APPENDIX M-2

SANITARY SEWER TECHNICAL MEMORANDUM



Sanitary Sewer Technical Memorandum

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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-flowing18-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).

AECOM

Figure 1. Existing Sanitary Sewer System



Sewer Utilities



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 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	%
		PVC Roughness
n=	0.013	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.

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Tere Tere <th< td=""><td>37669</td><td>I16S417.1</td><td>I16S415</td><td>44.00</td><td>42.60</td><td>46.00</td><td>0.004</td><td>18</td><td>350</td><td>1.18</td><td>1.83</td><td>10.1</td><td>42.75</td><td>42.77</td><td>3.25</td><td>0.05</td><td>0.07</td><td>4.30</td><td>1.7</td></th<>	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
systee lies lies <thlies< th=""> <t< td=""><td>37.667</td><td>I16S415.1</td><td>I16S416</td><td>42.60</td><td>41.10</td><td>47.40</td><td>0.004</td><td>18</td><td>380</td><td>1.27</td><td>1.74</td><td>9.7</td><td>41.24</td><td>41.27</td><td>6.16</td><td>0.05</td><td>0.07</td><td>4.26</td><td>1.7</td></t<></thlies<>	37.667	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
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33344 H1/S2001 H1/S200 2000 2010 <td>5042168</td> <td>H16S439.1</td> <td>H17S206</td> <td>28.47</td> <td>28.07</td> <td>40.10</td> <td>0.002</td> <td>78</td> <td>230</td> <td>5.28</td> <td>26.76</td> <td>34.3</td> <td>30.30</td> <td>30.73</td> <td>9.80</td> <td>25.18</td> <td>34.34</td> <td>141.20</td> <td>24.3</td>	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
Jose Infraction Jose	33340	H17S200.1	H17S207	20.07	27.02	40.10	0.002	70	526	5.23	20.60	34.4	29.20	29.09	7.44	25.20	34.47	140.90	24.5
5033075 HI7S2081 G17S236 25.7 25.8 26.8 24.1 27.3 27.2 10.2 25.3 34.63 139.99 24.7 5033075 HI7S2081 G17S2371 G17S2371 G17S2391 G17S2311 G17S191 G17S712 23.38 24.66 157.02 22.18 24.78 31.8 25.48 24.67 25.18 9.01 25.38 34.62 157.02 22.10 27771 G17S711 G17S3101 G17S3101 G17S3101 G17S3101 G17S300 19.92 19.75 36.00 0.002 78 43.7 4.81 28.83 37.0 22.21 22.68 10.58 25.59 34.65 157.02 22.0 27.77 G17	33352	H17S210.1	H17S208	27.02	20.11	38.00	0.002	78	252	5.31	27.04	34.4	20.00	28.37	10.07	25.31	34.63	136.66	24.5
565340 G1752351 G1752371 G1752371 G1752371 G1752371 G175299 24.56 37.30 0.002 78 335 G175391 G175291 G175299 24.56 23.63 35.00 0.002 78 52.65 32.9 25.77 26.26 9.23 25.39 34.63 142.27 24.33 3333 G1752901 G175712 23.38 22.56 33.80 0.002 78 32.2 5.75 25.28 32.42 24.67 25.18 9.13 25.38 34.62 157.02 22.1 5055264 G175211 G175711 G175711 G175711 G175711 G175811 21.86 33.07 0.002 78 463 5.52 26.06 33.4 23.03 23.50 10.54 25.40 34.65 157.78 22.0 27774 G175811 G175801 G175801 G175810 19.92 32.00 0.002 78 43.3 7.0 22.18 22.18 22.33 13.82 25.09 34.65 157.03 22.10 27.76 G175811 G175810 <td< td=""><td>5053075</td><td>H17S208.1</td><td>G17S236</td><td>25.70</td><td>25.15</td><td>37.39</td><td>0.002</td><td>78</td><td>321</td><td>5.36</td><td>26.63</td><td>34.1</td><td>27.37</td><td>27.82</td><td>10.02</td><td>25.39</td><td>34.63</td><td>139.99</td><td>24.7</td></td<>	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
5653070 G1732371 G1732371 G1732371 G1732771 G17370 23.63 23.63 23.63 23.63 23.64 23.64 23.64 23.64 23.64 23.64 23.64 23.64 23.64 23.64 23.64 23.63 23.64 </td <td>5053140</td> <td>G17S236.1</td> <td>G17S237</td> <td>25.15</td> <td>24.56</td> <td>37.39</td> <td>0.002</td> <td>78</td> <td>335</td> <td>5.39</td> <td>26.50</td> <td>34.0</td> <td>26.77</td> <td>27.22</td> <td>10.62</td> <td>25.39</td> <td>34.62</td> <td>142.31</td> <td>24.3</td>	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
3333 G173299.1 G17370 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 G17S72.1 G17S71.2 G17S71.1	5053070	G17S237.1	G17S299	24.56	23.63	35.00	0.002	78	528	5.63	25.68	32.9	25.77	26.26	9.23	25.39	34.63	142.27	24.3
27719 G17870.1 G17871.2 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 22.10 5055264 G17871.1 G178310.1 G17881 21.86 22.66 33.57 0.002 78 463 5.52 25.06 33.4 23.03 22.50 10.54 22.40 34.62 157.70 22.0 27727 G17881.1 G178300 19.92 19.97 36.00 0.002 78 437 4.81 28.83 37.0 22.32 22.68 10.54 25.59 34.65 157.70 22.17 27736 G178201.1 G178207 19.75 19.73 36.00 0.001 78 131 4.74 29.16 37.4 22.18 23.33 32.55 34.49 10.25 22.4 17.65 25.54 34.84 107.59 26.2 27676 G17820.1 G17820.4 G17820.4 G17820.4 G17820.4 G17820.4 G17820.4 G178.55 34.44 10.759	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
5055264 G17S211 G17S310 22.66 21.86 33.00 0.002 78 323 5.72 25.37 32.5 23.98 24.49 9.00 25.38 34.62 157.26 22.00 27741 G17S3101 G17S81 21.86 20.86 33.57 0.002 78 443 5.52 26.06 33.4 23.03 23.50 10.54 25.30 34.65 157.03 22.01 27727 G17S801 G17S207 19.75 36.00 0.002 78 131 4.74 29.16 37.4 22.18 22.53 13.82 25.50 34.65 127.00 27.3 5055248 G17S2071 G17S247 19.73 19.49 39.50 0.001 78 23.8 4.95 23.06 24.17 16.5 25.50 34.84 17.50 25.50 34.83 123.51 28.2 27676 G17S241 G17S204 18.43 11.44 40.00 0.001 78 800 5.08 27.79 35.6 20.74 21.15 20.75 25.53 34.83	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
27741 G1738101 G17881 21.86 20.86 33.57 0.002 78 463 5.52 26.06 33.4 23.03 22.30 10.54 25.40 34.65 157.78 22.0 27727 G175801 G175800 19.92 19.75 36.00 0.000 78 437 4.81 28.83 37.0 22.32 22.68 10.58 25.39 34.65 157.703 22.1 5055248 G17S2001 G17S247 19.75 19.73 36.00 0.002 78 13 4.74 29.22 37.5 22.17 22.52 13.83 25.50 34.45 157.78 22.62 27676 G17S2071 G17S26 19.49 18.43 16.00 0.001 78 23.60 20.64 21.45 22.24 17.65 25.54 34.84 107.93 28.2 27661 G17S2071 G17S261 G17S2071 G17S261 G17S2071 13.82 25.30 34.83 123.37 28.2 20.60 17.65 18.61 21.65 25.52 34.84 107.93 28.2	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
21/12 G17811 G17801	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
277.0 G178501 G17810 G17824 G17813 G1781 G17824	2//2/	G17S81.1	G17580	20.86	19.92	32.90	0.002	78	437	4.81	28.83	37.0	22.32	22.08	10.58	25.39	34.05	157.03	22.1
2005440 01732740 0173274 <	5055248	G17S300.1	G17S300 G17S207	19.92	19.75	36.00	0.001	70	121	4.74	29.10	37.4	22.10	22.55	13.82	25.59	34.05	132.05	27.5
27679 G17S241 G17S26 19.49 18.43 41.50 0.001 78 800 5.88 27.67 35.6 20.76 20.77 25.53 34.83 122.51 28.2 27681 G17S261 G17S200 18.43 17.48 40.00 0.001 78 715 6.57 23.06 29.6 19.40 20.07 20.60 25.52 34.83 123.51 28.2 5056123 G17S2030 167.44 16.44 40.00 0.023 66 45 4.31 20.41 30.9 18.41 18.43 21.66 17.76 17.42 329.92 53 5056123 G17S2040 G17S247 15.96 15.88 38.00 0.005 78 15 7.88 20.25 26.00 17.57 18.53 20.43 25.53 34.84 24.72 14.4 5476309 G17S247 15.96 15.88 38.00 0.006 78 340 7.51 20.99 15.59 16.46<	27676	G17S297.1	G175257	19.75	19.75	39.50	0.002	78	238	4.05	29.22	36.4	21.85	22.52	17.65	25.50	34.84	107.59	32.4
27681 G17S261 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 G17SD30 17.48 16.44 40.00 0.023 66 45 4.31 20.41 30.9 18.14 18.43 21.86 17.72 32.99.2 53 5056123 G17SD301 G17SD44 15.96 15.88 38.00 0.005 78 94 7.87 20.28 26.0 17.65 18.61 21.35 25.53 34.44 24.47.32 14.1 5476300 G17S247.1 G17S255 15.88 13.04 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 G17S252 13.05 28.62 27.40 0.002 78 58 5.43 28.98 <t< td=""><td>27679</td><td>G17S24.1</td><td>G17S26</td><td>19.49</td><td>18.43</td><td>41.50</td><td>0.001</td><td>78</td><td>800</td><td>5.08</td><td>27.79</td><td>35.6</td><td>20.74</td><td>21.15</td><td>20.75</td><td>25.53</td><td>34.83</td><td>123.51</td><td>28.2</td></t<>	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
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 G17SD301 G17S2461 G144 15.96 39.00 0.005 78 94 7.87 20.28 26.0 17.65 18.61 21.35 25.53 34.84 2421.71 14.4 5476300 G17S2461 G17S255 15.88 13.84 30.80 0.006 78 340 7.51 20.98 26.9 15.59 16.46 15.12 25.53 34.84 242.17 14.4 5056293 G17S2551 G17S252 15.88 13.34 13.05 28.00 0.006 78 137 8.16 21.19 27.2 14.82 15.85 13.18 28.32 38.46 256.64 15.0 5056293 G17S2521 G17S2521 G17S253 G17S253 G17S253 G17S253 9	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 G17SD301 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 G17S247.1 G17S247.1 G17S247.1 G17S247.1 G17S247.1 G17S247.1 G17S247.1 G17S247.1 G17S255.1 S8.8 13.84 30.80 0.006 78 34 7.57 12.09 26.0 17.57 18.53 20.43 25.53 34.84 24.24.2 14.1 5056293 G17S255.1 G17S255 13.84 13.05 28.00 0.006 78 137 8.16 21.19 27.2 14.82 15.85 13.18 28.32 38.46 251.64 15.05 5056293 G17S252.1 F17S233 9.62 28.80 0.005 78 624 5.52 28.12 36.1 11.96 12.44 16.84 29.10 39.46 251.14 15.3 5056494 F17S231 F17S233 9.62 25.74 0.002 78 588 5.54 <t< td=""><td>5056123</td><td>G17S30.2</td><td>G17SD30</td><td>17.48</td><td>16.44</td><td>40.00</td><td>0.023</td><td>66</td><td>45</td><td>4.31</td><td>20.41</td><td>30.9</td><td>18.14</td><td>18.43</td><td>21.86</td><td>12.76</td><td>17.42</td><td>329.92</td><td>5.3</td></t<>	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
5476300 G17S2461 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 34.44 247.32 14.1 5476209 G17S247.1 G17S255.5 15.88 13.84 30.80 0.006 78 340 7.51 20.98 26.9 15.59 16.46 15.21 25.54 34.87 262.65 13.3 5056293 G17S255.1 G17S252 13.05 9.62 28.00 0.006 78 137 8.16 21.19 27.2 14.82 15.85 13.18 28.32 38.46 25.64 15.3 5056293 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 14.44.2 27.3 5056406 F17S231.1 F17S233 9.62 5.74 27.00 0.002 78 5.56 28.62 36.7 9.21 9.68 18.09 29.09 39.39 134.33<	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
5476299 G17S251 G17S252 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 G17S2551 G17S255 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 15.05 5056293 G17S2551 G17S2552 17.8525 13.05 9.62 28.80 0.000 78 634 55.2 28.12 36.1 11.96 12.44 16.84 28.31 38.46 256.64 15.05 5056446 F17S231 F17S233 9.62 8.55 27.40 0.002 78 558 5.54 28.62 36.7 9.21 9.68 18.09 29.09 39.39 134.33 29.3 5056406 F17S2311 F17S2324 F17S234 7.74 1.000 7.75 0.002 78 5.64 28.26 36.2 8.10 8.59 18.91 29.18 <td>5476300</td> <td>G17S246.1</td> <td>G17S247</td> <td>15.96</td> <td>15.88</td> <td>38.00</td> <td>0.005</td> <td>78</td> <td>15</td> <td>7.88</td> <td>20.25</td> <td>26.0</td> <td>17.57</td> <td>18.53</td> <td>20.43</td> <td>25.53</td> <td>34.84</td> <td>247.32</td> <td>14.1</td>	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
5056293 G17S2551 G17S2531 S55 G24 S52 Z8.12 36.1 11.96 12.44 16.84 28.31 38.46 251.14 15.35 5056446 F17S231 S.55 6.82 27.30 0.002 78 11.00 5.53 28.62 36.7 9.21 9.68 18.09 29.09 39.39 134.33 29.3 5056406 F17S2311 F17S220 6.82 5.74 27.00 0.002 78 5.64 28.26 36.7 9.21 9.68 18.09 29.09 39.39 134.33 29.3 5056406 F17S2201 F17S227 5.74 1.900 2.750 0.002 78 2.447	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
Subsets Out Out Z8.80 0.000 78 O.24 S.S.2 28.12 Sol.1 11.96 12.44 10.84 22.31 38.46 251.14 15.3 5476297 0.17552.1 F175233 9.62 8.55 27.40 0.002 78 558 5.43 28.98 37.2 10.06 11.42 16.44 29.10 39.40 251.44.42 27.3 5056446 F175231 F175233 9.62 8.57 27.40 0.002 78 10.96 11.42 16.44 29.09 39.39 134.33 29.3 5056406 F175231 F175227 5.74 1.00 0.002 78 6.53 5.64 28.26 36.7 9.11 4.26 4.76 43.24 29.43 39.54 137.79 28.7 5056401 F1752271 F1752247 5.74 1.00 0.002 78 1.905 5.29 29.81 38.2 1.03 1.47 32.97 29.41 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
p=10227 p=10227 <t< td=""><td>5056293</td><td>G17SD5.1</td><td>G17S252</td><td>13.05</td><td>9.62</td><td>28.80</td><td>0.005</td><td>78</td><td>624</td><td>5.52</td><td>28.12</td><td>30.1</td><td>11.90</td><td>12.44</td><td>16.84</td><td>28.31</td><td>38.40</td><td>251.14</td><td>15.3</td></t<>	5056293	G17SD5.1	G17S252	13.05	9.62	28.80	0.005	78	624	5.52	28.12	30.1	11.90	12.44	16.84	28.31	38.40	251.14	15.3
5056406 F1752291 F175229 6.82 5.74 27.00 0.002 78 6.53 5.64 28.07 24.02 50.07 24.10 50.09 29.59 191.33 191.35 29.53 5056406 F1752217 F175229 6.82 5.74 27.00 0.002 78 6.53 5.64 28.20 36.2 8.10 8.59 18.19 29.18 39.54 143.31 27.8 5056406 F1752271 F175224 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 28.10 5056407 F175224 1.90 -1.45 34.00 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 E175350.1 E175411.1 4.88 -6.38 13.50 0.002 78 950 6.85	5056446	E178232.1	F179233	9.02	6.20 6.80	27.40	0.002	78	288	5.43	28.98	36.7	0.21	0.68	10.44	29.10	39.40	199.92	27.5
5056401 F1752241 F1752271 F175271 F175271 <td>5056406</td> <td>F17S231.1</td> <td>F175251</td> <td>6.82</td> <td>5.74</td> <td>27.50</td> <td>0.002</td> <td>78</td> <td>653</td> <td>5.64</td> <td>20.02</td> <td>36.2</td> <td>9.21</td> <td>9.00</td> <td>18.09</td> <td>29.09</td> <td>30.54</td> <td>1 34.33</td> <td>29.3</td>	5056406	F17S231.1	F175251	6.82	5.74	27.50	0.002	78	653	5.64	20.02	36.2	9.21	9.00	18.09	29.09	30.54	1 34.33	29.3
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 5056396 F17S227.1 E17S350 -1.45 34.00 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 14.00 0.002 78 9.50 6.85 24.82 31.8 -3.58 17.81 29.69 40.20 134.72 29.8 5056297 E17S350.1 E17S411 -4.88 -6.33 13.50 0.002 78 950 6.85 24.82 31.8 -3.58 17.81 29.69 40.20 134.72 29.8 5476160 E17S411.1 -4.88 -6.32 0.002 78 650 8.71 20.87 26.8 3.78 -7.60 32.28	5056401	F17S2291	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
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	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
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	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	1 29.84	30.7
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	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) 600 LENG TH WEIGHTED Q/CAP: 22.7 LENGTH WEIGHTED d/D: 31.2 LENGTH WEIGHTED HGL BELOW RIM (FT): 18.43

LENGTH OF PIPE - d/D < 50% (MILES): 6.98 LENG TH OF PIPE - d/D 50 - 75% (MILES): 0.00 LENG TH OF PIPE - d/D 75 - 100% (MILES): 0.01 LENGTH OF PIPE - d/D > 100% (MILES): 0.00 LENGTH OF PIPE - O/CAP < 50% (MILES): 6 00 LENGTH OF PIPE - Q/CAP 50 - 75% (MILES):

0.00 LENGTH OF PIPE - Q/CAP 75 - 100% (MILES): 0.00

LENG TH 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 - NOR TH MISSION VALLEY 2012 Wet Weather Flows

FACILITY SEQUENCE NUMBER	FIFEID	D OWNSTREAM MH ID	UFSTREAM MH INV. EL.	D OWNSTREAM MH INV. EL.	DOWNSTREAM MH RIM EL	FIFE SLOPE	FIFE	FIFE	MAX.	MAX.	MAX.	MAX.	MAX.	HGL DEPTH	AVG.	MAX.	FULL	MAX.
NUMBER			(TT)				DECOLOSICIST	LENGIN	VELOCITY	DELLH	a/D	HGL KL.	EGL EL.	BELOWRIM	FLOW	FLOW	CAPACITY	Q/CAP
			μŋ	(FT)	(FT)	(FT/FT)	(IN)	(FT)	(FT/SEC)	(IIN)	(%)	(FT)	(FT)	(FT)	(ALCED)	(MGD)	(M GD)	(%)
07701	11 (200.4.1	11 (01 4	<i></i>	<i>ct</i> 00	60.00	0.000	10	18-inch St	adium Sewer	1.01	10.4	61.06	61.06	17.04	0.01	0.00	0.00	
37031	116524.1	11654	30.00	08.10	69.90	0.020	18	189	0.42	1.91	10.6	21.96	01.96	17.94	0.01	0.03	9.60	0.3
37674	11654.1	1165419	05.10	46.80	52.00	0.004	18	200	0.49	2.40	13.3	47.00	47.00	11.5U 6.40	0.06	0.03	10.73	0.3
27670	1169419.1	1169418	40.00	49.40	40.10	0.004	10	250	1.56	2.39	12.2	40.00	40.04	4.00	0.00	0.14	4.30	2.2
37660	1165417.1	1169415	47.40	44.00	49.10	0.004	10	350	1.50	2.39	12.2	44.20	44.24	3.20	0.00	0.14	4.30	3.3
37667	1165415.1	1165416	44.00	41.10	40.00	0.004	18	380	1.55	2.40	12.7	42.00	41.33	6.11	0.00	0.14	4.50	33
37668	1165416.1	1165410	41.00	41.00	47.00	0.004	18	20	1.00	2.20	12.2	41.18	41.23	5.82	0.06	0.14	4.25	2.9
5,000	1100 110.1	100410	41.10	41.00	47.00	0.005	Nor	th Mission V	alley Trunk S	Sewer	14,4	44.10	11.45	5.04	0.00	0.14	3.02	2.5
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	H16S425	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	H16S425.1	H16S80	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	800.0	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	69.49	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	6.36	38.71	49.6	28.38	29.03	9.01	45.38	69.68	139.99	49.8
5053140	G17S236.1	G17S237	23.15	24.36	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
2023070	G17S237.1	G17S299	24.06	23.63	35.00	0.002	78	128	0.80	37.58	4/9	26.74	27.48	8.20	45.37	69.69	142.27	49.0
33323	G175299.1	G17570	23.03	23.42	34.00	0.002	78	128	7.09	30.40	40.7	20.40	23.24	8.04	45.37	09.08	157.24	30.8
5055264	G17870.1	G17572	23.38	22.30	33.80	0.002	78	202	6.95	37.08	47.2	20.00	20.40	0.15	45.30	60.69	157.02	44.4
277.41	G17S210.1	G17591	22.00	21.00	33.00	0.002	70	345	6.54	29.91	40.0	24.96	20.71	0.02	45.30	60.71	157.79	44.3
27727	G17S91 1	G17590	21.00	10.02	32.90	0.002	70	405	5.90	42 70	547	24.09	24.00	0.42	45.38	60.71	157.02	44.2
27726	G17580.1	G17S300	10.00	19.72	36.00	0.002	78	121	5.78	42.70	54.0	23.40	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	12.00	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	588	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	E17S350	-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	E17S350.1	E17S411	-4.88	-0.38	13.50	0.002	78	950	8.69	36.89	47.3	-3.31	-2.13	10.81	58.73	86.80	134.72	04.4
24/6160	E17S411.1	E17S335	-0.42	-10.52	23.50	0.006	178	000	11.02	30.80	39.5	-7.95	-0.06	31.45	58.72	86.80	268.99	32.3
TOTAL LENG	TH (MILES): SHTED O/C4	۹.		LENGT	H OF PIPE - H OF PIPE	d/D < 50% (d/D 50 - 75%	MILES): 6 (MILES)	3.88 3.11			LENGTH O	FPIPE-QA	CAP < 50% ((MILES): % (MILES):	3.19 3.67			

TOTAL LENGTH (MILES): LENGTH WEIGHTED Q/CAP: LENGTH WEIGHTED &D: LENGTH WEIGHTED HGL BELOWRIM (FT): LENGTH OF PIPE - d/D < 50% (MILES): LENGTH OF PIPE - d/D 50 - 75% (MILES): LENGTH OF PIPE - d/D 75 - 100% (MILES): 0.00 LENGTH OF PIPE - d/D > 100% (MILES): 0.01

LENGTH OF PIPE - Q/CAP < 50% (MILES): LENGTH OF PIPE - Q/CAP 50 - 75% (MILES): 3.19 3.67 LENGTH OF PIPE - Q/CAP 75 - 100% (MILES): 0.14 LENGTH OF PIPE - Q/CAP > 100% (MILES): 0.00

Figure 3. 2012 Wet Weather Flows

46.2

17.48