To: Cam Boyd
Chief Operating Officer
Coastal Community Builders

From: Chris Haugen, EIT | MKN & Associates, Inc.

Reviewer: Robert Lepore, GISP | MKN & Associates, Inc.

Date: June 25, 2024

Re: Final Infrastructure Review for City of Grover Beach – 197 West Grand Avenue Project

1. Introduction

The purpose of this infrastructure review was to identify potential impacts to the City of Grover Beach's (City) existing water distribution system and wastewater collection system from development of the 197 West Grand Avenue Project (Project) and to determine if offsite improvements are required based on the evaluation. The City has requested that MKN and Associates, Inc., (MKN) evaluate the water distribution system and the wastewater collection system as it relates to this project located at the northwest corner of West Grand Avenue and North 2nd Street.

Results presented in this report utilize analyses, design criteria, and data included in the City's 2019 Water System Master Plan (WMP) (MKN, 2019), 2019 Sewer Master Plan (SMP) (MKN, 2019) and 2020 Urban Water Management Plan (UWMP) (MKN, 2021). Project water demands and wastewater flows were calculated and added to the City's existing hydraulic models for the evaluation. The evaluation included existing/future demand and flow conditions (per the WMP and SMP) and this development.

2. Background

The City is an incorporated city of approximately 13,560 residents (per WMP) located in southern San Luis Obispo County. The City encompasses approximately 2.3 square miles of land that has been developed primarily for residential and commercial uses. The City topography varies from sea level to greater than 200 feet above mean sea level.

The City operates four (4) active production wells to extract groundwater from the Paso Robles formation and Careaga formation. All wells are located within the Santa Maria Valley Groundwater Basin (SMVGB). The City also receives surface water from the Lopez Project, which includes the Lopez Reservoir, the Lopez Terminal Reservoir, the Lopez Water Treatment Plant and the Lopez Pipeline. The City's existing water distribution system encompasses over 57 miles of water mains ranging from 2 to 16 inches in diameter. The water distribution system also includes three (3) welded steel storage tanks and one (1) booster pump station.

The City provides sewer collection services for approximately 13,560 customers with wastewater treatment provided by the South San Luis Obispo County Sanitation District (SSLOCSD). The sewer collection system consists of 35 miles of gravity collection system piping ranging in diameter from 6 to 12 inches, 0.5 miles of force main, approximately 360 manholes, 270 cleanouts, and three lift stations ranging in capacity from 120 to 350 gallons per minute (GPM) (simplex operation). In addition to City sewer facilities, there are several private lift stations that pump into the existing collection system.

The City owns hydraulic models for both the existing water distribution system and the wastewater collection system, which are revised as infrastructure reviews are completed.

3. Project Information and Calculations

The proposed Project is located at 197 West Grand Avenue, the northwest corner of West Grand Avenue and North 2nd Street, as shown in **Attachment 1**. The Project will include the construction of a mixed-use commercial and multi-family development consisting of the following:

- 2,080 square feet (SF) of ground-floor commercial space
- Three-bedroom townhomes with an attached garage and private roof deck (total of 23)
    - 1,800 SF units (total of 19)
    - 1,900 SF units (total of 4)
- Ground level common facilities and outdoor plaza

Steps for calculating the water demands and wastewater flows for this project began with the land use and demand factors as outlined in the WMP. Once water demands were calculated, a return to sewer ratio was applied in accordance with the SMP to determine the wastewater flow for the Project. These values were then entered into the hydraulic models and utilized for the analysis presented in the following sections.

a. Water Demand and Wastewater Flow Factors

The Project's water demand estimate for domestic use was calculated using values developed for the City's WMP and 2020 UWMP. **Table 3-1** provides a summary of the demand factors from the City's WMP.

Table 3-1: WMP Water Demand Factors

Demand Type	Unit	Demand Factor (GPDU)
Residential	Person	117
Hotel	Room	100
Restaurant	SF	0.65
Commercial Service / Retail	SF	0.10
Industrial	SF	0.10
Notes: GPDU = gallons per day per unit		

Table 3-2 provides a summary of per capita demand factors from the City's 2020 UWMP.

Table 3-2: 2020 UWMP Historical Use Rates (GPCD)					
Year	**Service Area Population**	**Water Production (AF)**	**Gross Water Use (gpcd)**	**Meter Residential Use (AF)**	**Residential Water Use (gpcd)**
2010	13,156	2,207	150	1,351	92
2011	13,205	2,644	179	1,209	82
2012	13,227	2,644	180	1,246	85
2013	13,345	1,795	121	1,228	83
2014	13,407	1,353	91	1,117	75
2015	13,489	1,252	84	863	58
2016	13,565	1,208	82	855	57
2017	13,593	1,248	85	851	57
2018	13,560	1,222	83	881	58
2019	13,320	1,188	81	882	59
2020	13,214	1,289	87	930	63
2021	12,803	1,270	89	931	65
2022	12,623	1,209	86	931	66
		5-Year Average	**85**	-	**62**
		10-Year Average	**97**	-	**69**

Notes:
1. Service area population estimates based on Department of Finance Table E-5 City/County Population and Housing Estimates
2. Five-year average includes years 2018 – 2022
3. Ten-year average includes years 2012 – 2022
4. gpcd = gallon per day per capita; AF = acre-feet

The historical 5-year average (2018 to 2022) water use rate of 85 gpcd was utilized to calculate residential demands for the Project.

To determine wastewater flow for the Project, a return to wastewater ratio was used. Section 3 of the SMP identifies the wastewater return factors for single family residential, multi-family residential, commercial/institutional, and industrial uses. The water use to wastewater flow reduction values are summarized in **Table 3-3** and the multi-family residential and commercial factors were used.

Table 3-3: Sewer Use Factors	
Customer Class	**Water Use to Wastewater Flow Return Factor (%)**
Single Family Residential	70
Multi-Family Residential	80
Commercial / Institutional	90
Industrial	95

b. Domestic Water Demand & Supply Calculation

As previously stated in this report, the Project's water demand estimate for domestic use was calculated using values developed in the City's WMP and 2020 UWMP. **Table 3-4** provides a summary of the demand calculations for the Project domestic water demand based on information provided by the developer and the City.

Table 3-4: Domestic Water Supply Calculations

Land Use Category	Unit Type	Unit Quantity	Demand Factor (gpd/unit)	Average Demand		Maximum Day Demand[3] (gpm)	Average Demand (AFY)
				gpd	gpm		
Three Bedroom Townhouse	Person	69	85	5,865	4.1	10.0	6.6
Commercial	Square	2,080	0.10	208	0.1	0.2	0.2
Subtotal				**6,073**	**4.2**	**10.2**	**6.8**
Estimated Existing Demand from WMP				864	0.6	1.5	1.0
Estimated Future Demand from WMP				144	0.1	0.2	0.2
Total Net Increase				**5,065**	**3.5**	**8.5**	**5.6**

Notes:
1. Unit estimates based on totals identified in Development Application 23-31 for 197 West Grand Avenue dated November 7th, 2023, and prepared by Coastal Community Builders, Inc. and RRM Design Group.
2. The population estimate for MFR units assumed equivalent persons based on number of bedrooms. Therefore, a three-bedroom town house contains approximately three people.
3. Maximum Day Demand = ADD X 2.43 peaking factor per City's 2019 Water Master Plan
4. gpm = gallons per minute
5. gpd = gallons per day
6. AFY = acre feet per year
7. ADD = Average Day Demand

Water demand is typically reported in acre feet per year (AFY) and this project will require a net increase in annual water supply of 5.6 AFY to meet the projected requirements.

c. Wastewater Flow Calculation

The Project water demands from **Table 3-4** and return to wastewater ratio from the City's SMP were used to determine the Project's wastewater flow. This analysis included calculating the wastewater flow for the net increase of the proposed Project as detailed in **Table 3-5.**

Table 3-5: Domestic Wastewater Flow Calculations

Land Use Category	Average Day Water Demand (gpd)	Wastewater Return Factor	Average Day Flow (gpd)	Average Day Flow (gpm)	Peak Hour Flow[1] (gpm)
Three Bedroom Townhouse	5,865	80%	4,694	3.3	7.2
Commercial	208	90%	187	0.1	0.2
		Subtotal	**4,881**	**3.4**	**7.4**
		Estimated Existing Flow from SMP	720	0.5	1.1
		Estimated Future Flow from SMP	144	0.1	0.2
		Total Net Increase	**4,017**	**2.8**	**6.1**

Notes:
1. Peak hour flow = ADF x 2.19 peaking factor
2. gpm = gallons per minute
3. gpd = gallons per day

The total net increase in average day and peak hour wastewater flow contributed to the City's wastewater collection system are <u>**0.6 gpm**</u> and **1.3 <u>gpm</u>**, respectively.

4. Evaluation Criteria

Evaluation criteria outlined in the City's WMP and SMP were applied to the model results to identify areas where the distribution and collection systems may be deficient. Section 6 of the WMP and Section 5 of the SMP describe these criteria as summarized below:

<u>Water Distribution System Requirements</u>

- Minimum Domestic Pressure: 40 psi
- Maximum Domestic Pressure: 125 psi
- Minimum Fire Flow Pressure: 20 psi
- Maximum Pipe Flow Velocity (MDD): 5 ft/s
- Maximum Fire Flow Pipe Velocity: 10 ft/s
- Mains for Developments (min.): 8-inch

<u>Wastewater Collection System Requirements</u>

- For gravity pipes ≤8 inches diameter, the allowable pipe flow depth to diameter ratio (d/D ratio) is 50% at PHF
- For gravity pipes ≥10 inches diameter, the allowable d/D ratio is 75% at PHF
- Minimum Pipe Velocity: 2 ft/s
- Maximum Pipe Velocity: 10 ft/s
- Minimum Pipe Size: 8-inch

5. Water Distribution System Infrastructure Impacts

As noted in Section 3, the Project will include 23 three-bedroom residential units and 2,080 square feet of commercial use. The Project's point of connections (POCs) to the distribution system will be an existing 10-inch diameter water main along N 2nd Street and an existing 10-inch diameter water main along Ramona Ave. The local water distribution system, Project location, and Project POCs can be seen on **Attachment 2.** The following subsections provide an evaluation of the City's storage and distribution facilities to serve the Project.

a. Storage Evaluation

A storage analysis was conducted for the existing/future conditions within the pressure zone that the Project is located. The following criteria were utilized to determine the water storage requirement:

- Operational Storage: 25% of Maximum Daily Demand
- Emergency Storage: 50 gpcd x 3 days x population
- Fire Storage: Largest fire flow requirement (school = 4,000 gpm)

Table 5-1 provides an evaluation of the City's existing water storage facilities to serve existing demands, future planned development projects (per the WMP), and the Project:

Table 5-1: Storage Analysis for Future Demands		
Storage Type	**Criteria**	**Storage Volume (Gallons)**
Fire Storage	4,000 gpm x 4 hour	960,000
Emergency Storage	50 gpcd x 3 days x 15,313 pp	2,296,950
Equalization Storage	0.25 x MDD of 3.74 MGD	935,000
	Total Recommended Storage	**4,191,950**
	Total Available Storage	3,775,884
	WMP Surplus / (Deficit)	**(416,066)**
197 West Grand Avenue Project		
Emergency Storage	50 gpcd x 3 days x 69 pp	10,350
Equalization Storage	0.25 x MDD of 0.01 MGD	2,500
	Revised Total Recommended Storage	**12,850**
	Project Surplus / (Deficit)	**(428,916)**

Per the WMP, under future demand conditions the City will have a storage deficit of approximately 416,000 gallons. This development project will increase the storage deficit by approximately 3% to 429,000 gallons. However, since space is limited at the existing reservoir site it is recommended that the City install a permanent standby generator at Well No. 4 to supplement the storage deficit. This was a recommended improvement in the WMP and would allow the City to supplement the future storage deficit, including the Project, through the ability to supply water to the system during a power outage.

b. Distribution System Evaluation

The Project is located within the City's gravity pressure zone. Average pressures at the Project site are estimated at 101 psi per the City's existing water system hydraulic model. The criteria used to evaluate Project fire hydrant flow requirements are outlined in the City's WMP (Table 6-2). The minimum required commercial fire hydrant flow requirements are shown in **Table 5-2.** This fire hydrant flow requirement was simulated utilizing the City's calibrated water model and results are presented in **Attachment 3.**

Table 5-2: Project Specific Fire Flow Requirements	
Land Use	Commercial
Hydrant Flow	3,750 gpm
Duration	3 Hours
Residual Pressure (min.)	20 psi

This report presents the results of domestic water supply at the Project's POCs to the distribution system (nodes J-25 and J-80) on North 2nd Street and Ramona Ave. The results from the calibrated hydraulic model for the local pressure nodes and pipelines can be found in **Attachment 3.** The results reflect existing and future demand conditions plus the Project. Once the Project demand was added to the hydraulic model, the surrounding infrastructure was analyzed for ADD, MDD and MDD plus project fire flow. For modeling purposes, project fire flow results are modeled as a "design fire" with city-wide maximum day water demands.

No fire flow deficiencies were identified in the project area to serve the required commercial fire flow demands. Based on a fire flow requirement of 3,750 gpm, the existing water distribution system appears sufficient to serve the Project demands.

6. Wastewater Collection System Infrastructure Impacts

As noted in Section 3, the Project will include 23 three-bedroom residential units and 2,080 square feet of commercial use. The Project's point of connection (POC) to the wastewater collection system is a direct connection to the existing 15-inch diameter SSLOCSD Trunk Sewer System on North 2nd Street, adjacent to the proposed east exit of the Project. The Project location, wastewater POC, and flow path from the Project location to the SSLOCSD treatment facility is shown on **Attachment 4.** Wastewater from the Project site would travel south along the SSLOCSD Trunk Sewer System until it terminates at the treatment site facility. The collection system hydraulic analysis in the SMP evaluated the following flow scenarios under average day and peak hour flow conditions:

- Existing Flow Scenario:
    - Existing flow conditions in 2018 validated with in field flow monitoring data
- Future Flow Scenario:
    - Includes existing flows plus pending development projects that are under construction, approved by the City, in the development review process
    - Vacant residential, commercial, and industrial properties
    - Underutilized residential properties
- Buildout Flow Scenario:
    - Includes future flows plus Underutilized West Grand Avenue corridor lots
    - Urban Reserve Area (strawberry field properties)
    - Parcels currently on septic that would be converted to sewer at buildout

As shown on **Attachment 1**, the Project is located within the Underutilized West Grand Avenue corridor and the total net flow increase from the Project identified in **Table 3-5** was added to the Buildout Flow Scenario. Along the flow path from the Project location to the SSLOCSD treatment facility the following improvements were identified and recommended in the City's SMP.

- Existing Flow Scenario:
    - No improvements recommended along Project flow path
- Future Flow Scenario:
    - Upgrade existing SSLOCSD 18-inch to 21-inch on Highway 1 from Manhattan Avenue to Trouville Avenue
- Buildout Flow Scenario:
    - Upgrade existing SSLOCSD 18-inch to 21-inch on Highway 1 from Manhattan Avenue to Trouville Avenue

The wastewater model results, shown on **Attachment 5**, represent all downstream pipe segments from the Project during existing and buildout peak hour flow scenarios. Based on hydraulic analyses, the following was observed:

- <u>Existing Flow Scenario with SMP CIPs:</u>
    - Project flow increases the PHF d/D by 1% in the existing SSLOCSD 15-inch on North 2nd Street
    - Project flow increases the PHF d/D by 1% in the existing SSLOCSD 15-inch on West Grand Avenue
    - Project flow increases the PHF d/D by 1% in the existing SSLOCSD 21-inch on Pacific Boulevard
    - Project flow increases the PHF d/D by 1% in the existing SSLOCSD 21-inch on Coolidge Drive
    - Project flow increases the PHF d/D by 1% in the existing SSLOCSD 24-inch on Norswing Drive
    - Project flow increases the PHF d/D by 1% in the existing SSLOCSD 24-inch on Lakeside Avenue
- <u>Buildout Flow Scenario with SMP CIPs:</u>
    - Project flow increases the PHF d/D by 1% in the existing SSLOCSD 15-inch on Ramona Avenue
    - Project flow increases the PHF d/D by 1% in the existing SSLOCSD 15-inch on West Grand Avenue
    - Project flow increases the PHF d/D by 1% in the existing SSLOCSD 21-inch on Pacific Boulevard
    - Project flow increases the PHF d/D by 1% in the existing SSLOCSD 24-inch on Norswing Drive
    - Project flow increases the PHF d/D by 1% in the existing SSLOCSD 24-inch on Air Park Drive

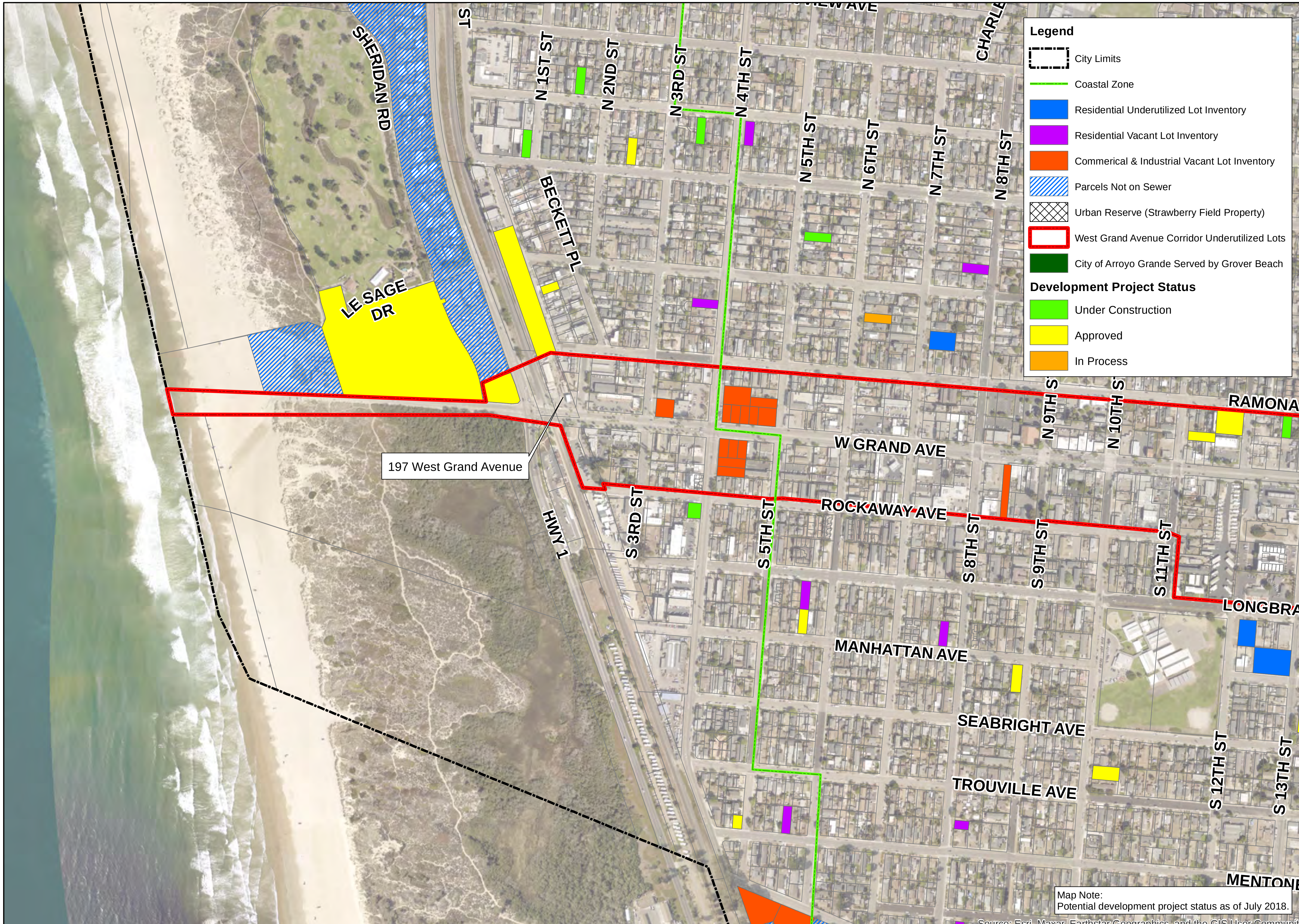
As seen in **Attachment 5**, no new pipeline capacity deficiencies were identified with the hydraulic analysis.

7. Recommendations

Based on the hydraulic evaluation completed in Sections 5 and 6, no new improvements beyond what was already identified in the City's 2019 Water and Sewer Master Plans are recommended to serve the Project.

Attachments:

Attachment 1 – Location Map
Attachment 2 – Water Pressure Zone Map
Attachment 3 – Water Model Results
Attachment 4 – Downstream Wastewater Flow Path Map
Attachment 5 – Wastewater Model Results



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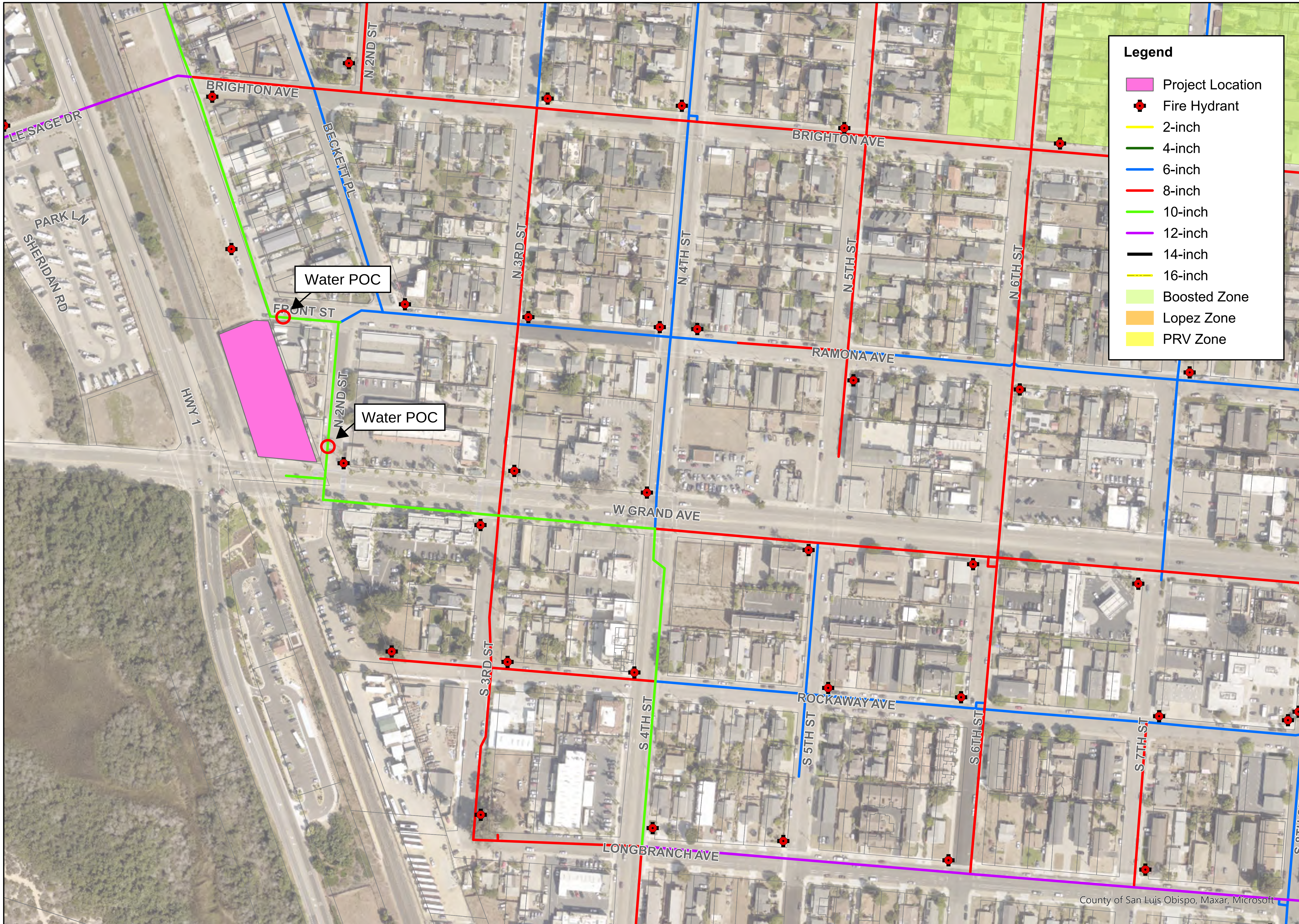
Attachment 1:

Location Map

Scale = NTS



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Attachment 2:

Water Pressure Zone Map

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WATER WASTEWATER REUSE

Water Model Result

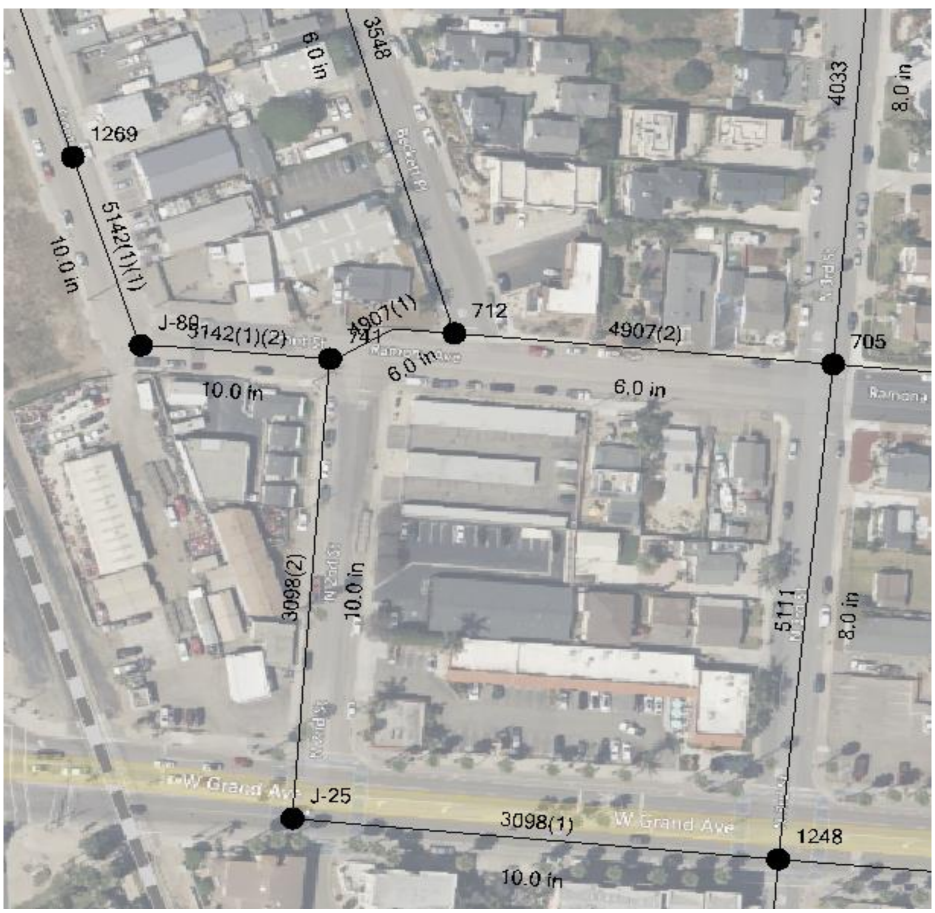
Pressure Node Summary - Existing Demands

Date: 4/2/2024
Project Name: 197 W Grand Avenue

Node ID from Model	Elevation (ft)	ADD Pressure (psi)	MDD Pressure (psi)	MDD plus Project Fire Flow (psi)[1]
Local Junctions				
705	37.2	94	87	47
712	28.3	98	91	49
1248	28.0	98	91	51
1269	24.2	100	93	50
J-25	21.0	101	94	50
J-80	24.6	100	92	50

Notes:
1. FF of 3,750 gpm applied at node J-25

*	*Point of Connection*
	Nodes with < 40 psi during ADD
	Nodes with > 125 psi during ADD
	Nodes with < 20 psi during MDD at Fire Flow Condition



Water Model Result

Pipe Velocity Summary - Existing Demands

Date: 4/2/2024
Project Name: 197 W Grand Avenue

Pipe ID from Model	Diameter (in)	Length (ft)	ADD Velocity (fps)	MDD Velocity (fps)	MDD plus Project Fire Flow Velocity (fps)[1]
Local Pipes					
3098 (1)	10	389	0.1	0.3	9.8
3098 (2)	10	398	0.1	0.3	5.6
4907(2)	6	303	0.1	0.2	4.7
5142(1)(2)	10	151	0.1	0.3	3.3

Notes:
1. FF of 3,750 gpm applied at node J-25

*	*Point of Connection*
	Pipelines that exceed 5 ft/sec during MDD
	Pipelines that exceed 10 ft/sec during MDD at Fire Flow Condition

Water Model Result

Pressure Node Summary - Future Demands

Date: 4/2/2024
Project Name: 197 W Grand Avenue

Node ID from Model	Elevation (ft)	ADD Pressure (psi)	MDD Pressure (psi)	MDD plus Project Fire Flow (psi)[1]
Local Junctions				
705	37.2	93	88	44
712	28.3	97	92	46
1248	28.0	97	92	48
1269	24.2	99	94	47
J-25	21.0	100	95	47
J-80	24.6	99	94	47

Notes:
1. FF of 3,750 gpm applied at node J-25

*	*Point of Connection*
	Nodes with < 40 psi during ADD
	Nodes with > 125 psi during ADD
	Nodes with < 20 psi during MDD at Fire Flow Condition

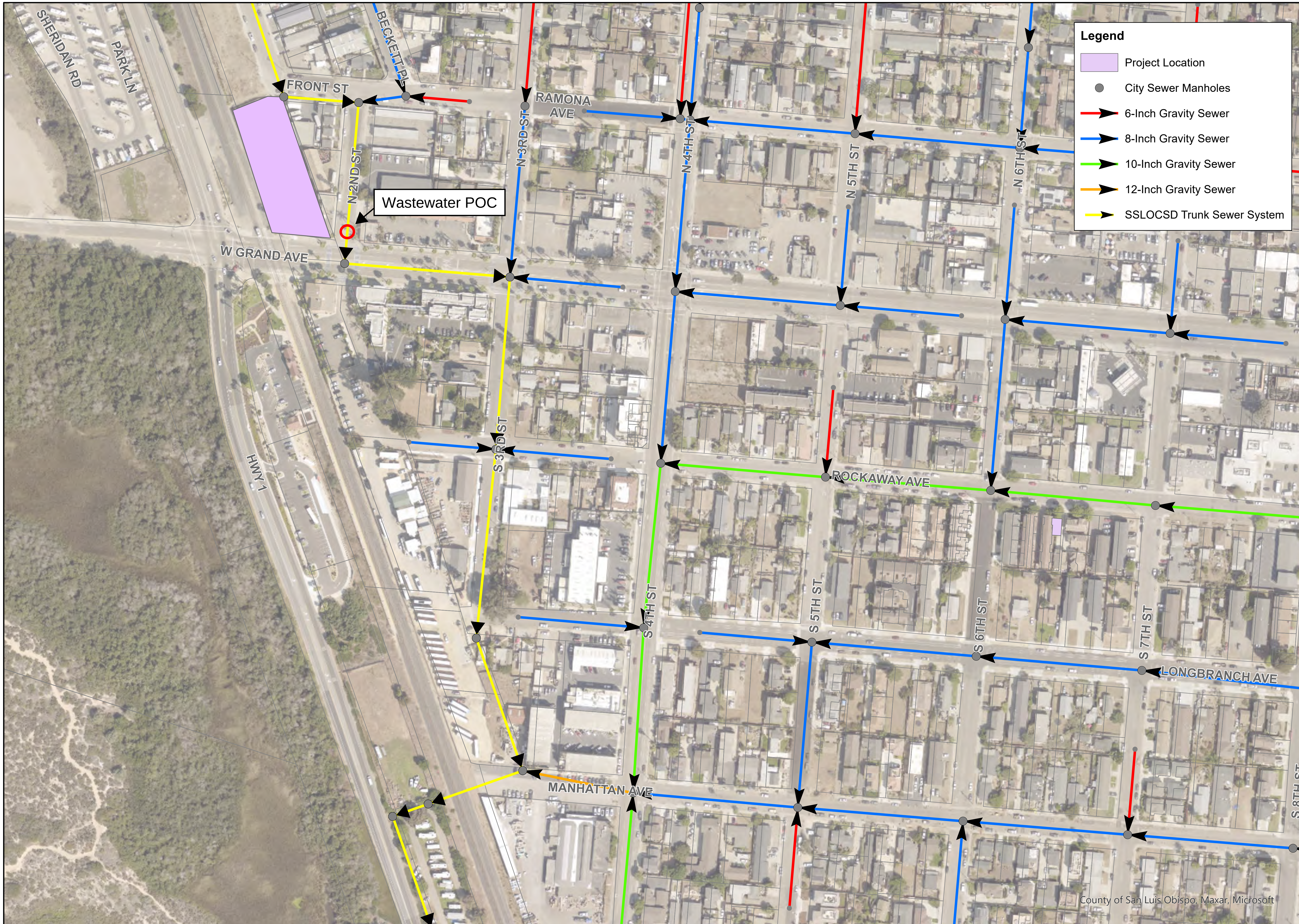
Water Model Result
Pipe Velocity Summary - Future Demands

Date: 4/2/2024
Project Name: 197 W Grand Avenue

Pipe ID from Model	Diameter (in)	Length (ft)	ADD Velocity (fps)	MDD Velocity (fps)	MDD plus Project Fire Flow Velocity (fps)[1]
Local Pipes					
3098 (1)	10	389	0.2	0.4	9.9
3098 (2)	10	398	0.2	0.4	5.5
4907(2)	6	303	0.1	0.3	4.8
5142(1)(2)	10	151	0.2	0.4	3.1

Notes:
1. FF of 3,750 gpm applied at node J-25

*	*Point of Connection*
	Pipelines that exceed 5 ft/sec during MDD
	Pipelines that exceed 10 ft/sec during MDD at Fire Flow Condition



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Attachment 4:

Wastewater Flow Path

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Scale = NTS

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WATER WASTEWATER REUSE

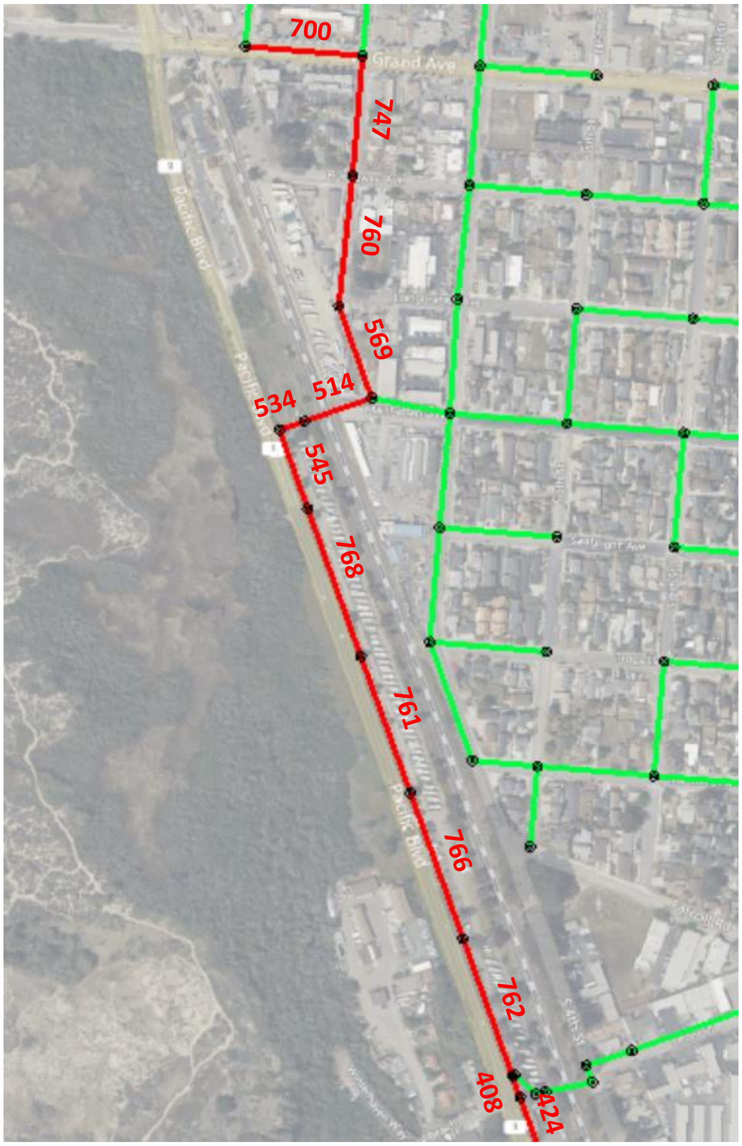
Wastewater Model Result
d/D and Velocity Summary - Existing Flows without CIPs

Date: 4/2/2024
Project Name: 197 W Grand Ave

Pipe ID From Model	Diameter (in)	Length (ft)	Slope	Existing PHF Conditions without Project Flow			Existing PHF Conditions with Project Flow		
				Flow (gpm)	Velocity (ft/s)	% (d/D)	Flow (gpm)	Velocity (ft/s)	% (d/D)
700	15	370.5	0.14	302	1.49	39	308	1.50	40
747	15	386.2	0.14	310	1.52	40	316	1.53	40
760	15	424.3	0.139	313	1.42	41	319	1.43	41
569	15	313.8	0.147	316	0.85	53	322	0.86	53
514	18	224.1	0.219	1,593	2.68	70	1,599	2.69	70
434	18	84.1	0.214	1,593	2.69	70	1,599	2.70	70
545	18	269.2	0.215	1,593	2.80	69	1,599	2.80	69
768	18	503.9	0.24	1,593	2.72	68	1,599	2.72	69
761	21	467.8	0.088	1,593	2.04	69	1,599	2.04	70
766	21	498.7	0.1	1,593	2.11	67	1,599	2.12	67
762	21	468.5	0.1	1,593	2.93	58	1,599	2.93	58
408	21	17.3	0.115	1,745	4.17	46	1,751	4.18	46
424	21	55.8	0.161	1,745	2.59	60	1,751	2.59	60
767	21	502.2	0.179	1,745	2.90	57	1,751	2.91	57
764	21	497.6	0.241	1,745	2.21	61	1,751	2.22	62
997	21	328.5	0.094	1,745	3.05	60	1,751	3.05	61
983	24	539	0.1	1,746	2.10	57	1,752	2.10	57
984	24	264	0.102	1,746	2.10	57	1,752	2.10	57
985	24	268.9	0.1	1,746	2.11	57	1,752	2.12	57
986	24	264.8	0.102	1,750	2.15	56	1,757	2.15	57
987	24	265.9	0.102	1,751	2.24	55	1,757	2.24	55
988	24	284	0.13	1,752	2.08	56	1,758	2.08	56
989	24	280	0.093	1,754	1.87	62	1,760	1.87	62
990	24	297.8	0.077	1,954	2.27	61	1,960	2.27	61
991	24	418	0.115	1,954	2.31	58	1,960	2.31	59
992	24	316.1	0.101	1,954	2.21	61	1,960	2.21	61
993	24	336	0.098	1,956	2.42	58	1,962	2.42	58
994	24	171.8	0.105	1,956	2.42	57	1,962	2.42	57
995	24	399.7	0.1	1,956	2.87	54	1,962	2.87	54
996	24	431	0.216	1,956	4.17	43	1,962	4.18	43

*	*Point of Connection*
	Pipeline velocity over 6.0 feet per second during PHF conditions
	Pipeline with diameters <= 8 inches that exceed 50% d/D during PHF conditions
	Pipeline with diameters >= 10 inches that exceed 75% d/D during PHF conditions

Wastewater Model Result
d/D and Velocity Summary - Existing Flows Map



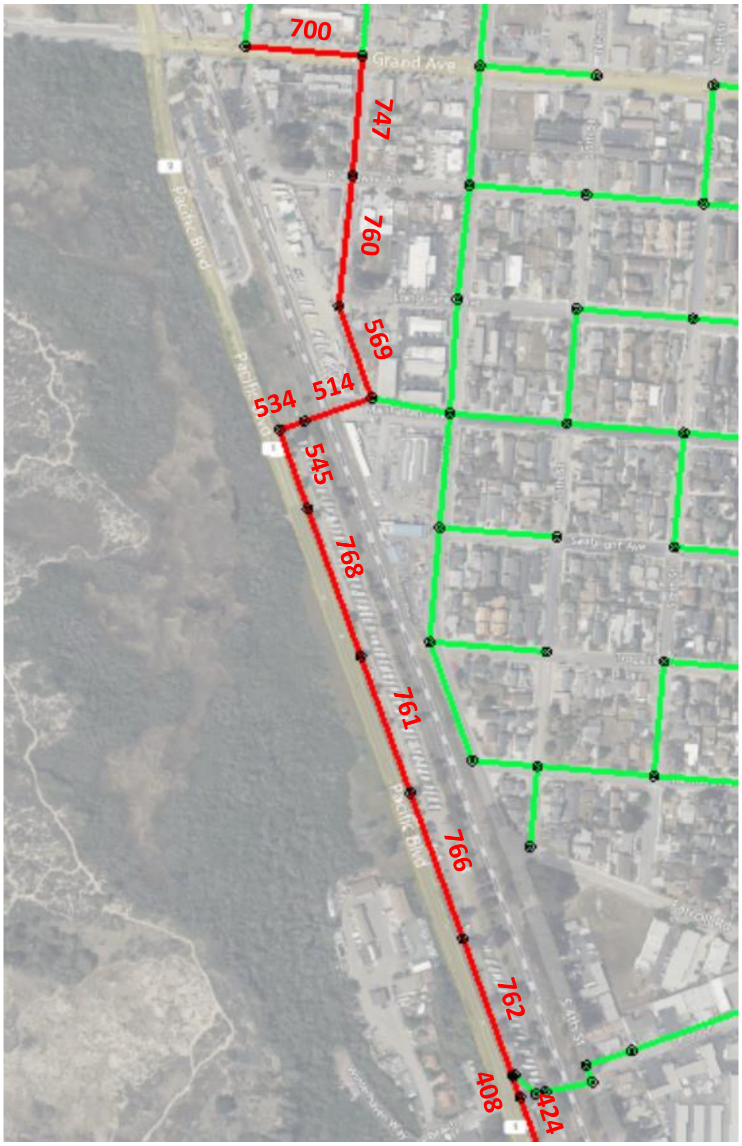
Wastewater Model Result
d/D and Velocity Summary - Existing Flows with CIPS

Date: 4/2/2024
Project Name: 197 W Grand Ave

Pipe ID From Model	Diameter (in)	Length (ft)	Slope	Existing PHF Conditions with CIPS and without Project Flow			Existing PHF Conditions with CIPS and Project Flow		
				Flow (gpm)	Velocity (ft/s)	% (d/D)	Flow (gpm)	Velocity (ft/s)	% (d/D)
700	15	370.5	0.14	302	1.49	39	308	1.50	40
747	15	386.2	0.14	310	1.52	40	316	1.53	40
760	15	424.3	0.139	313	1.42	41	319	1.43	41
569	15	313.8	0.147	316	0.85	53	322	0.86	53
514	18	224.1	0.219	1,593	2.68	70	1,599	2.69	70
434	18	84.1	0.214	1,593	2.69	70	1,599	2.70	70
545	18	269.2	0.215	1,593	2.80	69	1,599	2.80	69
768	18	503.9	0.24	1,593	2.72	68	1,599	2.72	69
761	21	467.8	0.088	1,593	2.04	69	1,599	2.04	70
766	21	498.7	0.1	1,593	2.11	67	1,599	2.12	67
762	21	468.5	0.1	1,593	2.93	58	1,599	2.93	58
408	21	17.3	0.115	1,745	4.17	46	1,751	4.18	46
424	21	55.8	0.161	1,745	2.59	60	1,751	2.59	60
767	21	502.2	0.179	1,745	2.90	57	1,751	2.91	57
764	21	497.6	0.241	1,745	2.21	61	1,751	2.22	62
997	21	328.5	0.094	1,745	3.05	60	1,751	3.05	61
983	24	539	0.1	1,746	2.10	57	1,752	2.10	57
984	24	264	0.102	1,746	2.10	57	1,752	2.10	57
985	24	268.9	0.1	1,746	2.11	57	1,752	2.12	57
986	24	264.8	0.102	1,750	2.15	56	1,757	2.15	57
987	24	265.9	0.102	1,751	2.24	55	1,757	2.24	55
988	24	284	0.13	1,752	2.08	56	1,758	2.08	56
989	24	280	0.093	1,754	1.87	62	1,760	1.87	62
990	24	297.8	0.077	1,954	2.27	61	1,960	2.27	61
991	24	418	0.115	1,954	2.31	58	1,960	2.31	59
992	24	316.1	0.101	1,954	2.21	61	1,960	2.21	61
993	24	336	0.098	1,956	2.42	58	1,962	2.42	58
994	24	171.8	0.105	1,956	2.42	57	1,962	2.42	57
995	24	399.7	0.1	1,956	2.87	54	1,962	2.87	54
996	24	431	0.216	1,956	4.17	43	1,962	4.18	43

*	*Point of Connection*
	Pipeline velocity over 6.0 feet per second during PHF conditions
	Pipeline with diameters <= 8 inches that exceed 50% d/D during PHF conditions
	Pipeline with diameters >= 10 inches that exceed 75% d/D during PHF conditions
	Recommended pipe size upgrade per 2019 SMP

Wastewater Model Result
d/D and Velocity Summary - Existing Flows Map



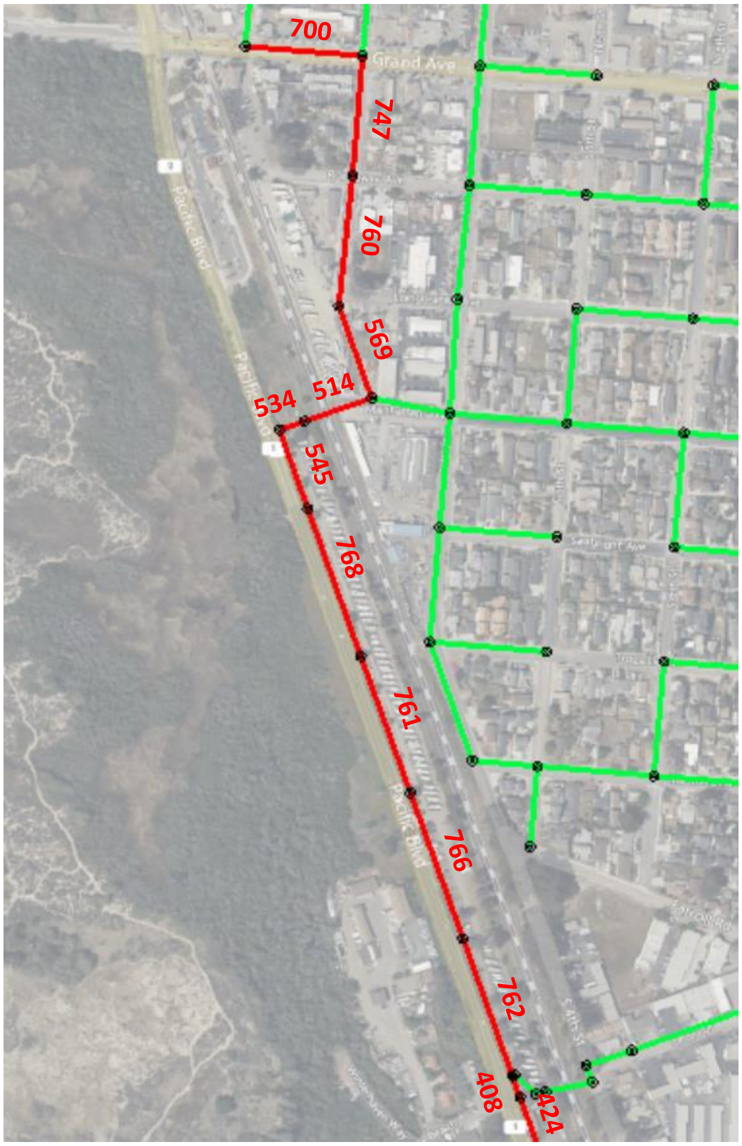
Wastewater Model Result
d/D and Velocity Summary - Future Flows without CIPS

Date: 4/2/2024
Project Name: 197 W Grand Ave

Pipe ID From Model	Diameter (in)	Length (ft)	Slope	Future PHF Conditions without Project Flow			Future PHF Conditions with Project Flow		
				Flow (gpm)	Velocity (ft/s)	% (d/D)	Flow (gpm)	Velocity (ft/s)	% (d/D)
700	15	370.5	0.14	627	1.14	100	633	1.15	100
747	15	386.2	0.14	641	1.16	100	647	1.17	100
760	15	424.3	0.139	645	1.17	100	651	1.18	100
569	15	313.8	0.147	648	1.18	100	654	1.19	100
514	18	224.1	0.219	2,317	2.92	100	2,323	2.93	100
434	18	84.1	0.214	2,317	2.92	100	2,323	2.93	100
545	18	269.2	0.215	2,317	2.92	100	2,323	2.93	100
768	18	503.9	0.24	2,317	2.92	100	2,323	2.93	100
761	21	467.8	0.088	2,317	2.21	97	2,323	2.21	97
766	21	498.7	0.1	2,317	2.36	89	2,323	2.36	89
762	21	468.5	0.1	2,317	3.23	74	2,323	3.23	74
408	21	17.3	0.115	2,691	4.80	57	2,697	4.80	57
424	21	55.8	0.161	2,691	2.81	83	2,697	2.81	84
767	21	502.2	0.179	2,691	3.02	80	2,697	3.02	80
764	21	497.6	0.241	2,691	2.54	86	2,697	2.54	86
997	21	328.5	0.094	2,691	3.03	86	2,697	3.03	86
983	24	539	0.1	2,692	2.28	78	2,697	2.28	79
984	24	264	0.102	2,692	2.28	78	2,697	2.28	78
985	24	268.9	0.1	2,692	2.29	78	2,698	2.30	78
986	24	264.8	0.102	2,696	2.31	77	2,702	2.31	77
987	24	265.9	0.102	2,697	2.34	77	2,703	2.34	77
988	24	284	0.13	2,698	2.22	78	2,704	2.22	78
989	24	280	0.093	2,699	2.13	84	2,705	2.13	84
990	24	297.8	0.077	2,899	2.43	81	2,905	2.43	82
991	24	418	0.115	2,899	2.46	78	2,905	2.46	78
992	24	316.1	0.101	2,899	2.44	80	2,905	2.44	80
993	24	336	0.098	2,902	2.63	76	2,907	2.63	76
994	24	171.8	0.105	2,902	2.65	74	2,907	2.65	74
995	24	399.7	0.1	2,902	3.15	69	2,907	3.15	69
996	24	431	0.216	2,902	4.71	54	2,907	4.71	54

*	*Point of Connection*
	Pipeline velocity over 6.0 feet per second during PHF conditions
	Pipeline with diameters <= 8 inches that exceed 50% d/D during PHF conditions
	Pipeline with diameters >= 10 inches that exceed 75% d/D during PHF conditions
	Recommended pipe size upgrade for existing condition per 2019 SMP

Wastewater Model Result
d/D and Velocity Summary - Future Flows Map



Wastewater Model Result
d/D and Velocity Summary - Future Flows with CIPS

Date: 4/2/2024
Project Name: 197 W Grand Ave

Pipe ID From Model	Diameter (in)	Length (ft)	Slope	Future PHF Conditions with CIPS and without Project Flow			Future PHF Conditions with CIPS and Project Flow		
				Flow (gpm)	Velocity (ft/s)	% (d/D)	Flow (gpm)	Velocity (ft/s)	% (d/D)
700	15	370.5	0.14	627	1.79	60	633	1.80	61
747	15	386.2	0.14	641	1.82	61	647	1.82	61
760	15	424.3	0.139	644	1.76	62	651	1.76	62
569	15	313.8	0.147	648	1.46	69	654	1.47	69
514	21	224.1	0.219	2,317	2.95	68	2,323	2.95	68
434	21	84.1	0.214	2,317	2.95	68	2,323	2.95	68
545	21	269.2	0.215	2,317	2.96	68	2,323	2.95	68
768	21	503.9	0.24	2,317	2.20	81	2,323	2.20	81
761	21	467.8	0.088	2,317	2.21	97	2,323	2.21	97
766	21	498.7	0.1	2,317	2.36	89	2,323	2.36	89
762	21	468.5	0.1	2,317	3.23	74	2,323	3.23	74
408	21	17.3	0.115	2,690	4.80	57	2,697	4.80	57
424	21	55.8	0.161	2,690	2.81	83	2,697	2.81	84
767	21	502.2	0.179	2,690	3.02	80	2,697	3.02	80
764	21	497.6	0.241	2,690	2.54	86	2,697	2.54	86
997	21	328.5	0.094	2,690	3.03	86	2,697	3.03	86
983	24	539	0.1	2,691	2.28	78	2,697	2.28	79
984	24	264	0.102	2,691	2.28	78	2,697	2.28	78
985	24	268.9	0.1	2,692	2.29	78	2,698	2.30	78
986	24	264.8	0.102	2,696	2.31	77	2,702	2.31	77
987	24	265.9	0.102	2,697	2.34	77	2,703	2.34	77
988	24	284	0.13	2,698	2.22	78	2,704	2.22	78
989	24	280	0.093	2,699	2.13	84	2,705	2.13	84
990	24	297.8	0.077	2,899	2.43	81	2,905	2.43	82
991	24	418	0.115	2,899	2.46	78	2,905	2.46	78
992	24	316.1	0.101	2,899	2.44	80	2,905	2.44	80
993	24	336	0.098	2,901	2.63	76	2,907	2.63	76
994	24	171.8	0.105	2,901	2.65	74	2,907	2.65	74
995	24	399.7	0.1	2,901	3.15	69	2,907	3.15	69
996	24	431	0.216	2,901	4.71	54	2,907	4.71	54

*	*Point of Connection*
	Pipeline velocity over 6.0 feet per second during PHF conditions
	Pipeline with diameters <= 8 inches that exceed 50% d/D during PHF conditions
	Pipeline with diameters >= 10 inches that exceed 75% d/D during PHF conditions
	Recommended pipe size upgrade per 2019 SMP

Wastewater Model Result
d/D and Velocity Summary - Future Flows Map