Hey and Associates,	Inc	
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Appendices



Crystal Lake 2007 Flooding Analysis

City of Crystal Lake

April 1, 2008

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Introduction

The Crystal Lake area experienced some of the heaviest rain fall totals in its recorded history in the summer of 2007. As a result of heavy rain totals, several areas in the City experienced flooding. Some flooding situations were isolated incidents that could be tied to a specific problem, such as maintenance needed on a drainage structure. However, there were some occurrences of flooding that were larger in scale, affecting many different properties and were part of a system wide inadequacy for storm water management.

As the City was preparing for its fiscal year 2009 budget, funds were identified and set aside to study the City's flooding issues. With the funds, the City will retain a storm water engineering consultant to study the flooding issues and to make recommendations on how to mitigate future flooding. In order to effectively study the flooding issues, the consultant will be provided some guidance on what exactly to study. This report will analyze the complaints that the City received and will recommend a prioritization so that the most problematic areas will be addressed first.

Severity of Rainfall

In the three month period of June through August of 2007, Crystal Lake received at least 22.03 inches of rain. 10.83 inches of that rain was received in August alone, with two separate days of rainfall totals of over two inches in 24 hours. The average rainfall for August in Crystal Lake is 4.21 inches. The average five year recurrences interval for 30 days is 9.53 inches of rain, which is more than what Crystal Lake received in August. The average five hundred year recurrence interval for 60 days is 20.77 inches of rain, which is about the amount of rain that Crystal Lake received in three months, or about 90 days.



Flooding on North Shore Drive

Complaints

The City received over 120 complaints during August of 2007, when the flooding issues were the most severe. These types of complaints can be broken down into three different issues: surface flooding, subgrade structure flooding, and sanitary sewer backups. A table of complaints is included in the appendix for reference.

Surface Flooding

Surface flooding is the most common and problematic form of flooding, affecting the most residents. This summer's surface flooding was so severe that North Shore Drive was closed and a temporary detour route to Woodland Drive had to be This flooding incident cost the City a considerable amount in terms of manpower. equipment costs, and materials. This form of flooding was the most severe because of the potential of injury to the public, the increased area for insect breeding, and the property damage that the water can cause. Most of the flooding experienced in 2007 based on the number complaints was surface flooding.



Construction of the North Shore Detour

Subgrade Structure Flooding

Subgrade structure flooding was the second most common flooding problem in 2007. The result of subgrade structure flooding is standing water in basements, which can cost a homeowner a significant amount in damages and inconvenience. While the overall danger to the public is not very great, it can be very disruptive to the homeowner that experiences it. This type of flooding is most commonly caused by issues with a sump pump. Usually the sump pump malfunctioned, there was a power outage with now battery backup, or the pumpwas not designed to handle the volumes of water that were required of it during this heavy rain fall period.

Sanitary Sewer Backup

The City received several complaints about sanitary sewer backup during this period of flooding. Similar to subgrade structure flooding, this can cause significant damage to a residential basement. This poses the same overall risk to the public as subgrade structure flooding. However, it appears that the area immediately southeast of Crystal Lake Main Beach experienced a significantly higher rate of sanitary sewer backup issues.

Analysis of Flooding Complaints

The flooding complaints were mapped using GIS tools to accurately show where flooding issues were most severe and to identify and prioritize areas for further study. When complaints were plotted on a map, trends emerged, and more effective analysis and prioritization was accomplished. Some problems are systemic, which will require a much more extensive study, while others are maintenance related, such as instances of detention pond flooding. Not surprisingly, most of the complaints were focused around Crystal Lake.

This area has long been known to have issues with drainage, and the elevated rain totals exacerbated the problems.

When prioritizing drainage complaints, several factors were considered. Emphasis was placed on the number of complaints in a compact geographical area, the area affected by the problems, as well as systemic drainage issues. The City received many flooding complaints and therefore must prioritize the complaint areas. The City willt focus on areas where there is a benefit to many of Crystal Lake's citizens as possible.

Priority 1: Cove Pond Subwatershed

The area that drains into cove pond, which is a subwatershed to the Crystal Lake Watershed, was significantly affected by the large amount of rainfall. This area alone is a significant part of the City, including several residential neighborhoods and part of the Virginia Street commercial corridor. Normally, there is a significant amount of water that flows through this area, and it alone contributes about seventeen percent of the lake's total water volume.

Cove Pond was reconstructed in the late 1980's as a way to help with the flooding issues that were in the area, and to help filter the water before it drained to Crystal Lake. The Cove Pond watershed is over 640 acres.



Flooding Complaints in the Cove Pond Subwatershed

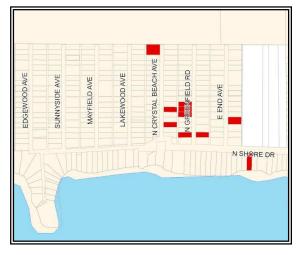
There have long been issues documented with the drainage in this area. There are well known issues with flooding in back yards along Oriole Trail, and the residents of Woodland Drive have been very vocal in their displeasure with the drainage in their neighborhood. The parcel known as the Hahn property is also known as being very flood prone. All of these areas experienced significant flooding issues in 2007, including the flooding of several streets and private property.

This area was chosen as the highest priority due to receiving the highest number of complaints; twenty-nine were received in all. Over one-hundred residents would benefit from an area wide drainage improvement that would mitigate flooding issues in the area.

Priority 2: North Shore Residential Area

The residential area directly north of Crystal Lake is known as the North Shore. It is a residential area that was historically vacation homes, but is now a full time residential area. At the time it was annexed into the City, City utilities were extended to the area, but no significant drainage improvements were made. Most of its storm water drains directly into Crystal Lake, either through runoff or antiquated and inadequate storm sewer pipe.

The flooding issues in this area are well known and documented. The soils in this area are poorly suited to aid drainage, and are almost marshy in some areas. There are several vacant parcels of



Flooding Complaints in the North Shore Area

land that are known to have regularly standing water. A drainage study was completed in the mid-1990's, however, its recommendations were not implemented. This warrants further study. Many of the complaints were regarding standing surface water, rather than basement flooding or sewer backups. A total of ten recorded complaints were received by the City. There is also the possibility to increase the quality of storm water which this area contributes to Crystal Lake.

Priority 3: West End Residential Area

The residential area known as the West End is similar in nature to the North Shore. It was an area that was primarily vacation homes and since has been converted to a full-time residential neighborhood. There is no comprehensive drainage system for this area. For the most part, storm water collects in isolated pockets and percolates into the ground.

The City received eight complaints about flooding during the heavy summer 2007 rains. The breakdown of flooding types is split evenly between standing surface water and basement flooding. One instance of surface flooding was caused by one resident's overactive sump pump extracting so much water that it caused the standing surface water on a neighboring property.



Flooding Complaints in the West End Area

The need for a comprehensive drainage study for this area is not as critical because there are typically not the number of surface drainage issues that the North Shore experiences.

Priority 4: South Lake Sanitary Sewer

An additional problem was discovered when analyzing the data. There were ten complaints regarding sanitary sewer backups in the area bounded by Broadway Avenue, Meridian Street, Country Club Road, and Riverside Drive, with an additional complaint from a residence on nearby Edgebrook Drive. This would seem to indicate that there is some problem with the sanitary sewer capacity in this area that is compounded by the high level the lake. While a storm water

drainage analysis is most likely not warranted, it is a significant problem that should be further studied by Public Works.



Flooding Complaints in the South Lake Area

Priority 5: Detention Pond Maintenance

Developers in Crystal Lake have used detention and retention ponds throughout the City to help manage storm water in accordance with City ordinances. Once the development was completed most storm water management facilities are then dedicated to a homeowner's association (HOA) for perpetual maintenance. Most, if not all, covenants that establish HOAs contain language that states if the drainage facilities were not maintained, the City can make any necessary repairs and recoup the costs from the HOA.

Several of the flooding complaints were related to detention ponds. The following subdivisions/areas experience flooding issues due to detention ponds:

- Bentwood Estates
- Skyridge Club Apartments
- Ken Bird Park
- Hunter's South
- Crystal Ridge
- Indian Hills Trails
- Hunter's Ridge

Recommendations

1. The City should consider retaining a consultant to study the flooding issues

The Engineering Division should oversee the selection of a qualified storm water consultant to further analyze the storm water issues that were discussed above. The Engineering Division should direct the consultant to examine the selected drainage issues as prioritized in this report and as the budget allows.

2. The City should investigate sanitary sewer backups in the residential neighborhoods south of the lake.

One of the more interesting findings of the flooding complaint analysis was the number of sanitary sewer backups that were concentrated in the area south of Crystal Lake. An investigation should be initiated to determine if this rash of flooding was caused by the heavy rains, and if this can be prevented in the future.

3. The City should perform routine inspections of private detention ponds.

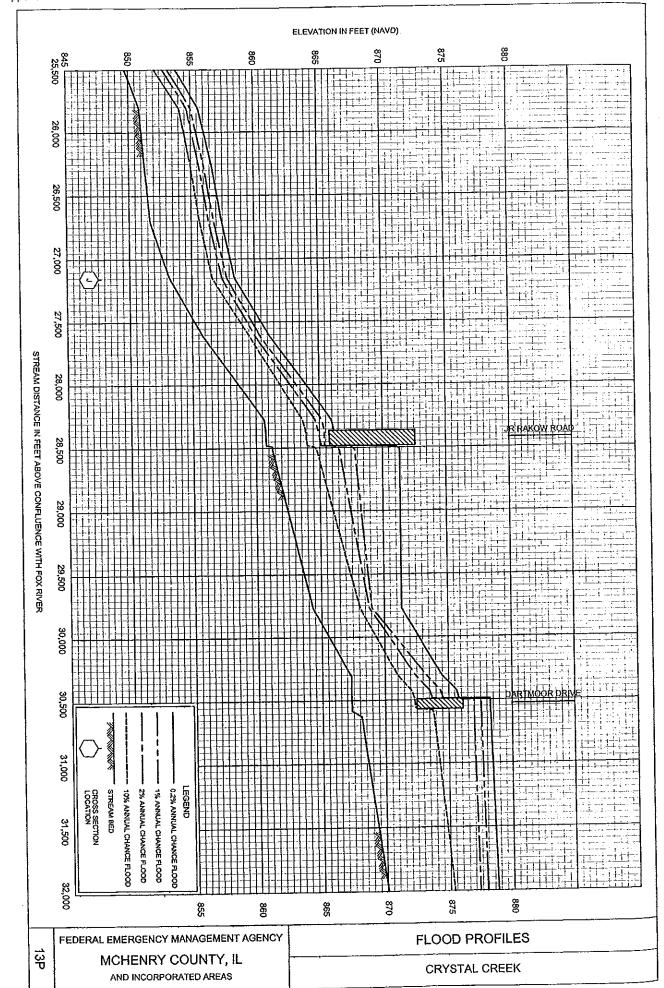
The City has relied upon the associations to properly maintain these detention ponds. However, this approach may not be effective, as seen from the number of detention ponds that overflowed with the heavy rain events in the summer of 2007. While the detention ponds are not owned by the City, when they do not function properly, residents typically complain to the City. If the City has knowledge of a potential problem with detention pond operation, the City can notify the appropriate association, which may remedy the issue before it becomes a problem.

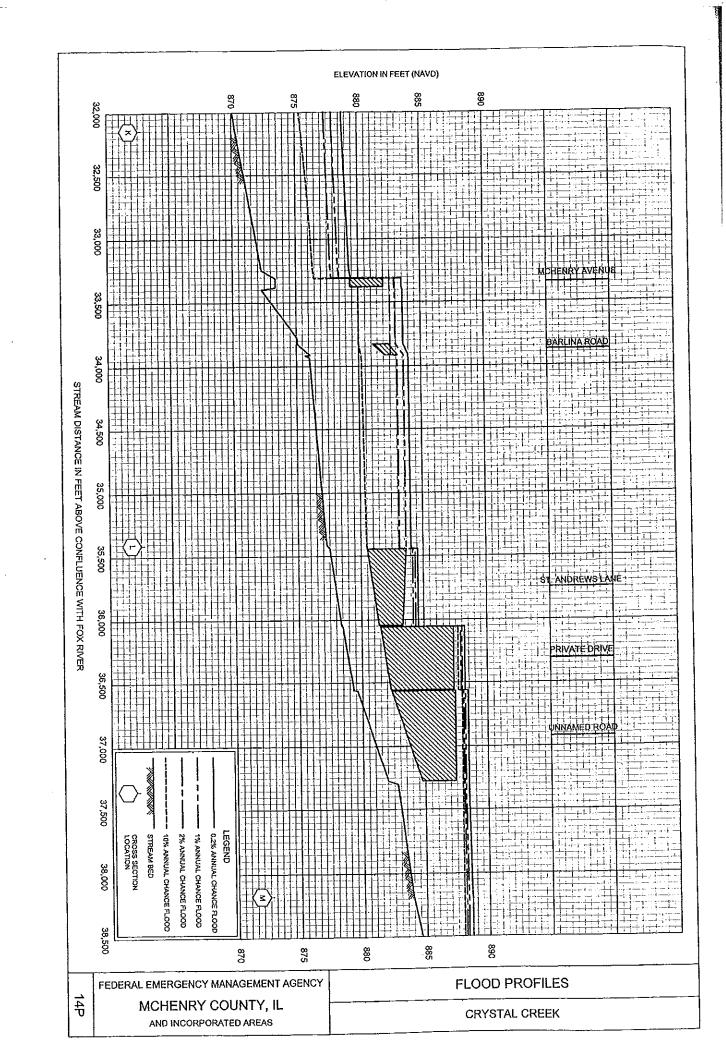
Appendix 1: List of Flooding Complaints

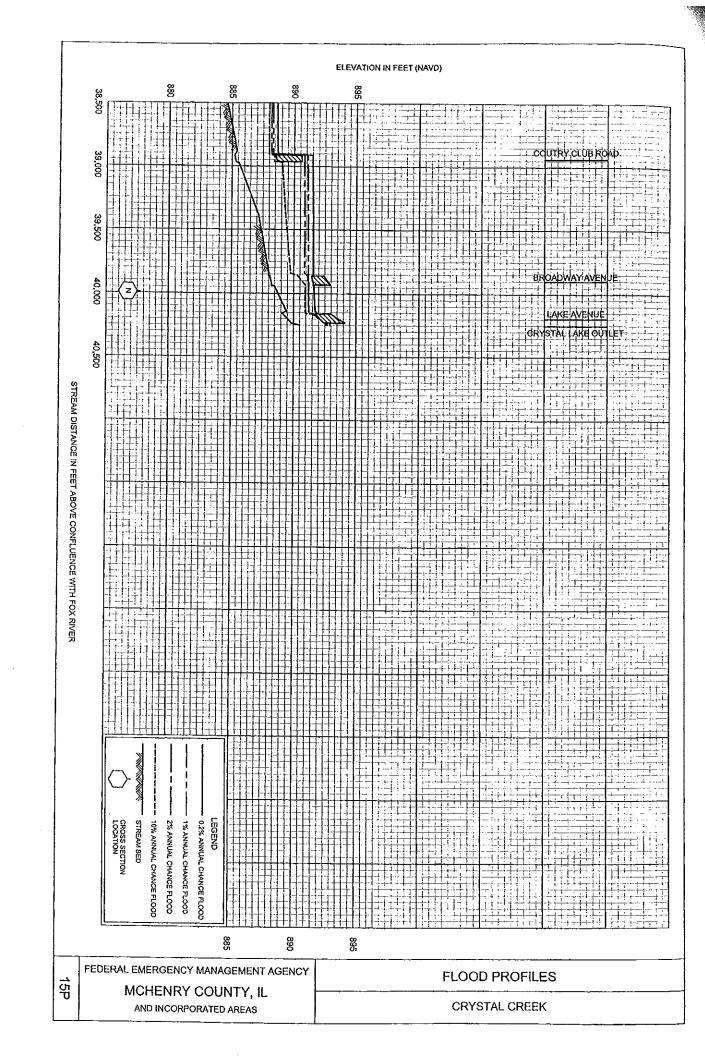
	North Shore Area	
100 Crystal Beach Ave	same	Standing water in yard
	same	
	same	Water in basement
144 N. Greenfield	same	Standing water in yard
148 N. Greenfield	same	Standing water in yard
152 Greenfield	same	Standing water in yard
170 N. Greenfield	same	Standing water in yard
171 N. Greenfield	same	Standing water in yard
159 East End	same	Standing water in yard
947 North Shore Dr	same	Water in Craw I Space
		Standing water in yard
	same	Standing water in yard
	State Farm property detention area	
131 North Virginia	same	Standing water in yard
	Hahn Property pond	Standing water in yard
	same	
	same	San. Sew er backup
•	same	Basement Flooding
	same	Basement Flooding
	same	Basement Flooding
854 North Shore	same	Standing water in yard
???	803 North Shore	Standing water in yard
???	811 North Shore	Standing w ater in yard
807 North Shore Drive	808 Northshore	Standing water in yard
811 Northshore	816 Northshore	Standing water in yard
794 Northshore	same	Standing water in yard
780 North Shore Dr	same	Standing water in yard
807 North Shore Drive	same	Standing water in yard
785 North Shore Drive	same	Flooded basement
740 Woodland	same	Street Flooding close to house
700 Woodland	same	
701 Woodland Drive	same	Flooded House
610 Woodland	same	
505 W. Crystal Lake Ave	Oriole Trail Rear Yards	Standing water in yard
489 West Crystal Lake Ave	Oriole Trail Rear Yards	Standing water in yard
25 S. Virginia	same	Basement Flooding
	Oriole Trail Rear Yards	Water coming in through drain
25 S. Oriole Trail	same	Basement Flooding
591 Woodland Drive		Standing water in yard
	3.00	- tannaming in another your
	West End	
364 Corrine Ave	same	Sanitary backup into basement
1338 North Avenue	same	Yard flooding due to neighbor pumping
1370 North Avenue	same	Overactive sump pump
1324 Snow berry	same	Standing water in yard
1344 Snow berry	same	Standing water in yard
		Standing water in yard
		Basement, Yard flooding
		Sanitary backup into basement
1	- · · · ·	Standing water in yard
	153 Crystal Beach 87 Crystal Beach 144 N. Greenfield 148 N. Greenfield 152 Greenfield 170 N. Greenfield 171 N. Greenfield 159 East End 947 North Shore Dr Cove Pond Watersh 59 Sycamore 632 Green Oaks Dr ??? 131 North Virginia 132 North Virginia 132 North Virginia 490 W. Crystal Lake Ave. 490 W CL Ave 486 W. Crystal Lake Avenue 468 W. CL Avenue 820 North Shore Drive 854 North Shore Drive 872? 807 North Shore Drive 811 Northshore 794 Northshore 794 Northshore 795 North Shore Drive 780 North Shore Drive 785 North Shore Drive 785 North Shore Drive 740 Woodland 700 Woodland 701 Woodland 701 Woodland 505 W. Crystal Lake Ave 489 West Crystal Lake Ave 489 Woodland 505 W. Crystal Lake Ave 489 Woodland 505 W. Crystal Lake Ave 489 West Crystal Lake Ave 489 Woodland 505 W. Crystal Lake Ave 489 Woodland 505 W. Crystal Lake Ave 489 West Crystal Lake Ave 489 West Crystal Lake Ave 489 Woodland Drive	100 Crystal Beach Ave same 153 Crystal Beach same 37 Crystal Beach same 37 Crystal Beach same 144 N. Greenfield same 152 Greenfield same 152 Greenfield same 152 Greenfield same 170 N. Greenfield same 171 N. Greenfield same 171 N. Greenfield same 179 N. Greenfield same 179 N. Greenfield same 179 North Shore Dr same 179 Sycamore City property behind his 632 Green Caks Dr same 179 State Farm property detention area 179 North Virginia same 179 North Shore Drive same 170 Woodland same 170 Woodland same 170 Woodland Drive same 170 North Shore Drive same 170 Nor

Name	Address	Location	Complaint Type
	•	South Lake	
Judy Zembow ski	901 Broadw ay	same	Flooded basement
Terry Blum	471 Merdian	same	
Judy/Amy	481 Meridian	same	Basement Flooding
Don Jarva	491 Meridian	same	San. Sew er Backup
Lynn Thillman	460 Melrose Gate 10	same	San. Sew er Backup
Sally Davidson	460 Cumberland	same	Basement Flooding
Lois Edward	779 Broadw ay	same	Drain Backup?
John Edw ards	779 Broadway	same	San. Sew er Backup
Ms. Johnson	440 Riverside Dr	same	Basement Flooding
Ed Wedeking	500 Riverside	same	Standing water In yard
Bob Fugate	496 Edgebrook	same	Basement Flooding
David W. Skjerven	615 Edgebrook	same	Standing water in yard?
,	, and the second		· ·
		Other	
Jennif er	90 Talcott	Across from Hannah Bearsley School	Standing Water in yard/street
Gary Komosa	60 Katherine Ct	same	Water coming in through drain
???	???	95 Oak Street	
Christine Kernes	???	122 Marian Pkw y	
???	???	45 S. Williams	
Carl	???	Skyridge Apartments	
Julie Marchek	Ackman	Pond w est of Skyridge on Ackman	Pond Overflowing
Glen Anderl	1246 Knollw ood	same	Steady river of water from underneath?
Resident	640 Coventry	same	Sanitary Sew er Backup
Mary McFarland	625 Bedford	same	Standing water in yard
Scott Benson	816 Glendale	same	Water in basement
Mr. George Nejmeh	675 Tamarisk	same	Flooded basement
Robert Arw ood	479 Brook Drive	same	Basement Flooding
Rick	257 Dole	same	Overactive sump pump
Mary Ottendorf	211 Sunset Terr	same	Drain not draining
???	???	32 S Walkup (Park Distirct Entrance)	Standing water in street
Steve Young	166 Maple Street	same	Water in basement
Tom Eibel	1799 Deerhaven	Ken Bird Park	Clogged Drain causing flooding
Beth - park District	1799 Deerhaven	Ken Bird Park	Clogged Drain causing flooding
Rebacca Baker	1198 Village Road	Same	Flooding in basement
Melody	Harper & Williamsburg	Hunter's South Detention Pond	Clogged pipes
Paula	Williamsburg	Hunter's South Detention Pond	Clogged pipes
Stephanie Prescar	980 Ridgew ood Lane	same	Flooded basement, drivew ay
Brian w / Greenstone Landscaping	801 Wedgew ood	same	Standing water in yard
???	???	7209 Huntley Road	
Charles K. Ebann	Wedgew ood HOA	499 Huntley	Pumping w ater to neighboning property
Dan McKnight	370 E Prairie St	same	Standing water in yard
PJ Peterson	365 E. Terra Cotta Avenue	same	Standing water in parking lot
Lee Jensen Co.	101 W. Terra Cotta	same	Standing water in partiting let
???	???	333 Woodstock Street	1
Debbie Pera	54 E Terra Cotta	same	Flooding in basement
Reginia Jamison	504 Spring Ridge Drive	Crystal Ridge retention basin	pond was holding water
???	???	IHT detention pond	Pond was nothing water
???	???	Talcott Subdivision	+
	1210 Country Club Rd		Saw or backup
Carrie Murphy		NOT IN THE CITY - LAKEWOOD NOT IN THE CITY - LAKEWOOD	Sew er backup
Lena Kalemba	346 Cumberland	I .	Basement Flooding
Chuck Turner	1215 Broadw ay	NOT IN THE CITY - LAKEWOOD	Flooded house
		<u>L</u>	

Name	Address	Location	Complaint Type
	<u> </u>	Road Flooding Areas	
???	???	30-46 McHenry Ave: Low area near Library	
???	???	Intersections of McHenry and Union	
???	???	Intersection of McHerny and Oriole Trail	
???	???	Street in front of 93 Elmhurst	
???	???	Intersection of Route 14 and Keith/Devonshire	
???	???	Street in front of 358 College	
???	???	Street in front of 333/344 Woodstock Street	
???	???	Street in front of 91 Oak Street	
???	???	Street in front of 1291 North Avenue	
???	???	Ridge Ave	
???	???	Highland & Edgebrook	
Linda Potas	???	Intersection of Huntley and Autumn	
Cindy Urcart	???	Kent Street & Crystal Lake Avenue	Water standing in road
Luanne Slavin	???	Union & Mary Ln	Clogged storm drains?
???	???	Green Oaks Drive area	
Mark BeBrovick	811 North Shore	North Shore Drive	
Randy Welton		Oakwood Lane (Randy Welton)	Water standing in road
???	???	Fairview and Crystal Lake Avenue	
???	???	Oriole Trail and Crystal Lake Avenue	
???	???	Uteg & College	
Caroline Schofield	1520 Crandon Ct	Hunters Ridge and Crandon	Water standing in road
Rich Teise	1544 Crandon Pl	Hunters Ridge and Crandon	Water standing in road
			Sink hole formed near here
Resident	288 Peterson Pkw y	Peterson Pkw y and Route 176	and filled w/w ater







	nates	a 1A						Area 1B									Area 1C										Area 3								let and Crystal C
	Are	a 1A				Improve		New Culverts	Open Chan	nol Cu	lvert from	Re-Route	Was	odland			Area 1C				Area 2 Replace	New Lippol	d Do	pair CLDD	Po I	-Route	Area 3	Cno	wberry	- Cne	wberry	Area 4 Repair/Rep	nlace	Increase	et and Crystal C
	No	/ Hovne	Repair		New Storm	Overlan		I Inder	Northshore			Northshore		m Sewer	Add Sto	rano	Pine Relief	Pine I	Pumping		Greenfield	Field Tile		eral 1		pold	Floresta	Pum	ning		ake	Area 4 Sto		Lake Outle	
		d Tile	Hovne Tile		Sewer	Route	•	Northshore	Lake			Drive		ake	to Cove		Sewer	Statio			Drainage	ricia riic		11A		tention	Drain Tile	Stati			vity Drain	Sewers	****	Capacity	-
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Granular Import and Placement	CY 20	0	0	0 0	1800	36000	0 0	25	500	500 10000	500 10000	4255	85100	25	500	0	0 100	2000	100	2000	0	0	0 0	0	0	0 0	200	4000	1000	20000	500 10	J000	500 100	000	500
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Utility Replace	LF 25	100	2500 10	0 2500	100	2500 1	00 2500	100		100 2500	100 2500	400	10000	100	2500	200 500	0 300	7500	300	7500	1000 250	00	0 0	1000	25000	0 0	300	7500	300	7500	300 7	/500	1000 250	.000	300
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Pavement Repair	LS 15000	0	0	0 0	0	0	0	1	15000	1 15000	1 15000		0	0	0	0	0 2	30000	2	30000	3 450	00	0 0	0	0	0 0	2	30000	2	30000	2 3	0000	4 600	.000	2
New Pavement																																			
Surface Course 1.5"	Ton 60	0		0	0		0					280	16800			0	0		0																
Binder 1.5"	Ton 50	0		0	0		0					280	14000			0	0		0																
Bit. Agg. 8"	Ton 40	0		0	0		0					1465	58600			0	0		0																
CA6 3"	Ton 20	0		0	0		0					550	11000			0	0		0																
Pavement Removal	SY 25	0		0	0		0					4200	105000			0	0		0																
Restoration and Seeding	SF 0.25	5000	1250 500	0 1250	40000	10000 400	00 10000	500	125	10000 10000	10000 2500	40000	10000	1000	250	1300000 32500	0 10000	2500	10000	2500	20000 50	00 80	20000	40000	10000	40000 10000	10000	2500	10000	2500	10000 2	2500	40000 100	.000	10000
Pumping Station	LS 25000																		1	25000									1						
Sub-Total		42	2750	42750		126000	86500		78125	74500	164500		458600		26250	458250	0	109500		134500	2190	00	87000		94500	52000)	102000	1/	158750	153	3750	9470	000	
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Wetland Delineation	LS 3000		3000	3000		3000	3000		3000	3000	3000		3000		3000	1000	0	1000		1000	30	00	3000		3000	3000)	3000		3000	?	3000	30	J00	
Floodplain BFE	LS 0		0	0		0	C		0	0	0		5000		0		0	0		0		0	0		0	()	0		0		0		0	
Permits (COE, IEPA, IDNR)	LS 5000		5000	5000		5000	5000		5000	5000	5000		15000		5000	5000	0	3000		3000	50	00	5000		5000	5000)	5000		5000		5000	50	J00	
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(1) Does not include compen	satory storage																																		

Appendix C Conceptual Cost Est	motoc						I					
Appendix C Conceptual Cost Est	illiales		Area 1A									
			Alea IA						Improve			
			New Hoyne		Repair		New Storm		Overland			
			Field Tile		Hoyne Tile		Sewer		Route			
Alternative			Tield Tile		2		3ewei		Koule 4			
Alternative			1				3		4			
Item	Units	Unit Cost	Amount	Total	Amount	Total	Amount	Total				
item	Ullita	Onit Cost	Amount	TOtal	Amount	Total	Amount	Total				
Easements	LS	5000	0	0	0	0	0	0	0	0		
Clearing	acres	2000		4000	_	4000	_		2	4000		
Excavation and Disposal	CY	20		0.000		0			1500	30000		
Granular Import and Placement	CY	20		0		0				0		
New Manhole Installed	LS	2500		10000		10000				10000		
Culvert 7x2 (2)	LF	250		0		0			0	0		
Storm Sewer	LF	50		0		0				0		
New Field Tiles (4"-12")	LF	10		15000	-	15000	-		_	15000		
Utility Replace	LF	25		2500		2500	100		100	2500		
Soil Erosion Control	LS	Varies	10000	10000	10000	10000	15000			15000		
Pavement Repair	LS	15000		0		0				0		
New Pavement												
Surface Course 1.5"	Ton	60	0		0		0		0			
Binder 1.5"	Ton	50	0		0		0		0			
Bit. Agg. 8"	Ton	40	0		0		0		0			
CA6 3"	Ton	20	0		0		0		0			
Pavement Removal	SY	25	0		0		0		0			
Restoration and Seeding	SF	0.25	5000	1250	5000	1250	40000	10000	40000	10000		
Pumping Station	LS	25000										
Sub-Total				42750		42750		126000		86500		
Contingency		20%		8550		8550		25200		17300		
Total Construction				51300		51300		151200		103800		
Engineering		12%		6156		6156		18144		12456		
Wetland Delineation	LS	3000		3000		3000		3000		3000		
Floodplain BFE	LS	0		0		0		0		0		
Permits (COE, IEPA, IDNR)	LS	5000		5000		5000		5000		5000		
(1) Does not include compensatory	storage											

Appendix C Conceptual Cost Es	timates														
- Files			Area 1B												
			New Culv	erts	Open Cha	annel	Culvert fro	om	Re-Route		Woodland				
			Under					Northshore Northshore			Storm Sewer		Add Storag	ae	
			Northsho	re	Lake		to Lake				to Lake			ond	
Alternative			6		6A		6B		7		With 6 or 7		9	1	
Item	Units	Unit Cost	Amount	Total	Amount	Total	Amount	Total	Amount	Total	Amount	Total	Amount	Total	
Easements	LS	5000	0	0	1	5000	0	-	5000	5000		5000			
Clearing	acres	2000	0	_	1	2000	1	2000	1	2000	0.25	500	30	60000	
Excavation and Disposal	CY	20	1000		1000	20000		20000	5555	111100		10000		4160000	
Granular Import and Placement	CY	20	25		500	10000	500	10000	4255	85100	25	500	0	0	
New Manhole Installed	LS	2500	2		0		-	7500		0	2	2500		_	
Culvert 7x2 (2)	LF	250	100		20	5000			60	15000		0		12500	
Storm Sewer	LF	50	0	0	0	0		-		0	-	0	0	0	
New Field Tiles (4"-12")	LF	10	0		0				-	0		0			
Utility Replace	LF	25	100		100	2500		2500	400	10000		2500			
Soil Erosion Control	LS	Varies	10000	10000	5000	5000	5000	5000	15000	15000	5000	5000	15000	15000	
Pavement Repair	LS	15000	1	15000	1	15000	1	15000		0	0	0	0	0	
New Pavement															
Surface Course 1.5"	Ton	60							280	16800			0		
Binder 1.5"	Ton	50							280				0		
Bit. Agg. 8"	Ton	40							1465				0		
CA6 3"	Ton	20							550				0		
Pavement Removal	SY	25							4200	105000			0		
Restoration and Seeding	SF	0.25	500	125	40000	10000	10000	2500	40000	10000	1000	250	1300000	325000	
Pumping Station	LS	25000													
Sub-Total				78125		74500		164500		458600		26250		4582500	
Contingency		20%		15625		14900		32900		91720		5250		916500	
Total Construction				93750		89400		197400		550320		31500		5499000	
Engineering	_	12%		11250		10728		23688		66038.4		3780		659880	
Wetland Delineation	LS	3000		3000		3000		3000		3000		3000		10000	
Floodplain BFE	LS	0		0		0		0		5000		0		0	
Permits (COE, IEPA, IDNR)	LS	5000		5000		5000		5000		15000		5000		50000	
(1) B	<u> </u>														
(1) Does not include compensatory	/ storage														

Appendix C Conceptual Cost Estin	nates					
			Area 1C			
			Pine Relief		Pine Pur	mping
			Sewer		Station	
Alternative			10		11	
			_		-	
Item	Units	Unit Cost	Amount	Total	Amount	Total
<u></u>						
Easements	LS	5000	3	15000	3	15000
Clearing	acres	2000	0.25	500	0.25	500
Excavation and Disposal	CY	20	1000	20000	1000	20000
Granular Import and Placement	CY	20	100	2000	100	2000
New Manhole Installed	LS	2500	2	5000	2	5000
Culvert 7x2 (2)	LF	250		0		0
Storm Sewer	LF	50	400	20000	400	20000
New Field Tiles (4"-12")	LF	10	200	2000	200	2000
Utility Replace	LF	25	300	7500	300	7500
Soil Erosion Control	LS	Varies	5000	5000	5000	5000
Pavement Repair	LS	15000	2	30000	2	30000
New Pavement						
Surface Course 1.5"	Ton	60	0		0	
Binder 1.5"	Ton	50	0		0	
Bit. Agg. 8"	Ton	40	0		0	
CA6 3"	Ton	20	0		0	
Pavement Removal	SY	25	0		0	
Restoration and Seeding	SF	0.25	10000	2500	10000	2500
Pumping Station	LS	25000			1	25000
1 0						
Sub-Total				109500		134500
Contingency		20%		21900		26900
		20,0				
Total Construction				131400		161400
				.5.100		
Engineering		12%		15768		19368
Wetland Delineation	LS	3000		1000		1000
Floodplain BFE	LS	0		0		0
Permits (COE, IEPA, IDNR)	LS	5000		3000		3000
		3230		2230		2000
(1) Does not include compensatory	/ storage					

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Appendix C Conceptual Cost Est	imates		A 0							
			Area 2		N		D : 01 I		D D .	
			Replace		New Lippold		Repair CLI	טט	Re-Route	
			Greenfie		Field Tile		Lateral 1		Lippold	
			Drainag				and 1A		Detention	
Alternative			1		2		3		4	
Item	Units	Unit Cost	Amount	Total	Amount	Total	Amount	Total	Amount	Total
Easements	LS	5000	2	10000	2	10000	1	5000	0	0
Clearing	acres	2000		4000		2000		2000	1	2000
Excavation and Disposal	CY	2000	0			2000		2000	-	30000
			_	_	-	-	_	_	1500	
Granular Import and Placement	CY	20		0	•	0	_	0	0	0
New Manhole Installed	LS LF	2500		30000		25000	_	12500	0	0
Culvert 7x2 (2)		250	0	0	0	0	_	0	0	0
Storm Sewer	LF LF	50		_		0		0	0	0
New Field Tiles (4"-12")		10				20000		25000	0	0
Utility Replace	LF	25				0		25000	0	0
Soil Erosion Control	LS	Varies	25000			10000		15000	10000	10000
Pavement Repair	LS	15000	3	45000	0	0	0	0	0	0
New Pavement										
Surface Course 1.5"	Ton	60								
Binder 1.5"	Ton	50								
Bit. Agg. 8"	Ton	40								
CA6 3"	Ton	20								
Pavement Removal	SY	25								
Restoration and Seeding	SF	0.25	20000	5000	80000	20000	40000	10000	40000	10000
Pumping Station	LS	25000								
Sub-Total				219000		87000		94500		52000
Contingency		20%		43800		17400		18900		10400
Contingency		20%		43000		17400		10900		10400
Total Construction				262800		104400		113400		62400
Total Constituction				202000		101100		110100		02-100
Engineering		12%		31536		12528		13608		7488
Wetland Delineation	LS	3000		3000		3000		3000		3000
Floodplain BFE	LS	0		0		0		0		0
Permits (COE, IEPA, IDNR)	LS	5000		5000		5000		5000		5000
, , ,										
(1) 2										
(1) Does not include compensatory	storage		<u> </u>							

Appendix C Conceptual Cost Est	imates							
			Area 3					
					Snowberry		Snowberry	
			Floresta		Pumping		to Lake	
			Drain Tile	⊢———— 2	Station		Gravity Drain	
Alternative			1	-	2		3	
Item	Units	Unit Cost	Amount	Total	Amount	Total	Amount	Total
Easements	LS	5000	3	15000	3	15000	3	15000
Clearing	acres	2000	0.25	500	0.25	500	0.25	500
Excavation and Disposal	CY	20	1000	20000	3000	60000	2000	40000
Granular Import and Placement	CY	20	200	4000	1000	20000	500	10000
New Manhole Installed	LS	2500	3	7500	2	5000	12	30000
Culvert 7x2 (2)	LF	250		0	1	250	1	250
Storm Sewer	LF	50		0	0	0	0	0
New Field Tiles (4"-12")	LF	10	1000	10000	300	3000	300	3000
Utility Replace	LF	25	300	7500	300	7500	300	7500
Soil Erosion Control	LS	Varies	5000	5000	15000	15000	15000	15000
Pavement Repair	LS	15000	2	30000	2	30000	2	30000
New Pavement								
Surface Course 1.5"	Ton	60						
Binder 1.5"	Ton	50						
Bit. Agg. 8"	Ton	40						
CA6 3"	Ton	20						
Pavement Removal	SY	25						
Restoration and Seeding	SF	0.25	10000	2500	10000	2500	10000	2500
Pumping Station	LS	25000			1			
Sub-Total				102000		158750		153750
Contingency		20%		20400		31750		30750
Total Construction				122400		190500		184500
Engineering		12%		14688		22860		22140
Wetland Delineation	LS	3000		3000		3000		3000
Floodplain BFE	LS	0		0		0		0
Permits (COE, IEPA, IDNR)	LS	5000		5000		5000		5000
				,				
]					
(1) Does not include compensatory	storage							

Appendix C Conceptual Cost Est	imates		A 4		Laba Cadlat	1 0 1 - 1 0 1	
			Area 4		Lake Outlet and	Crystal Creek	
			Repair/Replac		Increase		
			Area 4 Storm		Lake Outlet		
			Sewers		Capacity		
Alternative			3		1		
	11.7	11.70		T		-	
Item	Units	Unit Cost	Amount	Total	Amount	Total	
	1.0	5000	4	20000	0	0	
Easements	LS	5000				0	
Clearing	acres	2000					
Excavation and Disposal	CY	20				30000	
Granular Import and Placement	CY	20				10000	
New Manhole Installed	LS LF	2500				2500	
Culvert 7x2 (2)		250				25000	
Storm Sewer	LF	50				0	
New Field Tiles (4"-12")	LF	10				0	
Utility Replace	LF	25				7500	
Soil Erosion Control	LS	Varies	15000			15000	
Pavement Repair	LS	15000	4	60000	2	0	
New Pavement							
Surface Course 1.5"	Ton	60					
Binder 1.5"	Ton	50					
Bit. Agg. 8"	Ton	40					
CA6 3"	Ton	20					
Pavement Removal	SY	25					
Restoration and Seeding	SF	0.25		10000	10000	2500	
Pumping Station	LS	25000					
				0.4====			
Sub-Total	1			947000		93500	
•		2051		10010			
Contingency	1	20%		189400		18700	
Tatal Canatoniation	-			4400400		440000	
Total Construction	1			1136400		112200	
Engineering	1	12%		136368		13464	
Wetland Delineation	LS	3000		3000		3000	
Floodplain BFE	LS	0		3000		3000	
Permits (COE, IEPA, IDNR)	LS	5000		5000		5000	
Gillita (OOL, ILFA, IDINK)		3000		3000		3000	
(1) Does not include compensatory	otoross						