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Technical Memorandum

To: Manfred Wong – SFPUC
Bessie Tam – SFPUC

Thru: Wallis Lee – DPW Hydraulic Section

From: Bassam Aldhafari – DPW Hydraulic Section

Date: February 25, 2015

Subject: Hydraulic Assessment of Mission Bay Sanitary Pump Station

Executive Summary:

The Mission Bay Sanitary Pump Station (MBSPS) was constructed in year 2011 within block P15. The original design flow (full build-out) to the station accounted for 2 MGD and 6 MGD average and peak flow respectively in a study by Olivia Chen Consultants (Dated December 2000). Included in the study was a projection of 66 GPM (Average) and 200 GPM (Peak) for blocks 29 and 30 combined (see Attachment 1 for location). According to UCSF Long Range Development Plan Entitlement Increase Analysis (Dated May 2013), the current average and peak flow projections to MBSPS are 2.1 MGD and 6.63 MGD respectively at full build-out.

A flow meter was installed by the SFPUC to measure diurnal flows in the 33-inch influent sewer that connects to the wet well at MBSPS. Current flow entering the station is approximately 2.2 MGD average and 3.3 MGD peak during dry weather conditions.

Enclosed Attachments:

Attachment 1: Aerial Image and Major Drainage Elements

Attachment 2: Plan of Influent Sewer, Station, and Discharge Force main

Attachment 3: Plan and Profile of 33-inch Influent Sewer (Flow Meter Location)

Attachment 4: Profile of Wet Well and Pump Performance Curve at MBSPS

Attachment 5: Average and Peak Flow Projections from December 2000 Report by Olivia Chen Consultants

Attachment 6: Average and Peak Flow Projections from August 2004 Report by Winzler & Kelly Consultants

Attachment 7: Peak Sanitary Flow Projection Exhibit from May 2013 UCSF LRDP

Attachment 8: Exhibit of Average and Peak Flow Projections from New Warriors Arena

Attachment 9: Pump Curve of Proposed MBSPS Upgrade by F&L from 2013 UCSF LRDP

Background:

The Mission Bay Sanitary Pump Station was constructed within Block P15 part of the Mission Bay Development area and bounded by Mission Bay Blvd South, Mission Bay Blvd North, Third St East, and Fourth Street West (see Attachment 1 for reference). The station was originally designed to collect sanitary flow from Mission Bay South of the Channel (Labeled System “2” in previous study by Olivia Chen Consultants, 2000). The originally projected average and peak flow that would enter the new station was estimated to be 2 MGD and 6 MGD respectively in December 2000. The UCSF Long Range Development Plan (LRDP) Entitlement Increase Analysis dated May 17, 2013 states that the pump station was later designed to accommodate an average and peak flow rate of 2.1 MGD and 6.4 MGD respectively based on a sanitary sewer analysis prepared by Winzler & Kelly dated August 2005 (see Attachment 6). Additionally the LRDP states that in-situ pump performance testing was performed in May 2010 by Winzler & Kelly, showing the pump station discharged at a rate of 6.7 MGD. The station pumping capacity will need to be retested as the original test conducted capacity test of each pump individually and not all pumps simultaneously, which is needed to determine total peak flow capacity of the station. According to the LRDP, UCSF estimates an increase of 0.23 MGD to previously projected flow of 6.4 MGD resulting in a need to accommodate a total of 6.63 MGD at MBSPS. The LRDP recommends replacing the existing pumps will increase the pumping capacity to 7.34 MGD (see Attachment 9 for Pump Performance Curve). This recommendation was assembled without the participation of SFPUC and has not been approved as an adequate methodology to increase the station’s overall pumping capacity.

To estimate the amount of flow discharged by parcel users to the pump station, the SFPUC installed a flow monitor within the 33-inch influent sewer connecting to the station wet well. Based on measured data from beginning to mid January of 2015, the pump station receives an average flow rate of 1500 GPM (2.2 MGD) and a peak flow rate of 2300 GPM (3.3 MGD) under normal dry weather conditions (See Figure 1 below).

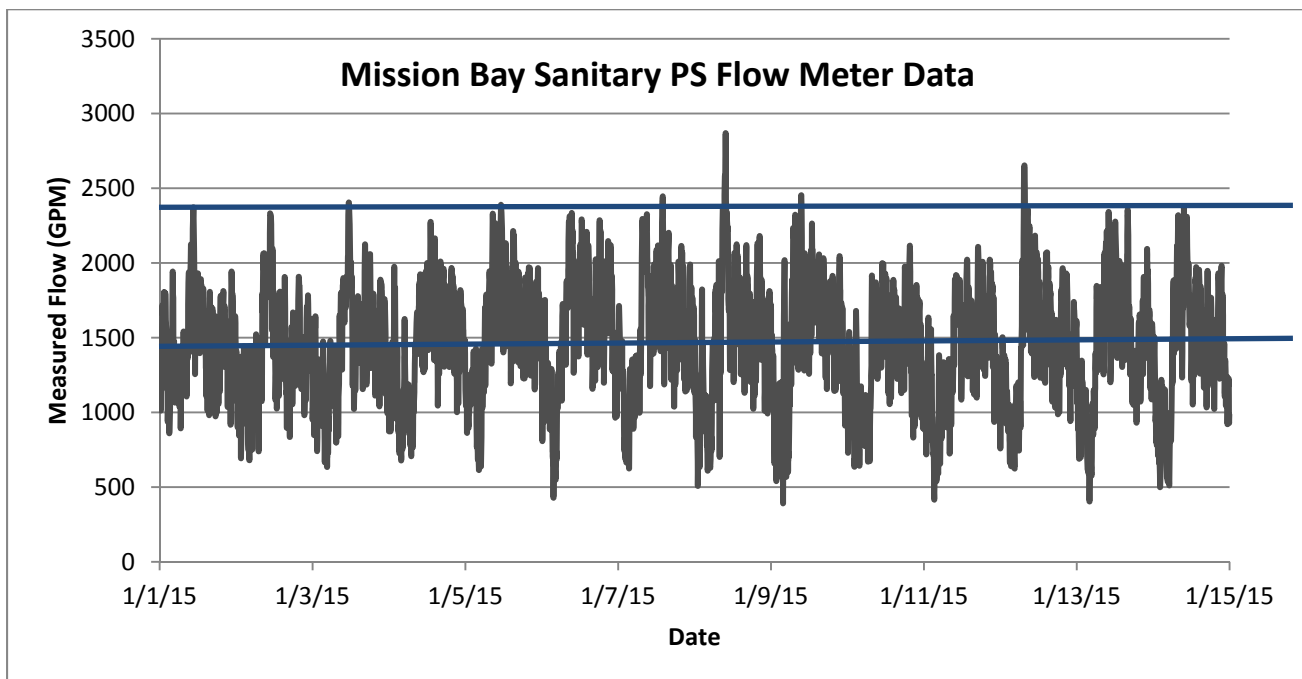


Figure 1: Flow Meter Data from 33-Inch Influent Sewer to Mission Bay Sanitary Pump Station (Normal Dry Weather Conditions)

Under wet weather conditions, the peak flow entering the station can reach a peak flow rate of 3700 GPM (5.3 MGD) and an average flow increasing to 2000 GPM (2.9 MGD) compared to average dry weather conditions (see Figure 2 below). The increase in average and peak flow during storm events is largely due to contribution from storm runoff and groundwater entering the sewer system through sewer joints, manholes, or possible cross connections from storm laterals to sewer mains.

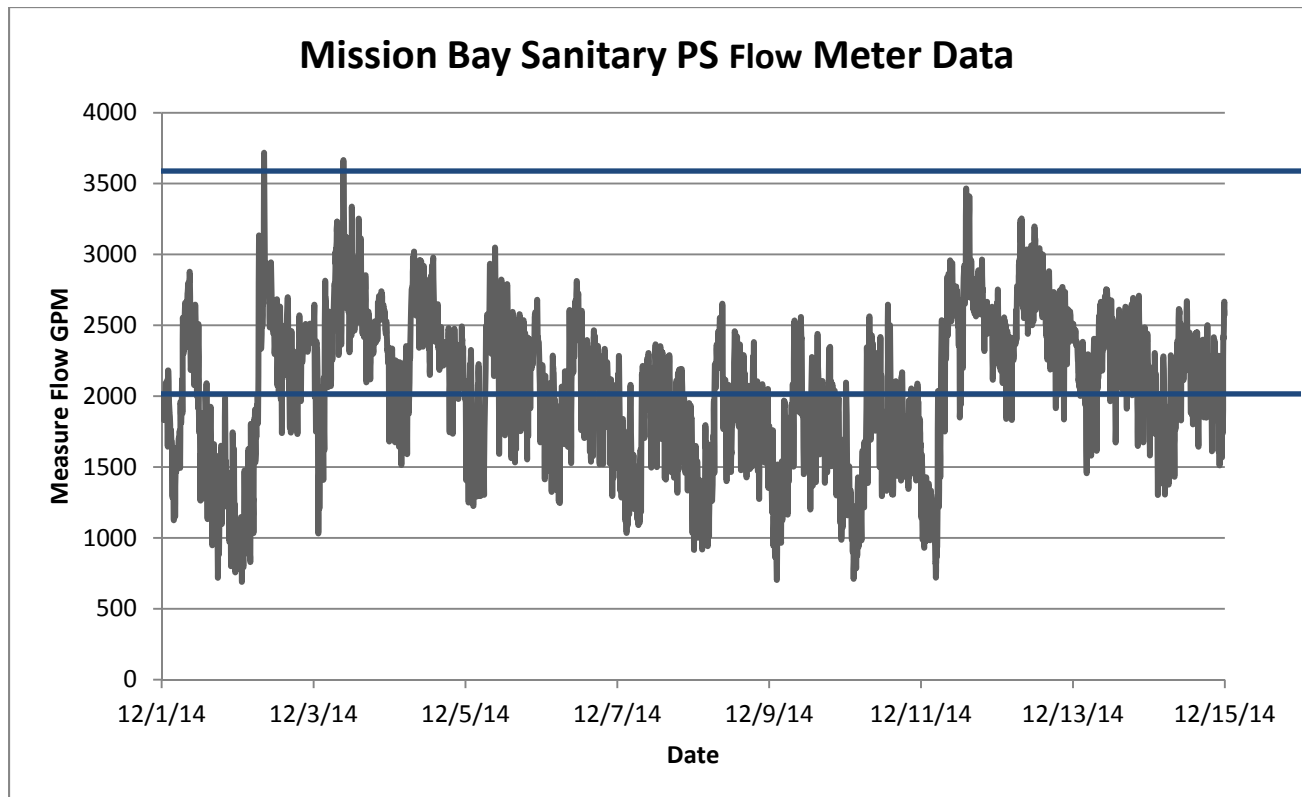


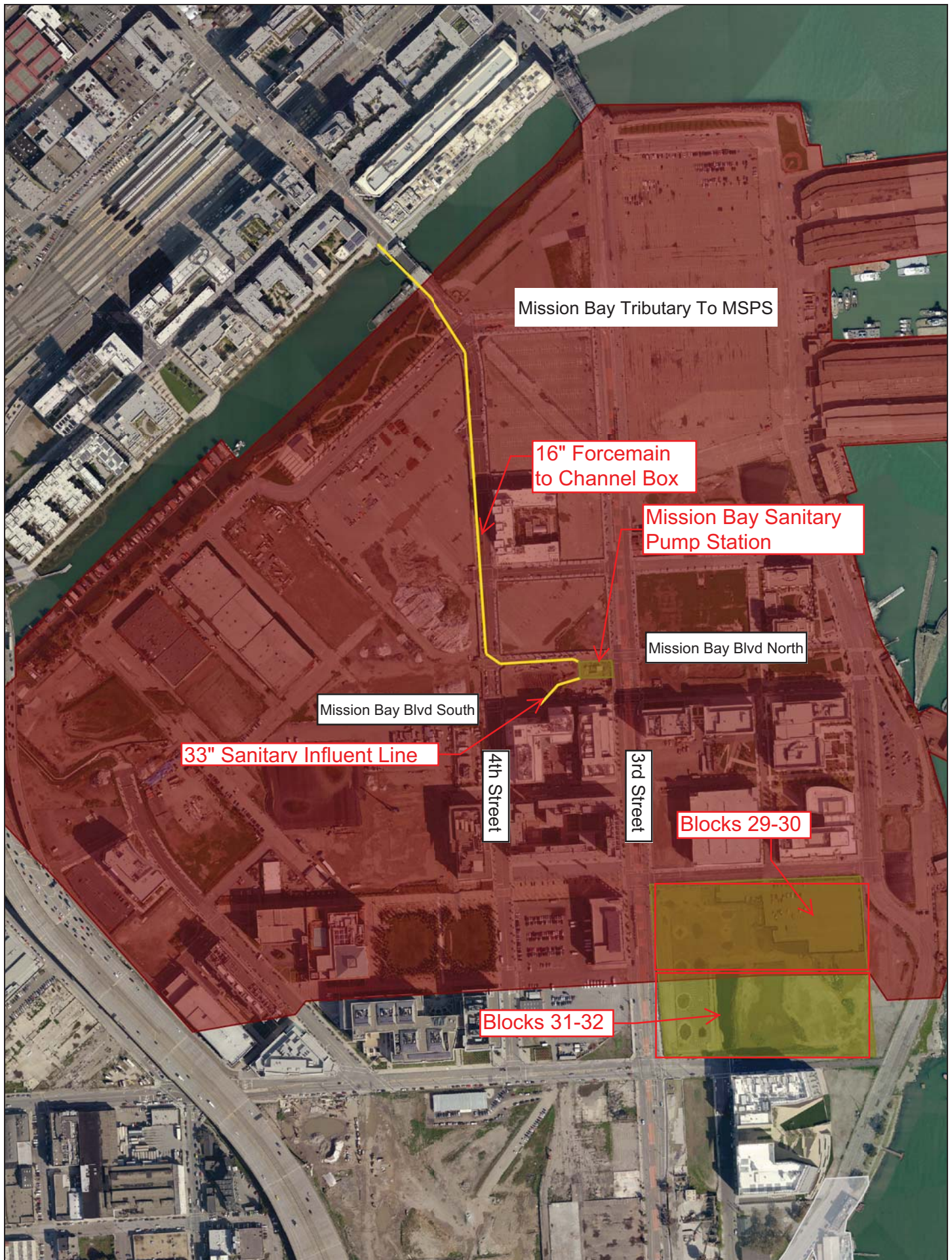
Figure 2: Flow Meter Data from 33-Inch Influent Sewer to Mission Bay Sanitary Pump Station (Wet Weather Conditions)

Summary of Findings:

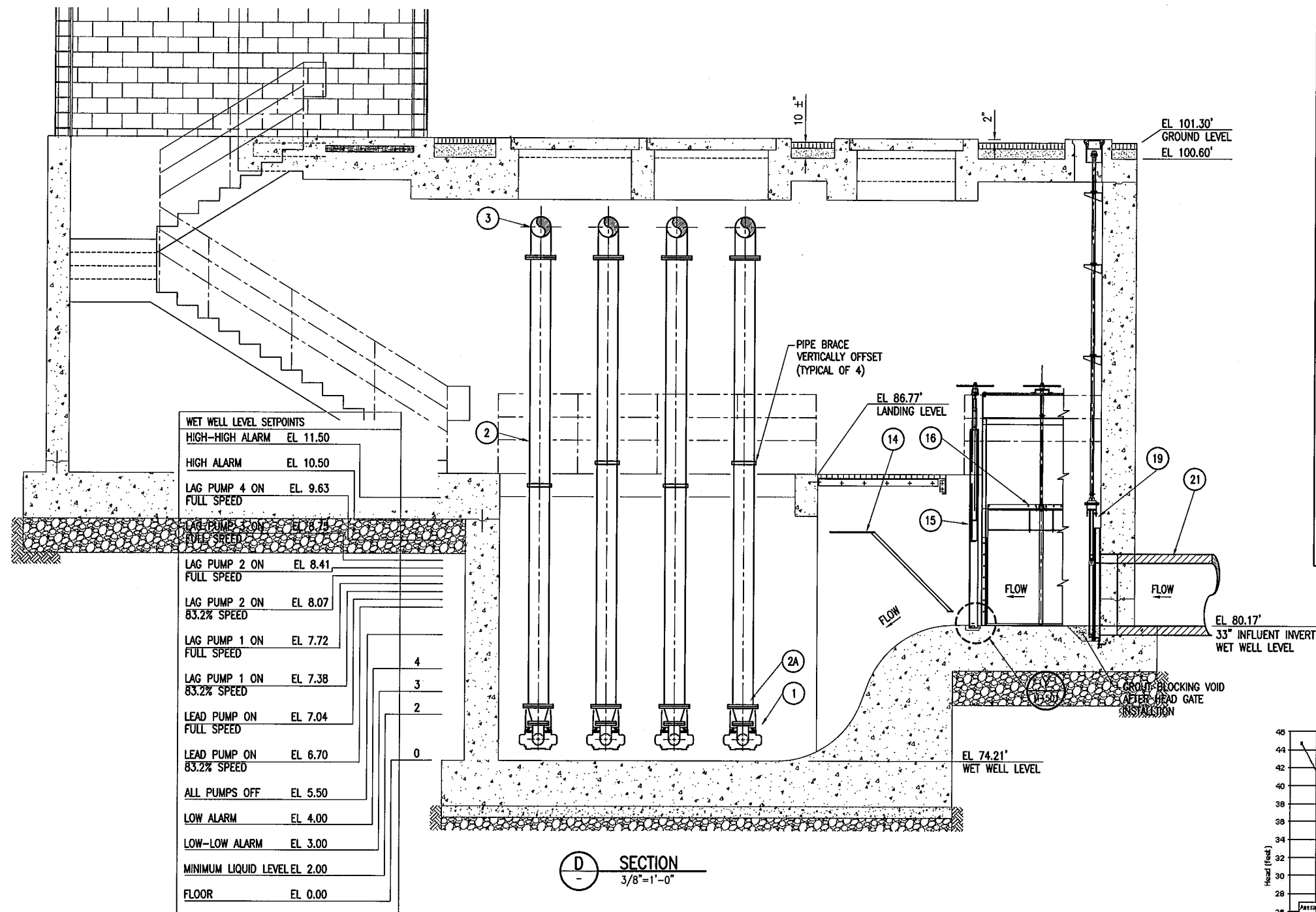
Based on collected flow meter data, and data obtained from the City's DCS for Mission Bay Sanitary Pump Station, the existing station is receiving 2.2 MGD Average and 3.3 MGD Peak flow under normal dry weather conditions. Based on pump a pump test conducted in 2010, the station had capacity to pump 6.7 MGD, testing each of the three pumps individually. A new test should be conducted to validate current pumping capacity. Based on current meter data, the station is has not reached the pump design capacity at current build-out. Continued monitoring of flow meter data and pump station is recommended as development continues within the remaining parcels to assess pump station performance.

cc: DPW: Norman Chan Iqbal Dhapa Louis Douglas Richard Graham Bimu Shrestha Cliff Wong
 SFPUC: Tony Flores George Engel Michael Tran Brian Carlomagno Ed Ho Kent Eickman
 Leslie Webster Lori Regler

Aerial Image and Major Drainage Elements



DRAWING NAME: \\saw2\Draws\Projects\Castellus - MGS-041 MS SPS(CA)\15 - Record Drawings\0334005041\0302.dwg
PLOT DATE: Jan 27, 2011 - 9:07am
PLOTTER: JWinfield



RECORD DRAWING

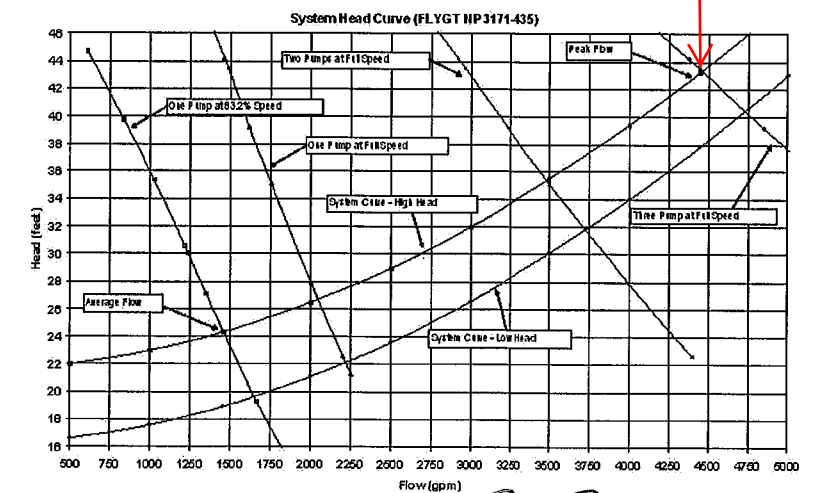
THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY THE PROJECT CONTRACTOR AND OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. FIELD VERIFICATION OF FACTS AND DATA SHOULD BE MADE IF THESE DOCUMENTS ARE TO BE USED AS A BASIS FOR FUTURE WORK.

ITEM NO.	DESCRIPTION
1	FLYGT NP-3171-435 SUBMERSIBLE PUMP WITH 6" DISCHARGE AND FLANGED 6" ELBOW UP
2	VERTICAL 10" DUCTILE IRON DISCHARGE PIPE
2A	6" TO 10" INCREASER
3	10" DUCTILE IRON ELBOW (TOP)
4	10" DUCTILE IRON SPOOL
5	10" FLANGED COUPLING ADAPTER
5A	10" EBAA IRON FLEX-TEND DOUBLE BALL FLEXIBLE EXPANSION JOINT
6	10" SWING CHECK VALVE (SPRING LOADED)
7	10" PLUG VALVE (FULL PORT)
8	10" DUCTILE IRON 45° FLANGED ELBOW
9	16" DISCHARGE HEADER (WELDED STEEL WITH HEAT FUSED EPOXY COATING)
10	16" DUCTILE IRON SPOOL, FL X PE
11	16" DUCTILE IRON SPOOL
12	16" FLEXIBLE BALL JOINT, EBAA FLEX-900
13	16" FLANGED COUPLING ADAPTER
14	BAR RACK
15	60"W x 48"H CHANNEL GATE - MANUALLY OPERATED (NORMALLY OPEN)
16	60"W x 42"H WEIR GATE - MANUALLY OPERATED
17	FLOOR DRAIN
18	EXTERIOR PIPE SLEEVE (LINK SEAL)
19	36"W x 36"H HEAD GATE - MANUALLY OPERATED (NORMALLY OPEN)
20	16" FORCE MAIN (BY OTHERS)
21	33" S SANITARY SEWER INFLUENT MAIN

NOTE:

1. THE WET WELL LEVEL SET POINT ELEVATIONS FOR THE PUMP STATION ARE REFERENCED TO THE WET WELL FINISH FLOOR ELEVATION - 0.00'.

6.3 MGD Peak w/ 3 pumps in operation



3/8"=1'-0"

MISSION BAY PROJECT - SAN FRANCISCO, CA
MISSION BAY SANITARY SEWER PUMP STATION
PUMP STATION SECTION
AND PUMP CURVE TABLE

MAX JOB NUMBER
0334005041
SHEET 13 OF 49
M-302

CATELLUS
OWNER: FOCILAB, LLC
PROJECT MANAGER: CATELLUS URBAN CONSTRUCTION, INC.
235 CHANNEL STREET • SAN FRANCISCO, CA 94108

WINZLER & KELLY
CIVIL ENGINEERS
417 HARRIS STREET
SAN FRANCISCO, CA 94103
WWW.WKENGINEERS.COM

BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

REVISIONS
DATE
BY
APPROVED

Table 2 Distribution of Sanitary Flow in System "2"

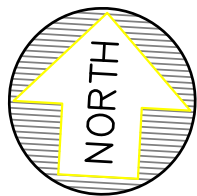
Pipe Segment U/S node	D/S node	Contributing Parcels						Average Total Inflow (gpm)	Max Total Inflow (gpm)
		Name	Perc.	Name	Perc.	Name	Perc.		
B63	B64	41	50%	21B	100%			42	125
B64	B65	21A	100%					0	0
B65	B66	18A	100%	42	100%	18B	100%	40	121
B66	B67	43	100%					31	94
B67	B68	14	100%					12	35
B59	B60	12	100%					48	143
B60	B61								
B61	B62								
B62	B68								
B68	B69								
B69	B70								
B70	B71	15A	100%					17	51
B71	B72	15B	100%					17	50
B72	B73	16A	100%					26	78
B73	B4	16B	100%					15	45
B1	B2	23A	100%	22	100%			18	54
B2	B3	20A	100%	19B	100%			31.1	93.4
B3	B4	19A	100%	17A/B	100%			66.4	199.2
B42	B43	13	100%					40.9	122.6
B43	B44								
B44	B45								
B45	B46								
B46	B47								
B47	B51								
B48	B49	5	50%					12.0	35.9
B49	B50								
B50	B51								
B51	B52								
B41	B52	3	100%					28.4	85.1
B52	B7								
B7	B6	4	100%					33.8	101.4
B53	B54	11	100%					25	74
B54	B55								
B55	B6	5	50%					12	36
B40	B6								
B6	B5								
B56	B57								
B57	B58	6	100%					34	101

Pipe Segment		Contributing Parcels						Average Total Inflow	Max Total Inflow
U/S node	D/S node	Name	Perc.	Name	Perc.	Name	Perc.	(gpm)	(gpm)
B58	B5								
B39	B5	7	100%					33.8	101.4
B5	B4								
B4	B12								
B13	B14	30	100%					27.9	83.6
B14	B16								
B16	B17								
B17	B9	27	100%					30.4	91.3
B8	B8B	29	100%	23B	100%			36.8	110.5
B8B	B9								
B9	B10								
B10	B11	20B	100%					0.0	0.0
B15	B19	28	100%	Bay1	100%			23.0	69.1
B19	B20	26A	100%	Pier 54	100%			9.2	27.6
B20	B21								
B21	B22								
B22	B11	26	100%					30.4	91.3
B33	B34	2	100%					27.4	82.2
B34	B35	1	100%	SWL337	50%			242.8	728.4
B32	B36	SWL 337	50%					183.8	551.3
B30	B31	Pier 48	100%	Pier 50	100%			109.1	327.2
B31	B36	9	100%					14.2	42.6
B36	B37	8	100%					4.3	13.0
B26	B27	9A	100%					9.0	27.1
B27	B28								
B28	B29								
B29	B37	10	100%					28.5	85.5
B37	B38								
B23	B24	10A	100%					14.8	44.4
B24	B25								
B25	B38								
B38	B11								
B11	B12								
B12	PUMP	17C	100%					15.0	45.1
Total (MGD)								2.00	6.00

Table 2 – Flow Projection Comparison

Block	INFLOW CONTRIBUTION (GPM)			
	OC Sewer Analysis 2000		W&K Sewer Analysis 2005	
	ADF	MDF	ADF	MDF
1	59.0	177.1	56.1	178.1
2	27.4	82.2	38.9	116.7
3	28.4	85.1	31.9	95.7
4	33.8	101.4	37.8	113.5
5	24.0	71.9	24.6	73.7
6	34.0	101.0	31.0	92.9
7	33.8	101.4	36.5	109.5
8	4.3	13.0	6.2	18.6
9	14.2	42.6	11.6	34.7
9A	9.0	27.1	7.3	22.0
10	28.5	85.5	38.7	116.1
10A	14.8	44.4	11.6	34.7
11	25.0	74.0	25.0	74.0
12	48.0	143.0	48.0	143.0
13	40.9	122.6	48.8	146.4
14	12.0	35.0	12.0	35.0
15A	17.0	51.0	17.0	51.0
15B	17.0	50.0	17.0	50.0
16A	26.0	78.0	26.0	78.0
16B	15.0	45.0	15.0	45.0
17A/B	40.0	121.0	24.2	72.5
17C	15.0	45.1	19.6	58.7
18A	0.0	0.0	0.0	0.0
18B	3.0	9.0	3.0	9.0
19A	26.0	78.0	29.0	87.0
19B	17.0	51.0	20.7	62.0
20A	16.5	49.5	51.5	154.4
20B	40.3	120.9		
21A	0.0	0.0	0.0	0.0
21B	22.0	64.0	19.2	57.6
22	0.0	0.0	0.0	0.0
23A	18.0	54.0	18.0	54.0
23B	0.0	0.0	0.0	0.0
26	30.4	91.3	42.8	128.3
26A	4.0	13.0	28.1	84.4
27	30.4	91.3	42.8	128.3
28	22.0	65.0	28.7	86.1
29	39.0	117.0	15.5	46.4
30	27.9	83.6	31.1	93.2
41	20.0	61.0	73.0	219.1
42	37.0	111.0		
43	31.0	94.0		
BAY 1	1.4	4.0	1.4	4.0
PIER 48	40.0	118.0	40.0	118.0
PIER 50	70.0	209.0	70.0	209.0
PIER 54	5.0	15.0	5.0	15.0
SWL 337	367.6	1102.6	367.6	1102.6
TOTAL (MGD)	2.1	6.2	2.1	6.4

Node #	Node #	Slope	Peak Flow Q=(GPM)	Existing Pipe Dia (in)	Depth of Flow (in)	Pipe Capacity Q=(GPM)	Percent Full
1	2	0.0040	143	10	3 1/4	614	32%
8	9	0.0030	394	12	5 5/8	875	47%
9	2	0.0030	429	15	5 1/4	1588	35%
2	3	0.0030	729	18	6 5/8	2580	37%
3	4	0.0030	815	21	6 1/2	3895	31%
6	7	0.0075	146	8	3	475	38%
7	4	0.0075	282	10	4	843	40%
4	5	0.0013	1836	24	12	3662	50%
10	11	0.0080	119	8	2 5/8	493	41%
11	12	0.0028	414	15	5 1/4	1535	33%
12	5	0.0020	2225	30	10 5/8	8231	35%
5	SSPS	0.0024	4120	33	13 1/2	11,629	36%



SCALE
200'

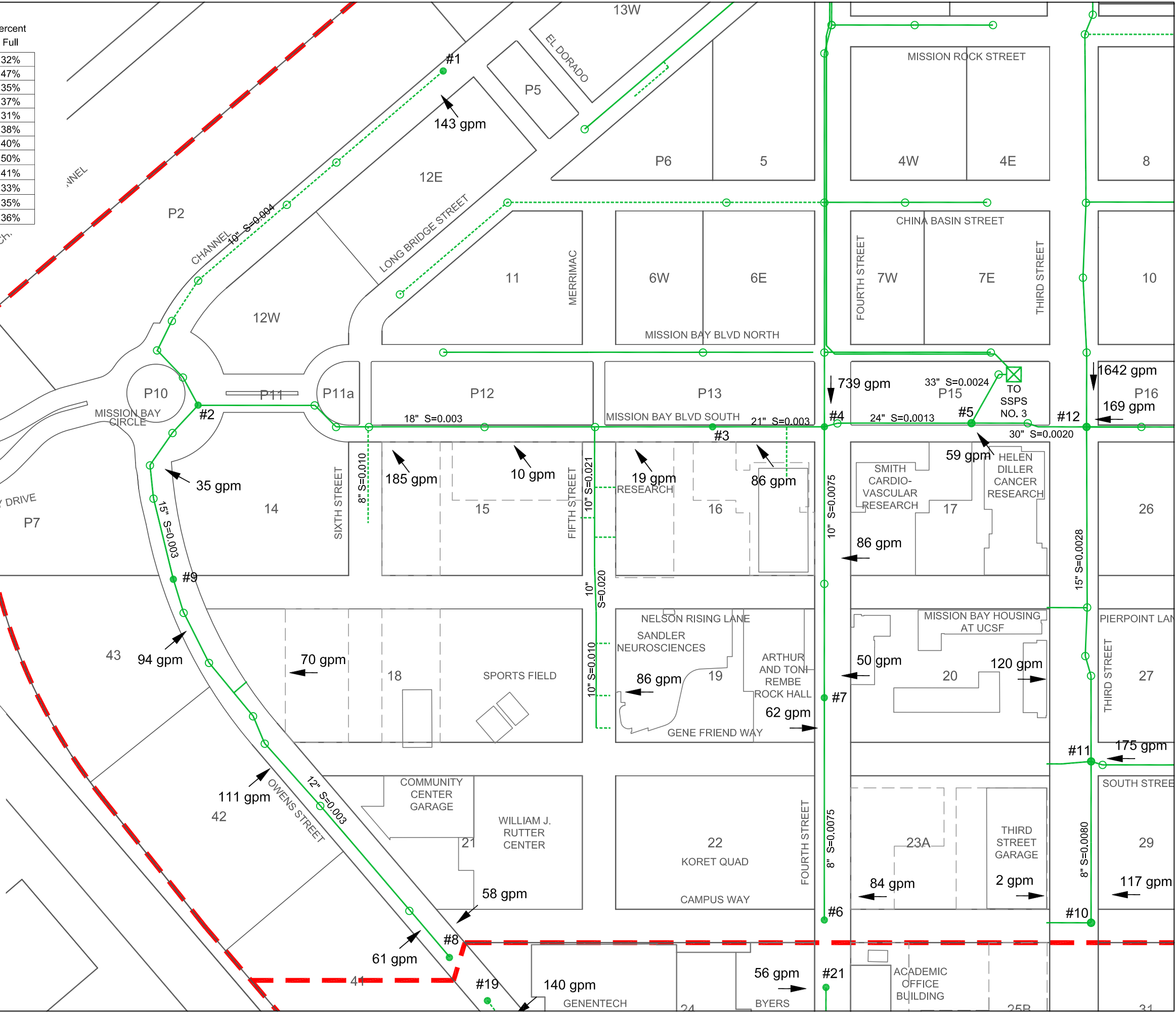
LEGEND

- CONSTRUCTED SS
- - - FUTURE SS
- ○ MANHOLE
- - - SYSTEM BOUNDARY
- - - UNPROGRAMMED BLOCK
- ▭ EXISTING BUILDING
- - - FUTURE BUILDING

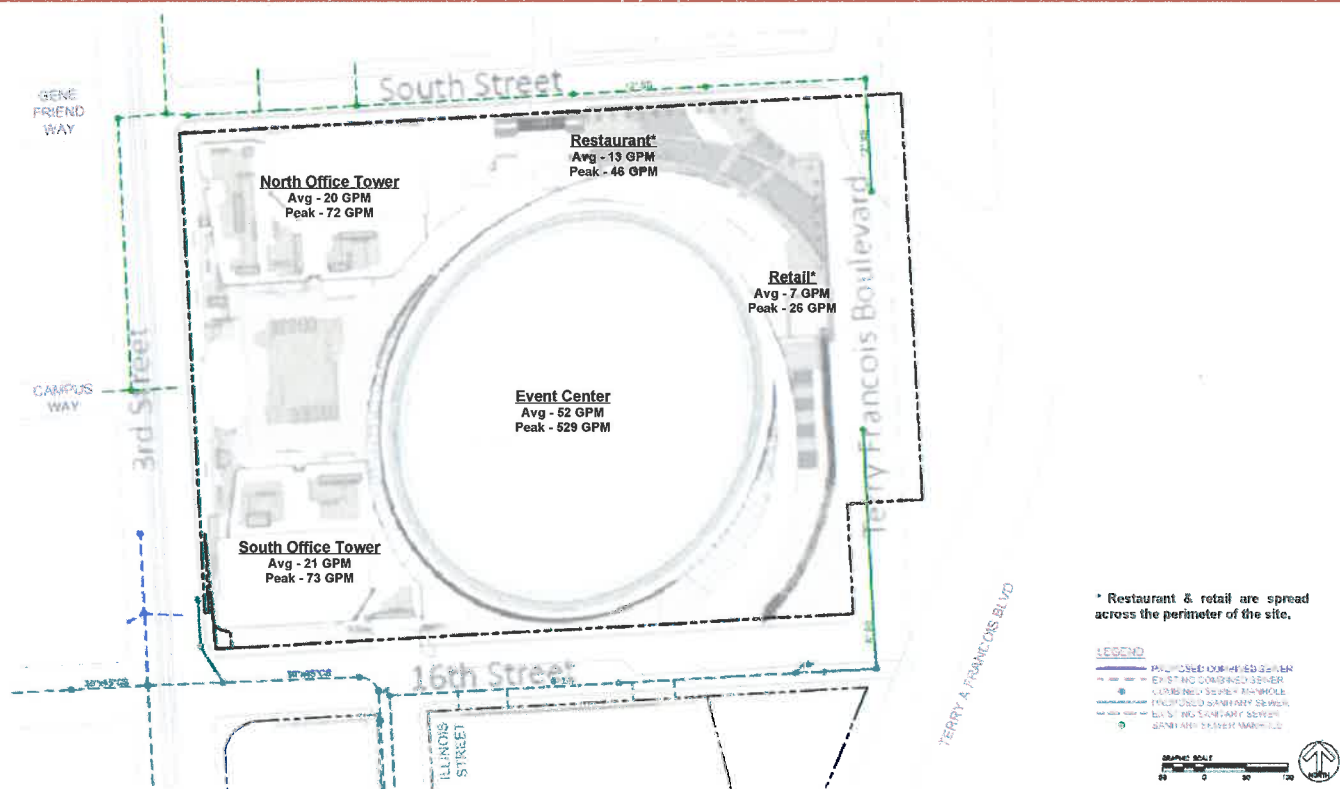
EXHIBIT 2
MISSION BAY UCSF LRDP
BLOCKS 15, 16, 18, 23, 25
SANITARY SEWER EXHIBIT



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SANITARY SEWER EXHIBIT



MANICA
ARCHITECTS

BKF
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Chart 1 - SSPS Pump Upgrade

