
APPENDIX M-2

SANITARY SEWER

TECHNICAL MEMORANDUM

Sanitary Sewer Technical Memorandum

To	File	Page	1
Subject	Stadium Reconstruction Project – Sanitary Sewer Technical Memorandum		
From	Jack Dullaghan, PE – AECOM		
Date	July 22, 2015		

Introduction

This memorandum serves to identify and evaluate the existing sanitary sewer facilities serving Qualcomm Stadium, calculate the sanitary sewage requirements for the Stadium Reconstruction Project, and determine if the existing sanitary sewer system is adequate to serve the proposed demand. The analysis, discussion, and options are based on the assumption that the selected alternative is the preferred alternative with the stadium reconstructed in the northeast corner of the existing property.

Basis of Design Flows

Proposed sanitary sewer system flow estimates are based on the San Francisco 49ers' Levi's Stadium square footage, an equivalent sized stadium and use, and water usage data from both San Francisco's Monster Park (formerly Candlestick Stadium) and Qualcomm Stadium.

Sanitary Sewer System

Existing Conditions

The existing wastewater system exits Qualcomm Stadium at seven locations through 8-inch and 6-inch pipes. An 8-inch vitrified clay pipe constructed in 1966 circles the outside of Qualcomm Stadium collecting wastewater from these seven locations. This pipe feeds into an 18-inch main pipe that was rebuilt in 1990. It flows westerly from the 8-inch collector pipe to another 18-inch main pipe located on the western side of the Project site that flows to the south. An existing 8-inch sewer main enters the property from the north and connects at the manhole where the two 18-inch pipes connect. The south-flowing 18-inch main pipe continues south along the western side of the site until it joins with the 84-inch North Mission Valley Interceptor Sewer that runs westerly near the southern boundary of the Project site (see Figure 1).

Figure 1. Existing Sanitary Sewer System



The existing sewer capacity was calculated at the first segment of the 18-inch polyvinyl chloride (PVC) sewer where the existing 18-inch stadium lateral pipe and the 8-inch Mission Village Drive collector pipe connect. Per the City of San Diego Sewer Design Guide (2015), the ratio of depth of flow to pipe diameter, the capacity is calculated with the depth of flow at $\frac{3}{4}$ of the inside diameter of the pipe using Manning's formula for open channel flows. Per the City of San Diego Sewer Design Guide, sewer grades will be designed for velocities of 3 to 5 feet per second (ft/s).

Manning's Equation:

$$Q = 1.49/n (AR^{2/3}S^{0.5})$$

Slope=S=	0.4	%
n=	0.013	PVC Roughness Coefficient
Diameter=	18	in
A=	204.7	in ²
P=	37.7	in
R=	5.43	in
Q=	6.07	cfs
Q=	2718.69	gpm
V=	4.27	ft/s

The capacity of the existing pipe is 2,700 gallons per minute (gpm) with a maximum velocity of 4.27 ft/s. The City of San Diego provided hydraulic model results (2012 Dry and Wet Weather Flow) that can be found in Figures 2 and 3. Based on the figures, the existing flow for a non-event day at Qualcomm Stadium in the 18-inch PVC sewer calculated above is 50 gpm.

Proposed System

The Stadium Reconstruction Project would utilize a similar piping layout for wastewater exiting the stadium, with a collector sewer located around the stadium and multiple points of connection. It is anticipated that a similar number of 8-inch pipes would exit the stadium, would be collected in an 18-inch pipe, and would connect to the existing 18-inch pipeline on-site that currently serves Qualcomm Stadium and connects to the 84-inch North Mission Valley Interceptor Sewer. The new 18-inch sewer network to the reconstructed stadium would be PVC pipe with a minimum slope of 0.75 percent, and have 4-foot-diameter concrete manholes located a maximum distance of 400 feet apart and where sewer alignment change is necessary. The sewer pipes would be constructed with sufficient slope to generate self-cleaning velocities.

It is anticipated that the Project field level would be raised above existing elevations. The raised field elevation would allow sanitary sewer flows to be collected via a gravity system from the reconstructed stadium and conveyed to the southwest to the existing point of connection. This would limit the need for sewer lift stations and allow wastewater to flow to the existing sanitary sewer based on grade differences.

The Project would include two cooling towers with three 750-ton cells each. The wastewater calculation is based on the required water flow from the water service evaluation (evaluation was based on the San Francisco 49ers' Levi's Stadium square footage and water usage data from both San Francisco's

Monster Park and Qualcomm Stadium). The peak wastewater discharge from the cooling towers is calculated to be 270 gpm based on the manufacturer's data. The water service evaluation also calculated a maximum day flow of 675 gpm and a peak hourly flow of 1,500 gpm. It assumed that 20 percent of the baseline water demand would be used for irrigation and would not contribute to the wastewater flows to the sanitary sewer system. This translates into a maximum day wastewater flow of 550 gpm and a peak hourly flow of wastewater of 1,200 gpm for a National Football League game day event. The combined flows of the cooling towers and peak hourly flow of wastewater would be 1,470 gpm. Combined with the on-site flow from the 8-inch Mission Village Drive Collector of 50 gpm, this is within the current capacity of the existing 18-inch sanitary sewer pipe connection of 2,700 gpm.

CITY OF SAN DIEGO
HYDRAULIC MODEL RESULTS TABLE
TRUNK SEWER 5 - NORTH MISSION VALLEY
2012 Dry Weather Flows
by the City of San Diego

FACILITY SEQUENCE NUMBER	PIPE ID	DOWNSIDE MHID	UPSTREAM MH INV. EL. (FT)	DOWNSIDE MH INV. EL. (FT)	DOWNSIDE MH RIM EL. (FT)	PIPE SLOPE (FT/FT)	PIPE DIAMETER (IN)	PIPE LENGTH (FT)	MAX VELOCITY (FT/SEC)	MAX DEPTH (IN)	MAX Q/D (%)	MAX HGL EL. (FT)	MAX EGL EL. (FT)	HGL DEPTH BELOW RIM (FT)	AVG. FLOW (MGD)	MAX FLOW (MGD)	FULL CAPACITY (MGD)	MAX Q/CAP (%)
18-inch Stadium Sewer																		
37531	I16S24.1	I16S4	55.58	51.80	69.90	0.020	18	189	0.23	1.86	10.3	51.96	51.96	17.95	0.01	0.01	9.60	0.2
37674	I16S4.1	I16S419	51.80	46.80	58.50	0.025	18	200	0.23	1.86	10.3	46.96	46.96	11.54	0.01	0.01	10.73	0.1
37671	I16S419.1	I16S418	46.80	45.40	52.00	0.004	18	350	1.19	1.82	10.1	45.55	45.57	6.45	0.05	0.07	4.30	1.7
37670	I16S418.1	I16S417	45.40	44.00	49.10	0.004	18	350	1.19	1.82	10.1	44.15	44.17	4.95	0.05	0.07	4.30	1.7
37669	I16S417.1	I16S415	44.00	42.60	46.00	0.004	18	350	1.18	1.83	10.1	42.75	42.77	3.25	0.05	0.07	4.30	1.7
37667	I16S415.1	I16S416	42.60	41.10	47.40	0.004	18	380	1.27	1.74	9.7	41.24	41.27	6.16	0.05	0.07	4.26	1.7
37668	I16S416.1	I16S410	41.10	41.00	47.00	0.005	18	20	1.35	1.67	9.3	41.14	41.17	5.86	0.05	0.07	4.75	1.5
North Mission Valley Trunk Sewer																		
37664	I16S410.1	I16S411	36.90	36.88	47.00	0.002	84	10	4.49	28.34	33.7	39.24	39.56	7.76	24.20	33.14	184.54	18.0
37665	I16S411.1	I16S412	36.88	36.84	47.00	0.001	84	30	4.48	28.41	33.8	39.21	39.52	7.79	24.20	33.14	148.88	22.3
5461661	I16S412.1	I16S425	36.84	35.26	64.00	0.001	84	1,390	4.43	28.62	34.1	37.64	37.95	26.35	24.19	33.12	139.28	23.8
5461659	I16S425.1	I16S80	35.25	34.05	55.00	0.001	84	1,058	4.85	27.45	32.7	36.34	36.70	18.66	25.10	34.21	139.04	24.6
33167	H16S80.1	H16S79	34.05	33.95	58.20	0.001	78	70	5.11	27.31	35.0	36.23	36.63	21.97	25.10	34.21	127.41	26.9
5461662	H16S79.1	H16S78	33.95	33.11	52.10	0.002	77	535	5.15	27.35	35.5	35.39	35.80	16.71	25.10	34.22	129.76	26.4
5461150	H16S78.1	H16S64	33.11	32.19	60.20	0.002	77	590	5.17	27.27	35.4	34.46	34.88	25.74	25.11	34.24	129.08	26.5
33161	H16S64.1	H16S107	32.19	31.25	44.10	0.002	77	611	5.57	25.87	33.6	33.41	33.89	10.70	25.20	34.35	128.54	26.7
33162	H16S107.1	H16S108	31.25	31.10	43.60	0.008	120	20	3.63	27.37	22.8	33.38	33.59	10.22	25.20	34.35	643.55	5.3
33164	H16S108.1	H16S480	31.10	29.98	50.00	0.002	78	721	5.12	27.35	35.1	32.26	32.67	17.74	25.20	34.35	133.48	25.7
33160	H16S480.1	H16S439	29.98	28.47	39.20	0.002	78	973	5.29	26.71	34.2	30.70	31.13	8.50	25.19	34.35	133.43	25.7
5042168	H16S439.1	H17S206	28.47	28.07	40.10	0.002	78	230	5.28	26.76	34.3	30.30	30.73	9.80	25.18	34.34	141.20	24.3
33347	H17S206.1	H17S207	28.07	27.02	40.10	0.002	78	607	5.28	26.80	34.4	29.25	29.69	10.84	25.26	34.47	140.90	24.5
33349	H17S207.1	H17S210	27.02	26.11	35.80	0.002	78	526	5.23	27.04	34.7	28.36	28.79	7.44	25.31	34.52	141.08	24.5
33352	H17S210.1	H17S208	26.11	25.70	38.00	0.002	78	252	5.31	26.81	34.4	27.93	28.37	10.07	25.39	34.63	136.66	25.3
5053075	H17S208.1	G17S236	25.70	25.15	37.39	0.002	78	321	5.36	26.63	34.1	27.37	27.82	10.02	25.39	34.63	139.99	24.7
5053140	G17S236.1	G17S237	25.15	24.56	37.39	0.002	78	335	5.39	26.50	34.0	26.77	27.22	10.62	25.39	34.62	142.31	24.3
5053070	G17S237.1	G17S299	24.56	23.63	35.00	0.002	78	528	5.63	25.68	33.9	25.77	26.26	9.23	25.39	34.63	142.27	24.3
33353	G17S299.1	G17S70	23.63	23.42	34.50	0.002	78	128	5.91	24.78	31.8	25.48	26.03	9.02	25.38	34.63	137.24	25.2
27719	G17S70.1	G17S72	23.38	22.56	33.80	0.002	78	382	5.75	25.28	32.4	24.67	25.18	9.13	25.38	34.62	157.02	22.1
5055264	G17S72.1	G17S310	22.56	21.86	33.00	0.002	78	323	5.72	25.37	32.5	23.98	24.49	9.02	25.38	34.62	157.26	22.0
27741	G17S310.1	G17S81	21.86	20.86	33.57	0.002	78	463	5.52	26.06	33.4	23.03	23.50	10.54	25.40	34.65	157.78	22.0
27727	G17S81.1	G17S80	20.86	19.92	32.90	0.002	78	437	4.81	28.83	37.0	22.32	22.68	10.58	25.39	34.65	157.03	22.1
27726	G17S80.1	G17S300	19.92	19.75	36.00	0.001	78	121	4.74	29.16	37.4	22.18	22.53	13.82	25.39	34.65	127.00	27.3
5055248	G17S300.1	G17S297	19.75	19.73	36.00	0.002	78	13	4.74	29.22	37.5	22.17	22.52	13.83	25.50	34.79	132.95	26.2
27676	G17S297.1	G17S24	19.73	19.49	39.50	0.001	78	238	4.95	28.36	36.4	21.85	22.24	17.65	25.54	34.84	107.59	32.4
27679	G17S24.1	G17S26	19.49	18.43	41.50	0.001	78	800	5.08	27.79	35.6	20.74	21.15	20.75	25.53	34.83	123.51	28.2
27681	G17S26.1	G17S30	18.43	17.48	40.00	0.001	78	715	6.57	23.06	29.6	19.40	20.07	20.60	25.52	34.83	123.37	28.2
5056123	G17S30.2	G17SD30	17.48	16.44	40.00	0.023	66	45	4.31	20.41	30.9	18.14	18.43	21.86	12.76	17.42	329.92	5.3
5056123	G17SD30.1	G17S246	16.44	15.96	39.00	0.005	78	94	7.87	20.28	26.0	17.65	18.61	21.35	25.53	34.84	242.17	14.4
5476300	G17S246.1	G17S247	15.96	15.88	38.00	0.005	78	15	7.88	20.25	26.0	17.57	18.53	20.43	25.53	34.84	247.32	14.1
5476299	G17S247.1	G17S255	15.88	13.84	30.80	0.006	78	340	7.51	20.98	26.9	15.59	16.46	15.21	25.54	34.87	262.45	13.3
5056293	G17S255.1	G17SD5	13.84	13.05	28.00	0.006	78	137	8.16	21.19	27.2	14.82	15.85	13.18	28.32	38.46	256.68	15.0
5056293	G17SD5.1	F17S252	13.05	9.62	28.80	0.005	78	624	5.52	28.12	36.1	11.96	12.44	16.84	28.31	38.46	251.14	15.3
5476297	G17S252.1	F17S233	9.62	8.55	27.40	0.002	78	588	5.43	28.98	37.2	10.96	11.42	16.44	29.10	39.40	144.42	27.3
5056446	F17S233.1	F17S231	8.55	6.82	27.30	0.002	78	1,100	5.53	28.62	36.7	9.21	9.68	18.09	29.09	39.39	134.33	29.3
5056406	F17S231.1	F17S229	6.82	5.74	27.00	0.002	78	653	5.64	28.26	36.2	8.10	8.59	18.91	29.18	39.54	137.79	28.7
5056401	F17S229.1	F17S227	5.74	1.90	47.50	0.002	78	2,147	5.66	28.37	36.4	4.26	4.76	43.24	29.43	39.86	143.31	27.8
5056396	F17S227.1	F17S224	1.90	-1.45	34.00	0.002	78	1,905	5.29	29.81	38.2	1.03	1.47	32.97	29.41	39.86	142.08	28.1
5056475	F17S224.1	E17S350	-1.45	-4.88	14.00	0.001	78	2,335	5.50	28.98	37.2	-2.46	-1.99	16.46	29.40	39.86	129.84	30.7
5056297	E17S350.1	E17S411	-4.88	-6.38	13.50	0.002	78	950	6.85	24.82	31.8	-4.31	-3.58	17.81	29.69	40.20	134.72	29.8
5476160	E17S411.1	E17S335	-6.42	-10.52	23.50	0.006	78	650	8.71	20.87	26.8	-8.78	-7.60	32.28	29.68	40.20	268.99	14.9

TOTAL LENGTH (MILES):	6.99	LENGTH OF PIPE - d/D < 50% (MILES):	6.98	LENGTH OF PIPE - Q/CAP < 50% (MILES):	6.99
LENGTH WEIGHTED Q/CAP:	22.7	LENGTH OF PIPE - d/D 50 - 75% (MILES):	0.00	LENGTH OF PIPE - Q/CAP 50 - 75% (MILES):	0.00
LENGTH WEIGHTED d/D:	31.2	LENGTH OF PIPE - d/D 75 - 100% (MILES):	0.01	LENGTH OF PIPE - Q/CAP 75 - 100% (MILES):	0.00
LENGTH WEIGHTED HGL BELOW RIM (FT):	18.43	LENGTH OF PIPE - d/D > 100% (MILES):	0.00	LENGTH OF PIPE - Q/CAP > 100% (MILES):	0.00

Figure 2. 2012 Dry Weather Flows

CITY OF SAN DIEGO
HYDRAULIC MODEL RESULTS TABLE
TRUNK SEWER 5 - NORTH MISSION VALLEY
2012 Wet Weather Flows
by the City of San Diego

FACILITY SEQUENCE NUMBER	FEID	DOWNSTREAM MH ID	UPSTREAM MH INV. EL. (FT)	DOWNSTREAM MH INV. EL. (FT)	DOWNSTREAM MH RM EL. (FT)	PIPE SLOPE (FT/FT)	PIPE DIAMETER (IN)	PIPE LENGTH (FT)	MAX. VELOCITY (FT/SEC)	MAX. DEPTH (IN)	MAX. A/D (%)	MAX. HGL EL. (FT)	MAX. EGL EL. (FT)	HGL DEPTH BELOW RM (FT)	AVG. FLOW (MGD)	MAX. FLOW (MGD)	FULL CAPACITY (MGD)	MAX. Q/CAP (%)
18-inch Stadium Sewer																		
37531	I16S24.1	I16S4	55.58	51.80	69.90	0.020	18	189	0.42	1.91	10.6	51.96	51.96	17.94	0.01	0.03	9.60	0.3
37674	I16S4.1	I16S419	51.80	46.80	58.50	0.025	18	200	0.49	2.40	13.3	47.00	47.00	11.50	0.01	0.03	10.73	0.3
37671	I16S419.1	I16S418	46.80	45.40	52.00	0.004	18	350	1.56	2.39	13.3	45.60	45.64	6.40	0.06	0.14	4.30	3.3
37670	I16S418.1	I16S417	45.40	44.00	49.10	0.004	18	350	1.56	2.39	13.3	44.20	44.24	4.90	0.06	0.14	4.30	3.3
37669	I16S417.1	I16S415	44.00	42.60	46.00	0.004	18	350	1.55	2.40	13.3	42.80	42.84	3.20	0.06	0.14	4.30	3.3
37667	I16S415.1	I16S416	42.60	41.10	47.40	0.004	18	380	1.66	2.29	12.7	41.29	41.33	6.11	0.06	0.14	4.26	3.3
37668	I16S416.1	I16S410	41.10	41.00	47.00	0.005	18	20	1.76	2.20	12.2	41.18	41.23	5.82	0.06	0.14	4.75	2.9
North Mission Valley Trunk Sewer																		
37664	I16S410.1	I16S411	36.90	36.88	47.00	0.002	84	10	5.39	40.83	48.6	40.28	40.73	6.72	40.72	64.68	184.54	35.0
37665	I16S411.1	I16S412	36.88	36.84	47.00	0.001	84	30	5.38	40.90	48.7	40.25	40.70	6.75	40.72	64.68	148.88	43.4
5461661	I16S412.1	I16S425	36.84	35.26	64.00	0.001	84	1,390	5.25	41.67	49.6	38.73	39.16	25.27	40.69	64.67	139.28	46.4
5461659	I16S425.1	I16S80	35.25	34.05	55.00	0.001	84	1,058	5.89	40.14	47.8	37.39	37.93	17.61	45.03	69.14	139.04	49.7
33167	H16S80.1	H16S79	34.05	33.95	58.20	0.001	78	70	6.25	40.00	51.3	37.28	37.89	20.92	45.03	69.14	127.41	54.3
5461662	H16S79.1	H16S78	33.95	33.11	52.10	0.002	77	535	6.31	39.98	51.9	36.44	37.06	15.66	45.03	69.14	129.76	53.3
5461150	H16S78.1	H16S64	33.11	32.19	60.20	0.002	77	590	6.37	39.67	51.5	35.50	36.13	24.70	45.04	69.16	129.08	53.6
33161	H16S64.1	H16S107	32.19	31.25	44.10	0.002	77	611	6.66	38.37	49.8	34.45	35.14	9.65	45.14	69.28	128.54	53.9
33162	H16S107.1	H16S108	31.25	31.10	43.60	0.008	120	20	5.04	39.83	33.2	34.42	34.81	9.18	45.15	69.29	643.55	10.8
33164	H16S108.1	H16S480	31.10	29.98	50.00	0.002	78	721	6.31	39.74	50.9	33.29	33.91	16.71	45.14	69.29	133.48	51.9
33160	H16S480.1	H16S439	29.98	28.47	39.20	0.002	78	973	6.48	38.90	49.9	31.71	32.37	7.49	45.12	69.29	133.43	51.9
5042168	H16S439.1	H17S206	28.47	28.07	40.10	0.002	78	230	6.47	38.95	49.9	31.32	31.97	8.78	45.12	69.29	141.20	49.1
33347	H17S206.1	H17S207	28.07	27.02	40.10	0.002	78	607	6.48	38.99	50.0	30.27	30.92	9.83	45.23	69.40	140.90	49.3
33349	H17S207.1	H17S210	27.02	26.11	35.80	0.002	78	526	6.44	39.22	50.3	29.38	30.02	6.42	45.28	69.57	141.08	49.3
33352	H17S210.1	H17S208	26.11	25.70	38.00	0.002	78	252	6.51	38.94	49.9	28.94	29.60	9.05	45.39	69.68	136.66	51.0
5053075	H17S208.1	G17S236	25.70	25.15	37.39	0.002	78	321	6.56	38.71	49.6	28.38	29.05	9.01	45.38	69.68	139.99	49.8
5053140	G17S236.1	G17S237	25.15	24.56	37.39	0.002	78	335	6.61	38.49	49.4	27.77	28.45	9.62	45.38	69.68	142.31	49.0
5053070	G17S237.1	G17S299	24.56	23.63	35.00	0.002	78	528	6.86	37.38	47.9	26.74	27.48	8.26	45.37	69.69	142.27	49.0
33353	G17S299.1	G17S70	23.63	23.42	34.50	0.002	78	128	7.09	36.45	46.7	26.46	27.24	8.04	45.37	69.68	137.24	50.8
27719	G17S70.1	G17S72	23.38	22.56	33.80	0.002	78	382	6.93	37.08	47.5	25.65	26.40	8.15	45.36	69.68	157.02	44.4
5055264	G17S72.1	G17S310	22.56	21.86	33.00	0.002	78	323	6.86	37.41	48.0	24.98	25.71	8.02	45.36	69.68	157.26	44.3
27741	G17S310.1	G17S81	21.86	20.86	33.57	0.002	78	463	6.54	38.81	49.8	24.09	24.76	9.48	45.38	69.71	157.78	44.2
27727	G17S81.1	G17S80	20.86	19.92	32.90	0.002	78	437	5.80	42.70	54.7	23.48	24.00	9.42	45.37	69.71	157.03	44.4
27726	G17S80.1	G17S300	19.92	19.75	36.00	0.001	78	121	5.78	42.82	54.9	23.32	23.84	12.68	45.37	69.71	127.00	54.9
5055248	G17S300.1	G17S297	19.75	19.73	36.00	0.002	78	13	5.81	42.79	54.9	23.30	23.82	12.70	45.52	69.93	132.95	52.6
27676	G17S297.1	G17S24	19.73	19.49	39.50	0.001	78	238	6.04	41.46	53.2	22.95	23.51	16.55	45.56	69.98	107.59	65.0
27679	G17S24.1	G17S26	19.49	18.43	41.50	0.001	78	800	6.40	39.63	50.8	21.73	22.37	19.77	45.55	69.97	123.51	56.7
27681	G17S26.1	G17S30	18.43	17.48	40.00	0.001	78	715	8.12	32.98	42.3	20.23	21.25	19.77	45.53	69.97	123.37	56.7
5056123	G17S30.2	G17SD30	17.48	16.44	40.00	0.023	66	45	5.51	29.56	44.8	18.90	19.37	21.10	24.44	36.66	329.92	11.1
5056123	G17SD30.1	G17S246	16.44	15.96	39.00	0.005	78	94	9.85	29.54	37.9	18.42	19.93	20.58	48.87	73.31	242.17	30.3
5476300	G17S246.1	G17S247	15.96	15.88	38.00	0.005	78	15	10.02	29.17	37.4	18.31	19.87	19.69	48.87	73.31	247.32	29.6
5476299	G17S247.1	G17S255	15.88	13.84	30.80	0.006	78	340	9.25	31.00	39.7	16.42	17.75	14.38	48.90	73.37	262.45	28.0
5056293	G17S255.1	G17SD5	13.84	13.05	28.00	0.006	78	137	9.96	31.66	40.6	15.69	17.23	12.31	53.74	81.32	256.68	31.7
5056293	G17SD5.1	G17S252	13.05	9.62	28.80	0.005	78	624	6.62	43.47	55.7	13.24	13.92	15.56	53.73	81.32	251.14	32.4
5476297	G17S252.1	F17S233	9.62	8.55	27.40	0.002	78	388	6.50	44.60	57.2	12.27	12.92	15.14	54.69	82.44	144.42	57.1
5056446	F17S233.1	F17S231	8.55	6.82	27.30	0.002	78	1,100	6.47	44.79	57.4	10.55	11.20	16.75	54.67	82.44	134.33	61.4
5056406	F17S231.1	F17S229	6.82	5.74	27.00	0.002	78	653	6.85	44.25	56.7	9.43	10.16	17.57	58.14	86.04	137.79	62.4
5056401	F17S229.1	F17S227	5.74	1.90	47.50	0.002	78	2,147	6.85	44.44	57.0	5.60	6.33	41.90	58.44	86.39	143.31	60.3
5056396	F17S227.1	F17S224	1.90	-1.45	34.00	0.002	78	1,905	6.47	46.56	59.7	2.43	3.08	31.57	58.41	86.39	142.08	60.8
5056475	F17S224.1	E17S330	-1.45	-4.88	14.00	0.001	78	2,335	6.86	44.37	56.9	-1.18	-0.45	15.18	58.39	86.42	129.84	66.6
5056297	E17S330.1	E17S411	-4.88	-6.38	13.50	0.002	78	950	8.69	36.89	47.3	-3.31	-2.13	16.81	58.73	86.80	134.72	64.4
5476160	E17S411.1	E17S335	-6.42	-10.52	23.50	0.006	78	650	11.02	30.80	39.5	-7.95	-6.06	31.45	58.72	86.80	268.99	32.3

TOTAL LENGTH (MILES):	6.99	LENGTH OF PIPE - d/D < 50% (MILES):	3.88	LENGTH OF PIPE - Q/CAP < 50% (MILES):	3.19
LENGTH WEIGHTED Q/CAP:	46.7	LENGTH OF PIPE - d/D 50 - 75% (MILES):	3.11	LENGTH OF PIPE - Q/CAP 50 - 75% (MILES):	3.67
LENGTH WEIGHTED d/D:	46.2	LENGTH OF PIPE - d/D 75 - 100% (MILES):	0.00	LENGTH OF PIPE - Q/CAP 75 - 100% (MILES):	0.14
LENGTH WEIGHTED HGL BELOW RM (FT):	17.48	LENGTH OF PIPE - d/D > 100% (MILES):	0.01	LENGTH OF PIPE - Q/CAP > 100% (MILES):	0.00

Figure 3. 2012 Wet Weather Flows

