURAL ALT 1

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-5 CHANNEL FDCT2
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard flooding and erosion MSD-33 & 34, Q76 - 830 Depot, 906, 924, 938, 954, 966 Chapel Oaks and Princess Avenue (paper street).

Strategy: 1) Install bank protection on FDCT2 from station 0+00 to 7+20 (720 LF).

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (S)	LF	720	\$225	\$162,000	\$0
Soft stabilization (S)	LF	720	\$125	\$0	\$90,000
Geomorphic Study	Ea.	2	\$10,000		\$20,000
Subtotal				\$162,000	\$110,000
Total				\$162,000	\$110,000
Utility Relocation			20%	\$32,400	\$22,000
Clearing			5%	\$8,100	\$5,500
Mobilization			4%	\$6,480	\$4,400
Total with Percent Allowances				\$208,980	\$141,900
Contingency			25%	\$52,245	\$35,475
Probable Construction Cost Estimate				\$261,225	\$177,375
Design Engineering and Geotechnical			30%	\$78,368	\$53,213
Total Conceptual Cost Estimate				\$340,000	\$231,000
Benefit Points				380	625
Benefit/Cost Ratio				1.12	2.71

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-5 Channel FDCT2, Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) Princess Avenue (Paper Street) <i>Address:830 Depot; 906,924,938,954,966 Chapel Oaks</i>	10	7	5		0		70	
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-5 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-5 Channel FDCT2, Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:			Points/pond:		5		
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20		
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:			Points/lot:		10		
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
	TOTAL PROBLEM POINTS							70	

FIGURE 7-5 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-5 Channel FDCT2, Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	6	Points per Add'l Proj.:	50 300
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	14	PER 100 LF	10	140
	Riffle Pool Complex	7	PER 100 LF	10	70
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements		8		10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		Yes	35
TOTAL SOLUTION POINTS					555
TOTAL BENEFIT POINTS					625

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

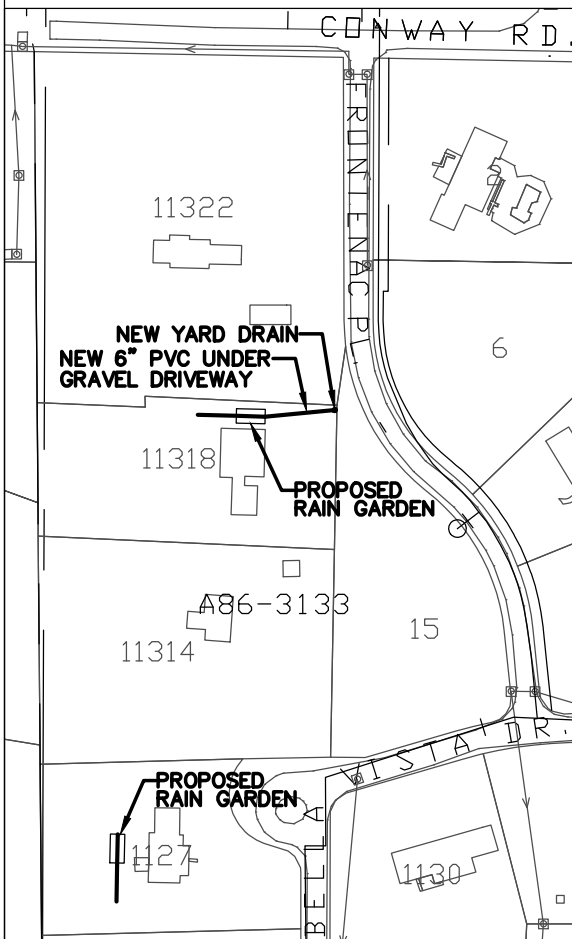
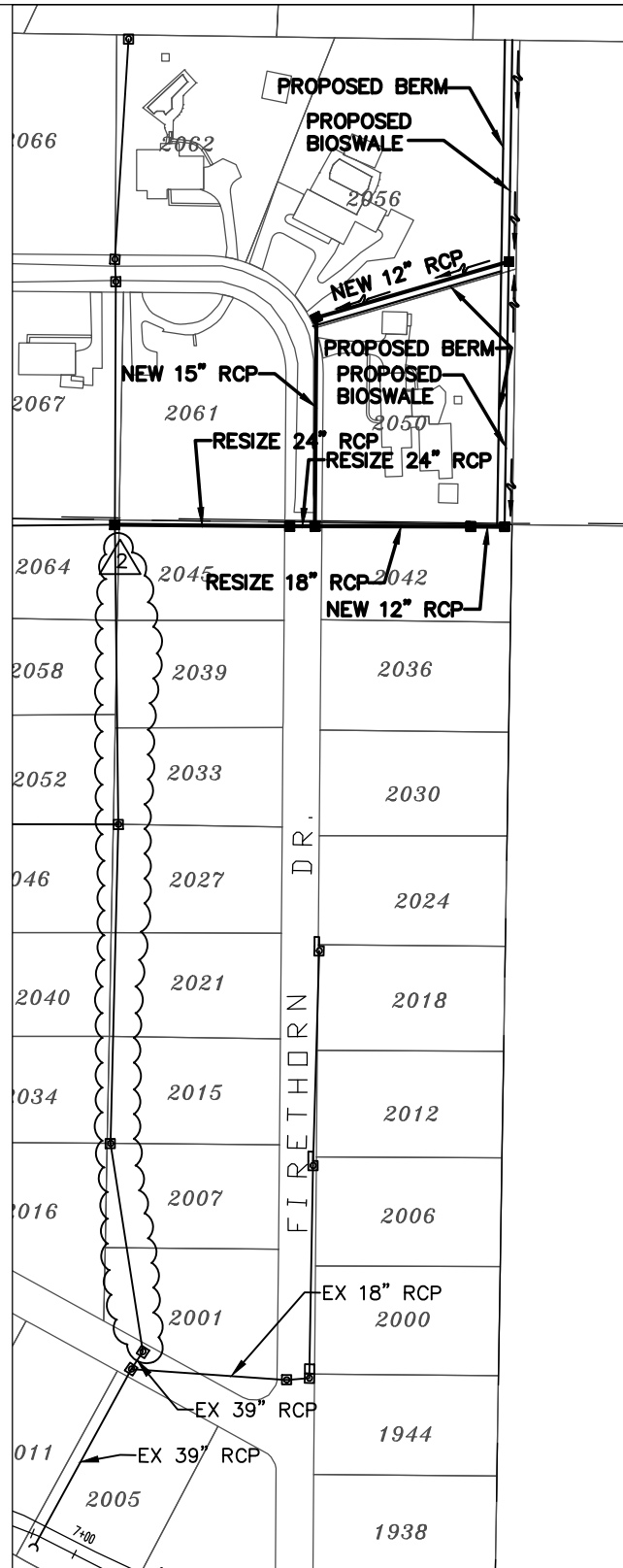
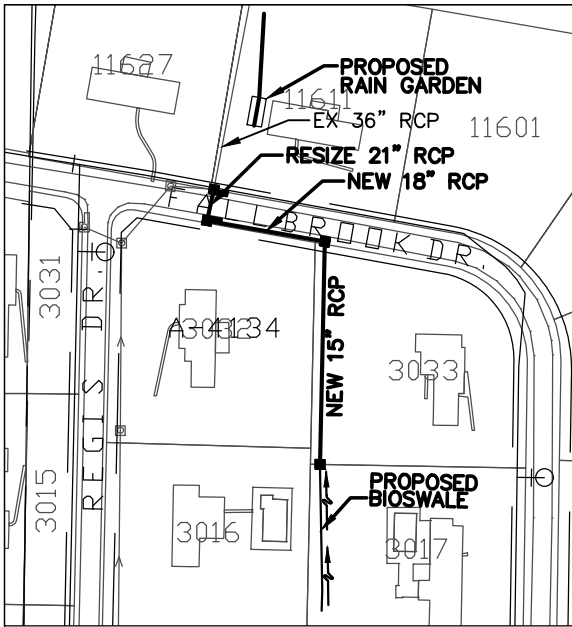
TOTAL COST IN THOUSANDS= 231

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= 2.71

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 7-5 CHANNEL Alt 2



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
 Consulting Engineers
 220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



0 200 400



SCALE

UPDATE NO. _____ DATE _____

FIGURE NO. 7-6

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-6 OVERLAND FLOW
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard erosion at Q170 - 3033 Fallbrook Dr. and 11611 Fallbrook Dr., (Q168)
Strategy: 1) Install inlet and pipe system to collect water. Attach to existing system. Resized undersized storm sewer pipe. Install Rain Garden to infiltrate runoff and protect natural channels. 2) Add Bioswale to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's
Single Area Inlet	EA	2	\$1,750	\$3,500	\$3,500
15" RCP CLASS III	LF	232	\$124	\$28,833	\$28,833
18" RCP CLASS III	LF	125	\$129	\$16,160	\$16,160
21" RCP CLASS III	LF	33	\$137	\$4,517	\$4,517
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000
Bioswale	LF	148	\$90	\$0	\$13,320
Subtotal				\$63,010	\$76,330
Total Benefit Points				60	75
Individual Benefit Point Ratio				0.45	0.47
Estimated Increased Property Values				\$4,000	\$6,000

Problem: Yard ponding at Q133 -11318 Conway Rd.
Strategy: 1) Install yard drain and pipe system to collect water. 2) Add Rain Garden to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's
Yard Drain	EA	1	\$500	\$500	\$500
6" PVC	LF	73	\$24	\$1,752	\$1,752
Regrade driveway	LS	1	\$1,000	\$1,000	\$1,000
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$3,252	\$13,252
Total Benefit Points				30	35
Individual Benefit Point Ratio				4.40	1.26
Estimated Increased Property Values				\$1,000	\$3,000

Problem: Yard ponding at Q30 - 1127 Bella Vista Dr
Strategy: 1) Install Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000
Additional Grading	LS	1	\$4,000	\$4,000	\$4,000
Subtotal				\$14,000	\$14,000
Total Benefit Points				35	35
Individual Benefit Point Ratio				1.19	1.19
Estimated Increased Property Values				\$2,000	\$2,000

Total **\$80,262** **\$103,582**

Utility Relocation	20%	\$16,052	\$20,716
Clearing	5%	\$4,013	\$5,179
Mobilization	4%	\$3,210	\$4,143
Total with Percent Allowances		\$103,538	\$133,621
Contingency	25%	\$25,885	\$33,405
Probable Construction Cost Estimate		\$129,423	\$167,027
Design Engineering and Geotechnical	30%	\$38,827	\$50,108
Total Conceptual Cost Estimate		\$169,000	\$218,000
Total Benefit Points		170	210
Total Benefit Point Ratio		1.01	0.96

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

FIGURE 7-6 OVERLAND

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-6 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-6 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-6 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50	0	35		12		
		Yard Flooding (1 per lot) <i>Address: Q133-11318 Conway; Q30-1127 Bella Vista</i>	10	2	6		0		20
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:		5		
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20		
	2.3. Yard Erosion (1 per lot) <i>Address: Q170-3033 Fall Brook; 11611 Fall Brook</i>	No. Lots:		2	Points/lot:		10	20	
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age							0	
	TOTAL PROBLEM POINTS							40	

FIGURE 7-6 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-6 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	2	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	2.98	PER 100 LF	10	30
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			30
TOTAL SOLUTION POINTS					170
TOTAL BENEFIT POINTS					210

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

218

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.96

Place "X" in one box below:

	MSD Project
	Project by Others

FIGURE 7-6 OVERLAND ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-6 OVERLAND FLOW STRUCTURAL FLOODING
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard Ponding and detached garage flooding at Q172 - 2050 Firethorn Dr
Strategy: 1) Install berm to catch overland flow and direct to inlet and pipe system. Resized undersized storm sewer pipes. 2) Add Bioswale to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1 With
				Without BMP's	BMP's
Single Area Inlet	EA	3	\$1,750	\$5,250	\$5,250
Single Inlet	EA	4	\$1,850	\$7,400	\$7,400
New Berm	LF	730	\$25	\$18,250	\$18,250
12" RCP CLASS III	LF	251	\$116	\$29,131	\$29,131
15" RCP CLASS III	LF	224	\$124	\$27,839	\$27,839
18" RCP CLASS III	LF	167	\$129	\$21,590	\$21,590
24" RCP CLASS III	LF	215	\$144	\$30,853	\$30,853
33" RCP CLASS III	LF	0	\$174	\$0	\$0
36" RCP CLASS III	LF	0	\$186	\$0	\$0
Bioswale	LF	509	\$90	\$0	\$45,810
Subtotal				\$140,312	\$186,122
Total Benefit Points				85	136
Individual Benefit Point Ratio				0.29	0.35
Estimated Increased Property Values				\$5,000	\$9,000
Total				\$140,312	\$186,122
Utility Relocation			20%	\$28,062	\$37,224
Clearing			5%	\$7,016	\$9,306
Mobilization			4%	\$5,612	\$7,445
Total with Percent Allowances				\$181,003	\$240,097
Contingency			25%	\$45,251	\$60,024
Probable Construction Cost Estimate				\$226,253	\$300,122
Design Engineering and Geotechnical			30%	\$67,876	\$90,037
Total Conceptual Cost Estimate				\$295,000	\$391,000
Total Benefit Points				85	136
Total Benefit Point Ratio				0.29	0.35

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-6 Structural with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-6 STRUCTURAL ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-6 Structural with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
	Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65			
	Basement (1 lot per structure)*	250	0	200		50			
	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50			
	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N			
	Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25			
	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address: Q172-2050 Fire Thorn</i>	50	1	35		12		50	
	Yard Flooding (1 per lot) <i>Address: Q172-2050 Fire Thorn; Q133-11318 Conway; Q30-1127 Bella Vista</i>	10	1	6		0		10	
	2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
	Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25			
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:	5			
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:	20			
	2.3. Yard Erosion (1 per lot) <i>Address: Q170-3033 Fall Brook; 11611 Fall Brook</i>	No. Lots:		0	Points/lot:	10			
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age							15	
	TOTAL PROBLEM POINTS								75

FIGURE 7-6 STRUCTURAL ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-6 Structural with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	5.09	PER 100 LF	10	51
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			
TOTAL SOLUTION POINTS					61
TOTAL BENEFIT POINTS					136

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

391

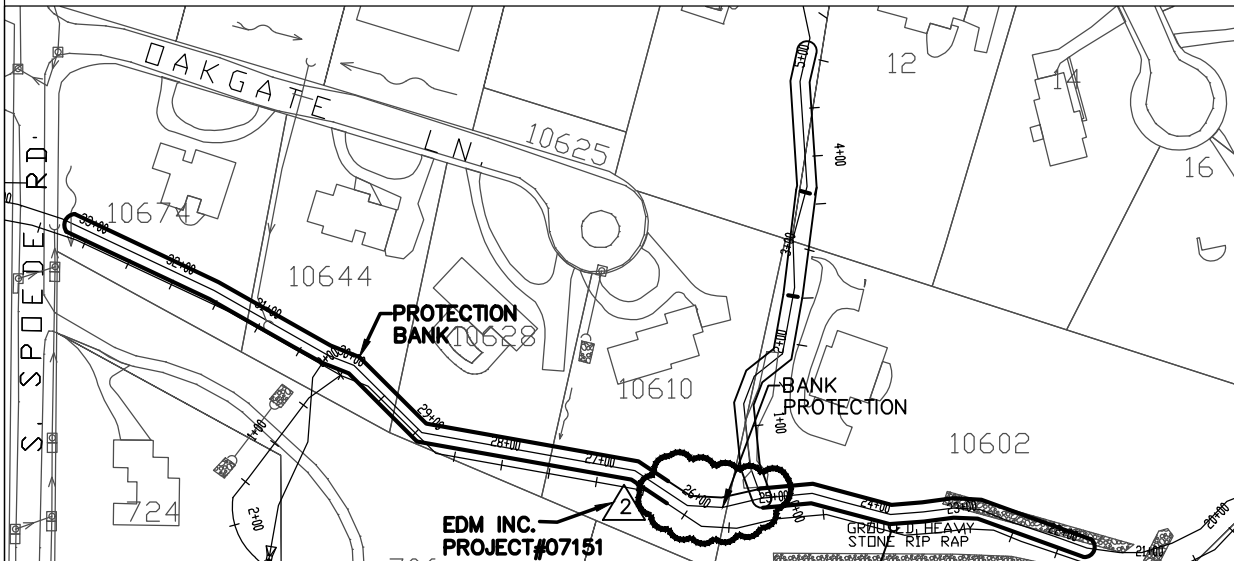
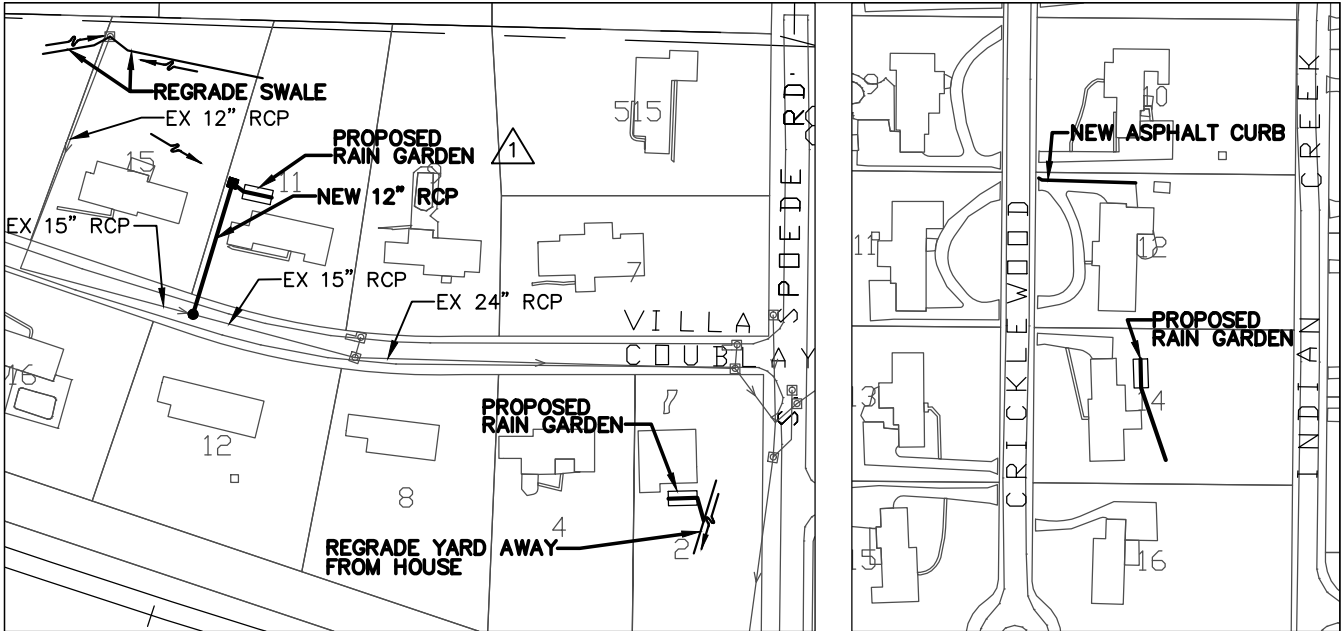
BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.35

Place "X" in one box below:

MSD Project
 Project by Others

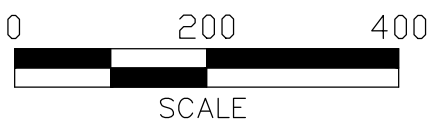
FIGURE 7-6 STRUCTURAL ALT 2



CITY OF FRONTENAC

STORMWATER SYSTEM MASTER IMPROVEMENT PLAN

EDM EDM Incorporated
 Consulting Engineers
 220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



UPDATE NO.	DATE
1	11/12/08
2	5/17/12

FIGURE NO. 7-7

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-7 OVERLAND FLOW
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Infrequent basement flooding and yard erosion at Q420 - 2 Villa Coublay Dr.

Strategy: 1) Regrade water away from garage. 2) Add Rain Gardens to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Clear and Regrade Yard	LS	1	\$4,000	\$4,000	\$4,000
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$4,000	\$14,000
Total Benefit Points				80	85
Individual Benefit Point Ratio				9.54	2.90
Estimated Increased Property Values				\$2,000	\$4,000

Problem: Yard ponding at Q162 - 10 Cricklewood Ln. and Q159 -14 Cricklewood Ln.

Strategy: 1) Install Curb along driveway at 12 Cricklewood Ln. to direct runoff away from 10 Cricklewood Ln. and install Rain Gardens at 14 Cricklewood Ln. to infiltrate runoff and protect natural channels.

Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
				Without BMP's	With BMP's
Asphalt Curb	LF	101	\$32	\$3,232	\$3,232
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000
Subtotal				\$13,232	\$13,232
Total Benefit Points				45	45
Individual Benefit Point Ratio				1.62	1.62
Estimated Increased Property Values				\$1,000	\$3,000

Total **\$17,232** **\$27,232**

Utility Relocation		20%	\$3,446	\$5,446
Clearing		5%	\$862	\$1,362
Mobilization		4%	\$689	\$1,089

Total with Percent Allowances **\$22,229** **\$35,129**

Contingency 25% **\$5,557** **\$8,782**

Probable Construction Cost Estimate **\$27,787** **\$43,912**

Design Engineering and Geotechnical 30% **\$20,000** **\$20,000**

Total Conceptual Cost Estimate **\$48,000** **\$64,000**

Total Benefit Points **165** **175**

Total Benefit Point Ratio **3.44** **2.73**

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-7 with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-7 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-7 with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)* <i>Address: Q420 - 2 Villa Coublay Dr.</i>	250	0	200		50	1	50
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q162-10 Cricklewood; Q159-14 Cricklewood</i>	10	2	6		0		20
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:		5	
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20	
		2.3. Yard Erosion (1 per lot) <i>Address: Q420-2 Villa Coublay</i>	No. Lots:		1	Points/lot:		10	10
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age							15	
TOTAL PROBLEM POINTS								95	

FIGURE 7-7 OVERLAND ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-7 with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	1	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	1	PER 100 LF	10	10
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
	4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10	
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			10
TOTAL SOLUTION POINTS					80
TOTAL BENEFIT POINTS					175

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

64

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

2.73

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 7-7 OVERLAND ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-7 OVERLAND FLOW STRUCTURAL FLOODING
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Basement Flooding and yard ponding at Q423-11 Villa Coublay Dr.
Strategy: 1) Regrade water away from basement and installed new area inlet and pipe to existing system. 2) Add Rain Gardens to infiltrate runoff and protect natural

Description	Unit	Quantity	Unit Cost	1) Alternative 1	
				Without BMP's	With BMP's
Manhole	EA	1	\$1,500	\$1,500	\$1,500
Single Area Inlet	EA	1	\$1,750	\$1,750	\$1,750
12" RCP CLASS III	LF	143	\$116	\$16,597	\$16,597
Grading	LS	1	\$5,000	\$5,000	\$5,000
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$24,847	\$34,847
Total Benefit Points				330	335
Individual Benefit Point Ratio				6.34	4.59
Estimated Increased Property Values				\$10,000	\$12,000

Total				\$24,847	\$34,847
Utility Relocation			20%	\$4,969	\$6,969
Clearing			5%	\$1,242	\$1,742
Mobilization			4%	\$994	\$1,394
Total with Percent Allowances				\$32,052	\$44,952
Contingency			25%	\$8,013	\$11,238
Probable Construction Cost Estimate				\$40,065	\$56,190
Design Engineering and Geotechnical			30%	\$20,000	\$20,000
Total Conceptual Cost Estimate				\$61,000	\$77,000
Total Benefit Points				330	335
Total Benefit Point Ratio				5.41	4.35

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-7 Structural with BMP's

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot				
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road: <i>Address:</i>		75		50		12		
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-7 STRUCTURAL ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-7 Structural with BMP's

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING								
	2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)* <i>Address: Q423-11 Villa Coublay Dr.</i>	250	1	200		50		250
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				Y	50	50
		Attached Garage (1 lot per structure) <i>Address: Q62-10353 Capitol</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address: Q423-11 Villa Coublay Dr.</i>	10	1	6		0		10
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6		
		Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2		
		Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1		
		Ponding (per ponding area) <i>Address: Q60-10349 Capitol</i>	No. Ponds:	0	Points/pond:		5		
		2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20		
		2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:	0	Points/lot:		10		
		2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							0
		TOTAL PROBLEM POINTS							310

FIGURE 7-7 STRUCTURAL ALT 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-7 Structural with BMP's

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	0.0%	Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales*	0.5	PER 100 LF	10	5
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)		PER 100 LF	10	
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts			
TOTAL SOLUTION POINTS					25
TOTAL BENEFIT POINTS					335

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

77

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

4.35

Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 7-7 STRUCTURAL ALT 2

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 7-7 CHANNEL FDC
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard erosion Q335-10674 Oakgate Lane, Q70-841 Chapel Oaks, and 10644, 10628, 10610, nad 10602 Chapel Oaks

Strategy: Install bank protection on FDC from Station 21+50 to 33+00 (1,150 LF).

Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
Hard stabilization (L)	LF	1,150	\$300	\$345,000	\$0
Soft stabilization (L)	LF	1,150	\$200	\$0	\$230,000
Geomorphic Study	Ea.	2	\$10,000		\$20,000
Subtotal				\$345,000	\$250,000
 Total				 \$345,000	 \$250,000
 Utility Relocation			20%	\$69,000	\$50,000
Clearing			5%	\$17,250	\$12,500
Mobilization			4%	\$13,800	\$10,000
 Total with Percent Allowances				 \$445,050	 \$322,500
 Contingency			25%	\$111,263	\$80,625
 Probable Construction Cost Estimate				 \$556,313	 \$403,125
 Design Engineering and Geotechnical			30%	\$166,894	\$120,938
 Total Conceptual Cost Estimate				 \$724,000	 \$525,000
 Benefit Points				 260	 400
Benefit/Cost Ratio				0.36	0.76

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-7 Channel FDC, Alternate 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points		
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected			
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25			
		Basement (1 lot per structure) <i>Address:</i>	200		100		15			
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8			
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4			
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25			
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0			
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15			
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2				
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1				
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, residential (1 lot per structure) <i>Address:</i>		300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>		150		100		25		
Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>		300		200		50				
1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot						
1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots			
Arterial Road: <i>Address:</i>		75		50		12				
Collector Road: <i>Address:</i>		35		25		6				
Residential Road: <i>Address:</i>		20		12		3				

FIGURE 7-7 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-7 Channel FDC, Alternate 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250		200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
		Attached Garage (1 lot per structure) <i>Address:</i>	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10		6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		Points/pond:		5			
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:		20			
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		Points/lot:		10			
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age								
			TOTAL PROBLEM POINTS						

FIGURE 7-7 CHANNEL Alt 2

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 7-7 Channel FDC, Alternate 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY					
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :		Max points:	1000
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	5	Points per Add'l Proj.:	50 250
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit	
	Bioswales		PER 100 LF	10	
	Forebays		AC	200	
	Wet Ponds		AC	100	
	Wetlands		AC	50	
	Biostabilization of banks (per bank)	11	PER 100 LF	10	110
	Riffle Pool Complex		PER 100 LF	10	
	4.2. Eliminates combined sewer (per project)		EA	100	
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10		
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)
	Points for Easements				10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts		Yes	30
TOTAL SOLUTION POINTS					400
TOTAL BENEFIT POINTS					400

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

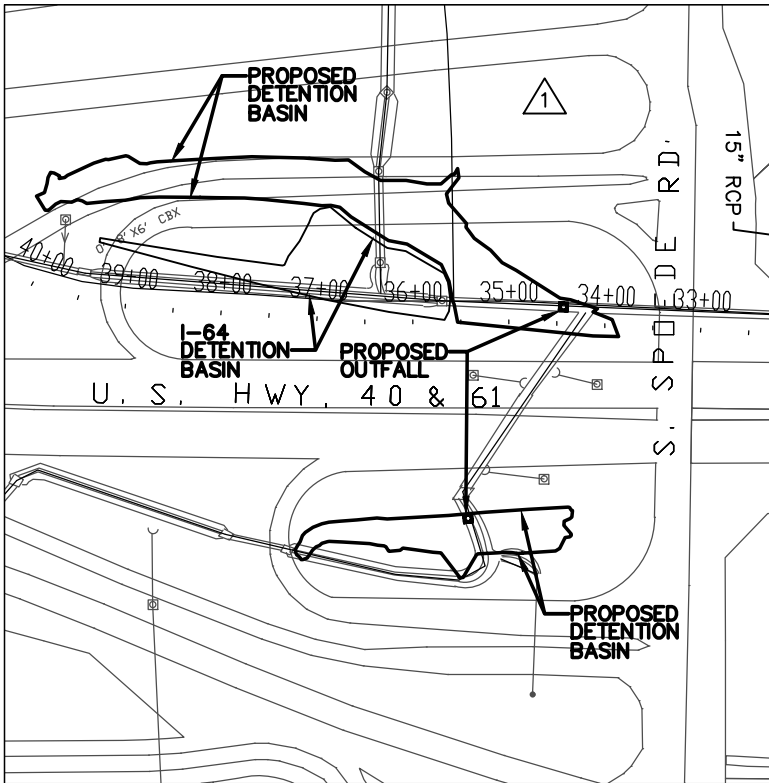
TOTAL COST IN THOUSANDS= **525**

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS= **0.76**

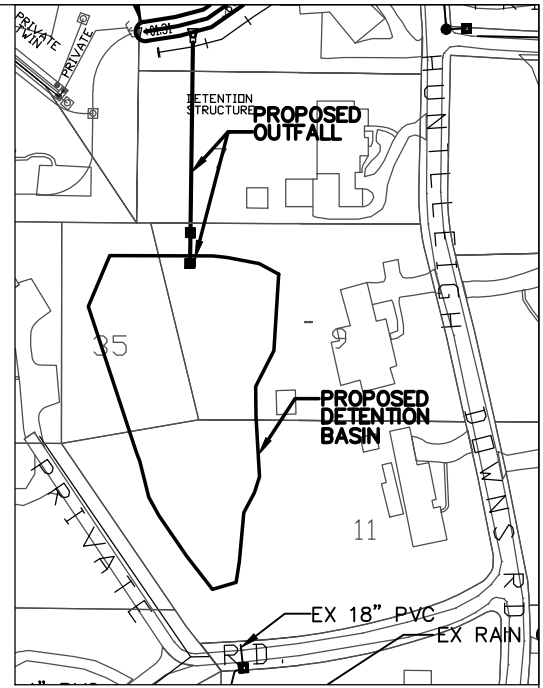
Place "X" in one box below:

MSD Project
 Project by Others

FIGURE 7-7 CHANNEL Alt 2

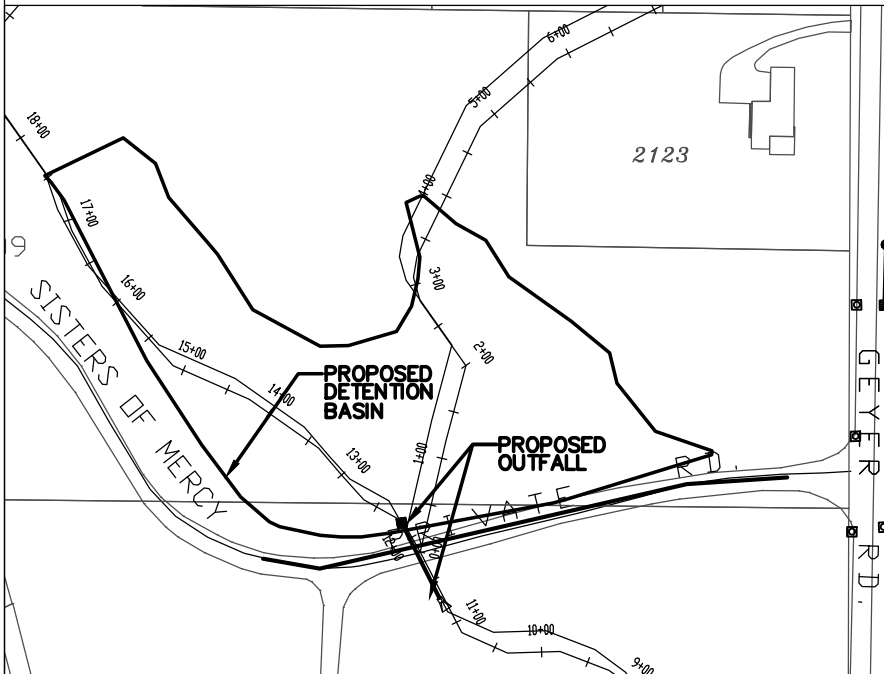


BASIN 1

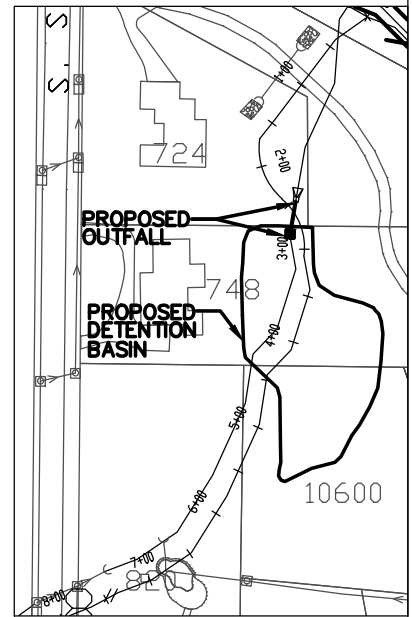


BASIN 2

BASIN 3



BASIN 4



CITY OF FRONTENAC STORMWATER SYSTEM MASTER IMPROVEMENT PLAN



220 Mansion House Center
 St. Louis, Missouri 63102
 Phone (314) 231-5485 Fax (314) 231-8167
 edm@edm-inc.com



0 200 400



SCALE

UPDATE NO. DATE
 1 11/12/08

FIGURE NO. 8-1

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 8-1 - BASIN 1
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard flooding and creek erosion downstream of Spoede and Interstate 64

Strategy: 1) Construct detention basins to reduce flow going through existing system

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's
Excavation - North Basin	CY	20000	\$18	\$360,000
Outfall Structure - North Basin	LS	1	\$10,000	\$10,000
Excavation - South Basin	CY	25000	\$18	\$450,000
Outfall Structure - South Basin	LS	1	\$10,000	\$10,000

Subtotal **\$830,000**

Total **\$830,000**

Utility Relocation		20%	\$166,000
Clearing		5%	\$41,500
Mobilization		4%	\$33,200

Total with Percent Allowances **\$1,070,700**

Contingency 25% \$267,675

Probable Construction Cost Estimate **\$1,338,375**

Design Engineering and Geotechnical 30% \$401,513

Total Conceptual Cost Estimate **\$1,740,000**

Total Benefit Points **320**

Total Benefit Point Ratio **0.18**

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 8-1 - Basin 1

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25		
		Basement (1 lot per structure) <i>Address:</i>	200		100		15		
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0		
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4		
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1			
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)							
		Habitable structures, residential (1 lot per structure) <i>Address:</i>	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	300		200		50		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot			
1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)									
Arterial Road: <i>Address:</i>		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots		
Collector Road: <i>Address:</i>	75		50		12				
Residential Road: <i>Address:</i>	35		25		6				
	20		12		3				

FIGURE 8-1-1 BASIN ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 8-1 - Basin 1

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10	0	6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:		5		
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20		
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		0	Points/lot:		10		
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age							0	
	TOTAL PROBLEM POINTS								

FIGURE 8-1-1 BASIN ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 8-1 - Basin 1

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY						
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	31.0%	Max points:	1000	310
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50	
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit		
	Bioswales*	0	PER 100 LF	10		
	Forebays		AC	200		
	Wet Ponds		AC	100		
	Wetlands		AC	50		
	Biostabilization of banks (per bank)		PER 100 LF	10		
	Riffle Pool Complex		PER 100 LF	10		
	4.2. Eliminates combined sewer (per project)		EA	100		
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10			
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)	
	Points for Easements					10
	5.2. Recreational/Educational	Yes = 100, no = 0 pts				
TOTAL SOLUTION POINTS						320
TOTAL BENEFIT POINTS						320

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

1740

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.18

Place "X" in one box below:

	MSD Project
	Project by Others

FIGURE 8-1-1 BASIN ALT 1

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 8-1 - BASIN 2
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard flooding and creek erosion downstream of Huntleigh Downs Rd.

Strategy: 1) Construct detention basins to reduce flow going through existing system

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's
Excavation - North Basin	CY	10028	\$18	\$180,504
Outfall Structure - North Basin	LS	1	\$30,000	\$30,000
Subtotal				\$210,504
Total				\$210,504
Utility Relocation			20%	\$42,101
Clearing			5%	\$10,525
Mobilization			4%	\$8,420
Total with Percent Allowances				\$271,550
Contingency			25%	\$67,888
Probable Construction Cost Estimate				\$339,438
Design Engineering and Geotechnical			30%	\$101,831
Total Conceptual Cost Estimate				\$442,000
Total Benefit Points				570
Total Benefit Point Ratio				1.29

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 8-1 - Basin 2

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25		
		Basement (1 lot per structure) <i>Address:</i>	200		100		15		
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0		
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4		
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1			
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)							
		Habitable structures, residential (1 lot per structure) <i>Address:</i>	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	300		200		50		
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot			
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
Arterial Road: <i>Address:</i>		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots		
Collector Road: <i>Address:</i>	75		50		12				
Residential Road: <i>Address:</i>	35		25		6				
	20		12		3				

FIGURE 8-1-2 BASIN ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 8-1 - Basin 2

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10	0	6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:	0	Points/pond:	5				
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:	20				
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:	0	Points/lot:	10				
	2.4. Age of Existing System	>50 yrs (30 pts)	26-50 yrs (15 pts)	<25 yrs (0 pts)					
	Points for Age							0	
	TOTAL PROBLEM POINTS								

FIGURE 8-1-2 BASIN ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 8-1 - Basin 2

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY						
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	55.0%	Max points:	1000	550
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50	
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit		
	Bioswales*	0	PER 100 LF	10		
	Forebays		AC	200		
	Wet Ponds		AC	100		
	Wetlands		AC	50		
	Biostabilization of banks (per bank)		PER 100 LF	10		
	Riffle Pool Complex		PER 100 LF	10		
	4.2. Eliminates combined sewer (per project)		EA	100		
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10			
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)	
	Points for Easements					20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts				
TOTAL SOLUTION POINTS						570
TOTAL BENEFIT POINTS						570

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

442

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.29

Place "X" in one box below:

	MSD Project
	Project by Others

City of Frontenac
Stormwater System Master Improvement Plan
CONCEPTUAL LEVEL ANALYSIS

Project Name: FIGURE 8-1 - BASIN 3
Solutions By: EDM INC. **DATE:** 10/18/2013

Problem: Yard flooding and creek erosion downstream of Sisters of Mercy

Strategy: 1) Construct detention basins to reduce flow going through existing system

Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's
Excavation	CY	27981	\$18	\$503,658
Outfall Structure	LS	1	\$25,000	\$25,000
Raise Existing Road	LS	1	\$25,000	\$25,000

Subtotal **\$553,658**

Total **\$553,658**

Utility Relocation		20%	\$110,732
Clearing		5%	\$27,683
Mobilization		4%	\$22,146

Total with Percent Allowances **\$714,219**

Contingency 25% \$178,555

Probable Construction Cost Estimate **\$892,774**

Design Engineering and Geotechnical 30% \$267,832

Total Conceptual Cost Estimate **\$1,161,000**

Total Benefit Points **170**

Total Benefit Point Ratio **0.15**

Additional Comments: Unit prices based on MSD Unit Prices January 2006 Construction Costs
 Conceptual Cost are rounded to the nearest \$1000

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 8-1 - Basin 3

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25		
		Basement (1 lot per structure) <i>Address:</i>	200		100		15		
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0		
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4		
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1			
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)							
		Habitable structures, residential (1 lot per structure) <i>Address:</i>	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	300		200		50		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot			
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Arterial Road: <i>Address:</i>	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
Collector Road: <i>Address:</i>	75		50		12				
Residential Road: <i>Address:</i>	35		25		6				
	20		12		3				

FIGURE 8-1-3 BASIN ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 8-1 - Basin 3

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10	0	6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:	0	Points/pond:	5				
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:		Points/lot:	20				
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:	0	Points/lot:	10				
	2.4. Age of Existing System	>50 yrs (30 pts)	26-50 yrs (15 pts)	<25 yrs (0 pts)					
	Points for Age							0	
	TOTAL PROBLEM POINTS								

FIGURE 8-1-3 BASIN ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 8-1 - Basin 3

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY						
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	15.0%	Max points:	1000	150
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50	
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit		
	Bioswales*	0	PER 100 LF	10		
	Forebays		AC	200		
	Wet Ponds		AC	100		
	Wetlands		AC	50		
	Biostabilization of banks (per bank)		PER 100 LF	10		
	Riffle Pool Complex		PER 100 LF	10		
	4.2. Eliminates combined sewer (per project)		EA	100		
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10			
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)	
	Points for Easements					20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts				
TOTAL SOLUTION POINTS						170
TOTAL BENEFIT POINTS						170

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

1161

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.15

Place "X" in one box below:

MSD Project
 Project by Others

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 8-1 - Basin 4

DATE: 10/18/2013

PROBLEM CATEGORY		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
1.0 STREAM	1.1. FLOODING	1.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) <i>Address:</i>	300		150		25		
		Basement (1 lot per structure) <i>Address:</i>	200		100		15		
		Attached Garage (1 lot per structure) <i>Address:</i>	100		50		8		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
		Yard Flooding (1 per lot) <i>Address:</i>	10		5		0		
		1.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
		Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		25		4		
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		12		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		5		1			
	1.2. EROSION	1.2.1. Threatening Structure (Ratio=Height of bank / distance from structure)							
		Habitable structures, residential (1 lot per structure) <i>Address:</i>	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	300		200		50		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	150		100		25		
		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
		1.2.2. No. of lots (from 1.2.1) on outside of bend			lots	10 points per lot			
		1.2.3. Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
Arterial Road: <i>Address:</i>		Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots		
Collector Road: <i>Address:</i>	75		50		12				
Residential Road: <i>Address:</i>	35		25		6				
	20		12		3				

FIGURE 8-1-4 BASIN ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 8-1 - Basin 4

DATE: 10/18/2013

CONTINUED:

	PROBLEM CATEGORY, CONT.	Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		Total Points	
		Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected		
2.0 STORM SEWER / OVERLAND FLOW	2.1. FLOODING	2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)* <i>Address:</i>	250	0	200		50		
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
		Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		35		12		
		Yard Flooding (1 per lot) <i>Address:</i>	10	0	6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
	Traffic obstruction (> 6" of water) on arterial street <i>Address:</i>	50		35		6			
	Traffic obstruction (> 6" of water) on collector street <i>Address:</i>	25		15		2			
	Traffic obstruction (> 6" of water) on residential street <i>Address:</i>	10		6		1			
	Ponding (per ponding area) <i>Address:</i>	No. Ponds:		0	Points/pond:		5		
	2.2. Moderate Risk Erosion of misc. structures <i>Address:</i>	No. Lots:			Points/lot:		20		
	2.3. Yard Erosion (1 per lot) <i>Address:</i>	No. Lots:		0	Points/lot:		10		
	2.4. Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
	Points for Age							0	
	TOTAL PROBLEM POINTS								

FIGURE 8-1-4 BASIN ALT 1

MSD Stormwater Projects Prioritization System
Revised Benefit Points Allocation Schedule

PROJECT NAME: Figure 8-1 - Basin 4

DATE: 10/18/2013

CONTINUED:

SOLUTION CATEGORY						
3.0 REGIONAL	3.1. Reduction of flowrate leaving site	% reduction of peak flowrate :	32.0%	Max points:	1000	320
	3.2. Combines smaller projects into regional solution (see note)	No. Add'l Projects:	0	Points per Add'l Proj.:	50	
4.0 ENVIRONMENTAL / WATER QUALITY	4.1. Addresses pollutants:	No. Units		Points per Unit		
	Bioswales*	0	PER 100 LF	10		
	Forebays		AC	200		
	Wet Ponds		AC	100		
	Wetlands		AC	50		
	Biostabilization of banks (per bank)		PER 100 LF	10		
	Riffle Pool Complex		PER 100 LF	10		
	4.2. Eliminates combined sewer (per project)		EA	100		
4.3. Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA	10			
5.0 MISC.	5.1. Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)	11-15 (5 pts)	>15 (0 pts)	
	Points for Easements					20
	5.2. Recreational/Educational	Yes = 100, no = 0 pts				
TOTAL SOLUTION POINTS						340
TOTAL BENEFIT POINTS						340

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

232

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.47

Place "X" in one box below:

	MSD Project
	Project by Others