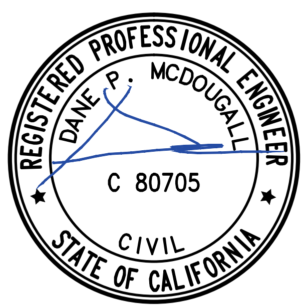
Sanitary Sewer Analysis

Evergreen – Melia Homes
APN Nos. 6115-019-042, 6115-019-043, 6115-019-044, & 6115-019-045
13615, 13619, & 13633 S. Vermont Avenue
Gardena, CA 90247

Prepared for:
Melia Homes,
8951 Research Drive
Irvine, CA 92618
(949) 759-4367

Prepared by:

C&V CONSULTING, INC.
6 Orchard, Suite 200
Lake Forest, California 92610
T. 949.916.3800
F. 949.769.3805
Contact: Dane McDougall, P.E.



Prepared April 2020
Revised May 2020
Revised June 2020

TABLE OF CONTENTS

FIGURES

APPENDICES

I. Purpose:

The purpose of this study is to analyze the existing sewer capacity of the public sewer system and to determine if the additional sewer flows generated by the proposed development will require upgrades to the existing system.

II. Introduction:

The proposed development site comprises approximately 4.145 net acres and is located at 13615, 13619, & 13633 S. Vermont Avenue in the City of Gardena, California. The site is bound by existing commercial to the north, an existing mobile home park to the south, Vermont Avenue to the east, and existing single-family residential to the west. Refer to Figure 1 for the Sanitary Sewer Analysis exhibit which identifies the project location.

The existing site is currently occupied by an existing plant nursery, an existing motel, and associated walkways, parking areas, landscaped areas, and drive aisles. Melia Homes is proposing to redevelop the site with eighty-four (84) attached condominiums. The proposed development will include landscaped open-space areas, private drive aisles, and guest and resident parking areas. The proposed site will be accessible via one proposed driveway entrance/exist along S. Vermont Avenue. Refer to the site plan within Appendix E for more information.

III. Methodology:

The existing sewer maximum flows were determined via monitoring one (1) existing manhole downstream of the proposed point of connection. Manhole monitoring was conducted by US^3 for eight (8) days. Over the duration of monitoring, flowrate, water level, and velocity measurements were taken every 15 minutes. The tabular and graphical results from the manhole monitoring are provided in Appendix B.

Maximum sewer flows generated by the proposed development were estimated using the Los Angeles County Sanitation District (LACSD) “Loadings for Each Class of Land Use” table within Appendix D. The maximum sewer demand was calculated as the product of the applicable average daily flow factor, the number of proposed units, and a peaking factor of 2.5. The proposed development was assigned an average daily flow of 195 gpd/DU to represent the demand of residential condominiums. Refer to Appendix D for the LACSD design criteria. The resulting future maximum sewer flows are tabulated in Appendix A.

In addition to the proposed development by Melia Homes, an in-progress 63-unit attached condominium development by KB Homes, the Stonefield development, will be tributary to the sanitary sewer segment in question in the future condition. The Stonefield development is not yet built-out/occupied, so the sewer monitoring results did not account for the proposed flows from this development. In order to account for these flows in the future condition flows, the Stonefield development’s number of units were referenced per the Sewer Area Study for Tract 082263, Stonefield prepared by Forma Engineering, Inc., dated August 13, 2018. The proposed flows from the Stonefield development were calculated as the product of the average daily flow factor for condominiums, the number of proposed units, and a peaking factor of 2.5. Refer to Appendix A for calculations. Refer to Appendix F for portion of the Sewer Area Study.

The total future maximum flow was determined as the sum of the monitored existing maximum flows, the estimated proposed flows for the Melia Homes development, and the estimated proposed flows for the Stonefield development by KB homes. Next, an iterative process was utilized with Manning's equation in order to find the corresponding future water level. An arbitrary water level was initially assumed and was adjusted until the future maximum flow was achieved. The resulting water level was used to determine the future depth-to-diameter ratio (d/D). Refer to Appendix A for calculations.

In order to approximate the real-world conditions of the existing pipe, a Manning's n value was calculated based on the existing maximum flow rate and maximum water level observed. For consistency, this new Manning's n-value was utilized in future water level calculations. Calculations are summarized in Appendix A.

Due to inconsistencies and possible anomaly within the monitoring results, two separate scenarios were analyzed for calculations. Upon further investigation of the existing water levels observed, it was determined that the ultimate monitored water level was an outlier and not representative of the actual pipe hydraulics. This may have been the result of temporary, partial clogging which, when unclogged, created an influx in water level. Therefore, the next highest water level (after excluding the flow disruption) was utilized for a second analysis of the monitoring results. The results of the analysis of the highest and second highest water levels are presented as Scenario #1 and Scenario #2 in Appendix A, respectively.

IV. Analysis:

Manhole #1 ~14206 S. Budlong Avenue

The proposed development will be serviced by an existing 8" vitrified clay pipe (VCP) sewer main flowing in the southerly direction within S. Budlong Avenue. The existing 8" VCP sewer is located along the street centerline of S. Budlong Avenue. The proposed project will connect to an existing sewer lateral within the existing single-family residential tract directly west of the project site which connects to the existing 8" VCP sewer main within S. Budlong Avenue approximately 690 feet southwest of the project site. Refer to the Figure 2, Sanitary Sewer Analysis Exhibit.

Per discussions with Jun De Castro at the City of Gardena, one (1) manhole along the 8" VCP sewer main within S. Budlong Avenue was selected for monitoring. The manhole selected is located approximately 1,700 feet southwest of the project site and is downstream of the point where proposed project site flows will be contributed. This manhole will be referred to as Manhole #1 within this study.

Based on the monitoring data collected by US^3, existing maximum flow for Manhole #1 was measured at 190.55 gpm (274,392 gpd). The maximum water level was measured at 4.11" (d/D = 0.51). This water level occurred during the previously mentioned irregular influx in water level. After excluding the inconsistent water level values, the next highest water level was measured at 3.61" (d/D = 0.45).

The proposed flows tributary to Manhole #1 consist of the entire Melia Homes development, (84) attached condominiums, and the entire KB Homes Stonefield development, (63) attached condominiums. Per the calculations within Appendix A, the Melia Homes development proposed maximum flows are approximately 40,950 gpd, and the KB Homes development proposed maximum flows are approximately 30,713 gpd.

Scenario #1

Scenario #1 was analyzed based on the existing maximum monitored flow and the existing measured water level. The results of Scenario #1 are summarized below:

Existing Condition (Monitored Flow)

Pipe Diameter (in)	Existing Maximum Flow (gpd)	Existing Water Level (in)	Existing d/D Ratio
8	**274,392**	4.11	0.51

Proposed Design Flows (Project Site & Stonefield Development)

Proposed Maximum Flow (gpd)		
Project Site TR 83037	Stonefield Development TR 82263	Total
40,950	30,713	**71,663**

Future Condition (Overall Total Flow)

Pipe Diameter (in)	Total Future Maximum Flow (gpd)	Future Water Level (in)	Future d/D Ratio
8	**346,055**	4.75	0.59

Scenario #2

Scenario #2 was analyzed based on the existing maximum monitored flow and the second highest existing measured water level. The results of Scenario #2 are summarized below:

Existing Condition (Monitored Flow)

Pipe Diameter (in)	Existing Maximum Flow (gpd)	Existing Water Level (in)	Existing d/D Ratio
8	**274,392**	3.61	0.45

Proposed Design Flows (Project Site & Stonefield Development)

Proposed Maximum Flow (gpd)		
Project Site TR 83037	Stonefield Development TR 82263	Total
40,950	30,713	**71,663**

Future Condition (Overall Total Flow)

Pipe Diameter (in)	Total Future Maximum Flow (gpd)	Future Water Level (in)	Future d/D Ratio
8	**346,055**	4.13	0.52

V. Conclusions:

The results from this Sanitary Sewer Analysis using methods provided by LACSD and Manning's equation demonstrate the following:

- The proposed maximum flows generated by the proposed residential development by Melia Homes and the in-progress development by KB Homes will result in an approximate 14-16% increase in flows tributary to the existing 8" VCP sewer main within S. Budlong Avenue. The water level in the pipe will increase by an amount between 0.52-0.64 inches.

- Water level results for Manhole #1 are an anomaly based on the general trend of the overall monitoring data. The abnormally high water level measured is indicative of a temporary blockage in the sewer main which dissipated within an hour. Therefore, the analysis which excluded the temporary influx values (Scenario #2) is a more appropriate estimation of actual pipe hydraulics.

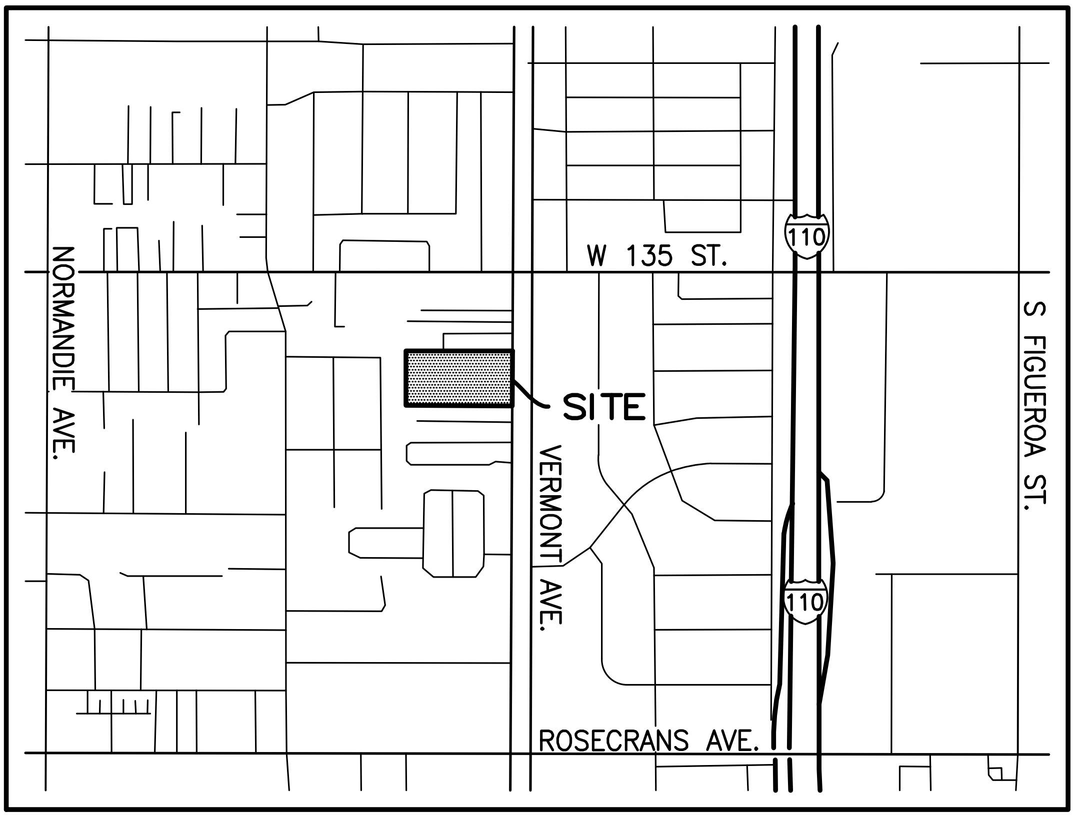
- The increase in flows tributary to the existing 8" VCP sewer main within S. Budlong Avenue is negligible, and upgrades to the existing sewer main will not be necessary to support the proposed 84-townhome residential development.

Figure 1

Vicinity Map

VICINITY MAP

VERMONT AVENUE – ROW TOWNHOMES

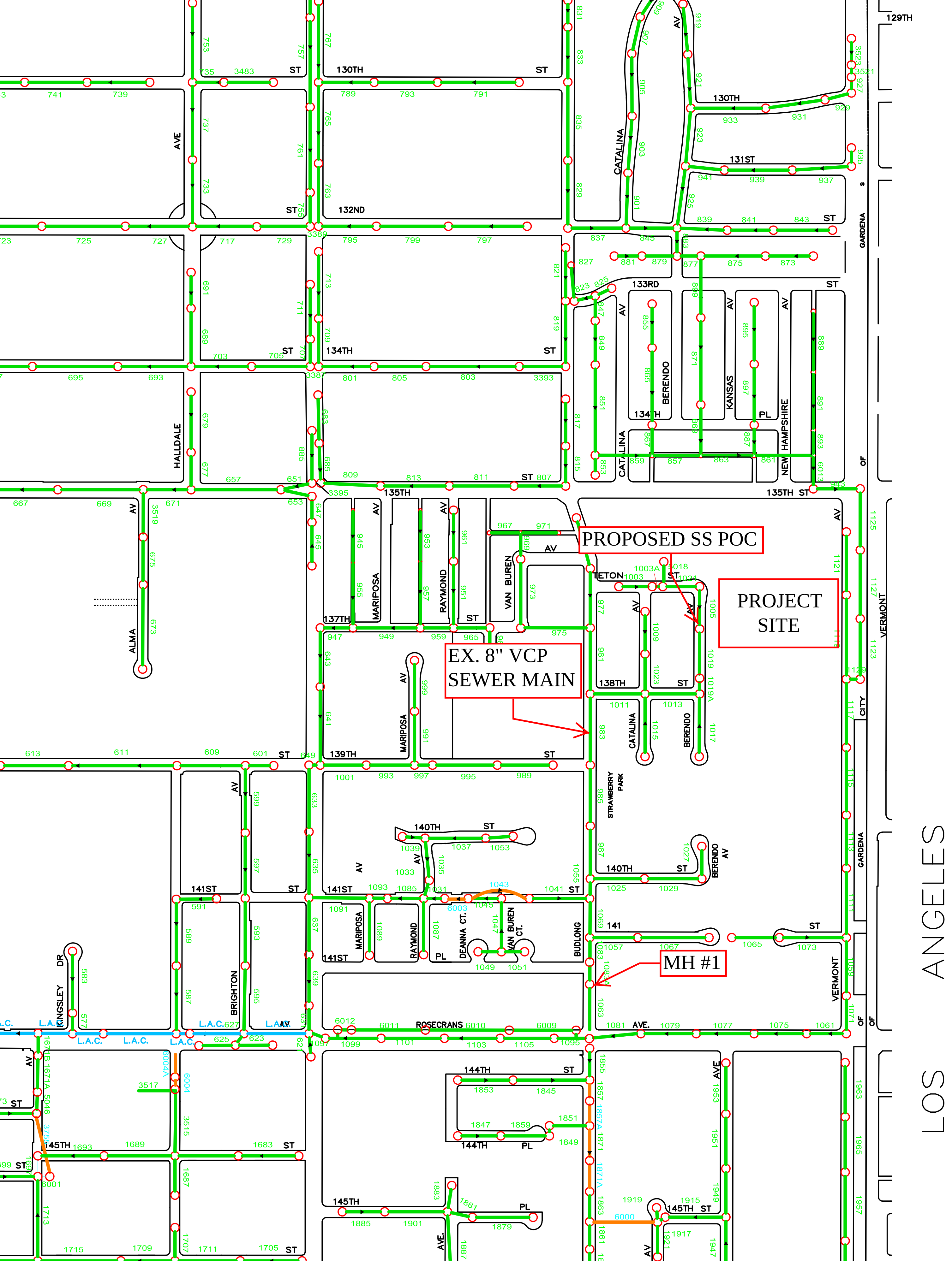


NOT TO SCALE

13615, 13619, & 13633 S. VERMONT AVENUE
GARDENA, CA 90247

Figure 2

Sanitary Sewer Analysis Exhibit


PROPOSED SS POC
PROJECT SITE
EX. 8" VCP SEWER MAIN
MH #1
LOS ANGELES
130TH ST
132ND ST
134TH ST
135TH ST
137TH ST
139TH ST
140TH ST
141ST ST
144TH ST
145TH ST
ROSECRANS AVE.
VERMONT AV
CATALINA AV
BERENDO AV
KANSAS AV
NEW HAMPSHIRE AV
VAN BUREN AV
MARIPOSA AV
RAYMOND AV
HALLDALE AVE
ALMA AV
BRIGHTON AV
KINGSLEY DR
TETON ST
131ST ST
133RD ST
STRAWBERRY PARK
DEANNA CT.
VAN BUREN CT.
BUDLONG AV
GARDENA
CITY OF GARDENA
L.A.C.

Appendix A

Calculations

Sanitary Sewer Analysis Calculation Table

Scenario #1: Existing Peak Depth of 4.11"

Monitor	As-Built Sta	Average Monitored Flow gpm	Average Monitored Flow gpd	Maximum Monitored Flow gpm	Maximum Monitored Flow gpd	Upstream Pipeline Diameter (in)	Upstream Pipeline Slope (ft/ft)	Measured Water Level Inches	Measured Water Level d/D	Calculated Manning's n	Total Future Maximum Flow Proposed Flows (gpd)	Total Future Maximum Flow Total Future Flows (gpd)	Total Future Maximum Flow Calculated Water Level (in)	Total Future Maximum Flow d/D	% Increase
14206 S. Budlong Ave. MH	2+50.00	99.38	143107	190.55	274392	8	0.0024	4.11	0.51	0.0095	71663	346055	4.75	0.59	16%

Scenario #2: Existing Peak Depth of 3.61"

Monitor	As-Built Sta	Average Monitored Flow gpm	Average Monitored Flow gpd	Maximum Monitored Flow gpm	Maximum Monitored Flow gpd	Upstream Pipeline Diameter (in)	Upstream Pipeline Slope (ft/ft)	Measured Water Level Inches	Measured Water Level d/D	Calculated Manning's n	Total Future Maximum Flow Proposed Flows (gpd)	Total Future Maximum Flow Total Future Flows (gpd)	Total Future Maximum Flow Calculated Water Level (in)	Total Future Maximum Flow d/D	% Increase
14206 S. Budlong Ave. MH	2+50.00	99.38	143107	190.55	274392	8	0.0024	3.61	0.45	0.0076	71663	346055	4.13	0.52	14%

Melia Homes Development (TR 83037) Proposed Flows

LACSD Loadings for Each Class of Land Use - Condominiums = 195 gpd/ DU

Peaking Factor = 2.5

Tributary Proposed Dwelling Units	84	DU
Avg. Future Flow Factor	195	gpd/DU
Peaking Factor	2.5	(unitless)
Future Peak Flow	40950	gpd

Stonefield Development (TR 82263) Proposed Flows

Per the Sewer Area Study for Tract 082263, Stonefield prepared by Forma Engineering, Inc., dated August 13, 2018, a proposed KB Homes 63-unit condominium development will also be tributary to the existing 8" sewer main within S. Budlong Avenue in the future.
The proposed flows from this development has been calculated below and incorporated within the, "Proposed Flows" column in the tables above and ultimately to the total future maximum flowrate. Refer to Appendix E for portions of the referenced Sewer Area Study

LACSD Loadings for Each Class of Land Use - Condominiums = 195 gpd/ DU

Peaking Factor = 2.5

Tributary Proposed Dwelling Units	63	DU
Avg. Future Flow Factor	195	gpd/DU
Peaking Factor	2.5	(unitless)
Future Peak Flow	30713	gpd

Manning's Calculator

$$Q = \frac{1.49}{n} AR^{2/3} S^{1/2}$$

Where Q = flowrate (cfs)
n = Manning's roughness coefficient (unitless)
A = flow area (sf)
R = hydraulic radius (ft)
S = slope (ft/ft)

Scenario #1: Maximum Monitored Flow w/ Maximum Water Level

Step 1: Calculate Manning's n

Mannings Equation Solved for n		
k	1.49	(unitless)
Diameter	8	in.
Diameter	0.67	ft.
Ex. Water Level	4.11	in.
Ex. Water Level	0.343	ft.
Central Angle	3.197	radians
Flow Area, A	0.181	sf
Wetter Perimeter, P	1.066	ft.
Hydraulic Radius	0.170	ft.
Channel Slope, S	0.0024	ft./ft.
Ex. Maximum Flow, Q	274392	gpd
Ex. Maximum Flow, Q	0.425	cfs
Calculated Manning's n	0.0095	(unitless)

Step 2: Calculate Future Water Level

Mannings Equation Solved for d		
k	1.49	(unitless)
Calculated Manning's n	0.0095	(unitless)
Diameter	8	in.
Diameter	0.67	ft.
Future Water Level	4.75	in.
Future Water Level	0.395	ft.
Central Angle	3.516	radians
Flow Area, A	0.216	sf
Wetter Perimeter, P	1.172	ft.
Hydraulic Radius	0.184	ft.
Channel Slope, S	0.0024	ft./ft.
Future Maximum Flow, Q	0.535	cfs
Future Maximum Flow, Q	346055	gpd

Scenario #2: Maximum Monitored Flow w/ Alternative Maximum Water Level

Step 1: Calculate Manning's n

Mannings Equation Solved for n		
k	1.49	(unitless)
Diameter	8	in.
Diameter	0.67	ft.
Ex. Water Level	3.61	in.
Ex. Water Level	0.301	ft.
Central Angle	2.946	radians
Flow Area, A	0.153	sf
Wetter Perimeter, P	0.982	ft.
Hydraulic Radius	0.156	ft.
Channel Slope, S	0.0024	ft./ft.
Ex. Maximum Flow, Q	274392	gpd
Ex. Maximum Flow, Q	0.425	cfs
Calculated Manning's n	0.0076	(unitless)

Step 2: Calculate Future Water Level

Mannings Equation Solved for d		
k	1.49	(unitless)
Calculated Manning's n	0.0076	(unitless)
Diameter	8	in.
Diameter	0.67	ft.
Future Water Level	4.13	in.
Future Water Level	0.344	ft.
Central Angle	3.207	radians
Flow Area, A	0.182	sf
Wetter Perimeter, P	1.069	ft.
Hydraulic Radius	0.170	ft.
Channel Slope, S	0.0024	ft./ft.
Future Maximum Flow, Q	0.535	cfs
Future Maximum Flow, Q	346055	gpd

Appendix B
Flow Monitoring Data

Site Report 4/03/2020

Confidential Proprietary Information

Melia Homes

2020.03 Budlong MH

MH at ~14206 S. Budlong Av
Gardena, CA 90247
MH #: Unknown

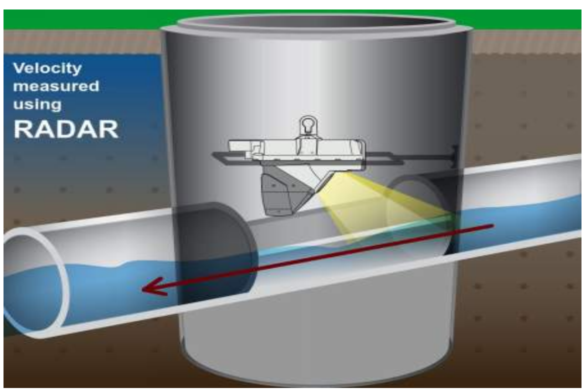
Access:
MH on centerline just south of 141st Pl

System Type:
Sanitary [X] Storm [ ]

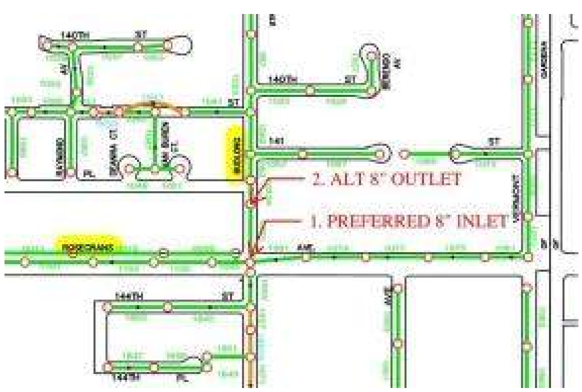
Install Date: 3/26/2020

Map

Technology



Sewer Plan



Flow Meter			
Meter Depth: 61"			
MH Coordinates: 33.902674, -118.296070			
Mild to moderate open channel hydraulics.			
Avg Velocity	Avg Measured Level		Multiplier
2.25	2.5"		1.0
Gas			
O2	H2S	CO	LEL
20.9	0	0	0

Notes
No laterals; monitored the upstream line as it provided the best hydraulics.

Traffic Safety
Used arrow board, cones & signs per site-specific CA MUTCD TC requirements.

Land Use			
Residential	Commercial	Industrial	Trunk
X			

Manhole Depth	78"
Monitored Pipe Size	8"
Inner Pipe Size (In/Out)	8"/8"
Pipe Shape	Round
Pipe Condition	Good
Manhole Material	Concrete
Silt	0"
Velocity Profile Data	*
Velocity Profile Taken	0.4 2-D
Sensor Offset	16.76"
Sensor Dist. to Crown	8.76"
Sensor Direction	Upstream
Flow Heading	South

Meter Site Document

2020.03 Budlong MH

MH at ~14206 S. Budlong Av

Gardena, CA 90247

Site

Manhole Before Install

Installation Process

Installed

Upstream

Monitored Pipe Size

Utility Systems Science and Software

Report Date: 04/03/2020
Customer: US3
Group: Gardena
Site: 2020.03 Budlong MH

Data for 2020.03 Budlong MH: 3/26/2020 thru 4/3/2020

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/03/26 08:29	2.37	37.43	0.96
2020/03/26 08:44	2.50	85.62	2.05
2020/03/26 08:59	2.41	101.94	2.56
2020/03/26 09:14	2.58	46.74	1.07
2020/03/26 09:29	2.48	71.87	1.73
2020/03/26 09:44	2.50	85.62	2.05
2020/03/26 09:59	2.48	97.43	2.35
2020/03/26 10:14	2.50	98.12	2.35
2020/03/26 10:29	2.50	98.54	2.36
2020/03/26 10:44	2.55	116.67	2.71
2020/03/26 10:59	2.68	149.72	3.26
2020/03/26 11:14	2.68	150.62	3.28
2020/03/26 11:29	2.71	160.62	3.44
2020/03/26 11:44	2.71	160.62	3.44
2020/03/26 11:59	2.66	160.21	3.51
2020/03/26 12:14	2.65	156.11	3.44
2020/03/26 12:29	2.66	150.56	3.30
2020/03/26 12:44	2.65	115.83	2.56
2020/03/26 12:59	2.64	115.00	2.56
2020/03/26 13:14	2.59	112.50	2.56
2020/03/26 13:29	2.59	114.31	2.60
2020/03/26 13:44	2.53	114.24	2.69
2020/03/26 13:59	2.59	120.07	2.73
2020/03/26 14:14	2.59	120.07	2.73
2020/03/26 14:29	2.61	136.04	3.07
2020/03/26 14:44	2.59	131.18	2.98
2020/03/26 14:59	2.59	120.07	2.73
2020/03/26 15:14	2.59	121.53	2.76
2020/03/26 15:29	2.62	133.12	2.98
2020/03/26 15:44	2.57	129.31	2.98
2020/03/26 15:59	2.57	119.72	2.76
2020/03/26 16:14	2.57	119.72	2.76
2020/03/26 16:29	2.54	131.67	3.08
2020/03/26 16:44	2.54	107.36	2.51
2020/03/26 16:59	2.51	105.69	2.51
2020/03/26 17:14	2.54	127.99	3.00
2020/03/26 17:29	2.54	131.67	3.08
2020/03/26 17:44	2.58	140.14	3.21
2020/03/26 17:59	2.61	142.15	3.21

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/03/26 18:14	2.61	142.15	3.21
2020/03/26 18:29	2.58	139.51	3.19
2020/03/26 18:44	2.55	128.26	2.98
2020/03/26 18:59	2.55	128.26	2.98
2020/03/26 19:14	2.55	128.26	2.98
2020/03/26 19:29	2.64	147.29	3.27
2020/03/26 19:44	2.64	147.29	3.27
2020/03/26 19:59	2.64	147.29	3.27
2020/03/26 20:14	2.59	137.64	3.13
2020/03/26 20:29	2.59	137.64	3.13
2020/03/26 20:44	2.58	136.67	3.13
2020/03/26 20:59	2.57	135.62	3.13
2020/03/26 21:14	2.54	85.42	2.00
2020/03/26 21:29	2.54	135.42	3.17
2020/03/26 21:44	2.54	113.19	2.65
2020/03/26 21:59	2.54	112.92	2.64
2020/03/26 22:14	2.66	120.62	2.64
2020/03/26 22:29	3.07	146.11	2.64
2020/03/26 22:44	3.07	135.76	2.46
2020/03/26 22:59	3.09	130.35	2.33
2020/03/26 23:14	3.09	130.35	2.33
2020/03/26 23:29	3.09	120.14	2.15
2020/03/26 23:44	3.01	95.28	1.77
2020/03/26 23:59	2.98	94.10	1.77
2020/03/27 00:14	2.96	104.10	1.98
2020/03/27 00:29	2.89	100.76	1.98
2020/03/27 00:44	2.71	92.29	1.98
2020/03/27 00:59	2.66	92.71	2.03
2020/03/27 01:14	2.66	90.35	1.98
2020/03/27 01:29	2.47	76.81	1.87
2020/03/27 01:44	2.28	64.65	1.76
2020/03/27 01:59	2.21	50.00	1.42
2020/03/27 02:14	2.19	47.01	1.35
2020/03/27 02:29	2.07	41.46	1.29
2020/03/27 02:44	2.05	41.04	1.29
2020/03/27 02:59	2.04	38.40	1.22
2020/03/27 03:14	1.97	33.12	1.10
2020/03/27 03:29	1.97	33.12	1.10
2020/03/27 03:44	1.97	38.68	1.29
2020/03/27 03:59	1.97	30.49	1.02
2020/03/27 04:14	2.01	40.14	1.30
2020/03/27 04:29	2.03	44.86	1.44
2020/03/27 04:44	2.04	40.90	1.30
2020/03/27 04:59	2.03	31.46	1.01
2020/03/27 05:14	2.04	32.15	1.02

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/03/27 05:29	2.11	33.75	1.02
2020/03/27 05:44	2.11	33.75	1.02
2020/03/27 05:59	2.11	33.75	1.02
2020/03/27 06:14	2.39	58.33	1.49
2020/03/27 06:29	2.62	84.58	1.89
2020/03/27 06:44	2.62	84.58	1.89
2020/03/27 06:59	2.62	73.12	1.64
2020/03/27 07:14	2.62	84.58	1.89
2020/03/27 07:29	2.66	74.86	1.64
2020/03/27 07:44	2.94	85.69	1.64
2020/03/27 07:59	2.94	85.69	1.64
2020/03/27 08:14	2.94	103.89	1.99
2020/03/27 08:29	2.90	101.94	1.99
2020/03/27 08:44	2.84	125.07	2.51
2020/03/27 08:59	2.84	99.31	1.99
2020/03/27 09:14	2.78	95.97	1.99
2020/03/27 09:29	2.78	88.40	1.83
2020/03/27 09:44	3.12	80.28	1.42
2020/03/27 09:59	3.12	80.28	1.42
2020/03/27 10:14	2.78	68.33	1.42
2020/03/27 10:29	2.78	68.33	1.42
2020/03/27 10:44	2.78	92.29	1.91
2020/03/27 10:59	2.78	109.31	2.26
2020/03/27 11:14	2.66	87.29	1.91
2020/03/27 11:29	2.66	111.53	2.44
2020/03/27 11:44	2.68	112.29	2.44
2020/03/27 11:59	2.69	80.07	1.73
2020/03/27 12:14	2.69	80.07	1.73
2020/03/27 12:29	2.83	105.07	2.12
2020/03/27 12:44	2.93	110.00	2.12
2020/03/27 12:59	2.97	112.08	2.12
2020/03/27 13:14	2.97	112.08	2.12
2020/03/27 13:29	2.93	96.81	1.86
2020/03/27 13:44	2.87	94.31	1.86
2020/03/27 13:59	2.76	89.37	1.86
2020/03/27 14:14	2.71	110.62	2.37
2020/03/27 14:29	2.71	126.67	2.72
2020/03/27 14:44	2.71	126.67	2.72
2020/03/27 14:59	2.68	148.06	3.22
2020/03/27 15:14	2.58	140.69	3.22
2020/03/27 15:29	2.68	148.06	3.22
2020/03/27 15:44	2.57	117.57	2.71
2020/03/27 15:59	2.68	149.72	3.26
2020/03/27 16:14	2.64	145.90	3.24
2020/03/27 16:29	2.64	145.90	3.24

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/03/27 16:44	2.64	113.96	2.53
2020/03/27 16:59	2.64	145.90	3.24
2020/03/27 17:14	2.64	145.90	3.24
2020/03/27 17:29	2.64	113.96	2.53
2020/03/27 17:44	2.64	137.99	3.07
2020/03/27 17:59	2.75	146.04	3.07
2020/03/27 18:14	2.61	136.04	3.07
2020/03/27 18:29	2.61	110.83	2.50
2020/03/27 18:44	2.75	139.72	2.93
2020/03/27 18:59	2.86	104.58	2.08
2020/03/27 19:14	2.87	105.28	2.08
2020/03/27 19:29	2.87	103.19	2.04
2020/03/27 19:44	2.87	73.19	1.45
2020/03/27 19:59	2.87	73.19	1.45
2020/03/27 20:14	2.75	68.89	1.45
2020/03/27 20:29	2.61	87.15	1.97
2020/03/27 20:44	2.61	106.67	2.40
2020/03/27 20:59	2.58	112.85	2.58
2020/03/27 21:14	2.47	101.32	2.46
2020/03/27 21:29	2.47	101.32	2.46
2020/03/27 21:44	2.47	101.32	2.46
2020/03/27 21:59	2.47	100.83	2.45
2020/03/27 22:14	3.01	126.81	2.35
2020/03/27 22:29	3.07	121.18	2.19
2020/03/27 22:44	3.14	124.93	2.19
2020/03/27 22:59	3.14	133.96	2.35
2020/03/27 23:14	3.07	138.26	2.50
2020/03/27 23:29	3.04	136.53	2.50
2020/03/27 23:44	3.04	136.53	2.50
2020/03/27 23:59	3.04	139.65	2.56
2020/03/28 00:14	3.02	122.50	2.26
2020/03/28 00:29	3.00	113.96	2.13
2020/03/28 00:44	2.94	101.11	1.93
2020/03/28 00:59	2.91	99.79	1.93
2020/03/28 01:14	2.80	94.65	1.93
2020/03/28 01:29	2.50	75.62	1.81
2020/03/28 01:44	2.44	73.33	1.81
2020/03/28 01:59	2.36	51.11	1.32
2020/03/28 02:14	2.30	49.44	1.32
2020/03/28 02:29	2.22	43.96	1.24
2020/03/28 02:44	2.19	30.49	0.87
2020/03/28 02:59	2.19	30.49	0.87
2020/03/28 03:14	2.19	34.10	0.98
2020/03/28 03:29	2.18	33.68	0.98
2020/03/28 03:44	2.19	34.10	0.98

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/03/28 03:59	2.16	33.47	0.98
2020/03/28 04:14	2.16	46.74	1.37
2020/03/28 04:29	2.25	35.21	0.98
2020/03/28 04:44	2.25	44.72	1.24
2020/03/28 04:59	2.22	43.96	1.24
2020/03/28 05:14	2.22	46.81	1.32
2020/03/28 05:29	2.22	43.96	1.24
2020/03/28 05:44	2.22	45.76	1.29
2020/03/28 05:59	2.22	46.81	1.32
2020/03/28 06:14	2.22	48.61	1.37
2020/03/28 06:29	2.28	54.24	1.48
2020/03/28 06:44	2.29	58.82	1.59
2020/03/28 06:59	2.29	58.82	1.59
2020/03/28 07:14	2.29	60.69	1.64
2020/03/28 07:29	2.36	75.07	1.95
2020/03/28 07:44	2.69	96.67	2.09
2020/03/28 07:59	2.79	107.99	2.22
2020/03/28 08:14	2.79	107.99	2.22
2020/03/28 08:29	2.79	101.46	2.09
2020/03/28 08:44	2.79	101.46	2.09
2020/03/28 08:59	2.47	83.68	2.03
2020/03/28 09:14	2.47	57.99	1.41
2020/03/28 09:29	2.47	57.99	1.41
2020/03/28 09:44	2.53	97.15	2.29
2020/03/28 09:59	2.53	97.15	2.29
2020/03/28 10:14	2.54	101.25	2.37
2020/03/28 10:29	2.54	137.36	3.22
2020/03/28 10:44	2.55	138.40	3.22
2020/03/28 10:59	2.57	139.44	3.22
2020/03/28 11:14	2.62	143.61	3.22
2020/03/28 11:29	2.62	122.92	2.75
2020/03/28 11:44	2.62	122.92	2.75
2020/03/28 11:59	2.62	152.22	3.41
2020/03/28 12:14	2.66	155.56	3.41
2020/03/28 12:29	2.68	156.67	3.41
2020/03/28 12:44	2.69	170.00	3.67
2020/03/28 12:59	2.69	171.32	3.70
2020/03/28 13:14	2.69	170.00	3.67
2020/03/28 13:29	2.69	170.00	3.67
2020/03/28 13:44	2.69	170.00	3.67
2020/03/28 13:59	2.69	171.32	3.70
2020/03/28 14:14	2.69	171.94	3.71
2020/03/28 14:29	2.73	175.56	3.71
2020/03/28 14:44	2.73	176.94	3.74
2020/03/28 14:59	2.73	176.94	3.74

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/03/28 15:14	2.69	124.24	2.68
2020/03/28 15:29	2.61	95.62	2.16
2020/03/28 15:44	2.61	95.62	2.16
2020/03/28 15:59	2.57	88.82	2.05
2020/03/28 16:14	2.57	82.08	1.89
2020/03/28 16:29	2.57	88.82	2.05
2020/03/28 16:44	2.55	97.57	2.27
2020/03/28 16:59	2.48	72.50	1.75
2020/03/28 17:14	2.48	89.65	2.16
2020/03/28 17:29	2.48	89.65	2.16
2020/03/28 17:44	2.41	71.67	1.80
2020/03/28 17:59	2.41	71.67	1.80
2020/03/28 18:14	2.43	86.94	2.16
2020/03/28 18:29	2.43	114.65	2.86
2020/03/28 18:44	2.53	121.11	2.86
2020/03/28 18:59	2.53	121.11	2.86
2020/03/28 19:14	2.61	113.26	2.55
2020/03/28 19:29	2.61	112.01	2.53
2020/03/28 19:44	2.53	107.08	2.53
2020/03/28 19:59	2.51	107.50	2.55
2020/03/28 20:14	2.51	121.32	2.88
2020/03/28 20:29	2.51	121.32	2.88
2020/03/28 20:44	2.48	123.96	2.99
2020/03/28 20:59	2.48	119.44	2.88
2020/03/28 21:14	2.48	115.07	2.78
2020/03/28 21:29	2.48	115.07	2.78
2020/03/28 21:44	2.48	80.07	1.93
2020/03/28 21:59	2.51	81.32	1.93
2020/03/28 22:14	2.51	92.57	2.20
2020/03/28 22:29	2.55	112.01	2.60
2020/03/28 22:44	2.55	94.65	2.20
2020/03/28 22:59	3.04	131.11	2.40
2020/03/28 23:14	3.04	131.11	2.40
2020/03/28 23:29	3.01	80.21	1.49
2020/03/28 23:44	3.01	80.21	1.49
2020/03/28 23:59	3.01	80.21	1.49
2020/03/29 00:14	3.00	75.97	1.42
2020/03/29 00:29	3.00	75.83	1.41
2020/03/29 00:44	2.87	62.64	1.24
2020/03/29 00:59	2.69	57.29	1.24
2020/03/29 01:14	2.47	50.90	1.24
2020/03/29 01:29	2.43	62.50	1.56
2020/03/29 01:44	2.37	61.32	1.58
2020/03/29 01:59	2.25	60.14	1.67
2020/03/29 02:14	2.23	62.01	1.73

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/03/29 02:29	2.15	53.47	1.58
2020/03/29 02:44	2.15	53.47	1.58
2020/03/29 02:59	2.14	46.60	1.39
2020/03/29 03:14	2.12	38.47	1.16
2020/03/29 03:29	1.98	35.00	1.16
2020/03/29 03:44	1.98	35.00	1.16
2020/03/29 03:59	1.98	40.14	1.33
2020/03/29 04:14	1.98	40.14	1.33
2020/03/29 04:29	1.98	40.14	1.33
2020/03/29 04:44	1.98	29.72	0.98
2020/03/29 04:59	1.98	28.75	0.95
2020/03/29 05:14	1.98	28.75	0.95
2020/03/29 05:29	2.00	29.24	0.96
2020/03/29 05:44	2.03	30.62	0.98
2020/03/29 05:59	2.04	31.46	1.00
2020/03/29 06:14	2.11	53.06	1.61
2020/03/29 06:29	2.11	53.06	1.61
2020/03/29 06:44	2.11	53.06	1.61
2020/03/29 06:59	2.11	53.06	1.61
2020/03/29 07:14	2.11	53.06	1.61
2020/03/29 07:29	2.41	64.10	1.61
2020/03/29 07:44	2.65	72.92	1.61
2020/03/29 07:59	2.65	77.43	1.71
2020/03/29 08:14	2.75	89.58	1.88
2020/03/29 08:29	2.76	91.53	1.91
2020/03/29 08:44	2.96	100.42	1.91
2020/03/29 08:59	3.00	103.26	1.93
2020/03/29 09:14	3.12	108.12	1.91
2020/03/29 09:29	3.12	109.10	1.93
2020/03/29 09:44	3.12	126.94	2.24
2020/03/29 09:59	3.12	150.69	2.66
2020/03/29 10:14	3.21	156.11	2.66
2020/03/29 10:29	3.11	155.97	2.77
2020/03/29 10:44	3.18	154.31	2.66
2020/03/29 10:59	3.21	156.11	2.66
2020/03/29 11:14	3.18	133.68	2.31
2020/03/29 11:29	2.82	113.61	2.31
2020/03/29 11:44	2.82	113.61	2.31
2020/03/29 11:59	2.80	149.93	3.06
2020/03/29 12:14	2.80	159.86	3.27
2020/03/29 12:29	2.80	159.86	3.27
2020/03/29 12:44	2.86	164.17	3.27
2020/03/29 12:59	2.86	161.94	3.22
2020/03/29 13:14	2.89	158.19	3.11
2020/03/29 13:29	2.89	148.82	2.92

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/03/29 13:44	2.93	132.64	2.55
2020/03/29 13:59	2.93	124.17	2.39
2020/03/29 14:14	2.89	130.07	2.55
2020/03/29 14:29	2.89	148.82	2.92
2020/03/29 14:44	2.83	143.47	2.89
2020/03/29 14:59	2.83	143.47	2.89
2020/03/29 15:14	2.89	147.36	2.89
2020/03/29 15:29	2.89	145.07	2.85
2020/03/29 15:44	2.87	144.17	2.85
2020/03/29 15:59	3.00	132.01	2.46
2020/03/29 16:14	3.00	131.60	2.46
2020/03/29 16:29	2.96	93.33	1.77
2020/03/29 16:44	3.01	132.43	2.46
2020/03/29 16:59	3.01	132.43	2.46
2020/03/29 17:14	2.96	129.10	2.46
2020/03/29 17:29	2.96	120.35	2.29
2020/03/29 17:44	2.97	121.11	2.29
2020/03/29 17:59	2.97	121.11	2.29
2020/03/29 18:14	3.07	126.53	2.29
2020/03/29 18:29	3.09	132.85	2.37
2020/03/29 18:44	3.09	132.85	2.37
2020/03/29 18:59	3.09	132.85	2.37
2020/03/29 19:14	3.26	134.17	2.24
2020/03/29 19:29	4.09	140.83	1.75
2020/03/29 19:44	4.09	140.83	1.75
2020/03/29 19:59	4.11	169.37	2.09
2020/03/29 20:14	4.11	169.37	2.09
2020/03/29 20:29	3.71	148.40	2.09
2020/03/29 20:44	3.66	184.93	2.64
2020/03/29 20:59	2.57	120.00	2.77
2020/03/29 21:14	2.53	125.69	2.96
2020/03/29 21:29	2.53	125.69	2.96
2020/03/29 21:44	2.57	128.26	2.96
2020/03/29 21:59	2.57	128.26	2.96
2020/03/29 22:14	2.57	128.26	2.96
2020/03/29 22:29	2.57	115.69	2.67
2020/03/29 22:44	2.44	77.01	1.90
2020/03/29 22:59	2.44	77.01	1.90
2020/03/29 23:14	2.40	74.10	1.87
2020/03/29 23:29	2.40	64.72	1.64
2020/03/29 23:44	2.47	67.36	1.64
2020/03/29 23:59	2.51	68.89	1.64
2020/03/30 00:14	2.65	74.24	1.64
2020/03/30 00:29	2.65	74.24	1.64
2020/03/30 00:44	2.57	83.89	1.93

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/03/30 00:59	2.51	68.82	1.64
2020/03/30 01:14	2.33	64.72	1.71
2020/03/30 01:29	2.22	57.99	1.64
2020/03/30 01:44	2.19	57.01	1.64
2020/03/30 01:59	2.19	57.01	1.64
2020/03/30 02:14	2.18	37.43	1.08
2020/03/30 02:29	2.15	36.81	1.08
2020/03/30 02:44	2.15	36.81	1.08
2020/03/30 02:59	2.14	32.36	0.96
2020/03/30 03:14	2.14	32.36	0.96
2020/03/30 03:29	2.14	38.89	1.16
2020/03/30 03:44	2.11	29.58	0.90
2020/03/30 03:59	2.08	37.43	1.16
2020/03/30 04:14	2.08	37.43	1.16
2020/03/30 04:29	2.12	38.54	1.16
2020/03/30 04:44	2.12	42.15	1.27
2020/03/30 04:59	2.14	42.57	1.27
2020/03/30 05:14	2.15	42.92	1.27
2020/03/30 05:29	2.21	44.51	1.27
2020/03/30 05:44	2.26	36.67	1.01
2020/03/30 05:59	2.36	38.89	1.01
2020/03/30 06:14	2.36	46.74	1.21
2020/03/30 06:29	2.36	46.74	1.21
2020/03/30 06:44	2.66	62.50	1.37
2020/03/30 06:59	2.66	64.93	1.42
2020/03/30 07:14	2.66	66.11	1.45
2020/03/30 07:29	2.41	84.93	2.13
2020/03/30 07:44	2.41	88.75	2.23
2020/03/30 07:59	2.39	95.56	2.44
2020/03/30 08:14	2.32	91.74	2.44
2020/03/30 08:29	2.39	115.42	2.94
2020/03/30 08:44	2.39	115.42	2.94
2020/03/30 08:59	2.39	115.42	2.94
2020/03/30 09:14	2.39	115.42	2.94
2020/03/30 09:29	2.40	116.39	2.94
2020/03/30 09:44	2.43	118.61	2.95
2020/03/30 09:59	2.43	125.42	3.12
2020/03/30 10:14	2.44	118.96	2.94
2020/03/30 10:29	2.44	126.39	3.12
2020/03/30 10:44	2.44	127.99	3.16
2020/03/30 10:59	2.55	138.61	3.22
2020/03/30 11:14	2.55	138.61	3.22
2020/03/30 11:29	2.59	141.94	3.22
2020/03/30 11:44	2.59	141.94	3.22
2020/03/30 11:59	2.66	130.35	2.86

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/03/30 12:14	2.66	129.24	2.83
2020/03/30 12:29	2.66	129.24	2.83
2020/03/30 12:44	2.62	126.46	2.83
2020/03/30 12:59	2.62	126.46	2.83
2020/03/30 13:14	2.62	126.46	2.83
2020/03/30 13:29	2.58	137.29	3.14
2020/03/30 13:44	2.57	136.32	3.14
2020/03/30 13:59	2.57	112.57	2.60
2020/03/30 14:14	2.48	88.54	2.14
2020/03/30 14:29	2.48	88.54	2.14
2020/03/30 14:44	2.48	88.54	2.14
2020/03/30 14:59	2.47	133.12	3.24
2020/03/30 15:14	2.51	142.92	3.40
2020/03/30 15:29	2.54	147.08	3.44
2020/03/30 15:44	2.57	149.31	3.44
2020/03/30 15:59	2.54	138.33	3.24
2020/03/30 16:14	2.54	109.93	2.57
2020/03/30 16:29	2.50	100.90	2.42
2020/03/30 16:44	2.48	98.96	2.39
2020/03/30 16:59	2.46	78.96	1.93
2020/03/30 17:14	2.48	98.96	2.39
2020/03/30 17:29	2.48	98.96	2.39
2020/03/30 17:44	2.50	108.40	2.60
2020/03/30 17:59	2.58	127.29	2.91
2020/03/30 18:14	2.58	127.29	2.91
2020/03/30 18:29	2.58	136.04	3.11
2020/03/30 18:44	2.58	127.29	2.91
2020/03/30 18:59	2.58	136.04	3.11
2020/03/30 19:14	2.68	118.54	2.58
2020/03/30 19:29	2.68	118.54	2.58
2020/03/30 19:44	2.61	114.37	2.58
2020/03/30 19:59	2.61	116.60	2.63
2020/03/30 20:14	2.61	116.60	2.63
2020/03/30 20:29	2.61	124.86	2.82
2020/03/30 20:44	2.57	136.18	3.14
2020/03/30 20:59	2.57	142.64	3.29
2020/03/30 21:14	2.57	142.64	3.29
2020/03/30 21:29	2.57	142.64	3.29
2020/03/30 21:44	2.57	138.40	3.19
2020/03/30 21:59	2.50	108.82	2.60
2020/03/30 22:14	2.50	108.82	2.60
2020/03/30 22:29	2.50	104.24	2.50
2020/03/30 22:44	2.50	108.40	2.60
2020/03/30 22:59	2.64	116.81	2.60
2020/03/30 23:14	3.16	143.19	2.48

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/03/30 23:29	3.16	132.64	2.30
2020/03/30 23:44	3.16	140.14	2.43
2020/03/30 23:59	2.98	122.57	2.30
2020/03/31 00:14	2.90	117.92	2.30
2020/03/31 00:29	2.89	112.92	2.22
2020/03/31 00:44	2.87	86.53	1.71
2020/03/31 00:59	2.72	80.35	1.71
2020/03/31 01:14	2.36	60.69	1.57
2020/03/31 01:29	2.36	60.69	1.57
2020/03/31 01:44	2.36	60.69	1.57
2020/03/31 01:59	2.33	61.39	1.62
2020/03/31 02:14	2.30	49.58	1.33
2020/03/31 02:29	2.21	56.87	1.62
2020/03/31 02:44	2.19	46.25	1.33
2020/03/31 02:59	2.18	45.83	1.33
2020/03/31 03:14	2.18	45.83	1.33
2020/03/31 03:29	2.19	37.50	1.08
2020/03/31 03:44	2.19	37.50	1.08
2020/03/31 03:59	2.15	36.11	1.07
2020/03/31 04:14	2.14	39.72	1.18
2020/03/31 04:29	2.14	33.82	1.01
2020/03/31 04:44	2.05	35.21	1.11
2020/03/31 04:59	2.05	35.21	1.11
2020/03/31 05:14	2.15	40.07	1.18
2020/03/31 05:29	2.29	47.92	1.29
2020/03/31 05:44	2.34	51.94	1.36
2020/03/31 05:59	2.40	61.11	1.55
2020/03/31 06:14	2.40	61.11	1.55
2020/03/31 06:29	2.43	62.08	1.55
2020/03/31 06:44	2.43	38.61	0.96
2020/03/31 06:59	2.47	39.51	0.96
2020/03/31 07:14	2.73	45.49	0.96
2020/03/31 07:29	2.73	59.17	1.25
2020/03/31 07:44	2.73	59.17	1.25
2020/03/31 07:59	2.66	77.15	1.69
2020/03/31 08:14	2.79	85.76	1.76
2020/03/31 08:29	2.66	81.87	1.79
2020/03/31 08:44	2.66	102.01	2.23
2020/03/31 08:59	2.43	89.72	2.23
2020/03/31 09:14	2.43	107.36	2.67
2020/03/31 09:29	2.40	109.37	2.77
2020/03/31 09:44	2.43	114.31	2.85
2020/03/31 09:59	2.43	114.31	2.85
2020/03/31 10:14	2.44	115.21	2.85
2020/03/31 10:29	2.40	109.51	2.77

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/03/31 10:44	2.40	88.40	2.24
2020/03/31 10:59	2.40	88.40	2.24
2020/03/31 11:14	2.43	89.86	2.24
2020/03/31 11:29	2.39	87.71	2.24
2020/03/31 11:44	2.41	110.90	2.78
2020/03/31 11:59	2.43	126.67	3.15
2020/03/31 12:14	2.41	114.72	2.88
2020/03/31 12:29	2.41	127.92	3.21
2020/03/31 12:44	2.53	136.18	3.21
2020/03/31 12:59	2.53	122.08	2.88
2020/03/31 13:14	2.53	104.03	2.45
2020/03/31 13:29	2.53	104.03	2.45
2020/03/31 13:44	2.51	103.26	2.45
2020/03/31 13:59	2.46	125.21	3.07
2020/03/31 14:14	2.46	125.21	3.07
2020/03/31 14:29	2.48	130.21	3.14
2020/03/31 14:44	2.48	130.21	3.14
2020/03/31 14:59	2.58	137.29	3.14
2020/03/31 15:14	2.58	142.92	3.27
2020/03/31 15:29	2.58	143.89	3.29
2020/03/31 15:44	2.61	149.93	3.38
2020/03/31 15:59	2.58	147.71	3.38
2020/03/31 16:14	2.55	145.56	3.38
2020/03/31 16:29	2.55	139.72	3.25
2020/03/31 16:44	2.55	139.72	3.25
2020/03/31 16:59	2.54	101.39	2.37
2020/03/31 17:14	2.54	101.39	2.37
2020/03/31 17:29	2.54	119.79	2.80
2020/03/31 17:44	2.54	119.79	2.80
2020/03/31 17:59	2.54	119.79	2.80
2020/03/31 18:14	2.54	119.79	2.80
2020/03/31 18:29	2.55	128.89	2.99
2020/03/31 18:44	2.61	132.78	2.99
2020/03/31 18:59	2.55	128.89	2.99
2020/03/31 19:14	2.61	132.78	2.99
2020/03/31 19:29	2.64	134.72	2.99
2020/03/31 19:44	2.64	120.62	2.68
2020/03/31 19:59	2.68	129.24	2.81
2020/03/31 20:14	2.68	129.24	2.81
2020/03/31 20:29	2.64	126.46	2.81
2020/03/31 20:44	2.64	137.92	3.06
2020/03/31 20:59	2.65	148.68	3.28
2020/03/31 21:14	2.64	164.51	3.66
2020/03/31 21:29	2.64	164.51	3.66
2020/03/31 21:44	2.64	161.04	3.58

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/03/31 21:59	2.59	157.57	3.58
2020/03/31 22:14	2.50	148.82	3.56
2020/03/31 22:29	2.46	138.89	3.40
2020/03/31 22:44	2.36	112.22	2.91
2020/03/31 22:59	2.36	103.47	2.68
2020/03/31 23:14	2.36	103.47	2.68
2020/03/31 23:29	2.40	105.97	2.68
2020/03/31 23:44	2.40	92.64	2.34
2020/03/31 23:59	2.44	91.18	2.25
2020/04/01 00:14	2.46	91.87	2.25
2020/04/01 00:29	2.50	77.92	1.87
2020/04/01 00:44	2.68	85.83	1.87
2020/04/01 00:59	2.68	90.14	1.96
2020/04/01 01:14	2.68	90.97	1.98
2020/04/01 01:29	2.66	89.51	1.96
2020/04/01 01:44	2.64	88.26	1.96
2020/04/01 01:59	2.54	80.90	1.89
2020/04/01 02:14	2.33	48.75	1.28
2020/04/01 02:29	2.33	43.75	1.15
2020/04/01 02:44	2.18	39.17	1.14
2020/04/01 02:59	2.16	37.15	1.09
2020/04/01 03:14	2.16	37.15	1.09
2020/04/01 03:29	2.16	24.65	0.72
2020/04/01 03:44	2.16	32.85	0.96
2020/04/01 03:59	2.14	30.62	0.91
2020/04/01 04:14	2.12	31.94	0.96
2020/04/01 04:29	2.12	31.94	0.96
2020/04/01 04:44	2.12	31.94	0.96
2020/04/01 04:59	2.23	39.65	1.11
2020/04/01 05:14	2.25	41.67	1.16
2020/04/01 05:29	2.26	43.33	1.19
2020/04/01 05:44	2.46	66.74	1.64
2020/04/01 05:59	2.55	77.64	1.80
2020/04/01 06:14	2.61	84.72	1.91
2020/04/01 06:29	2.66	82.36	1.80
2020/04/01 06:44	2.68	88.12	1.92
2020/04/01 06:59	2.78	92.50	1.92
2020/04/01 07:14	2.78	92.50	1.92
2020/04/01 07:29	2.80	96.32	1.97
2020/04/01 07:44	2.80	96.32	1.97
2020/04/01 07:59	3.14	111.87	1.96
2020/04/01 08:14	3.33	122.64	1.99
2020/04/01 08:29	3.33	142.57	2.31
2020/04/01 08:44	3.33	128.54	2.08
2020/04/01 08:59	3.30	141.04	2.31

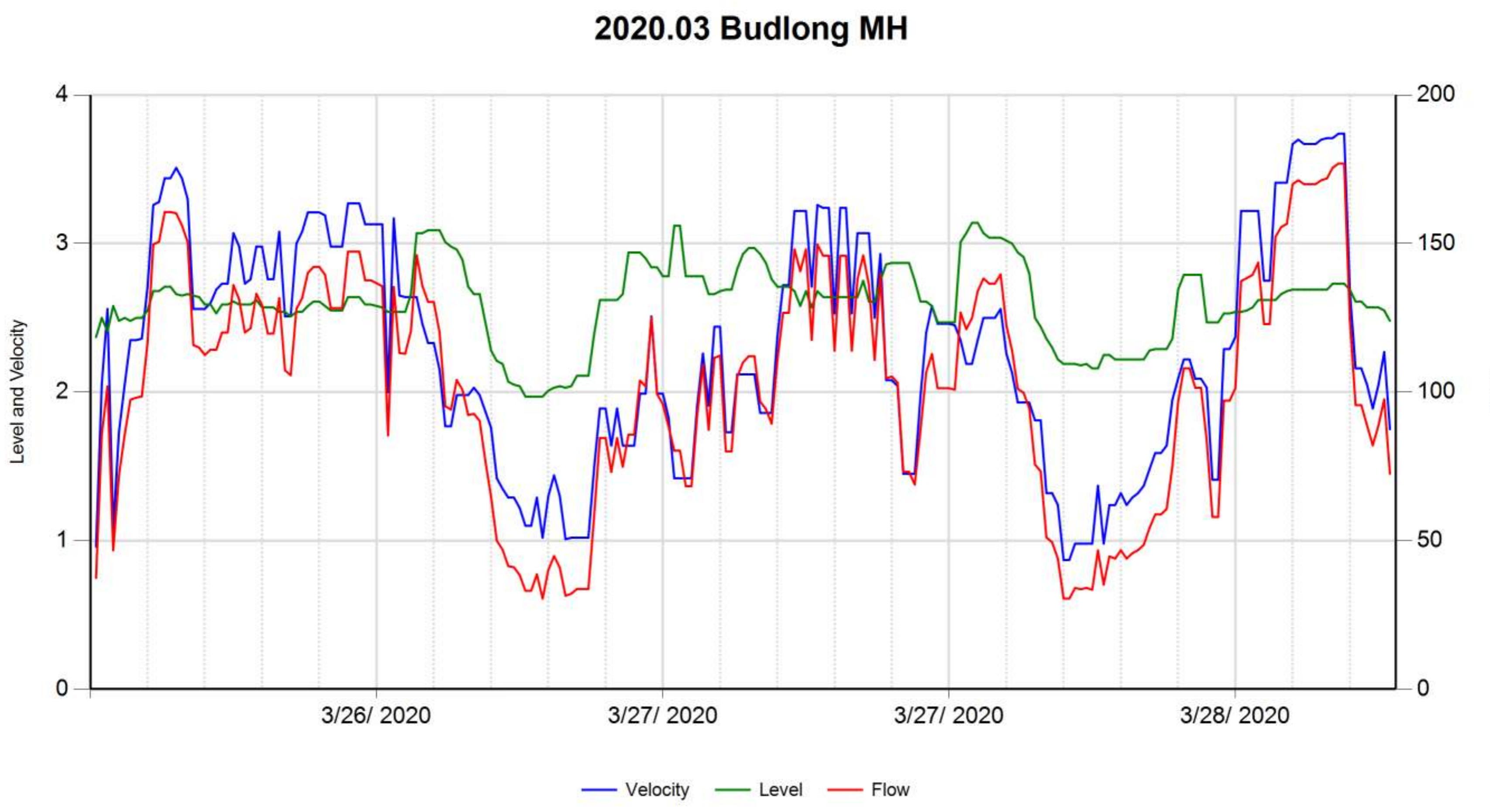
TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/04/01 09:14	3.16	133.19	2.31
2020/04/01 09:29	3.16	131.87	2.29
2020/04/01 09:44	3.16	131.87	2.29
2020/04/01 09:59	3.18	132.64	2.29
2020/04/01 10:14	3.23	135.69	2.29
2020/04/01 10:29	3.33	141.18	2.29
2020/04/01 10:44	3.50	147.99	2.25
2020/04/01 10:59	3.61	154.17	2.25
2020/04/01 11:14	3.50	142.36	2.16
2020/04/01 11:29	3.33	127.22	2.06
2020/04/01 11:44	2.97	114.44	2.16
2020/04/01 11:59	2.96	130.42	2.48
2020/04/01 12:14	2.96	97.85	1.86
2020/04/01 12:29	2.96	117.92	2.24
2020/04/01 12:44	2.96	117.92	2.24
2020/04/01 12:59	3.11	125.49	2.23
2020/04/01 13:14	3.19	106.18	1.82
2020/04/01 13:29	3.22	107.43	1.82
2020/04/01 13:44	3.22	107.43	1.82
2020/04/01 13:59	3.19	129.37	2.22
2020/04/01 14:14	3.19	114.58	1.97
2020/04/01 14:29	3.19	114.58	1.97
2020/04/01 14:44	3.19	129.37	2.22
2020/04/01 14:59	3.44	142.99	2.22
2020/04/01 15:14	3.44	129.86	2.01
2020/04/01 15:29	3.47	144.93	2.22
2020/04/01 15:44	3.47	160.90	2.47
2020/04/01 15:59	3.39	155.83	2.47
2020/04/01 16:14	3.23	146.60	2.47
2020/04/01 16:29	3.05	144.86	2.64
2020/04/01 16:44	3.05	135.69	2.47
2020/04/01 16:59	2.97	139.58	2.64
2020/04/01 17:14	3.05	150.90	2.75
2020/04/01 17:29	3.09	153.68	2.75
2020/04/01 17:44	3.09	140.00	2.50
2020/04/01 17:59	3.14	144.17	2.53
2020/04/01 18:14	3.14	142.57	2.50
2020/04/01 18:29	3.09	140.00	2.50
2020/04/01 18:44	3.04	138.19	2.53
2020/04/01 18:59	2.97	148.33	2.80
2020/04/01 19:14	2.90	143.68	2.80
2020/04/01 19:29	2.86	140.90	2.80
2020/04/01 19:44	2.86	151.04	3.00
2020/04/01 19:59	2.89	152.01	2.98
2020/04/01 20:14	2.89	120.56	2.37

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/04/01 20:29	2.89	107.15	2.10
2020/04/01 20:44	2.89	107.15	2.10
2020/04/01 20:59	2.89	107.15	2.10
2020/04/01 21:14	2.86	102.43	2.04
2020/04/01 21:29	2.83	91.32	1.84
2020/04/01 21:44	2.83	91.32	1.84
2020/04/01 21:59	2.80	90.14	1.84
2020/04/01 22:14	2.80	90.14	1.84
2020/04/01 22:29	2.79	103.40	2.13
2020/04/01 22:44	2.80	110.35	2.26
2020/04/01 22:59	2.78	108.89	2.26
2020/04/01 23:14	2.82	111.11	2.26
2020/04/01 23:29	2.79	103.40	2.13
2020/04/01 23:44	2.90	108.61	2.12
2020/04/01 23:59	2.90	76.87	1.50
2020/04/02 00:14	3.01	48.54	0.90
2020/04/02 00:29	3.02	48.89	0.90
2020/04/02 00:44	3.08	76.11	1.37
2020/04/02 00:59	3.08	65.76	1.18
2020/04/02 01:14	3.02	64.17	1.18
2020/04/02 01:29	2.64	55.76	1.24
2020/04/02 01:44	2.58	54.17	1.24
2020/04/02 01:59	2.47	50.97	1.24
2020/04/02 02:14	2.46	50.56	1.24
2020/04/02 02:29	2.36	61.81	1.60
2020/04/02 02:44	2.26	59.24	1.63
2020/04/02 02:59	2.18	55.35	1.60
2020/04/02 03:14	2.12	54.44	1.63
2020/04/02 03:29	2.12	54.44	1.63
2020/04/02 03:44	2.16	49.79	1.45
2020/04/02 03:59	2.12	48.40	1.45
2020/04/02 04:14	2.12	48.40	1.45
2020/04/02 04:29	2.03	37.36	1.20
2020/04/02 04:44	2.03	37.36	1.20
2020/04/02 04:59	2.03	32.99	1.06
2020/04/02 05:14	2.03	32.99	1.06
2020/04/02 05:29	2.03	50.35	1.61
2020/04/02 05:44	2.07	51.81	1.61
2020/04/02 05:59	2.07	54.79	1.71
2020/04/02 06:14	2.07	55.97	1.74
2020/04/02 06:29	2.14	59.17	1.76
2020/04/02 06:44	2.23	61.04	1.71
2020/04/02 06:59	2.23	65.62	1.84
2020/04/02 07:14	2.23	70.49	1.97
2020/04/02 07:29	2.28	67.36	1.84

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/04/02 07:44	2.28	72.29	1.97
2020/04/02 07:59	2.28	72.43	1.97
2020/04/02 08:14	2.30	74.51	2.00
2020/04/02 08:29	2.37	87.99	2.26
2020/04/02 08:44	2.32	85.83	2.28
2020/04/02 08:59	2.40	90.14	2.28
2020/04/02 09:14	2.40	97.78	2.47
2020/04/02 09:29	2.40	90.14	2.28
2020/04/02 09:44	2.40	90.83	2.30
2020/04/02 09:59	2.47	93.54	2.27
2020/04/02 10:14	2.62	101.60	2.27
2020/04/02 10:29	2.62	97.64	2.19
2020/04/02 10:44	2.53	92.64	2.19
2020/04/02 10:59	2.53	80.35	1.90
2020/04/02 11:14	2.54	80.97	1.90
2020/04/02 11:29	2.54	93.40	2.19
2020/04/02 11:44	2.57	84.37	1.95
2020/04/02 11:59	2.62	100.00	2.24
2020/04/02 12:14	2.62	100.00	2.24
2020/04/02 12:29	2.62	111.39	2.49
2020/04/02 12:44	2.62	87.85	1.97
2020/04/02 12:59	2.51	82.78	1.97
2020/04/02 13:14	2.43	71.11	1.77
2020/04/02 13:29	2.43	79.03	1.97
2020/04/02 13:44	2.43	79.03	1.97
2020/04/02 13:59	2.82	102.22	2.08
2020/04/02 14:14	2.98	127.50	2.39
2020/04/02 14:29	3.09	153.96	2.75
2020/04/02 14:44	3.09	153.96	2.75
2020/04/02 14:59	3.09	153.96	2.75
2020/04/02 15:14	3.09	147.36	2.63
2020/04/02 15:29	3.08	143.89	2.59
2020/04/02 15:44	3.02	140.42	2.59
2020/04/02 15:59	2.79	127.99	2.63
2020/04/02 16:14	2.54	112.71	2.64
2020/04/02 16:29	2.54	132.22	3.09
2020/04/02 16:44	2.51	130.28	3.09
2020/04/02 16:59	2.51	130.28	3.09
2020/04/02 17:14	2.55	133.26	3.09
2020/04/02 17:29	2.58	135.21	3.09
2020/04/02 17:44	2.78	135.83	2.81
2020/04/02 17:59	2.78	163.61	3.39
2020/04/02 18:14	2.78	139.03	2.88
2020/04/02 18:29	2.61	127.71	2.88
2020/04/02 18:44	2.61	157.15	3.54

TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/04/02 18:59	2.61	157.15	3.54
2020/04/02 19:14	2.73	167.57	3.54
2020/04/02 19:29	2.84	176.87	3.54
2020/04/02 19:44	3.07	190.55	3.45
2020/04/02 19:59	3.07	157.22	2.84
2020/04/02 20:14	3.07	157.22	2.84
2020/04/02 20:29	2.84	121.94	2.44
2020/04/02 20:44	2.68	90.69	1.97
2020/04/02 20:59	2.61	95.35	2.15
2020/04/02 21:14	2.68	112.29	2.44
2020/04/02 21:29	2.72	105.62	2.25
2020/04/02 21:44	2.65	101.94	2.25
2020/04/02 21:59	2.65	152.15	3.36
2020/04/02 22:14	2.65	152.15	3.36
2020/04/02 22:29	2.58	125.07	2.86
2020/04/02 22:44	2.58	125.07	2.86
2020/04/02 22:59	2.58	108.47	2.48
2020/04/02 23:14	2.69	98.82	2.13
2020/04/02 23:29	3.00	114.44	2.13
2020/04/02 23:44	3.02	123.47	2.28
2020/04/02 23:59	3.00	114.44	2.13
2020/04/03 00:14	2.84	113.61	2.28
2020/04/03 00:29	2.84	113.61	2.28
2020/04/03 00:44	2.84	105.49	2.11
2020/04/03 00:59	2.76	99.03	2.07
2020/04/03 01:14	2.72	99.24	2.11
2020/04/03 01:29	2.48	87.57	2.11
2020/04/03 01:44	2.41	84.24	2.11
2020/04/03 01:59	2.41	70.42	1.77
2020/04/03 02:14	2.40	69.86	1.77
2020/04/03 02:29	2.19	54.93	1.58
2020/04/03 02:44	2.16	44.79	1.31
2020/04/03 02:59	2.16	44.79	1.31
2020/04/03 03:14	2.16	44.79	1.31
2020/04/03 03:29	2.15	49.86	1.47
2020/04/03 03:44	2.15	57.71	1.70
2020/04/03 03:59	2.15	57.71	1.70
2020/04/03 04:14	2.14	49.44	1.47
2020/04/03 04:29	2.11	46.04	1.40
2020/04/03 04:44	2.11	38.75	1.17
2020/04/03 04:59	2.11	38.75	1.17
2020/04/03 05:14	2.18	47.71	1.38
2020/04/03 05:29	2.21	49.10	1.40
2020/04/03 05:44	2.23	69.93	1.95
2020/04/03 05:59	2.43	81.39	2.03

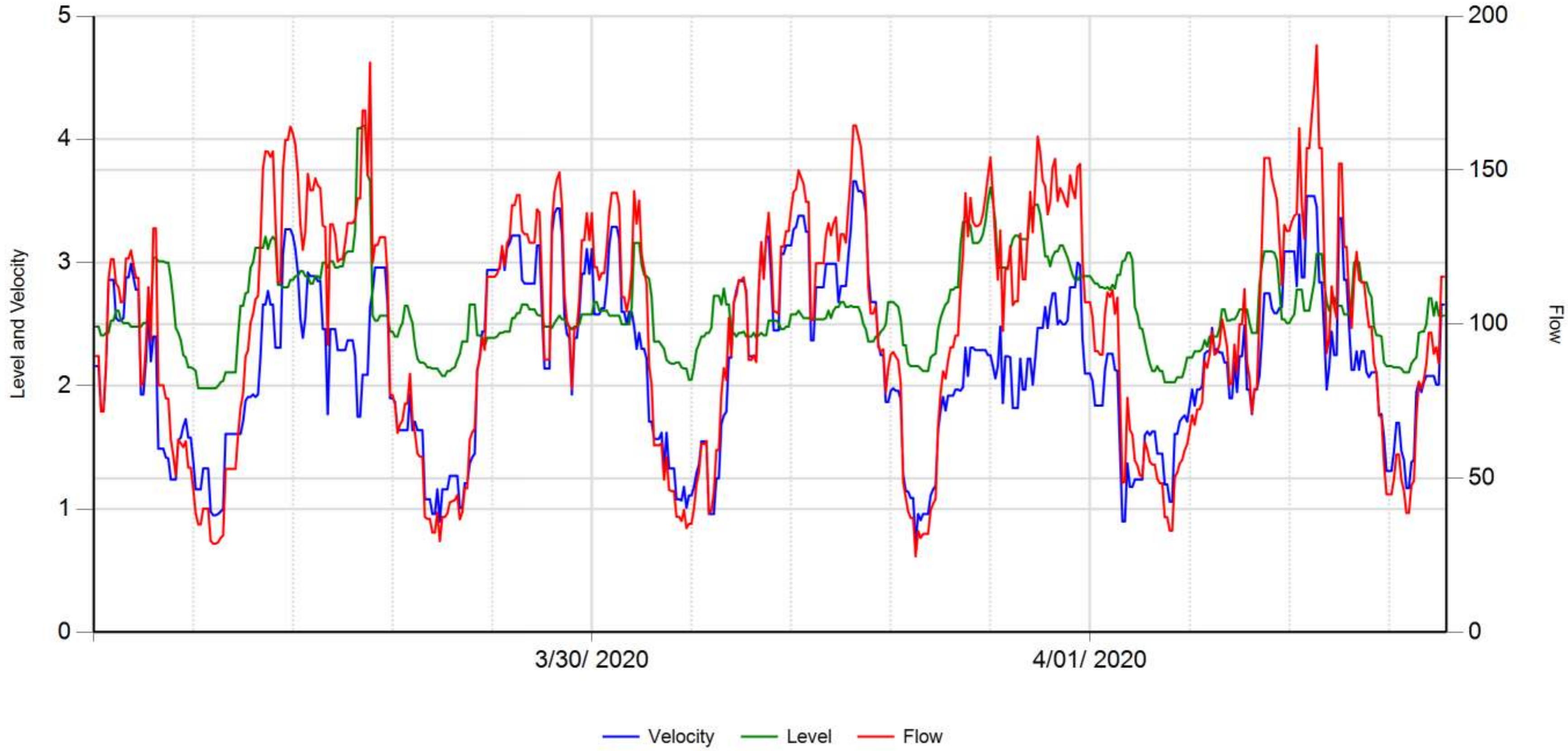
TimeStamp	Level (in)	Flow (gpm)	Velocity (fps)
2020/04/03 06:14	2.44	79.17	1.95
2020/04/03 06:29	2.44	82.01	2.03
2020/04/03 06:44	2.50	87.08	2.08
2020/04/03 06:59	2.71	97.22	2.08
2020/04/03 07:14	2.71	97.22	2.08
2020/04/03 07:29	2.57	90.42	2.08
2020/04/03 07:44	2.68	92.50	2.01
2020/04/03 07:59	2.57	87.22	2.01
2020/04/03 08:14	2.57	115.42	2.66
2020/04/03 08:29	2.57	115.42	2.66



	Velocity (fps)	Level (in)	Flow (gpm)		
Average	2.276	2.598	102.396	**RainFall**	Inches
Maximum	3.740	3.140	176.944		
Minimum	0.870	1.970	30.486		

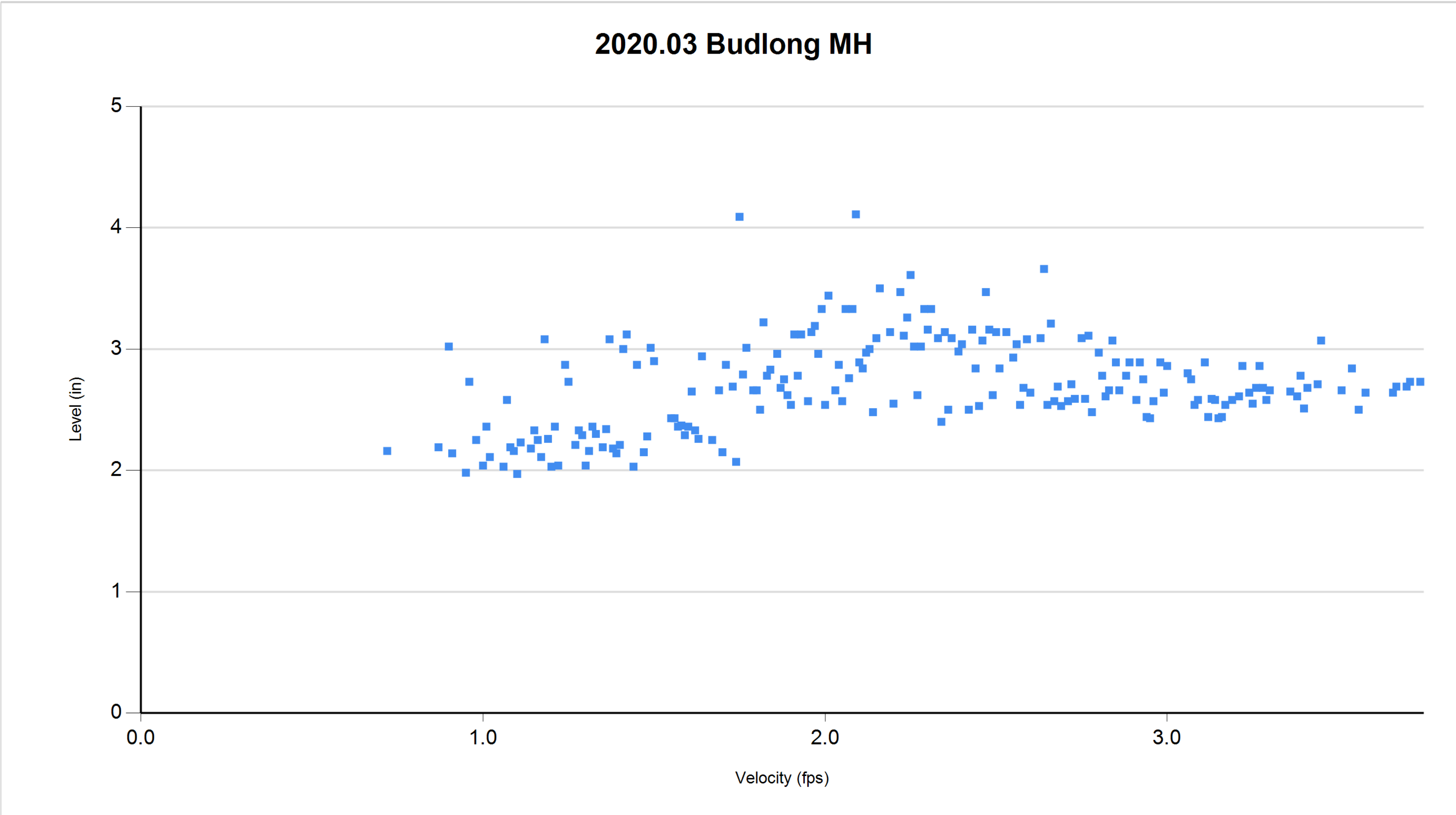
4/03/2020

2020.03 Budlong MH



	Velocity (fps)	Level (in)	Flow (gpm)		
Average	2.189	2.612	99.460	**RainFall**	Inches
Maximum	3.660	4.110	190.555		
Minimum	0.720	1.980	24.653		

4/03/2020



3/26/2020 thru 4/3/2020

4/3/2020 4:07:59 PM

Utility Systems Science and Software

Report Date: 04/03/2020
Customer: Melia Homes
Group: Gardena
Site: 2020.03 Budlong MH

Statistics for 2020.03 Budlong MH: 3/26/2020 thru 4/3/2020

	Flow (GPM)			Flow (MGD)			Velocity (FPS)			Level (inches)				
Date	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Total Gal	Rain
3/26/20	122.43	160.62	37.43	0.18	0.23	0.05	2.73	3.51	0.96	2.63	3.09	2.37	176,306	
3/27/20	94.26	149.72	30.49	0.14	0.22	0.04	2.05	3.26	1.01	2.63	3.14	1.97	135,741	
3/28/20	97.57	176.94	30.49	0.14	0.25	0.04	2.23	3.74	0.87	2.54	3.04	2.16	140,507	
3/29/20	102.73	184.93	28.75	0.15	0.27	0.04	2.09	3.27	0.95	2.73	4.11	1.98	147,927	
Week:	**104.25**	**184.93**	**28.75**	**0.15**	**0.27**	**0.04**	**2.28**	**3.74**	**0.87**	**2.63**	**4.11**	**1.97**	**600,481**	
3/30/20	99.22	149.31	29.58	0.14	0.22	0.04	2.35	3.44	0.90	2.48	3.16	2.08	142,878	
3/31/20	99.50	164.51	33.82	0.14	0.24	0.05	2.37	3.66	0.96	2.48	2.90	2.05	143,274	
4/1/20	106.27	160.90	24.65	0.15	0.23	0.04	2.02	3.00	0.72	2.88	3.61	2.12	153,027	
4/2/20	97.07	190.55	32.99	0.14	0.27	0.05	2.19	3.54	0.90	2.57	3.09	2.03	139,782	
4/3/20	75.37	115.42	38.75	0.11	0.17	0.06	1.84	2.66	1.17	2.41	2.84	2.11	108,526	
Week:	**95.48**	**190.55**	**24.65**	**0.14**	**0.27**	**0.04**	**2.15**	**3.66**	**0.72**	**2.56**	**3.61**	**2.03**	**687,486**	
Totals:	**99.38**	**190.55**	**24.65**	**0.14**	**0.27**	**0.04**	**2.21**	**3.74**	**0.72**	**2.59**	**4.11**	**1.97**	**1,287,966**	

Methods & Procedures & Equipment

Methods and Procedures

Utility Systems Science & Software provided Melia Homes with an off the shelf, non-proprietary flow monitoring solution that included one state of the art Hach Flo-Dar® AV Sensor system. The project course of action is listed below. The US^3 team:

- Assessed permitting and traffic control at the site on Budlong Av in Gardena, CA.
- Validated the sites for suitability for sewer flow monitoring for the 13633 Vermont Project.
- Obtained a City Encroachment Permit.
- Installed and removed traffic control in accord with site-specific CA MUTCD requirements for both the installation and removal of equipment.
- Installed and calibrated the flow monitoring equipment per manufacturer recommendations.
- Removed the equipment, validated the data and prepared the data reports.
    - The depth for the peak flows observed during this study exceeded the d/D limit of 0.50 at the site once for approximately an hour during the night of 03/29. Low velocities were also observed during this time frame, leading us to suggest there may have been a blockage or backwater effect downstream of our monitoring site that later cleared.
    - The maximum d/D observed during this study was ~0.51.

Equipment

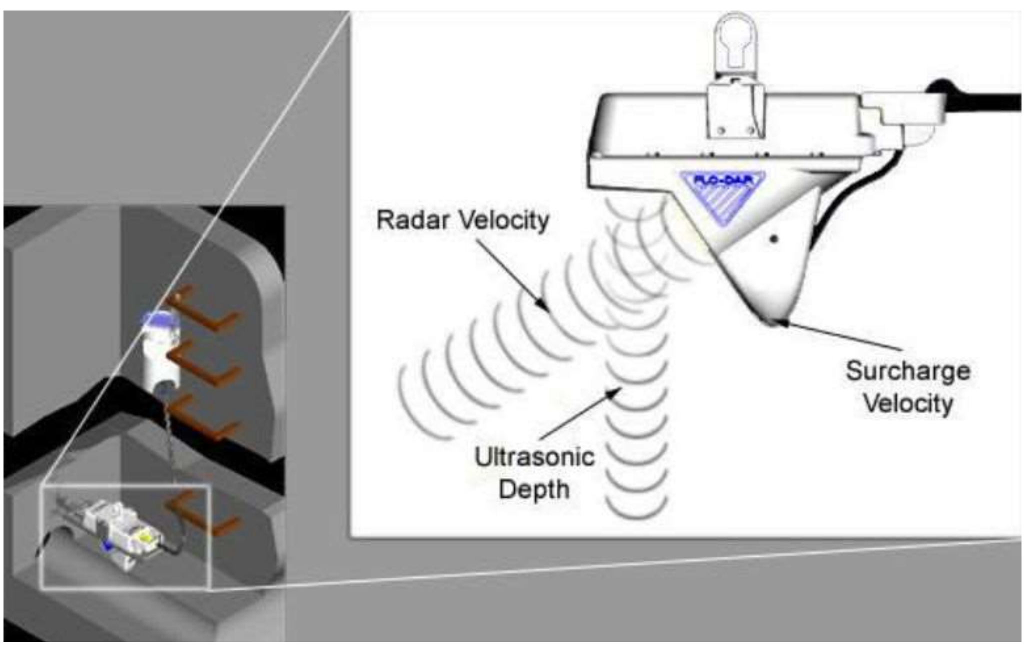


Figure: Equipment installed for the Sewer Flow Monitoring Study

Figure: Web-Enabled Flo-Dar® AV Sensor, Radar-Based Velocity/Area Flow Meter

SPECIFICATIONS

- **Enclosure**
    - IP68 Waterproof rating, Polystyrene
- **Dimensions**
    - 160.5 W x 432.2 L x 297 D mm (6.32 x 16.66 x 11.7 in.),
    - With SVS, D = 387 mm (15.2 in.)
- **Weight**
    - 4.8 kg (10.5 lbs.)
- **Operating Temperature**
    - -10 to 50°C (14 to 122°F)
- **Storage Temperature**
    - -40 to 60°C (-40 to 140°F)
- **Power Requirements**
    - Supplied by FL900 Flow Logger, Flo-Logger, or Flo-Station

- **Interconnecting Cable**
  - Disconnect available at both sensor and logger or Flo-Station
  - Polyurethane, 0.400 (±0.015) in. diameter; IP68
  - Standard length 9 m (30 ft), maximum 305 m (1000 ft)
- **Cables – available in two styles:**
  - connectors at both ends
  - connector from sensor with open leads to desiccant hub, desiccant hub with connector to logger. A potting/sealant kit will be included. This can be used to run the cable through conduit.
- **Certification**
  - Certified to: FCC Part 15.245: FCC ID: VIC-FLODAR24
  - Industry Canada Spec. RSS210. v7: IC No.: 6149A-FLODAR24

SURCHARGE DEPTH MEASUREMENT

  - Auto zero function maintains zero error below 0.5 cm (0.2 in.)
- **Method**
  - Piezo-resistive pressure transducer with stainless steel diaphragm
- **Range**
  - 3.5 m (138 in.), overpressure rating 2.5 x full scale

VELOCITY MEASUREMENT

- **Method**
  - Radar
- **Range**
  - 0.23 to 6.10 m/s (0.75 to 20 ft/s)
- **Frequency Range**
  - 24.075 to 24.175 GHz, 15.2 mW (max.)
- **Accuracy**
  - ±0.5%; ±0.03 m/s (±0.1 ft/s)

DEPTH MEASUREMENT

- **Method**
  - Ultrasonic
- **Standard Operating Range from Flo-Dar® Housing to Liquid**
  - 0 to 152.4 cm (0 to 60 in.)
- **Optional Extended Level Operating Range from Transducer Face to Liquid**
  - 0 to 6.1 m (0 to 20 ft.) with 43.18 cm (17 in.) dead band, temperature compensated.
- **Accuracy**
  - ±1%; ±0.25 cm (±0.1 in.)

FLOW MEASUREMENT

- **Method**
  - Based on Continuity Equation
- **Accuracy**
  - ±5% of reading typical where flow is in a channel with uniform flow conditions and is not surcharged, ±1% full scale max.

SURCHARGE CONDITIONS DEPTH/VELOCITY DEPTH (Std with Flo-Dar® Sensor)

- **Surcharge depth supplied by Flo-Dar® sensor.**

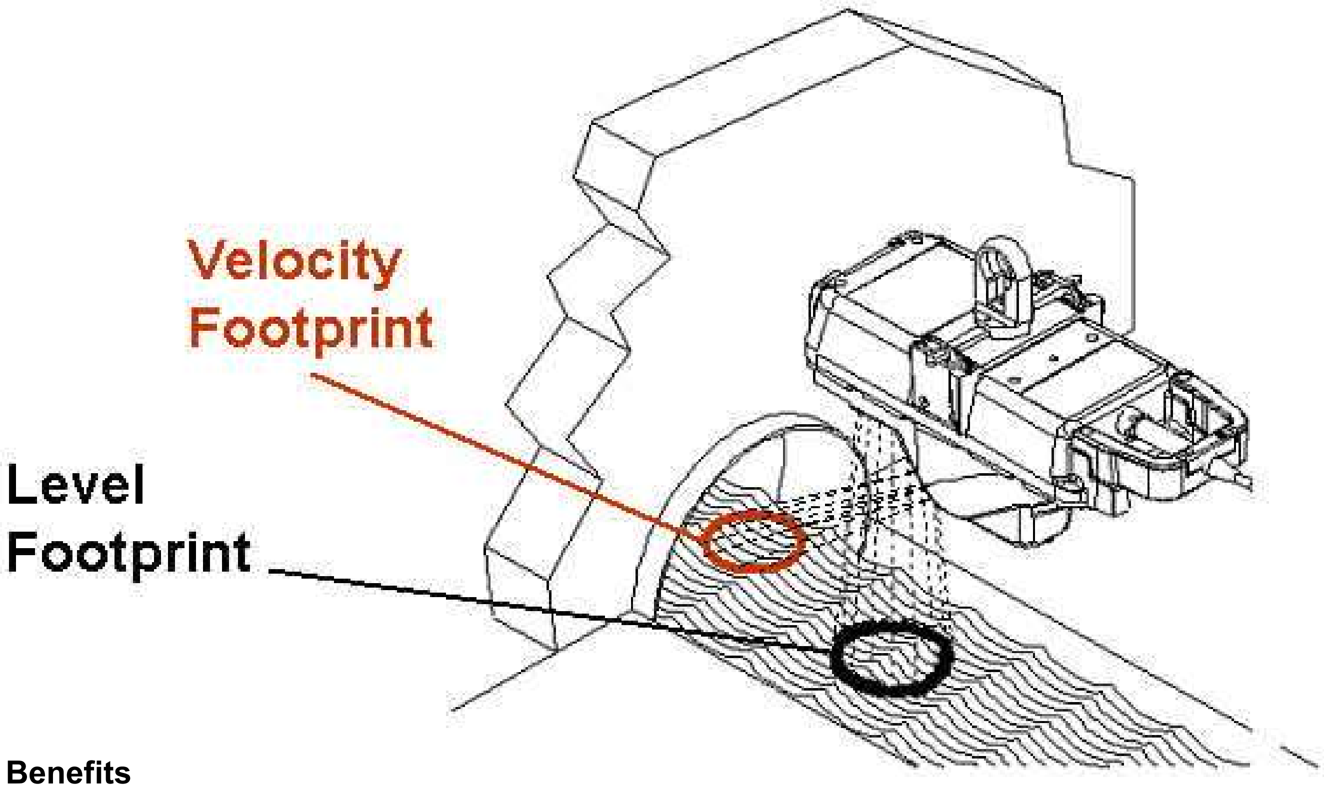
VELOCITY (Optional Surcharge Velocity Sensor)

- **Method**
  - Electromagnetic
- **Range**
  - ±4.8 m/s (±16 ft/s)
- **Accuracy**
  - ±0.15 ft/s or 4% of reading, whichever is greater.
- **Zero Stability**
  - ±0.05 ft/s

The Flo-Dar® Open Channel Flow Meters provide an innovative approach to open channel flow monitoring. Combining digital Doppler radar velocity sensing with ultrasonic pulse echo level sensing Flo-Dar® provides accurate open channel flow monitoring without the fouling problems associated with submerged sensors.

Perfect Solution for Difficult Flow Conditions:

- Flows with High Solids Content
- High Temperature Flows
- Caustic Flows
- Large Man-Made Channel
- High Velocities
- Shallow Flows



Benefits

1. Personnel have no contact with the flow during installation.
2. Maintenance caused by sensor fouling is eliminated
3. Field Replaceable/Interchangeable Sensors and Monitors

How It Works

Flo-Dar® transmits a digital Doppler radar beam that interacts with the fluid and reflects back signals at a different frequency than that which was transmitted. These reflected signals are compared with the transmitted frequency. The resulting frequency shift provides an accurate measure of the velocity and the direction of the flow. Level is detected by ultrasonic pulse echo. Flow is then calculated based on the Continuity Equation:

Q = V x A, Where Q = Flow, V = Average Velocity and A = Area

Accurate Flow Measurements

Flo-Dar® provides the user with highly accurate flow measurements under a wide range of flows and site conditions. By measuring the velocity of the fluid from above, Flo-Dar® eliminates accuracy problems inherent with submerged sensors including sensor disturbances, high solids content and distribution of reflectors.

US^3 Company Information

US^3 is a California Corporation **Federal ID No. 33-0729605** and qualifies as a Minority Business Enterprise. US^3 has certified as an MBE with the California Public Utility Commission's authorized clearinghouse, **Verification Number: 97ES0008.**

US^3 is a specialty service company for the Water & Waste Water industry, providing monitoring and control for Utilities since 1996. US^3 is in the forefront of this industry by taking the proven technological approaches developed in other high-tech industries and applying them to protect one of our most precious natural resources - our water.

US^3 engineers and technical personnel have applied advanced instrumentation system technology to water/wastewater open channel flow monitoring, pipeline evaluation, engineering, and data analysis, all coupled to the power of the Internet. This unique integrated systems approach allows the company to bring greater insight and intelligence to gathering information about water/wastewater system performance of our clients, and in turn, to support the fulfillment of their commitments to manage and cost effectively design, operate, and maintain these systems.

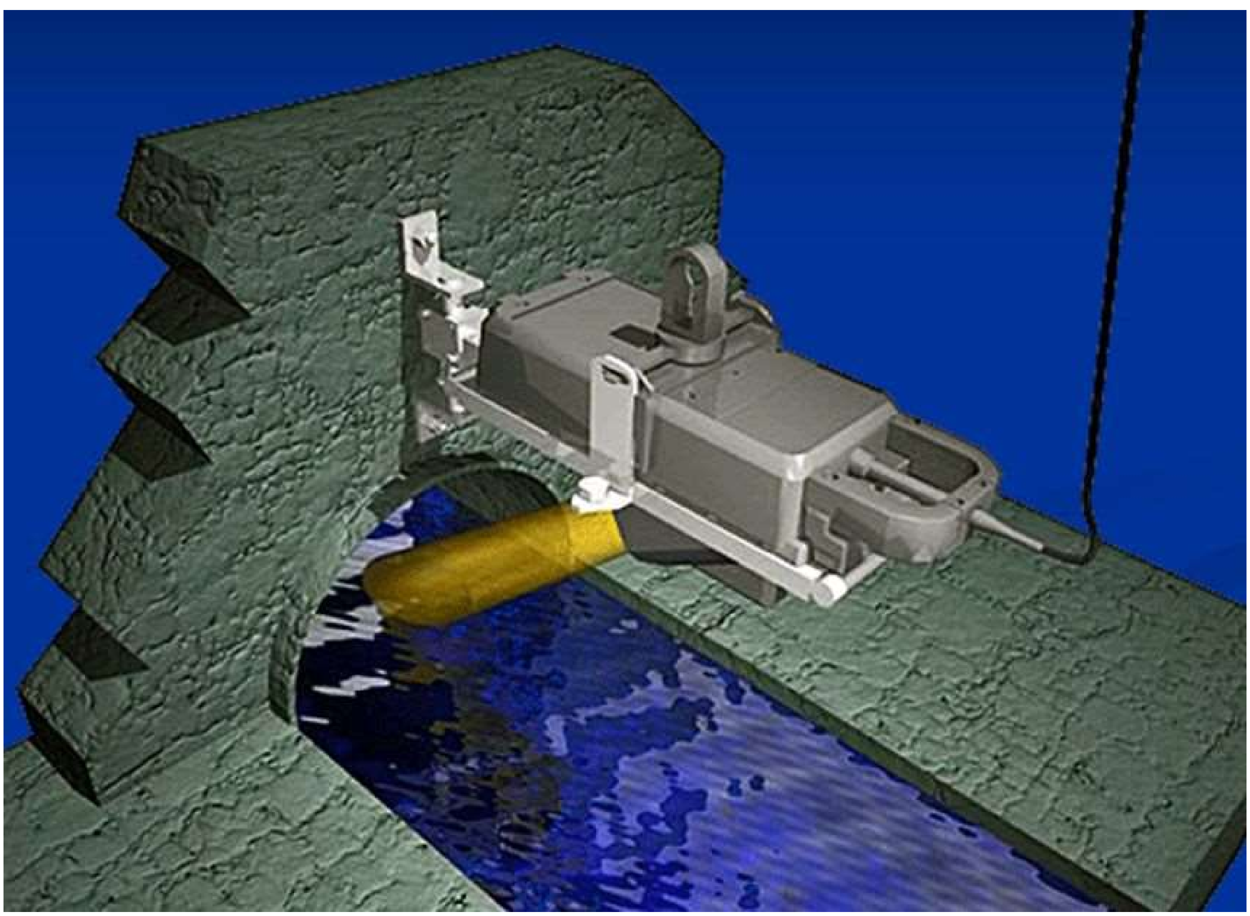


Figure: US^3 utilizes exclusively Hach March-McBirney Flo-Dar® Meters

Moreover, ***US³*** supports Municipalities, Consulting Engineering firms and other water/waste water systems integrators by providing temporary technical services for engineering, software programming and technical site maintenance and calibration site support work, primarily in the Water and Waste Water industries.

Figure: All technicians are certified for Confined Space Entry.

Name, Title, Address and Telephone numbers of persons to contact concerning this report.

Darlene Szczublewski, PE
Senior Civil Engineer
darlene.szczublewski@uscubed.com

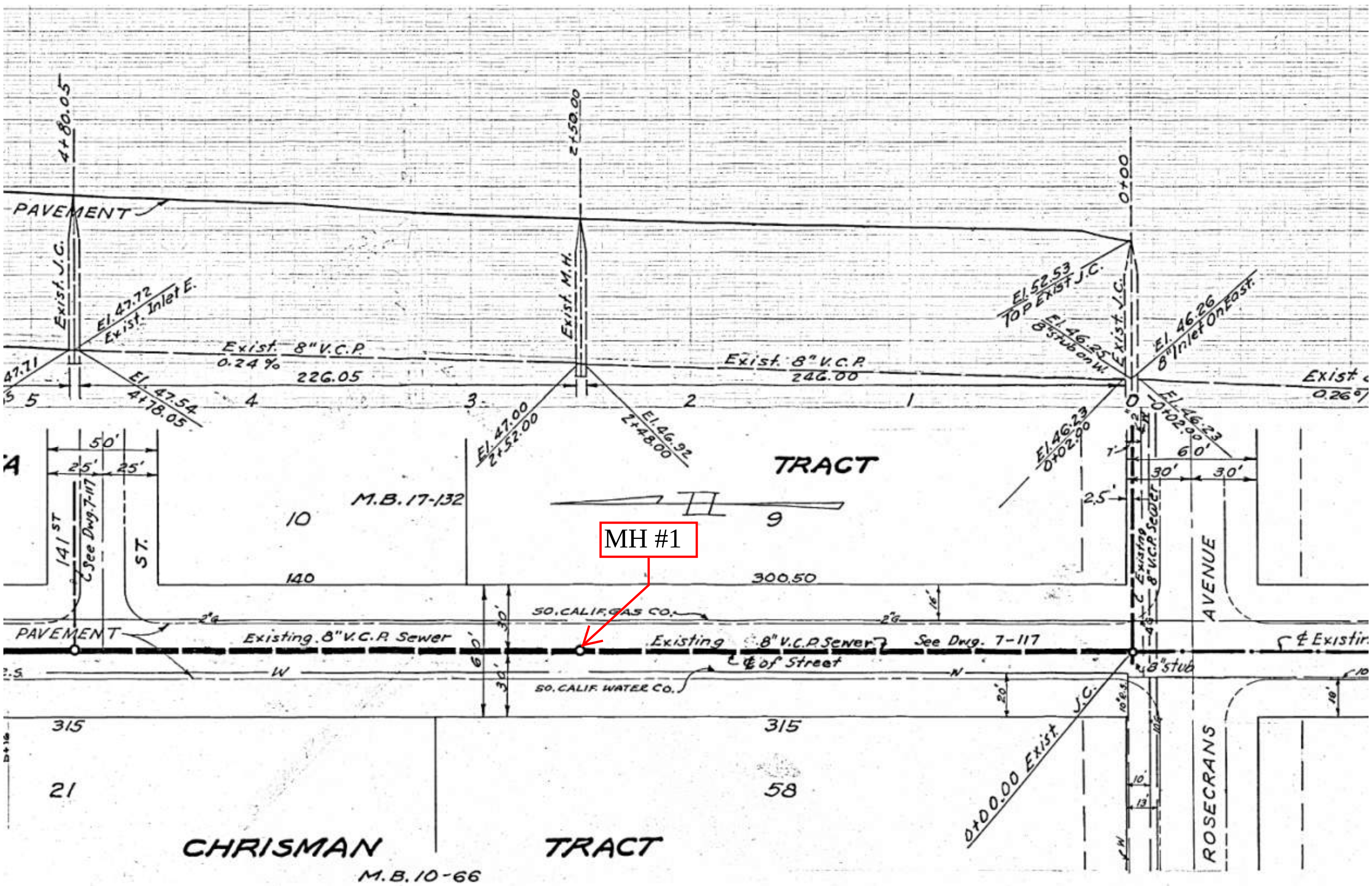
9314 Bond Av, Suite A
El Cajon, CA 92021
619-546-4281 (work)
619-246-5304 (cell)

Tom Williams
Engineering Manager
tom.williams@uscubed.com

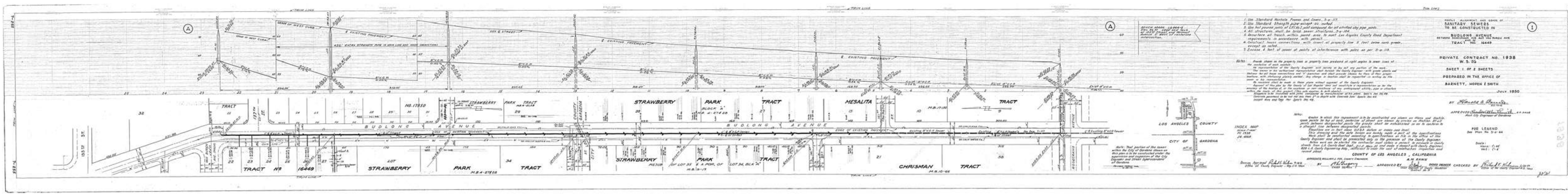
9314 Bond Av, Suite A
El Cajon, CA 92021
619-546-4281 (work)
619-398-7799 (cell)

Appendix C

Sewer As-Builts



4+80.05
2+50.00
0+00
PAVEMENT
Exist. J.C.
El. 47.72 Exist. Inlet E.
Exist. M.H.
El. 52.53 TOP EXIST J.C.
El. 46.25 8" stub on W.
Exist. J.C.
El. 46.26 8" Inlet On East.
Exist. 8" V.C.P. 0.24 %
226.05
Exist. 8" V.C.P.
246.00
Exist.
0.26%
El. 47.54 4+78.05
El. 47.00 2+52.00
El. 46.92 2+48.00
El. 46.23 0+02.00
El. 46.23 0+02.00
TRACT
M.B. 17-132
10
9
MH #1
141 ST
See Dwg. 7-117
ST.
140
300.50
SO. CALIF. GAS CO.
PAVEMENT
Existing 8" V.C.P. Sewer
Existing 8" V.C.P. Sewer
See Dwg. 7-117
℄ of Street
℄ Existing
8" stub
SO. CALIF. WATER CO.
Existing 8" V.C.P. Sewer
AVENUE
ROSECRANS
0+00.00 Exist. J.C.
315
315
21
58
CHRISMAN
TRACT
M.B. 10-66



1. Use Standard Manhole Frames and Covers, S-a-117.
2. Use Standard Strength pipe except as noted.
4. All structures shall be brick sewer structures, S-a-104.
5. Resurface all trench within paved area to meet Los Angeles County Road Department requirements in accordance with permit.
6. Construct house connections with invert at property line 5 feet below curb grade, except as noted.
7. Encase 4 feet of sewer at points of interference with poles as per S-a-119.
SANITARY SEWERS
TO BE CONSTRUCTED IN
BUDLONG AVENUE
TRACT NO. 16449
PRIVATE CONTRACT NO. 1938
W. S. 26
SHEET 1 OF 2 SHEETS
PREPARED IN THE OFFICE OF
BARNETT, HOPEN & SMITH
JULY 1950
FOR LEGEND
INDEX MAP
LOS ANGELES COUNTY
CITY OF GARDENA
COUNTY OF LOS ANGELES, CALIFORNIA
A. M. RAWN
STRAWBERRY PARK TRACT
MESALITA TRACT
CHRISMAN TRACT
TRACT No 16449
BUDLONG AVENUE

Appendix D
Design Criteria

TABLE 1

LOADINGS FOR EACH CLASS OF LAND USE

DESCRIPTION	UNIT OF MEASURE	FLOW (Gallons Per Day)	COD (Pounds Per Day)	SUSPENDED SOLIDS (Pounds Per Day)
RESIDENTIAL				
Single Family Home	Parcel	260	1.22	0.59
Duplex	Parcel	312	1.46	0.70
Triplex	Parcel	468	2.19	1.05
Fourplex	Parcel	624	2.92	1.40
Condominiums	Parcel	195	0.92	0.44
Single Family Home (reduced rate)	Parcel	156	0.73	0.35
Five Units or More	No. of Dwlg. Units	156	0.73	0.35
Mobile Home Parks	No. of Spaces	156	0.73	0.35
COMMERCIAL				
Hotel/Motel/Rooming House	Room	125	0.54	0.28
Store	1000 ft^2	100	0.43	0.23
Supermarket	1000 ft^2	150	2.00	1.00
Shopping Center	1000 ft^2	325	3.00	1.17
Regional Mall	1000 ft^2	150	2.10	0.77
Office Building	1000 ft^2	200	0.86	0.45
Professional Building	1000 ft^2	300	1.29	0.68
Restaurant	1000 ft^2	1,000	16.68	5.00
Indoor Theatre	1000 ft^2	125	0.54	0.28
Car Wash				
Tunnel - No Recycling	1000 ft^2	3,700	15.86	8.33
Tunnel - Recycling	1000 ft^2	2,700	11.74	6.16
Wand	1000 ft^2	700	3.00	1.58
Financial Institution	1000 ft^2	100	0.43	0.23
Service Shop	1000 ft^2	100	0.43	0.23
Animal Kennels	1000 ft^2	100	0.43	0.23
Service Station	1000 ft^2	100	0.43	0.23
Auto Sales/Repair	1000 ft^2	100	0.43	0.23
Wholesale Outlet	1000 ft^2	100	0.43	0.23
Nursery/Greenhouse	1000 ft^2	25	0.11	0.06
Manufacturing	1000 ft^2	200	1.86	0.70
Dry Manufacturing	1000 ft^2	25	0.23	0.09
Lumber Yard	1000 ft^2	25	0.23	0.09
Warehousing	1000 ft^2	25	0.23	0.09
Open Storage	1000 ft^2	25	0.23	0.09
Drive-in Theatre	1000 ft^2	20	0.09	0.05

From Sanitation Districts of Los Angeles County

Appendix E

Site Plan

REVISIONS					
NO	DATE	INITIAL	DESCRIPTION	APP	DATE

OWNER/DEVELOPER

MELIA HOMES

MELIA HOMES
8951 RESEARCH DR. #100
IRVINE, CA 92618
(949) 759-4367

PREPARED BY :

C&V CONSULTING, INC.
CIVIL ENGINEERING
LAND PLANNING & SURVEYING
6 ORCHARD, SUITE 200
LAKE FOREST, CALIFORNIA 92630
T. 949.916.3800
F. 949.916.3805
CVC-INC.NET

REGISTERED PROFESSIONAL ENGINEER
DANE P. MCDOUGALL
C 80705
CIVIL
STATE OF CALIFORNIA

I hereby certify that :

1. These plans have been prepared under my supervision;
2. The grading shown hereon will not divert drainage from its natural downstream course or obstruct the drainage of adjacent properties;
3. Existing ground contours and elevations were obtained by field survey performed on JANUARY 2019

ENGINEER ____________ DATE ____________
RCE 68167

PRELIMINARY GRADING PLAN
TENTATIVE TRACT MAP No. 83037

13615 & 13633 S VERMONT AVE.
GARDENA, CA 90249

SHEET 2 OF 4

SCALE: AS SHOWN | DRAWN BY: EP | CHECKED BY: MM

CITY OF GARDENA

PLAN SET: PS02
DATE: 05/07/2020

P:\MELA-005\DWG\SHEETS\TTM\TTM-02-GRAD.DWG
BY: ERIC PEREZ 5/7/20 5:34 PM

Appendix F

Portions of the Sewer Area Study for Tract 082263, Stonefield

Sewer Area Study

Tract 082263
~~Stonecrest~~ Stonefield
In the City of Gardena

Prepared for:

KB Home
25152 Springfield Ct, Suite 180
Valencia, CA 91355
(661) 219-6852

Prepared by:

FORMA ENGINEERING INC.
CIVIL ENGINEERING SERVICES

Telephone: (818) 832-1710

Prepared under the supervision of

REGISTERED PROFESSIONAL ENGINEER
ARET BINATLI
No 64448
Exp. 6/30/19
CIVIL
STATE OF CALIFORNIA

Aret Binatli   Date
R.C.E. 64448 (Exp. 30 Jun 19)

August 13, 2018

L:\18006\Admin\Reports\18006_SAS_01.docx

Table of Contents

1. INTRODUCTION

Tract 082263 is located within the City of Gardena, and includes the addresses 14031 S. Vermont Avenue & 1017 W. 141st Street, 90247. The site is bound by Vermont Ave. to the east, West 141st Street to the southeast, Commercial property to the north and southwest and residential tracts, tracts 28241 and Mesalita Tract to the west. 63 attached condominia are proposed to be constructed on the site. The general area is shown in Figure 1.

The study area is delineated by the existing sewer system in an urbanized area, which is roughly bound at the upstream end by 135th Street to the north, Vermont Ave. to the east, Budlong Ave. to the west, and Rosecrans Ave. to the south. The study area terminates where the City of of Gardena sewer main empties into the existing 15" Los Angeles County Sanitation District Trunk Sewer, in Rosecrans Ave. at Normandie Ave.

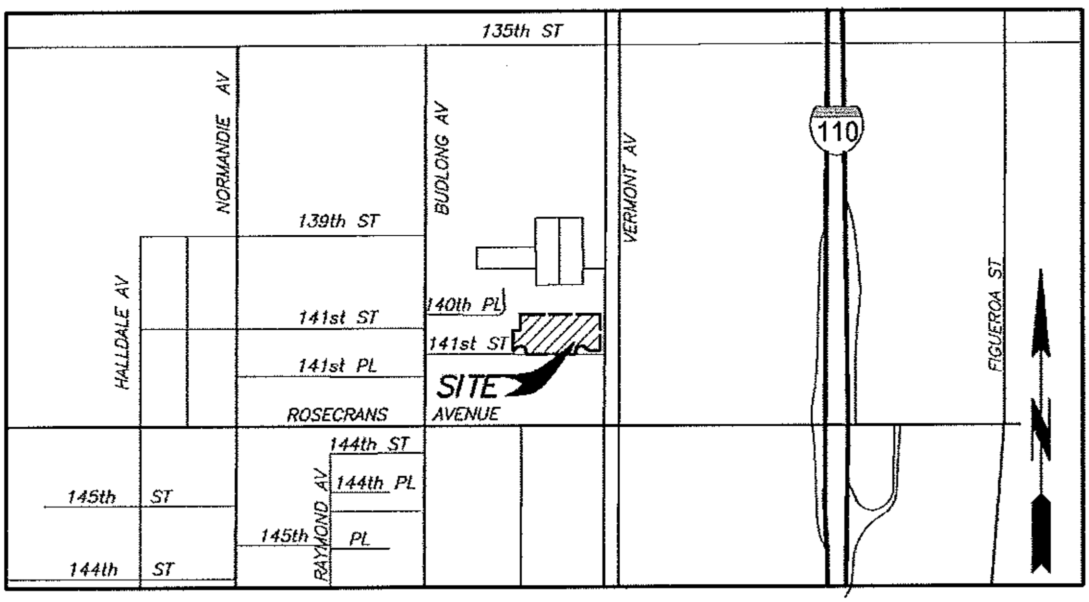


Figure 1. Vicinity map.

This report determines the adequacy of the existing public sewer system from the project to the Trunk Sewer connection at the intersection of Rosecrans Ave. and Normandie Ave..

2. SITE DESCRIPTION

The 2.56-acre site was previously zoned as commercial/light industrial. There are two existing commercial buildings onsite, the remainder of the site is a parking lot. The intent is to raze all existing buildings and parking, and construct 63 attached condominia, further described in Section 3.

3. PROJECT DESCRIPTION

The subject project will construct 63 attached condominia and open space area. The residences are three stories in height and of wood and stucco construction.

There is an existing City of Gardena public sewer system in 141st Street, west of the project site. Connection to the public sewer will be made to the existing terminal manhole, per City of Gardena Plan No. 7-117, Sewer Wall Map line ID B-8.

4. PROPOSED SEWER SYSTEM

The project site will be served by its own private sewer. No new public sewer improvements are proposed onsite or offsite.

5. EXISTING SEWER SYSTEM

The existing sewer system serving the site is under the local jurisdiction of the City of Gardena. The City sewer main empties in to the Los Angeles County Sanitation District trunk sewer in Rosecrans Ave. at Normandie Ave. The downstream trunk sewer is 15-inch VCP. The Sanitation Districts of Los Angeles County has reviewed the capacity of the existing trunk sewer and issued a will serve letter for the proposed project. A copy of the will serve letter for the proposed project is located in Appendix G.

As the local sewer main is maintend by the City of Gardena, the local sewer maintenance map, 'Wall Map', was used to identify specific reaches. The City's Wall Map does not include MH ID numbers; therefore, the MH ID numbers referenced here in were assigned for this study only and are not relavent for any other purpose. The locations and labels of referenced MH ID's have been added to the City of Gardena's Wall Map located in Pocket Insert 2 and Sewer Area Study Exhibit, Figure 2, located in Pocket Insert 3 at the end of this report.

The manhole in Rosecrans Ave. at Normandie Ave. where the local sewer main empties into the trunk sewer is reference from hereon as MH 0. Starting at MH 0 the local sewer main runs east in Rosecrans Ave. to Budlong Ave, MH 6. The local sewer main between MH 0 and MH6 is an existing 8" VCP that was upgraded by installing a parallel 12" relief main. Upstream of the 12" relief main is a 10" VCP . That portion of the main immediately downstream of MH 6 that is 10" is known as Reach 1. For simplicity, the sewer flow that enters the system between MH0 and MH6 was assumed to enter similtanteously at the upper end of Reach 1. From MH 6 the local sewer main branches north along Budlong Ave. and east along Rosecrans Ave.

The reach that runs east in Rosecrans Ave from MH 6, known as Reach 2, is upstream of any flow generated by the proposed development; therefore only the flow contributed by Reach 2 has been studied and the capacity of the existing local sewer has not been determined. Reach 2 runs east in Rosecrans Ave. until it reaches the City limits at Vermont Ave. and continues north collecting the area east of Vermont Ave. until the main reaches the City of Gardena limits at El Segundo.

The reach that runs north in Budlong Ave. from MH 6, known as Reach 3, is downstream of the project site. The local sewer main the runs north in Budlong Ave. between MH 6 and MH 8 is the critical portion of Reach 3 as it is the same size as the main that serves the project site, 8" VCP, but is flatter and also received additional upstream flow. The flow from the project site connects to the existing sewer main in 141st Street at MH 8.

6. METHODOLOGY USED

6.1 Introduction

For this study, the majority of land has been developed allowing the use of direct counts of residential units, land area and building square footage

The Sanitation Districts of Los Angeles County has issued a Will Serve Letter dated May 3, 2018. The average wastewater flow expected by the sanitation district is based on 'Table 1, Loadings for Each Class of Land Use'; therefore, Table 1 is used as the basis for calculation of average wastewater flow generation factors. To calculate peak flows, a peaking factor of 2.5 is applied to the average flows. This leads directly to a determination of the peak flow rate. Peak flow rates are returned in cubic feet per second (ft^3/s). Average Daily flow rates are given in gallons per day (GPD). Sewage flow factors applied are given in Appendix A and discussed in Section 6.2.

A combination of resources was used in determining the variables used to calculate flow generation. Tract/Parcel maps available online at the Los Angeles County Department of Public Works website were used to determine land area, and number of parcels when available. The Los Angeles County Assessor's website was used to determine land use, land area, dwelling units, occupancy, and gross floor areas. Areas were drawn against GIS data provided by Los Angeles County in an AutoCAD format to verify areas. The areas of street rights-of-way were not included in the area calculations.

6.2 Zoning, Dwelling Units & Building Floor Area

The City of Gardena zoning map covers the complete study area. A copy of the zoning map is available in the Pocket Insert 1 at the end of this report. In most circumstances, zoning was not used for calculation of flow generation because the study area is nearly completely developed.

The website for the Los Angeles County Assessor's Office frequently lists the number of dwelling units on a property, including multi-family and condominia. The Assessor's office also lists number of rooms within motels and hotels, and the number of spaces in a mobile home park. Where these data were available, they were used.

In portions of the study area, particularly in commercial and industrial zones, dwelling units or occupancy were not available, so the flow rate was determined by gross building floor area of the existing structure area. Building floor area was used to calculate flow generation based on a per 1000 ft^2 basis, with flows per day varying based on building use.

Parcels that are currently occupied by parking areas and contain no structures, including the parking adjacent to the Lady Luck Casino and The Church of the Holy Communion do not generate any flow in the current developed condition and were not included in the study. Similarly, several vacant lots that contain no buildings exist within the study area were also assumed to not generate sewer flows.

Flow generation factors applied to dwelling units, and building floor area were referenced from the Sanitation Districts of Los Angeles County "Table 1, Loadings for Each Class of Land Use" given in Appendix A of this report.

6.3 Calculation Method

The County of Los Angeles uses Kutter's formula for pipe flow. Kutter developed a relation for the roughness coefficient to be used with the Chezy equation.

$$C = \frac{41.65 + \frac{0.00281}{S} + \frac{1.811}{n}}{1 + \left(\frac{41.65 + \frac{0.00281}{S}}{\sqrt{R}} \right) n} \qquad (1)$$

where:
- C = roughness coefficient,
- n = Manning's roughness coefficient, n=0.013,
- S = friction slope and,
- R = hydraulic radius (ft).

The hydraulic radius,

$$R = \left(\frac{A}{P} \right) \qquad (2)$$

where:
- A = flow area (ft^2) and
- P = wetted perimeter (ft).

Chezy's equation:

$$V = C \sqrt{R S} \qquad (3)$$

where: V = flow velocity (ft/s).

The flow rate can then be calculated using continuity:

$$Q = V A \qquad (4)$$

where: Q = volumetric flow rate (ft^3/s).

Flow depth can be calculated through iterations starting with an assumed flow depth and using the pipe geometry to find the flow. If the calculated flow is incorrect, the flow depth is adjusted up or down to suit and the flow re-calculated. Beginning with a flow depth of half the pipe diameter, the true depth will usually converge in a few iterations. Using ten iterations of a spreadsheet allows the use of calculated data feeding to the depth calculator.

Summary calculations for flow rate, depth and capacity are given in Table 1. Raw flow calculations are given in Appendix B and C and flow depth calculations are given in Appendix D and E.

7.SEWER CAPACITY ANALYSIS

7.1 Existing Capacity Analysis

Existing sewer flow generations were calculated based on the previously described methods and summarized in Table 1; however only the sewer main capacities downstream of the proposed project site were analyzed. Additionally, as required by the City of Gardena, monitoring of existing sewer flow downstream of the project site was performed.

MH 7 was selected for flow monitoring because it is located within Reach 3, downstream of the project site, within the critical portion of the sewer main. Monitoring took place over the course of 1 week from the afternoon of Thursday, June 7th to the morning of Thursday, June 14th. The monitoring recorded flow rates, depths and velocities. A copy of the sewer monitoring report for MH 7 is located in Appendix F. The peak flow depth observed in Reach 3 was 2.47 inches within an 8" pipe, which is less than 100% of the pipe capacity.

Flow within Reach 2 was not monitored beause it is not downstream of the site so is therefore not analyzed. Reach 1 was not monitored because flows within Roscrans Ave. were too turbulent due to the numerous main connections being made at the location. The theoretical analysis was used to determine flows within Reach 1.

The theoretical flow depth at the existing peak flow rate is determined assuming no flow from the proposed site. The kutter formula flow is used to calculate the depth within each reach. Existing existing sewage flow calculations are available in Appendix B; existing flow depth calculations are available in Appendix D. The theoretical existing peak flow in Reach 3 is 0.477 cfs (123,237 gpd), which is equates to a flow depth of 5.65 inches, and 141% capacity. The theoretical existing peak flow in Reach 1 is 1.481 cfs (382,961 gpd), which equates to a flow depth of 7.02 inches, and 140% capacity.

7.2 Proposed Capacity Analysis

Proposed sewer flow generations were calculated based on the previously described methods and summarized in Table 2. The theoretical flow including the proposed site is determined in the same manner as in the existing condition, and an additional 0.048 cfs (12,285 gpd) from the site contributes to Reaches 3 and 1 cummulative flow. The proposed sewage flow calculation is available in Appendix C; proposed flow depth calculations are available in Appendix E. The theoretical proposed peak flow in Reach 3 is 0.524CFS (135,552 gpd), which is equates to a flow depth of 5.81 inches, and 145% capacity. The theoretical proposed peak flow in Reach 1 is 1.529 cfs (395,246 gpd), which equates to a flow depth of 7.17 inches, and 143% capacity.

Reach 2 is not downstream of the proposed development so is therefore not analyzed.

7.3 Impacts to Existing Sewer System

The proposed project is estimated to contribute an additional 12,285 gpd to the average daily flow of the downstream system, which is equal to the allowable flow cited in the Will Serve Letter provided by the Sanitation District Office. The proposed project will also contribute 0.048 cfs to the peak flow rate, which increases the theoretical flow depth from 5.65 inches to 5.81 inches in Reach 3, and 7.02 inches to 7.17 inches in Reach 1. The sewer flow calculation reveals that with the proposed development, downstream sewers are expected to operate at less than 150% of capacity based on Peak Flow Rates, which is within acceptable parameters.

Results of the flow monitoring within Reach 3 yielded an actual peak flow depth of 2.47 inches and compared to the theoretical existing maximum flow depth of 5.65 inches, illustrates that the method of analysis is extremely conservative. Meaning, that while the theoretical proposed sewer flow depth is estimated to be 145% of the pipe capacity, which is still less than the allowable 150% capacity, the actual flow depth resulting from of the proposed development will be significantly less than theorized.

Sewer Area Study Table (TR082263) - Existing Condition

REACH	STREET NAME	SEGMENT		PIPE		CAPACITY[a] (ft^3/s)		Area[d]	Zoning	Flow	TOTAL FLOW						TOTAL FLOW % Full	
											Calculated Peak Flow[b]		Cumulative Calculated Flow[b]		Depth of Cumulative Flow (in)	City of Gardena Construction Plan #	Flow Depth[c]/ (0.5 x Pipe Dia.)	Cumulative Flow/ Capacity (cfs)
		M.H. #	M.H. #	Size (in.)	Slope (%)	1/2 Full (<15")	3/4 Full (≥15")	(Acres)		Coeff.	Avg (gpd)	Peak (cfs)	Avg (gpd)	Peak (cfs)				
3	Budlong Ave	6	8	8	0.24	0.27	0.00	55	Varies	See Appendix C	123,267	0.477	123,267	0.477	5.65	7-117	141	1.77
2	Rosecrans Ave	6	11	10	0.60	0.80	0.00	120	Varies		221,065	0.855	221,065	0.855	5.16	7-474	103	1.08
1	Rosecrans Ave	5	6	10	0.60	0.80	0.00	8	Varies		38,630	0.149	382,961	1.481	7.02	7-474	140	1.86

[a] Calculated using Kutter's Formula with $n = 0.013$ (as in S-C4 graph in PC Procedural Manual)

[b] Based on current land use and coefficients per LA County. (Attach supporting calculations)

[c] For pipes > 15", % Full should be calculated by taking the flow depth divided by 0.75 times the pipe diameter

[d] The areas shown in this column are those delivering flow to the system. Un-buildable areas are not included. The sum of this column does not equal that of the study area.

[e] The current system ends at MH 0 in Rosecrans Avenue at Normandie

Table 1. Existing sewage flow results summary.

Sewer Area Study Table (TR082263) - Proposed Condition

REACH	STREET NAME	SEGMENT		PIPE		CAPACITY[a] (ft^3/s)		Area[d]	Zoning	Flow	TOTAL FLOW						TOTAL FLOW % Full	
											Calculated Peak Flow[b]		Cumulative Calculated Flow[b]		Depth of Cumulative Flow (in)	City of Gardena Construction Plan #	Flow Depth[c]/ (0.5 x Pipe Dia.)	Cumulative Flow/ Capacity (cfs)
		M.H. #	M.H. #	Size (in.)	Slope (%)	1/2 Full (<15")	3/4 Full (≥15")	(Acres)		Coeff.	Avg (gpd)	Peak (cfs)	Avg (gpd)	Peak (cfs)				
3	Budlong Ave	6	8	8	0.24	0.27	0.00	55	Varies	See Appendix C	135,552	0.524	135,552	0.524	5.81	7-117	145	1.95
2	Rosecrans Ave	6	11	10	0.60	0.80	0.00	120	Varies		221,065	0.855	221,065	0.855	5.16	7-474	103	1.08
1	Rosecrans Ave	5	6	10	0.60	0.80	0.00	8	Varies		38,630	0.149	395,246	1.529	7.17	7-474	143	1.92

[a] Calculated using Kutter's Formula with $n = 0.013$ (as in S-C4 graph in PC Procedural Manual)

[b] Based on current land use and coefficients per LA County. (Attach supporting calculations)

[c] For pipes > 15", % Full should be calculated by taking the flow depth divided by 0.75 times the pipe diameter

[d] The areas shown in this column are those delivering flow to the system. Un-buildable areas are not included. The sum of this column does not equal that of the study area.

[e] The current system ends at MH 0 in Rosecrans Avenue at Normandie

Table 2. Proposed sewage flow results summary.

8. CONCLUSION

No mitigation is necessary for the construction of this project's 63 dwelling unit development as the flow depths resulting from the estimated peak flows within the downstream mains is less than 150% of the main capacity in all reaches. Additionally, the flow produced by the proposed project is equal to the allowable flow cited in the LACSD Will Serve Letter.

The poorest performing downstream pipe is within Reach 3 (MH 6 - MH 8), which is estimated to be at 145% capacity during peak flows. However, monitoring at MH 7 reported maximum flow depths within this reach as less than half of the theoretical maximum flow rate. Therefore, the results of this study are within limits established by the County of Los Angeles, Sanitation Districts of Los Angeles County, and the City of Gardena, so, the system is adequate to accept the project flows.