CAPITAL IMPROVEMENT PROGRAM

7.1 INTRODUCTION

The capacity analysis, described in Chapter 6, sets the foundation for the CIP, which focuses on alleviating the collection system capacity deficiencies and identifying the needs for future growth. The CIP will serve as a working document that will provide the City a structured plan to update and expand the sewer collection system. The criteria used to develop the CIP are discussed in this chapter along with a phasing of improvements.

7.2 CAPITAL IMPROVEMENT PROGRAM

The City must consider capital improvements within its entire service area to address capacity deficiencies and plan for future growth. The CIP provides the City with a working document that will correct the capacity deficiencies in the collection system in order to convey the PWWF to the WWTP. When fully implemented, the CIP will provide hydraulic capacity to convey PWWFs during the 10-year, 24-hour design storm for the projected future condition. This section provides a discussion of the sewer replacement criteria, modeling assumptions, cost criteria, and recommended pipeline improvements.

7.2.1 CIP Criteria

7.2.1.1 Modeling and Analysis Assumptions

The CIP is based on several assumptions:

- The hydraulic grade line is to be maintained a minimum of 3 feet below ground level during the 10-year, 24-hour design storm's PWWF.
- A comprehensive surveying effort obtained both horizontal and vertical data for most of the existing manholes in the City. For future development areas, 2-foot contours were used to interpolate where ground elevations were unknown. If pipeline improvements are required where ground elevations are unknown, field verification of the ground elevation is recommended during the pre-design effort.
- The hydraulic model primarily evaluated the 10-inch and greater diameter gravity pipelines and critical 6-inch and 8-inch diameter gravity pipelines. Analysis of the City's remaining 6-inch and 8-inch diameter gravity pipelines was not part of the scope of services for this project. Force mains of all sizes were incorporated into the hydraulic model. No analysis was performed to determine if flooding would occur in these pipelines when the larger pipelines are surcharged to within 3 feet of rim elevation.

7.2.1.2 Sewer Replacement Criteria

When additional capacity is required, existing sewers can be replaced or paralleled. For the purposes of this master plan update, it is assumed that an existing deficient sewer will be replaced with a larger diameter pipeline at the same slope as the existing pipeline. The decision to replace or parallel the existing pipeline should be made during the pre-design effort. During the pre-design effort, the existing sewer should be closed circuit televised (CCTV) to determine its structural condition. If deteriorated, the existing sewer could either be replaced or rehabilitated by slip lining or inversion lining and a parallel sewer can be constructed to convey the excess flow. A rehabilitated sewer has less hydraulic capacity because of a reduction in the cross-sectional area, and this loss in existing capacity needs to be accounted for when sizing the parallel sewer.

7.2.1.3 Cost Criteria

The construction cost estimate used in developing the CIP is based on the unit costs presented in Table 7.1. These costs are based on planning level estimates for similar communities in northern California. A unit cost analysis is provided in Appendix K. The unit costs are for “typical” field conditions with construction in stable soil at an average depth of up to 15 feet. High seasonal groundwater could greatly affect the overall unit cost. The unit costs include pipe purchase and installation, manhole and appurtenances, mechanical equipment, structures, electrical and instrumentation, excavation and backfill, pavement removal and replacement, limited sheeting, dewatering and shoring, and contractor overhead and profit. The costs are based on an Engineering News Record Construction Cost Index of 8,641 (20-Cities, December 2009). A contingency factor of 10 percent is added to address the possible excavation challenges foreseen for the area. To develop total CIP project costs, an additional 30 percent is added for construction contingencies and 20 percent is added for engineering, administrative, and legal fees. These contingencies are similar to those used by other agencies and municipalities.

7.2.2 Recommended Capital Improvement Program

City staff selected to improve the collection system to convey the PWWFs of the 10-year 24-hour design storm. The pipe criteria set for this alternative was to pass the PWWFs while allowing the surcharge level to rise up to 3 feet below the manhole rim elevation. A number of pipelines require improvements to meet the City’s surcharge criteria. The recommended CIP includes several pipeline improvements and capacity upgrades at several pump stations. The recommended CIP is summarized below.

Several pipeline conveyance improvements are required to improve the capacity of the collection system to meet future build-out conditions. The pipeline conveyance improvements range in diameter from 8 inches to 24 inches and involve the replacement of approximately 40,600 feet of pipeline. In addition, 10 new pump stations and approximately 92,900 feet of new 4-inch to 21-inch pipeline are needed as backbone facilities to accommodate future growth.

Table 7.1 Unit Costs
Sewage Disposal Master Plan
City of Oroville

Pipe Diameter (inches)	Unit	Unit Cost[1][2]	Initial Construction Estimate: Unit Cost + 10 percent Excavation Contingency[3]	Construction Cost: Initial Construction Estimate + 30 percent Estimating Contingency	Capital Improvement Cost: Construction Cost + 20 percent Other Costs (Engineering, Admin, Legal)
Pipelines					
4	$/LF	104	114	148	178
6	$/LF	112	123	160	192
8	$/LF	120	132	172	206
10	$/LF	128	141	183	220
12	$/LF	135	149	194	233
14	$/LF	143	180	234	281
15	$/LF	147	162	211	253
18	$/LF	159	175	228	274
21	$/LF	170	187	243	292
24	$/LF	182	200	260	312
Pump Stations					
Retrofit	$/GPM		300	390	468
New/Replace	$/GPM		600	780	936

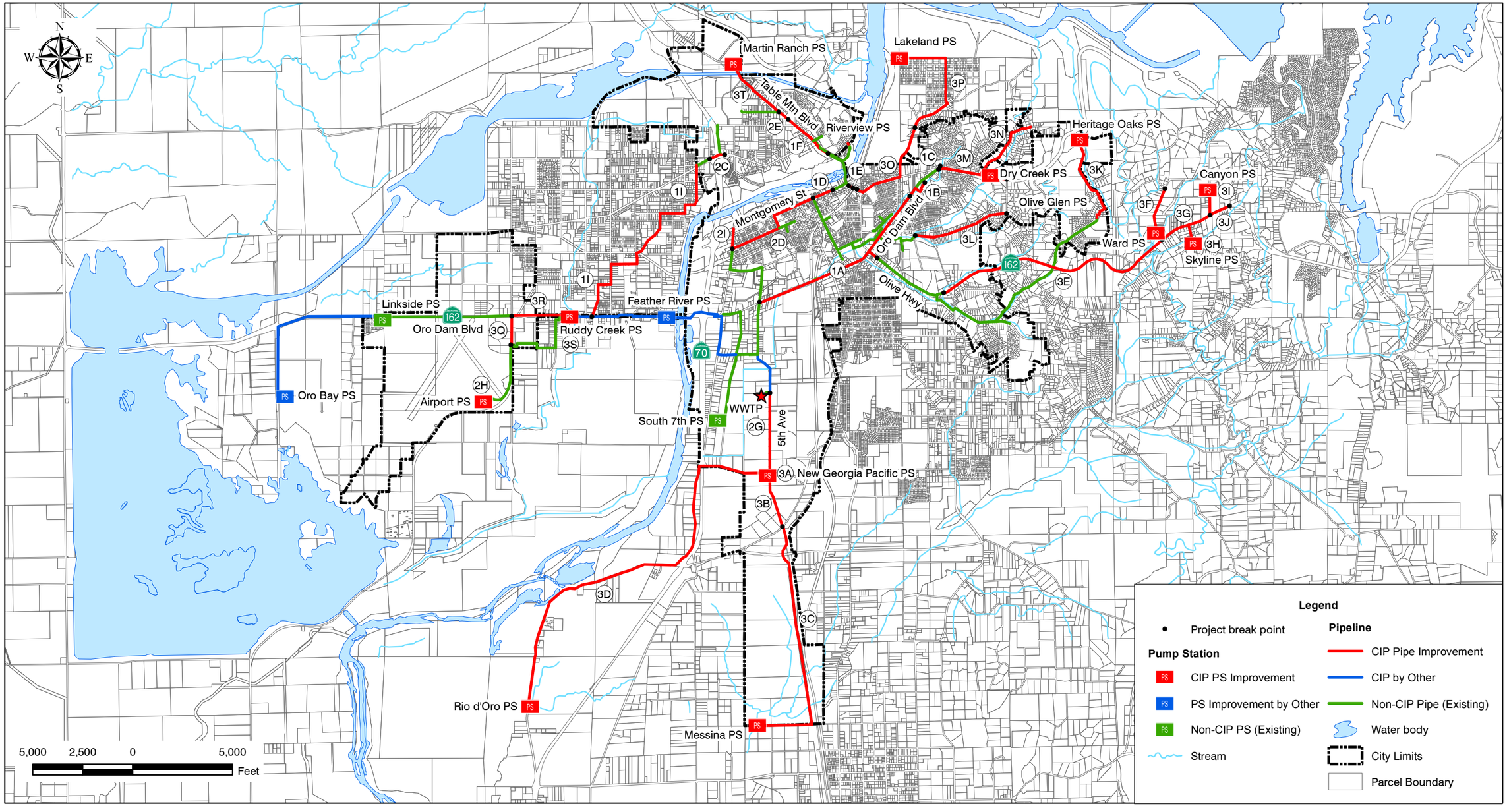
Notes:
1. Unit costs include pipe and pipe installation, manhole and appurtenances, lower laterals, mechanical equipment, structures, electrical and instrumentation, excavation and backfill, pavement removal and replacement, limited sheeting, dewatering and shoring, and contractor overhead and profit.
2. These costs coincide with a 20-Cities ENR of 8,641 (December 2009).
3. A contingency is added for excavation complexities due to the potential to encounter lava cap.
4. Project 1A, 1A Alt, and 2A Alt use additional contingencies to account for difficulties in construction within the Oro Dam corridor.

The CIP project costs are summarized in Table 7.2 and total $40.4 million. The necessary pipelines are estimated to cost $32.2 million and requisite pump stations are estimated to cost $8.2 million. The total project costs include a 30 percent construction contingency and a 20 percent engineering, administrative, and legal contingency, and are based upon 2009 costs for all projects. The improvements are based on DWF projected to the build-out condition, in conjunction with the WWF of the 10-year, 24-hour design storm. The CIP projects are presented in Figure 7.1. A detailed summary of the CIP is located in Appendix L.

Table 7.2 Project List and Cost Summary
Sewage Disposal Master Plan
City of Oroville

Project Number	Project Name	Cost[1]
1A[2]	Oroville Dam Boulevard Relief Sewer	$ 4,584,000
1B	Stanford Avenue Sewer	$ 318,000
1C	Grace Baptist Church	$ 42,000
1D	Montgomery Street Sewer	$ 553,000
1E	Table Mountain Boulevard Sewer I	$ 53,000
1F	Table Mountain Boulevard Sewer II	$ 733,000
1I[3]	TWSD East Interceptor	$ 2,205,000
2C	Grand Avenue Sewer	$ 178,000
2D	Downtown Sewer	$ 1,689,000
2E	Table Mountain Boulevard Sewer III	$ 154,000
2G	5th Avenue Sewer	$ 1,232,000
2H	Airport Pump Station Upgrade	$ 238,000
2I	Feather River Blvd Sewer	$ 214,000
3A	New Georgia Pacific Pump Station	$ 2,564,000
3B[4]	Oroville Industrial Park Sewer	$ 745,000
3C	Messina Pump Station and Pipeline Expansion	$ 3,502,000
3D	Rio d'Oro Pump Station and Pacific Heights Road Improvements	$ 6,257,000
3E	Olive Highway Expansion I	$ 2,551,000
3F	Ward Pump Station and Pipeline Expansion	$ 661,000
3G	Olive Highway Expansion II	$ 563,000
3H	Skyline Pump Station and Pipeline Expansion	$ 264,000
3I	Canyon Pump Station and Pipeline Expansion	$ 312,000
3J	Olive Highway Expansion III	$ 224,000
3K	Heritage Oaks Pump Station and Pipeline Expansion	$ 951,000
3L	Oroville Quincy Highway Expansion	$ 994,000
3M	Dry Creek Pump Station and Pipeline Expansion	$ 799,000
3N	Zepher Way Expansion	$ 875,000
3O	Orange Avenue Sewer	$ 1,037,000
3P	Lakeland Pump Station and Pipeline Expansion	$ 1,342,000
3Q	Larkin Road Bypass Sewer	$ 307,000
3R	West Oroville Dam Boulevard Expansion	$ 690,000
3S	Ruddy Creek Pump Station Upgrade	$ 2,718,000
3T	Martin Ranch Pump Station And Force Main	$ 858,000
	Total[5]	**$ 40,407,000**
1A-Alt	Mitchell Avenue Sewer	$ 1,989,000
2A-Alt	Mitchell Avenue Sewer II	$ 3,108,000
3B-Alt	East Georgia Pacific PS and Pipeline	$ 2,564,000
	Alternate Total	**$ 42,739,000**

Notes:
1. Based on a 20-Cities ENR of 8,641 (December 2009).
2. Project 1A-Alt together with Project 2A-Alt may be selected in lieu of Project 1A.
3. Previously identified as Project 2B. Moved to Element 1 due to identified urgency by TWSD. Cost shown for Project 1I reflects City's 75% share based on agreement with TWSD. Total project cost = $2.94M.
4. Project 3B-Alt may be selected in lieu of Project 3B.
5. Projects 1G (Riverview PS Upgrade), 1H (Ruddy Creek PS Upgrade I), and 2F (Olive Glen PS Upgrade) have been removed from the CIP due to sufficient capacity upon review.



CITY OF OROVILLE, CALIFORNIA

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Figure 7.1
CIP PROJECTS
SANITARY SEWER MASTER PLAN
CITY OF OROVILLE

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7.3 CIP ELEMENTS

Categorizing the required capital improvements for the City sewer collection system is an important aspect of the CIP. The CIP needs to be grouped in a manner that provides the City with a realistic approach to implementing the CIP. The recommended improvements were separated into 33 projects. These 33 projects were delineated based on three factors: (1) capacity deficiency, (2) historical overflow problems (if any), and (3) existence of sufficient downstream conveyance capacity. The result of the prioritization was to group the 33 projects into the following three CIP elements:

- Element 1 Projects – Improvements to the existing collection system with existing capacity deficiencies (seven projects). The costs associated with Element 1 projects must be initially covered by existing users through monthly sewer rates. There are future users that will benefit from the planned capacity upgrades associated with the Element 1 Projects. As growth occurs, these future users will contribute through connection fees. Further details are provided as part of the Financial Analysis included in Chapter 9.

- Element 2 Projects – Improvements to the existing collection system to accommodate future growth (six projects). The costs associated with Element 2 projects are to be shared between existing and future users, since new users will benefit from the augmented capacity, while existing users benefit from the renewed improvement lifespan.

- Element 3 Projects – Improvements that expand the existing collection system to service future growth areas (20 projects). Funding for the Element 3 projects will be provided through the impact fees assessed to new users of the sewer collection system.

A figure and brief description of each CIP project is provided in Figures 7.2 - 7.34.

Project 1A: Oroville Dam Blvd Relief Sewer

Project 1A consists of constructing a new 10,108 foot relief sewer in Oro Dam Boulevard from just south of Stanford Avenue to 5th Avenue. The relief sewer is needed to increase capacity for the drainage of Basins 7 and 9. Sewers from Oroville Quincy Highway and Olive Highway will be re-routed to the new sewer. A relief sewer is recommended over replacement due to the easier alignment and need to replace significant reaches of the existing pipeline. A Caltrans encroachment permit will be needed due to construction in a state road.

- Facilities: 8-inch gravity pipeline (34 feet)
  15-inch gravity pipeline (3,074 feet)
  18-inch gravity pipeline (4,053 feet)
  21-inch gravity pipeline (2,947 feet)
- Estimated Cost: $ 4.58 M
- Associated Project(s): 1A-Alternate, 2A-Alternate

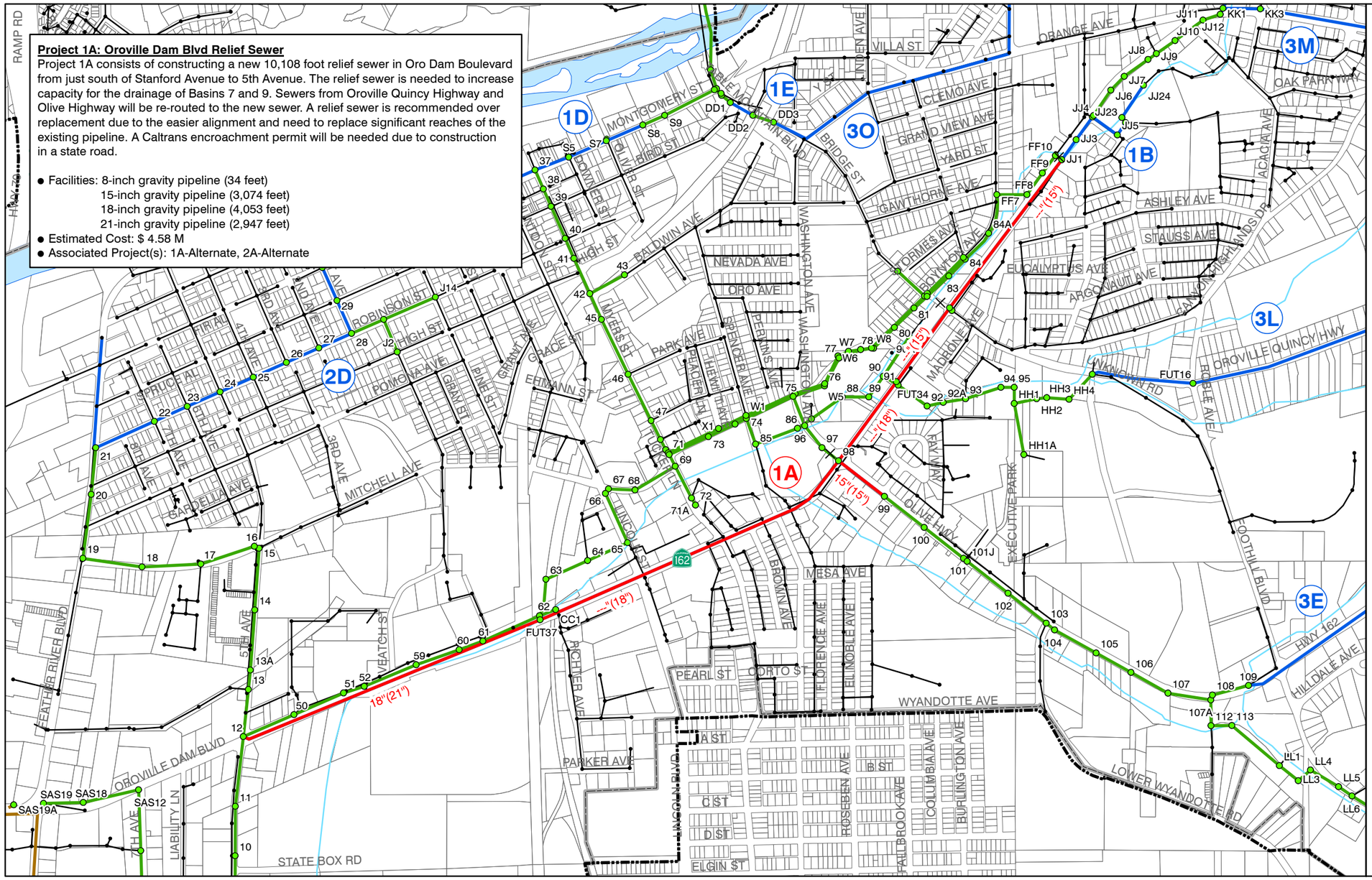

Figure 7.2
PROJECT 1A
SANITARY SEWER MASTER PLAN
CITY OF OROVILLE

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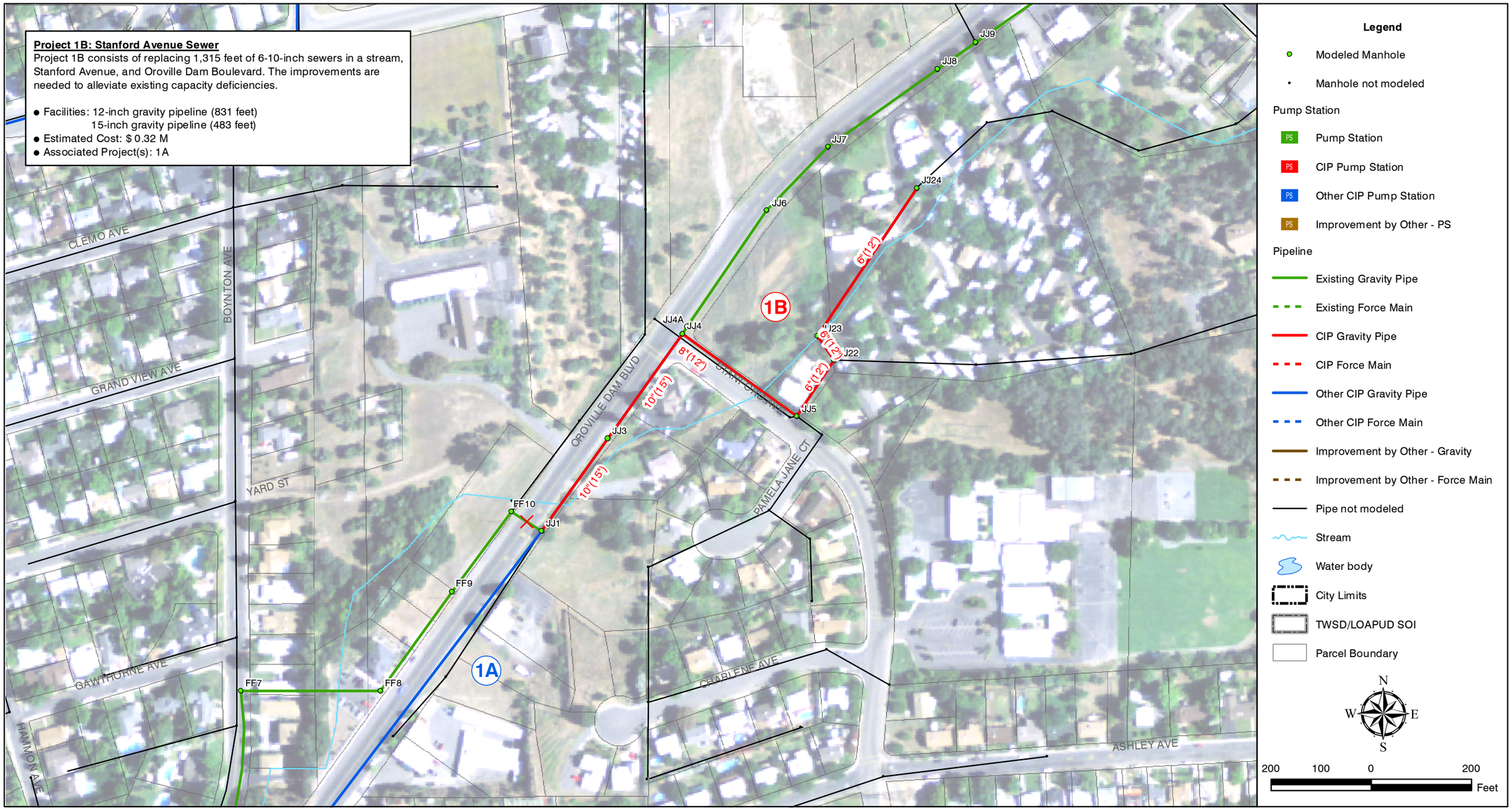

Figure 7.3
PROJECT 1B
SANITARY SEWER MASTER PLAN
CITY OF OROVILLE

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Figure 7.4
PROJECT 1C
SANITARY SEWER MASTER PLAN
CITY OF OROVILLE

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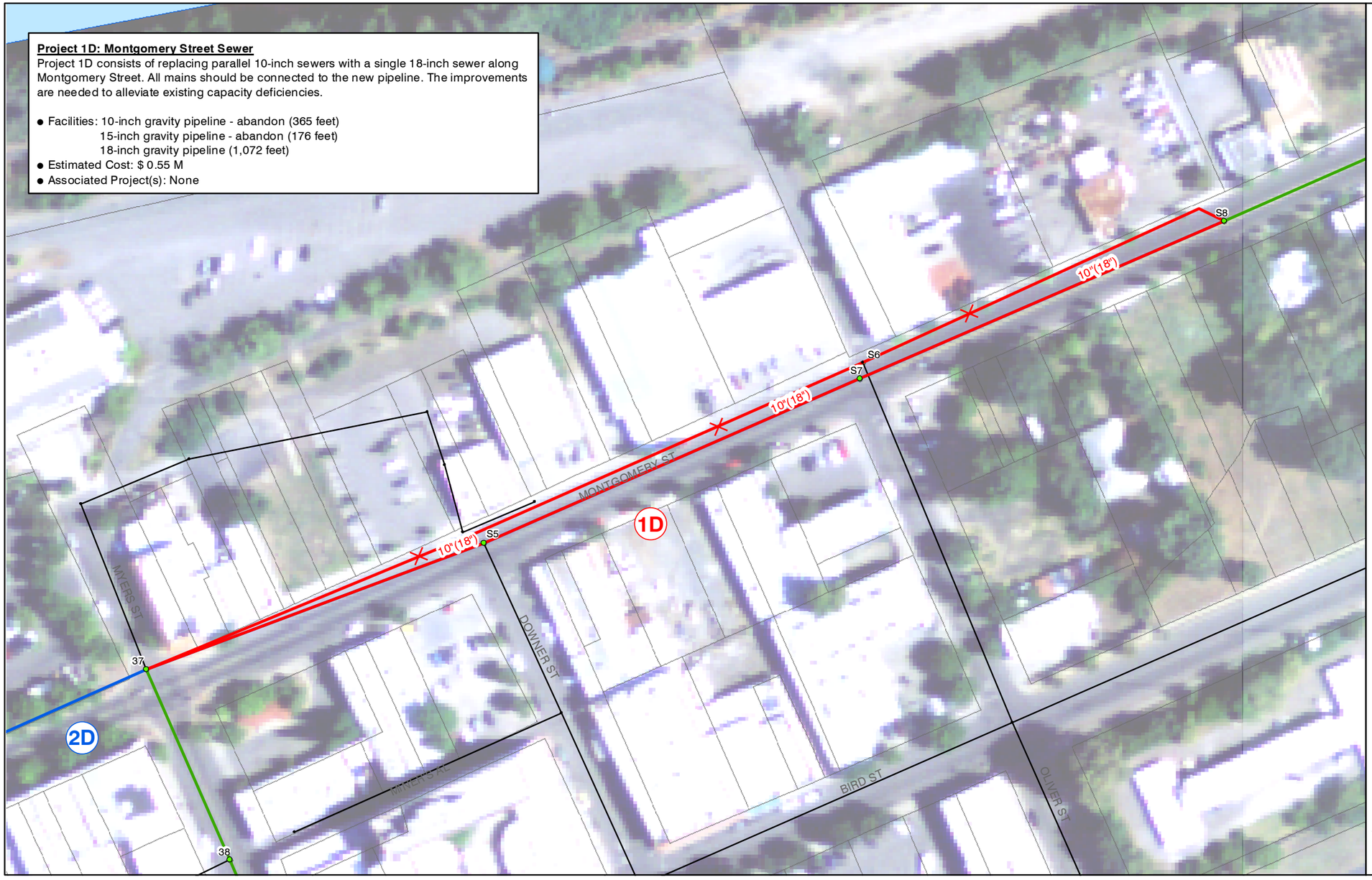
Project 1D: Montgomery Street Sewer

Project 1D consists of replacing parallel 10-inch sewers with a single 18-inch sewer along Montgomery Street. All mains should be connected to the new pipeline. The improvements are needed to alleviate existing capacity deficiencies.

- Facilities: 10-inch gravity pipeline - abandon (365 feet)
  15-inch gravity pipeline - abandon (176 feet)
  18-inch gravity pipeline (1,072 feet)
- Estimated Cost: $ 0.55 M
- Associated Project(s): None



Legend

- Modeled Manhole
- Manhole not modeled

Pump Station

- Pump Station
- CIP Pump Station
- Other CIP Pump Station
- Improvement by Other - PS

Pipeline

- Existing Gravity Pipe
- Existing Force Main
- CIP Gravity Pipe
- CIP Force Main
- Other CIP Gravity Pipe
- Other CIP Force Main
- Improvement by Other - Gravity
- Improvement by Other - Force Main
- Pipe not modeled
- Stream
- Water body
- City Limits
- TWSD/LOAPUD SOI
- Parcel Boundary

N W E S

100 50 0 100 Feet

Figure 7.5
PROJECT 1D
SANITARY SEWER MASTER PLAN
CITY OF OROVILLE

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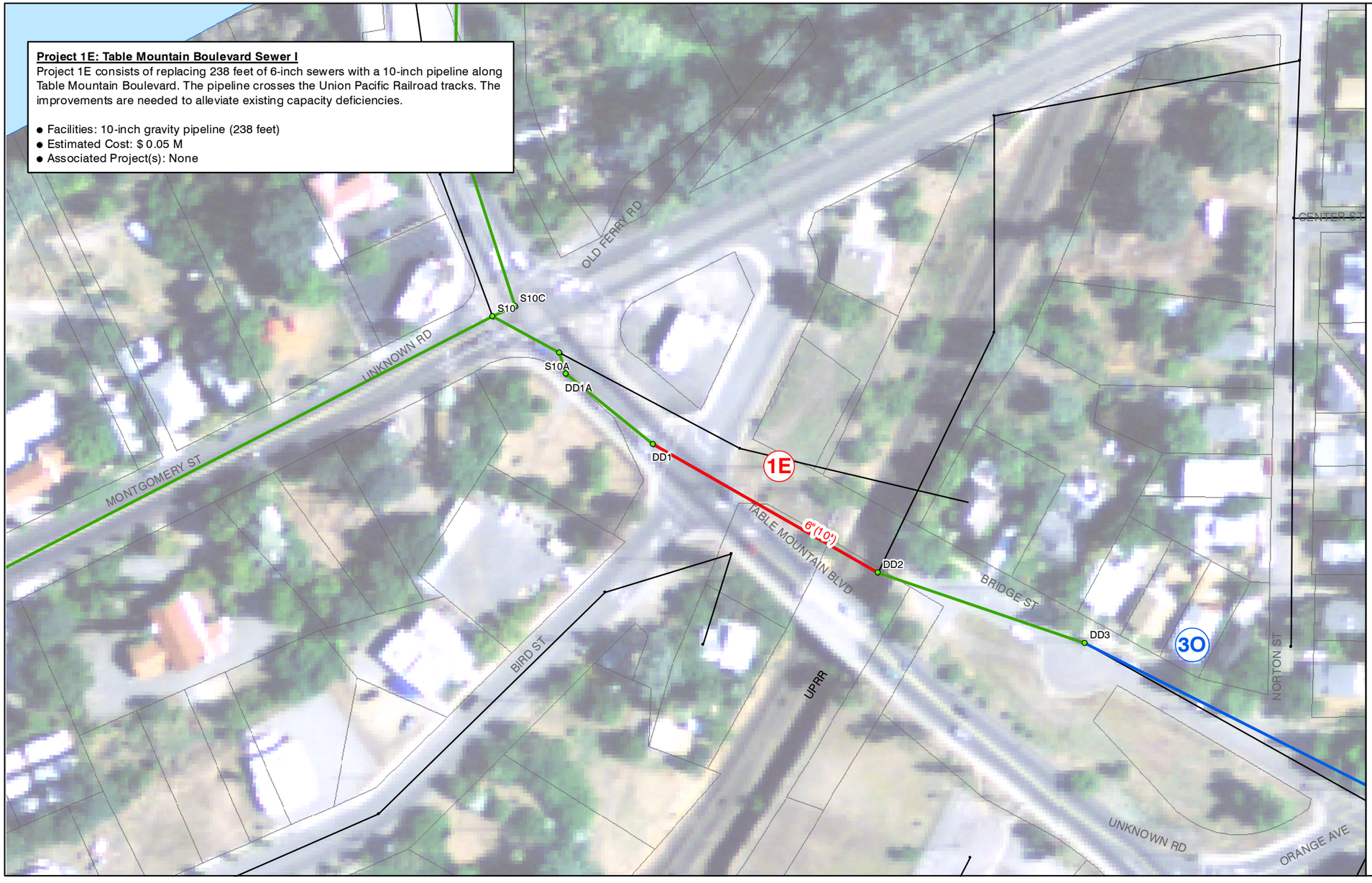
Project 1E: Table Mountain Boulevard Sewer I

Project 1E consists of replacing 238 feet of 6-inch sewers with a 10-inch pipeline along Table Mountain Boulevard. The pipeline crosses the Union Pacific Railroad tracks. The improvements are needed to alleviate existing capacity deficiencies.

- Facilities: 10-inch gravity pipeline (238 feet)
- Estimated Cost: $ 0.05 M
- Associated Project(s): None



Legend

- Modeled Manhole
- Manhole not modeled

Pump Station

- Pump Station
- CIP Pump Station
- Other CIP Pump Station
- Improvement by Other - PS

Pipeline

- Existing Gravity Pipe
- Existing Force Main
- CIP Gravity Pipe
- CIP Force Main
- Other CIP Gravity Pipe
- Other CIP Force Main
- Improvement by Other - Gravity
- Improvement by Other - Force Main
- Pipe not modeled
- Stream
- Water body
- City Limits
- TWSD/LOAPUD SOI
- Parcel Boundary

N W E S

100 50 0 100 Feet

Figure 7.6
PROJECT 1E
SANITARY SEWER MASTER PLAN
CITY OF OROVILLE

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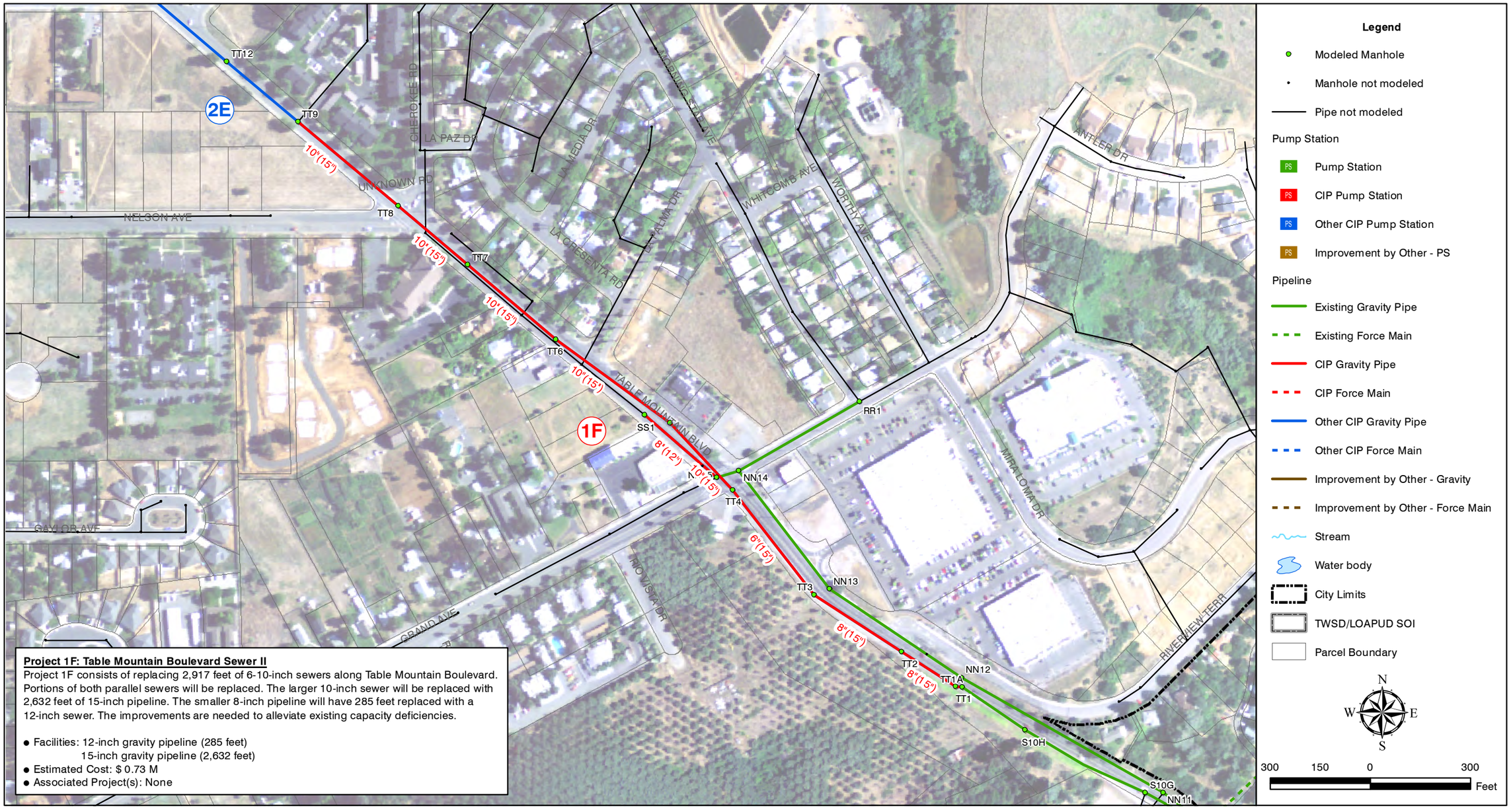

Figure 7.7
PROJECT 1F
SANITARY SEWER MASTER PLAN
CITY OF OROVILLE

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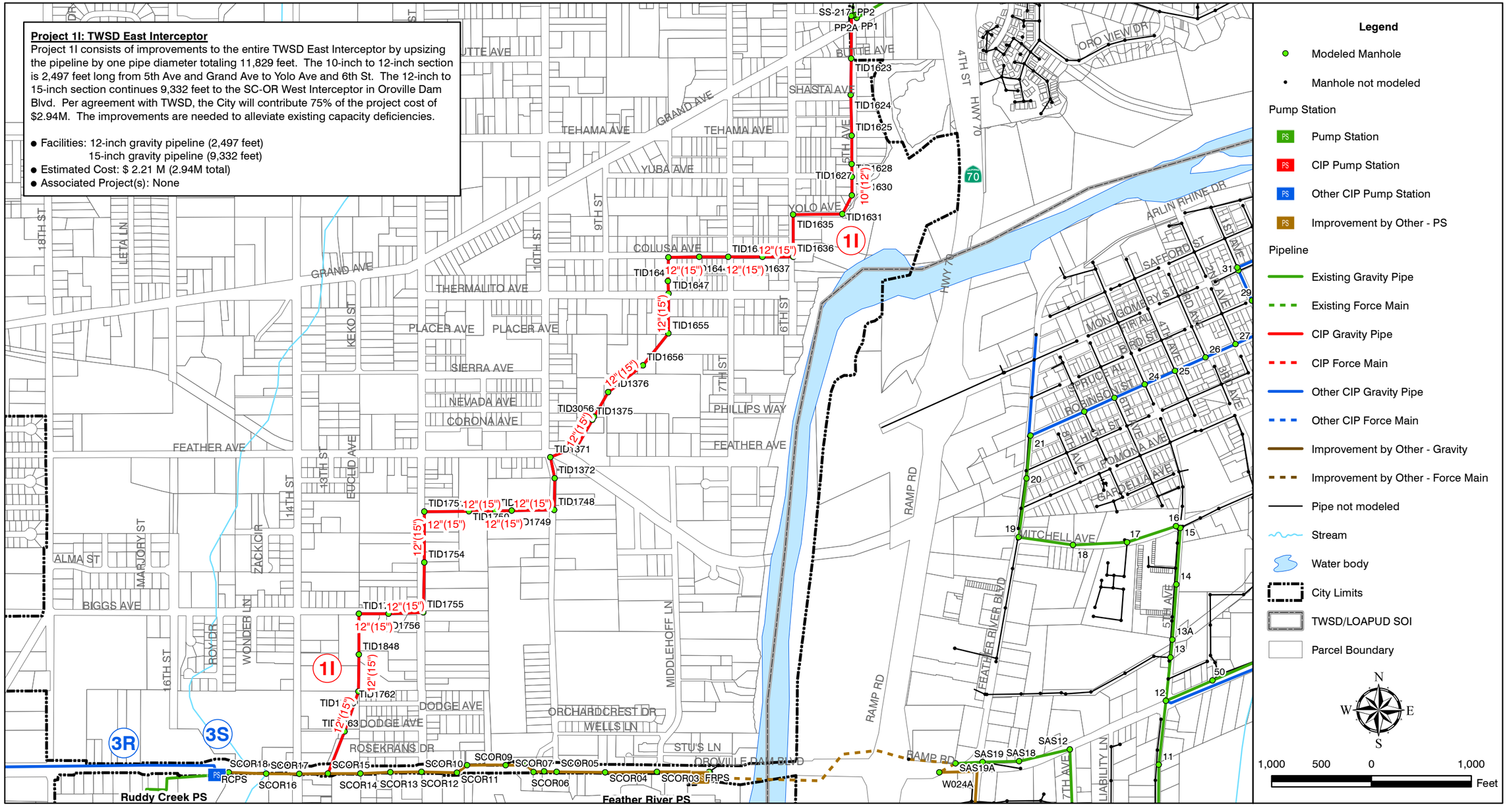
Project 1I: TWSD East Interceptor

Project 1I consists of improvements to the entire TWSD East Interceptor by upsizing the pipeline by one pipe diameter totaling 11,829 feet. The 10-inch to 12-inch section is 2,497 feet long from 5th Ave and Grand Ave to Yolo Ave and 6th St. The 12-inch to 15-inch section continues 9,332 feet to the SC-OR West Interceptor in Oroville Dam Blvd. Per agreement with TWSD, the City will contribute 75% of the project cost of $2.94M. The improvements are needed to alleviate existing capacity deficiencies.

- Facilities: 12-inch gravity pipeline (2,497 feet)
  15-inch gravity pipeline (9,332 feet)
- Estimated Cost: $ 2.21 M (2.94M total)
- Associated Project(s): None



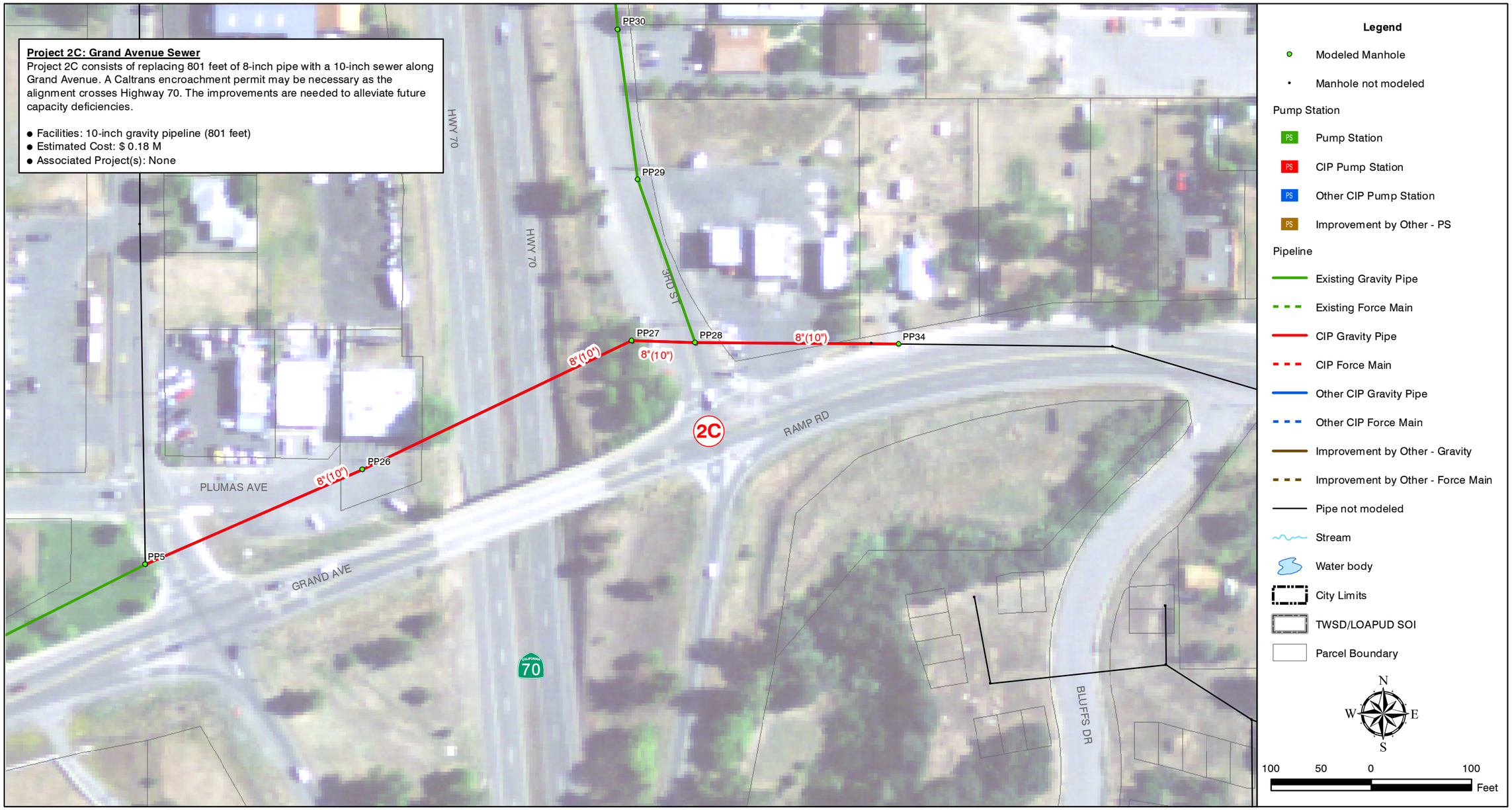


Figure 7.9
PROJECT 2C
SANITARY SEWER MASTER PLAN
CITY OF OROVILLE

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Project 2D: Downtown Sewer

Project 2D consists of replacing 5,413 feet of 18 and 20-inch sewer in the downtown area along Montgomery Street, 1st Avenue, and Robinson Street from Myers Street to Feather River Boulevard. The replacement pipeline will be 24-inches in diameter. The improvements are needed to alleviate future capacity deficiencies.

- Facilities: 24-inch gravity pipeline (5,413 feet)
- Estimated Cost: $ 1.69 M
- Associated Project(s): 2E, 3O, 3P, 3T

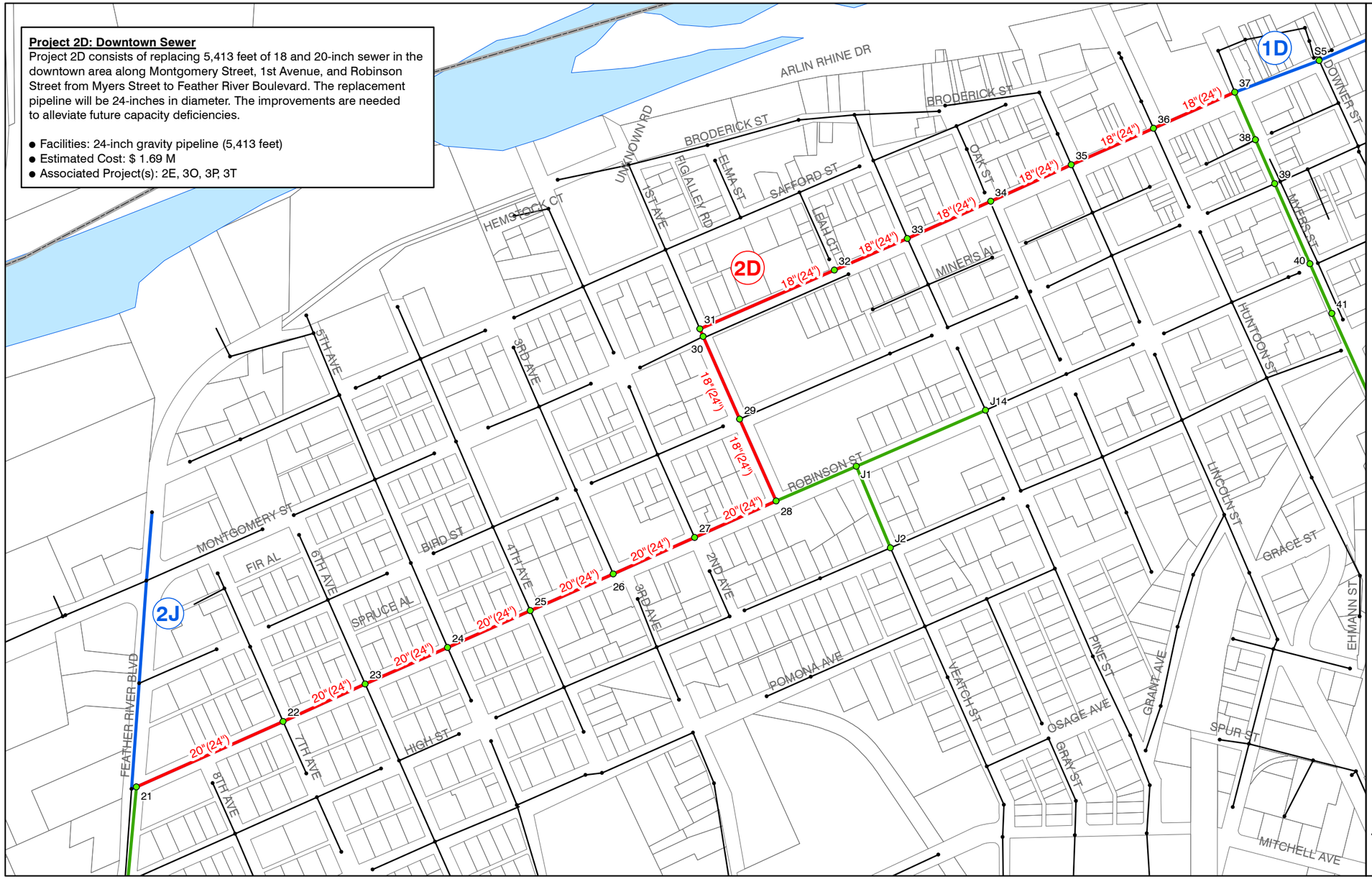

Figure 7.10
PROJECT 2D
SANITARY SEWER MASTER PLAN
CITY OF OROVILLE

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