the pumping system. The current pumping configuration produces a controlling high point within the valve vault atop the existing wet well. By reducing losses within the manifold piping this modification would alter the system hydraulics by creating a vacuum within the system high point and converting the controlling high point to the discharge manhole. This modification would lower overall TDH of the system by approximately one foot and allow for greater pumping capacity. This alternative also includes the replacement of the existing submersible pumps because they are nearing the end of their useful life and the replacement of the valve vault enclosure. The existing valve vault enclosure is compact and does not contain adequate space to place upsized pipe and fittings. This alternative would involve increasing the peak flow discharged to the Village combined sewer system (CSS) and would warrant a review of its system to determine whether the increased flows will negatively impact any downstream overflows and what additional measures would be required to mitigate these impacts.

However, it will be difficult to find a submersible duplex pump configuration to service normal dry weather conditions, wet weather conditions, and mitigate the existing SSOs because of the large difference between minimum and maximum flows. To address this large difference in flows, an additional standby high-flow pump(s) could be installed to provide system redundancy and overall capacity during wet weather or an equalization storage facility can be constructed to control the influent flows to the MRPS.

The costs shown in Table 14 were developed based on the estimate that MRPS has an approximate capacity of 755 gpm (See Appendix C for pumping system calculations) and construction of a 105,000-gallon storage facility to service the sewershed for a 2-year LOS. Storage volume was estimated similar to that mentioned for Collection Systems Improvements Alternative C. The OPCCs presented do not include the option of installing a standby diesel power pump. This alternative would allow the MRPS to mitigate SSOs to a 2-year LOS and increase its available pumping capacity. The equalization facility can be constructed in addition to the MRPS wet well or at another point along the main trunk sewer to offload flows from FM3 and FM4. This alternative adds additional storage to the SSS and will aid the MRPS to be able to service the tributary sewershed and fulfill regulatory requirements.

Constructability and community impact for the equalization storage facility are similar to those mentioned for Collection Systems Improvements Alternative C. Constructability of the manifold piping upsizing and pump replacement will be dependent on the time necessary for the MRPS to be out of operation to minimize bypass pumping needs. The community impact for the manifold piping and pump replacement portion of the alternative should be minimal as residents should experience no disruption in service and minimal disruption because of construction requirements.

B. Upsize Submersible Pumps and Equalization Storage

The existing submersible pumps were installed in 2001 with the initial MRPS construction. The pumps are nearing the end of their useful life and will be in need of replacement in the near future. This alternative includes the upsizing of the existing duplex configuration to allow for each pump to have a capacity of 1,000 gpm. This increased flow rate would allow for each pump to experience less than six starts per hour during high flow conditions to minimize pump usage and ultimately maintenance concerns. Also, the existing wet well would have a maximum detention time of less than 30 minutes during assumed minimum flow conditions to minimize odor and corrosion concerns. No other modifications to the pumping configuration are proposed in this alternative. This alternative would involve increasing the peak flow discharged to the Village's CSS and would warrant a review of its system to determine whether the

increased flows will negatively impact any downstream overflows and what additional measures would be required to mitigate these impacts. However, it will be difficult to find a submersible duplex pump configuration to service normal dry weather conditions, wet weather conditions, and mitigate the existing SSOs because of the large difference between minimum and maximum flows. To address this large difference in flows, an additional standby high-flow pump(s) could be installed to provide system redundancy and overall capacity during wet weather or an equalization storage facility can be constructed to control the influent flows to the MRPS.

The costs shown in Table 14 were developed based on the estimate that MRPS has an increased capacity mentioned above and construction of a 72,000 gallon storage facility to service the sewershed for a 2-year LOS. Storage volume was estimated similar to that mentioned for Collection Systems Improvements Alternative C. The OPCCs presented do not include the option of installing a standby diesel power pump. This alternative would allow the MRPS to mitigate SSOs to a 2-year LOS and increase its available pumping capacity. The equalization facility can be constructed in addition to the MRPS wet well or at another point along the main trunk sewer to offload flows from FM3 and FM4. This alternative adds additional storage to the SSS and will aid the MRPS to be able to service the tributary sewershed and fulfill regulatory requirements.

Constructability and community impact for the equalization storage facility are similar to those mentioned for Collection Systems Improvements (Alternative C). Constructability of the pump upsizing will be dependent on the time necessary for the MRPS to be out of operation to minimize bypass pumping needs. The community impact for the pump replacement portion of the alternative should be minimal as residents should experience no disruption in service and minimal disruption because of construction requirements.

C. Construct New Pumping Station and New Force Main

This alternative would consist of constructing a new pumping station at the MRPS location and constructing a new 12-inch-diameter force main to service the entire sewershed for a 2-year LOS. The existing 8-inch-diameter force main could remain in service to operate in conjunction with the new force main or in bypass situations when necessary. This configuration would be requires further evaluation dependent on the specific pumping configuration chosen during design. The new station should be able to efficiently convey peak sanitary conditions of approximately 619 gpm (see Appendix C for calculations) while also conveying peak wet weather conditions of approximately 3,092 gpm (see Table 11). This alternative would involve increasing the peak flow discharged to the Village's CSS and would warrant a review of its system to determine whether the increased flows will negatively impact any downstream overflows and what additional measures would be required to mitigate these impacts. It is difficult to design a pumping configuration to service normal dry weather conditions, wet weather conditions, and mitigate the existing SSOs. The costs shown in Table 14 are estimated to use four submersible pumps with three pumps providing the desired capacity for the station and the fourth pump providing adequate redundancy for the system.

Constructability of the new pumping station will be dependent on the interface between the existing station compared to the new station to allow the existing MRPS to operate under existing conditions as long as possible to minimize bypass pumping needs and the pumping configuration determine to provide the most efficient conveyance of two extremely different normal and wet weather flow scenarios while

still providing adequate redundancy. Constructability of the new force main will be dependent on the interface between the alignment of the new force main compared to the existing force main to allow the MRPS to operate under existing conditions as long as possible to minimize bypass pumping needs. This modification may also require the use of trenchless technologies to install new steel casing pipe at the crossing of Gallia Street (US 52 WB), if it is determined the existing casing pipe is not able, or is not feasible, to be reused because of application, condition, and/or a cost-benefit analysis of taking the existing force main out of operation and bypass pumping versus constructing a new casing pipe. Additionally, an extended project area will be required to construct the force main compared to other alternative presented in this report, causing disruption to normal conditions on Clayport Street and/or Rhodes Avenue (US 52 EB).

Alternative	OPCC[1]	Net Present Value [1,2,3]	Estimated Construction Duration (Months)
A	$1,114,000	$896,000	10
B	$844,000	$736,000	10
C	$850,000	$834,000	11

Note:
[1]Results shown as 2018 equivalent value.
[2]Assumed inflation rate = 2.5 percent (based on recent ENR Construction Cost Index data).
[3]Evaluated life span: Total = 20 years, Pumps = 15 years, all other infrastructure = 50 years.

Table 14 Pumping Station Improvement Cost and Schedule Summary

RECOMMENDATIONS AND CONCLUSIONS

The results of this report indicate that the tributary sewershed to the MRPS is susceptible to excess rainfall induced I/I. There are several alternatives detailed above within the collection system and within the pumping system that would aid to mitigate SSOs at the existing MRPS. Given the limitations of the data collection within the sewershed, the impact the implementation on the community, the regulatory requirements, and the significant financial investment these projects would have on the City, it is recommended that the City take a phased approach that begins with further investigations and rehabilitation.

Data indicates estimated representative dry weather flow derived from the flow monitoring analysis was skewed because of direct inflow from the Munns Run Creek and connections from the Village's sewer system. It is recommended that Collection System Improvement Alternatives A and B be completed prior to consideration of all other alternatives so the true level of impact of I/I outside of the items to be remedied by Collection Systems Improvements Alternatives A and B can be fully understood.

Once the main trunk sewer is rehabilitated and likely direct inflow sources have been removed from the Village's system, the City's system should be remonitored for a minimum of 6 months to better determine the amount of flow that will be experienced at the MRPS site. The duration of monitoring should be extended to 6 months from the initial study period of 3 months to increase the chance of capturing a significant rainfall event.

The relatively small rainfall events experienced during this initial study required the flow and sizing calculations to rely predominately on the extrapolation of rainfall and estimated sewer flow, which could lead to an overly conservative design. It is also recommended the existing mapping of the City's North Moreland sewershed be reviewed and updated to better understand the current configurations of the system. Updated mapping could be done in conjunction with the sewer televising work currently being completed in accordance with the Management, Operations, and Maintenance program. The updated mapping and televising information will allow for the best understanding of the monitoring results and existing conditions. Once these initial projects have been completed and remonitored, the remaining alternatives can be re-evaluated to determine whether SSOs are still occurring and better determine a recommendation, if necessary, to mitigate SSOs. A recommended schedule for how to progress through the recommended steps is listed in Table 15.

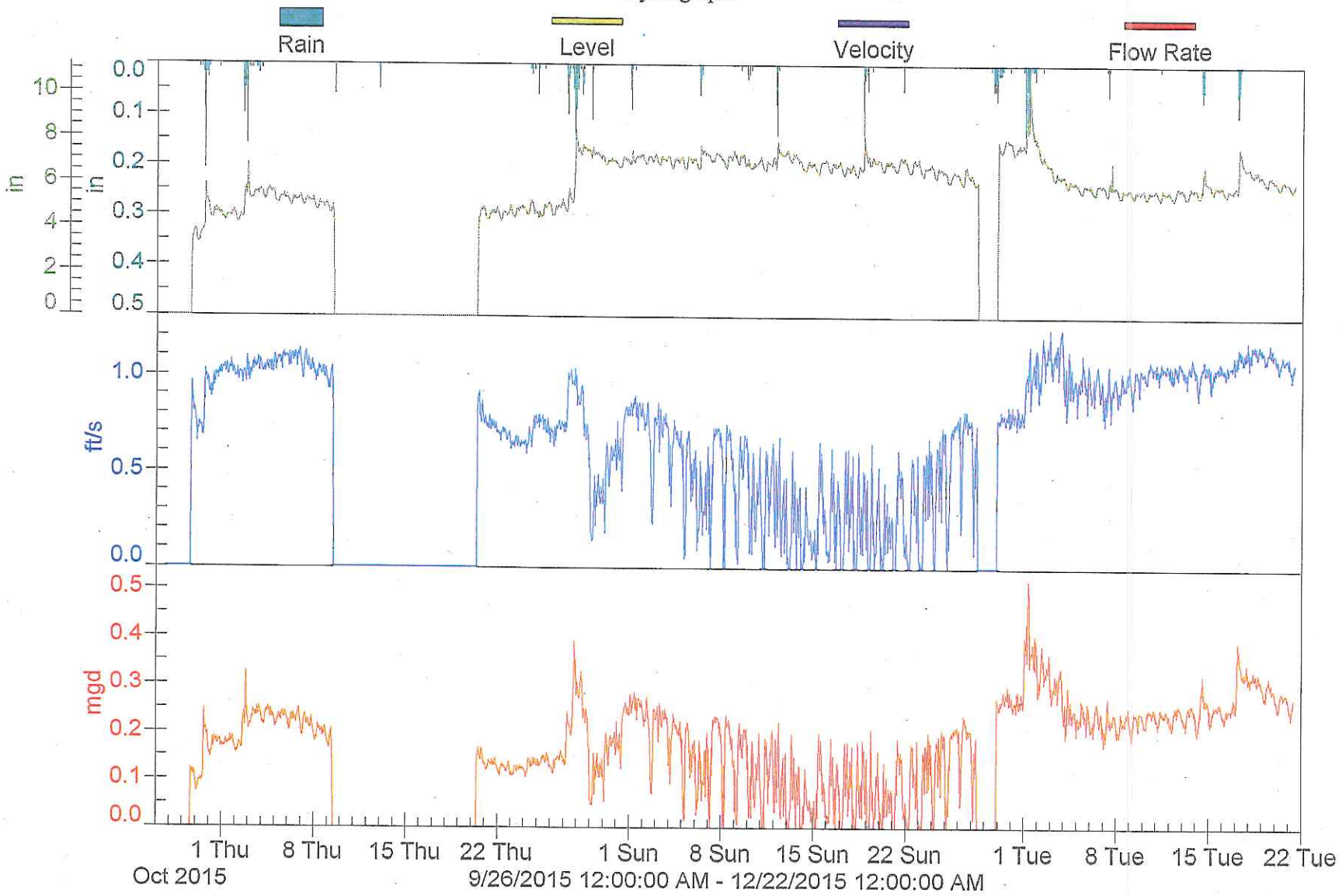
Project	Estimated Completion
Complete MRPS Sewershed Mapping Update and CCTV Evaluation	No later than 19 months after the USEPA's written approval of the Amended Schedule
Repair Stream Crossing in Village's Sewer System (Collections Systems Improvements Alternative A)	No later than 22 months after the USEPA's written approval of the Amended Schedule
Rehabilitate Main Trunk Sewer (Collections Systems Improvements Alternative B)	No later than 27 months after the USEPA's written approval of the Amended Schedule
Remonitoring of North Moreland Sewershed	No later than 34 months after the USEPA's written approval of the Amended Schedule
Re-evaluation of SSO Mitigation Alternatives	No later than 40 months after the USEPA's written approval of the Amended Schedule

Table 15 Recommended Project Schedule

America
Blaine
FM2b
FM1
Pennsylvania
Columbia
Columbia
York
5Th
FM3
York
Monroe
Harrisonville
Brookside
Taft
Maple
Maple
FM4
RG 1
Lakeview
RG 2
Oak
Cedar
Spruce
Lakeshore
Pine
Basham
Mildale

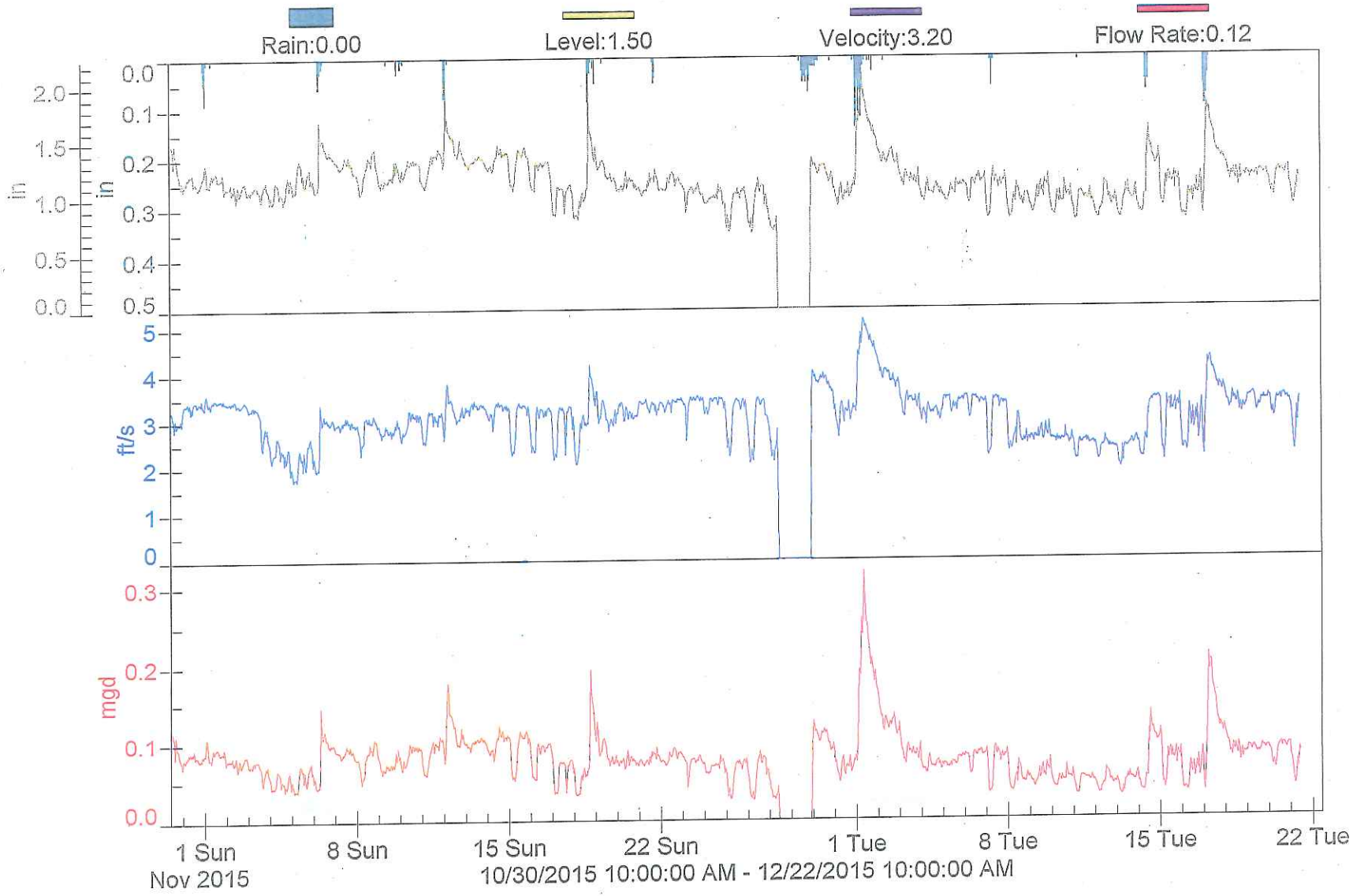
FM1 - 4228 Columbia Ave.

Hydrograph



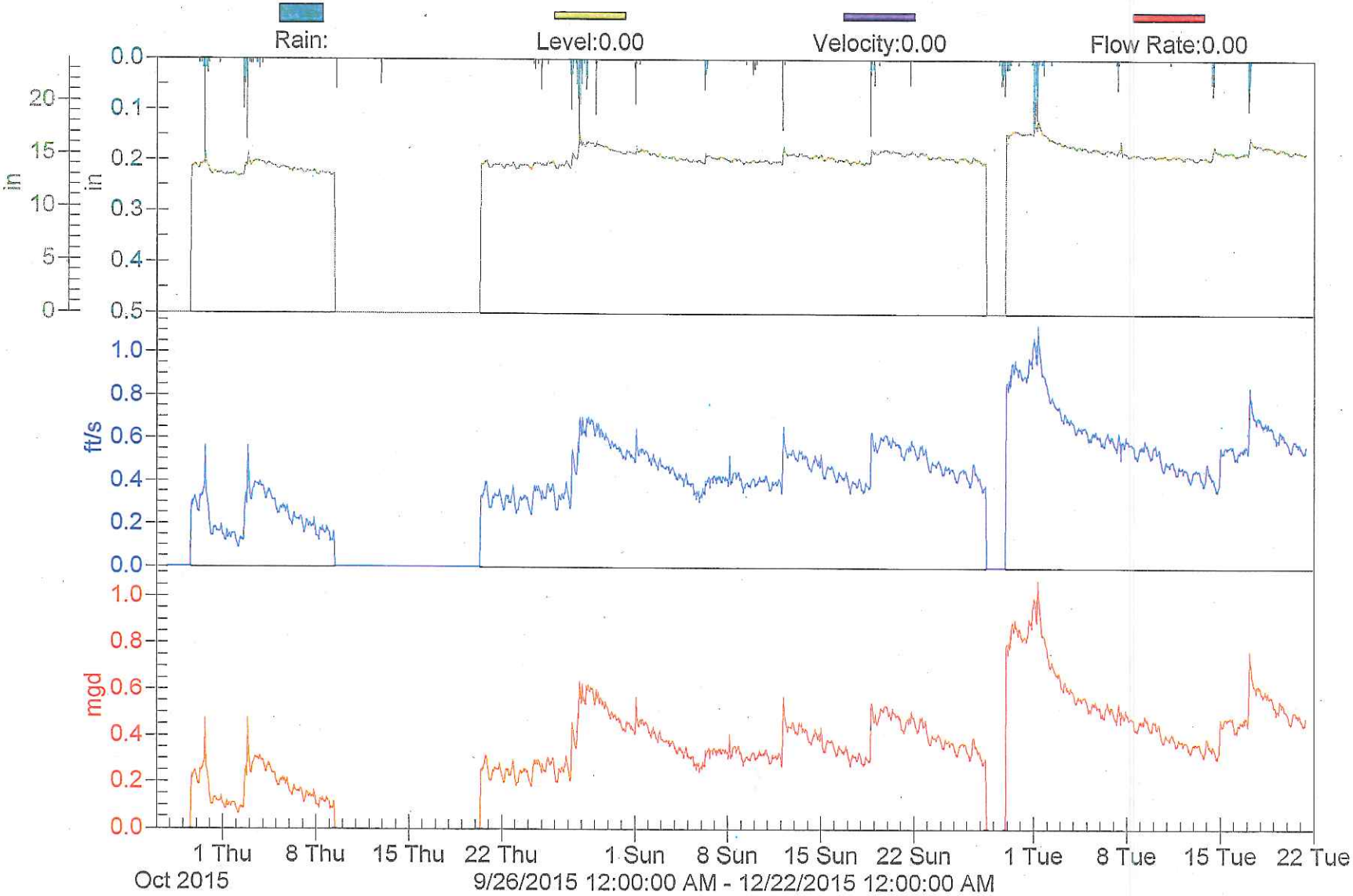
FM2 - 1506 Harrisonville Ave.

Hydrograph



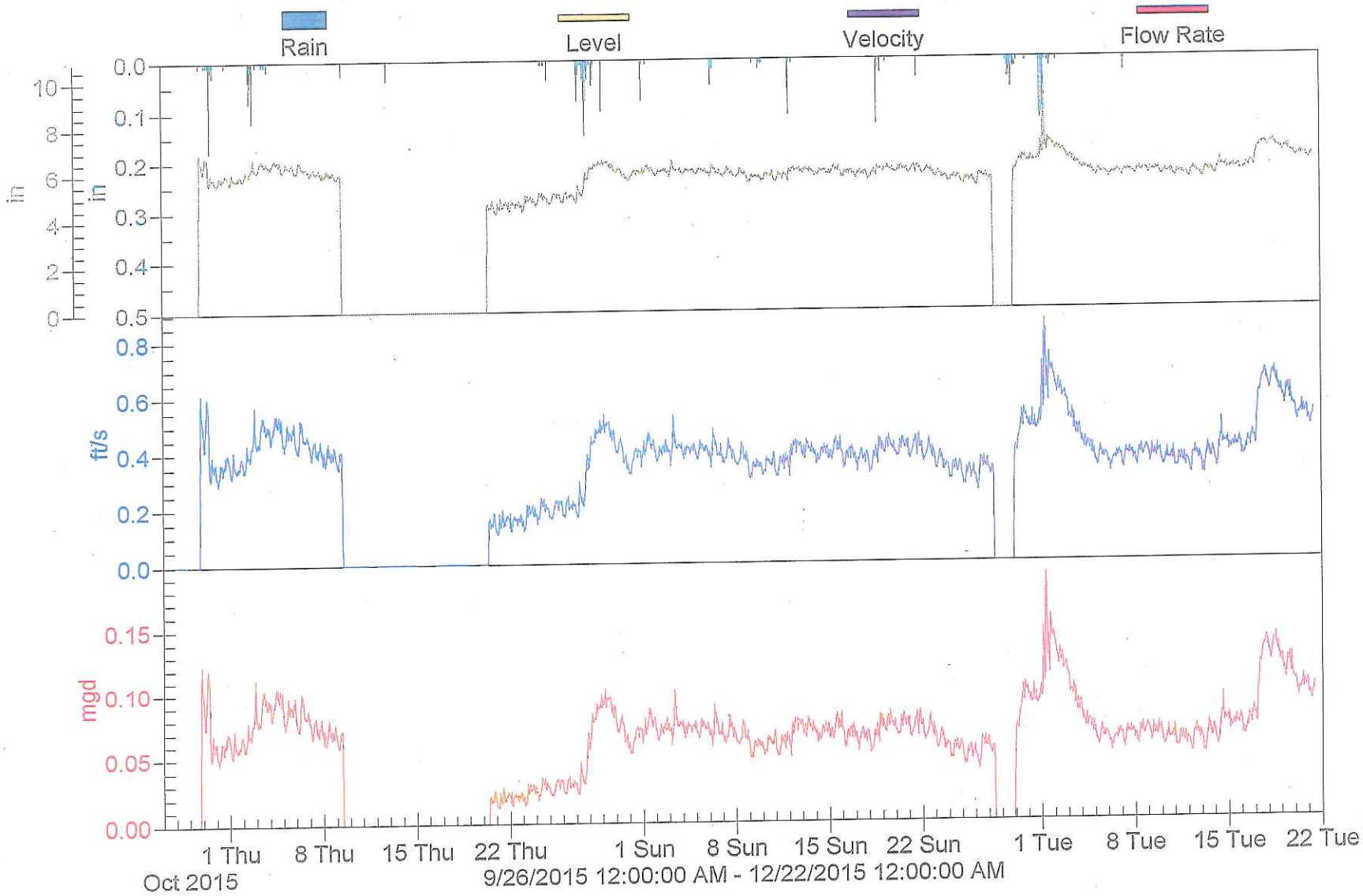
FM3 - 4236 York St.

Hydrograph



FM4 - 1100 Lakeview Ave.

Hydrograph



City of Portsmouth, Ohio
Munns Run Pumping Station
Strand Associates, Inc.

	Munn's Run PS - Flow Calculation	Units	Per Unit Factor	Per Unit (GPD)	Flow Rate (GPD)
	Flow Monitoring Area - FM 1				
1	Household	384	2.4	120	110,592
2	Apartment	6	1	120	720
3	Church	2	200	5	2,000
4	Commercial Store (Employees)	3	5	15	225
5	Commercial Store (Customers)	3	5	5	75
				Sub-Total:	**113,612**
	Flow Monitoring Area - FM 2b				
1	Household	183	2.4	120	52,704
2	Commercial Store (Employees)	1	5	15	75
3	Commercial Store (Customers)	1	5	5	25
4	Church	1	200	5	1,000
5	Funneral Home	1	5	20	100
				Sub-Total:	**53,904**
	Flow Monitoring Area - FM 3				
1	Household	16	2.4	120	4,608
				Sub-Total:	**4,608**
	Flow Monitoring Area - FM 4				
1	Household	105	2.4	120	30,240
2	Church	3	200	5	3,000
				Sub-Total:	**33,240**
	MRPS				
1	Household	40	2.4	120	11,520
2	School (Student)	1	455	20	9,100
3	School (Employee)	1	60	15	900
4	Daycare (Students)	1	155	10	1,550
5	Daycare (Employee)	1	21	35	735
6	Medical Office	2	3	75	450
7	Commercial Store (Employees)	1	5	15	75
8	Commercial Store (Customers)	1	11	5	55
				Sub-Total:	**24,385**

Average Residential Billing Flow Rate, Q_R:	220,000	gpd (avg)
Average Apartment Billing Flow Rate, Q_A:	800	gpd (avg)
Average School Billing Flow Rate, Q_S:	10,000	gpd (avg)
Average Flow Rate, Q_{avg}:	230,800	gpd (avg)
Average Flow Rate, Q_{avg}:	160	gpm (avg)

Appendix C.1
Existing Pumping System Calculations

EPA GREENBOOK

Peaking Factor (Residential), PF:	3.33	
Peaking Factor (Apartments), PF:	5.00	
Peaking Factor (Schools), PF:	9.99	
Ultimate Peaked Flow Rate, Q:	836,500	gpd (peak)
Ultimate Peaked Flow Rate, Q:	581	gpm (peak)

10 STATES STANDARD

Est. Population, P_T,:	2,190	
Est. Population, P,:	2	
Peaking Factor (10 States Std), PF:	3.55	
Peaking Factor (Schools), PF:	10.66	
Ultimate Peaked Flow Rate, Q:	891,546	gpd (peak)
Ultimate Peaked Flow Rate, Q:	619	gpm (peak)

Design Peaked Flow Rate, Q:	891,546	gpd (peak)
Design Peaked Flow Rate, Q:	619	gpm (peak)

FLOW CALCULATION SUMMARY - MRPS

Ultimate Average Flow Rate, Q:	160	gpm (avg)
Ultimate Peaked Flow Rate, Q:	619	gpm (peak)
MIN Flow Rate in Force Main:	725	gpm

IF Design Value > Peak Value

WET WELL VOLUME SIZING - MRPS

Volume = (Pump Cycle, min) * (Pump Capacity, gpm) / 4

Iteration #1:

Starts Per Hour:	9.65	# starts/hr
Pump Cycle, Phi:	6	min
Pump Capacity, Q:	725	gpm
Volume, V:	1,127	gal

(Detention time < 30 min)

Detention Time (t, min):

	Flow	t (min)
Average Flow Rate, Q:	160	7.03
Minimum Flow Rate, Q:	53	21.09
Peaked Flow Rate, Q:	725	1.55

WET WELL DIAMETER SIZING - MRPS

Wet Well Diamter:	8.0	ft
Wet Well Area:	50.27	ft^2

Volume = (Drawdown Depth, ft) * (Unit Volume, gal/ft)

Drawdown Depth:	3.00	ft
Unit Volume:	376	gal/ft
Drawdown Volume, V:	1,127	gal

FLOAT SETTING CALCULATIONS - MRPS

FM Discharge:	98.47	= Elevation of FM in Discharge MH (CONTROLLING)
Centerline of FM:	104.75	= Centerline of FM at high point
Top of Wet Well:	101.00	= Rim Elevation of Existing MRPS
High Level Alarm:	96.00	= High Water Level
SSO Overflow:		= Invert of Overflow Pipe
Lag Pump On:	94.50	= Lag Pump On (Pump off + Drawdown)
Lead Pump On:	94.00	= Lead Pump On (Pump off + Drawdown)
Lag Pump Off:	91.50	= Pump Off (Assumed 3' above Sump)
Lead Pump Off:	91.00	= Pump Off (Assumed 3' above Sump)
Low Level Alarm:	89.50	= Low Level Cut Off, Sump +1.5' (from record drawings)
Bottom Wet Well:	88.00	= Sump of Wet Well

PUMP SELECTION - MRPS

Assumptions (MRPS Pumping Alone):

Ultimate Peaked Flow Rate, Q_1:	725	gpm		
Ultimate Peaked Flow Rate, Q_2:	725	gpm		
Force Main Material, M_1:	Ductile Iron			
Force Main Nom. Diameter, ND_1:	6	in	0.50	feet
Force Main Inside Diameter, D_1:	6.40	in	0.53	feet
Force Main Material, M_2:	HDPE - (DR 11, DIPS)			
Force Main Nom. Diameter, ND_2:	8	in	0.67	feet
Force Main Diameter, D_2:	7.31	in	0.61	feet
Force Main Length, L_1:	17	ft		
Force Main Length, L_2:	355	ft		
Hazen Williams, C_{120}:	120			
Hazen Williams, C_{100}:	100			
Hazen Williams, C_{140}:	140			
Fluid Velocity, V_1:	7.23	fps		
Fluid Velocity, V_2:	5.55	fps		

Design (MRPS Pumping Alone):

	Lead Pump		Lag Pump	
Crown of Force Main, Z_2:	98.80	EL	98.80	EL
Pumping Level (C=120), Z_1:	91.00	EL	91.50	EL
Static Head (C=120):	7.80	ft	7.30	ft
Pumping Level (C=100), Z_1:	91.00	EL	91.50	EL
Static Head (C=100):	7.80	ft	7.30	ft
Pumping Level (C=140), Z_1:	91.00	EL	91.50	EL
Static Head (C=140):	7.80	ft	7.30	ft

Design (MRPS Pumping Alone):

Piping Losses (C=120), H_{P1}:	0.59	ft
Piping Losses (C=120), H_{P2}:	6.43	ft
Piping Losses (C=120):	7.02	ft
Piping Losses (C=100), H_{P1}:	0.82	ft
Piping Losses (C=100), H_{P2}:	9.01	ft
Piping Losses (C=100):	9.83	ft
Piping Losses (C=140), H_{P1}:	0.44	ft
Piping Losses (C=140), H_{P2}:	4.83	ft
Piping Losses (C=140):	5.28	ft

K_1:	2.73	
K_2:	1.52	
H_{v1}, $V^2/(2G)$:	0.81	ft
H_{v2}, $V^2/(2G)$:	0.48	ft
Minor Losses, H_{M1}:	2.22	ft
Minor Losses, H_{M2}:	0.73	ft
Minor Losses:	2.94	ft

P (TDH) = Static Head (ft) + Piping Losses (ft) + Minor Losses (ft)

P (TDH @ C=120):	**17.76**	ft	**17.26**	ft
P (TDH @ C=100):	**20.58**	ft	**20.08**	ft
P (TDH @ C=140):	**16.02**	ft	**15.52**	ft

MRPS - Summary of K Values

Piping & Appurtenances	Dia (in)	Type (mj / flg)	K Value	Cumulative K Values
CV	6	flg	1.752	1.75
Tee Elbow	6	flg	0.934	2.69
90 BEND	6	flg	0.292	2.98
6"-8" Enlarger	6-8	flg	0.045	2.73

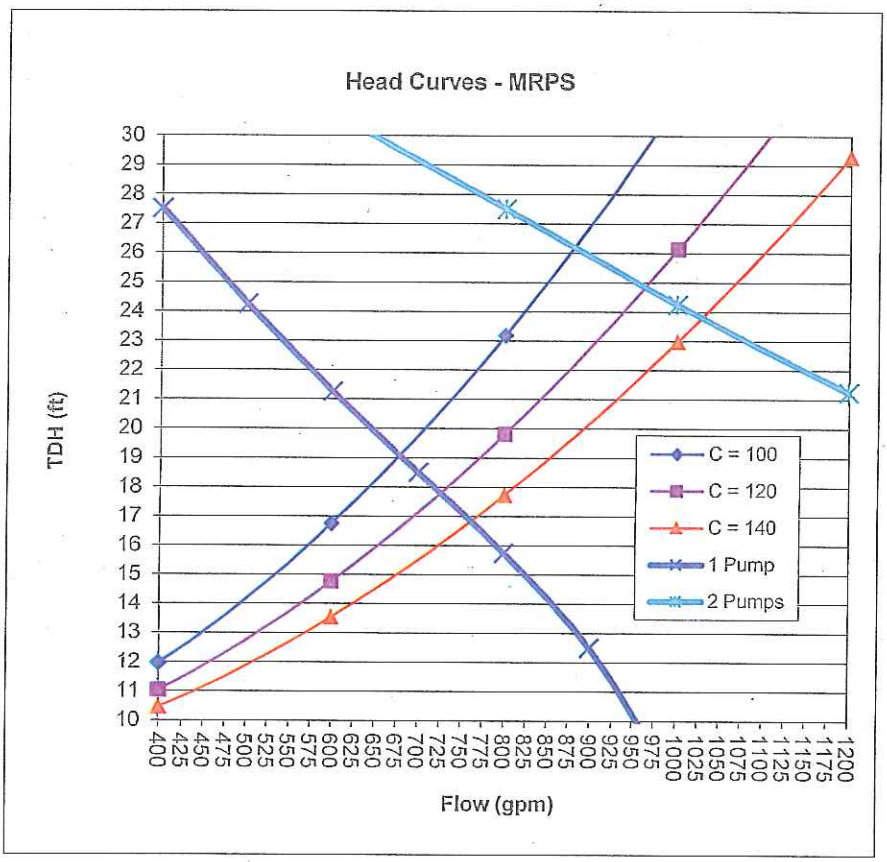
K_1: **2.73**

90 BEND	8	flg	0.282	0.28
22.5 BEND	8	flg	0.169	0.45
45 BEND	8	flg	0.226	0.68
45 BEND	8	flg	0.226	0.90
45 BEND	8	flg	0.226	1.13
45 BEND	8	flg	0.226	1.35
22.5 BEND	8	flg	0.169	1.52

K_2: **1.52**

FLOW CALCULATION SUMMARY - MRPS - Alone

Flow Rate, Q (GPM)	C=120	C=100	C=140
0	8	8	8
100	8	8	8
200	9	9	9
400	11	12	10
600	15	17	14
800	20	23	18
1000	26	31	23
1200	34	41	29
1400	43	52	37
1600	53	65	45
1800	64	79	54
2000	76	95	65



FLOW CALCULATION SUMMARY - MRPS

Ultimate Average Flow Rate, Q:	160	gpm (avg)
Ultimate Peaked Flow Rate, Q:	619	gpm (peak)
MIN Flow Rate in Force Main:	755	gpm

IF Design Value > Peak Value

WET WELL VOLUME SIZING - MRPS

Volume = (Pump Cycle, min) * (Pump Capacity, gpm) / 4

Iteration #1:

Starts Per Hour:	7	# starts/hr
Pump Cycle, Phi:	9	min
Pump Capacity, Q:	755	gpm
Volume, V:	1,618	gal

(Detention time < 30 min)

Detention Time (t, min):

	Flow	t (min)
Average Flow Rate, Q:	160	10.09
Minimum Flow Rate, Q:	53	30.28
Peaked Flow Rate, Q:	755	2.14

WET WELL DIAMETER SIZING - MRPS

Wet Well Diamter:	8.0	ft
Wet Well Area:	50.27	ft^2

Volume = (Drawdown Depth, ft) * (Unit Volume, gal/ft)

Drawdown Depth:	4.30	ft
Unit Volume:	376	gal/ft
Drawdown Volume, V:	1,618	gal

FLOAT SETTING CALCULATIONS - MRPS

FM Discharge:	98.47	= Elevation of FM in Discharge MH (CONTROLLING)
Centerline of FM:	104.75	= Centerline of FM at high point
Top of Wet Well:	101.00	= Rim Elevation of Existing MRPS
High Level Alarm:	96.00	= High Water Level
SSO Overflow:		= Invert of Overflow Pipe
Lag Pump On:	95.80	= Lag Pump On (Pump off + Drawdown)
Lead Pump On:	95.30	= Lead Pump On (Pump off + Drawdown)
Lag Pump Off:	91.50	= Pump Off (Assumed 3' above Sump)
Lead Pump Off:	91.00	= Pump Off (Assumed 3' above Sump)
Low Level Alarm:	89.50	= Low Level Cut Off, Sump +1.5' (from record drawings)
Bottom Wet Well:	88.00	= Sump of Wet Well

PUMP SELECTION - MRPS

Assumptions (MRPS Pumping Alone):

Ultimate Peaked Flow Rate, Q_1:	755	gpm		
Ultimate Peaked Flow Rate, Q_2:	755	gpm		
Force Main Material, M_1:	Ductile Iron			
Force Main Nom. Diameter, ND_1:	8	in	0.67	feet
Force Main Inside Diameter, D_1:	8.55	in	0.71	feet
Force Main Material, M_2:	HDPE - (DR 11, DIPS)			
Force Main Nom. Diameter, ND_2:	8	in	0.67	feet
Force Main Diameter, D_2:	7.31	in	0.61	feet
Force Main Length, L_1:	17	ft		
Force Main Length, L_2:	355	ft		
Hazen Williams, C_{120}:	120			
Hazen Williams, C_{100}:	100			
Hazen Williams, C_{140}:	140			
Fluid Velocity, V_1:	4.22	fps		
Fluid Velocity, V_2:	5.78	fps		

Design (MRPS Pumping Alone):

	Lead Pump		Lag Pump	
Crown of Force Main, Z_2:	98.80	EL	98.80	EL
Pumping Level (C=120), Z_1:	91.00	EL	91.50	EL
Static Head (C=120):	7.80	ft	7.30	ft
Pumping Level (C=100), Z_1:	91.00	EL	91.50	EL
Static Head (C=100):	7.80	ft	7.30	ft
Pumping Level (C=140), Z_1:	91.00	EL	91.50	EL
Static Head (C=140):	7.80	ft	7.30	ft

Design (MRPS Pumping Alone):

Piping Losses (C=120), H_{P1}:	0.15	ft
Piping Losses (C=120), H_{P2}:	6.93	ft
Piping Losses (C=120):	7.09	ft
Piping Losses (C=100), H_{P1}:	0.22	ft
Piping Losses (C=100), H_{P2}:	9.71	ft
Piping Losses (C=100):	9.93	ft
Piping Losses (C=140), H_{P1}:	0.12	ft
Piping Losses (C=140), H_{P2}:	5.21	ft
Piping Losses (C=140):	5.33	ft

K_1:	3.49	
K_2:	1.51	
H_{v1}, $V^2/(2G)$:	0.28	ft
H_{v2}, $V^2/(2G)$:	0.52	ft
Minor Losses, H_{M1}:	0.96	ft
Minor Losses, H_{M2}:	0.79	ft
Minor Losses:	1.75	ft

P (TDH) = Static Head (ft) + Piping Losses (ft) + Minor Losses (ft)

P (TDH @ C=120):	**16.64**	**ft**	**16.14**	**ft**
P (TDH @ C=100):	**19.48**	**ft**	**18.98**	**ft**
P (TDH @ C=140):	**14.88**	**ft**	**14.38**	**ft**

MRPS - Summary of K Values

Piping & Appurtenances	Dia (in)	Type (mj / flg)	K Value	Cumulative K Values
CV	8	flg	1.689	1.69
Tee Elbow	8	flg	0.901	2.59
Tee Elbow	8	flg	0.901	3.49
90 BEND	8	flg	0.282	2.87
Enlarger	8-10	flg		3.49

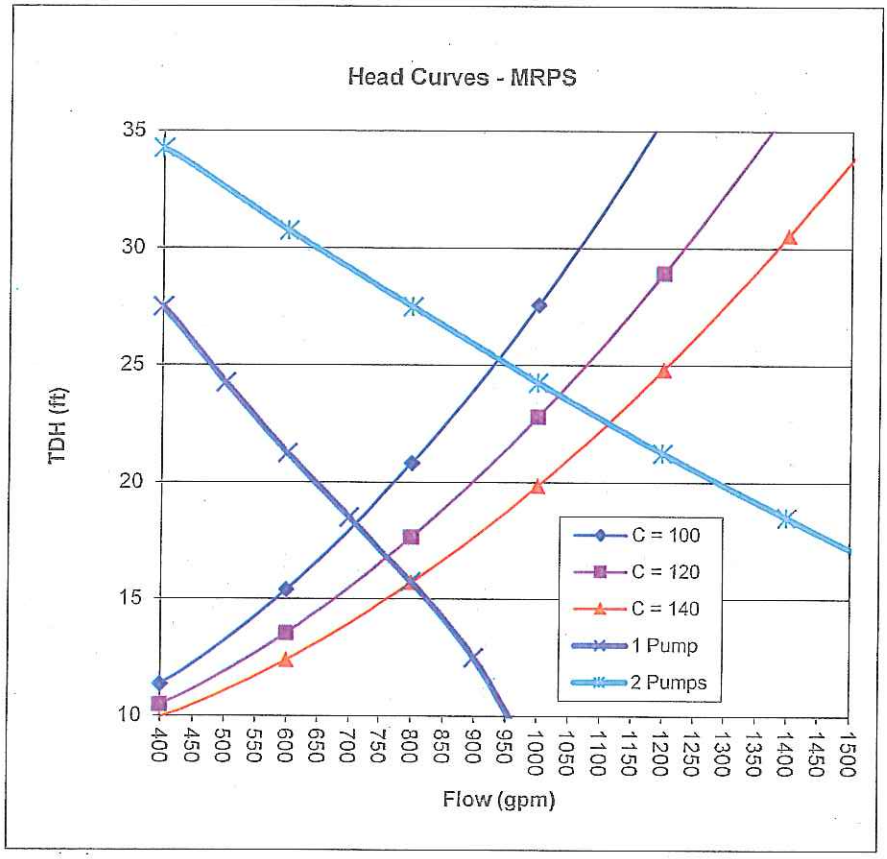
K_1: **3.49**

90 BEND	8	flg	0.282	0.28
22.5 BEND	8	flg	0.165	0.45
45 BEND	8	flg	0.226	0.67
45 BEND	8	flg	0.226	0.90
45 BEND	8	flg	0.226	1.12
45 BEND	8	flg	0.226	1.35
22.5 BEND	8	flg	0.165	1.51

K_2: **1.51**

FLOW CALCULATION SUMMARY - MRPS - Alone

Flow Rate, Q (GPM)	C=120	C=100	C=140
0	8	8	8
100	8	8	8
200	9	9	8
400	10	11	10
600	14	15	12
800	18	21	16
1000	23	28	20
1200	29	36	25
1400	36	45	31
1600	44	56	37
1800	53	67	44
2000	63	80	52



FLOW CALCULATION SUMMARY - MRPS

Ultimate Average Flow Rate, Q:	160	gpm (avg)
Ultimate Peaked Flow Rate, Q:	619	gpm (peak)
MIN Flow Rate in Force Main:	1,000	gpm

IF Design Value > Peak Value

WET WELL VOLUME SIZING - MRPS - Iteration #1

Volume = (Pump Cycle, min) * (Pump Capacity, gpm) / 4

Iteration #1:

Starts Per Hour:	7.55	# starts/hr
Pump Cycle, Phi:	8	min
Pump Capacity, Q:	1,000	gpm
Volume, V:	1,987	gal

(Detention time < 30 min)

Detention Time (t, min):

	Flow	t (min)
Average Flow Rate, Q:	160	12.40
Minimum Flow Rate, Q:	53	37.19
Peaked Flow Rate, Q:	1,000	1.99

WET WELL DIAMETER SIZING - MRPS - Iteration #1

Wet Well Diamter:	8.0	ft
Wet Well Area:	50.27	ft^2

Volume = (Drawdown Depth, ft) * (Unit Volume, gal/ft)

Drawdown Depth:	5.28	ft
Unit Volume:	376	gal/ft
Drawdown Volume, V:	1,987	gal

FLOAT SETTING CALCULATIONS - MRPS - Iteration #1

FM Discharge:	98.47	= Elevation of FM in Discharge MH (CONTROLLING)
Centerline of FM:	104.75	= Centerline of FM at high point
Top of Wet Well:	101.00	= Rim Elevation of Existing MRPS
High Level Alarm:	96.00	= High Water Level
SSO Overflow:		= Invert of Overflow Pipe
Lag Pump On:	96.78	= Lag Pump On (Pump off + Drawdown)
Lead Pump On:	96.28	= Lead Pump On (Pump off + Drawdown)
Lag Pump Off:	91.50	= Pump Off (Assumed 3' above Sump)
Lead Pump Off:	91.00	= Pump Off (Assumed 3' above Sump)
Low Level Alarm:	89.50	= Low Level Cut Off, Sump +1.5' (from record drawings)
Bottom Wet Well:	88.00	= Sump of Wet Well

PUMP SELECTION - MRPS

Assumptions (MRPS Pumping Alone):

Ultimate Peaked Flow Rate, Q_1:	1,000	gpm		
Ultimate Peaked Flow Rate, Q_2:	1,000	gpm		
Force Main Material, M_1:	Ductile Iron			
Force Main Nom. Diameter, ND_1:	6	in	0.50	feet
Force Main Inside Diameter, D_1:	6.40	in	0.53	feet
Force Main Material, M_2:	HDPE - (DR 11, DIPS)			
Force Main Nom. Diameter, ND_2:	8	in	0.67	feet
Force Main Diameter, D_2:	7.31	in	0.61	feet
Force Main Length, L_1:	17	ft		
Force Main Length, L_2:	355	ft		
Hazen Williams, C_{120}:	120			
Hazen Williams, C_{100}:	100			
Hazen Williams, C_{140}:	140			
Fluid Velocity, V_1:	9.97	fps		
Fluid Velocity, V_2:	7.66	fps		

Design (MRPS Pumping Alone):	Lead Pump		Lag Pump	
Crown of Force Main, Z_2:	98.80	EL	98.80	EL
Pumping Level (C=120), Z_1:	91.00	EL	91.50	EL
Static Head (C=120):	7.80	ft	7.30	ft
Pumping Level (C=100), Z_1:	91.00	EL	91.50	EL
Static Head (C=100):	7.80	ft	7.30	ft
Pumping Level (C=140), Z_1:	91.00	EL	91.50	EL
Static Head (C=140):	7.80	ft	7.30	ft

Design (MRPS Pumping Alone):

Piping Losses (C=120), H_{P1}:	1.06	ft
Piping Losses (C=120), H_{P2}:	11.66	ft
Piping Losses (C=120):	12.72	ft
Piping Losses (C=100), H_{P1}:	1.49	ft
Piping Losses (C=100), H_{P2}:	16.33	ft
Piping Losses (C=100):	17.82	ft
Piping Losses (C=140), H_{P1}:	0.80	ft
Piping Losses (C=140), H_{P2}:	8.77	ft
Piping Losses (C=140):	9.56	ft

K_1:	2.73	
K_2:	1.52	
H_{v1}, $V^2/(2G)$:	1.54	ft
H_{v2}, $V^2/(2G)$:	0.91	ft
Minor Losses, H_{M1}:	4.22	ft
Minor Losses, H_{M2}:	1.39	ft
Minor Losses:	5.60	ft

P (TDH) = Static Head (ft) + Piping Losses (ft) + Minor Losses (ft)

P (TDH @ C=120):	**26.13**	ft	**25.63**	ft
P (TDH @ C=100):	**31.23**	ft	**30.73**	ft
P (TDH @ C=140):	**22.97**	ft	**22.47**	ft

MRPS - Summary of K Values

Piping & Appurtenances	Dia (in)	Type (mj / flg)	K Value	Cumulative K Values
CV	6	flg	1.752	1.75
Tee Elbow	6	flg	0.934	2.69
90 BEND	6	flg	0.292	2.98
6"-8" Enlarger		flg	0.045	2.73

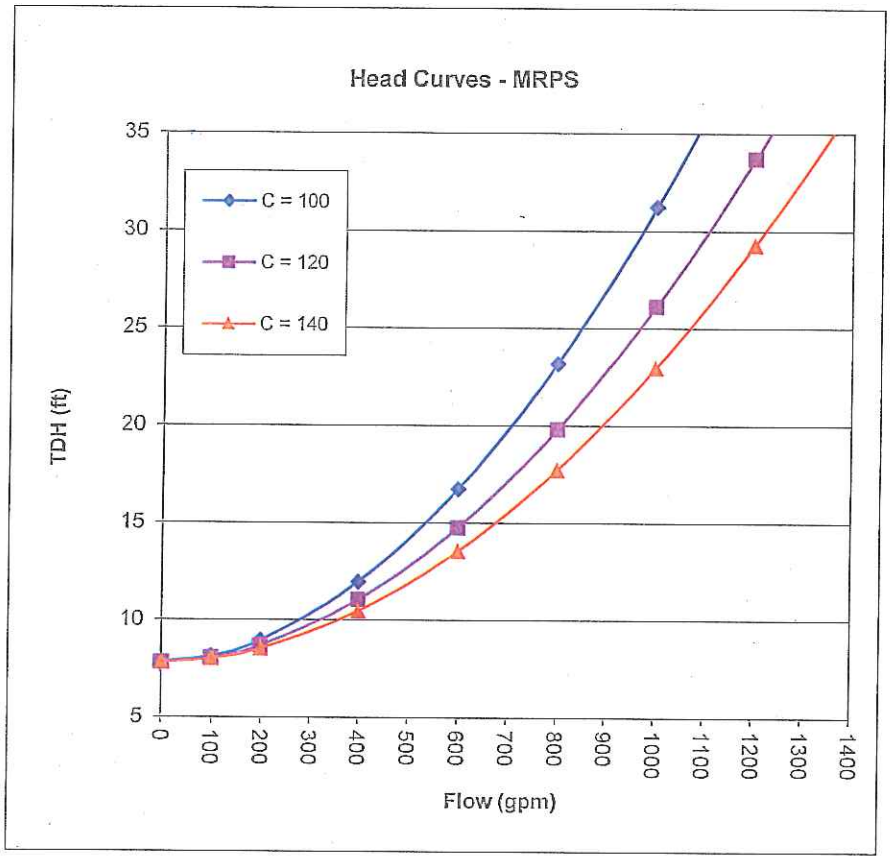
K_1: **2.73**

90 BEND	8	flg	0.282	0.28
22.5 BEND	8	flg	0.169	0.45
45 BEND	8	flg	0.226	0.68
45 BEND	8	flg	0.226	0.90
45 BEND	8	flg	0.226	1.13
45 BEND	8	flg	0.226	1.35
22.5 BEND	8	flg	0.169	1.52

K_2: **1.52**

FLOW CALCULATION SUMMARY - MRPS - Alone

Flow Rate, Q (GPM)	C=120	C=100	C=140
0	8	8	8
100	8	8	8
200	9	9	9
400	11	12	10
600	15	17	14
800	20	23	18
1000	26	31	23
1200	34	41	29
1400	43	52	37
1600	53	65	45
1800	64	79	54
2000	76	95	65



From: Desai, Sudhir
Sent: Thursday, September 22, 2016 7:52 AM
To: 'Ruggles, Kris'
Subject: RE: Portsmouth, OH/2-16 report

Hi Kris,

I just called and left the message on your voice mail. Please call. Now you should not have problem in sending the files electronically.

Thx.

Sudhir
312/886-6704

From: Ruggles, Kris [mailto:Kris.Ruggles@strand.com]
Sent: Thursday, September 22, 2016 7:42 AM
To: Desai, Sudhir <desai.sudhir@epa.gov>
Cc: Karnes, H. Patrick <Patrick.Karnes@strand.com>
Subject: RE: Portsmouth, OH/2-16 report

Sudhir,

I tried your number this morning.

Are you requesting the Bi-Monthly report from February or another report?

It has been a challenge sending large attachment sizes to USEPA in the past. Can you let us know the maximum file size you can receive and if the USEPA has a file transfer site where we can transfer files larger than your maximum attachment size? Large attachments have bounced back in the past undeliverable.

Thanks!

From: Desai, Sudhir [mailto:desai.sudhir@epa.gov]
Sent: Wednesday, September 21, 2016 1:19 PM
To: Ruggles, Kris <Kris.Ruggles@strand.com>
Subject: Portsmouth, OH/2-16 report

Hi Kris,

I just called and left the message on your voice mail. Sorry, I missed you.

I will appreciate if you can share the electronic version of the February 2016 report.

Thank you.

Sudhir Desai
312/886-6704

Desai, Sudhir

From: Ruggles, Kris <Kris.Ruggles@strand.com>
Sent: Thursday, September 22, 2016 7:42 AM
To: Desai, Sudhir
Cc: Karnes, H. Patrick
Subject: RE: Portsmouth, OH/2-16 report

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Sudhir Desai
312/886-6704

Desai, Sudhir

From: Desai, Sudhir
Sent: Wednesday, September 21, 2016 12:19 PM
To: 'Kris.Ruggles@strand.com'
Subject: Portsmouth, OH/2-16 report

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I will appreciate if you can share the electronic version of the February 2016 report.

Thank you.

Sudhir Desai
312/886-6704

Desai, Sudhir

From: Desai, Sudhir
Sent: Saturday, September 10, 2016 6:50 PM
To: Desai, Sudhir
Subject: Fw: Portsmouth Inspection Agenda, September 13-14, 2016/OH

From: Desai, Sudhir
Sent: Thursday, September 8, 2016 2:29 PM
To: [redacted]
Cc: 'John Haas'; Desai, Sudhir
Subject: Re: Portsmouth Inspection Agenda, September 13-14, 2016/OH

Hi Rick,

Thank you Rick for forwarding the message to John Haas.

Christopher Kosto from the OEPA's central office is planning to be at the meeting. Jack Knapp of the OEPA's district office is an paternity leave. So he won't be joining us. I have sent the invitation to Jennifer Witte but have not heard from her. So they may decide to send some one to represent District office but no word from the District office yet. I will let you know if I hear anything more.

The comment letters are going through the sign off. Did John Haas got the copy of the OERP approval letter?

It will help us if you can have some sort of presentations about the various alternatives mentioned in the feasibility report.

Today is my day off but I know that I will hear from you and hence took the chance to the EPA secured site to access my messages.

Thank you.

Sudhir

From: [redacted]
Sent: Thursday, September 8, 2016 7:23 AM
To: Desai, Sudhir
Cc: 'John Haas'
Subject: FW: Portsmouth Inspection Agenda, September 13-14, 2016/OH

Sudhir,

I forwarded your email to John Haas.

I don't believe you will need any special safety gear.

Can you tell me if anyone is coming from Ohio EPA?

Thanks.

Desai, Sudhir

From: Desai, Sudhir
Sent: Saturday, September 10, 2016 6:50 PM
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Can you tell me if anyone is coming from Ohio EPA?

Thanks.

Desai, Sudhir

From: Prichard, Gary
Sent: Friday, September 09, 2016 2:08 PM
To: Desai, Sudhir
Cc: Kuefler, Patrick
Subject: RE: Portsmouth, OH Comments due date

Sudhir – I don't think that we should put a due date on a response. Instead, I think you should discuss the issues with them when you meet and ask them when they think they will be able to provide responses. I suggest you send a new message to them telling them that, rather than there being a due date, you'd like to discuss our comments and their responses when you meet with them and, at that time, you can discuss when Portsmouth will be able to provide any written responses that we need.

Thanks,
Gary

From: Desai, Sudhir
Sent: Friday, September 09, 2016 1:51 PM
To: [redacted]; andrew.etter@squirepb.com; karen.winters@squirepb.com; DAllen@portsmouthoh.org; christopher.kosto@epa.ohio.gov; Jack.Knapp@epa.ohio.gov; Witte, Jennifer <jennifer.witte@epa.ohio.gov>
Cc: Kuefler, Patrick <kuefler.patrick@epa.gov>; Vantil, Barbara <vantil.barbara@epa.gov>; Prichard, Gary <prichard.gary@epa.gov>; Desai, Sudhir <desai.sudhir@epa.gov>; Vargas, Noel <vargas.noel@epa.gov>; Gunter, Kenneth <gunter.kenneth@epa.gov>
Subject: Portsmouth, OH Comments due date

Hi All,

Please note that the due date to provide written comments to EPA/ERG comments that I shared with you today on your Lawson Run Feasibility Report and Revised Management, Operation and Maintenance submissions are October 14, 2016.

Thank you.

Sudhr Desai
USEPA, Region 5
WECA
77 E. Jackson Blvd.
Chicago, IL 60604
Telephone Number: 312/886-6704
E Mail Address: desai.sudhir@epa.gov

Desai, Sudhir

From: Desai, Sudhir
Sent: Friday, September 09, 2016 1:52 PM
To: Paul Buellesbach; Jessica.Gary@erg.com
Subject: Fw: Portsmouth, OH Comments due date

Hi Paul and Jess,
FYI.

sUDHIR

From: Desai, Sudhir
Sent: Friday, September 9, 2016 1:51 PM
To: [redacted]; andrew.etter@squirepb.com; karen.winters@squirepb.com; DAllen@portsmouthoh.org; christopher.kosto@epa.ohio.gov; Jack.Knapp@epa.ohio.gov; Witte, Jennifer
Cc: Kuefler, Patrick; Vantil, Barbara; Prichard, Gary; Desai, Sudhir; Vargas, Noel; Gunter, Kenneth
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WECA
77 E. Jackson Blvd.
Chicago, IL 60604
Telephone Number: 312/886-6704
E Mail Address: desai.sudhir@epa.gov

Desai, Sudhir

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Sent: Friday, September 09, 2016 1:51 PM
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Cc: Kuefler, Patrick; Vantil, Barbara; Prichard, Gary; Desai, Sudhir; Vargas, Noel; Gunter, Kenneth
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WECA
77 E. Jackson Blvd.
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E Mail Address: desai.sudhir@epa.gov

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USEPA, Region 5
WECA
77 E. Jackson Blvd.
Chicago, IL 60604
Telephone Number: 312/886-6704
E Mail Address: desai.sudhir@epa.gov

Desai, Sudhir

From: Paul Buellesbach <Paul.Buellesbach@erg.com>
Sent: Friday, September 09, 2016 1:51 PM
To: Desai, Sudhir
Cc: Jessica Gray
Subject: Re: Portsmouth, OH letters

Received

Sent from my iPhone

On Sep 9, 2016, at 2:25 PM, Desai, Sudhir <desai.sudhir@epa.gov> wrote:

Hi Jess and Paul,

Here is the e mail I sent ot the City folks. I am having trouble in sending the docs. Please make sure you got the message.

Thank you.

Sudhir

From: Desai, Sudhir
Sent: Friday, September 9, 2016 1:12 PM
To: andrew.etter@squirepb.com; karen.winters@squirepb.com; [redacted]; Ruggles, Kris; john lyons; 'John Haas'; christopher.kosto@epa.ohio.gov; Jack.Knapp@epa.ohio.gov; Witte, Jennifer; DAllen@portsmouthoh.org; Vantil, Barbara
Cc: Desai, Sudhir; Kuefler, Patrick; Vantil, Barbara; Prichard, Gary; Vargas, Noel; Gunter, Kenneth
Subject: Portsmouth, OH letters

Hi All,
As Portsmouth has requested, I am providing comments below that EPA has prepared with the assistance of our contractor, ERG, on the Lawson Run Sewer Separation Feasibility Report. I am also attaching to this message comments we have on Portsmouth's Revised MOM. We would be happy to discuss these comments when we are in
Portsmouth next week.
Thank you,

Sudhir Desai
Environmental Engineer
USEPA, Region 5
Water Enforcement and Compliance Assurance Branch
77 W. Jackson Blvd.
Chicago, IL 60604
Telephone Number: 312/886-6704
E Mail Address: desai.sudhir@epa.gov

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Thank you,

Sudhir Desai

Comments on Lawson Run Sewer Separation Feasibility Report

1. What monitoring has Portsmouth performed throughout the Lawson Run Tunnel System (LRTS) to evaluate the performance of the LRTS and identify bottlenecks during wet weather? What monitoring has Portsmouth performed throughout the LRTS tributary areas to evaluate the performance of these systems and identify bottlenecks during wet weather?
2. Based on the February 12, 2013, Joint Presentation by Portsmouth and EPA/OEPA, it appears that there is a bottleneck in the LRTS between 23rd and 25th Streets. Has Portsmouth evaluated any options for relieving this bottleneck? If so, what are the benefits in terms of reductions of CSOs, SSOs, and basement backups, and what are the costs of alleviating the bottleneck?
3. What size storm triggers CSOs throughout the system?
4. The inspection of the LRTS identified several defects and poor connections to the LRTS. Has the City evaluated the impacts of addressing these defects and connections on reducing CSOs, SSOs, and basement backups?
5. The City identifies three potential routes for the LRTS separation solution. Each of these include some length of deep (i.e., 25 to 40 feet deep) sewer construction. Did Portsmouth evaluate any other routes that would reduce the length of deep sewer construction? For each of the proposed separation projects, what are the benefits in terms of CSO, SSO, and basement backup reductions? What storm event or typical year is Portsmouth using as the basis of its modeling activities to assess benefits?
6. What is the source of the unit costs listed in Appendix J? Also, what is the year basis of these costs? Please provide the underlying reports or analyses that support these costs. Also, the costs in Table 3.02-2 for the Twin Tubes Sewershed Separation do not match the costs presented in Appendix J. Please clarify which costs are correct.
7. For the tributary areas listed in Table 3.02-3 with a costing method of "Tributary Area" please explain why using the cost of $110,000 per square acre is appropriate. Also please explain how Portsmouth determined that using costs from the City of Columbus and the City of Indianapolis were appropriate for the Portsmouth system. Please provide more detail as to how cost estimates were developed for tributary areas identified in Table 3.02-3 with a costing method of "Bid Tabulations." Does Portsmouth have specific bid tabulations for each area, or are these estimates based on bid tabulations for other separation projects within the City? Please provide the area for each tributary evaluated for separation.
8. Section 4.02 discusses constructability concerns. Since the report was completed, has Portsmouth performed any geotechnical analyses to evaluate rock depth? Have other geotechnical studies been performed in the city for other reasons that could be used to help assess soil conditions and rock depth?

9. Please provide a comparison of the costs and reductions in CSOs of the separation projects to other previously developed LTCP alternatives, as is recommended in the introduction to the LRTS report. What specific projects does Portsmouth recommend proceeding with, what are the benefits and costs of these projects, and what is the schedule of these projects?

<Comments on Portsmouth MOM 9-9-16.docx>

Desai, Sudhir

From: Ruggles, Kris <Kris.Ruggles@strand.com>
Sent: Friday, September 09, 2016 1:34 PM
To: Desai, Sudhir
Subject: RE: Portsmouth, OH letters

Thank you. I got this one. See you next week!

From: Desai, Sudhir [mailto:desai.sudhir@epa.gov]
Sent: Friday, September 09, 2016 2:34 PM
To: Ruggles, Kris <Kris.Ruggles@strand.com>
Subject: Fw: Portsmouth, OH letters

From: Desai, Sudhir
Sent: Friday, September 9, 2016 1:18 PM
Cc: Desai, Sudhir
Subject: Fw: Portsmouth, OH letters

From: Prichard, Gary
Sent: Friday, September 9, 2016 10:58 AM
To: Desai, Sudhir
Cc: Kuefler, Patrick
Subject: RE: Portsmouth, OH letters

Sudhir – I had a meeting with Pat today on something else and the Portsmouth letters came up. Perhaps the best way to transmit our comments to Portsmouth would be for you to send an email in which you transmit the comments. I've drafted a message (below) and edited the MOM comment letter so it is just a set of comments rather than a letter from Pat. You should send it to the usual group at Portsmouth that you correspond with, including Portsmouth counsel. Here's what I suggest:

As Portsmouth has requested, I am providing comments below that EPA has prepared with the assistance of our contractor, ERG, on the Lawson Run Sewer Separation Feasibility Report. I am also attaching to this message comments we have on Portsmouth's Revised MOM. We would be happy to discuss these comments when we are in Portsmouth next week.

Thank you,

Sudhir Desai

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Desai, Sudhir

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To: Ruggles, Kris
Subject: Fw: Portsmouth, OH letters
Attachments: Comments on Portsmouth MOM 9-9-16.docx

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Cc: Kuefler, Patrick
Subject: RE: Portsmouth, OH letters

Sudhir – I had a meeting with Pat today on something else and the Portsmouth letters came up. Perhaps the best way to transmit our comments to Portsmouth would be for you to send an email in which you transmit the comments. I've drafted a message (below) and edited the MOM comment letter so it is just a set of comments rather than a letter from Pat. You should send it to the usual group at Portsmouth that you correspond with, including Portsmouth counsel. Here's what I suggest:

As Portsmouth has requested, I am providing comments below that EPA has prepared with the assistance of our contractor, ERG, on the Lawson Run Sewer Separation Feasibility Report. I am also attaching to this message comments we have on Portsmouth's Revised MOM. We would be happy to discuss these comments when we are in Portsmouth next week.

Thank you,

Sudhir Desai

Comments on Lawson Run Sewer Separation Feasibility Report

1. What monitoring has Portsmouth performed throughout the Lawson Run Tunnel System (LRTS) to evaluate the performance of the LRTS and identify bottlenecks during wet weather? What monitoring has Portsmouth performed throughout the LRTS tributary areas to evaluate the performance of these systems and identify bottlenecks during wet weather?
2. Based on the February 12, 2013, Joint Presentation by Portsmouth and EPA/OEPA, it appears that there is a bottleneck in the LRTS between 23rd and 25th Streets. Has Portsmouth evaluated any options for relieving this bottleneck? If so, what are the benefits in terms of reductions of CSOs, SSOs, and basement backups, and what are the costs of alleviating the bottleneck?
3. What size storm triggers CSOs throughout the system?

4. The inspection of the LRTS identified several defects and poor connections to the LRTS. Has the City evaluated the impacts of addressing these defects and connections on reducing CSOs, SSOs, and basement backups?
5. The City identifies three potential routes for the LRTS separation solution. Each of these include some length of deep (i.e., 25 to 40 feet deep) sewer construction. Did Portsmouth evaluate any other routes that would reduce the length of deep sewer construction? For each of the proposed separation projects, what are the benefits in terms of CSO, SSO, and basement backup reductions? What storm event or typical year is Portsmouth using as the basis of its modeling activities to assess benefits?
6. What is the source of the unit costs listed in Appendix J? Also, what is the year basis of these costs? Please provide the underlying reports or analyses that support these costs. Also, the costs in Table 3.02-2 for the Twin Tubes Sewershed Separation do not match the costs presented in Appendix J. Please clarify which costs are correct.
7. For the tributary areas listed in Table 3.02-3 with a costing method of "Tributary Area" please explain why using the cost of $110,000 per square acre is appropriate. Also please explain how Portsmouth determined that using costs from the City of Columbus and the City of Indianapolis were appropriate for the Portsmouth system. Please provide more detail as to how cost estimates were developed for tributary areas identified in Table 3.02-3 with a costing method of "Bid Tabulations." Does Portsmouth have specific bid tabulations for each area, or are these estimates based on bid tabulations for other separation projects within the City? Please provide the area for each tributary evaluated for separation.
8. Section 4.02 discusses constructability concerns. Since the report was completed, has Portsmouth performed any geotechnical analyses to evaluate rock depth? Have other geotechnical studies been performed in the city for other reasons that could be used to help assess soil conditions and rock depth?
9. Please provide a comparison of the costs and reductions in CSOs of the separation projects to other previously developed LTCP alternatives, as is recommended in the introduction to the LRTS report. What specific projects does Portsmouth recommend proceeding with, what are the benefits and costs of these projects, and what is the schedule of these projects?

Comments on Portsmouth's Revised Management, Operation and Maintenance Report

1. Organizational Structure

EPA Comment:

Review of the City's Department of Wastewater and Flood Defense in figure 3.01 indicates that the Department has 24 employees. Twenty-two employees provide services to the wastewater department, and the remaining employees are responsible for flood defense. Additionally, the report indicates a number of additional staff members will be needed to complete sewer televising and cleaning for all sewers less than 18 inches in diameter.

The City has provided the 2010 U.S. Census Bureau data for the City of Portsmouth as the current service population (20,226). In order to provide a more accurate assessment of Portsmouth's staffing needs, the entire service population for the Portsmouth and Sciotoville publicly owned treatment works (POTWs) needs to be determined. Please provide EPA a more updated service population for the POTWs, using 2014 American Community Survey data and the number of service connections.

The Staff Complements for Wastewater Collection System Maintenance table on page 2-8 of the CMOM guidance suggests that a City of 25,000 should have 18 employees plus maintenance mechanics, maintenance mechanic helpers, and construction inspection supervisors. Based upon that guidance and the entire service population, please provide additional information on the number of total staff needed, as well as staff in the positions below.

Position	Reference	Portsmouth Calculated # of positions
Maintenance Mechanic II	See footnote (c), page 2-8	
Maintenance Mechanic I	See footnote (d), page 2-8	
Maintenance Mechanic Helper	See footnote (d), page 2-8	
Construction Inspection Supervisor	See footnotes (e and f), page 2-8	

Page 2-8, footnotes c, d, e, and f refers to: Guide for Evaluating CMOM Programs and Wastewater Collection Systems document: EPA-305-B-05-002.

Also, in Section 3.01 of your report, you indicate that as part of the City's AOC, Portsmouth is required to complete a total sewer system inventory and assessment and complete sewer televising and cleaning for all sewers less than 18 inch in diameter. As a result, City anticipates that these additional tasks will not only require the purchase of new televising equipment but also the addition of two positions to the organization chart and the hiring of employees to complete the designated tasks. The City claims that they will add the two proposed positions when appropriate funding has been secured.

EPA agrees with the conclusion that the City must add additional staff to accomplish various tasks required to meet objectives of your MOM program. Furthermore, Portsmouth should provide detailed information on how it intends to meet the staffing needs and how it intends to secure the funding for such projects. Please provide various milestones to accomplish the funding goals, names of the funding sources and additional employee hiring needs to complete various Operation and Maintenance tasks.

Portsmouth Response:

a. The City provided the requested population and service connection data in Section 1.03 of the revised MOM Program report. According to the 2010-2014 American Community Survey 5-Year Estimate data, the population of Portsmouth is 20,320 people. The Billing Department also provided information stating the total number of active sewer accounts in the City wastewater collection system is 7,009 accounts. Using the average household size for the City from the 2010-2014 American Community Survey 5-Year Estimate data of 2.38 people per household, the total service population for the City's wastewater collection system is approximately 16,682 people.

b. The City has also provided, as requested, the estimated number of man-hours per week for the four positions in the table below in accordance with the guidance from the State Complements for Wastewater Collection System Maintenance table provided in the USEPA *Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems*.

Position	Reference	Portsmouth Calculated # of positions
Maintenance Mechanic II	See footnote (c), page 2-8	17 pumping stations x 8/3 = 45.34 man-hours/week
Maintenance Mechanic I	See footnote (d), page 2-8	1 visit/pumping station/week x 17 = 17 man-hours/week
Maintenance Mechanic Helper	See footnote (d), page 2-8	1 visit/pumping station/week x 17 = 17 man-hours/week
Construction Inspection Supervisor	See footnotes (e and f), page 2-8	0.25 construction site visits/week x 8/3 = 0.67 man-hours/week*

*The City generally contracts its major construction inspection responsibilities to private companies and only performs approximately one inspection of sewer lateral connections to the public sewer per month.

This exercise indicates the recommended number of employees for a system of up to 25,000 people is up to 22 employees. This number considers one employee each for the Maintenance Mechanic I and Helper and Construction Inspection Supervisor. The results of the calculation indicate that these positions are significantly less than full time positions, which could be combined with other tasks and reduce the overall number of full-time employees needed. The City currently employs 24 employees, 22 of which are dedicated to the wastewater department, which meets this recommendation. Additionally, the City states the number of employees on staff are effectively performing the current tasks attributed to them.

c. There are up to 372,000 feet of sewer less than 18 inches in diameter that have been in service for more than 20 years in the City's collection system, which need cleaning and televising. Although the City's original MOM submittal included a tentative schedule to achieve this work in four years, it appears that a five-year schedule is appropriate given the City's current economic condition. The Wastewater Department has been operating in a deficit for nine of the last 11 years, and the Department fund ended 2015 with a deficit of $965,198.31. The City was placed on Fiscal Watch by the Auditor of State in late 2012. As part of the provisions of this, the City is not permitted to add staff at this time and therefore cannot add staff to meet the sewer cleaning and televising goals. Even under the revised five-year schedule, additional staff may be necessary to complete the sewer cleaning and televising task required by the AOC within the required five-year period.

Despite the City's fiscal and staffing challenges, it has developed a plan to help ensure this cleaning and televising work moves forward. The plan is outlined in Sections 3.01 and 5.05 of the MOM Program and would be completed in five years. This will allow the City greater flexibility to complete these tasks. The City's revised plan would involve the following:

1) Using currently employed Department staff to complete the sewer cleaning and televising in year one of the schedule.
2) Evaluating the progress made by the Department staff at the end of year one and determining if at the achieved production rate the Department staff will be able to meet the proposed five-year schedule.
3) Adjusting the Department's annual cleaning and televising goal (as necessary) based on the production achieved in year one.
4) Contracting with a private sewer cleaning and televising firm to supplement the Department's staff. The private company would clean and televise the balance of sewers the Department

staff was unable to complete. This could be done as one contract or as annual contracts to create a more economically feasible plan for the City.

This plan will give the City the flexibility necessary to develop an economically effective approach for completion of this work while allowing the City time to reduce its current deficit operating budget through its recently passed sewer rate increase.

EPA/ERG Comments and Questions on 6/2016 MOM Report:

1. Do the number of active sewer accounts Portsmouth provided in Section 1.03 of the revised MOM Program include the areas outside the City proper that are serviced by the City's sewer system?
2. Appendix H of the revised MOM Program does not include job descriptions for the Sewer Maintenance Supervisor, Sewer Crew Leader, Heavy Equipment Operator, or Flood Defense Supervisor, which are included in Figure 3.01-1 Department of Wastewater and Flood Defense Organizational Chart. Note that these job descriptions were included in Appendix H of the original MOM Program, dated May 2014. Appendix H of the original and revised MOM programs do not include job descriptions for the City Manager and Director of Wastewater. Portsmouth should provide the job descriptions that are not included in Appendix H of the revised MOM Program.
3. Section 3.01 of the revised MOM Program notes that there is currently one open position in the Department. What is the open position? Section 3.01 also notes that the sewer televising and cleaning tasks would require an additional two positions. Which positions are these? If these positions do not fall within the current job descriptions included in Appendix H, please provide the job descriptions for the currently open and new positions.
4. Portsmouth should evaluate if the job descriptions should be updated to reflect the sewer televising and cleaning tasks that the Department staff is going to perform in year 1.
5. Section 3.01 of the revised MOM Program notes: "The current staffing level is adequate for system operation but does not provide much availability to perform additional tasks outside of those already being completed." However, Portsmouth is only going to use Department staff in year 1 of the sewer televising and cleaning, which is estimated to take 1,376 man hours (172 man days). If the Department staff are already at their capacity, it will be extremely difficult to achieve the year 1 goals without other parts of their jobs suffering. Portsmouth should revise the year 1 sewer televising and cleaning estimates to adequately reflect the Department staff's availability. What threshold will Portsmouth use to determine if additional or outside staff are needed to achieve the Department's five-year sewer televising and cleaning completion?
6. There is a disconnect between the number of years for the sewer televising and cleaning in Section 3.01, Section 5.05, Table 5.01-1, and Appendix T of the revised MOM Program. Section 3.01 and Table 5.01-1 indicate a five-year sewer televising and cleaning schedule, but the Section 5.05 text and Table in Appendix T indicate a four-year televising and cleaning schedule. Portsmouth should clarify how many years the sewer televising and cleaning will take with a breakdown of the sewer pipe length and estimated man-hours for each year.
7. How did Portsmouth identify which areas of the sewer would be televised and cleaned each year?
8. Section 5.05 of the revised MOM Program does not include timeframes or defined actions to be taken for completing sewer cleaning, maintenance, and repairs; eliminating stormwater connections; and remedying infiltration identified through the sewer televising. Please provide the specific actions and timeframes for when they will be completed.
9. Are the recently passed sewer rate increases reflected in Section 4.01.A and Appendix M of the revised MOM Program? Based on the recently passed sewer rate increases, when does Portsmouth estimate eliminating the current deficit? Will the deficit impact Portsmouth's ability to hire contractors to complete the sewer televising and cleaning work in the five-year schedule?

2. Training

EPA Comment:

The City indicates the Department does not have a formal written training program to train employees on their specific job responsibilities. This does not mean that training is not provided.

The commitment of management to training personnel is a key to a successful program. Although training is not explicitly required under the current regulations, a collection system with untrained or poorly trained collection system personnel runs the risk of noncompliance. The following are the many sources of maintenance training:

- Manufacturer
- In-house
- On-the-job
- Industry-wide (e.g., consultants, regulatory authorities, professional associations, or educational institutions)

EPA recommends that Portsmouth provide structured training opportunities on various topics related to the collection system MOM program and document them.

Please provide a list of trainings the City intends to provide to trainees/employees with different skills (i.e., new employees, mid-level employees, veteran employees). For each training, please discuss who will provide the training and when. If you intend to provide only on-the-job training, please document how many hours of training these staff were provided, who provided the training and area of the training.

Portsmouth Response:

a. The Department has been providing on-the-job training to its staff for many years. The program includes the training of new staff by more veteran staff. There is not a set length of time for this training. It is determined on a case-by-case basis based on the progression of the new staff toward understanding their tasks and duties. The determination of when the new employee's on-the-job training period formally ends is made by the trainer and the Director of Wastewater and Flood Defense. However, even when the initial on-the-job training concludes, training will still occur daily throughout the completion of tasks and the honing of skills.

   The City also initiates specific training activities as necessary. With respect to the training of collections staff on the AOC, the City organized a presentation of the components of the MOM program which pertains directly to the collections staff in May, 2015. Strand Associates, Inc.(R) developed a presentation that highlighted the sewer assessment and inventory and sewer cleaning and televising programs among the other provisions of the MOM Program. The collections staff was also given the opportunity to ask questions and gain a better understanding of what their specific roles would be related to achieving the overall goals.

   As evidenced by the fact that the Department has not experienced any collections system issues related to a lack of proper training, the City believes that its training program has worked well. Because on-the-job training does not lend itself to documentation and to do so would create an unnecessary burden on the City's limited resources, the Department does not feel that changes to its training program are warranted at this time.

EPA/ERG Comments and Questions on June 2016 MOM Report:

1. Portsmouth did not make any revisions to Section 3.02 the revised MOM Program in response to this comment. Based on the information provided in Section 3.02 of the revised MOM Program, Portsmouth is lacking a structured employee training and evaluation program. Training the three new employees Portsmouth anticipates needing in the future will place a large burden on the veteran staff. Portsmouth notes that the current staff do not have much availability to perform additional tasks

outside of those already being completed, but is relying on these staff to perform the sewer televising and cleaning activities for year 1. Portsmouth should consider using the job descriptions to develop specific training (on-the-job or by other means) that each new employee should receive. Additionally, Portsmouth should develop a way to evaluate that new employees have adequately mastered each task that is part of their job description.

2. What training will be necessary for the employees that will be using the new CCTV equipment?
3. What training does Portsmouth provide to veteran staff on an on-going basis related to their job responsibility?

3. Communication and Customer Service

EPA Comment:

The City has made attempts to communicate with their citizens in matters related to the recent basement flooding and other topics of concern. EPA recommends that the City develop additional tools to coordinate such activities. It will help communication efforts between EPA and the City if the City would share documented citizen complaints with EPA with their bimonthly monitoring reports.

Portsmouth Response:

a. The Department has developed specific questionnaires and procedures for taking complaints from the public as part of its revised Overflow Emergency Response Plan (OERP), which was submitted on November 16, 2015, and is currently awaiting USEPA approval. These were included as an appendix in the original MOM Program, though were not specifically referenced in this section. Section 3.03.A.2 now includes a reference to the questionnaire from the revised OERP related to the report of an overflow which can also be used to report any type of complaint. If the report is related to an unauthorized overflow, the provisions of the OERP should be followed (the revised OERP submitted to USEPA in November 16, 2015, has been included in the revised MOM program to replace the older version). The procedures outlined in the MOM Program as revised coupled with the procedures of the OERP address the how communication with the public should be handled by the Department.

   The City also has been supplying the Bimonthly Reports in accordance with Paragraph 13 of the AOC. Additionally, the City is reporting to the USEPA any sanitary sewer overflows (SSOs) and unauthorized combined sewer overflows in accordance with its NPDES Permit and the AOC. In order to keep the Bimonthly Report consistent with the AOC requirements and avoid duplicative reporting requirements that would be unnecessarily burdensome for the Department's limited staff, the City believes complaints should be reported in accordance with procedures outlined in the MOM and revised OERP submittals.

EPA/ERG Comments and Questions on June 2016 MOM Report:

1. Portsmouth added one sentence to Section 3.03 of the revised MOM Program that references the procedures outlined in the OERP that should be followed in the event of an unauthorized overflow. ERG did not fully review the OERP to assess its adequacy.
2. ERG would like to review the SSO and unauthorized CSO reports delivered to USEPA and/or OEPA in accordance with the NPDES Permit and AOC.
3. The Department developed a specific Sanitary Sewer Overflow Phone Questionnaire for taking citizen complaints about overflows. The OERP does not discuss a questionnaire or specific procedure used for documenting non-overflow (e.g., basement backups) related citizen complaints. The OERP Section 6.5 says "All calls from citizens that are not directly reporting an overflow shall be forwarded to the Director for a response." How does Portsmouth address the non-overflow (e.g., basement backup) related citizen complaints? How does Portsmouth report the non-overflow related citizen complaints to USEPA and/or OEPA?

4. Section 3.03 and associated appendices of the revised MOM Program do not include a discussion of outreach to local groups (media, schools, senior citizens, etc.), except that outreach is performed on an as-needed basis. Portsmouth should develop and implement a more consistent, proactive outreach program in terms of both SSO prevention (e.g., oil and grease education) and basement back-up clean-up.
5. Portsmouth does not have a public relations program. The OERP Section 6.5 states that a door hanger is distributed to citizens after an overflow event that details the event, location, duration, and cleanup. Please provide a copy of an example of a door hanger to verify that the information being conveyed to the citizens is adequate.
6. There is no formal procedure for evaluating and responding to public complaints, except a statement that the complaint will be responded to as soon as possible. Portsmouth should develop specific timeframes within which the City will respond to different types of complaints.
7. Portsmouth should develop a formal procedure for customers to evaluate the services provided by the City. Portsmouth should also make records of Portsmouth's performance in response to customer complaints (e.g., has Portsmouth has been responding in a timely manner?) available to the USEPA, OEPA, and citizens.
8. No form is used by dispatchers to record the information about an overflow in the field. The OERP Section 6.4 states that dispatchers will capture details about the overflows, but does not indicate where the information will be documented. Portsmouth should develop a checklist for dispatchers to use to document information about overflows.
9. Portsmouth should develop an employee public outreach training.
10. Section 3.03 of the revised MOM Program states that, "Once the issue has been addressed, call records are updated with the cause of the issue (if it was able to be determine), the actions taken to resolve the issue, who completed the fix, and the date the issue was resolved
11. Portsmouth should make information submitted to USEPA and/or OEPA under its NPDES Permit and the AOC available to the public on the city website.

4. SSO Notification

EPA Comment:

The City continues to report SSOs. However, review of the reports indicates that the quantity of discharges are not reported in accordance with your Overflow Emergency Response Plan. The report should include how the City arrived at the discharge volumes. Please share this information when submitting the bimonthly monitoring report(s).

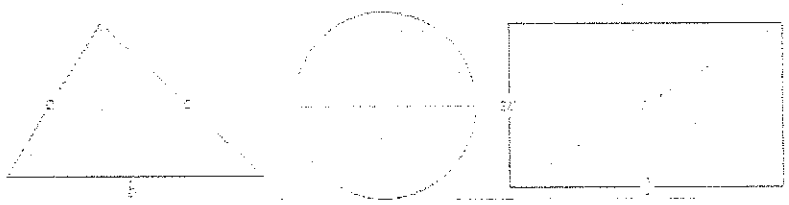
Portsmouth Response:

a. The City received comments on the OERP on October 14, 2015, and submitted a revised OERP on November 16, 2015. The City has continued to report SSOs in accordance with its NPDES Permit and will begin to report estimated SSO volumes upon written approval of the revised OERP in accordance with Paragraph 5 of the AOC. The revised OERP also includes additional guidance on how the Department will estimate SSO volumes to report in accordance with the revised OERP. In order to keep the Bimonthly Report consistent with the AOC requirements and avoid duplicative reporting requirements that would be unnecessarily burdensome for the Department's limited staff, the City believes that SSO discharge volumes should be reported in accordance with procedures outlined in the revised OERP submittals once it is approved.

ERG/EPA Comments and Questions on June 2016 MOM Report:

1. Portsmouth did not make any changes to Section 3.05 of the revised MOM Program in response to this comment.

2. Appendix F of the OERP (Appendix K of the revised MOM Program) outlines the four methods for estimating discharge volumes Portsmouth uses to estimate sewer overflow volumes. Portsmouth's November 16, 2015, cover letter explaining the edits made to the OERP states, "The method the City uses to estimate sewer overflow volumes varies based on the nature, timing, and location of the overflow". This statement implies that Portsmouth is already calculating overflow volumes, and therefore, reporting overflow discharge volumes would not be an additional burden to Portsmouth.
3. The approach for calculating SSO volume using Method 1 is subjective. ERG recommends combining Methods 1 and 2 into one approach for any size contained overflow so that the approach is quantitative and replicable.
4. For Method 2, we suggest adding figures to Appendix F in the OERP showing the dimensions to measure and use for the area calculations, for example:



5. The second approach for estimating the overflow start time in Method 3 is vague. This approach is based on visual observation of grease and toilet paper. The City should assess if this approach is appropriate and if there are ways to reduce the method's subjectiveness and associated potential large margin of error.
6. The explanation of how to determine overflow end time using a downstream flow meter is vague. Portsmouth should consider expanding the explanation and following a similar approach as the explanation included for start time estimation.
7. Revise the title of Method 4 to apply more generally to instances when flow monitoring data are unavailable, instead of being specific to only Munn's Run Pumping Station. EPA would like Portsmouth to consider the installation of a flow meter on the Munn's Run Pumping Station SSO.
8. The approach for Method 4 is vague. The explanation says that the overflow duration should be obtained from SCADA. Portsmouth should add more information about where SCADA data are housed and specifically what piece(s) of information is to be obtained to determine the duration. The explanation also says that the volumes are calculated using the "CSO Estimation for DMR" and "Cross-Sectional Wet Area of Pipe Flowing Partially Full". The "CSO Estimation for DMR" tables can be used to determine the flow rate depending on either pipe size or CSO location. The "Cross-Sectional Wet Area of Pipe Flowing Partially Full" tables can be used to determine the wet area (Wet Area = D2 × Multiplication Factor). Portsmouth should add explanation of how the wet area is used to calculate flow rate.

5. Maintenance Scheduling

EPA Comment:

Portsmouth's sewer cleaning needs are addressed, among others, by visiting slow-runners and completing the sewer cleaning and repairs. Based on Portsmouth and EPA reviews of the information, it appears that this program has largely achieved the desired outcomes. Please provide qualitative and quantitative results of this program (i.e., reduced I/I, number of blockages removed per quarter, etc.) to determine its true effectiveness.

Portsmouth Response:

a. The City has developed and included a map of the locations of the Slow-Runners in Section 5.05 and Appendix U of the revised MOM Program.

The Department has also reviewed it maintenance histories over the last approximately two years versus the Slow-Runner locations. This review indicates that in that time period, the Department has performed normal maintenance activities on some of the Slow-Runners to prevent significant blockages, which could eventually lead to back-ups. Examples of the types of maintenance activities performed include removing minor debris build-up with a long handled shovel and cleaning of debris with the vactor truck. This type of debris is generally observed to be grit, rags, and fats, oils, and grease. The Department has not had any recorded maintenance activities to remove significant sewer blockages or blockages creating backups at any of the Slow-Runner locations. This demonstrates the Slower-Runner program appears to be achieving its objective of preventing blockages and backups through a systematic approach of visiting and reviewing the sites a minimum of three times per week and addressing minor issues before they lead to blockages and backups.

The following is a table which presents the maintenance completed on Slow-Runners since January, 2014.

Slow-Runner Name	Number of Instances/Type of Maintenance	Notes
Orizaba Lane	38/Cleaning with Long Handled Shovel	Debris removed is generally rags, which settle from the waste stream because of shallow sewer grade. Sewer grade is unable to be adjusted because of conflicts with other infrastructure.
2124 Dorman Drive	1/Cleaning with Long Handled Shovel	
AEP/Scioto Trail	1/Cleaning with Rake	
Buch Alley	1/Cleaning with Vactor Truck	
Gatti's Pizza	10/Cleaning Grease with Vactor Truck	
Robinson Avenue/Phone Company	1/Cleaning with Vactor Truck	This Slow-Runner was added to the list in September, 2015. Grit buildup is from upstream pumping station.
Front Street	1/Cleaning with Vactor Truck	
AAA Insurance Alley	1/Cleaning with Long Handled Shovel	
Hempstead Manor	1/Cleaning with Vactor Truck	

Slow-runners are a dynamic portion of the Department's system and locations are removed from the list based on construction projects or added to the list based on an identified need. A revised list has been provided in Table 5.05-2 of the revised MOM.

EPA/ERG Comments and Questions on June 2016 MOM Report:

1. Table 5.01-2 of the revised MOM Program includes 25 Slow-Runners, but the table in Portsmouth's response to EPA's comment only includes 9 Slow-Runners. Please explain the maintenance activities performed on the Slow-Runners that were not included in Portsmouth's response to EPA's comment.
2. It appears that at least one area of concern is associated with a food establishment. What outreach has Portsmouth done to the residences and businesses in the Slow-Runner areas? What specific outreach programs for food establishments does Portsmouth have for fats, oils, and grease?
3. Section 5.05 of the revised MOM Program notes that Portsmouth identifies the Slow-Runners based on historical blockages. Portsmouth also continues to add and remove Slow-Runners based on identified

need and construction projects, respectively. What criteria does Portsmouth use to add an area to the Slow-Runner list? What criteria does Portsmouth use to remove an area from the Slow-Runner list?

6. Inventory

EPA Comment:

The submission provides information about how the City handles management of this critical item. However, the program as written is too generic and does not provide substantive information about the inventory. A snap shot of the parts inventory with quantitative number of parts will increase EPA's confidence that the City if fully equipped to have spare parts available to provide parts in need of an emergency and regular maintenance. Please provide a list of the various essential equipment parts maintained by the City.

Portsmouth Response:

a. The City has provided a list of critical spare parts developed by the Department in Section 5.06 and Appendix V of the revised MOM Program.

EPA/ERG Comments and Questions on June 2016 MOM Report:

1. ERG does not have a copy of Appendix V, and has not reviewed the spare parts list.

7. Collection System Compliance

EPA Comment:

The City continues to perform compliance monitoring as required by their NPDES permit. The City should consider extending their stormwater downspout disconnection program to the sanitary sewers to cover the entire City rather than selected areas of the City only. Also, the City should make certain that it enforces its local sewer use ordinance related to stormwater.

Portsmouth Response:

a. The City has previously circulated letters detailing downspout disconnection and why it is important as required by Paragraph 11 of the AOC. The City will take into consideration USEPA's suggestion of program expansion. The City continues to enforce its local sewer use ordinance related to stormwater. However, because of legal and practical concerns regarding enforcement, the City's residential downspout disconnection program is being implemented on a voluntary basis.

EPA/ERG Comments and Questions on June 2016 MOM Report:

1. How many downspouts are there in the Grandview Avenue area? How many were disconnected as a result of the circulated letters? Portsmouth should quantify the reduction on the number and volume of downstream overflows and basement backups as a result of the downspout disconnections.
2. What are the legal and practical concerns regarding enforcement of the local sewer ordinance with respect to downspout disconnections?

Desai, Sudhir

From: Desai, Sudhir
Sent: Friday, September 09, 2016 1:33 PM
To: Ruggles, Kris
Subject: Portsmouth, OH

Hi Kris,

I am having problems with the computers sending the messages. I sent the comments to the entire team about 10 min. ago. Please let me know if you have questions.

Thank you.

Sudhir
847 848 3057

Desai, Sudhir

From: Ruggles, Kris <Kris.Ruggles@strand.com>
Sent: Friday, September 09, 2016 1:30 PM
To: Desai, Sudhir
Subject: RE: Portsmouth, OH letters

There was not an attachment.

From: Desai, Sudhir [mailto:desai.sudhir@epa.gov]
Sent: Friday, September 09, 2016 2:14 PM
To: andrew.etter@squirepb.com; karen.winters@squirepb.com; [redacted]; Ruggles, Kris <Kris.Ruggles@strand.com>; Lyons, John <John.Lyons@strand.com>; 'John Haas' <JHaas@portsmouthoh.org>; christopher.kosto@epa.ohio.gov; Jack.Knapp@epa.ohio.gov; Witte, Jennifer <jennifer.witte@epa.ohio.gov>; DAllen@portsmouthoh.org; Vantil, Barbara <vantil.barbara@epa.gov>
Cc: Kuefler, Patrick <kuefler.patrick@epa.gov>; Prichard, Gary <prichard.gary@epa.gov>; Vargas, Noel <vargas.noel@epa.gov>; Gunter, Kenneth <gunter.kenneth@epa.gov>
Subject: Re: Portsmouth, OH letters

Hi All,

Here are the comments on your submissions.

From: Desai, Sudhir
Sent: Friday, September 9, 2016 1:12:24 PM
To: andrew.etter@squirepb.com; karen.winters@squirepb.com; rduncan1@falcon1.net; Ruggles, Kris; john lyons; 'John Haas'; christopher.kosto@epa.ohio.gov; Jack.Knapp@epa.ohio.gov; Witte, Jennifer; DAllen@portsmouthoh.org; Vantil, Barbara
Cc: Desai, Sudhir; Kuefler, Patrick; Vantil, Barbara; Prichard, Gary; Vargas, Noel; Gunter, Kenneth
Subject: Portsmouth, OH letters

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Sudhir Desai
Environmental Engineer
USEPA, Region 5
Water Enforcement and Compliance Assurance Branch
77 W. Jackson Blvd.
Chicago, IL 60604
Telephone Number: 312/886-6704
E Mail Address: desai.sudhir@epa.gov

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Sudhir Desai

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Desai, Sudhir

From: Desai, Sudhir
Sent: Friday, September 09, 2016 1:26 PM
To: Paul Buellesbach; Jessica.gray@erg.com
Subject: Re: Portsmouth, OH letters

From: Desai, Sudhir
Sent: Friday, September 9, 2016 1:24:56 PM
To: Paul Buellesbach; Jessica.gray@erg.com
Subject: Fw: Portsmouth, OH letters

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From: Desai, Sudhir
Sent: Friday, September 09, 2016 1:25 PM
To: Paul Buellesbach; Jessica.gray@erg.com
Subject: Fw: Portsmouth, OH letters
Attachments: Comments on Portsmouth MOM 9-9-16.docx

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Comments on Portsmouth's Revised Management, Operation and Maintenance Report

1. Organizational Structure

EPA Comment:

Review of the City's Department of Wastewater and Flood Defense in figure 3.01 indicates that the Department has 24 employees. Twenty-two employees provide services to the wastewater department, and the remaining employees are responsible for flood defense. Additionally, the report indicates a number of additional staff members will be needed to complete sewer televising and cleaning for all sewers less than 18 inches in diameter.

The City has provided the 2010 U.S. Census Bureau data for the City of Portsmouth as the current service population (20,226). In order to provide a more accurate assessment of Portsmouth's staffing needs, the entire service population for the Portsmouth and Sciotoville publicly owned treatment works (POTWs) needs to be determined. Please provide EPA a more updated service population for the POTWs, using 2014 American Community Survey data and the number of service connections.

The Staff Complements for Wastewater Collection System Maintenance table on page 2-8 of the CMOM guidance suggests that a City of 25,000 should have 18 employees plus maintenance mechanics, maintenance mechanic helpers, and construction inspection supervisors. Based upon that guidance and the entire service population, please provide additional information on the number of total staff needed, as well as staff in the positions below.

Position	Reference	Portsmouth Calculated # of positions
Maintenance Mechanic II	See footnote (c), page 2-8	
Maintenance Mechanic I	See footnote (d), page 2-8	
Maintenance Mechanic Helper	See footnote (d), page 2-8	
Construction Inspection Supervisor	See footnotes (e and f), page 2-8	

Page 2-8, footnotes c, d, e, and f refers to: Guide for Evaluating CMOM Programs and Wastewater Collection Systems document: EPA-305-B-05-002.

Also, in Section 3.01 of your report, you indicate that as part of the City's AOC, Portsmouth is required to complete a total sewer system inventory and assessment and complete sewer televising and cleaning for all sewers less than 18 inch in diameter. As a result, City anticipates that these additional tasks will not only require the purchase of new televising equipment but also the addition of two positions to the organization chart and the hiring of employees to complete the designated tasks. The City claims that they will add the two proposed positions when appropriate funding has been secured.

EPA agrees with the conclusion that the City must add additional staff to accomplish various tasks required to meet objectives of your MOM program. Furthermore, Portsmouth should provide detailed information on how it intends to meet the staffing needs and how it intends to secure the funding for such projects. Please provide various milestones to accomplish the funding goals, names of the funding sources and additional employee hiring needs to complete various Operation and Maintenance tasks.

Portsmouth Response:

a. The City provided the requested population and service connection data in Section 1.03 of the revised MOM Program report. According to the 2010-2014 American Community Survey 5-Year Estimate data, the population of Portsmouth is 20,320 people. The Billing Department also provided information stating the total number of active sewer accounts in the City wastewater collection system is 7,009 accounts. Using the average household size for the City from the 2010-2014 American Community Survey 5-Year Estimate data of 2.38 people per household, the total service population for the City's wastewater collection system is approximately 16,682 people.

b. The City has also provided, as requested, the estimated number of man-hours per week for the four positions in the table below in accordance with the guidance from the State Complements for Wastewater Collection System Maintenance table provided in the USEPA *Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems*.

Position	Reference	Portsmouth Calculated # of positions
Maintenance Mechanic II	See footnote (c), page 2-8	17 pumping stations x 8/3 = **45.34 man-hours/week**
Maintenance Mechanic I	See footnote (d), page 2-8	1 visit/pumping station/week x 17 = **17 man-hours/week**
Maintenance Mechanic Helper	See footnote (d), page 2-8	1 visit/pumping station/week x 17 = **17 man-hours/week**
Construction Inspection Supervisor	See footnotes (e and f), page 2-8	0.25 construction site visits/week x 8/3 = **0.67 man-hours/week***

*The City generally contracts its major construction inspection responsibilities to private companies and only performs approximately one inspection of sewer lateral connections to the public sewer per month.

This exercise indicates the recommended number of employees for a system of up to 25,000 people is up to 22 employees. This number considers one employee each for the Maintenance Mechanic I and Helper and Construction Inspection Supervisor. The results of the calculation indicate that these positions are significantly less than full time positions, which could be combined with other tasks and reduce the overall number of full-time employees needed. The City currently employs 24 employees, 22 of which are dedicated to the wastewater department, which meets this recommendation. Additionally, the City states the number of employees on staff are effectively performing the current tasks attributed to them.

c. There are up to 372,000 feet of sewer less than 18 inches in diameter that have been in service for more than 20 years in the City's collection system, which need cleaning and televising. Although the City's original MOM submittal included a tentative schedule to achieve this work in four years, it appears that a five-year schedule is appropriate given the City's current economic condition. The Wastewater Department has been operating in a deficit for nine of the last 11 years, and the Department fund ended 2015 with a deficit of $965,198.31. The City was placed on Fiscal Watch by the Auditor of State in late 2012. As part of the provisions of this, the City is not permitted to add staff at this time and therefore cannot add staff to meet the sewer cleaning and televising goals. Even under the revised five-year schedule, additional staff may be necessary to complete the sewer cleaning and televising task required by the AOC within the required five-year period.

Despite the City's fiscal and staffing challenges, it has developed a plan to help ensure this cleaning and televising work moves forward. The plan is outlined in Sections 3.01 and 5.05 of the MOM Program and would be completed in five years. This will allow the City greater flexibility to complete these tasks. The City's revised plan would involve the following:

1) Using currently employed Department staff to complete the sewer cleaning and televising in year one of the schedule.
2) Evaluating the progress made by the Department staff at the end of year one and determining if at the achieved production rate the Department staff will be able to meet the proposed five-year schedule.
3) Adjusting the Department's annual cleaning and televising goal (as necessary) based on the production achieved in year one.
4) Contracting with a private sewer cleaning and televising firm to supplement the Department's staff. The private company would clean and televise the balance of sewers the Department

staff was unable to complete. This could be done as one contract or as annual contracts to create a more economically feasible plan for the City.

This plan will give the City the flexibility necessary to develop an economically effective approach for completion of this work while allowing the City time to reduce its current deficit operating budget through its recently passed sewer rate increase.

EPA/ERG Comments and Questions on 6/2016 MOM Report:

1. Do the number of active sewer accounts Portsmouth provided in Section 1.03 of the revised MOM Program include the areas outside the City proper that are serviced by the City's sewer system?
2. Appendix H of the revised MOM Program does not include job descriptions for the Sewer Maintenance Supervisor, Sewer Crew Leader, Heavy Equipment Operator, or Flood Defense Supervisor, which are included in Figure 3.01-1 Department of Wastewater and Flood Defense Organizational Chart. Note that these job descriptions were included in Appendix H of the original MOM Program, dated May 2014. Appendix H of the original and revised MOM programs do not include job descriptions for the City Manager and Director of Wastewater. Portsmouth should provide the job descriptions that are not included in Appendix H of the revised MOM Program.
3. Section 3.01 of the revised MOM Program notes that there is currently one open position in the Department. What is the open position? Section 3.01 also notes that the sewer televising and cleaning tasks would require an additional two positions. Which positions are these? If these positions do not fall within the current job descriptions included in Appendix H, please provide the job descriptions for the currently open and new positions.
4. Portsmouth should evaluate if the job descriptions should be updated to reflect the sewer televising and cleaning tasks that the Department staff is going to perform in year 1.
5. Section 3.01 of the revised MOM Program notes: "The current staffing level is adequate for system operation but does not provide much availability to perform additional tasks outside of those already being completed." However, Portsmouth is only going to use Department staff in year 1 of the sewer televising and cleaning, which is estimated to take 1,376 man hours (172 man days). If the Department staff are already at their capacity, it will be extremely difficult to achieve the year 1 goals without other parts of their jobs suffering. Portsmouth should revise the year 1 sewer televising and cleaning estimates to adequately reflect the Department staff's availability. What threshold will Portsmouth use to determine if additional or outside staff are needed to achieve the Department's five-year sewer televising and cleaning completion?
6. There is a disconnect between the number of years for the sewer televising and cleaning in Section 3.01, Section 5.05, Table 5.01-1, and Appendix T of the revised MOM Program. Section 3.01 and Table 5.01-1 indicate a five-year sewer televising and cleaning schedule, but the Section 5.05 text and Table in Appendix T indicate a four-year televising and cleaning schedule. Portsmouth should clarify how many years the sewer televising and cleaning will take with a breakdown of the sewer pipe length and estimated man-hours for each year.
7. How did Portsmouth identify which areas of the sewer would be televised and cleaned each year?
8. Section 5.05 of the revised MOM Program does not include timeframes or defined actions to be taken for completing sewer cleaning, maintenance, and repairs; eliminating stormwater connections; and remedying infiltration identified through the sewer televising. Please provide the specific actions and timeframes for when they will be completed.
9. Are the recently passed sewer rate increases reflected in Section 4.01.A and Appendix M of the revised MOM Program? Based on the recently passed sewer rate increases, when does Portsmouth estimate eliminating the current deficit? Will the deficit impact Portsmouth's ability to hire contractors to complete the sewer televising and cleaning work in the five-year schedule?

2. Training

EPA Comment:

The City indicates the Department does not have a formal written training program to train employees on their specific job responsibilities. This does not mean that training is not provided.

The commitment of management to training personnel is a key to a successful program. Although training is not explicitly required under the current regulations, a collection system with untrained or poorly trained collection system personnel runs the risk of noncompliance. The following are the many sources of maintenance training:

- Manufacturer
- In-house
- On-the-job
- Industry-wide (e.g., consultants, regulatory authorities, professional associations, or educational institutions)

EPA recommends that Portsmouth provide structured training opportunities on various topics related to the collection system MOM program and document them.

Please provide a list of trainings the City intends to provide to trainees/employees with different skills (i.e., new employees, mid-level employees, veteran employees). For each training, please discuss who will provide the training and when. If you intend to provide only on-the-job training, please document how many hours of training these staff were provided, who provided the training and area of the training.

Portsmouth Response:

a. The Department has been providing on-the-job training to its staff for many years. The program includes the training of new staff by more veteran staff. There is not a set length of time for this training. It is determined on a case-by-case basis based on the progression of the new staff toward understanding their tasks and duties. The determination of when the new employee's on-the-job training period formally ends is made by the trainer and the Director of Wastewater and Flood Defense. However, even when the initial on-the-job training concludes, training will still occur daily throughout the completion of tasks and the honing of skills.

   The City also initiates specific training activities as necessary. With respect to the training of collections staff on the AOC, the City organized a presentation of the components of the MOM program which pertains directly to the collections staff in May, 2015. Strand Associates, Inc.(R) developed a presentation that highlighted the sewer assessment and inventory and sewer cleaning and televising programs among the other provisions of the MOM Program. The collections staff was also given the opportunity to ask questions and gain a better understanding of what their specific roles would be related to achieving the overall goals.

   As evidenced by the fact that the Department has not experienced any collections system issues related to a lack of proper training, the City believes that its training program has worked well. Because on-the-job training does not lend itself to documentation and to do so would create an unnecessary burden on the City's limited resources, the Department does not feel that changes to its training program are warranted at this time.

EPA/ERG Comments and Questions on June 2016 MOM Report:

1. Portsmouth did not make any revisions to Section 3.02 the revised MOM Program in response to this comment. Based on the information provided in Section 3.02 of the revised MOM Program, Portsmouth is lacking a structured employee training and evaluation program. Training the three new employees Portsmouth anticipates needing in the future will place a large burden on the veteran staff. Portsmouth notes that the current staff do not have much availability to perform additional tasks

outside of those already being completed, but is relying on these staff to perform the sewer televising and cleaning activities for year 1. Portsmouth should consider using the job descriptions to develop specific training (on-the-job or by other means) that each new employee should receive. Additionally, Portsmouth should develop a way to evaluate that new employees have adequately mastered each task that is part of their job description.

2. What training will be necessary for the employees that will be using the new CCTV equipment?
3. What training does Portsmouth provide to veteran staff on an on-going basis related to their job responsibility?

3. Communication and Customer Service

EPA Comment:

The City has made attempts to communicate with their citizens in matters related to the recent basement flooding and other topics of concern. EPA recommends that the City develop additional tools to coordinate such activities. It will help communication efforts between EPA and the City if the City would share documented citizen complaints with EPA with their bimonthly monitoring reports.

Portsmouth Response:

a. The Department has developed specific questionnaires and procedures for taking complaints from the public as part of its revised Overflow Emergency Response Plan (OERP), which was submitted on November 16, 2015, and is currently awaiting USEPA approval. These were included as an appendix in the original MOM Program, though were not specifically referenced in this section. Section 3.03.A.2 now includes a reference to the questionnaire from the revised OERP related to the report of an overflow which can also be used to report any type of complaint. If the report is related to an unauthorized overflow, the provisions of the OERP should be followed (the revised OERP submitted to USEPA in November 16, 2015, has been included in the revised MOM program to replace the older version). The procedures outlined in the MOM Program as revised coupled with the procedures of the OERP address the how communication with the public should be handled by the Department.

   The City also has been supplying the Bimonthly Reports in accordance with Paragraph 13 of the AOC. Additionally, the City is reporting to the USEPA any sanitary sewer overflows (SSOs) and unauthorized combined sewer overflows in accordance with its NPDES Permit and the AOC. In order to keep the Bimonthly Report consistent with the AOC requirements and avoid duplicative reporting requirements that would be unnecessarily burdensome for the Department's limited staff, the City believes complaints should be reported in accordance with procedures outlined in the MOM and revised OERP submittals.

EPA/ERG Comments and Questions on June 2016 MOM Report:

1. Portsmouth added one sentence to Section 3.03 of the revised MOM Program that references the procedures outlined in the OERP that should be followed in the event of an unauthorized overflow. ERG did not fully review the OERP to assess its adequacy.
2. ERG would like to review the SSO and unauthorized CSO reports delivered to USEPA and/or OEPA in accordance with the NPDES Permit and AOC.
3. The Department developed a specific Sanitary Sewer Overflow Phone Questionnaire for taking citizen complaints about overflows. The OERP does not discuss a questionnaire or specific procedure used for documenting non-overflow (e.g., basement backups) related citizen complaints. The OERP Section 6.5 says "All calls from citizens that are not directly reporting an overflow shall be forwarded to the Director for a response." How does Portsmouth address the non-overflow (e.g., basement backup) related citizen complaints? How does Portsmouth report the non-overflow related citizen complaints to USEPA and/or OEPA?

4. Section 3.03 and associated appendices of the revised MOM Program do not include a discussion of outreach to local groups (media, schools, senior citizens, etc.), except that outreach is performed on an as-needed basis. Portsmouth should develop and implement a more consistent, proactive outreach program in terms of both SSO prevention (e.g., oil and grease education) and basement back-up clean-up.
5. Portsmouth does not have a public relations program. The OERP Section 6.5 states that a door hanger is distributed to citizens after an overflow event that details the event, location, duration, and cleanup. Please provide a copy of an example of a door hanger to verify that the information being conveyed to the citizens is adequate.
6. There is no formal procedure for evaluating and responding to public complaints, except a statement that the complaint will be responded to as soon as possible. Portsmouth should develop specific timeframes within which the City will respond to different types of complaints.
7. Portsmouth should develop a formal procedure for customers to evaluate the services provided by the City. Portsmouth should also make records of Portsmouth's performance in response to customer complaints (e.g., has Portsmouth has been responding in a timely manner?) available to the USEPA, OEPA, and citizens.
8. No form is used by dispatchers to record the information about an overflow in the field. The OERP Section 6.4 states that dispatchers will capture details about the overflows, but does not indicate where the information will be documented. Portsmouth should develop a checklist for dispatchers to use to document information about overflows.
9. Portsmouth should develop an employee public outreach training.
10. Section 3.03 of the revised MOM Program states that, "Once the issue has been addressed, call records are updated with the cause of the issue (if it was able to be determine), the actions taken to resolve the issue, who completed the fix, and the date the issue was resolved
11. Portsmouth should make information submitted to USEPA and/or OEPA under its NPDES Permit and the AOC available to the public on the city website.

4. SSO Notification

EPA Comment:

The City continues to report SSOs. However, review of the reports indicates that the quantity of discharges are not reported in accordance with your Overflow Emergency Response Plan. The report should include how the City arrived at the discharge volumes. Please share this information when submitting the bimonthly monitoring report(s).

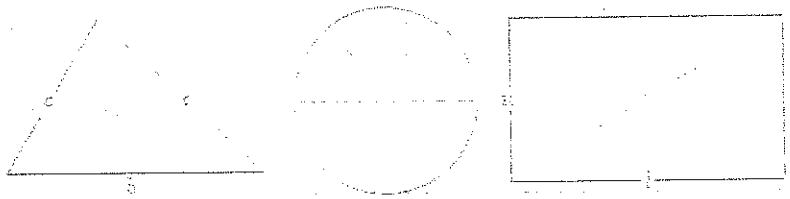
Portsmouth Response:

a. The City received comments on the OERP on October 14, 2015, and submitted a revised OERP on November 16, 2015. The City has continued to report SSOs in accordance with its NPDES Permit and will begin to report estimated SSO volumes upon written approval of the revised OERP in accordance with Paragraph 5 of the AOC. The revised OERP also includes additional guidance on how the Department will estimate SSO volumes to report in accordance with the revised OERP. In order to keep the Bimonthly Report consistent with the AOC requirements and avoid duplicative reporting requirements that would be unnecessarily burdensome for the Department's limited staff, the City believes that SSO discharge volumes should be reported in accordance with procedures outlined in the revised OERP submittals once it is approved.

ERG/EPA Comments and Questions on June 2016 MOM Report:

1. Portsmouth did not make any changes to Section 3.05 of the revised MOM Program in response to this comment.

2. Appendix F of the OERP (Appendix K of the revised MOM Program) outlines the four methods for estimating discharge volumes Portsmouth uses to estimate sewer overflow volumes. Portsmouth's November 16, 2015, cover letter explaining the edits made to the OERP states, "The method the City uses to estimate sewer overflow volumes varies based on the nature, timing, and location of the overflow". This statement implies that Portsmouth is already calculating overflow volumes, and therefore, reporting overflow discharge volumes would not be an additional burden to Portsmouth.
3. The approach for calculating SSO volume using Method 1 is subjective. ERG recommends combining Methods 1 and 2 into one approach for any size contained overflow so that the approach is quantitative and replicable.
4. For Method 2, we suggest adding figures to Appendix F in the OERP showing the dimensions to measure and use for the area calculations, for example:



5. The second approach for estimating the overflow start time in Method 3 is vague. This approach is based on visual observation of grease and toilet paper. The City should assess if this approach is appropriate and if there are ways to reduce the method's subjectiveness and associated potential large margin of error.
6. The explanation of how to determine overflow end time using a downstream flow meter is vague. Portsmouth should consider expanding the explanation and following a similar approach as the explanation included for start time estimation.
7. Revise the title of Method 4 to apply more generally to instances when flow monitoring data are unavailable, instead of being specific to only Munn's Run Pumping Station. EPA would like Portsmouth to consider the installation of a flow meter on the Munn's Run Pumping Station SSO.
8. The approach for Method 4 is vague. The explanation says that the overflow duration should be obtained from SCADA. Portsmouth should add more information about where SCADA data are housed and specifically what piece(s) of information is to be obtained to determine the duration. The explanation also says that the volumes are calculated using the "CSO Estimation for DMR" and "Cross-Sectional Wet Area of Pipe Flowing Partially Full". The "CSO Estimation for DMR" tables can be used to determine the flow rate depending on either pipe size or CSO location. The "Cross-Sectional Wet Area of Pipe Flowing Partially Full" tables can be used to determine the wet area (Wet Area = D2 × Multiplication Factor). Portsmouth should add explanation of how the wet area is used to calculate flow rate.

5. Maintenance Scheduling

EPA Comment:

Portsmouth's sewer cleaning needs are addressed, among others, by visiting slow-runners and completing the sewer cleaning and repairs. Based on Portsmouth and EPA reviews of the information, it appears that this program has largely achieved the desired outcomes. Please provide qualitative and quantitative results of this program (i.e., reduced I/I, number of blockages removed per quarter, etc.) to determine its true effectiveness.

Portsmouth Response:

a. The City has developed and included a map of the locations of the Slow-Runners in Section 5.05 and Appendix U of the revised MOM Program.

The Department has also reviewed it maintenance histories over the last approximately two years versus the Slow-Runner locations. This review indicates that in that time period, the Department has performed normal maintenance activities on some of the Slow-Runners to prevent significant blockages, which could eventually lead to back-ups. Examples of the types of maintenance activities performed include removing minor debris build-up with a long handled shovel and cleaning of debris with the vactor truck. This type of debris is generally observed to be grit, rags, and fats, oils, and grease. The Department has not had any recorded maintenance activities to remove significant sewer blockages or blockages creating backups at any of the Slow-Runner locations. This demonstrates the Slower-Runner program appears to be achieving its objective of preventing blockages and backups through a systematic approach of visiting and reviewing the sites a minimum of three times per week and addressing minor issues before they lead to blockages and backups.

The following is a table which presents the maintenance completed on Slow-Runners since January, 2014.

Slow-Runner Name	Number of Instances/Type of Maintenance	Notes
Orizaba Lane	38/Cleaning with Long Handled Shovel	Debris removed is generally rags, which settle from the waste stream because of shallow sewer grade. Sewer grade is unable to be adjusted because of conflicts with other infrastructure.
2124 Dorman Drive	1/Cleaning with Long Handled Shovel	
AEP/Scioto Trail	1/Cleaning with Rake	
Buch Alley	1/Cleaning with Vactor Truck	
Gatti's Pizza	10/Cleaning Grease with Vactor Truck	
Robinson Avenue/Phone Company	1/Cleaning with Vactor Truck	This Slow-Runner was added to the list in September, 2015. Grit buildup is from upstream pumping station.
Front Street	1/Cleaning with Vactor Truck	
AAA Insurance Alley	1/Cleaning with Long Handled Shovel	
Hempstead Manor	1/Cleaning with Vactor Truck	

Slow-runners are a dynamic portion of the Department's system and locations are removed from the list based on construction projects or added to the list based on an identified need. A revised list has been provided in Table 5.05-2 of the revised MOM.

EPA/ERG Comments and Questions on June 2016 MOM Report:

1. Table 5.01-2 of the revised MOM Program includes 25 Slow-Runners, but the table in Portsmouth's response to EPA's comment only includes 9 Slow-Runners. Please explain the maintenance activities performed on the Slow-Runners that were not included in Portsmouth's response to EPA's comment.
2. It appears that at least one area of concern is associated with a food establishment. What outreach has Portsmouth done to the residences and businesses in the Slow-Runner areas? What specific outreach programs for food establishments does Portsmouth have for fats, oils, and grease?
3. Section 5.05 of the revised MOM Program notes that Portsmouth identifies the Slow-Runners based on historical blockages. Portsmouth also continues to add and remove Slow-Runners based on identified