Onondaga County, New York
CSO 018 Constructed Wetlands Treatment Facility

Wet Weather Operating Plan

Prepared for

New York State Department of Environmental Conservation

Prepared jointly by

Onondaga County Department of WATER ENVIRONMENT PROTECTION and CH2MHILL

November 2014

Revision 1

Contents

SECTION 1

Introduction

The purpose of this manual is to provide a set of operating guidelines to assist staff in making operational decisions that will: (1) meet treatment performance expectations; and (2) meet the State Pollutant Discharge Elimination System (SPDES) permit monitoring requirements.

This manual is designed to be a quick reference during wet weather events and is a living document. Users of the manual are encouraged to identify new steps, procedures, and recommendations to improve the overall utility of the manual. All recommendations shall be submitted to the user's immediate supervisor for consideration for inclusion in the manual during potential future updates.

SECTION 2

Facility Components

The Harbor Brook CSO 018 constructed wetlands treatment facility includes two major systems:

- Grit and floatables (G&F) removal facility
- Wetlands treatment facility

Each of these facilities is further described below.

2.1 Grit and Floatables Removal Facility

The G&F facility is diagramed in Figure 2-1 and comprises the components identified in Table 2-1.

FIGURE 2-1

Grit and Floatables Facility Diagram

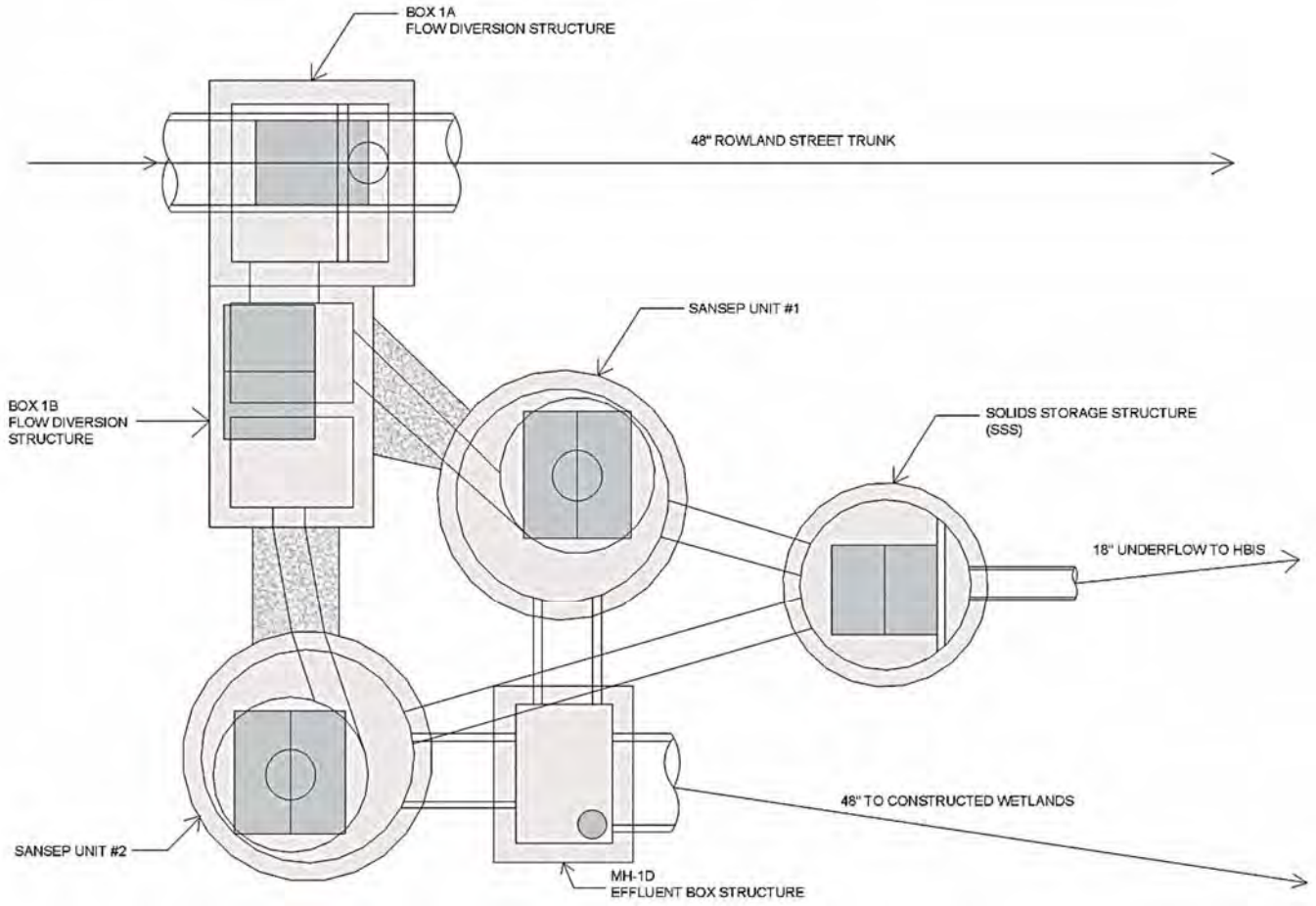


TABLE 2-1
Grit and Floatables Removal Facility Components and Description

Component	Description
Box 1A Flow Diversion Structure	Contains a gate structure. During flows below 6 ft^3/second and above 44 ft^3/second, flow continues straight through the existing 48-inch Rowland Street Trunk Sewer to the Harbor Brook Interceptor Sewer (HBIS). During flows between 6 ft^3/second and 44 ft^3/second, the gate automatically shuts and flow is diverted to Box 1B Flow Diversion.
Box 1B Flow Diversion Structure	Contains an adjustable weir (with stop logs) that diverts flow to either SanSep Unit #1 (Flows between 6 and 8 ft^3/second) or SanSep Unit #2 (flows between 8 and 44 ft^3/second).
SanSep Units #1 and #2	Using centrifugal force and deflective screening, the unit separates liquids and solids. Liquid flows to Manhole 1D. Collected solids with minimal flow are conveyed to the Solids Storage Structure (SSS).
Manhole 1D (Effluent Box Structure)	Liquid discharges from the SanSep units flow through Manhole 1D to the wetland facility via a 48-inch high-density polyethylene (HDPE) pipe.
Solids Storage Structure (SSS)	The SSS has a sump for capturing and storing floatables, typically cleaned out periodically using a vactor truck. The underflow is conveyed to the HBIS.

The SanSep vendor, PW Tech has developed an Installation, Operating, and Maintenance Manual. Once finalized, the manual can be made available upon request.

2.2 Wetland Treatment Facility

The following three types of wetland cells have been constructed to determine the optimal CSO treatment potential and operational configuration (please refer to drawings C-1003 and C-2001 in Appendix A):

- Floating Wetland Islands (FWI)
- Vertical Down Flow (VDF) wetlands
- Surface Flow (SF) wetlands

Flow control structures are configured for flow between 6 and 44 ft^3/second to flow from the grit and floatables removal facility to the wetland treatment facility. The wetland treatment facility can be programmed to receive flow to any or all cells for operation in series, parallel, and series-parallel. The operational scenarios will be further explained in Section 3. A summary of the wetland cell dimensions for each type of wetland cell is presented in Table 2-2.

TABLE 2-2
Wetland Cell Dimensions by Type

	Wetland Cell Type		
Wetland Cell Dimension	**FWI (Cell 1)**	**VDF (Cell 2)**	**SF (Cell 3)**
Area (ft^2)	12,217	10,562	11,012
Side slopes	3:1	3:1	3:1
Normal Water Level (NWL) Depth (ft)	1	0	0.5
Maximum Event Water Level (EWL) Depth (ft)	4.0	1.5	1.5
Normal Water Level (NWL) Elevation[1] (ft)	396.5±[2]	not applicable	393.0±[2]
Bottom Elevation[1] (ft)	395.5±[2]	393.8±[2]	392.5±[2]
Bottom Elevation[1] Deep Zone (ft)	not applicable	not applicable	389.6±[2]

[1] Elevations based on NAVD 88.

[2] Note ± elevations are average as-built elevations.

2.2.1 Floating Wetland Island (FWI)

The FWI cell (Cell 1) will have flow entering directly from the G&F facility. The FWIs are a series of man-made floating islands of wetland vegetation with roots that extend down into the water column below the island mat. This cell will be drained to a low water elevation of about 1 foot of water depth between CSO events. During CSO events, the cell will fill to about 3 feet of water depth (398.5 feet NAVD 88) flowing out through flow diversion structure 11 (FDS-11). During extreme events, or when the dosing valve in MH-12 is closed when in parallel operation, the cell will fill to an elevation of 402.00 feet (NAVD 88), approximately 6.5 feet of water, before overtopping the cell berms and flowing into Cell 2. Cell 1 will provide a high storage volume for storm flows, but due to the ability of the FWI to vary in elevation, the plants will not become flooded for long periods of time as they would if planted into the wetland bottom soils.

The FWI cell has greater diversity of vegetation, since the depth of water over the root portion of the plants will be consistently low, with the roots themselves always submerged. The combination of open water and diverse plant species provide pleasing aesthetics and high habitat value but low mosquito productivity since mosquito predators will be maintained in this environment.

2.2.2 Vertical Down Flow (VDF) Wetland

The VDF wetland cell (Cell 2) will have water entering either directly from the G&F removal facility or from Cell 1. CSO water will be dosed into Cell 2 from Cell 1 using an automated control valve. Flow is conveyed up through riser pipes onto splash pads that distribute the flow across the wetland surface. The VDF wetland will be dosed at a rate of approximately 55,000 gallons per dose. Once the initial dose has run through the wetland and discharged through the underdrain, the cell will be automatically dosed again. This process will continue until the water volume in the FWI (Cell 1) returns to its normal water level (NWL) of 396.50 feet (NAVD 88). The VDF wetland cell is expected to have a more robust range of vegetation since this cell will be flooded and drained regularly.

2.2.3 Surface Flow (SF) Wetland

The SF wetland cell (Cell 3) has a vegetated shelf that is about ½ to 1 foot deep under dry weather water level conditions and 3-feet deep water areas (deep zones) that help to redistribute flow to reduce the potential for short-circuiting. The deep zones provide an area for natural treatment of the CSO flow, as well as a refuge for wildlife. The SF cell has the potential for increased water depth for greater CSO water storage and treatment prior to discharge to Harbor Brook. The SF wetland outfall is a 36-inch pipe with an invert of 391.71 (NAVD 88, as-built elevation). Stop logs in the outlet structure will set the discharge elevation at 393.0 (NAVD 88) allowing a minimum of 6 inches of standing water within the wetland.

As with the FWI, the combination of open water and plantings will provide high habitat value but low mosquito productivity since mosquito predators will be maintained in this environment.

SECTION 3

Operations

3.1 Grit and Floatables Removal Facility

There are only two components of the G&F removal facility that have operational controls; these components are presented in Table 3-1.

TABLE 3-1
Grit and Floatables Removal Facility Operational Components

Component	Operations
Box 1A Flow Diversion	• Between 6ft^3/second and 44ft^3/second: shut gate to Rowland Street Trunk Sewer and divert flow to Box 1B Flow Diversion[1] • After storm subsides and dry weather flow rates resume (sustained 6 ft^3/second flow or lower for 30 minutes): open gate[1] • Below 6ft^3/second and above 44 ft^3/second: open gate to Rowland Street Trunk Sewer and flow proceeds to Harbor Brook Interceptor Sewer (HBIS)
Box 1B Flow Diversion	• Box 1B stop logs currently set at elevation 403.70[2]. Below 403.70 (flows less than 8 ft^3/second) flow proceeds to SanSep Unit #1. Above 403.70 flows proceed to both SanSep Units #1 and #2. • The number of stop logs can be changed to adjust weir height to alter flows between the two SanSep units as desired. Each stop log represents 1.0 feet of elevation.

[1] Note that the operation of the gate in Box 1A is automatic via the PLC located at the G&F facility.

[2] As-built elevation (NAVD 88).

3.2 Wetlands Treatment System

The Harbor Brook CSO 018 constructed wetlands treatment facility can be operated in any one of the following three operational scenarios.

- Series (S) Flow
- Series-Parallel (SP) Flow
- Parallel (P) Flow

Table 3-2 presents the operational scenarios for Years 1 and 2. The target operational start date is December 1, 2014. This is contingent on the construction contractor successfully completing system testing and calibration prior to this date.

The long-term operating scenario will be decided upon after the completion of the initial monitoring period.

TABLE 3-2
Years 1 and 2 Wetland Operational Scenarios

Year 1	**2014**		**2014-2015**	**2015**			**2015**			**2015**
Season	Fall		Winter[2]	Spring			Summer			Fall
Months	Oct	Nov	Dec-Feb	Mar	Apr	May	June	July	Aug	Sep
Configuration[1]	S	S	S	S	S	S	S	S	S	S
Year 2	**2015**		**2015-2016**	**2016**			**2016**			**2016**
Season	Fall		Winter[2]	Spring			Summer			Fall
Months	Oct	Nov	Dec-Feb	Mar	Apr	May	June	July	Aug	Sep
Configuration[1]	P	SP	S	P	SP	S	P	SP	S	P

[1] S = Series; SP = Series-Parallel; P = Parallel

[2] Flow sequence will automatically be changed to Series before a snowpack develops, and will remain so until snowmelt.

3.2.1 Operating Scenarios

Flow control through the constructed wetlands will consist of a series of flow diversion structures (FDS) with weirs and gates to direct and control flows under various flow scenarios combined with pressure transducers located in each wetland cell. Refer to Appendix B for the flow diagrams for each scenario.

Table 3-3 identifies the various gate positions to achieve the three flow scenarios: series, series-parallel, and parallel. The required valve/gate configurations to operate in each of these three scenarios are typically controlled remotely via the Onondaga County Department of Water Environment Protection's (OCDWEP's) supervisory control and data acquisition (SCADA) system. They can also be operated manually, if required. If the system is set to manual operation, and then returned to automatic operation, valves will automatically return to the automatic position. The locations of the FDSs and MHs referenced in Table 3-3 and the operating descriptions below are provided on the flow diagrams in Appendix B.

TABLE 3-3
Wetland System Diversion Gate Configurations

FDS	**Gate**	**Direction**	**Series**	**Series-Parallel**	**Parallel**
6	6A	From G&F to Emergency Bypass	Closed	Closed	Closed
6	6B	From G&F to Cell 2	Closed	Closed	Open
7	7A	From Cell 1 to Cell 2/3	Closed	Open	Closed
8	8A	From G&F/Cell 1 to Cell 2	Closed	Closed	Open
11	11A	From Cell 1 to Outfall/Cell 2	Open	Open	Open
12	Dosing Valve	From Cell 1/FDS 11 to Cell 2	Open	Open	Closed
13	13A	From Cell 2 to Cell 3	Open	Closed	Closed
13	13B	From Cell 2 to Outfall	Closed	Open	Open

Series Operation: When operating in series, the flow is required to travel through all three cells prior to discharge. Flow from the grit and floatables facility will be diverted into Cell 1 via FDS-6. The pressure transducer in FDS #11 will activate (open) a 12-inch butterfly valve when the desired elevation is reached within the structure, and Cell 2 will be dosed approximately 55,000 gallons of water (to an equivalent 6-inch

depth over the area of Cell 2). The valve will close based on this predetermined duration of discharge. A second pressure transducer in FDS #13 will determine when wetland Cell 3 can accept additional flow and will not allow the valve to open until the predetermined water level has been reached. The dosing process will continue until the water level within Cell 1 drops below the valve-off elevation indicated by the pressure transducer. Water from Cell 3 will discharge out the CSO 018 outfall and into Harbor Brook when it reaches an elevation of 393.0 within the cell.

Series-Parallel: When operating in series-parallel, water has to go through a minimum of two cells prior to discharge. The flow from the G&F facility will flow through FDS-6 and into Cell 1. From Cell 1, the water will either flow into Cell 2 (via the procedure highlighted in "Series Operation" above), or into Cell 3 once the water elevation in Cell 1 reaches 395.60 (*Elevation missing from as-builts, will be confirmed once as-builts are approved). The water will flow from Cell 1 into FDS-7 via a 12" pipe. From FDS-7 water will pass through FDS-8, FDS-13 and MH-10 into Cell 3. Water from beneath the surface of Cell 2 will flow into FDS-13 once it reaches an elevation of 393.32. From FDS-13 water will be directed to MH-17 and MH-19 where it will discharge to Harbor Brook. Similarly, water within Cell 3 will discharge through MH-18 and MH-19 and into Harbor Brook once it reaches an elevation of 393.0 within the cell.

Parallel: When operating in parallel, flow only goes through one of the cells prior to discharge. Water from the G&F facility will flow into FDS-6, and be directed to Cells 1, 2 and 3 simultaneously. Water will leave Cell 1 via FDS-11 and travel through MH-16, MH-17 and MH-19 and into Harbor Brook once it reaches an elevation of 394.98 within the cell. The effluent from Cell 2 will discharge via FDS-13 into MH-17 and MH-18 once the water reaches an elevation of 393.32 beneath the cell surface. Similarly, the water within Cell 3 will discharge into MH-18 and MH-19 once the elevation in the cell reaches 393.0. The effluents from each of the Cells are not combined until MH-19 and the discharge into Harbor Brook.

3.2.2 Wetland Water Level Control

Water levels will be monitored using in-cell staff gauges. Water level control will be maintained using a series of automated pressure transducers and 12-inch butterfly valves located within flow diversion structures and/or overflow weirs. At normal pool elevations, water levels in Cells 1 and 3 will be maintained at 396.5 and 393.32 (NAVD 88), respectively. Staff gauges will be marked to reflect a depth relative to the grade elevation of the wetland cell so that all elevations will indicate a depth at the time of observation. If water levels are above their respective datum and flow does not appear to be exiting out of Cells 1 and/or 3, equipment and flow-through channels will be checked and remedial action taken.

Cells 1 and 2 are lined with a high-density polyethylene (HDPE) liner. Cell 3 is unlined and has a compacted substrate underlying the topsoil. Cell 3 also contains a "deep zone" for flow distribution across the width of the wetland that will also act as a sump as it is anticipated to be below the average elevation of the water table at the study site. This will provide some degree of water level buffering in Cell 3. If the water level falls below one foot of standing water in Cell 1 and if this is not due to drought conditions, the cause for the low water level will be determined and corrected. Water from unlined Cell 3 can be pumped to Cell 1 if standing water in the Cell 1 falls below 2 inches. Water additions to Cell 1 should be economical and will only serve as a contingency until drought conditions cease or the cause of the low water level is determined. No more than 2 inches of water will be added over the area of Cell 1 at a time. Cell 2 will not have standing water regularly, and therefore, water level maintenance will not be required; however, under drought conditions, irrigation of the plants will be required using Cell 3 water.

3.2.3 Low Flow Water Level Cell Conditions

During prolonged periods between storm events, it may be necessary to provide supplemental water to the Cells 1 and 2 to ensure plant survivability. Groundwater levels are anticipated to be sufficient to provide the required moisture for Cell 3 since it is unlined. During low CSO flows to the wetlands, a temporary pump will be set up by OCDWEP to pump water into Cells 1 and 2 from the Cell 3 deep zone. As groundwater data is collected through the initial 2-year monitoring period, the operation may be modified accordingly. As a secondary source of water, the temporary pump could be set up to draw water from Harbor Brook or from

the stormwater box culvert adjacent to Velasko Road (upon approval from the NYSDEC). Water that is pumped into the constructed wetlands will flow through the system back to Harbor Brook.

3.2.4 High Flow Water Level Cell Conditions

If flooding occurs, site access will only be allowed if it is determined to be safe to do so. If flooding is close to an elevation of 402 feet (NAVD 88), which is the average elevation of the berms around the wetlands, water depths at site access roads and paths will be determined. If accessible, operations staff will be required to wear wading boots and personal floatation devices. If flooding is above this level, site visits will be rescheduled until water levels have subsided below the elevation of the surrounding berms. After flooding, any debris should be cleared from the site and all equipment checked. A check valve is installed in the 36-inch HDPE pipe discharging to Harbor Brook from MH-19 to prevent backflow from the Brook from entering into the wetlands.

3.2.5 Bypass Flow

In the event that the constructed wetlands need to be taken offline for maintenance activities, the system will be changed to bypass by manually opening the gate in Box 1A of the grit and floatables facility. The flow bypassing the system will be directed to the HBIS via the existing Rowland Street Trunk Sewer. If maintenance is occurring during emergency flow circumstances, flow will bypass the system by closing Gate 6B and opening Gate 6A within FDS-6, and the bypass flow will discharge into Harbor Brook in the same location as wetland-treated flow (MH-19). Immediately after maintenance activities have been completed, the system will be returned to automatic operation.

3.2.6 Power Outages

The system will continue to operate in the manner that it was operating prior to a power outage occurrence. If the flow is greater than 6 ft^3/second prior to the power outage, CSO flow will continue through the G&F facility. The system will continue to operate as it was before the power outage (series, series-parallel, or parallel). In the event that the dosing valve in MH-12 between Cells 1 and 2 was not open prior to the power outage, the valve will either need to be manually opened, or water within Cell 1 will fill up and overflow into Cell 2. Flow will continue between Cells 2, 3 and the outfall in accordance with how the system was being operated prior to the outage. Flow meters installed at the Wetlands Influent (MH-4A), Wetlands Effluent (MH-18), and CSO 018 Effluent (MH-19) will have battery backups to ensure that data is recorded in the event of a power outage.

3.3 Flow Uniformity

Blockages within flow-through channels may result in the backing-up of the treatment system. Weekly checks will be made of inflow/outflow structures to clear them of vegetation and debris. Timing of these checks will typically occur immediately following a rain event if one occurs during that week.

SECTION 4

System Maintenance

The Harbor Brook CSO 018 constructed wetlands treatment facility has been designed and constructed to minimize the maintenance required to run the facility. A summary of the specific maintenance for each system is outlined below. The Contractor for the construction of the constructed wetlands is required to maintain the vegetation on site in accordance with the activities below until the fall of 2015, after which OCDWEP will assume the responsibility. All other activities below are the responsibility of OCDWEP or other designees.

4.1 Routine Maintenance

Maintenance activities are described in Table 4-1.

TABLE 4-1
Maintenance Activity List with Associated Contingencies

Activity	Routine	Frequency	Contingency
Site Maintenance – General			
Berm Integrity	Monitor sedimentation due to erosion/inspect for burrows	Weekly	Added erosion control if required; fill burrows with heavy gravel or clay; trapping of animals
	Removal of tree seedlings/Weeding	Monthly during growing season	
Sampling/flow monitoring equipment	Maintenance checks	Weekly	Battery replacement; equipment replacement
Fence Maintenance	Check for debris and damage	Weekly for damage; clean debris after flooding	Fence repair/replacement
Wetland Cells – General			
Flow Configuration	Operate flow diversion structures under prescribed flow regime	As noted in Table 3-2 above	Flow configurations will adapt to sampling protocols
Water Levels	Check water levels	Weekly and/or following storm events	Transfer water from Cell 3 if levels are low in Cell 1; check for blockages if levels are high
Flow Uniformity/Sediment	Check for blockages at all inflow/outflow points	Weekly and/or following storm events	Manual sediment/vegetation removal; dredging
Vegetation	Monitor health	Weekly	Re-vegetation
Odor Control	Monitor odors and wind direction	Weekly; Hotline from residents	Adjust water level by pumping from adjacent cells or outside water source, installation of solar powered bubblers
Vector Control	Monitor for presence of mosquito larvae	Weekly	Consult with Department of Health and Community
	Set up bat/bird boxes	Post-construction	

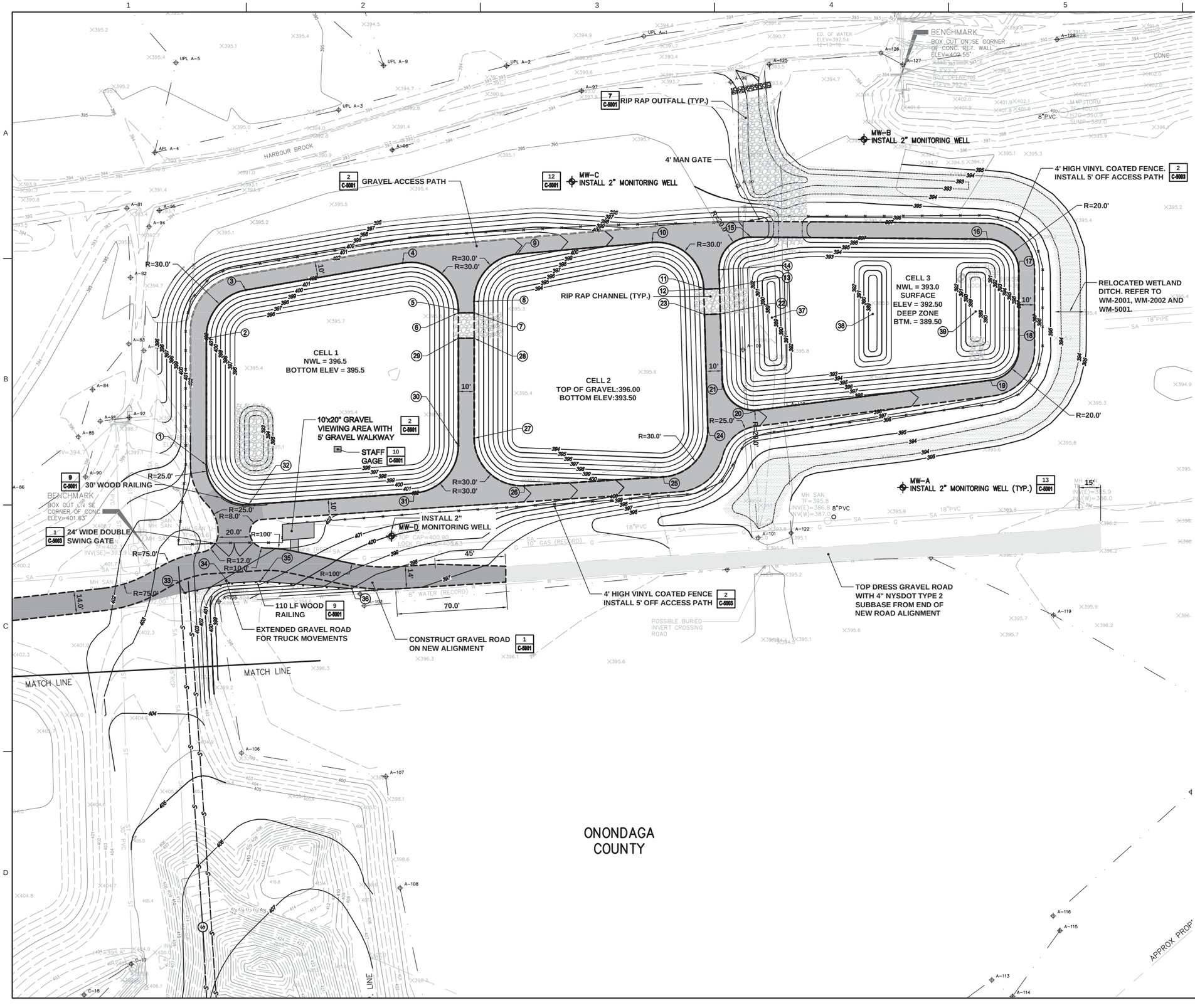
TABLE 4-1
Maintenance Activity List with Associated Contingencies

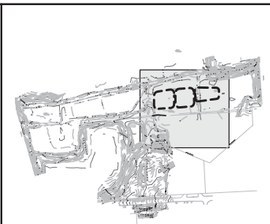
Activity	Routine	Frequency	Contingency
Treatment System Components - Specific			
G&F Removal Facility	General maintenance check	After first 2 CSO Events; Monthly	Perform required maintenance
	Check Screens	Monthly and after storm events	Wash screen with high pressure hose if more than 50% blocked
	Check/empty solids storage structure	Monthly and after storm events	Vacuum clean solids storage structure
Floatables Removal	Removal of floatables from the wetland cells, flow diversion structures and manholes	When observations indicate it is required	Vacuum clean structures and wetland cells
FWI (Cell 1)	Check island tethering structures and islands for stability and balance	Weekly	Repair tethers
VDF (Cell 2)	Check to see if vegetative health is maintained during dry conditions	Weekly	Watering of stressed vegetation during dry conditions
SF (Cell 3)	Make sure water levels are appropriate for emergent/riparian plant species	Weekly	Remove blockages/sediment that may adversely impact water levels

4.2 Winter Maintenance

Cells 1 and 3 water levels will not be drained, and will be allowed to retain standing water over the winter. Cell 2 will naturally remain drained and the organic layer at the surface along with snow cover will insulate the bed.

APPENDIX A
Site and Utility Plans





SITE KEY MAP
NOT TO SCALE

POINT TABLE			
POINT NO.	NORTHING	EASTING	DISCRIPTION
1	1106335.14	926948.22	POB
2	1106415.00	926948.22	PC
3	1106445.57	926973.12	PC
4	1106462.67	927072.17	PC
5	1106433.10	927107.28	PT
6	1106431.21	927107.28	
7	1106431.22	927117.24	
8	1106438.39	927117.23	PC
9	1106468.31	927144.66	PT
10	1106475.64	927229.60	PC
11	1106446.62	927262.16	PT
12	1106446.17	927262.18	
13	1106446.46	927272.17	
14	1106458.39	927271.82	PC
15	1106478.97	927291.97	PT
16	1106477.79	927441.18	PC
17	1106457.79	927461.02	PT
18	1106408.54	927461.02	PC
19	1106388.65	927443.16	PT
20	1106369.84	927296.38	PC
21	1106389.09	927273.84	PT
22	1106430.47	927272.64	
23	1106430.18	927262.64	
24	1106358.43	927264.73	PC
25	1106327.62	927236.63	PT
26	1106322.12	927149.12	PC
27	1106352.06	927117.24	PT
28	1106415.20	927117.24	
29	1106415.21	927107.28	
30	1106347.30	927107.28	PC
31	1106317.37	927079.29	PT
32	1106310.20	926974.94	PC
33	1106254.53	926934.39	
34	1106260.59	926962.51	
35	1106261.79	926982.21	
36	1106257.18	927039.98	
37	1106428.23	927305.21	CENTER OF DEEP ZONE
38	1106430.47	927368.85	CENTER OF DEEP ZONE
39	1106432.04	927433.82	CENTER OF DEEP ZONE

N
0 30 60 90
SCALE: 1" = 30'

NO.	DATE	DSGN	DR	CHK	RND	APVD
0	06/20/12	SKB	JRH	KH	BY	MEH
						APVD

ISSUED FOR BID
REVISION

CH2MHILL
CHA
430 E. GENESEE STREET, SUITE 400
SYRACUSE, NY 13202
PH (315) 345-1400 FAX (315) 451-7270
EB 0000072 AA 001992

HARBOR BROOK CSO 018
CONSTRUCTED WETLANDS
CITY OF SYRACUSE
ONONDAGA COUNTY, NEW YORK

LAYOUT PLAN
WETLAND FACILITY

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	JUNE 20, 2012
PROJ	19217
DWG	C-1003
SHEET	

REFER TO SHEET C-3008 FOR CELL 2 DETAILS

2 C-5002 **MH-19**
TF:398.20
INV IN (MH-17):392.50
INV IN (MH-18):392.75
INV OUT (STREAM):392.50
(INSTALL 2 IN-LINE FLOWMETERS IN MH-19)

2 C-5002 **MH-18**
TF:398.00
INV IN (CELL 3):393.00
INV OUT (MH-19):393.00

29 LF 36"
HDPE @ 2.07%

2 C-5002 **MH-17**
TF:399.20
INV IN (FDS-13):393.10
INV IN (MH-16):393.10
INV OUT(MH-19):393.10

42"X36" EQUIPMENT
PAD - 4" CONCRETE
ON 6" SUBBASE (TYP)

MW-C
INSTALL 2" MONITORING WELL

156 LF
36" HDPE @ 0.38%

4 C-5006 **FDS 11**
TF=402.0
INV IN (CELL 1): 395.30
INV OUT (MH-16):395.30
INV OUT (DOSING):395.00

2 C-5002 **MH-16**
TF:402.15
INV IN (FDS-11):395.00
INV IN (MH-15):393.70
INV OUT(MH-17):393.70

64 LF
12" HDPE @ 0.47%

162 LF 36"
HDPE @ 0.38%

MH-15
TF:402.0
INV IN (MH-5A):394.31
INV OUT(MH-16):394.31

153 LF 36"
HDPE @ 0.35%

72 LF 36" HDPE
@ 0.32% WITH
(2) 45° BENDS

14 C-5001 PIPE PENETRATION
INV:395.50

17 LF
18" HDPE @1.00%

CELL 1
NWL = 396.5
BOTTOM ELEV = 395.5

6 LF
12" DIP @ 8.30%

90° BEND

DOSING MH-12
WITH 12" ACTUATOR
VALVE
TF:402.0
INV IN (FDS-11):394.50
INV OUT (CELL 2):394.50

14 C-5001 PIPE PENITRATION

36"x36"x36" TEE
INV:395.50

INV @ 90° BEND:395.60
TOP OF PIPE ELEV:398.10
15 LF 12" PVC @ 0.67%

CELL 2
TOP OF GRAVEL:396.00
BOTTOM ELEV:393.50

15 LF 12"
PVC @ 0.00%

6"Ø RISER (TYP.)
CREST @ 396.5

INV @ TEE:393.50

13 LF 12"
PVC @ 7.7%

INV @ TEE:393.50

117 LF
12" HDPE
@ 0.34%

INV:390.00

CELL 3
NWL = 393.0
SURFACE ELEV = 392.50
DEEP ZONE BTM. = 389.50

13 LF 36"
HDPE @
0.00%
INV:393.00

INV:392.44

15 LF 36" HDPE @ 0.50% FIELD
MITER END TO MATCH SLOPE

36" INLINE CHECK VALVE (CHECKMATE
BY TIDEFLEX TECHNOLOGIES OR EQUAL)

MW-B
INSTALL 2" MONITORING WELL

5 LF
36" HDPE @ 5.00%

RIPRAP OUTLET (TYP CELL 3)
MEDIUM STONE FILL
10'x15'

INV:393.00

17 LF 30"
HDPE @ 0.00%

MH-10
TF:397.15
INV IN (MH-9):393.00
INV OUT (CELL 3):393.00

160 LF 30"
HDPE @ 0.31%

MW-A
INSTALL 2" MONITORING WELL (TYP.)

22 LF 12"
HDPE @0.00%

MH-20
TF=398.00
INV OUT: 390.00
SUMP INV: 388.00

MH-9
TF:398.25
INV IN (FDS-8):393.50
INV IN (FDS-13):393.50
INV OUT (MH-10):393.50

45° BEND

5 LF 12"
HDPE @ 0.00%

MH-5A
TF:402.90
INV IN (FDS-6):394.84
INV IN (S):394.84
INV OUT (MH-15):394.84

14 LF 36"
HDPE @ 7.0%

24 LF-48" HDPE @ 1.67%

28 LF 36" HDPE @0.57%

COORDINATE WITH
NATIONAL GRID FOR
RELOCATION OF GAS MAIN

EX. MANHOLE
RESET TF
NEW TF:403.15
INV OUT:395.00

MW-D

50 LF 30"
PVC @ 2.65%

FDS-6
TF:403.50
INV IN (MH-4B):395.85
INV OUT (CELL 1):395.82
INV OUT (FDS-7):395.72
INV OUT (MH-5A):395.82
1 C-5006

FDS-8
TF:402.00
INV IN (FDS-7):394.71
INV OUT (CELL 2):394.67
INV OUT (MH-9):394.67
3 C-5006

POSSIBLE BURIED
CULVERT CROSSING
UNDER ROAD

42 LF
30" HDPE @ 0.69%

42"X36" EQUIPMENT
PAD - 4" CONCRETE
ON 6" SUBBASE (TYP)

FDS-7
TF:402.00
INV IN (FDS-6):395.00
INV IN (CELL 1):395.50
INV OUT (FDS-8):395.00
2 C-5006

133 LF
30" HDPE @ 0.54%
1 C-5002

FDS-13
TF:399.00
INV IN (Cell 2):393.50
INV OUT (MH-9):393.50
INV OUT (MH-17):393.50
5 C-5006

45° BEND

169 LF 30"
HDPE @ 0.69%

ONONDAGA
COUNTY

MATCH LINE

REFER TO SHEET D-3001
FOR ADDITIONAL UTILITY
INFORMATION

NOTE:

1. PIPE LENGTHS SHOWN ARE APPROXIMATE. CONTRACTOR SHALL INCLUDE ALL PIPE REQUIRED TO PROVIDE A COMPLETE SYSTEM.

EQUIPMENT INSTALLATION NOTES:

CONTRACTOR SHALL INSTALL THE FOLLOWING OWNER SUPPLIED EQUIPMENT.

1. INSTALL PRESSURE SENSOR MODULES AND AREA VELOCITY METERS INSIDE VARIOUS SIZE PIPES AT 11 LOCATIONS. SECURE USB CABLE TO STRUCTURE WALL JUST BELOW THE STRUCTURE HATCH OR COVER WITH STAINLESS STEEL EYE BOLT. INSTALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURES RECOMMENDATIONS.

STRUCTURE	PIPE SIZE	DESCRIPTION
MH #1	48"	INLET PIPE
MH #3	48"	OUTLET PIPE
FDS 6	48"	INLET PIPE
FDS 6	36"	OUTLET TO CELL 1
FDS 8	30"	INLET PIPE
MH #9	30"	INLET PIPE
FDS 11	18"	INLET PIPE
FDS 13	12"	INLET PIPE
MH #16	12"	INLET PIPE
MH #17	12"	INLET PIPE
MH #18	36"	INLET PIPE

SITE KEY MAP
NOT TO SCALE

N

0 30 60 90
SCALE: 1" = 30'

NO.	DATE	DSGN	DR	CHK	RND	APVD
0	06/20/12	SKB	JRH	KH	BY	MEH APVD

ISSUED FOR BID
REVISION

STATE OF NEW YORK
MICHAEL E. HOLLOWOOD
LICENSED PROFESSIONAL ENGINEER
075891

CH2MHILL
CHA
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EB 00000072 AA 001992

HARBOR BROOK CSO 018
CONSTRUCTED WETLANDS
CITY OF SYRACUSE
ONONDAGA COUNTY, NEW YORK

UTILITY SITE PLAN
WETLAND FACILITY

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	JUNE 20, 2012
PROJ	19217
DWG	C-2001
SHEET	

005-C-2001-19217.dwg 6/15/2012 3:45 PM

APPENDIX B
Flow Diagrams

FLOW DIVERSION STRUCTURE
FLOWS < 6CFS → ALL FLOW TO TRUNK SEWER
FLOWS > 6CFS, BUT < 44CFS → ALL FLOWS DIVERTED TO SANSEP UNITS
FLOWS > 44CFS → OVER FLOW TO TRUNK SEWER

EXISTING 48" RCP
ROWLAND STREET TRUNK

EXISTING 48"
RCP ROWLAND
STREET TRUNK

EXISTING
MANHOLE U15A

EXISTING WEIR
STRUCTURE

36" HDPE

EXISTING 48" SEWER

EXISTING
MANHOLE

BOX 1A
FLOW DIVERSION
STRUCTURE

BOX 1B
FLOW DIVERSION
STRUCTURE

FLOWS UP TO
8 CFS

SANSEP UNIT#1

EXISTING
18" HBIS

SOLIDS STORAGE
STRUCTURE

FLOWS ABOVE
8 CFS

UNDERFLOW TO
TRUNK SEWER MH3C

18" HDPE

EXISTING
MANHOLE
U15

MH-4A
INFLUENT METERING
LOCATION

EXISTING 21" HBIS

SANSEP UNIT#2

48" HDPE

TO WETLAND
FACILITY

EFFLUENT BOX
STRUCTURE (MH-1D)
INFLUENT SAMPLING
LOCATION

LEGEND

COMBINED SEWER

UNDERFLOW TO TRUNK SEWER

TREATED FLOW TO WETLANDS

NO.	DSGN	DR	CHK	APVD
0	ZM	GH	MM	MM

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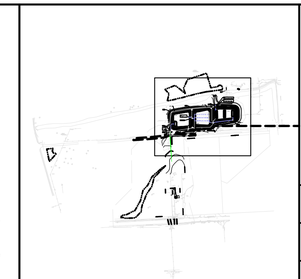
GRIT AND FLOATABLES REMOVAL
FACILITY FLOW DIAGRAM

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2014
PROJ	381098
DWG	FD-1
SHEET	1 of 5

NOTE:
SPDES PERMIT REQUIRED AND
SYSTEM OPTIMIZATION
MONITORING LOCATIONS SHOWN.



SITE KEY MAP
NOT TO SCALE

MH-19
OVERFLOW METERING LOCATION

MH-18
EFFLUENT SAMPLING LOCATION,
EFFLUENT METERING LOCATION

MH-17

MH-16

36" HDPE

MH-15

36" HDPE

CELL #1

CELL #2

CELL #3

FDS#11
OPTIMIZATION
SAMPLING LOCATION

DOSING MH-12

30" HDPE

MH-10

FDS#13
OPTIMIZATION
SAMPLING LOCATION

FDS#6

MH-5A
BYPASS
METERING
LOCATION

36" HDPE

MH-5B

FDS#7

FDS#8 30" HDPE

APPROX PROPERTY LINE

APPROX PROPERTY LINE

Wetland System Diversion Gate Configuration

FDS	Gate	Direction	Series
6	6A	From G&F to Emergency Bypass	Closed
6	6B	From G&F to Cell 2	Closed
7	7A	From Cell 1 to Cell 2/3	Closed
8	8A	From G&F/Cell 1 to Cell 2	Closed
11	11A	From Cell 1 to Outfall/Cell 2	Open
12	Dosing valve	From Cell 1/FDS 11 to Cell 2	Open
13	13A	From Cell 2 to Cell 3	Open
13	13B	From Cell 2 to Outfall	Closed

LEGEND

SERIES FLOW PATH

TREATED FLOW
FROM G & F

N

0 30 60 90

SCALE: 1" = 30'

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SERIES FLOW DIAGRAM
WETLAND FACILITY

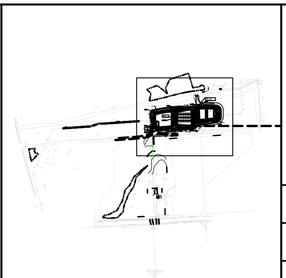
NO.	DSGN	DR	CHK	APVD
0	ZM	GH	MM	MM

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2014
PROJ	381098
DWG	FD-2
SHEET	2 of 5

NOTE:
SPDES PERMIT REQUIRED AND
SYSTEM OPTIMIZATION
MONITORING LOCATIONS SHOWN.



SITE KEY MAP
NOT TO SCALE

MH-19
OVERFLOW/ EFFLUENT
METERING LOCATION,
EFFLUENT SAMPLING LOCATION

MH-18

MH-17

MH-16

36" HDPE

36" HDPE

MH-15

CELL #1

FDS#11
OPTIMIZATION
SAMPLING LOCATION

DOSING MH-12

CELL #2

CELL #3

30" HDPE

MH-10

FDS#13
OPTIMIZATION
SAMPLING LOCATION

FDS#6

MH-5A
BYPASS
METERING
LOCATION

36" HDPE

MH-5B

FDS#7

FDS#8

30" HDPE

APPROX PROPERTY LINE

APPROX PROPERTY LINE

ED. OF WATER
ELEV=392.5±
12-10-10

BENCHMARK
BOX CUT ON SE CORNER
OF CONC. RET. WALL
ELEV=402.55'

Wetland System Diversion Gate Configuration

FDS	Gate	Direction	Parallel
6	6A	From G&F to Emergency Bypass	Closed
6	6B	From G&F to Cell 2	Open
7	7A	From Cell 1 to Cell 2/3	Closed
8	8A	From G&F/Cell 1 to Cell 2	Open
11	11A	From Cell 1 to Outfall/Cell 2	Open
12	Dosing valve	From Cell 1/FDS 11 to Cell 2	Closed
13	13A	From Cell 2 to Cell 3	Closed
13	13B	From Cell 2 to Outfall	Open

LEGEND

FLOW PATH
CELL 2 FLOW PATH
CELL 3 FLOW PATH
TREATED FLOW
FROM G & F

0 30 60 90
SCALE: 1" = 30'

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ONONDAGA COUNTY, NEW YORK

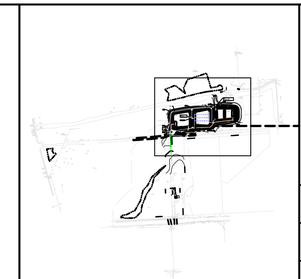
PARALLEL FLOW DIAGRAM
WETLAND FACILITY

NO.	DSGN	DR	CHK	APVD
0	ZM	GH	MM	MM

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2014
PROJ	381098
DWG	FD-3
SHEET	3 of 5

NOTE:
SPDES PERMIT REQUIRED AND
SYSTEM OPTIMIZATION
MONITORING LOCATIONS SHOWN.



SITE KEY MAP
NOT TO SCALE

MH-19
OVERFLOW/ EFFLUENT
METERING LOCATION,
EFFLUENT SAMPLING LOCATION

MH-18

MH-17

MH-16

36" HDPE

36" HDPE

MH-15

CELL #1

CELL #2

CELL #3

FDS#11
OPTIMIZATION
SAMPLING LOCATION

DOSING MH-12

FDS#6

MH-5A
BYPASS
METERING
LOCATION

36" HDPE

MH-5B

FDS#7

FDS#8 30" HDPE

30" HDPE

MH-10

FDS#13
OPTIMIZATION
SAMPLING LOCATION

APPROX PROPERTY LINE

APPROX PROPERTY LINE

ED. OF WATER
ELEV=392.5±
12-10-10

BENCHMARK
BOX CUT ON SE CORNER
OF CONC. RET. WALL
ELEV=402.55'

Wetland System Diversion Gate Configuration

FDS	Gate	Direction	Series & Parallel
6	6A	From G&F to Emergency Bypass	Closed
6	6B	From G&F to Cell 2	Closed
7	7A	From Cell 1 to Cell 2/3	Open
8	8A	From G&F/Cell 1 to Cell 2	Closed
11	11A	From Cell 1 to Outfall/Cell 2	Open
12	Dosing valve	From Cell 1/FDS 11 to Cell 2	Open
13	13A	From Cell 2 to Cell 3	Closed
13	13B	From Cell 2 to Outfall	Open

LEGEND

CELL 1-2 SERIES FLOW PATH

CELL 1-3 SERIES FLOW PATH

TREATED FLOW FROM G & F

0 30 60 90
SCALE: 1" = 30'

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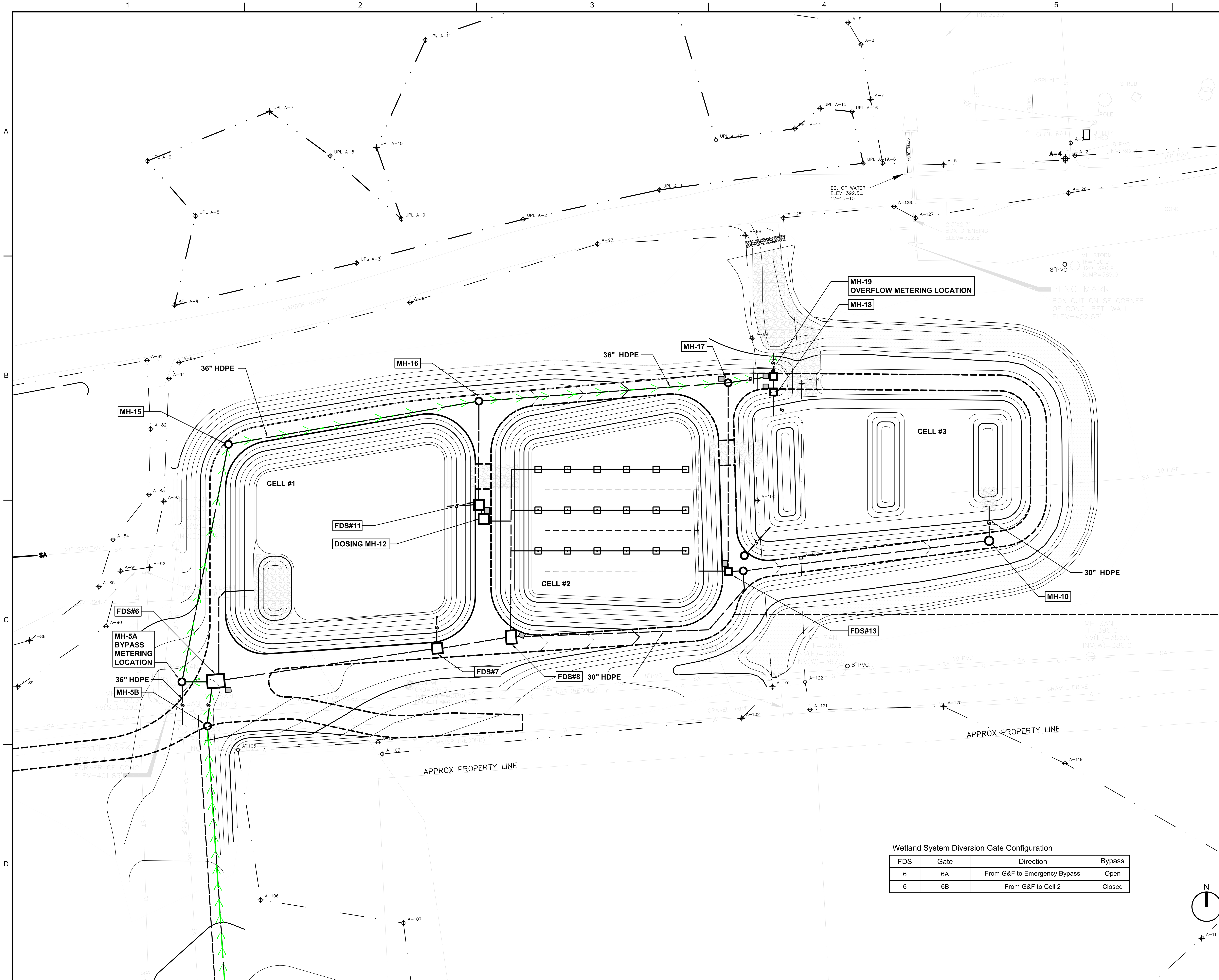
SERIES AND PARALLEL FLOW DIAGRAM
WETLAND FACILITY

NO.	DSGN	DR	CHK	APVD
0	ZM	GH	MM	MM

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2014
PROJ	381098
DWG	FD-4
SHEET	4 of 5

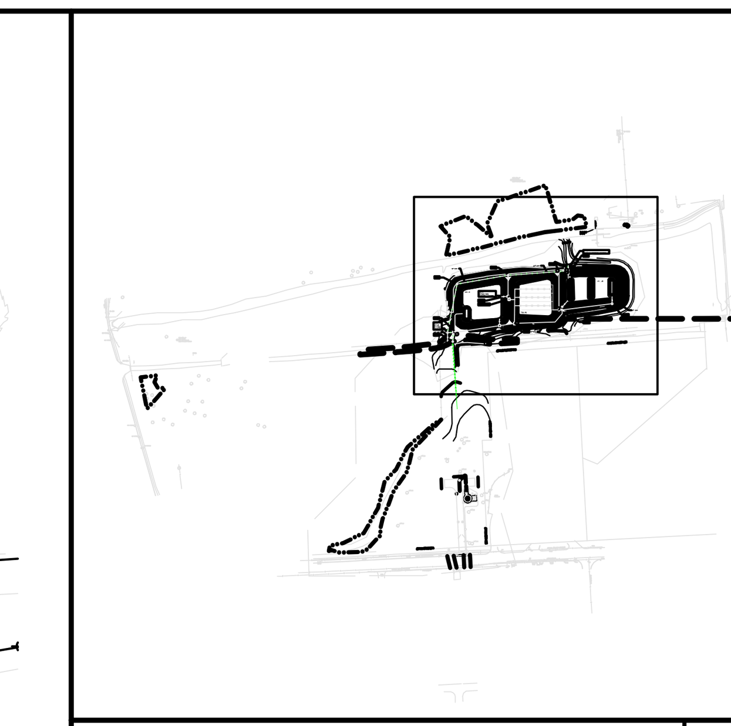


LEGEND

BYPASS FLOW PATH

Wetland System Diversion Gate Configuration

FDS	Gate	Direction	Bypass
6	6A	From G&F to Emergency Bypass	Open
6	6B	From G&F to Cell 2	Closed



NO.	DSGN	DR	CHK	APVD
0	ZM	GH	MM	MM

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BYPASS FLOW DIAGRAM WETLAND FACILITY

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOVEMBER 2014
PROJ	381098
DWG	FD-5
SHEET	5 of 5