

APPENDIX C
COLLECTION SYSTEM REHABILITATION RECOMMENDATIONS

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MH-1 SUBAREA A
REHABILITATION RECOMMENDATIONS

Table A-1
MH-1 Subarea A
Manhole Rehabilitation

Sewer Subarea	Page Number	Manhole Number	Manhole Location	Manhole Rehabilitation Depth (Vertical Feet)	Unit Cost (\$/Vert. Foot)	Total Repair Cost (\$)	Completion Year
Defects: Infiltration Through Barrel							
Recommended Rehabilitation Method: High pressure cleaning, apply water plug grout where necessary, and apply a spray on or trowel on cementitious coating to full manhole depth or as noted. Recommend follow up with installation of Cretex Internal Rubber Boot to alleviate the effects of cement cracking in the upper cone section (additional \$356).							
9	194	111	1240 90th NW of 90-91st Intersection	10.8	\$420	\$4,536	
9	201	118	1275 91st Street	7.7	\$420	\$3,234	
9	200	117	1523 91st Street	9.0	\$420	\$3,780	
9	311	158	1224 93rd Street	12.5	\$420	\$5,250	
9	317	167	93rd Dead End	7.9	\$420	\$3,318	
8b	127	224B	9516 Cayuga Drive	15.8	\$420	\$6,636	
					Subtotal	\$26,754	

Sewer Subarea	Page Number	Manhole Number	Manhole Location	Manhole Rehabilitation Depth (Vertical Feet)	Unit Cost (\$/Vert. Foot)	Total Repair Cost (\$)	Completion Year
Defects: Poor Cone / Riser							
Recommended Rehabilitation Method: Flex-Seal Utility Sealant.							
9	259	25	1276 88th Street	3	\$278	\$834	
9	236	50	1294 89th Street	3	\$278	\$834	
9	240	45	8902 Cayuga Drive	3	\$278	\$834	
8a	91	320	1415 100th Street	3	\$278	\$834	
8b	133	225	1212 96th Street	3	\$278	\$834	
8a	92	319	99th & Marine Memorial Drive	3	\$278	\$834	
8b	152	247	97th Street & Marine Memorial Dr.	3	\$278	\$834	
8b	67	231	9616 Cayuga Dr.	3	\$278	\$834	
					Subtotal	\$6,672	

Sewer Subarea	Page Number	Manhole Number	Manhole Location	Manhole Rehabilitation Depth (Vertical Feet)	Unit Cost (\$/Vert. Foot)	Total Repair Cost (\$)	Completion Year
Defects: Poor Collar							
Recommended Rehabilitation Method: Flex-Seal Utility Sealant.							
8b	128	224	96th Street & Cayuga Drive	3	\$278	\$834	
					Subtotal	\$834	
					Total Incomplete		\$34,260

Table A-2
MH-1 Subarea A
Spot CIPP

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Repair Length, ft	Cost	Defect
Defects: Pipe joint offset, joint infiltration, mineral buildup, etc.							
Recommended Rehabilitation Method: Cured-in-place spot pipe lining.							
9	27-5	8728 Cayuga, near creek/ East	40	8	20	\$20,000	Broken pipe
9	20-7	MH 157 93rd/ South	35	10	6	\$8,600	Broken pipe
9	20-19	MH 160 94th/ North	110	10	6	\$8,600	Broken pipe
8a	17-8	MH 323 100th/ North	69	10	6	\$8,600	Broken pipe
8b	16-7	MH 257 98th/ North	104	10	6	\$8,600	Broken pipe
			Total Length (ft)		44	\$54,400	

Table A-3
MH-1 Subarea A
Sectional CIPP

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Table A-4
MH-1 Subarea A
Excavation

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Depth at Manhole	Repair Length, ft	Cost	Defect
Defects: Pipe joint offset, pipe dip, pipe collapse, pipe crack, etc.								
Recommended Rehabilitation Method: Spot excavation and pipe replacement.								
9	20-18	MH 161 94th/ South	53	10	11.6	16	\$23,900	Collapsed pipe
8b	16-7	MH 257 98th/ North	180/200	10	8.6	30	\$29,000	Broken Pipe
8b	7-8	MH 223 98th/ South	265	10	11	10	\$20,700	offset
8a	16-22	MH 318 99th/ South	80	10	6.6	10	\$19,400	offset
8b	28-4	9522A Cayuga/West	16/10	10	10	10	\$24,400	offset
			Total Incomplete			76	\$117,400	

Table A-5
MH-1 Subarea A
Chemical Grout

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Repair Length, L	Cost
Defects: Joint infiltration & mineral buildup						
Recommended Rehabilitation Method: Chemical/Gel grout injection						
8b	17-19	MH 243 97th/East	70	10	9	\$2,300
Total Length (ft)					9	\$2,300

Table A-6
MH-1 Subarea A
Sewer Cleaning

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction		Distance from Manhole (ft)	Pipe Diameter (in)	Clean Sewer Vacuum/Remove Debris	Repair Cost
Defects: Debris blocking pipe, pipe dip, mineral buildup, etc.							
Recommended Rehabilitation Method: Frequent pipe cleaning.							
8b	16-6	MH 257	98th/ South	29	10	284	\$ 596
8b	26-13	MH 231	Cayuga at 98th/ West	3	10	202	\$ 424
						Total	\$ 1,021

Table A-7
MH-1 Subarea A
Root Treatment and Sewer Cleaning

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction		Distance from Manhole (ft)	Pipe Diameter (in)	Roots in Joint	Root Cut	Foam Following Root Cut	Repair Cost
Defects: Roots in joints and laterals									
Recommended Rehabilitation Method: Root cutting and chemical treatment									
9	17-22	MH 25	88th/ South	152	10	4	Spot	172	\$ 718
9	20-7	MH 157	93rd/ North	80-95	10	3	Spot	132	\$ 630
9	20-22	MH 179	94th/ West	5 & 10	10	3	Spot	137	\$ 641
8a	26-3	MH 306	Cayuga/ East	90/92	10	3	Spot x 2	180	\$ 852
8b	21-7	MH 175	95th/ South	108	10	4	Spot	269	\$ 932
8b	16-4	MH 256	98th/ North	84	10	4	Spot	284	\$ 965
							Total	1174	\$ 4,738

Table A-8
MH-1 Subarea A
Cutting Protuding Laterals

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Cost
Defects: Lateral protruding					
Recommended Rehabilitation Method: Cutting protruding laterals					
9	19-6	MH115 Demunda/ East	50	10	\$2,000
9	20-12	MH 172 94th/ North	52	10	\$2,000
8b	26-14	MH 224 Cayuga at 96th/ East	162	10	\$2,000
8b	26-15	MH 224 Cayuga at 96th/ West	50	10	\$2,000
8b	17-16	MH 245 97th/ South	178	10	\$2,000
				Total	\$10,000

Table A-9
MH-1 Subarea A
Cross Connection

LOCATION	SUBAREA	Defect	Status
Defects: Storm sewer interconnection			
Recommended Rehabilitation Method: further investigation to determine rehabilitation method. Potential rehabilitation method including grouting, spot CIPP and sectional CIPP the sanitary and/or storm pipe and/or lateral.			
93rd at MH-159	9	Open, defective and/or damaged laterals and/or joints in the storm sewer allow water to pass through and enter the sanitary by way of defective sanitary sewer laterals and/or joints that pass below the storm line.	
89th at MH-48	9		Completed grouting
101st at MH-386	8a		
97th at MH-245	8b		
Estimated Cost for Further Investigation and Correction Measure:			\$20,000

Table A-10
MH-1 Subarea A
Private Property I/I Sources

Subarea	House Number	Defect	Rehabilitation Method
9	8876 Cayuga Drive	Roof drain connection	Disconnect roof drain
8a	9906 Cayuga Drive	Roof drain connection	Disconnect roof drain
8b	1638 98 th Street	Roof drain connection	Disconnect roof drain
9	9341 St. John Avenue	Roof drain connection	Disconnect roof drain
9	1319 98 th Street	Roof drain connection	Disconnect roof drain
9	1413 98 th Street	Low lying lawn vent	Extend lawn vent
9	1729 93 rd Street	Low lying lawn vent	Extend lawn vent
8a	9933 Cayuga Drive	Low lying lawn vent	Extend lawn vent
8a	9818 Cayuga Drive	Low lying lawn vent	Extend lawn vent
8a	9812 Cayuga Drive	Low lying lawn vent	Extend lawn vent
8b	9812 Cayuga Drive	Low lying lawn vent	Extend lawn vent
8b	9516 Cayuga Drive	Low lying lawn vent	Extend lawn vent

MH-1 SUBAREA B
REHABILITATION RECOMMENDATIONS

Table B-1
MH-1 Subarea B
Manhole Rehabilitation

Sewer Subarea	Page Number	Manhole Number	Manhole Location	Manhole Rehabilitation Depth (Vertical Feet)	Unit Cost (\$/Vert. Foot)	Total Repair Cost (\$)	Completion Year
(MH-1) Manhole Rehabilitation Recommendations Incompleted for Area B							
Infiltration Through Wall							
Recommended Rehabilitation Method: High pressure cleaning, apply water plug grout where necessary, and apply a spray on or trowel on cementitious coating to full manhole depth or as noted. Recommend follow up with installation of Cretex Internal Rubber Boot to alleviate the effects of cement cracking in the upper cone section (additional \$356).							
3	272	8	Pear and Oak Street	10.7	\$420	\$4,494	
5	63	276	100th Street	7.8	\$420	\$3,276	
5	62	277	100th Street	6.3	\$420	\$2,646	
5	60	284	100th Street	6.3	\$420	\$2,646	
5	58	285	100th Street	7.8	\$420	\$3,276	
5	364	350	101st Street	14.1	\$420	\$5,922	
5	365	351	101st Street	15.3	\$420	\$6,426	
5	367	352	101st Street	15.5	\$420	\$6,510	
5	15	209	1021 97th Street	9.4	\$420	\$3,948	
5	372	354	102nd	8.8	\$420	\$3,696	
5	373	355	102nd	8.4	\$420	\$3,528	
5	374	356	102nd	9.1	\$420	\$3,822	
5	371	359	102nd	9.9	\$420	\$4,158	
5	5	197	Colvin & 96th Intersection	19.3	\$420	\$8,106	
5	19	199	9712 Cayuga Drive	18.8	\$420	\$7,896	
5	9	203	97th & Greenwald	10.2	\$420	\$4,284	
5	394	412	Colvin Avenue	14.8	\$420	\$6,216	
6	413	264	100th Street	6.6	\$420	\$2,772	
6	352	265	100th Street	8.2	\$420	\$3,444	
6	120	267	100th Street	9.4	\$420	\$3,948	
6	118	274	100th Street	9.5	\$420	\$3,990	
6	359	333	101st Street	8.1	\$420	\$3,402	
6	404	346	102nd and	13.7	\$420	\$5,754	
6	403	347	619 102nd Street	12.3	\$420	\$5,166	
6	401	339	102nd Street	11.1	\$420	\$4,662	
6	407	340	102nd Street	10.5	\$420	\$4,410	
7	52	290	100th & Black Creek Drive	14.0	\$420	\$5,880	
7	42	302	100th Street &	11.2	\$420	\$4,704	
7	34	363	1033 101 Street	12.3	\$420	\$5,166	
7	54	287	9914 Colvin Blvd.	17.8	\$420	\$7,476	
7	51	292	1030 99th Street	11.9	\$420	\$4,998	
7	50	293	1034 99th Street	12.0	\$420	\$5,040	
7	345	372	1 Deuro Drive	6.2	\$420	\$2,604	
7	350	374	73 Deuro Drive	5.5	\$420	\$2,310	
7	30	367A	Mueller Crescent & 101 Street	8.8	\$420	\$3,696	
4a	186	87	1022 91st Street	12.2	\$420	\$5,124	
4a	305	152	1108 93rd and Colvin	18.3	\$420	\$7,686	
4b	386	430	95th Street	10.3	\$420	\$4,326	
					Subtotal	\$177,408	

Table B-1
MH-1 Subarea B
Manhole Rehabilitation

Sewer Subarea	Page Number	Manhole Number	Manhole Location	Manhole Rehabilitation Depth (Vertical Feet)	Unit Cost (\$/Vert. Foot)	Total Repair Cost (\$)	Completion Year
Poor Cone / Riser							
Recommended Rehabilitation Method: Flex-Seal Utility Sealant.							
5	65	282	100th Street	3	\$278	\$834	
5	365	351	101st Street	3	\$278	\$834	
5	21	212	1020 98th Street	3	\$278	\$834	
5	23	214	1067 98th Street	3	\$278	\$834	
5	3	196	989 96th Street	3	\$278	\$834	
5	1	194	96th Street	3	\$278	\$834	
5	57	281	99th Street	3	\$278	\$834	
5	121	219	61 Mason Crescent	3	\$278	\$834	
5	122	220	64 Mason Crescent	3	\$278	\$834	
6	353	328	100th and Frontier	3	\$278	\$834	
6	117	275	100th Street & Wheatfield	3	\$278	\$834	
6	377	353	682 102nd Street	3	\$278	\$834	
6	361	342	Wheatfield and 101st	3	\$278	\$834	
7	42	302	100th Street & Moschel Crescent	3	\$278	\$834	
7	35	364	1049 101 Street	3	\$278	\$834	
7	349	380	32 Deuro Drive	3	\$278	\$834	
7	348	379	44 Deuro Drive	3	\$278	\$834	
7	379	378	63 Deuro Drive	3	\$278	\$834	
7	26	370	Mueller Crescent	3	\$278	\$834	
					Subtotal	\$15,846	

Sewer Subarea	Page Number	Manhole Number	Manhole Location	Manhole Rehabilitation Depth (Vertical Feet)	Unit Cost (\$/Vert. Foot)	Total Repair Cost (\$)	Completion Year
Poor Collar							
Recommended Rehabilitation Method: Flex-Seal Utility Sealant.							
4b	385	426	95th Street	3	\$278	\$834	
5	7	201	1040 96th Street	3	\$278	\$834	
					Subtotal	\$1,668	
Total Incomplete						\$194,922	

Table B-2
MH-1 Subarea B
Spot CIPP

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Repair Length, If	Cost	Defect
Defects: Pipe joint offset, joint infiltration, mineral buildup, etc.							
Recommended Rehabilitation Method: Cured-in-place spot pipe lining.							
3	9-16	MH 10 Oak/North	18	10	9	\$12,900	Broken pipe
5	9-7	MH 289 100th/South	93	10	6	\$8,600	Broken pipe
5	9-7	MH 289 100th/South	189	10	15	\$17,200	Cracked pipe
5	6-13	MH 198 Colvin/ East	18	15	6	\$13,200	Joint offset
5	7-4	MH 205 Greenwald/ West	37	8	6	\$8,000	Broken pipe
7	8-13	MH 364 Black Creek/ South	110	8	6	\$8,000	Broken pipe
7	21-21	MH 377 Deuro/ North	277	8	6	\$8,000	Broken pipe
6	12-2	MH 263 100th/ North	233	10	20	\$21,500	Broken pipe
6	12-2	MH 267 100th/ North	178	10	9	\$12,900	Broken pipe
5	12-11	MH 277 100th/ South	49	10	15	\$17,200	Broken pipe
5	9-8	MH 285A 100th/North	151	10	6	\$8,600	Broken pipe
Total Length (ft)					104	\$136,100	

Table B-3
MH-1 Subarea B
Sectional CIPP

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Table B-4
MH-1 Subarea B
Excavation

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Depth at Manhole	Repair Length, L	Cost	Defect
Defects: Pipe joint offset, pipe dip, pipe collapse, pipe crack, etc.								
Recommended Rehabilitation Method: Spot excavation and pipe replacement.								
7	9-4	MH 296 100th/South	71	10	13.2	10	\$23,900	Broken Pipe
3	3-2	MH 70 90th/ North	14	8	8.2	10	\$20,100	Broken Pipe
7	22-4	MH 373 Deuro/ North	46	8	5.4	10	\$16,400	Broken Pipe
7	21-16	MH 382 Deuro/ South	16	8	6.1	10	\$19,400	Broken Pipe
7	21-13	MH 371 Mueller/ West	31	10	6.4	10	\$19,400	Broken Pipe
6	12-3	MH 265 100th/ South	130	10	8.2	10	\$19,300	Broken Pipe
5	12-9	MH 276 100th/ South	38	10	7.8	16	\$21,600	Broken Pipe
5	6-6	MH 197 Colvin/East	13	15	15	50	\$53,800	Sag
Total Length (ft)						126	\$193,900	

Table B-5
MH-1 Subarea B
Chemical Grout

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Repair Length, If	Cost
Defects: Joint infiltration & mineral buildup						
Recommended Rehabilitation Method: Chemical/Gel grout injection						
4a	5-14	MH 142 93rd/ North	67	10	9	\$2,300
5	9-12	MH 286 99th/ South	68	10	9	\$2,300
5	9-12	MH 286 99th/ South	90	10	9	\$2,300
5	9-8	MH 285A 100th/North	236	10	9	\$2,300
5	9-10	MH 360 102nd/ South	47	10	9	\$2,300
Total Length (ft)					45	\$11,500

**Table B-6
MH-1 Subarea B
Sewer Cleaning**

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction		Distance from Manhole (ft)	Pipe Diameter (in)	Debris Blocking Pipe	Clean Sewer Vacuum/Remove Debris	Repair Cost
Defects: Debris blocking pipe, pipe dip, mineral buildup, etc.								
Recommended Rehabilitation Method: Frequent pipe cleaning.								
3	1-19	MH 12	Pasadena/ North	10	10	4	50	\$ 105
3	1-16	MH 43	Pasadena/ North	29	10	3	202	\$ 424
3	1-14	MH 42	Pasadena/ South	2	10	4	220	\$ 462
6	10-16	MH 330	101st/ North	51	10	3	249	\$ 523
4a	3-6	MH 99	91st/ South	69	10	3	230	\$ 483
							Total:	\$ 1,997

Table B-7
MH-1 Subarea B
Root Treatment and Sewer Cleaning

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction		Distance from Manhole (ft)	Pipe Diameter (in)	Roots in Joint	Root Cut	Foam Following Root Cut	Repair Cost
Defects: Roots in joints and laterals									
Recommended Rehabilitation Method: Root cutting and chemical treatment									
3	3-4	MH 78	90th/ North	70	8	3	Spot	184	\$ 745
3	3-3	MH 78	90th/ South	131	8	3	Spot	192	\$ 762
3	1-5	MH 4	Creekside/ North	121	10	4	Spot x 3	238	\$ 1,207
3	1-3	MH 4	Creekside/ South	99	10	3	Spot	174	\$ 723
3	9-16	MH 11	Oak/ South	27/29	10	4	300 LF	300	\$ 1,650
5	9-21	MH 351	101st/ South	143	10	4	Spot	265	\$ 923
5	12-20	MH 196	96th/ South	72/80	8	4	Spot x 2	230	\$ 962
6	10-13	MH 332	101st/ North	22	10	3	Spot	272	\$ 938
6	10-15	MH 331	101st/ South	157	10	4	Spot	250	\$ 890
6	10-12	MH 333	101st/ South	22	10	4	Spot	272	\$ 938
								Total	\$ 9,738

Table B-8
MH-1 Subarea B
Cutting Protruding Laterals

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Cost	Completion Year
Defects: Lateral protruding						
Recommended Rehabilitation Method: Cutting protruding laterals						
3	1-1	MH 2 Creekside & Lindbergh/ East	45	10	\$2,000	
5	12-11	MH 277 100th/North	137	10	\$2,000	
6	11-11	MH 347 102nd/North	56	10	\$2,000	
6	11-12	MH 348 102nd/South	92	10	\$2,000	
				Total	\$8,000	

Table B-9
MH-1 Subarea B
Cross Connection

LOCATION	AREA	SUBAREA	DEFECT	Status
Defects: Storm sewer interconnection				
Recommended Rehabilitation Method: further investigation to determine rehabilitation method. Potential rehabilitation method include grouting, spot CIPP and sectional CIPP the sanitary and/or storm pipe and/or lateral.				
Pasadena at MH-39	3	B	Open, defective and/or damaged laterals and/or joints in the storm sewer allow water to pass through and enter the sanitary by way of defective sanitary sewer laterals and/or joints that pass below the storm line.	Completed grouting
Pear and Pasadena at MH-7	3	B		
92nd at MH-90	4a	B		
91st at MH-88	4a	B		Completed grouting
MH-338 on 102nd	6	B (C.B. Smoked)		
MH-348 on 102nd	6	B (C. B. Smoked)		
Brookside and 90th	3	B (C.B. Smoked)		
MH-139 on 93rd Street	5	B (C.B. Smoked)		
Duero Drive at MH-372	7	B		Completed grouting
Pasadena at MH-42	3	B		
Creekside at MH-6	3	B		
Mueller Crescent at MH-371	7	B		
Estimated Cost for Further Investigations for Correction Measure:				\$110,000

Table B-10
MH-1 Subarea B
Private Property I/I Sources

Subarea	House Number	Defect	Rehabilitation Method
3	8808 and 8804 Pear Avenue	Roof drain connection	Disconnect roof drain
3	North of 1114 Pasadena Avenue	Low lying lawn vent	Extend lawn vent
3	8874 Lindbergh Avenue	Low lying lawn vent	Extend lawn vent
5	1010 96 th Street	Low lying lawn vent	Extend lawn vent
4b	MH 435A 95 th Street	Low lying lawn vent	Extend lawn vent

Table B-11
MH-1 Subarea B
Trunk Sewer Rehabilitation/Upgrade

Location	Total Cost	Estimated Flow Removed/ Restored, mgd
101 Trunk Sewer	\$350,000	0.214
Luick/Colvin Ave	\$504,150	0.5

MH-1 SUBAREA C
REHABILITATION RECOMMENDATIONS

Table C-1
MH-1 Subarea C
Manhole Rehabilitation

Sewer Subarea	Page Number	Manhole Number	Manhole Location	Manhole Rehabilitation Depth (Vertical Feet)	Unit Cost (\$/Vert. Foot)	Total Repair Cost (\$)	Completion Year
(MH-1) Manhole Rehabilitation Recommendations Incomplete for area C							
Infiltration through Manhole Wall							
Recommended Rehabilitation Method: High pressure cleaning, apply water plug grout where necessary, and apply a spray on or trowel on cementitious coating to full manhole depth or as noted. Recommend follow up with installation of Cretex Internal Rubber Boot to alleviate the effects of cement cracking in the upper cone section (additional \$356).							
1a ₁	252	33	713 Pasadena Avenue	9.9	\$420	\$4,158	
1a ₃	255	30	617 Pasadena Avenue	12.6	\$420	\$5,292	
1a ₃	230	56	91st and S. Military	10.0	\$420	\$4,200	
1a ₃	253	32	Corner of Read and Pasadena	11.2	\$420	\$4,704	
1b	103	25D	8819 Point Avenue	9.4	\$420	\$3,948	
					Subtotal	\$22,302	

Sewer Subarea	Page Number	Manhole Number	Manhole Location	Manhole Rehabilitation Depth (Vertical Feet)	Unit Cost (\$/Vert. Foot)	Total Repair Cost (\$)	Completion Year
Poor Cone / Riser							
Recommended Rehabilitation Method: Flex-Seal Utility Sealant.							
2	295	136	632 93rd Street	3	\$278	\$834	
2	296	135	Read Avenue	3	\$278	\$834	
1a ₃	343	403	Frontier and 93rd	3	\$278	\$834	
1a ₃	222	65	Jayne and 91st	3	\$278	\$834	
					Subtotal	\$3,336	

Sewer Subarea	Page Number	Manhole Number	Manhole Location	Manhole Rehabilitation Depth (Vertical Feet)	Unit Cost (\$/Vert. Foot)	Total Repair Cost (\$)	Completion Year
Poor Collar							
Recommended Rehabilitation Method: Flex-Seal Utility Sealant.							
1a ₁	251	34	733 Pasadena Avenue	3	\$278	\$834	
1a ₂	222	65	Jayne and 91st	3	\$278	\$834	
					Subtotal	\$5,004	
					Total Incomplete		\$30,642

**Table C-2
MH-1 Subarea C
Spot CIPP**

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Repair Length, LF	Cost	Defect
Defects: Pipe joint offset, joint infiltration, mineral buildup, etc.							
Recommended Rehabilitation Method: Cured-in-place spot pipe lining.							
2	5-6	MH 137 93rd/North	191	10	15	\$17,200	Joint offset
2	5-12	MH 140 93rd/North	36	10	20	\$21,500	Broken Pipe
1a3	13-9	MH 30 Pasadena/ North	45	18	15	\$32,000	Broken Pipe
Total Length (ft)					50	\$70,700	

Table C-3
MH-1 Subarea C
Sectional CIPP

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Table C-4
MH-1 Subarea C
Excavation

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Depth at Manhole	Repair Length, ft	Cost	Defect
Defects: Pipe joint offset, pipe dip, pipe collapse, pipe crack, etc.								
Recommended Rehabilitation Method: Spot excavation and pipe replacement.								
2	4-12	MH 132 92nd/South	220	10	7.7	24	\$24,600	Broken Pipe
1b	22-14	MH 401 Frontier/ North	129	8	5.5	50	\$31,700	Broken Pipe
2	5-6	MH 137 93rd/North	191	10	7.2	50	\$35,000	Crack Pipe/Sag
2	4-10	MH 62 Read/West	50	10	12	60	\$49,132	dips
Total Length (ft)						184	\$140,432	

Table C-5
MH-1 Subarea C
Chemical Grout

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Repair Length, If	Cost
Defects: Joint infiltration & mineral buildup						
Recommended Rehabilitation Method: Chemical/Gel grout injection						
1a1	14-11	MH 35 Pasadena/ South	110	10	9	\$2,300
1a1	14-10	MH 36 Pasadena/ South	143	10	9	\$2,300
1a2	13-13	MH 71 91st/ South	113	18	9	\$2,300
Total Length (ft)					27	\$6,900

Table C-6
MH-1 Subarea C
Sewer Cleaning

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Roots in Joint	Debris Blocking Pipe	Clean Sewer Vacuum/Remove Debris	Repair Cost
Defects: Debris blocking pipe, pipe dip, mineral buildup, etc.								
Recommended Rehabilitation Method: Frequent pipe cleaning.								
2	4-2	MH 74 92nd/ North	19	10	4	4	239	\$ 502
1a ₁	26-1	Cayuga & Pershing/ West	80	12		4	200	\$ 420
							Total	\$ 922

Table C-7
MH-1 Subarea C
Root Treatment and Sewer Cleaning

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Roots in Joint	Debris Blocking Pipe	Root Cut	Foam Following Root Cut	Repair Cost
Defects: Roots in joints and laterals									
Recommended Rehabilitation Method: Root cutting and chemical treatment									
2	4-2	MH 74 92nd/ North	19	10	4	4	Spot	239	\$ 866
2	4-7	MH 134 92nd/ South	215	10	3		Spot x 2	232	\$ 966
2	4-4	MH 73 92nd/ South	95	10	4		Spot	241	\$ 870
2	3-16	MH 77 92nd/ South	65	10	4		Spot	250	\$ 890
2	4-8	MH 63 Read/ East	90	10	3		Spot	150	\$ 670
2	4-8	MH 63 Read/ East	91	10	3		Spot	150	\$ 670
1a ₁	14-9	MH 36 Pasadena/ North	13	10	4		Spot	260	\$ 912
1a ₂	14-4	MH 67 90th/ North	170	10	4		Spot	250	\$ 890
1a ₂	14-6	MH 69 90th/ South	15	10	3		Spot	185	\$ 747
1a ₂	14-6	MH 69 90th/ South	83	10	3		Spot	185	\$ 747
1a ₂	14-6	MH 69 90th/ South	89	10	4		Spot	185	\$ 747
1a ₂	13-14	MH 65 91st/ South	260	18	4		Spot	275	\$ 945
1a ₃	5-2	MH 130 93rd/ North	119	10	3		Spot x 2	269	\$ 1,047
1a ₃	5-4	MH 131 93rd/ North	113	10	3		Spot	269	\$ 932
1b	23-6	MH 25M / West	194	10	3		Spot	231	\$ 848
1b	14-16	MH 25K Buffalo/ East	163	12	3		Spot	199	\$ 778
1b	15-4	MH 25C Point/ West	89	10	3		Spot	226	\$ 837
								Total	\$ 14,362

Table C-8
MH-1 Subarea C
Cutting Protruding Laterals

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Table C-9
MH-1 Subarea C
Cross Connection

LOCATION	SUBAREA	DEFECT	Status
Defects: Storm sewer interconnection			
Recommended Rehabilitation Method: further investigation to determine rehabilitation method. Potential rehabilitation method including grouting, spot CIPP and sectional CIPP the sanitary and/or storm pipe and/or lateral.			
92nd at MH-73	C	Open, defective and/or damaged joint in the storm sewer allow water to pass through and enter the sanitary by way of defective sanitary sewer lateral that passes below the storm line.	
Pasadena at MH-36	C		
93rd at MH-131	C		
Estimated Cost for Further Investigation and Correction Measure:			\$30,000

Table C-10
MH-1 Subarea C
Private Property

Subarea	House Number	Defect
1a ₃	8915 S. Military Avenue	Roof drain connection
1a ₂	826 90 th Street	Low lying lawn vent
1b	8703 Point Avenue	Low lying lawn vent

MH-4 SUBAREA D
REHABILITATION RECOMMENDATIONS

Table D-1
MH-4 Subarea D
Manhole Rehabilitation

Sewer Sub area	Manhole Location	Manhole Rehabilitation Depth (Vertical Feet)	Unit Cost (\$/Vert. Foot)	Total Repair Cost (\$)	Completion Year
Debris in Manhole					
Recommended Rehabilitation Method: High pressure cleaning and removal of debris					
MH-4 Area D Manhole Repairs Incomplete					
D	416 77th Street at Frontier			\$300	
D	Frontier & 80th Street, 150' west			\$300	
			Total Incomplete	\$600	

Table D-2
MH-4 Subarea D
Spot CIPP

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Repair Length (lf)	Cost	Defect
Defects: Pipe joint offset, joint infiltration, mineral buildup, etc.							
Recommended Rehabilitation Method: Cured-in-place spot pipe lining.							
D	5	76th @454 / south	55	10	20	\$21,500	Joint offset & infiltration
D	5	76th @555 / south	69	10	48	\$51,600	Joint offset & infiltration
D	6	77th @Lindbergh / east	221	10	12	\$12,900	Joint offset & infiltration
D	6	77th Street @617 / south	133	10	4	\$4,300	Joint offset & infiltration
D	9	79th @456 / north	71	10	4	\$4,300	Joint offset & infiltration
D	10	80th @488 / north	228	10	4	\$4,300	Joint offset & infiltration
D	6	Lindbergh @7911 / east	96	10	4	\$4,300	Joint offset & infiltration
Total:						\$103,200	

Table D-3
MH-4 Subarea D
Sectional CIPP

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Repair Length (lf)	Cost
Defects: Multiple defects in one run of pipe including joint offsets, joint infiltration, cracked pipes, mineral buildup and roots in joints.						
Recommended Rehabilitation Method: Manhole to manhole Cured-in-place sectional pipe lining.						
D	5	76th @555 / south	1	10	269	\$25,555
D	5	76th @555 / west down Wing Ct.	1	10	225	\$21,375
D	7	78th @639 / south	1	10	203	\$19,285
					Total	\$66,215

Table D-4
MH-1 Subarea D
Excavation

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Table D-5
MH-4 Subarea D
Chemical Grout

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Chemical Grout, ft	Cost
Defects: Joint infiltration & mineral buildup						
Recommended Rehabilitation Method: Chemical/Gel grout injection						
D	6	77th Street @617 / south	133	10	2	\$2,300
D	9	79th @456 / north	71	10	2	\$2,300
Total Cost						\$4,600

**Table D-6
MH-4 Subarea D
Sewer Cleaning**

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Pipe Diameter (in)	Clean and Root Cut	Clean Sewer Vacuum/Remove Debris	Root Cut, Clean and Foam	Cost
Defects: Debris blocking pipe, pipe dip, mineral buildup, etc.							
Recommended Rehabilitation Method: Frequent pipe cleaning.							
D	5	76th @ 555 / north	10		181		\$362
D	8	78th @ 429 / north	10			255	\$587
D	8	78th @ 556 / south	10			281	\$646
D	7	78th @ 639 / north	10			215	\$495
D	9	79th @ 426 / north	10			280	\$644
D	10	80th @ 436 / north	10	249			\$996
D	10	80th @ 462 / north	10			248	\$570
Total Lengths				249	181	1279	\$4,300

NOTES:

Cleaning is estimated on a sectional (manhole to manhole) basis. For debris removal and grouting the actual lengths must be field verified.

Additional defects may be identified following the removal of root, mineral, and debris which prevented video inspection.

Table D-7
MH-1 Subarea D
Root Treatment and Sewer Cleaning

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Table D-8
MH-1 Subarea D
Cutting Protruding Laterals

(Left Blank Intentionally)

Table D-9
MH-4 Subarea D
Cross Connection

LOCATION	AREA	SUBAREA	Defect	Status
Defects: Storm sewer interconnection				
Recommended Rehabilitation Method: further investigation to determine rehabilitation method. Potential rehabilitation method including grouting, spot CIPP and sectional CIPP the sanitary and/or storm pipe and/or lateral.				
78th at MH-522	4	D	Open, defective and/or damaged joint in the storm sewer allow water to pass through and enter the sanitary by way of defective sanitary sewer lateral that passes below the storm line.	Completed grouting
79th at MH-403	4	D		Completed grouting
80th at MH-436	4	D		
79th at MH-478	4	D		
77th at MH-471	4	D		
Estimated Cost for Further Investigation and Correction Measure:				\$40,000

Table D-10
MH-4 Subarea D
Private Property I/I Sources
Residential Roof Drains Connected to Sanitary Sewer

Sewer Subarea	House Number	Street Name	Defect	Rehabilitation Method
4	416	77 th Street	Roof drain connection	Disconnect roof drain
4	447	79 th Street	Roof drain connection	Disconnect roof drain

MH-4 SUBAREA E
REHABILITATION RECOMMENDATIONS

Table E-1
MH-4 Subarea E
Manhole Rehabilitation

Sewer Sub area	Manhole Location	Manhole Rehabilitation Depth (Vertical Feet)	Unit Cost (\$/Vert. Foot)	Total Repair Cost (\$)	Completion Year
Debris in Manhole					
Recommended Rehabilitation Method: High pressure cleaning and removal of debris					
MH-4 Area E Manhole Repairs Incomplete					
3	Niagara Falls Blvd. & 77th Street			\$300	
3	660 79th Street			\$300	
3	670 79th Street			\$300	
2	Niagara Falls Blvd. & 82nd Street, back of plaza			\$300	
5	814 86th Street			\$300	
2	Military Rd & Behind Pine Plaza			\$300	
1	east			\$300	
2	8250 Bollier Avenue			\$300	
1	8715 Bollier Avenue, north side			\$300	
1	8629 Bollier Avenue, north side			\$300	
1	1216 Cayuga Drive			\$300	
1	1234 Cayuga Drive			\$300	
2	8503 Krull Parkway			\$300	
2	Military Road & Krull Parkway, Westside			\$300	
5	8603 Lindbergh			\$300	
1	200' south of Niagara Falls Blvd. & Tuscarora Rd			\$300	
			Total	\$4,800	

Table E-2
MH-4 Subarea E
Spot CIPP

MH-4 Sub area ID	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Repair Length, lf	Number of CIPP Sections	Cost	Defect
Defects: Pipe joint offset, joint infiltration, mineral buildup, etc.								
Recommended Rehabilitation Method: Cured-in-place spot pipe lining.								
3	7	78th @Niagara Falls Blvd / south	47	10	20	4	\$17,200	Joint offset & infiltration
3	8	79th @697 / south	65	10	4	1	\$4,300	Joint offset & infiltration
7	25-1	81st @663/south	134	15	4	1	\$6,600	Joint offset & infiltration
7	13	81st @746 / north	175	15	8	2	\$13,200	Joint offset & infiltration
2	14	82nd @614 / north	51	10	12	2	\$8,600	Joint offset & infiltration
5	16	83rd @Pershing / north	156	10	4	1	\$4,300	Joint offset & infiltration
2	17	85th @1097/north (note: tape shows Witkop)	42	8	4	1	\$4,000	Joint offset & infiltration
1	19	85th @1225/ north	130	8	4	1	\$4,000	Joint offset & infiltration
1	19	85th @1225/ north	225	8	4	1	\$4,000	Joint offset & infiltration
2	22-18	Bollier @8251/ west (south side)	20	12	36	6	\$30,600	Joint offset & infiltration
2	22-18	Bollier @8251/ west (south side)	108	12	16	3	\$15,300	Joint offset & infiltration
1	21-2	Bollier @87th/ east	91	10	4	1	\$4,300	Joint offset & infiltration
1	21-3	Bollier @87th/ west	140	10	8	2	\$8,600	Joint offset & infiltration
2	19	Krull @8503/ south	187	8	4	1	\$4,000	Joint offset & infiltration
2	19	Krull @8503/ south	301	8	8	2	\$8,000	Joint offset & infiltration
2	20-1	Krull @8551/ east	242	8	4	1	\$4,000	Joint offset & infiltration
2	18	Laughlin @8360/west	52	8	12	2	\$8,000	Joint offset & infiltration
5	14	Lindbergh @8226 / west	112	10	4	1	\$4,300	Joint offset & infiltration
5	13	Lindbergh @86th / south	84	10	4	1	\$4,300	Joint offset & infiltration
5	12	Pershing @83rd / east	22	10	8	2	\$8,600	Joint offset & infiltration
5	12	Pershing @83rd / east	48	10	4	1	\$4,300	Joint offset & infiltration
5	18	Witkop @8260/ south	148	10	4	1	\$4,300	Joint offset & infiltration
Total						38	\$174,800	

Table E-3
MH-4 Subarea E
Sectional CIPP

Sewer Sub area	Tape #	Camera Entrance Location / Direction	Pipe Diameter (in)	Repair Length, Lf	Cost
Defects: Multiple defects in one run of pipe including joint offsets, joint infiltration, cracked pipes, mineral buildup and roots in joints.					
Recommended Rehabilitation Method: Manhole to manhole Cured-in-place sectional pipe lining.					
2	20-11	Bollier @8278/ east (north side)	8	266	\$18,620
2	20-21	Bollier @85th/ west (south side)	12	288	\$31,680
3	7	78th @664 / east between houses	10	310	\$29,450
			Total	864	\$79,750

NOTES:

Lengths are based on distances between manholes as reported in the video inspection logs.
The actual distance, and pipe condition, should be field verified prior to work.

Table E-4
MH-4 Subarea E
Excavation and Pipe Replacement

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Table E-5
MH-4 Subarea E
Chemical Grout

Sewer Sub area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Chemical Grout,ft	Cost
Defects: Joint infiltration & mineral buildup						
Recommended Rehabilitation Method: Chemical/Gel grout injection						
3	8	79th @697 / south	65	10	2	\$2,300
7	25-1	81st @663/south	134	15	2	\$2,300
2	17	85th @1097/north (note: tape shows Witkop)	42	8	4	\$2,300
2	20-1	Krull @8551/ east	242	8	2	\$2,300
5	18	Witkop @8260/ south	148	10	2	\$2,300
					Total	12
						\$11,500

NOTES:

The distance from manhole is the approximate beginning of the spot repair. The exact location and length of the should be verified prior to installation of the liner.

A minimum length of 2 feet was assumed to provide sufficient overlap at each joint.

Table E-6
MH-4 Subarea E
Sewer Cleaning

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Pipe Diameter (in)	Clean Sewer Vacuum/ Remove Debris, LF	Root Cut, Clean and Foam, LF	Clean and Grout, LF	Cost
Defects: Debris blocking pipe, pipe dip, mineral buildup, etc.							
Recommended Rehabilitation Method: Frequent pipe cleaning.							
1	19	86th @1270/ north	8	244			\$488
1	21-4	Bollier @8610/ west	10		151		\$604
1	20-16	Bollier @8629/ east (south side)	8		175		\$700
1	20-5	Military @Krull/ north	8		122		\$488
2	17	85th @1074/north (note: tape shows Witkop)	8		235		\$940
2	20-19	Bollier @8513/ west (south side)	12			200	\$3,200
2	20-10	Military @Bollier/ west (n. side)	8		220		\$880
3	7	78th @680 / north	10	235			\$470
5	15	84th @804 / north	10		295		\$1,180
5	12	86h @Pershing /west	10		240		\$960
5	18	Laughlin @8273/ n.west	8		108		\$432
5	12	Pershing @8416 / east	10		117		\$468
5	11	Pershing @8624 / west	10		250		\$1,000
7	13	81st @566 / south	15	240			\$480
Total				475	1587	200	\$12,290

NOTES:

Cleaning is estimated on a sectional (manhole to manhole) basis. For debris removal and grouting the actual lengths must be field verified.

Additional defects may be identified following the removal of root, mineral, and debris which prevented video inspection.

Table E-7
MH-1 Subarea E
Root Treatment and Sewer Cleaning

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Table E-8
MH-1 Subarea E
Cutting Protruding Laterals

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Table E-9
MH-4 Subarea E
Cross Connection

LOCATION	MH-4 Sewer Subarea	Defect	Status
Defects: Storm sewer interconnection			
Recommended Rehabilitation Method: further investigation to determine rehabilitation method. Potential rehabilitation method including grouting, spot CIPP and sectional CIPP the sanitary and/or storm pipe and/or lateral.			
77th/N.F. BLVD (Catch Basin Smoked)	3	Open, defective and/or damaged joint in the storm sewer allow water to pass through and enter the sanitary by way of defective sanitary sewer lateral that passes below the storm line.	
Scott and 85th (Catch Basin Smoked)	1		
82nd and Laughlin	5		Completed grouting
81st at MH-639	7		
81st and Lindbergh	7		
Estimated Cost for Further Investigation and Correction Measure:			\$40,000

Table E-10
MH-4 Subarea E
Private Property I/I Sources
Residential Roof Drains Connected to Sanitary Sewer

Sewer Subarea	House Number	Street Name	Defect	Rehabilitation Method
1	1234	Cayuga Drive	Roof drain connection	Disconnect roof drain
1	126	85 th Street	Roof drain connection	Disconnect roof drain
1	1253	Military Road	Roof drain connection	Disconnect roof drain
3	643	77 th Street	Roof drain connection	Disconnect roof drain
3	651	77 th Street	Roof drain connection	Disconnect roof drain
3	657	77 th Street	Roof drain connection	Disconnect roof drain
3	Mini Mall	77 th Street	Roof drain connection	Disconnect roof drain
5	524	82 nd Street	Roof drain connection	Disconnect roof drain
5	8222	Pershing Avenue	Roof drain connection	Disconnect roof drain
7	511	81 st Street	Roof drain connection	Disconnect roof drain
7	613	81 st Street	Roof drain connection	Disconnect roof drain
7	623	81 st Street	Roof drain connection	Disconnect roof drain
7	624	81 st Street	Roof drain connection	Disconnect roof drain
7	640	81 st Street	Roof drain connection	Disconnect roof drain
7	653	81 st Street	Roof drain connection	Disconnect roof drain

MH-4 SUBAREA F
REHABILITATION RECOMMENDATIONS

Table F-1
MH-4 Subarea F
Manhole Rehabilitation

Sewer Subarea	Manhole Location	Manhole Rehabilitation Depth (Vertical Feet)	Unit Cost (\$/Vert. Foot)	Total Repair Cost (\$)	Completion Year
Manhole Repairs Incomplete					
Debris in Manhole					
Recommended Rehabilitation Method: High pressure Cleaning and removal of debris					
8	646 74th Street			\$300	
8	426 75th Street			\$300	
8	636 75th Street			\$300	
8	665 76th Street			\$300	
			Total	\$1,200	

Table F-2
MH-4 Subarea F
Spot CIPP

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Repair Length, lf	Cost	Defect
Defects: Pipe joint offset, joint infiltration, mineral buildup, etc.							
Recommended Rehabilitation Method: Cured-in-place spot pipe lining.							
8	3	73rd @403 / north	36-42	10	20	\$21,500	Joint offset & infiltration
8	24-5	74th @445/ north	248	24	12	\$3,550	Joint offset & infiltration
8	24-7	74th @479/ north	42	24	12	\$33,000	Joint offset & infiltration
8	24-6	74th @479/ south	11	24	44	\$50,000	Joint offset & infiltration
8	3	75th @426 / south	49	10	16	\$17,200	Joint offset & infiltration
8	4	75th @554 / north	139	10	4	\$4,300	Joint offset & infiltration
8	4	75th @554 / north	258	10	4	\$4,300	Joint offset & infiltration
8	3	75th @Frontier / north	20	10	4	\$4,300	Joint offset & infiltration
8	3	75th @Frontier / north	162	10	4	\$4,300	Joint offset & infiltration
8	4	75th @Lindbergh / north	178	10	4	\$4,300	Joint offset & infiltration
8	4	Lindbergh @75th / west	3	10	8	\$8,600	Joint offset & infiltration
8	4	Lindbergh @75th / west	52	10	40	\$43,000	Joint offset & infiltration
8	4	Lindbergh @75th / west	105	10	8	\$8,600	Joint offset & infiltration
Total Length (ft)					180	\$206,950	

NOTES:

The distance from manhole is the approximate beginning of the spot repair. The exact location and length of the should be verified prior to installation of the liner.

Repair lengths are listed in increments of four feet based on the typical installation techniques and equipment used.

Table F-3
MH-4 Subarea F
Sectional CIPP

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Pipe Diameter (in)	Repair Length	Cost
Defects: Multiple defects in one run of pipe including joint offsets, joint infiltration, cracked pipes, mineral buildup and roots in joints.					
Recommended Rehabilitation Method: Manhole to manhole Cured-in-place sectional pipe lining.					
8	24-8	74th @Lindbergh/ north	24	210	\$39,060
8	4	75th @452 / south	10	210	\$19,950
8	4	75th @472 / north	10	210	\$19,950
8	5	76th @594A / west	10	156	\$14,820
				Total	\$93,780

NOTES:

Lengths are based on distances between manholes as reported in the video inspection logs.
The actual distance, and pipe condition, should be field verified prior to work.

Table F-4
MH-4 Subarea F
Excavation

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Repair Length, LF	Cost	Defect
Defects: Pipe joint offset, pipe dip, pipe collapse, pipe crack, etc.							
Recommended Rehabilitation Method: Spot excavation and pipe replacement.							
8	24-5	74th @ 445/ North	255	24	50	\$80,000	Broken Pipe
8	4	75th @ 452/ North	43	10	6	\$20,000	Broken Pipe
8	4	75th @ 472/ North	49	10	4	\$20,000	Broken Pipe
			Total Length (ft)		60	\$120,000	

Table F-5
MH-1 Subarea F
Chemical Grout

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Table F-6
MH-4 Subarea F
Sewer Cleaning

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Pipe Diameter (in)	Clean and Root Cut	Cost
Defects: Debris blocking pipe, pipe dip, mineral buildup, etc.					
Recommended Rehabilitation Method: Frequent pipe cleaning.					
8	4	75th @Lindbergh / north	10	147	\$588

NOTES:

Cleaning is estimated on a sectional (manhole to manhole) basis. For debris removal and grouting the actual lengths must be field verified.

Additional defects may be identified following the removal of root, mineral, and debris which prevented video inspection.

Table F-7
MH-1 Subarea F
Root Treatment and Sewer Cleaning

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Table F-8
MH-1 Subarea F
Cutting Protruding Laterals

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Table F-9
MH-1 Subarea F
Cross Connection

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Table F-10
MH-4 Subarea F
Private Property I/I Sources
Residential Roof Drains Connected to Sanitary Sewer

Sewer Subarea	House Number	Street Name	Defect	Rehabilitation Method
8	650	75 th Street	Roof drain connection	Disconnect roof drain

MH-4 SUBAREA G
REHABILITATION RECOMMENDATIONS

Table G-1
MH-4 Subarea G
Manhole Rehabilitation

Sewer Subarea	Manhole Location	Manhole Rehabilitation Depth (Vertical Feet)	Unit Cost (\$/Vert. Foot)	Total Repair Cost (\$)	Completion Year
Manhole Repair Incomplete					
Debris in Manhole					
Recommended Rehabilitation Method: High pressure cleaning and removal of debris					
6	519 87th Street (Storm Sewer Manhole)			\$300	
6	1014 87th Street			\$300	
6	Munson and 87th Street, southwest corner			\$300	
6	Munson & Cayuga Drive			\$300	
6	South Military Road & Cayuga Drive			\$300	
6	8631 Jacob Place			\$300	
			Total Incomplete	\$1,800	

**Table G-2
MH-4 Subarea G
Spot CIPP**

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Distance from Manhole (ft)	Pipe Diameter (in)	Repair Length	Cost	Defect
Defects: Pipe joint offset, joint infiltration, mineral buildup, etc.							
Recommended Rehabilitation Method: Cured-in-place spot pipe lining.							
6	2	Frontier @8463 / west	228	20	8	\$19,000	Joint offset & infiltration
6a	16	84th @Pershing / south on east side	178	10	4	\$4,300	Joint offset & infiltration
6a	10	87th @723 / south	54	10	4	\$4,300	Joint offset & infiltration
6a	10	87th @723 / south	90	10	12	\$12,900	Joint offset & infiltration
6a	16	Pershing @84th Street / south	96	10	12	\$12,900	Joint offset & infiltration
6b	17	87th @Lindbergh /east	50	10	8	\$8,600	Joint offset & infiltration
6b	16	88th @Lindbergh / south	191	15	8	\$13,200	Joint offset & infiltration
6b	16	88th @Munson / east	185	10	16	\$17,200	Joint offset & infiltration
6b	22-9	Cayuga @Pershing South/ south	45	10	8	\$8,600	Joint offset & infiltration
Total:						\$101,000	

NOTES:

The distance from manhole is the approximate beginning of the spot repair. The exact location and length of the should be verified prior to installation of the liner.

Repair lengths are listed in increments of four feet based on the typical installation techniques and equipment used.

Table G-3
MH-4 Subarea G
Sectional CIPP

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Pipe Diameter (in)	Repair Length	Cost
Defects: Multiple defects in one run of pipe including joint offsets, joint infiltration, cracked pipes, mineral buildup and roots in joints.					
Recommended Rehabilitation Method: Manhole to manhole Cured-in-place sectional pipe lining.					
6a	12	85th@Muson/ east	10	260	\$24,700
6b	17	88th @927 /south	10	170	\$16,150
6b	21-13	Cayuga @1036/ north	10	247	\$23,465
6b	22-15	Military @1032/ south	10	273	\$25,935
				Total:	\$90,250

NOTES:

Lengths are based on distances between manholes as reported in the video inspection logs.
The actual distance, and pipe condition, should be field verified prior to work.

Table G-4
MH-1 Subarea G
Excavation

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Table G-5
MH-1 Subarea G
Chemical Grout

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**Table G-6
MH-6 Subarea G
Sewer Cleaning**

Sewer Sub-Area	Tape #	Camera Entrance Location / Direction	Pipe Diameter (in)	Clean Sewer Vacuum/Remove Debris	Root Cut, Clean and Foam	Clean and Grout	Cost
Defects: Debris blocking pipe, pipe dip, mineral buildup, etc.							
Recommended Rehabilitation Method: Frequent pipe cleaning.							
6a	15	82nd @474 / south	10	275			\$550
6a	15	82nd @Lindbergh / south	10		259		\$1,554
6a	16	84th @517 / south on east side	10			250	\$3,500
6a	16	84th @Pershing / south on east side	10		186		\$1,116
6a	11	87th @Munson / south	10	150			\$300
6a	11	Mang & 87th @8723 / west	10		213		\$1,278
6a	11	Munson @8722 / west	10		238		\$1,428
6a	11	Munson @8742 / west	10		238		\$1,428
6a	15	Pershing @8203 / east	10		217		\$1,302
6a	16	Pershing @84th Street / south	10		201		\$1,206
6a	12	Pershing @85th / east (S. side of Pershing)	10		250		\$1,500
6a	12	Pershing @85th / west (S. side of Pershing)	10		120		\$720
6a	11	Pershing @8627 / east	10		225		\$1,350
6a	11	Pershing @86th / west	10		225		\$1,350
6a	11	Pershing @87th / west south side	10		250		\$1,500
6b	11	Pershing @8732 / east North side	10		75		\$450
6b	11	Pershing @8732 / west north side	10		275		\$1,650
6b	17	Witkop @8619 /west	10		163		\$978
						Total	\$23,160

NOTES:

Cleaning is estimated on a sectional (manhole to manhole) basis. For debris removal and grouting the actual lengths must be field verified.

Additional defects may be identified following the removal of root, mineral, and debris which prevented video inspection.

Table G-7
MH-1 Subarea G
Root Treatment and Sewer Cleaning

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Table G-8
MH-1 Subarea G
Cutting Protruding Laterals

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Table G-9
MH-4 Subarea G
Cross Connection

LOCATION	AREA	SUBAREA	Defect	Status
Defects: Storm sewer interconnection				
Recommended Rehabilitation Method: further investigation to determine rehabilitation method. Potential rehabilitation method including grouting, spot CIPP and sectional CIPP the sanitary and/or storm pipe and/or lateral.				
83rd and Pershing	6a	G	Open, defective and/or damaged joint in the storm sewer allow water to pass through and enter the sanitary by way of defective sanitary sewer lateral that passes below the storm line.	Completed grouting
Mang and 87th	6a	G (C.B. Smoked)		
Munson and 86th	6a	G (C.B. Smoked)		
Pershing and 86th	6a	G (C.B. Smoked)		
Pershing and 88th	6a	G (C.B. Smoked)		
87th at MH-812	6a	G		
86th at MH-722	6a	G		Completed grouting
85th at MH-716	6a	G		Completed grouting
Estimated Cost for Further Investigation and Corrective Measure:				\$40,000

Table G-10
MH-4 Subarea G
Private Property I/I Source
Residential Roof Drains Connected to Sanitary Sewer

Sewer Subarea	House Number	Street Name	Defect	Rehabilitation Method
6a	514	87 th Street	Roof drain connection	Disconnect roof drain
6b	923	88 th Street	Roof drain connection	Disconnect roof drain
6b	821	88 th Street	Roof drain connection	Disconnect roof drain
6b	1036	Cayuga Drive	Roof drain connection	Disconnect roof drain
6b	1036	Cayuga Drive	Roof drain connection	Disconnect roof drain
6b	620	Cayuga Drive	Roof drain connection	Disconnect roof drain
6b	812	Cayuga Drive	Roof drain connection	Disconnect roof drain
6b	822	Cayuga Drive	Roof drain connection	Disconnect roof drain

MH-6 SUBAREA H
REHABILITATION RECOMMENDATIONS

Table H-1
MH-6 Subarea H
Manhole Rehabilitation

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Table H-2
MH-6 Subarea H
Spot CIPP

Sewer Sub-Area	Pipe Problem Locations Manhole Entrance Location/Direction	Distance from Manhole	Pipe Diameter	Repair Length	Total Cost	Defect
		feet	in	feet	\$	
Defects: Pipe joint offset, joint infiltration, mineral buildup, etc.						
Recommended Rehabilitation Method: Cured-in-place spot pipe lining.						
2	66th Street cross connection Stephenson & 66/N	34'-72	10	40	\$43,000	Joint offset & infiltration
2	66th Street cross connection Stephenson & 66/N	95'-125'	10	30	\$34,400	Joint offset & infiltration
2	Stephenson Ave. MH @ field near 190 / East	\$169	15	6	\$13,200	Joint offset & infiltration
2	Stephenson Ave. MH @ field near 190 / East	\$368	15	10	\$19,800	Joint offset & infiltration
3	Stephenson Ave. 67th. Street / West	\$139	20	6	\$19,000	Joint offset & infiltration
3	Stephenson Ave. 67th. Street / West	\$142	20	6	\$19,000	Joint offset & infiltration
3	Stephenson Ave. MH @ 68th / East	\$255	20	6	\$19,000	Joint offset & infiltration
		Total Length (ft)		\$104	\$167,400	

Table H-3
MH-1 Subarea H
Sectional CIPP

(Left Blank Intentionally)

Table H-4
MH-6 Subarea H
Excavation

Sewer Sub-Area	Pipe Problem Locations Manhole Entrance Location/Direction	Distance from Manhole feet	Pipe Diameter in	Spot Excavation and Repair feet	Total Cost \$	Defect
Defects: Pipe joint offset, pipe dip, pipe collapse, pipe crack, etc.						
Recommended Rehabilitation Method: Spot excavation and pipe replacement.						
2	66th Street MH @ 178 / South	179-183	10	20	\$30,000	Broken Pipe
2	66th Street MH @ 178 / South	186-189	10	20	\$30,000	Broken Pipe
2	66th Street MH @ 178 / South	250-253	10	20	\$30,000	Broken Pipe
2	66th Street MH @ 178 / South	295-299	10	20	\$30,000	Broken Pipe
3	67th Street MH @ 223 / North	1	10	20	\$30,000	Broken Pipe
3	70th Street (West side) MH @ 252 /South	5	10	20	\$30,000	Broken Pipe
3	70th Street (West side) MH @ 252 /South	19	10	20	\$30,000	Broken Pipe
3	70th Street MH @ 317 / North	25	10	20	\$30,000	Broken Pipe
3	71st Street MH @ 224 / North	7'-30'	10	20	\$30,000	Broken Pipe
Total Length				180	\$270,000	

Table H-5
MH-6 Subarea H
Chemical Grout

Sewer Sub-Area	Pipe Problem Locations Manhole Entrance Location/Direction	Distance from Manhole feet	Pipe Diameter in	Clean and Grout feet	Total Cost \$
Defects: Joint infiltration & mineral buildup					
Recommended Rehabilitation Method: Chemical/Gel grout injection					
1	62nd Street MH @ Stevenson Ave. / South	190	10	426	\$3,400.00
1	63rd Street MH @ Stevenson Ave. / South	63	8	474	\$3,700.00
2	66th Street MH @ empty lot / North	265	10	280	\$2,300.00
2	66th Street MH @ empty Lot / South	180	10	282	\$2,300.00
				Total	\$11,700.00

**Table H-6
MH-6 Subarea H
Sewer Cleaning**

Sewer Sub-Area	Pipe Problem Locations Manhole Entrance Location/Direction	Distance from Manhole feet	Pipe Diameter in	Clean Sewer Vacuum/ Remove Debris feet	Unit Cost \$/LF	Total Cost \$
Defects: Debris blocking pipe, pipe dip, mineral buildup, etc.						
Recommended Rehabilitation Method: Frequent pipe cleaning.						
1	61st Street MH @ 218 / South	147	10	380	\$ 0.95	\$ 361.00
1	62nd Street MH @ 222 / South	6	10	20	\$ 0.95	\$ 19.00
2	65th Street MH @ Empty lots / North	127	10	180	\$ 0.95	\$ 171.00
2	65th Street (West side)	0	8	1110	\$ 0.95	\$1,054.50
2	65th Street (East side)	111	8	1190	\$ 0.95	\$1,130.50
2	66th Street MH @ 216 / South	6.5	10	280	\$ 0.95	\$ 266.00
2	66th Street MH @ 216 / South	80	10	100	\$ 0.95	\$ 95.00
2	Stephenson Ave. between parkway / West	100	15	305	\$ 0.95	\$ 289.75
3	67th Street MH @ 223 / North	0	10	234	\$ 0.95	\$ 222.30
3	67th Street MH @ 201 / North	122-123	10	440	\$ 0.95	\$ 418.00
3	69th Street MH @ 254 / North	87	10	90	\$ 0.95	\$ 85.50
3	69th Street MH @ 227 / North	261	10	280	\$ 0.95	\$ 266.00
3	70th Street (West side) MH @ 312 /South	0	10	280	\$ 0.95	\$ 266.00
3	71st Street MH @ 344 / North	167-193	10	260	\$ 0.95	\$ 247.00
3	72nd Street MH @ 313 / South	0	10	300	\$ 0.95	\$ 285.00
3	72nd Street MH @ 313 / South	60	10	100	\$ 0.95	\$ 95.00
3	Stephenson Ave. MH between 68&67th / West	95	20	317	\$ 0.95	\$ 301.15
3	Stephenson Ave. MH @ 68th / East	261	20	294	\$ 0.95	\$ 279.30
4	73rd Street (East side) MH @ 319 / North	127	10	200	\$ 0.95	\$ 190.00
Total Length (ft)				6360		\$6,042.00

Table H-7
MH-6 Subarea H
Root Treatment and Sewer Cleaning

Sewer Sub-Area	Pipe Problem Locations Manhole Entrance Location/Direction	Distance from Manhole feet	Pipe Diameter in	Clean and Root Cut feet	Unit Cost \$/LF	Total Cost \$
Defects: Roots in joints and laterals						
Recommended Rehabilitation Method: Root cutting and chemical treatment						
3	68th Street MH @ 216 / South	204	10	421	\$ 1.50	\$ 632
3	69th Street MH @ Edison / South	324	10	325	\$ 1.50	\$ 488
3	69th Street MH @ 140 / North	37	10	280	\$ 1.50	\$ 420
3	70th Street (East) MH @ 257 So	228	10	285	\$ 1.50	\$ 428
3	70th Street MH @ 250 / North	17	10	30	\$ 1.50	\$ 45
3	72nd Street MH @ 313 / South	245	10	10	\$ 1.50	\$ 15
4	73rd Street MH @ Stephenson /	130	10	210	\$ 1.50	\$ 315
4	74th Street	0	10	2051	\$ 1.50	\$ 3,077
4	75th Street MH @ 304 / South	101	10	275	\$ 1.50	\$ 413
4	75th Street MH @ 236 / South	233	10	275	\$ 1.50	\$ 413
4	76th Street (East side)	0	10	1550	\$ 1.50	\$ 2,325
4	76th Street (West side)	0	10	1008	\$ 1.50	\$ 1,512
Total Length (ft)				6720		\$ 10,080

Table H-8
MH-6 Subarea H
Cutting Protruding Laterals

Sewer Sub-Area	Pipe Problem Locations Manhole Entrance Location/Direction	Distance from Manhole feet	Pipe Diameter in	Total Cost \$
Defects: Lateral protruding				
Recommended Rehabilitation Method: Cutting protruding laterals				
3	70th Street MH @ 317 / North	34	10	\$ 2,000
3	70th Street (East side) MH @ 257 South	19	10	\$ 2,000
3	70th Street (East) MH @ 257 South	228	10	\$ 2,000
	Total Length (ft)	281		\$ 6,000

Table H-9
MH-1 Subarea H
Cross Connection

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Table H-10
MH-6 Subarea H
Private Property I/I Sources

Sewer Sub area	Manhole Smoke Inject Location	House Number Possible Problem	Street Name	Defect	Rehabilitation Method
3	202	157	69th Street	Roof drain connection	Disconnect roof drain
3	202	188	69th Street	Roof drain connection	Disconnect roof drain
3	312	362	70th Street	Roof drain connection	Disconnect roof drain
3	246	305	71st Street	Roof drain connection	Disconnect roof drain
3	254	231	72nd Street	Roof drain connection	Disconnect roof drain
3	254	306	72nd Street	Roof drain connection	Disconnect roof drain
4	240	245	74th Street	Roof drain connection	Disconnect roof drain
4	240	246	74th Street	Roof drain connection	Disconnect roof drain
4	244	246	74th Street	Roof drain connection	Disconnect roof drain
4	240	251	74th Street	Roof drain connection	Disconnect roof drain
4	244	251	74th Street	Roof drain connection	Disconnect roof drain
4	244	254	74th Street	Roof drain connection	Disconnect roof drain
4	330	304	74th Street	Roof drain connection	Disconnect roof drain
4	330	305	74th Street	Roof drain connection	Disconnect roof drain
4	330	315	74th Street	Roof drain connection	Disconnect roof drain
4	330	316	74th Street	Roof drain connection	Disconnect roof drain
4	330	324	74th Street	Roof drain connection	Disconnect roof drain
4	330	326	74th Street	Roof drain connection	Disconnect roof drain
4	330	327	74th Street	Roof drain connection	Disconnect roof drain
4	330	330	74th Street	Roof drain connection	Disconnect roof drain
4	330	333	74th Street	Roof drain connection	Disconnect roof drain
4	330	337	74th Street	Roof drain connection	Disconnect roof drain
4	240	340	74th Street	Roof drain connection	Disconnect roof drain
4	330	343	74th Street	Roof drain connection	Disconnect roof drain
4	330	319	75th Street	Roof drain connection	Disconnect roof drain
4	330	329	75th Street	Roof drain connection	Disconnect roof drain
4	330	334	75th Street	Roof drain connection	Disconnect roof drain
4	330	253	76th Street, east side	Roof drain connection	Disconnect roof drain

MH-6 SUBAREA I
REHABILITATION RECOMMENDATIONS

Table I-1
MH-6 Subarea I
Manhole Rehabilitation

(Left Blank Intentionally)

Table I-2
MH-6 Subarea I
Spot CIPP

Sewer Sub-Area	Pipe Problem Locations Manhole Entrance Location/Direction	Distance from Manhole feet	Pipe Diameter in	Line Sewer (sectional cured-in-place liner) feet	Total Cost \$	Defect
Defects: Pipe joint offset, joint infiltration, mineral buildup, etc.						
Recommended Rehabilitation Method: Cured-in-place spot pipe lining.						
6	Stephenson Ave. MH @ 8000 / East	250	20	6	\$ 19,000	Joint offset & infiltration
6	Stephenson Ave. MH @ 8000 / East	45'-47'	20	6	\$ 19,000	Joint offset & infiltration
Total Length (ft)				12	\$ 38,000	

Table I-3
MH-1 Subarea I
Sectional CIPP

(Left Blank Intentionally)

**Table I-4
MH-6 Subarea I
Excavation**

Sewer Sub-Area	Pipe Problem Locations Manhole Entrance Location/Direction	Distance from Manhole feet	Pipe Diameter in	Spot Excavation and Repair feet	Total Cost \$	Defect
Defects: Pipe joint offset, pipe dip, pipe collapse, pipe crack, etc.						
Recommended Rehabilitation Method: Spot excavation and pipe replacement.						
5	79th Street (East side) North Buff. Ave. / North	1	10	20	\$ 30,000	Broken Pipe
6	79th Street MH @ 322 / North	127	10	20	\$ 30,000	Broken Pipe
7	84th Street MH @ 242 / North	31	8	20	\$ 25,000	Broken Pipe
7	85th Street (East side) MH @ 285 / South	105-107	10	20	\$ 30,000	Broken Pipe
7	85th Street (West side) MH @ 228 / South	239	10	20	\$ 30,000	Broken Pipe
8	70th Street (West side) MH @ 122 / South	33	10	20	\$ 30,000	Broken Pipe
8	70th Street (West side) MH @ 122 70th / South	38	10	20	\$ 30,000	Broken Pipe
8	70th Street MH @ 141 / South	46	10	20	\$ 30,000	Broken Pipe
8	70th Street (East side) MH @ 117 South	162-165	10	20	\$ 30,000	Broken Pipe
8	72nd Street MH @ 230 / North	101-118	10	20	\$ 30,000	Broken Pipe
8	72nd Street MH @ 200 / North	1127-133	10	20	\$ 30,000	Broken Pipe
8	72nd Street MH @ 200 / North	126-132	10	20	\$ 30,000	Broken Pipe
9	73rd Street (East side) MH @ 129 / North	86	10	20	\$ 30,000	Broken Pipe
9	74th Street MH @ 154 / North	91'-94'	10	20	\$ 30,000	Broken Pipe
9	74th Street MH @ Buff Ave / North	165	10	20	\$ 30,000	Broken Pipe
11	87th Street MH @ 126 / North	44	12	20	\$ 40,000	Broken Pipe
11	87th Street next to library / South	22'-24'	12	20	\$ 40,000	Broken Pipe
11	87th Street next to library / South	5'-7'	12	20	\$ 40,000	Broken Pipe
11	Buffalo Ave (South side) @ 8210 / East	35	8	20	\$ 25,000	Broken Pipe
11	Valle Drive MH @ s83rd / North	21	8	20	\$ 25,000	Broken Pipe
11	s84th Street Valle drive / North	18'-25'	8	20	\$ 25,000	Broken Pipe
11	s84th Street Valle drive / North	49'-52'	8	20	\$ 25,000	Broken Pipe
11	s84th Street Valle drive / North	69'-79'	8	20	\$ 25,000	Broken Pipe
11	s84th Street Valle drive / North	89'-97'	8	20	\$ 25,000	Broken Pipe
11	s84th Street Valle drive / North	160-177	8	20	\$ 25,000	Broken Pipe
11	Valle Drive MH @ s83rd / West	45	8	20	\$ 25,000	Broken Pipe
11	Valle Drive MH @ 8121 / East	92	8	20	\$ 25,000	Broken Pipe
Total length (ft)				540	\$ 790,000	

**Table I-5
MH-6 Subarea I
Chemical Grout**

Sewer Sub-Area	Pipe Problem Locations Manhole Entrance Location/Direction	Distance from Manhole feet	Pipe Diameter in	Clean and Grout feet	Total Cost \$
Defects: Joint infiltration & mineral buildup					
Recommended Rehabilitation Method: Chemical/Gel grout injection					
8	Buffalo Ave. & 70th West side MH Buff/West	217	10	220	\$ 2,300
11	Buffalo Ave. MH @ s83rd /West	171	8	180	\$ 2,300

Sewer Sub-Area	Pipe Problem Locations Manhole Entrance Location/Direction	Distance from Manhole feet	Pipe Diameter in	Clean, Root Cut, and Grout feet	Total Cost \$
Defects: Joint infiltration & mineral buildup					
Recommended Rehabilitation Method: Chemical/Gel grout injection					
8	70th Street (West side) MH @ 122 /North	0	10	290	\$ 2,300
		Total Length (ft)		690	\$ 6,900

**Table I-6
MH-6 Subarea I
Sewer Cleaning**

Sewer Sub-Area	Pipe Problem Locations Manhole Entrance Location/Direction	Distance from Manhole feet	Pipe Diameter in	Clean Sewer Vacuum/ Remove Debris feet	Unit Cost \$/LF	Total Cost \$
Defects: Debris blocking pipe, pipe dip, mineral buildup, etc.						
Recommended Rehabilitation Method: Frequent pipe cleaning.						
5	80th Street / South	247	10	250	\$ 0.95	\$ 238
5	Buffalo Ave. (South Side) MH @ 7827/ East	0-4	8	100	\$ 0.95	\$ 95
6	80th Street	71	10	100	\$ 0.95	\$ 95
6	Stephenson Ave. MH between 77&78th / East	90-125	20	163	\$ 0.95	\$ 155
6	Stephenson Ave. MH @ 8118 / West	200	20	225	\$ 0.95	\$ 214
7	85th Street (East side) MH @ 231 /South	22	10	225	\$ 0.95	\$ 214
7	Troy Ave. MH @ 82nd. / West	0	10	225	\$ 0.95	\$ 214
8	70th Street (West side) MH @ 122 /South	117	10	220	\$ 0.95	\$ 209
8	70th Street (West side) MH @ Buff /North	36	10	50	\$ 0.95	\$ 48
8	71st Street MH @ 150 / South	0	10	10	\$ 0.95	\$ 10
8	Buffalo Ave. (North side) MH @ 72nd /West	135	15	150	\$ 0.95	\$ 143
8	Buffalo Ave. (North side) MH @ 7407 /West	3	15	10	\$ 0.95	\$ 10
8	Buffalo Ave. (South side) MH @69th S. / East	9.5	8	20	\$ 0.95	\$ 19
8	Buffalo Ave. (South side) MH @7103 / East	87	8	100	\$ 0.95	\$ 95
8	Buffalo Ave. (South side) MH @71st S. / North	5	8	60	\$ 0.95	\$ 57
8	Buffalo Ave. (South side) MH @71st S. / West	35	8	50	\$ 0.95	\$ 48
8	Buffalo Ave. (South side) MH @7211 / North	0	8	100	\$ 0.95	\$ 95
8	Buffalo Ave. (South side) MH @7623 / East	95	8	120	\$ 0.95	\$ 114
9	73rd Street (East side) MH @ 153 / South	11	10	30	\$ 0.95	\$ 29
9	Buffalo Ave (North side) MH @ 73rd / East	108	15	120	\$ 0.95	\$ 114
9	Buffalo Ave. (North side) MH @ 74th /East	8	15	135	\$ 0.95	\$ 128
10	Stephenson Ave. MH @ 77th / South	25	20	50	\$ 0.95	\$ 48
11	Buffalo Ave. (North side) MH @ 87th (E. side) / W	6	15	20	\$ 0.95	\$ 19
11	Buffalo Ave. (North side) MH @ 87th (W. side) / E	20	15	40	\$ 0.95	\$ 38
11	Buffalo Ave. (North side) MH @ 87th (W. side) / W	106	15	120	\$ 0.95	\$ 114
11	Buffalo Ave. (North side) MH @ 8723 / East	90	15	120	\$ 0.95	\$ 114
11	Buffalo Ave. MH @ 8210 driveway / East	38	8	50	\$ 0.95	\$ 48
11	Buffalo Ave. MH @ s84th /East	5'-20'	10	80	\$ 0.95	\$ 76
11	Buffalo Ave. MH @ s84th /South	175	8	180	\$ 0.95	\$ 171
11	Buffalo Ave. MH @ s84th (North) / West	250	8	250	\$ 0.95	\$ 238
11	Buffalo Ave. (South side) MH @ 8421 driveway /	7	8	20	\$ 0.95	\$ 19
11	Buffalo Ave.(South side) MH @ 8435 / East	80	8	100	\$ 0.95	\$ 95
11	Buffalo Ave. MH @ 8210 driveway / West	28	15	276	\$ 0.95	\$ 262
11	Buffalo Ave. MH @ 8652 / East	70	15	200	\$ 0.95	\$ 190
11	s84th Street MH @ 55 North	0	8	5	\$ 0.95	\$ 5
11	s 86th Street	0	10	453	\$ 0.95	\$ 430
11	s 87th Street MH @ sidewalk / North	15	10	20	\$ 0.95	\$ 19
11	Valle Drive MH @ s84th / East	0-102	8	140	\$ 0.95	\$ 133
Total Length (ft)				4587		\$ 4,358

Table I-7
MH-6 Subarea I
Root Treatment and Sewer Cleaning

Sewer Sub-Area	Pipe Problem Locations Manhole Entrance Location/Direction	Distance from Manhole feet	Pipe Diameter in	Clean and Root Cut feet	Unit Cost \$/LF	Total Cost \$
Defects: Roots in joints and laterals						
Recommended Rehabilitation Method: Root cutting and chemical treatment						
6	78th Street	0	10	1739	\$ 1.50	\$ 2,609
6	79th Street	0	10	1600	\$ 1.50	\$ 2,400
6	80th Street MH at 300 80th / North	220	10	220	\$ 1.50	\$ 330
6	Stephenson Ave. MH @ 78th / West	65	20	325	\$ 1.50	\$ 488
7	82nd Street MH @ 172 / South	0	10	672	\$ 1.50	\$ 1,008
8	70th Street (East side) MH @ 231 South	239-246	10	280	\$ 1.50	\$ 420
8	70th Street (East side) MH @ 119 North	190	10	220	\$ 1.50	\$ 330
8	71st Street MH @ 150 / South	0	10	270	\$ 1.50	\$ 405
8	71st Street MH @ 127 / North	236	10	268	\$ 1.50	\$ 402
8	72nd Street MH @ 200 / North	170	10	230	\$ 1.50	\$ 345
8	72nd Street MH @ 200 / South	225	10	230	\$ 1.50	\$ 345
8	72nd Street MH @ 146 / South	164	10	232	\$ 1.50	\$ 348
8	72nd Street MH @ Buff Ave / North	76	10	232	\$ 1.50	\$ 348
8	73rd Street (West side) MH @ 152 / North	152	10	262	\$ 1.50	\$ 393
8	73rd Street (West side) MH @ 124 / North	136	10	348	\$ 1.50	\$ 522
8	73rd Street (West side) MH @ Buff Ave / North	200	10	238	\$ 1.50	\$ 357
8	Buffalo Ave. (North side) MH @ 70th (East side)	132	12	150	\$ 1.50	\$ 225
8	Buffalo Ave. (North side) MH @ 71st (East side)	160	12	170	\$ 1.50	\$ 255
10	77th Street	0	10	1853	\$ 1.50	\$ 2,780
12	81st Street MH @ 142 / North	120	18	120	\$ 1.50	\$ 180
12	81st Street MH @ Buffalo Ave. / North	234	18	240	\$ 1.50	\$ 360
7	83rd Street MH @ 243 / North	66'-70'	10	80	\$ 1.50	\$ 120
7	84th Street (East side) MH @ 119 / North	27	8	27	\$ 1.30	\$ 35
7	85th Street (East side) MH @ 211 / South	65-80	10	155	\$ 1.50	\$ 233
7	85th Street (West side) MH @ 258 / South	119.5	10	300	\$ 1.50	\$ 450
7	85th Street (West side) MH @ 228 / South	239	10	240	\$ 1.50	\$ 360
7	86th Street (East side) MH @ Troy East/North	99	8	380	\$ 1.30	\$ 494
7	86th Street (West side) MH @ Troy (W) /North	75-91	8	507	\$ 1.30	\$ 659
			Total Length (ft)	11588		\$ 17,199

Table I-8
MH-6 Subarea I
Cutting Protruding Laterals

Sewer Sub-Area	Pipe Problem Locations Manhole Entrance Location/Direction	Distance from Manhole feet	Pipe Diameter in	Total Cost \$
Defects: Lateral protruding				
Recommended Rehabilitation Method: Cutting protruding laterals				
6	79th Street MH @ 322 / North	128	10	\$ 2,000
6	80th Street MH @ 300 80th / South	214	10	\$ 2,000
7	85th Street (East side) MH @ 231 / North	104	10	\$ 2,000
7	85th Street (West side) MH @ 228 / South	239	10	\$ 2,000
8	Buffalo Ave. (South side) MH @ 7316 / West	128	8	\$ 2,000
9	73rd Street (East side) MH @ 205 / South	146	10	\$ 2,000
9	Buffalo Ave. (South side) 73rd Street (east side)	39.5	8	\$ 2,000
10	77th Street MH @ 126 / South	261	10	\$ 2,000
11	Valle Drive MH @ s83rd / North	133	8	\$ 2,000
Total				\$ 18,000

Table I-9
MH-6 Subarea I
Cross Connection

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Table I-10
MH-6 Subarea I
Private Property I/I Sources

Sewer Sub area	Manhole Smoke Inject Location	House Number Possible Problem	Street Name	Defect	Rehabilitation Method
6	222	222	78th Street	Roof drain connection	Disconnect roof drain
6	222	234	78th Street	Roof drain connection	Disconnect roof drain
6	222	237	78th Street	Roof drain connection	Disconnect roof drain
6	222	243	78th Street	Roof drain connection	Disconnect roof drain
6	222	247	78th Street	Roof drain connection	Disconnect roof drain
6	117	129	79th Street	Roof drain connection	Disconnect roof drain
6	117	134	79th Street	Roof drain connection	Disconnect roof drain
6	224	212	79th Street	Roof drain connection	Disconnect roof drain
6	224	216	79th Street	Roof drain connection	Disconnect roof drain
6	224	224	79th Street	Roof drain connection	Disconnect roof drain
6	322	304, Garage	79th Street	Roof drain connection	Disconnect roof drain
6	176	151	80th Street	Roof drain connection	Disconnect roof drain
6	304	234	80th Street	Roof drain connection	Disconnect roof drain
6	81st &	8014	Stephenson	Roof drain connection	Disconnect roof drain
7	242	242	83rd Street	Roof drain connection	Disconnect roof drain
7	242	253	83rd Street	Roof drain connection	Disconnect roof drain
7	242	259	83rd Street	Roof drain connection	Disconnect roof drain
7	150	140	86th Street	Roof drain connection	Disconnect roof drain
8	117	127	70th Street	Roof drain connection	Disconnect roof drain
8	231	237	70th Street	Roof drain connection	Disconnect roof drain
8	146	156	72nd Street	Roof drain connection	Disconnect roof drain
8	7404	7314	Buffalo Avenue	Roof drain connection	Disconnect roof drain
8	7404	7318	Buffalo Avenue	Roof drain connection	Disconnect roof drain
9	235	158	73rd Street	Roof drain connection	Disconnect roof drain
9	235	222	73rd Street	Roof drain connection	Disconnect roof drain
9	235	246	73rd Street	Roof drain connection	Disconnect roof drain
9	235	249	73rd Street	Roof drain connection	Disconnect roof drain
9	240	218	74th Street	Roof drain connection	Disconnect roof drain
9	240	223	74th Street	Roof drain connection	Disconnect roof drain
9	240	226	74th Street	Roof drain connection	Disconnect roof drain
9	240	230	74th Street	Roof drain connection	Disconnect roof drain
10	128	134	77th Street	Roof drain connection	Disconnect roof drain
10	128	143	77th Street	Roof drain connection	Disconnect roof drain
10	128	151	77th Street	Roof drain connection	Disconnect roof drain
10	126	126	78th Street	Roof drain connection	Disconnect roof drain
10	126	146	78th Street	Roof drain connection	Disconnect roof drain
11	86th Street	8636/8638 Duplex	Buffalo Avenue NE corner, intersection	Roof drain connection	Disconnect roof drain
11	87th Street &	8651	South end of South 87th Street	Roof drain connection	Disconnect roof drain

APPENDIX D

COLLECTION SYSTEM MANAGEMENT/WORK PRACTICES

**NIAGARA FALLS WATER BOARD
WASTEWATER FACILITIES**

1200 Buffalo Avenue, Niagara Falls, New York 14303-1514

January 28th, 2004

Gerard A. Palumbo, P. E.
Regional Water Engineer
New York State Department of Environmental Conservation
Region 9 : Division of Water
270 Michigan Avenue
Buffalo, New York 14203-2999

Re : Niagara Falls Wastewater Treatment Plant
DEC No. 9-2911-00056/00004
CSO & SSO BMP Annual Report

Dear Mr. Palumbo :

This report has been prepared and submitted to address the requirements in our current State Pollutant Discharge Elimination System (SPDES) Permit (NY-0026336), Part I, Page 16 of 28, Best Management Practice (BMP) No. 15. As stated there, "The permittee shall submit an annual report summarizing implementation of the above best management practices (BMPs)."

1) CSO/SSO Maintenance/Inspection

A written inspection and maintenance program for all SSO's, CSO's and tributary regulators was prepared and issued on May 28th, 2003. Please find a copy of the program enclosed. The program involves the sewer maintenance, operations, monitoring & compliance, and maintenance divisions. The results of the monthly inspections are included with the monthly facility operating report.

In addition to the above, Drop Shaft Zero of the Falls Street Tunnel (FST) was inspected on September 30th, 2003. The results of the inspection were forwarded to the Region 9 office shortly afterward. Permission for an associated short-term "anticipated bypass" for the purposes of flowmeter instrument maintenance had been provided by the Department on September 26th, 2003. Because of the inspection and maintenance activities, a problem with the Outfall 003 flowmeter was found and corrected. The circumstances were documented in an October 14th, 2003 letter to the Department.

Other inspections of components of the sewer collection system in 2003 included :

- A) During July several television inspections of sanitary and storm sewers in the

LaSalle area were conducted as part of an effort to document suspected interconnections. The effort was incorporated into the LaSalle Post-Improvement Assessment being performed by Parsons.

- B) Several entries into Drop Shaft 12, Drop Shaft 13 and Drop Shaft 13A of the Falls Street Tunnel were performed during late fall by the Water Board and URS Corp. in association with a study of FST infiltration near the New York Power Authority (NYPA) conduit intersection. NYPA sponsored the study, which is ongoing, as part of relicensing activities.
- C) An inspection of the Gorge Pumping Station approach channel was performed in late fall in association with Contract 52 work (North Gorge Interceptor Conveyance Restoration).
- D) The Bath Avenue Outfall (008) structure was inspected in March to verify apparent winter structural damage. Overflows discharging through the structure remain largely unimpeded. The remainder of the lower river outfalls (011, 010, 009, 007, 006 and 005) were inspected in April to provide information to consultants proposing on the Long Term Control Plan (LTCP) development.

2) Maximum Use of Collection System for Storage

The greatest degree of collection system storage occurs within the Southside Interceptor (SSI). Shift Operations Supervisors run the main pumps to maintain the influent level in the main wet well within a defined range. As the flow increases the pump speeds are increased in an attempt to maintain the wet well level. During storm events, all available pumps are operated at their highest output. This practice not only maximizes conveyance to the treatment facility, but also maximizes the storage capacity of the interceptor to delay overflow to the Falls Street Tunnel along Royal Avenue for as long as possible into an event.

There are four locations along the FST where flow is detained and allowed to collect within the tunnel :

- 1) At Drop Shaft Zero (DSZ), a large diversion dam in the mainline tunnel and a smaller set of stop logs in the Parshall Flume branch of the tunnel retain flow behind them, directing it through the rectangular orifices and into the South Gorge Interceptor. When functioning properly, all dry weather flow and a measure of wet weather flow will be retained before the stop logs are overtopped and CSO passes through the flume and on to the river.
- 2) At Drop Shaft 11 in Hyde Park Blvd., the construction of Regulator 6A resulted in restricting the upper portion of the tunnel at that location, creating a static sluice gate behind which excess wet weather flow is retained.
- 3) At Drop Shaft 13A, a concrete weir wall was constructed in 1989 as part of Contract 32 construction work to direct tunnel infiltration to the Southside Interceptor. The weir wall also functions to retain a measure of wet weather flow before overtopping.

- 4) Just upstream from Regulator 8, there exists hard debris currently restricting flow through that portion of the tunnel. One impact of the restriction is to attenuate tunnel flow by retaining upstream wet weather flows in the 47th Street & New Road tunnels. All upstream flow is stored within the system until released past the restriction, as there are no upstream overflow points.

As described under BMP 12, there are several catch basin restrictors installed in various parts of the combined sewer system. The units act to temporarily store street run-off in the basins and along adjacent curbs, thereby lessening storm peaks in the combined sewers.

The operation of the system of regulators on the combined sewer system will be examined under the LTCP. The existing configuration of regulator orifices and overflow weirs will be evaluated with respect to conveying higher strength industrial flows to the treatment plant as well as system storage during wet weather events.

In the sanitary sewer system, the lift station wet wells and incoming sewers provide temporary storage of elevated wet weather flows. Bypassing and SSO activation only occurs when basement flooding and property damage is imminent. Recent upgrades to the two most prominent LaSalle lift stations (LS-4, Luick Avenue and LS-6, Frontier Avenue) included improvements to the bypassing system to better optimize system storage, thereby reducing the magnitude of SSO events. It is believed that the improvements have helped lead to markedly reduced bypassing in 2003, as detailed under BMP 6.

During 2003 the Porter Road Drainage Project was completed, which removed roadway runoff from the combined sewers on Porter Road (between Hyde Park Blvd. and Gill Creek) and directed the flow to a new outfall on Gill Creek. This was undertaken in conjunction with sewer cleaning, catch basin cleaning, and catch basin flow restrictors, in order to alleviate capacity and surcharging problems affecting Seneca Avenue, east of Hyde Park Blvd.

3) Industrial Pretreatment

The POTW currently has 27 permitted Significant Industrial Users (SIU's). Three of those SIU's are hauled waste customers, and deliver their wastestreams directly to the treatment plant, not using the collection system. Of the remaining 24 local SIU's, there are three (SIU #51 – Kanthal Global, SIU #53 – Ferro Electronics Materials, SIU #49 – Occidental / Hyde Park whose wastestream comes to the treatment plant via the North Gorge Interceptor and the Gorge Pumping Station. The other 21 SIU's arrive at the treatment plant via the SouthSide Interceptor.

The existing High Flow SOP considered the location and nature of these industrial flows when establishing flow diversion priorities, primarily involving the Gorge Pumping Station and regulator closing sequence. The SIU listing and distribution will be updated and considered when the High Flow SOP is developed into the wet weather operating plan referenced in Item #5 (below).

Non-contact cooling water is excluded from the combined collection system to the extent practical; Niagara Falls Water Board Regulations [1960.4 (b) (2)] prohibit the discharge of uncontaminated storm water runoff, uncontaminated surface runoff, or uncontaminated cooling water to the sanitary sewer system. The 5 permitted users of the Diversion Sewer include the following facilities :

	<u>SPDES Permit</u>
Occidental Chemical Co.	NY-000-3336
Praxair, Inc.	NY-010-8251
E. I. DuPont de Nemours & Co.	NY-000-3328
Olin Corporation	NY-000-1635
Washington Mills	NY-020-3335

These discharges combine with treatment plant effluent (after sampling) in the Ice Shaft and Adams Tailrace Tunnel, entering the river at Outfall 004. Any user of the diversion sewer is required to provide a continuously and immediately accessible control manhole suitable for inspection, observation, sampling, testing, and measurement of their discharge [1960.4 (b) (7)].

There are currently 7 industrial permittees whose operations involve batch discharges :

Niagara Custom Plating (#18) : Discharges of 100 – 200 gallons/day contain very low levels of metals, with no persistent toxics. Flow passes through Regulator #6A.

Occidental / Hyde Park (#49) : Full carbon treatment results in a very low pollutant loading to the collection system. Flow passes through the Garfield Tunnel Regulator and the Gorge Pumping Station.

102nd Street Landfill : This discharge is piped directly to the Occidental / Love Canal treatment facility.

Occidental / Love Canal (#44) : Full carbon treatment results in a very low pollutant loading to the collection system. Discharge is suspended upon notification of bypass pumping at the Luick Avenue Lift Station (Outfall 013). Flow passes through Luick Avenue Lift Station, Frontier Avenue Lift Station and Regulator #8.

Philips Services (#42) : All new wastestreams are screened for pollutants including persistent toxics and priority pollutants to meet local limits/WQS prior to approval. Flow passes through Regulator #4B.

CRS Truck/Trailer Services (#46) : The same procedure is followed as described for Philips Services (#42), above. Flow passes through Regulator #2B.

Goodyear / Forest Glen (#61) : This is a new wastestream with low pollutant loadings. Discharge is suspended upon indication of overflow at Regulator #8.

Collection system capacity issues are considered with respect to the industrial users with continuous discharges. Sewer maintenance concerns, potential difficulties with other connected customers, and the ability of regulators to pass all dry weather flow to their associated interceptor are all considered. The impact of persistent toxics from new SIU's will be considered in accordance with TOGS 1.3.8. The next review of local limits shall also consider the effects upon CSO's and SSO's.

4) Maximize Flow to POTW

Flushing sewers to remove accumulations of debris and restore their hydraulic conveyance capability is a prominent component of the sewer maintenance program. A third combination flushing/vacuuming truck was added to the maintenance fleet in 2003. During 2003, 42.0 miles of sewers were cleaned, up from 27.5 miles in 2002; the four-year average (1999-2002) has been 46.3 miles.

Tunnel cleaning for Contract 52, North Gorge Interceptor Conveyance Restoration (CWSRF No. C9-6664-08-00) commenced in 2003 and is continuing in 2004. The job involves removing and disposing of rock, hard debris and sediment that has been obstructing the tunnel for some time. As of January 10th, 2004, 1975.53 cubic yards of debris had been removed from stretches near Shaft 14 (Chasm Avenue) and Shaft 10 (Cleveland Avenue). Operation of the bypass pumping system around the work zone has increased wet weather conveyance from upstream of Shaft 14 to the Gorge Pumping Station. Work is expected to continue through Spring 2004.

As a temporary construction measure, permission was obtained from the Department (by letter dated August 12th, 2003) to restrict the openings from the Garfield Avenue regulator structure (upstream from Outfall 011) and the Maple Avenue regulator structure (upstream from Outfall 010). The restrictions have reduced the magnitude of wet weather flow passing into the North Gorge Interceptor, mitigating safety and logistical issues for the Contract 52 contractor. The restrictions shall be removed as part of job demobilization, returning the structures to their normal function.

The Falls Street Tunnel also has a portion that is partially obstructed, from Drop Shaft 13A at the NYPA conduit cross-over to Drop Shaft 15 at 47th Street. A tunnel cleaning project similar to Contract 52 is planned for 2006 (CWSRF No. C9-6664-13-00).

The wastewater treatment plant is operated such that as much flow as possible is brought into the plant for treatment. At least 65 MGD of primary influent flow is achieved and at least 22 carbon filters are available for wet weather treatment before flow reduction measures such as regulator operation, carbon filter bypass, or GPS flow reduction occurs. When necessary, regulators are operated in accordance with the High Flow SOP, where regulators with a high proportion of industrial flows have a higher treatment priority over those with largely residential flows. Facility operation in wet weather is summarized in annual reports; the 2003 report was submitted to the Department on January 5th, 2004.

It was been observed that the annual average flow received at the treatment plant continued to decline in 2003. The average flow for 2003 compares to recent years as shown below :

<u>Year</u>	<u>WWTP Annual Average Flow</u>
2003	31.8 million gallons per day
2002	32.7 million gallons per day
2001	33.5 million gallons per day
2000	36.2 million gallons per day

The average for the decade of the 1990's was 37.8 mgd. The reasons for flow reduction include Falls Street Tunnel infiltration control measures, reductions in industrial discharges, and decreased water sales, which results in decreased wastewater generation. While this trend creates financial hardships that impact the utility, it also produces a greater capacity for wet weather flows through the collection system and through the treatment plant.

5) Wet Weather Operating Plan

A wet weather operating plan will be developed and submitted to Region 9 staff for Department review and approval by June 1st, 2004, as required by BMP #5. Our present Standard Operating Procedure (SOP) for High Influent Flows (submitted to the Department on November 21st, 1997 with the Annual Storm Flow Optimization Report) shall serve as the basis for our plan. The SOP will be updated and expanded as necessary. The operational philosophy behind the SOP and the plan will continue to involve providing full treatment for as long into a storm event as possible. When full treatment is no longer possible, treatment priority will be given to higher strength, industrial flows over lower strength domestic wastes.

6) Prohibition of Dry Weather Overflow

Collection system outfalls are inspected regularly to ensure that dry weather overflow is not occurring and, if found, it is reported and abated promptly. Reports of these inspections are submitted with the monthly operating report. During 2003 no instances of dry weather overflow were found in the LaSalle sanitary sewer system (Outfalls 013 >> 019). No instances of dry weather overflows were found at CSO Outfalls 003, 005, 008, 010 or 011.

Discharges from the Cleveland Avenue Outfall (007) were observed in March, April and May. A large amount of material deposition within the North Gorge Interceptor (NGI) was known to be limiting conveyance through the NGI to the Gorge Pumping Station. This in turn created surcharging in the upstream tunnel and connecting shafts, including the one (No. 10) connecting the NGI to the Cleveland Avenue Tunnel. In May of 2003 the Contract 52 contractor mobilized to begin tunnel cleaning operations. The construction and operation of a bypass pumping system around the work area eliminated the surcharge and related Outfall 007 discharge problem.

Minor problems with the Contract 52 bypass pumping system resulted in three overflows on June 9th, August 20th and November 17th. The noncompliance reports previously filed with the Department detail the circumstances of pump shutdown, pipe weld failure and pump maintenance as the causes of the overflows. Cleaning operations and bypass pumping will continue into 2004.

Numerous dry weather overflows occurred during 2003 at Outfall 006, the Gorge Pumping Station (GPS). A meeting was held with Region 9 staff on November 26th to review the causes and corrective actions. The causes generally involved pump bearing overheating, variable frequency drive (VFD) faults & failures, check valve failures, and losses of incoming power. Corrective actions have included check valve repairs, VFD repairs, exploration of VFD upgrade options, seeking outside assistance with bearing problems, verifying VFD pump restart programming, verifying the automatic station power transfer system, and pursuing power quality and reliability issues with our electric utility, Niagara Mohawk. These efforts are ongoing. Since the November 26th meeting, one additional dry weather overflow occurred in 2003, on December 26th. The 10 minute overflow on that date was due to the loss of station power.

Sanitary Sewer Overflow (SSO) events are tracked and summarized on a monthly report, submitted with the monthly operating report. These overflows occur at Outfalls 013 >> 019. The total duration of overflow at all outfalls, all events during 2003 was 135.3 hours. This total is down from the 2002 total of 492.2 hours and the five year (1998 >> 2002) average of 362.9 hours. Since the revised discharge permit became active on June 1st, no wet weather bypass pumping at other, non-permitted locations, was necessary. An engineering report concerning continued SSO performance improvement will be submitted to the Department by June 30th, 2004, in accordance with Compliance Schedule (e) on page 25 of 28 in our SPDES permit.

7) Control of Floatable and Settleable Solids

Measures implemented for BMP's 1, 2 and 4 also have favorable impacts on floatable and settleable solids control. Additionally, it is our standard practice to have collection system catch basins trapped and sumped. We have found that this aids in keeping the combined sewers clear of debris. It also makes system maintenance easier by collecting debris in the sumps, which are accessible for cleaning by vacuum trucks. There were 860 catch basins cleaned in 2003. Our four year average (1999 – 2002) was 1023 catch basins cleaned per year.

8) Combined Sewer System Replacement

Combined sewer repair work in 2003 involved spot repairs, where very short stretches are replaced in-kind due to pipe collapses or other specific defects. No large scale combined sewer construction occurred during the year.

9) Combined Sewer/Extension

No extensions to the combined collection system were undertaken in 2003. No extensions are anticipated for 2004.

Niagara Falls Water Board Regulations prohibit the discharge of excessive amounts of infiltration to any sanitary or combined sewer [1960.4 (b) (3)]. The Regulations also prohibit the discharge of inflow to any sanitary sewer [1960.4 (b) (4)].

10) Service Backups

Since September, 1995, the facility has been including summaries of all reported instances of service backups, overflows, etc. with the monthly facility operating report. The sewer complaints can include water in the basement (backups), water in the street, catch basin problems, manhole cover problems, sewer odors, and blocked sewer mains. The complaints are addressed by our sewer maintenance crews, who also respond to underground utility location inquiries, lift station maintenance, corrective and preventative sewer cleaning, sewer repairs, regulator inspection and repairs, and appurtenance repair and/or replacement.

During 2003, an average of 1.7 sewer complaints were received per day, down slightly from a four-year (1999-2002) average of 1.9 complaints per day. About 44 percent of the complaints were water in the basement complaints. The vast majority of these were found to be homeowner problems, where the sewer main was found to be functioning properly. Typical homeowner problems include root intrusion into laterals, collapsed laterals, and plugged or partially plugged laterals.

11) Septage and Hauled Waste

The release of septage or hauled waste upstream of a CSO or SSO has been, and continues to be, prohibited. This prohibition is contained in the Niagara Falls Water Board Regulations Section 1960.4 (a) (3). The wastewater treatment plant is the only location that accepts septage or hauled waste. Liquid waste and septage are accepted into the facility's plant sewer, which routes the waste to the head-end of the treatment process. Waste with a high solids content may be accepted into one of the facility's two gravity thickeners; overflow from the thickeners is also conveyed to the facility's head-end via the plant sewer.

The transport and receipt of septage and hauled waste is regulated by a well-established system of permits and approvals. Presently, there are 19 firms permitted to transport waste to the wastewater treatment plant. Septage haulers have daily and/or weekly limits on the volume of septage they may discharge at the plant; as a practical matter, very little septage was received for treatment during 2003. Generators of other waste that is transported to the plant are also subject to an approval and permitting process. After having modest annual gains since 1996, 2003 produced a reduction in the facility's hauled waste business of 20 percent, approximately down to 2000 levels.

12) Control of Run-off

It continues to be our standard policy to allow commercial customers a single 6 inch storm water connection to the combined collection system. Depending upon roof area, parking lot size, etc., the customer then determines the type and volume of onsite run-off retention necessary to prevent flooding for a ten-year storm event. Measures typically constructed include retention ponds and underground pipe networks. If the development involves multiple catch basins connected in series, we require the last basin before the combined sewer connection to have a sump and trap. These measures greatly reduce the rate at which run-off from private sources enters the combined sewers, attenuating surcharge and conveyance-related problems.

Approximately 50 catch basin outlet restriction devices have been installed in various portions of the combined collection system. These devices slow the rate at which street run-off enters the sewers by creating temporary storage within the basin and along adjacent curbs. The fabrication and installation of additional units is expected to be a component of the LTCP to be developed.

The removal of storm water from the combined collection through sewer separation will also be considered in the developing the LTCP. One 2003 project described in BMP 2 was the Porter Road Drainage project, where street run-off was removed from the combined sewers and directed to a new street drainage system. Similar opportunities are in development for 2004.

13) Public Notification

Identification signage remains posted at Outfalls 001, 004 and 006, as required. Inspection and maintenance of these signs is addressed in the written program described under BMP #1. Replacement signs for the locations are in storage at the treatment plant for use as necessary. Please note that Outfall 001 (Wastewater Treatment Plant) and Outfall 004 (Diversion Sewer) share one physical outfall structure, and are labeled with one sign containing the appropriate text.

By letter dated February 26th, 1998, the Department granted a signage waiver request for Outfalls 003, 005, 007, 008, 009, 101, 011, 012, 013, 014, 015, 016, 017 and 018. By letter dated June 5th, 2003, the Department transmitted a Notice of Waiver, in response to a signage waiver request for Outfalls 019, 01A and 02A.

The facility has established a Public Information File, located in the Administration Building at the wastewater treatment plant. The file is available to any member of the public during normal business hours. The contents of the file is as follows :

Section 1

Copy of SPDES Permit NY-0026336 dated 4-23-03

Copy of SPDES Permit Amendment transmitted 8-8-03

Section 2	Collection System & Outfall Maps
Section 3	Outfall Photographs
Section 4	Copies of Newspaper Public Notices
Section 5	Copies of Inspection Reports for Regulators, Outfalls, Outfall Signage, NGI Shaft 10 Surcharge
Section 6	Gorge Pumping Station (Outfall 006) CSO Data
Section 7	Falls Street Tunnel (Outfall 003) Inspection Reports
Section 8	LaSalle Area (Outfalls 013 – 019) SSO Data
Section 9	CSO/SSO Best Management Practices Annual Report
Appendix A	Copies of Discharge Monitoring Reports (DMRs)
Appendix B	Copies of Collection System Complaint Reports

The file is continually updated with new reports and information.

The public is informed as to the existence and availability of the public information file through a series of newspaper notices. The notices are placed quarterly in the Niagara Gazette. During 2003 the notices appeared on June 16th, September 12th and December 15th. A copy of the December 15th notice is enclosed.

14) Characterization and Monitoring

At present, two of the permitted CSO outfalls (003 Falls Street Tunnel and 006 Gorge Pumping Station) have equipment for overflow measurement. This equipment is operated continuously. Records of Gorge Pumping Station overflow and rainfall are submitted with the monthly operating report. Records of Falls Street Tunnel overflow are maintained at the treatment plant.

During 2003, the duration of overflow from the Falls Street Tunnel increased slightly, while total overflow volume for the year decreased slightly. Please refer to the table below :

Year	Overflow Events	Overflow Duration	Overflow Volume
2003	39	119.7 Hrs.	67.61 MG
2002	24	105.5 Hrs.	71.66 MG
2001	34	74.1 Hrs.	47.82 MG

Table 1 : Falls Street Tunnel Overflow Trends

Similar behavior was observed at the Gorge Pumping Station overflow in 2003, where the duration of overflow increased slightly while the volume of overflow decreased :

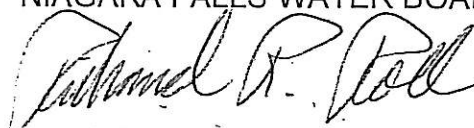
Year	Rainfall	Overflow Duration	Overflow Volume
2003	32.8 in.	204.0 Hrs.	54.6 MG
2002	30.4 in.	202.0 Hrs.	70.6 MG
2001	28.3 in.	151.2 Hrs	42.0 MG

Table 2 : Gorge Pumping Station Overflow Trends

At present, an up-to-date computer model of the combined collection system does not exist. However, system modeling is planned as part of the LTCP CSS Characterization Monitoring and Modeling effort. Overflow information at other permitted outfalls would also be collected, as would overflow quality information.

If you have any questions on this information, please contact me at 286-4992.

Sincerely,
NIAGARA FALLS WATER BOARD



Richard R. Roll, P. E.
Environmental Engineer

encls

cc : W. Bolents, Jr. w/o encls
D. Crocker w/o encls
J. Hook w/o encls
A. Zaepfel w/o encls
NYSDEC/DOW-Albany
NCHD-Lockport

Attachment 1 : Photographs



Photo 1 : Niagara Falls Wastewater Treatment Plant



Photo 2 : Removing Falls Street Tunnel Drop Shaft Zero Vault Cover

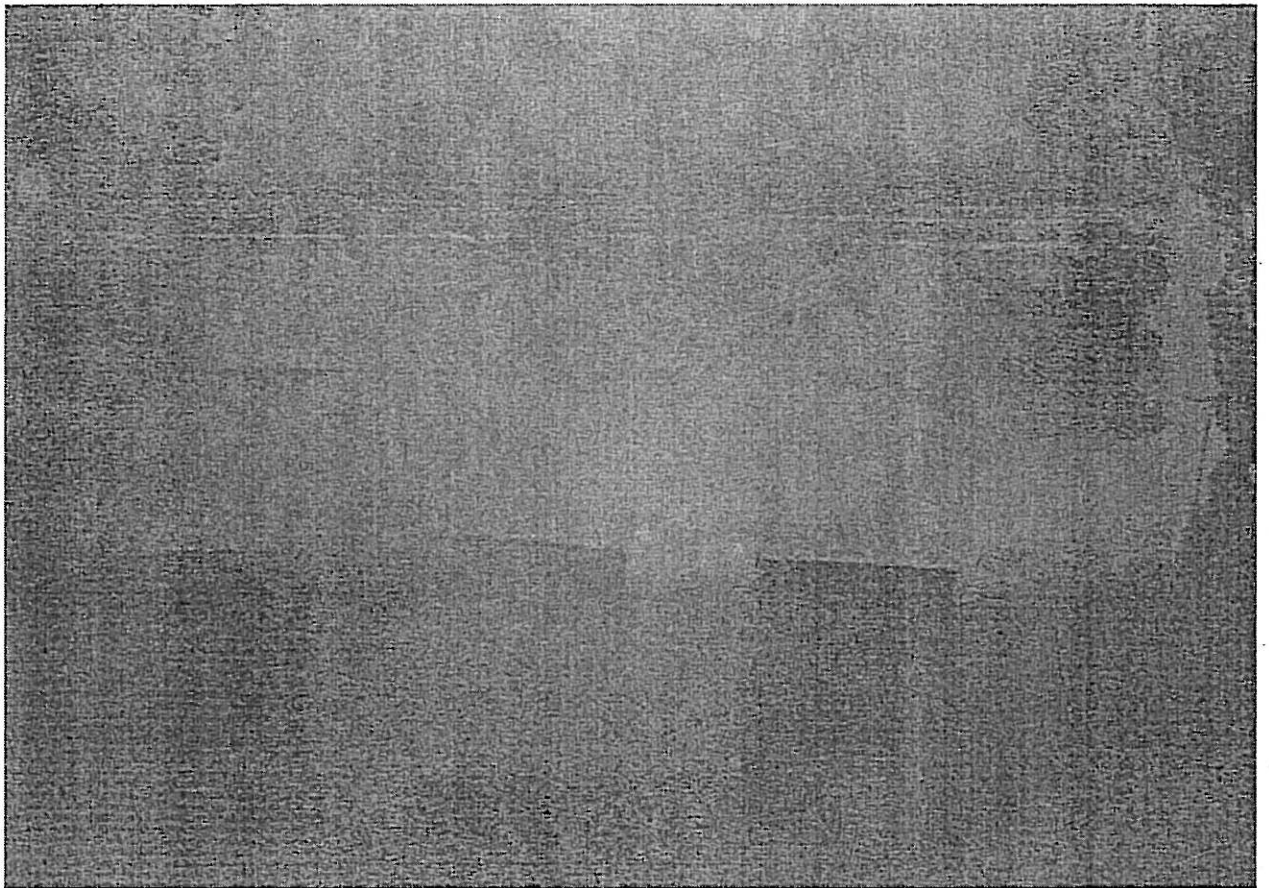


Photo 3 : Falls Street Tunnel / South Gorge Interceptor Twin Orifices

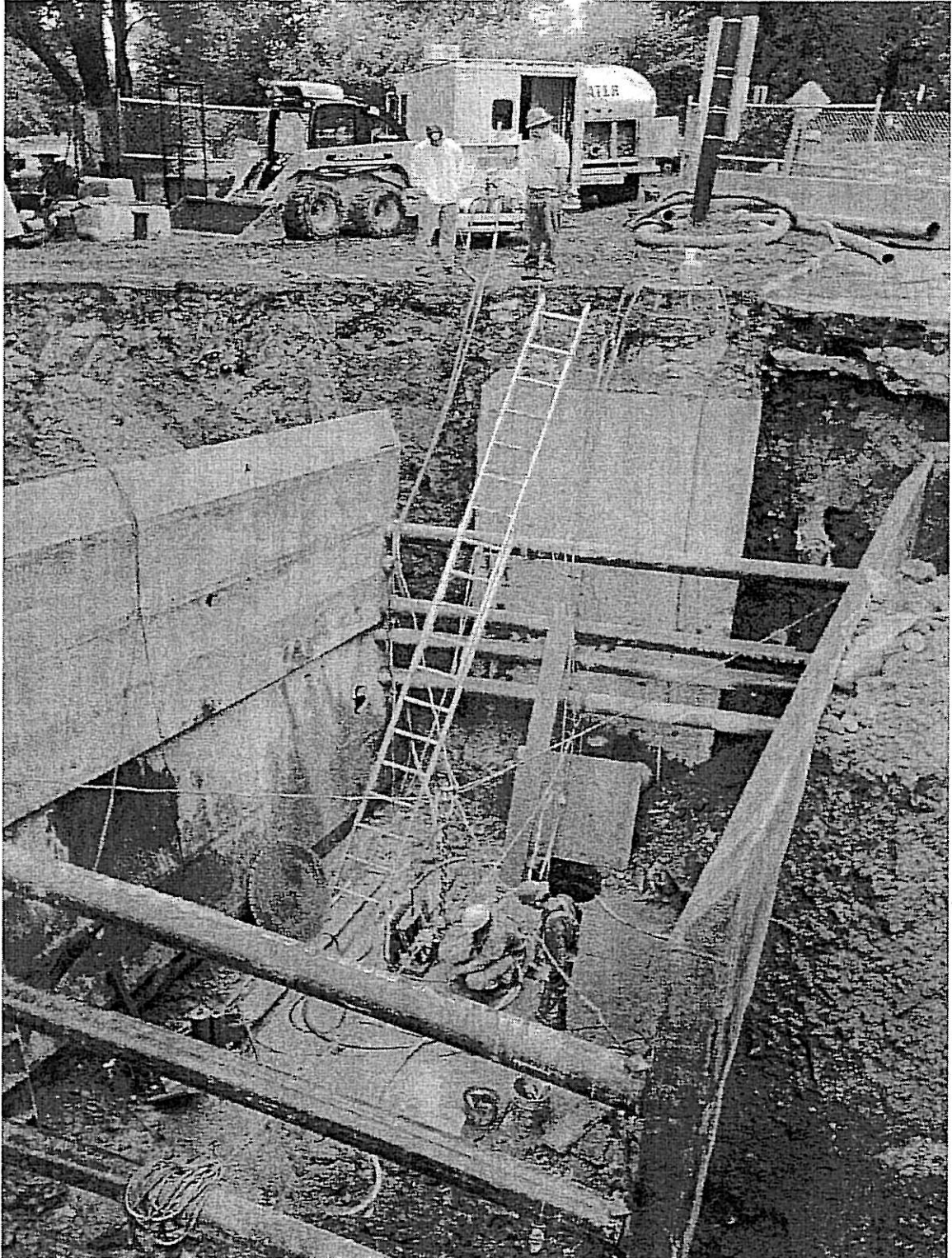


Photo 4 : Contract 52 North Gorge Interceptor Shaft 14 Excavation

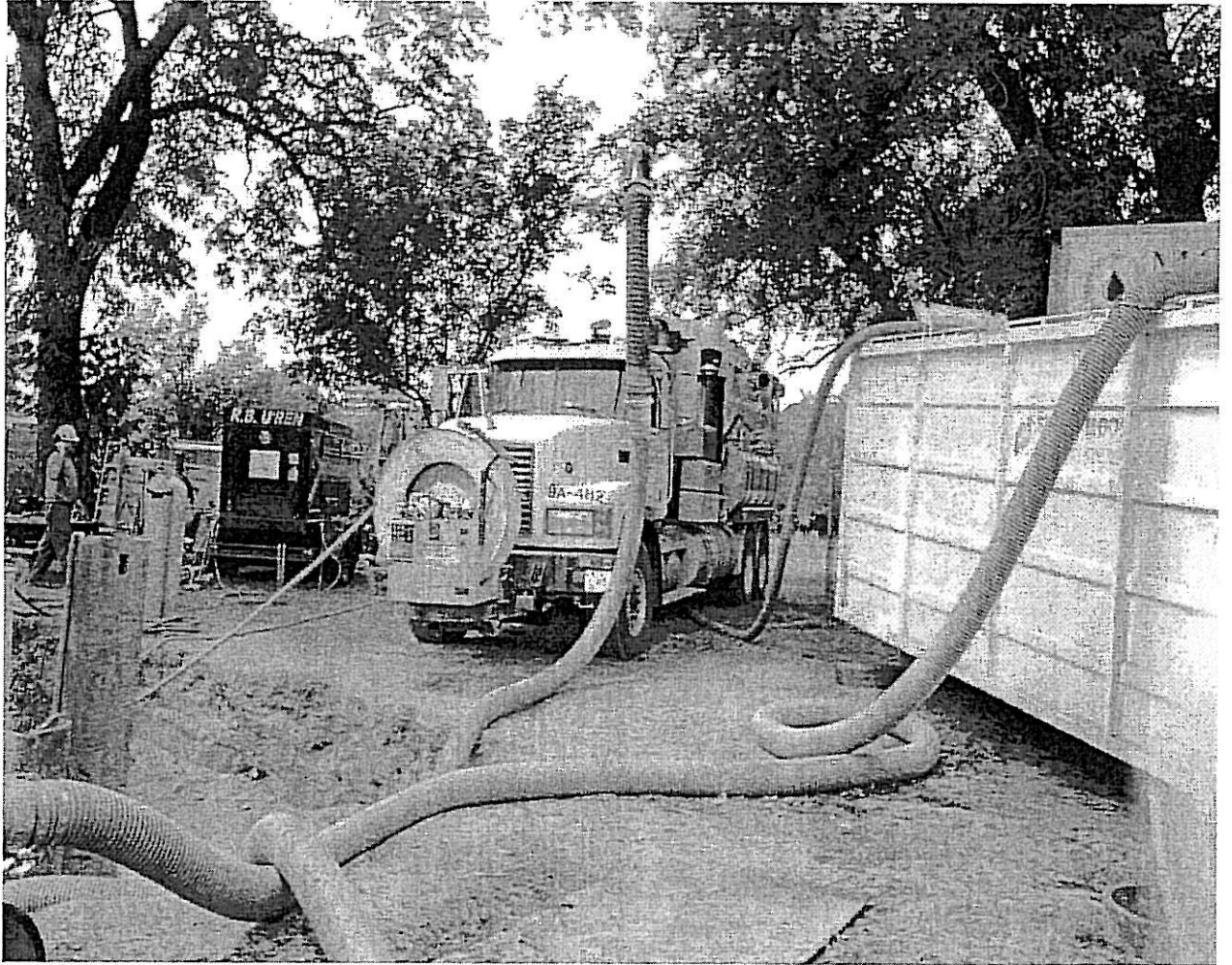


Photo 5 : Contract 52 North Gorge Interceptor Cleaning Equipment

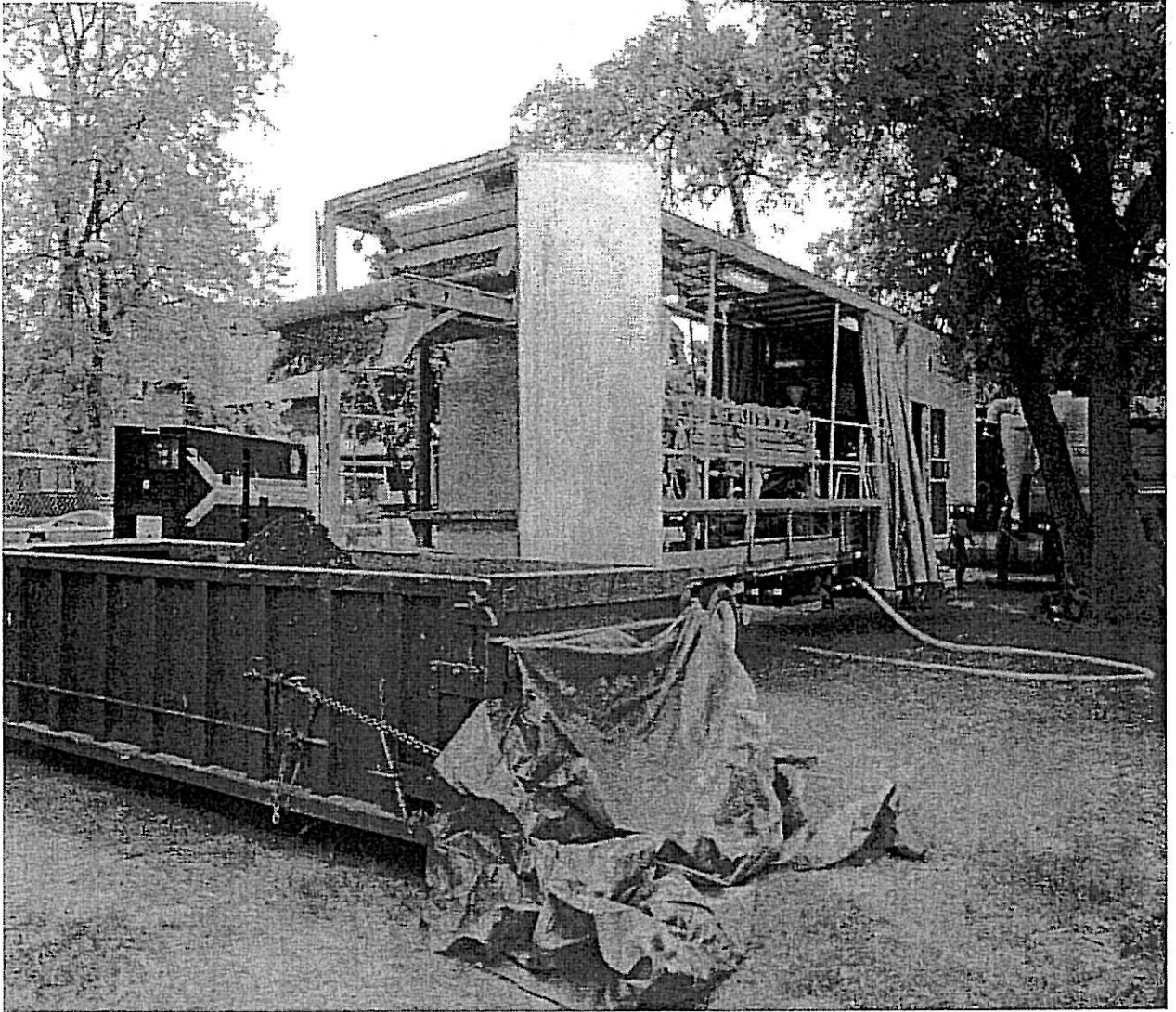


Photo 6 : Contract 52 Belt Filter Press & Debris Roll-Off Container

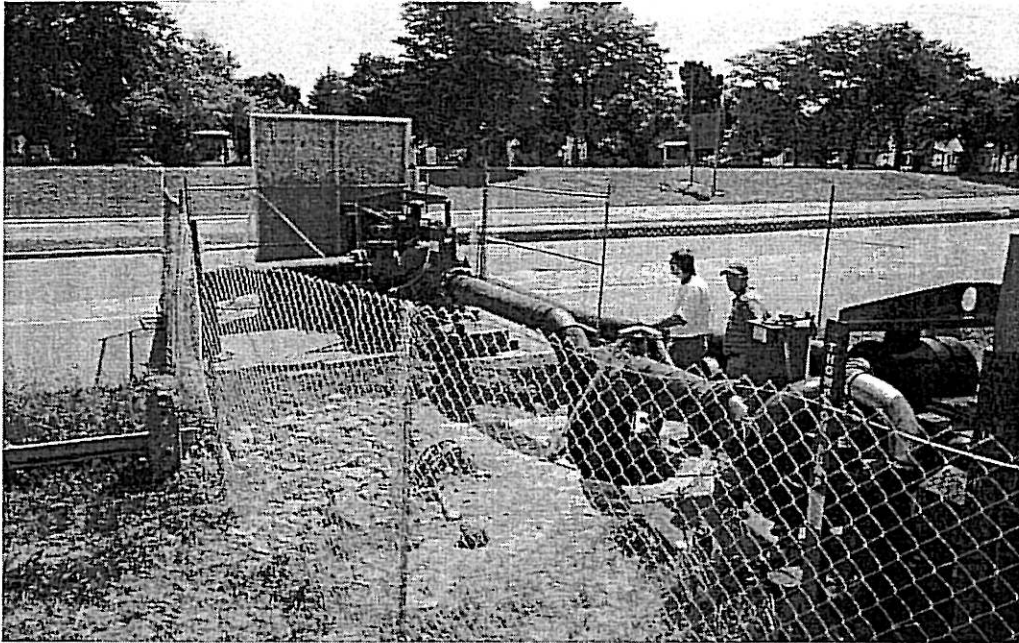


Photo 7 : Contract 52 Bypass Pumps



Photo 8 : Contract 52 Bypass Pipeline

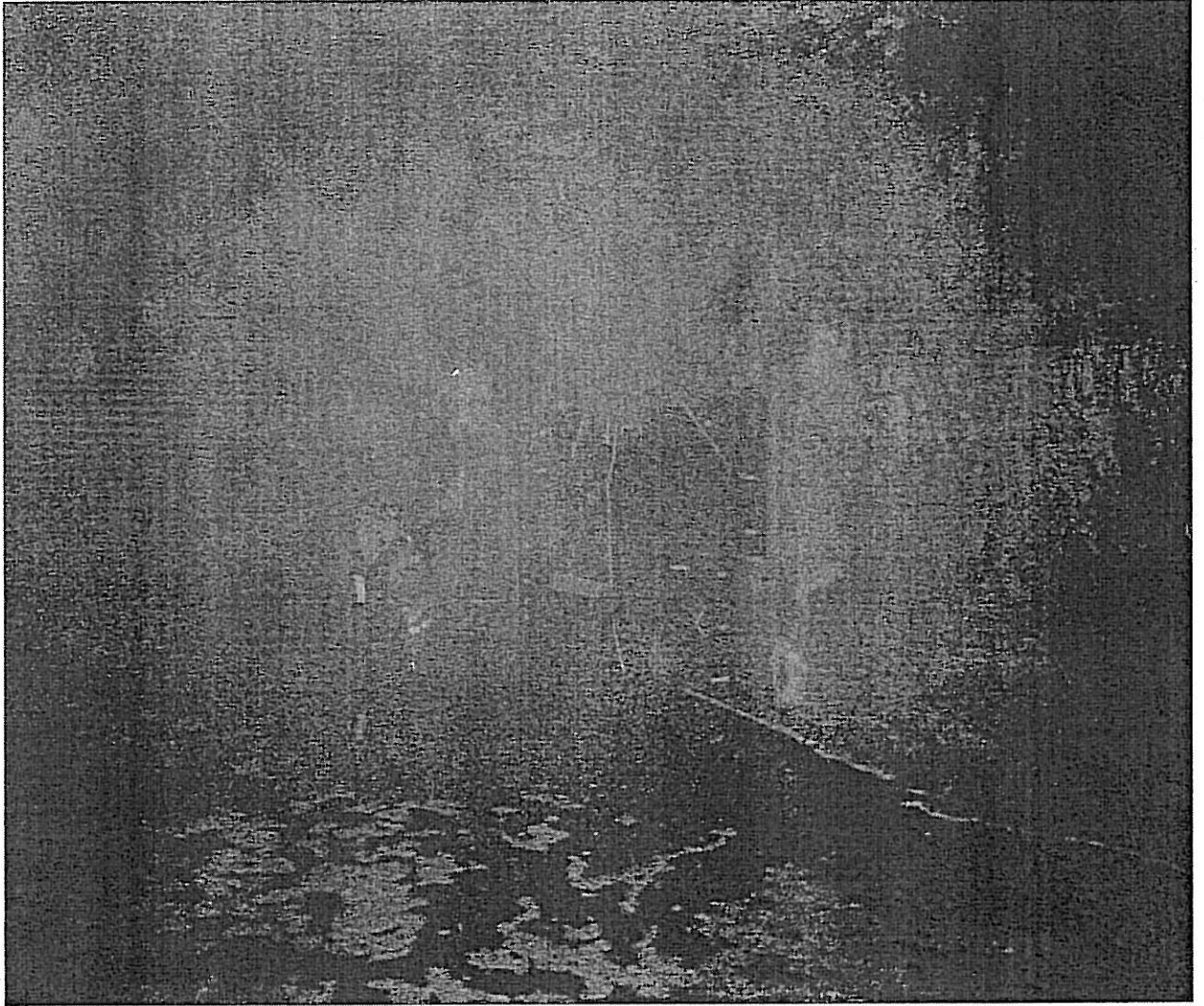


Photo 9 : Contract 52 Garfield Tunnel / North Gorge Interceptor Connection



Photo 10 : Inspecting Gorge Pumping Station Approach Tunnel

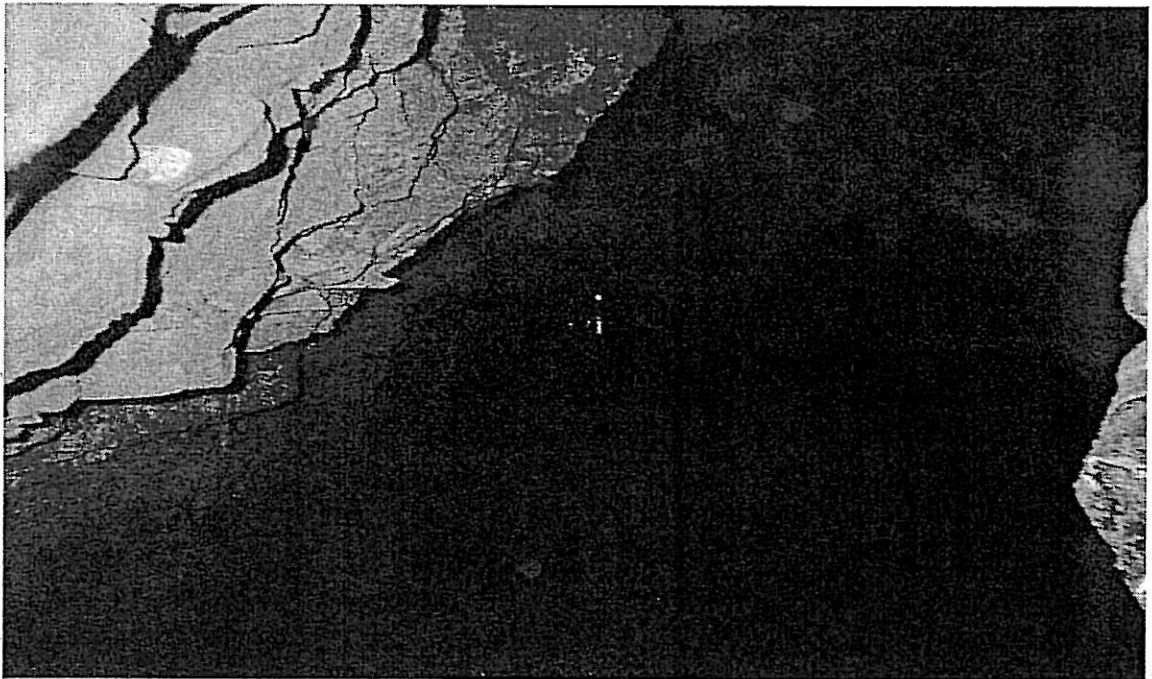



Photo 11 : Inspecting Gorge Pumping Station Approach Tunnel



CITY OF NIAGARA FALLS, NEW YORK

TO: File

FROM: Richard R. Roll 
Environmental Engineer

SUBJECT: CSO/SSO Best Management Practice #1
Inspection and Maintenance Program

DATE: May 28th, 2003

Best Management Practice #1 for combined and sanitary sewer overflows (attached) in SPDES Permit No. NY-0026336 requires the existence of a written maintenance and inspection program for CSO's and SSO's. This document constitutes the program intended to satisfy this requirement.

Responsibility for inspection of the CSO's and SSO's is divided between the sewer maintenance (OSM), operations (OPS) and monitoring & compliance (M&C) divisions. The breakdown is as shown below:

<u>Outfall</u>	<u>Type</u>	<u>Description</u>	<u>Division</u>
003	CSO	Falls Street Tunnel	OPS/M&C
005	CSO	Walnut Avenue	OSM
006	CSO	Gorge Pumping Station	OPS
007	CSO	Cleveland Avenue	OSM
008	CSO	Bath Avenue	OSM
009	CSO	Chasm Avenue	OSM
010	CSO	Maple Avenue	OSM
011	CSO	Garfield Avenue	OSM
013	SSO	LS#4, 91 st & Luick Ave.	OSM
014	SSO	LS#6, 81 st & Frontier Ave.	OSM
015	SSO	LS#7, Military & Bollier Ave.	OSM
016	SSO	LS#1, 81 st & Stephenson Ave.	OSM
017	SSO	Mang Ave. & Cayuga Drive	OSM
018	SSO	West Rivershore Drive	OSM
019	SSO	76 th & Stephenson Ave.	OSM

Falls Street Tunnel CSO Outfall (003) :

Operations is responsible for continuously monitoring the FST trend recorder located in the control room. The recorder indicates overflow from the tunnel to the lower river as measured by a Parshall Flume installed in Drop Shaft Zero (DSZ). The recorder should indicate no flow (overflow) in dry weather and during low intensity wet weather events. If this is not the case, a direct visual observation must be made to verify no overflow. If no overflow is observed, the instrumentation group must be notified in order to determine the reason for flow indication and to take corrective measures in the bubbler, telemetry or trend recording systems.

The outfall may be directly observed from the Rainbow Bridge. No sign of flow indicates that all tunnel flow is passing through the DSZ bulkhead orifices and into the South Gorge Interceptor (SGI). It is possible to observe flow exiting the outfall that is not tunnel overflow. This is because of a storm water drainage connection to the tunnel between the flume and the outfall. If flow is observed, a second observation into DSZ is necessary to confirm the absence of tunnel flow through the flume.

If there is dry weather overflow to the river, it may be due to closed or obstructed upstream regulators, or an obstructed DSZ bulkhead orifice. Sewer maintenance is to be contacted to verify that all regulators are directing flow to the SouthSide Interceptor (SSI). If all regulators are functioning properly and FST overflow persists, an access contractor must be retained to allow an inspection of the DSZ orifices. This is typically done under a purchase order, and involves 3 – 6 hours work. The New York State Department of Environmental Conservation (DEC) and Niagara Falls Bridge Commission (NFBC) must be informed in advance of performing this work. As required in BMP #6, the DEC is to be contacted within 24 hours of the discovery of any dry weather overflow; a written report describing the event is to be submitted to the Region 9 office within 14 days.

In addition to continuous monitoring of the FST trend recorder by operations, Special Condition A of the permit (page 22 of 28) requires inspections on the second and fourth Thursday of each month. The monitoring and compliance group performs these inspections and conducts sampling of the overflow if necessary. If sampling is not necessary, the inspection is used to verify the absence of dry weather overflow and address any inconsistencies or unusual observations. The inspection forms from each inspection event (2/month) are to be included with the monthly facility operating report.

Gorge Pumping Station CSO Outfall (006):

Operations is also responsible for continuously monitoring the GPS overflow trend recorder, located in the same cabinet as the FST overflow trend recorder. The GPS recorder indicates flow from both north and south overflow channels at

the GPS. As with all other CSO/SSO outfalls, overflow in dry weather is prohibited; if overflow at the GPS is indicated, it must be visually verified. This may be done in the approach channel area adjacent to the wet well area, or by observing the outfall. Actual overflow in dry weather could be caused by an unusual spike in GPS influent flows (such as the City Market watermain break of June, 2002), obstructions on one or both bar racks, or by problems in the pumping/force main system. Maintenance personnel are to be contacted to diagnose and correct problems related to the GPS mechanical systems.

It is a normal condition to overflow at the GPS in moderate-to-heavy wet weather events. During such times, if the Gorge Force Main (GFM) flow meter has peaked and no overflow is registering, the overflow channel bubbler/telemetry system may be malfunctioning. The instrumentation staff is to be contacted to diagnose and correct the problem.

A day-by-day summary of GPS operations, including pumpage, wet weather overflow and dry weather overflow, is to be included with the monthly facility operating report submitted to the DEC.

Remaining CSO/SSO Outfalls:

The remaining outfalls are to be regularly inspected by sewer maintenance staff. Dry weather inspections are to be conducted on a monthly basis to ensure the absence of dry weather overflow. A sample inspection form is attached; completed forms must be included with the monthly operating report. Permit compliance may be determined by observations at the following specific locations:

Walnut Avenue CSO (005)

Check for overflow over both weirs (north/south) in the diversion chamber east of the Robert Moses Parkway near the Niagara Gorge Discovery Center. The 12 inch vertical borehole should be conveying all wastewater to the SGI.

Cleveland Avenue CSO (007)

Due to both shallow and deep connections, and the inability to observe the overflow weir within the tunnel without a confined space entry, check for the absence of flow at the outfall pipe outlet on the lower river. Alternately, open the North Gorge Interceptor (NGI) Shaft 10 cover in the Parkway Pedestrian Walking Path and measure the distance to the water surface below, which should be 100 feet or greater.

Bath Avenue CSO (008)

Check for overflow in the shallow weir chamber at Whirlpool Street and

Bath Avenue, near the Whirlpool Bridge approach. The 12 inch borehole should be conveying all wastewater to the NGI.

Chasm Avenue CSO (009)

Check for overflow at the north weir in the 30 inch pipe (within the manhole in the street at Chasm Avenue & Whirlpool Street) and the south weir (48 inch pipe) in the diversion chamber adjacent to the west curbline. All wastewater should be conveyed into NGI Shaft 14, south of the diversion chamber.

Maple Avenue CSO (010)

Check for overflow in the weir chamber located in Whirlpool Park. All wastewater should be conveyed to NGI Shaft 18 through the 12 inch connection.

Garfield Avenue CSO (011)

Check for the absence of flow in the Garfield Avenue Tunnel downstream of the diversion weir by observing at the shaft connection.

91st & Luick Lift Station SSO (013)

Check to ensure that the bypass pump is not operating and has recorded no additional run-time hours since the previous bypass event.

81st & Frontier Lift Station SSO (014)

Check to ensure that the bypass pump is not operating and has recorded no additional run-time hours since the previous bypass event.

Military & Bollier Lift Station SSO (015)

Check to ensure that the bypass pump is not operating and has recorded no additional run-time hours since the previous bypass event.

81st & Stephenson Lift Station SSO (016)

Check to ensure that the overflow run-time meter has not recorded any additional overflow since the previous wet weather event. Inspect the station discharge manhole to ensure that no debris or obstructions are present at the sanitary sewer outlet.

Mang & Cayuga Drive SSO (017)

Check to ensure that the bypass pump is not operating.

West Rivershore SSO (018)

Check to ensure that the bypass pump is not operating.

76th & Stephenson SSO (019)

Open the storm sewer manhole in the intersection and ensure that no sanitary sewer overflow is entering through the connecting relief pipe.

If dry weather overflow is observed at any of these locations, it is to be reported to the DEC within 24 hours, and investigated to determine the appropriate corrective actions.

Falls Street Tunnel Regulator System

A series of regulator structures constructed in the 1970's and 1980's directs flow from the combined sewer system to either the FST, the SSI or both. The sewer maintenance staff is to inspect each regulator monthly to ensure that all control valves are open and dry weather flow is conveyed to the SSI in accordance with BMP #4. If weir overflow to the FST exists it must be investigated and corrected. At least two inspections annually shall involve operations and instrumentation staff to verify the operability of the regulators from the treatment facility. Work orders shall be written for malfunctioning components such as air compressors, air valves, telemetry, etc.

Wet Weather Inspections

Wet weather inspections of Gorge Interceptor and Falls Street Tunnel regulators are also to be conducted to document storm flow responses and identify the need for maintenance/repair work such as weir modifications, dry weather connection flushing, orifice resizing, etc. These inspections are to be coordinated with concurrent efforts to develop a Long Term Control Plan (LTCP), whose goal is to reduce the frequency, magnitude and duration of wet weather overflows.

Sewer Use Ordinance Compliance

During the course of conducting these inspections, all staff are to be watchful for possible violations of the sewer use ordinance (SUO). These violations may include sanitary waste being discharged to storm sewers, uncontaminated flow improperly discharged to sanitary sewers, the presence of interfering materials such as grease, and prohibited substances such as paint, oils, etc. Strong or unusual odors may be an indicator of a prohibited substance. Either the cross-connection inspector or the monitoring & compliance group are to be contacted for appropriate follow-up actions. The sewer maintenance supervisor and chief operator are to be immediately notified of any dangerous conditions such as fuel spills/dumps. Document any unusual situations that are observed in order to assist subsequent investigations and enforcement actions.

Outfall Signage

The SPDES permit requires the posting and maintenance of informational signs at permitted outfalls. Specific text requirements may be found in the permit (page 26 of 28). Waivers to the signage requirement have been obtained for most outfalls. Those locations requiring signs include :

001/004	Wastewater Treatment Plant / Diversion Sewer
006	Gorge Pumping Station

The monitoring & compliance group will continue to conduct semiannual inspections to verify that the signs remain intact and legible. Work orders are to be written whenever signs require replacement, with the work performed by the maintenance staff. Nine signs of each type are currently in-stock at the WWTP.

cc : W. Bolents, Jr.
J. Hook
D. Crocker
D. Gallagher
A. Zaepfel

LIST OF DISCHARGES

<u>Outfall Number</u>	<u>Description</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Receiving Water</u>
001	Wastewater Treatment Plant	43° 05' 20"	79° 04' 00"	Niagara River
003	Falls Street Tunnel (CSO) ⁽¹⁾	43° 05' 24"	79° 04' 00"	Niagara River
004	Diversion Sewer	43° 05' 20"	79° 04' 00"	Niagara River
005	Walnut Avenue (CSO)	43° 05' 38"	79° 03' 48"	Niagara River
006	Gorge Pumping Station (CSO)	43° 05' 58"	79° 03' 38"	Niagara River
007	Cleveland Avenue (CSO)	43° 06' 26"	79° 03' 25"	Niagara River
008	Bath Avenue (CSO)	43° 06' 38"	79° 03' 29"	Niagara River
009	Chasm Avenue (CSO)	43° 06' 49"	79° 03' 33"	Niagara River
010	Maple Avenue (CSO)	43° 07' 32"	79° 03' 35"	Niagara River
011	Garfield Avenue (CSO)	43° 07' 56"	79° 03' 03"	Niagara River
13	Lift Station #4, 91st and Luick Avenue (SSO)	43° 05' 05"	78° 57' 20"	Cayuga Creek
014	Lift Station #6, 81st and Frontier Avenue (SSO)	43° 04' 50"	78° 58' 00"	Cayuga Creek
015	Lift Station #7, Military Road & Bollier Avenue (SSO)	43° 05' 30"	78° 57' 50"	Cayuga Creek
016	Lift Station #1, 81st Street and Stephenson Avenue (SSO)	43° 04' 45"	78° 58' 00"	Little Niagara River
017	Mang Avenue and Cayuga Drive (SSO)	43° 04' 26"	78° 58' 08"	Cayuga Creek
018	Crossover between West Rivershore Drive and 81st Street at Buffalo Avenue (SSO)	43° 04' 26"	78° 58' 08"	Little Niagara River
019	76 th Street and Stephenson Avenue (SSO)	43° 04' 42"	78° 58' 21"	Little Niagara River
01A	Head of Ice Shaft (Stormwater Outfall at WTP)			Niagara River
02A	Drop Shaft to International Paper Tunnel (Stormwater Outfall at WTP)			Niagara River

⁽¹⁾ List of Regulators on the Southside Interceptor/Falls Street Tunnel

During dry weather, all Falls Street Tunnel flows shall be directed to the WTP.

- | | |
|-------------------------|----------------------------------|
| 1. 19th Street | 6B. Hyde Park Boulevard |
| 2A. 22nd Street | 8. Royal Avenue |
| 3. 22nd Street | 9. Falls Street |
| A. 24th Street | 10. 12th Street |
| 3B. 24th Street | 11A. 10th Street |
| 4A. 27th Street | 11B. 10th Street |
| 4B. 27th Street | 12. 4th Street and Rainbow Blvd. |
| 5. 30th Street | |
| 6A. Hyde Park Boulevard | |

BEST MANAGEMENT PRACTICES FOR COMBINED AND SANITARY SEWER OVERFLOWS

The permittee shall implement the following Best Management Practices (BMPs). These BMPs are designed to implement operation & maintenance procedures, utilize the existing treatment facility and collection system to the maximum extent practicable, and implement sewer design, replacement and drainage planning, to maximize pollutant capture and minimize water quality impacts from combined sewer overflows. The BMPs are equivalent to the "Nine Minimum Control Measures" required under the USEPA National Combined Sewer Overflow policy. -

1. CSO/SSO Maintenance/Inspection - The permittee shall have a written maintenance and inspection program for all SSOs and CSOs listed on page 2 of this permit. This program shall include all regulators tributary to these CSOs and SSOs, and shall be conducted during periods of both dry and wet weather. This is to insure that no discharges occur during dry weather and that the maximum amount of wet weather flow is conveyed to the POTW for treatment. This program shall consist of inspections with required repair, cleaning and maintenance done as needed and shall include a continuing sewer system investigation to detect and correct illegal connections to the combined and sanitary sewers as defined by the City's Sewer Use Ordinance.

Inspection reports shall be completed indicating visual inspection, any observed flow, incidence of rain or snowmelt, condition of equipment and work required. These reports shall be in a format approved by the Region 9 Office and submitted to the Region with the monthly operating report (Form 92-15-7).

2. Maximum Use of Collection System for Storage - The permittee shall optimize the collection system by operating and maintaining it to minimize the discharge of pollutants from SSOs and CSOs. It is intended that the maximum amount of in-system storage capacity be used (without causing service backups) to minimize CSOs and bypasses and convey the maximum amount of combined sewage to the Niagara Falls treatment plant in accordance with Item 4 below.

This shall be accomplished by an evaluation of the hydraulic capacity of the system but should also include a continuous program of flushing or cleaning to prevent deposition of solids and the adjustment of regulators and weirs to maximize storage.

3. Industrial Pretreatment - The approved Industrial Pretreatment Program shall consider SSOs and CSOs in the calculation of local limits for indirect discharges. Discharge of persistent toxics upstream of SSOs and CSOs will be in accordance with guidance under (NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.3.8 New Discharges to POTWs. For industrial operations characterized by use of batch discharge, consideration shall be given to the feasibility of a schedule of discharge during conditions of no SSO & CSO. For industrial discharges characterized by continuous discharge, consideration must be given to the collection system capacity to maximize delivery of waste to the treatment plant. Non-contact cooling water should be excluded from the combined system to the maximum extent practicable. Direct discharges of cooling water must apply for a SPDES permit.

To the maximum extent practicable, consideration shall be given to maximize the capture of industrial waste containing toxic pollutants and this wastewater should be given priority over residential/commercial service areas for capture and treatment by the POTW. For new industry, these factors shall be considered in siting with preference to service by areas not tributary to SSOs or CSOs or having sufficient capacity to deliver all industrial wastewater during all conditions to the POTW.

4. Maximize Flow to POTW - Factors cited in Item 2. above shall also be considered in maximizing flow to the POTW. Maximum delivery to the POTW is particularly critical in treatment of "first-flush" flows. The Niagara Falls treatment plant shall be capable of receiving the peak design hydraulic loading rates for all process units. During wet weather events, WWTP primary influent flow * rates shall exceed 65 MGD before any regulators are closed, the Gorge pump station pumping rates are reduced or any bypass of the carbon beds is allowed. The permittee shall maximize treatment of wet weather flows in excess of 65 MGD. This paragraph shall not apply if all available beds (and in no event less than 22 beds) are in operation and if achievement of these requirements is not physically possible. * (Primary influent flows shall be defined as flows from the Southside interceptor plus flows from the Gorge pumping station plus WWTP recycle flows as measured by main pump and gorge force main totalizers/recorders.)

The permittee shall continue the optimization program for treatment of storm flows and industrial wastewater at the WWTP. Specifically, the upper flow limit before overflow of the 100 foot weir and regulator bypass shall be increased through process

improvements where practicable. Annual reports on storm flow and pollutant treatment optimization shall be submitted to the Department by January 31st, each year.

The permittee shall operate all Regulators in a manner consistent with maximization of the conveyance of industrial wastewater to the treatment plant via the Southside Interceptor during high flow conditions in the system. The permittee shall operate the regulators in the Southside Interceptor (see page 2) during dry weather in a manner to insure that industrial wastewater is conveyed to the permittee's wastewater treatment plant and not to the Falls Street Tunnel.

5. Wet Weather Operating Plan - The permittee shall maximize treatment during wet weather events. This shall be accomplished by having a wet weather operating plan containing procedures so as to operate unit processes to treat maximum flows while not appreciably diminishing effluent quality or destabilizing treatment upon return to dry weather operation. The wet weather operations plan shall be submitted to the Region 9 Office for review and approval within 12 months after the effective date of this permit.

The submission of a wet weather operating plan is a one time requirement that shall be done to the Department's satisfaction once. When this permit is administratively renewed by NYSDEC letter entitled "SPDES NOTICE/RENEWAL APPLICATION/PERMIT", the permittee is not required to repeat the submission. The above due dates are independent from the effective date of the permit stated in the letter of "SPDES NOTICE/RENEWAL APPLICATION/PERMIT".

6. Prohibition of Dry Weather Overflow - Dry weather overflows from the combined and sanitary sewer systems are prohibited. The occurrence of any dry weather overflow shall be promptly abated and reported to the NYSDEC Region 9 Office within 24 hours. A written report shall also be submitted within fourteen (14) days of the time the permittee becomes aware of the occurrence. Such reports shall contain the information listed in the General Conditions (Part II), Section 5(b) of the SPDES permit.

The permittee shall submit to the Regional Water Engineer an SSO Bypass Report, along with the Monthly Operating Report, that summarizes, for each day that an overflow occurs at an SSO, an estimate of the total volume and duration of each overflow, measurements of the total amount of rainfall, and visual observations of water quality at each outfall when possible.

7. Control of Floatable and Settleable Solids - The discharge of floating solids, oil and grease, or solids of sewage origin which cause deposition in the receiving waters, is a violation of the NYS Narrative Water Quality Standards contained in Part 703. As such, the permittee shall implement best management practices in order to eliminate or minimize the discharge of these substances. All of the measures cited in Items 1, 2, 4 & 5 above shall constitute approvable "BMPs" for mitigation of this problem. If aesthetic problems persist, the permittee should institute additional BMP's including but not limited to: street sweeping, litter control laws, installation of floatables traps in catch basins (such as hoods), booming and skimming of CSOs, and disposable netting on CSO outfalls. In cases of severe or excessive floatables generation, booming and skimming should be considered an interim measure prior to implementation of final control measures. Public education on harmful disposal practices of personal hygienic devices may also be necessary including but not limited to: public broadcast television, printed information inserts in sewer bills, or public health curricula in local schools.
8. Combined Sewer System Replacement - Replacement of combined sewers shall not be designed or constructed unless approved by NYSDEC. When replacement of a combined sewer is necessary it shall be replaced by separate sanitary and storm sewers to the greatest extent possible. These separate sanitary and storm sewers shall be designed and constructed simultaneously but without interconnections to maximum extent practicable. When combined sewers are replaced, the design should contain cross sections which provide sewage velocities which prevent deposition of organic solids during low flow conditions.
9. Combined Sewer/Extension - Combined sewer/extension, when allowed should be accomplished using separate sewers. These sanitary and storm sewer extensions shall be designed and constructed simultaneously but without interconnections. No new source of storm water shall be connected to any separate sanitary sewer in the collection system.

If separate sewers are to be extended from combined sewers, the permittee shall demonstrate the ability of the sewerage system to convey, and the treatment plant to adequately treat, the increased dry-weather flows. Upon a determination by the Region 9 Regional Water Engineer an assessment shall be made by the permittee of the effects of the increased flow of sanitary sewage or industrial waste on the strength of CSOs and their frequency of occurrence including the impacts upon best usage of the receiving water. This assessment should use techniques such as collection system and water quality modeling contained in the

SPECIAL CONDITIONS

A. Discharge No. 003, Falls Street Tunnel

During the period beginning on effective date of this permit modification (EDPM) and lasting until this permit expires, the discharge from the Falls Street Tunnel to the Niagara River shall be sampled on the second Thursday and fourth Thursday of each month on a grab sample basis. [If any Thursday so designated for sampling falls on a holiday, the sampling may be rescheduled (and so noted on the preceding Monthly Operating Report) for the day immediately preceding or following the holiday]. If there is no flow to the Niagara River on the sampling day, the permittee shall report 'no discharge' on the Monthly Operating Report for that sample. If there is a flow to the Niagara River from the Falls Street Tunnel when the sample person (personnel) collect(s) the sample, the permittee shall report the flow on the Monthly Operating Report. If the flow exceeds 35 MGD, the permittee shall report ">35 MGD" on the Monthly Operating Report. Flow from the discharge point shall be monitored on a continuous basis.

Each of the grab samples collected in accordance with this section shall be analyzed for all of the substances listed on pages 6 - 9 of this permit. The results of that sample analysis shall be reported on the Monthly Operating Report.

Beginning on July 1, 1994, the permittee shall, annually, submit to the USEPA-Region II, a summary of monitoring results (including the flows in the Monthly Operating Report, dates of sampling and concentration(s) for individual substances) for samples of outfall 003 discharges from the previous year.

FALLS STREET TUNNEL REGULATORS									
INSPECTION DATE:		WEATHER & TEMP				INSPECTED BY:			
REG. NO.	VALVE POSITION		WEIR OVERFLOW		VALVE OPERATION		COMPRESSOR		REMARKS:
	OPEN	CLOSED	YES	NO	REMOTE	LOCAL	BLEED	PRES.	
1									
2A									
2B									
3A									
3B									
4A									
4B									
5									
6A									
6B									
7A									CONNECTION SEALED
7B									CONNECTIONS SEALED
8									
9									
10									
11A									
11B									
12									

F:\ADMIN\WINWORD\MONTHLY OPERATING REPORT\MONTHLY REGULATOR INSPECTION

SEWER MAINTENANCE

GORGE INTERCEPTOR REGULATORS			
OUTFALL	LOCATION	OVERFLOW	
		YES	NO
011 GARFIELD	SHAFT #22		
010 MAPLE	OF WEIR		
009 CHASM	NORTH WEIR		
	SOUTH WEIR		
008 BATH	OF WEIR		
007 CLEVELAND			
005 WALNUT	NORTH WEIR		
	SOUTH WEIR		

LASALLE SANITARY BYPASS LOCATIONS			
OUTFALL TYPE	LOCATION	BYPASS	
		YES	NO
013 - PUMP	LUICK LS		
014 - PUMP	FRONTIER LS		
015 - PUMP	BOLLIER LS		
016 - GRAVITY	STEPHENSON LS		
017 - PUMP	CAYUGA		
018 - PUMP	W. RIVERSHORE		
019 - GRAVITY	76 TH STREET & STEPHENSON		

COMMENTS & OBSERVATIONS:

⑦

⑦



City of Niagara Falls, New York


P.O. Box 69, Niagara Falls, NY 14302-0069

DEPARTMENT OF WASTEWATER FACILITIES

FALLS STREET TUNNEL [OUTFALL 003] INSPECTIONS/SAMPLING

To be conducted on the 2nd and 4th Thursday of each month.

DATE: May 22, 2003
TIME: 8:00 AM

INSPECTORS: Joel Paradise
Ted Lewis 

FLOWMETER READING: 0 % = 0 MGD

Is there evidence of flow entering the river?
Is the flowmeter displaying a false reading?

YES NO X
YES NO X
n/a % False Reading

If yes, please E-mail the Instrument Shop.

WAS SAMPLE TAKEN?	YES <u> </u>	NO <u> X </u>
ENVIRONMENTAL GRAB	YES <u> </u>	NO <u> X </u>
WASTEWATER GRAB	YES <u> </u>	NO <u> X </u>
ONE (1) SET OF VOLATILES	YES <u> </u>	NO <u> X </u>

Informed Lab of Falls St. Tunnel sample status? X YES

Give a brief description of the weather conditions for the past 24 hours, AS IT WOULD AFFECT THE F.S.T. (rain, melting snow, etc.)

OTHER COMMENTS:

As per attachment, on May 12, 2003 Douglas Crocker, Chief Operator, noted an elevated flow at the FST meter. An observation was taken and Marty Czum (Instrument Tech) and Ted Lewis observed no flow entering the river. The bubbler tube was blown down and the flow reading returned to normal, i.e., 0%.

Cc J. Paradise (1)
* Original to File: IPP #7

K. Kargatis (1)
* Monthly SPDES Report: DEC/NCHD

D. Crocker

A. Zaepfel (2)
* Semiannual Report: DEC/EPA
* Annual Report: EPA

R. Roll

REVISED: 1/2/03

Niagara Falls Water Board
Publicly Owned Treatment Works (POTW)

The Niagara Falls Water Board owns and operates a Publicly Owned Treatment Works (POTW) that includes a sewer collection system and wastewater treatment facility. The system is designed to collect all dry weather flow generated by users (residents, businesses and industries) and treat to the standards required by the joint City/Water Board State Pollutant Discharge Elimination System (SPDES) Discharge Permit, permit number 0026336, as issued by the New York State Department of Environmental Conservation. During wet weather the POTW is operated to maximize the extent of flow and pollutant capture.

There are, however, wet weather events (for example rainfall or snowmelt) which exceed the capacity of the sewer collection system, the treatment facility, or both. When this occurs, a portion of the excess flow is directly discharged in accordance with the terms of the above referenced permit. There are seven permitted locations in the LaSalle area which discharge into either the Little Niagara River or Cayuga Creek. There are eight additional locations along the City's western boundary which discharge into the Lower Niagara River. Efforts to reduce the frequency and severity of combined sewer overflow (CSO) and sanitary sewer overflow (SSO) are ongoing, also in accordance with the SPDES permit.

The public is cautioned to avoid contact with the overflow outfalls, particularly when they are active in wet weather. For more information on specific outfall locations, discharge history, and mitigation efforts, please contact the wastewater treatment plant at 286-4960. Additional information is available for public review during normal business hours at this location. For sewer service problems or wet weather emergencies, please contact the sewer maintenance office at 286-4970.

#N07501318

December 15, 2003