Ord Community Wastewater System Master Plan

Prepared for Marina Coast Water District

Final Report, July 19, 2005

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MARINA COAST WATER DISTRICT
ORD COMMUNITY
WASTEWATER SYSTEM MASTER PLAN
FINAL PROJECT REPORT
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TABLE OF CONTENTS

APPENDICES

Appendix A	**Waste Discharge Requirements Order No. R3-2002-0078**
Appendix B	**Flow Monitoring Report**
Appendix C	**Model Results**
Appendix D	**Condition Assessment Summary Sheets & Field Photos**
Appendix E	**Technical Memorandum Lift Stations Predesign Study April 2004**
Appendix F	**Recommended Capital Improvement Project Descriptions**

1 EXECUTIVE SUMMARY

1.1 PURPOSE

The purpose of this Master Plan report is to provide guidance to Marina Coast Water District (MCWD or District) in planning for the scheduling and cost estimating of anticipated improvements needed for the Ord Community wastewater collection system. The wastewater collection system includes 18 lift stations, approximately 65 miles of gravity sewer, and approximately 7 miles of pressure pipeline or force main.

1.2 BACKGROUND

The Central Coast Regional Water Quality Control Board (RWQCB or Regional Board) of California issued a requirement for the District and other sewer system operators tributary to the Monterey Regional Water Pollution Control Agency (MRWPCA) Regional Treatment Plant (RTP) to prepare a Sewer System Management Plan (SSMP) with the goal of reducing the frequency and severity of sanitary sewer overflows (SSOs). Similar requirements are either in place or being planned by the RWQCB's in the San Diego Bay Area, the Santa Ana River Basin, the San Francisco Bay Area, and a few agencies in the Central Valley and North Coast Regional Water Quality Control Boards. Broader application of these requirements is anticipated over the next two years throughout California. The State Water Resources Control Board (State Board or SWRCB) is developing a statewide program to regulate SSO's. State Board Resolution No. 2004-0080 requires State Board staff to propose a program by November 2005 to develop a proposed Sanitary Sewer Overflow Reduction Program that will direct publicly owned collection systems to develop and implement SSMPs that incorporate appropriate funding and management practices, provide consistent Statewide reporting of SSO's, explore SSMP and operator certification, and propose appropriate enforcement guidelines. Once the State Board adopts its program, the Regional Board can consider whether to rescind the WDRs

already issued to collection systems in order to allow dischargers to enroll in the State Board's program. The Environmental Protection Agency (EPA) has prepared draft SSO regulations referred to as "cMOM" (capacity, management, operation and maintenance). Final approval of federal cMOM regulations is unknown at this time.

The scope of work for this project included evaluating current maintenance practices, reviewing the condition of the collection system, estimating anticipated wastewater flows, evaluating the hydraulic capacity of the sewer system, identifying sewers with capacity and condition deficiencies, and developing a capital improvement program at 5-year increments through anticipated build-out. This Master Plan presents the results of the scope of work. The recommendations will assist the District in complying with current regulations. Implementation of recommendations support the achievement of the Regional Board's goals to eliminate sewer system overflows.

1.3 RESULTS

Based upon this investigation, portions of the existing wastewater system are not capable of providing adequate capacity to accommodate future anticipated wastewater flows.

Field investigations and review of previous videotape inspections find that the wastewater collection system is overall in generally poor condition. Limited use of significant portions of the system has been attributed to increased pipeline deterioration. Root intrusion has led to pipeline clogging and previous overflow conditions.

1.4 RECOMMENDATIONS

1.4.1 Wastewater System Master Plan Updates

Over the next 20 years, significant land development is planned to occur throughout the Ord Community, consistent with the Fort Ord

Base Reuse Plan (BRUP) and Environmental Impact Report (EIR). New residential, commercial and other developments are planned for construction. Since closure of the base, the Seaside Highlands Development, and portions of California State University Monterey Bay (CSUMB) have been constructed. To ensure the plans presented in this Wastewater System Master Plan continue to provide effective guidance to the District, it is recommended that this Plan be revised and updated every five years, to incorporate the actual locations and pace of planned development, inclusion of the newly constructed in-tract wastewater collection systems and any other modifications to the backbone components of the system. The hydraulic model should be updated continuously as new developments and capital improvement projects are constructed.

1.4.2 Capital Improvement Program

A Capital Improvement Program (CIP) has been developed to meet the long-term Ord Community Wastewater System needs based on the wastewater system hydraulic analysis, development growth and associated anticipated wastewater generation, District standards and discussions with District staff. The CIP provides an inventory of the projects recommended for construction in order to meet the projected wastewater system requirements. The CIP also provides a schedule of recommended improvements and corresponding engineering opinion of probable cost. The estimates of likely total project costs for each planning period are shown in Table 1, Capital Improvement Project Summary.

TABLE 1

Capital Improvement Project Summary

YEAR	Pipeline Replacement	Lift Station and Force Main	Condition Assessment Recommendations	Total
2005	$ 1,886,300	$ 5,956,000	$ 1,454,350	$ 9,296,650
2010	$ -	$ -	$ -	$ -
2015	$ -	$ -	$ -	$ -
2020	$ 757,200	$ 1,867,300	$ -	$ 2,624,500
TOTAL	$ 2,643,500	$ 7,823,300	$ 1,454,350	$11,921,150

2 INTRODUCTION

2.1 BACKGROUND AND STUDY OBJECTIVES

The Marina Coast Water District (MCWD or District) authorized RBF Consulting to complete a Wastewater System Master Plan and Capital Improvement Program (CIP) for the Ord Community Service Area for wastewater infrastructure improvements on January 28, 2004. The previous Wastewater Master Plan of the Ord Community was completed in 2001 for the Fort Ord Reuse Authority (FORA). An infrastructure assessment was also completed in 1991 at the time of the closure of the Fort Ord Military Base.

One objective of this Master Plan study is to assist MCWD with the compliance with the Regional Water Quality Control Board Waste Discharge Requirements (WDR) Order No. R3-2002-078, including the requirements as set forth in Attachment B for the preparation of a Sewer System Management Plan (SSMP) by providing a master plan of existing and planned wastewater collection facilities. A copy of the WDR is included in Appendix A of this report. The SSMP was prepared by the District in November 2004 based in part on information that resulted during the course of this investigation. This Master Plan study identifies the required capital improvements for the wastewater collection system and provides the District with a schedule for implementation of recommended improvements for a twenty-year planning period through the anticipated build-out of the Ord Community. The Master Plan study provides the District with an inventory of existing wastewater facilities and wastewater flow projections, under anticipated wet and dry weather flow conditions.

2.2 STUDY AREA

The Marina Coast Water District service area is located on the coast of Monterey Bay at the northwest end of the Salinas Valley, Monterey County, California, Figure 1, approximately 100 miles south of the City of

San Francisco. Marina Coast Water District provides sewer services for the central portion of the City of Marina and the Ord Community, Figure 2. In February 2005, the District completed a separate analysis and Master Plan of the wastewater system in the central portion of Marina.

The study area for this Wastewater System Master Plan is defined as the Ord Community and is identified in the FORA *Fort Ord Base Reuse Plan (1997)*. The former Fort Ord army base consists of approximately 28,000 acres incorporating portions of the cities of Seaside, Monterey, Del Rey Oaks, Marina, CSUMB, UCMBEST, US ARMY and portions of unincorporated Monterey County. The Ord Community is a mixture of residential, institutional, and commercial land uses that is currently in various stages of redevelopment.

The area's Mediterranean-type climate is characterized by warm, dry summers and cool, rainy winters. The Pacific Ocean is the principal influence on the climate of the project area. Ocean effects include fog and onshore westerly winds which moderate temperature extremes with morning fog, a common year-round occurrence. Daily ambient air temperatures typically range between 40 and 70 degrees Fahrenheit; however, temperatures extremes in the low 100's have been recorded in the inland areas.

Average annual precipitation is approximately 15 inches, the majority of which falls between November and April. Because the predominant soil is permeable sand, runoff is limited and stream flows only occur intermittently and within the very steep canyons in the eastern portion of the Ord Community. Summers are usually cool, with fog and low clouds forming overnight and dissipating during the day. Typically, winds blow onshore, although during the spring and summer it is not unusual for an offshore flow to develop, which produces a strong easterly breeze (California State Parks, 1996).

Elevations in the Ord Community range from approximately 900 feet above mean sea level (MSL) on the east side of the base, to sea level at

the beach. The predominant topography of the area reflects dune sand deposits that underlie the western and northern portions of the area where the ground surface slopes west and northwest, draining toward Monterey Bay. The topography of the southeastern portion of the area is moderate to steep sloping canyons draining toward the east into the Salinas Valley.

2.3 EXISTING WASTEWATER COLLECTION SYSTEM

The wastewater facilities of the Ord Community have been constructed over a period of approximately 60 years by the United States Army to meet the needs of an active military base beginning in the early 1940's. The sewer system collected domestic and industrial wastewater without any pretreatment until the mid-1960s when oil/water separators were installed to treat wastewater from vehicle wash racks. All wastewater currently flows from the District to the Monterey Regional Water Pollution Control Agency Regional Treatment Plant north of the City of Marina for treatment. Construction, expansion, operation and maintenance of the Ord Community wastewater collection system facilities was the responsibility of the United States Army until 1998 and therefore did not necessarily comply with standards established by the State Department of Health Services, Monterey County Environment Health Department, State Water Resources Control Board, Regional Water Quality Control Board, or the American Water Works Association. However, construction and maintenance of all new wastewater facilities will be required to meet standards established in Title 22 of the State Water Code as implemented by the State Water Resources Control Board. MCWD has an adopted set of procedural guidelines and design standards in effect throughout the service area compliant with federal, state, and local requirements.

In January 1998, FORA and MCWD entered into a Water/Wastewater Facilities Agreement governing the provision of water and wastewater services and facilities on Fort Ord. In March 2001, an Amendment to the Waster/Wastewater facilities agreement was executed. The conveyance

process was completed in late October 2001 when the Army transferred the deeds conveying the existing water and wastewater infrastructure to FORA and FORA in turn transferred the property to MCWD.

MCWD owns and operates the Ord Community wastewater collection system which includes over 65 miles of 4 to 36-inch diameter gravity sewers (Table 2.1) and approximately 7 miles of force mains.

The majority of the system is 6 and 8-inch diameter pipelines, as shown in Table 2.1. Five gravity sewer pipelines and one force main cross under Highway One. The District recently completed pipeline rehabilitation projects (cured in-place pipe insertion method) to increase structural stability of an existing 24-inch diameter pipeline crossing Highway One to the former Main Garrison Wastewater Treatment Plant, and on a 12-inch diameter pipeline crossing Highway One to the Ord Village Lift Station. Figure 3 shows the Wastewater Collection System and Figure 4 shows the major sewersheds served by these sewers. The District operates eighteen major lift stations in the Ord Community, listed in Table 2.2. Maintenance access to the sewers is provided by approximately 1,480 manholes and a number of cleanout structures.

Facility information for this Master Plan was provided by the District as described by facility maps, database spreadsheets, and limited field verification.

A condition assessment of the existing facilities was completed as a part of this project and is further described in Section 9.

TABLE 2-1

SIZE DISTRIBUTION OF EXISTNG GRAVITY SEWERS

Pipeline Diameter (inches)	Length (feet)	Length (miles)	Percent of System (by length)
4	1328	0.25	0.4%
6	137134	25.97	37%
8	156601	29.66	42%
10	16122	3.05	7%
12	28625	5.42	8%
15	14424	2.73	4%
18	14606	2.77	4%
24	1328	0.25	0.4%
27	667	0.13	0.2%
30	2805	0.53	0.8%
36	100	0.02	0.1%
TOTAL	**373740**		

TABLE 2-2

ORD COMMUNITY WASTEWATER LIFT STATIONS

Lift Station	Location	Pump Description	Maximum Capacity (gpm)	Maximum Capacity (MGD)
Fritzsche Field[1]	Fritzsche Field North	2-- 160 gpm	160	0.23
East Garrison	Inter-Garrison Road and Ord Ave	1 -- 350 gpm (INACTIVE)	350	0.5
Station 31	East Garrison on Ord Ave	ABANDONED	N/A	N/A
DEH	DEH Yard (CSUMB)	2 -- 54 gpm (ABANDONED)	54	0.08
TAC	CSUMB	2 -- 5 Hp; 176 gpm, 37' TDH (ABANDONED)	176	0.25
Ord Village	End of Beach Range Road	3 -- 800 gpm, 135 TDH, 56 HP, 1750 RPM Sump: 50 gpm, 19 THD; .5 HP	600	2.3
Jefferson	Abram Drve and Valley Drive	2-15 HP Pumps, 25 gpm; 37 TDH	25	0.03
San Pablo	San Pablo Court	2-15 HP Pumps; 65 gpm, 37 TDH	65	0.09
Wittemeyer	North of Wittemyer Court	2-- 3 HP; 140 gpm, 35 TDH	140	0.2
Booker	End of Booker Street	1 -- 23 HP; 760 gpm; 64' TDH 1 -- 23 HP; 520 gpm; 82' TDH	760	1.09
Clark	Brostrum Drive at clark Court	2 -- 15 HP, 280 gpm, 70 TDH	280	0.4
Neeson[(1)]	Neeson Road/Marina Airport	2 -- 2 HP, 400 gpm	200	0.28
Landrum	Landum Court	2 -- 10 HP; 400 gpm, 49 TDH	400	0.57
Imjin	Imjin at Abrams	2 -- 18Hp,1490 gpm; 33 TDH	1490	2.14
Schoonover	Schoonover and Warrelman	2--10 Hp, 240gpm; 64 TDH	240	0.35
Hodges	Hodges Court	2-94 gpm	94	0.14
Hatten	Hatten Road	2-40 gpm	40	0.05
Giggling	Okinawa and Noumea Road	1 -- 850 gpm, 100' TDH; 1 -- 620gpm, 122 TDH Sump: 50 gpm, 19 THD . .5 HP	850	1.22
Reservation	Reservation Road 1125 feet nw of Imjin	2 -- 47 HP, 900 gpm, 120' TDH	900	1.26

(1) Existing flow pumps to MRWPCA Salinas Interceptor. FORA 2006 CIP schedule for improvements at Neeson Road and Gateway may eliminate the need for Fritzcche Field and Neeson Lift Stations. Wastewater will then flow by gravity to Reservation Road Lift Station.

(2) The District is currently planning upgrades or abandonment of the following Lift Stations: Schoonover, Landrum, Imjin, San Pablo, Ord Village, Jefferson.

2.4 EXISTING WASTEWATER TREATMENT PLANT

Wastewater flows from the main sewage trunk pipelines to the former Main Garrison Sewage Treatment Plant and is conveyed to the MRWPCA RTP via the MRWPCA interceptor. Assessment of the MRWPCA trunk, treatment and disposal facilities are not included in this Master Plan.

MRWPCA owns and operates a regional wastewater management system that provides collection, treatment, and disposal services to most of northern Monterey County. The agency is governed by a 12 member Board of Directors with one representative from each of the following entities; Pacific Grove, Monterey, Seaside, Del Rey Oaks, Sand City, Salinas, MCWD, Moss Landing and Boronda County Sanitation Districts, County Services Area No. 14, the County of Monterey, and the U.S. Army. MCWD became a member agency of MRWPCA in 1989. The MRWPCA RTP is located east of Highway 1, north of Reservation Road approximately 2 miles north of the City of Marina. The plant's average daily flow is approximately 21 mgd, serving a population of approximately 255,000.

The U.S. Army formerly operated the Main Garrison Sewage Treatment Plant, located on the west side of Highway One and 8th Street for the treatment of wastewater on Fort Ord. The treatment plant had capacity for 4.25 MGD and provided secondary treatment with trickling filters and chlorination. The plant provided treatment of wastewater generated within the main Garrison, the most densely populated portion of the base. The treatment plant was abandoned in 1990. Wastewater flows were then conveyed from the Main Garrison Sewage Treatment Plant to MRWPCA. Much of the mechanical equipment has been removed and the physical plant structure is deteriorating due to age and non-use. There are currently no plans to reactivate the plant.

The U.S. Army also operated the Ord Village Treatment Plant located at the southwest border of the base. The plant provided primary treatment of wastewater and was closed in 1964, at which time Ord Village lift

station was constructed and wastewater flows were conveyed to the Main Garrison Treatment Plant.

3 INFORMATION MANAGEMENT SYSTEM

3.1 GEOGRAPHICAL INFORMATION SYSTEM (GIS)

GIS is a computer mapping system that links databases of geographically-based information to maps that display the information. In order to evaluate the performance of the wastewater collection system and to optimize operation and maintenance activities, a GIS system was developed based on the District's existing paper-based record information of the wastewater system.

For this Master Plan Project, GIS has been used to identify facility locations and attributes, and the accumulation of operations and maintenance data. It has been used to display operations and maintenance data and developed in a manner that will facilitate tracking and reporting of SSO's, tracking and measuring operations and maintenance activities, identifying potential capital projects as signaled by the frequency of SSO activities. GIS is used to create maps to visualize areas identified as current and historic trouble spots. It also allows integration between engineering and operations and maintenance by updating the hydraulic model data based on new system improvements or results of field activities. The District currently does not have a GIS program in-place for its facilities.

As part of this project, the District's sewer mapping and inventory data has been built to be compatible with H20Map Sewer hydraulic modeling software and ESRI ArcGIS. The District may wish to make future provisions to continue to support and update the information to maximize these capabilities in the future.

The sewer system was made compatible with the hydraulic modeling software and GIS by converting the existing AutoCAD maps to shape files and inputting data field attributes such as corresponding upstream and downstream manhole, pipeline diameter, manhole depth, invert elevations, rim elevation, material, roughness coefficient, etc. The

attribute table was populated by the text attributes in the AutoCAD drawings and other data provided by the District.

The objective of the GIS is to compile a geographically located inventory of assets. It is common that the initial GIS may have missing information that should be updated by field surveying, such as verifying pipeline diameters, manhole invert elevations, rim elevations. While the initial GIS is adequate for the purposes of development of this analysis, it is recommended that the District should continue to gather information for updating and refinement of the GIS, in addition to identifying a long-term plan for the ongoing implementation and maintenance of GIS technologies throughout the divisions at the District.

4 OPERATIONS AND MAINTENANCE (O&M)

Effective O&M is the quickest and most cost-effective way to reduce the number and impact of sanitary sewer overflows. The goals of sewer system O&M activities are to remove accumulated grease, root intrusion, and/or other debris that could clog the system and lead to sanitary sewer overflows and to remove those materials when they are present to prevent overflows.

This section describes current O&M practices of the District and presents recommendations for future actions.

4.1 CURRENT OPERATION AND MAINTENANCE PROCEDURES

The District has a commitment to the State for the jetting of the wastewater collection system on a cycle of once every 3 years, as described by District O&M staff. Due to frequent grease accumulation and root intrusion problems, the entire Fitch Park area is completely jetted approximately every 8-months.

The District does not have a program for continuous root removal. If problematic roots occur, the District borrows a root cutter or contracts with a vendor for root removal. The District has previously considered the purchase of root cutters as part of its capital equipment purchases.

O&M staff performs regular inspections of the lift stations to check oil, diesel fuel, and the operation of the pumps. Each lift station has an O&M schedule sheet that is marked for inspection.

The Sewer System Management Plan of the WDR, requires that a source control program be prepared and implemented to reduce the amount of grease, fats and oils discharged to the sewer system. The District has prepared a Source Control Program that addresses the following:

- Requirements to install grease removal devices (such as traps or interceptors);

- Design standards for grease removal devices, maintenance requirements, BMP requirements, record-keeping and reporting requirements;
- Develops and implements source control measures for all sources of grease and fats discharged to the sewer system.

The District has an ordinance in place requiring grease, oil, and sand interceptors be in place when they are necessary in the opinion of the General Manger. The District currently has a contract with MRWPCA for the public outreach elements of a Fats, Oils, and Grease (FOG) programs. MCWD is planning a future contract with MRWPCA for the set-up and inspections of the FOG program. The set-up of the program includes:

- Organize, schedule and moderate meetings with the jurisdictional representatives to develop the methodology of prioritization of businesses, set goals and milestone dates for the progress of the program and determine the level of pretreatment at each business.
- Formulate a FOG Task Force with the jurisdictional representative, Restaurant Association Board of Directors and FORA. The MRWPCA shall serve as the moderator, advisor and provide assistance in the activities of the task force.
- Provide an updated list and location of all businesses in the District's service area.
- Prepare and distribute Public Notification letters for inspections. The notifications shall clearly define the roles of the District and the MRWPCA.
- Provide miscellaneous program management and administrative support.

Inspection tasks include:

- Inspect each food-handling business or facility.
- Develop standard restaurant/facility inspection forms.
- Fill out a form for each business or facility and distribute hand-out materials and maintenance logs.
- Identify for the District what pretreatment equipment (if any) exists at each business or facility.
- Determine if current pretreatment equipment is up to code.
- Size the facility for correct pretreatment equipment.
- If a grease interceptor is required by Code, recommend to the District that the business or facility be required to have a plumber conduct a line location to determine where the installation of an interceptor is best suited.
- Prepare a letter for the District to send to the business or facility to inform them of the District's requirement.
- Draft pretreatment sizing compliance letter for the District after the MRWPCA has reviewed the line location results from the business owner.
- Draft Grease Interceptor Waiver Forms for the District, as applicable.
- Notify the District of any compliance issues that are developing or occurring at a particular business.
- If requested, provide input to District Personnel on appropriate compliance action to be taken.
- Prepare a violation letter for the District if that becomes necessary at any particular business.

- Attend any non-compliance/show-cause meetings between business owners and the District, in an informational capacity at MCWD's request.

4.2 GENERAL MAINTENANCE TRACKING

The District O&M staff currently uses an Excel spreadsheet and MS Project software for the scheduling of maintenance activities. O&M staff outlines the location and a description of maintenance activities completed, and the date of future maintenance activities planned for that location.

4.3 SPILL REPORTING

O&M staff prepares and submits Sanitary Sewer Overflow reporting forms as required to the RWQCB. The O&M staff is responsible for spill response and mitigation.

Figure 5 presents a Trouble Map showing areas of previous sewer system overflows and frequent grease accumulation or root intrusion problems between 2001 and August 2004. Table 4-1 (located in Section 11, following Figures) presents descriptions of Trouble Map Locations.

"Trouble spot" and previous SSO report locations and current O&M scheduling reports were reviewed. The current O&M scheduling reports used by staff identify locations included in the "trouble spot" and previous SSO reports as areas requiring regular and scheduling maintenance activities such as grease and root removal.

4.4 RECOMMENDED OPERATIONS AND MAINTENANCE ACTIVITIES

4.4.1 Corrosion Prevention

As described further in Section 9, Condition Assessment, the existing sewer pipelines are in generally poor structural condition.

Limited use of significant portions of the system has been attributed to increased pipeline deterioration due to low flows and accumulation of corrosive gases in the pipelines. Corrosion has been seen in the larger diameter concrete pipelines and in some manholes downstream of high velocity force mains. Corrosion of pipelines may be decreased by O&M activities such as chemical injections, sewer combinations to increase flow within pipelines, controls schemes at the lift stations to reduce the age of wastewater and strategic video taping of the system to monitor "trouble areas". Coordination with the MRWPCA RTP should be made prior to any chemical injections in the survey system.

4.4.2 Preventative Maintenance Prior to Development

As the Ord Community continues to be developed and increased flows are seen in the wastewater collection system, previously inactive sewer pipelines are being brought to their full capacity. It is recommended that pipelines not currently receiving wastewater flows be scheduled for cleaning and root removal prior to a development's completion and increased wastewater flow.

It is recommended that the District be aware of current construction schedules for new developments, and prior to construction of the development, perform preventative maintenance activities such as root removal and cleaning to the development's connections to the collection system. This activity will prevent potential overflows from occurring when increased flows are introduced to the system. In, addition, the District should consider that existing wastewater collection facilities to remain in service with new developments be lined to reduce the overall impact of RDI flows.

4.4.3 SSO Investigations

The District should implement a standard procedure for the investigation of Sanitary Sewer Overflows. Following the identification, stoppage, clean up, and appropriate communication procedures, O & M staff should determine the source of the overflow. Specific areas with grease accumulation should be investigated for FOG controls.

FOG controls to be implemented are anticipated to reduce repeated maintenance activities for grease removal.

4.4.4 Root Control

Per information described by O & M staff and observed in field condition assessments, root intrusion is an issue within the collection system. The District currently borrows root cutting equipment or contracts with a vendor. The District should implement a program for continuous root control, such as foaming the entire system at two year intervals. In addition, areas with repeated root issues should be investigated for capital improvements such as slip lining rehabilitation or replacement with new pipeline.

Routine foaming or slip lining projects will reduce the frequency and number of scheduled root removal maintenance activities.

4.4.5 I/I Reduction Methodology

As further discussed in Section 6, infiltration/inflow (I/I) are groundwater or storm water components of the total flow within the wastewater collection system that enter enough cracks, joints, or illicit connections. Reduction of I/I can improve pipeline and lift station capacities, resulting in fewer capacity related capital improvement costs and reduced treatment costs.

Inspection and testing to identify leaks that allow unwanted infiltration and to determine the location of direct connections of storm water sources (e.g., roof drains, floor drains) such as air testing or smoke testing may be used. Methods for I/I reduction include:

- Cracked sewer pipelines or those with misaligned joints may be slip-lined to reduce infiltration of storm water or groundwater.
- Direct connections to storm water sources should be immediately removed from the sewer system and appropriately connected to discharge to the storm drain system.

ASCE has identified that up to 90% of I/I in the wastewater collection system is from privately owned sewer laterals. Sewer laterals connections to the trunk pipeline are often mis-jointed, cracked, and infiltrated with roots. Sewer laterals located on private property are the responsibility of the property owner as described in the District Code. It is recommended that the District adopt an ordinance requiring testing and replacement of the failed private lateral by the property owner. Similar wastewater Districts' have adopted grant programs to assist the property owner in the expense of private lateral replacement or have included testing as a requirement prior to home sales.

4.4.6 Effect of Increased Wastewater Flow

As the Ord Community continues to develop and wastewater flows increase, velocity within the wastewater pipelines will also increase. The increased pipeline velocities will reduce the deposition of solids within the pipelines. Increased wastewater flow will also reduce the residence time of the wastewater within the collection system, thus reducing hydrogen sulfide generation

and potential corrosive environments. The increased flows will reduce required maintenance activities. The increased wastewater flows will improve the operation of the Ord Community wastewater collection system by increasing velocity and reducing residence time within the pipeline.

4.4.7 Computerized Maintenance Management System

It is recommended that the District use the hydraulic modeling software and GIS system developed in this project for tracking and reporting their wastewater system maintenance activities. The District should obtain training for the hydraulic modeling software and GIS. Staff may also use software such as Arc-reader that enables users to view GIS functions without requiring use of the actual GIS database. O&M staff may use the tools available for the updating of wastewater collection facilities, prevention of sewer overflows and for the regulatory reporting compliance requirements.

The District has previously considered the used of a Computerized Maintenance Management System (CMMS) as a tool for planning and scheduling sewer maintenance work and for tracking the maintenance history of individual wastewater pipeline segments. The CMMS may be linked with the District's accounting software. Packages can incorporate GIS, CMMS, Hydraulic Modeling Results, Condition Assessment and CIP. The primary function of a CMMS is:

- Maintenance of service requests and maintenance history information for each facility;
- Produce and update the maintenance schedule based on feedback information from the cleaning operation;
- Generate work orders;

- Generate reports that support data analysis and decision making;
- Maintain condition assessment information for each facility;
- Provide information on cost of O&M activities for each facility;
- Provide documentation for use in regulatory compliance reporting;
- Indicate facilities that may be candidates for replacement of rehabilitation under the capital improvement program.

It is recommended that the District further consider the purchase of one of the many available CMMS packages that may be compatible with their existing system.

5 LAND USE AND POPULATION PROJECTIONS

5.1 SUMMARY

Anticipated land uses, population growth and planned development areas were analyzed in this study to predict wastewater flows in 5-year planning increments, through Year 2020 (build-out). Each jurisdiction (City of Marina, Del Rey Oaks, City of Monterey, City of Seaside CSUMB, UCMBEST, and Monterey County) within the Ord Community provided the anticipated land uses and locations of anticipated development during each 5-year planning period. Land use data collected included land use designations, number of existing and planned dwelling units, and total developed area. Current and future wastewater flows for the Ord Community were computed through interpretation of information provided by each jurisdiction and corresponding water use and wastewater generation factors in the MCWD Guideline Procedures and Policy Manual. Figure 6 presents a GIS map identifying anticipated development within each jurisdiction of the Ord Community.

This section presents land use information for ultimate development conditions as received from jurisdictions in August 2004. Table 5-1 presents a summary of this land use data.

5.2 EFFECTS OF CHANGES IN ECONOMIC AND POLITICAL CONDITIONS

Growth projections provided by the land use jurisdictions imply favorable economic conditions over the next twenty years. However, ultimate development conditions of land use mix and population are not anticipated to be affected. In addition, political conditions will determine, to some extent, the amount, character, and timing of future development. It is anticipated that there will continue to be changes in the development characteristics and thus, this Master Plan report must be reviewed and updated regularly by MCWD.

TABLE 5-1

LAND USE DATA

Land Use	Number of Units or Building Size	Unit
MARINA		
University Villages		
Residential		
Single Family	564	units
Multi-family	673	units
Commercial		
Office/R&D	760,000	sq.ft.
Large/Mid Box Retail	420,000	sq.ft.
Restaurants – Quick Serve/Fast Food	40,000	sq.ft.
Restaurants – Full Serve	40,000	sq.ft.
Grocery	70,000	sq.ft.
Full Service Hotel	300	Rooms
Limited Service Hotel	150	Rooms
Other (Unknown Attraction)	630,000	sq.ft.
Marina Heights		
Residential		
Single Family	974	units
Community Center		
Cypress Knolls		
Residential		
Duplex	408	units
Apartment	72	units
Assisted Living	54	rooms
Community Center		
Existing Marina		
Duplex	225	units
Marina Airport		
Light Industrial	830,000	sq ft
DEL REY OAKS [1]		
Residential		
Single Family	86	units
Multi-family	581	units
Assisted Living	150	rooms

Land Use	Number of Units or Building Size	Unit
Commercial		
Golf Operations	20,000	sq ft
Golf Clubhouse	22,500	sq ft
Boutique Hotel	100	rooms
Conference Hotel	350	rooms
Timeshare	96	units
Maintenance	2,500	sq ft
Retail	20,000	sq ft
Office	400,000	sq ft
CITY OF MONTEREY [1]		
Commercial		
Office	309,750	sq ft
Industrial	33	sq ft
CITY OF SEASIDE		
Seaside Resort		
Residential		
Single Family	125	units
Commercial		
Conference Hotel	330	rooms
Timeshare	170	units
Seaside Highlands		
Residential		
Single Family	380	units
Affordable Housing -- Surplus II		
Residential		
Single Family	108	units
MultiFamily	251	units
First Tee Project [2]		
Commercial		
Restaurants	3,000	sq ft
Retail	890	sq ft
Office	17,000	sq ft
Chartwell School		
School (assume 450 students)	33,000	sq ft
Monterey College of Law		
Higher Education (assume 200 students)	18,000	sq ft
Brostrom Park		
Residential		
Single Family	70	units
Navy Housing		
Residential		
Single Family	200	units
South Side of Lightfigher		

Land Use	Number of Units or Building Size	Unit
Residential		
Single Family	300	units
Regional Shopping Center at Lightfighter and Hwy 1		
Commercial		
Restaurant (assume200 seats)	20,000	sq ft
Retail	680,000	sq ft
Surplus II Area		
Commercial		
Restaurant (assume 100 seats)	10,000	sq ft
Office	100,000	sq ft
East of General Jim Moore		
Residential		
Single Family	2,200	units
Fitch Middle School		
School	550	students
Marshal Elementary School		
School	435	students
Stillwell Elementary School		
School	200	students
Sunbay Apartments		
Multi-Family	291	units
Hayes Elementary School		
School (assume 400 students)	400	students
CSUMB		
CSUMB –SEASIDE		
Residential		
Multi-Resident (Student housing)	382,200	Sq ft
Assume 200 sq ft per unit	1,911	units
Commercial		
Higher Education (assume 7833 students)	845,000	Sq ft
CSUMB –MONTEREY COUNTY		
Commercial		
Higher Education (assume 533 students)	48,000	sqft
CSUMB –HOUSING		
Single Family	385	units
Multi-Unit Residential	739	units
CSUMB –MARINA		
Multi-Resident (Student housing)	164,000	sq ft
Assume 200 sq ft per unit	820	units

Land Use	Number of Units or Building Size	Unit
Commercial		
Higher Education (assume 572 students)	51,500	Sq ft
ARMY		
Hayes Park		
Residential		
Single Family	180	units
Fitch Park		
Residential		
Single Family	582	units
Marshall Park		
Residential		
Single Family	356	units
Upper Stillwell Park		
Residential		
Single Family	116	units
Stillwell Park		
Residential		
Single Family	345	units
UCMBEST		
Commercial		
Office	1,698,840	sq ft
MONTEREY COUNTY		
East Garrison		
Residential		
Single Family (medium high density)	779	units
Multi-Family (medium density)	621	units
Multi-family (high density)	70	units
Commercial		
Cultural	100,000	sq ft
Office	86,000	sq ft
Assumptions of number of students per school, per MRWPCA wastewater estimates		

(1) Flows from Del Rey Oaks and City of Monterey assumed to flow to Seaside County Sanitation District.

(2) There may be additional information that the land use in this development area has changed since issuance of the Master Plan report, but has not been confirmed. The land use may change to a residential land use that can increase the volume of projected sewer flows. The District will continue discussions with the City of Seaside.

6 WASTEWATER FLOWS

6.1 BACKGROUND

The analysis of existing and historical wastewater flows within the Ord Community wastewater collection system is an important element of this study. Estimates of existing and future wastewater flows are needed to assess the adequacy of the existing collection system under current and future conditions and to determine the location and size of future wastewater collection facilities.

A flow-metering program was conducted to measure wastewater flow over a 30-day period at 5 key locations in the collection system to assess the existing flows within the collection system. To obtain information on infiltration and inflow (I/I) of storm water into the collection system, rain gauges were established in the nearby City of Marina to monitor rainfall over the same period. The wastewater flow and rainfall data were collected and analyzed resulting in an identification of observed flows into source components. The flow-metering program in the Ord Community was a coordinated effort with a similar wastewater flow-metering program conducted by the District in central City of Marina.

This section describes the collection and analysis of flow and rainfall data.

6.2 FLOW COMPONENTS

Average Dry Weather Flow

Average Dry Weather Flow (ADWF) consists of sanitary wastewater from residential, commercial, institutional sources, and industrial wastewater. It is affected by the population and land uses in an area and varies thought the day in response to personal habits and business operations. ADWF is normally estimated by application of unit flow factors to land use units (e.g. gpd per acre). ADWF unit flow factor for residential units are 90 gallons per capita per day at densities described per Section 500 of the MCWD Procedures Guidelines and Design Requirements. ADWF for

commercial land uses are assumed to be equal to the water use rate (i.e. assumes a 100% water return rate). Table 6-1 presents Base Wastewater Unit Flow Factors used for this analysis.

TABLE 6-1

AVERAGE DRY WEATHER FLOW UNIT FACTOR

LAND USE CATEGORY	UNITS	UNIT FLOW FACTOR
Residential	90	Gallons Per Capita Per Day
Commercial (assumes 100% water return rate)		Gallons per day/square foot
Office/R&D	0.107	gpd./sq ft
Large/Mid Box Retail	0.009	gpd./sq ft
Restaurants – Quick Serve/Fast Food	0.241	gpd./sq ft
Restaurants – Full Serve	0.278	gpd./sq ft
Grocery	0.348	gpd./sq ft
Full Service Hotel	151	gpd./room
Limited Service Hotel	82	gpd./room
Other (Unknown Attraction)	0.045	gpd./sq ft
Schools	4	Gpd/student
Source: MCWD Procedures Guidelines and Design Requirements, 2003; MRWPCA Wastewater Generation Estimates; 1999		

Average Dry Weather Flow Peaking

Diurnal wastewater variations are normally accounted for by applying a multiplier, called a peaking factor, to the average ADWF. MCWD estimates the peaking factor according to Figure 500-1 of the MCWD Procedures Guidelines and Design Requirements, Figure 7. Low ADWF has higher peaking factors than higher ADWF. The hydraulic model is used to recalculate the peaking factor at each manhole, thereby accounting for attenuation of flow through the collection system providing an accurate estimate of hydraulic capacity requirements.

Figure 8 presents the estimated Ord Community peaking factors for each development.

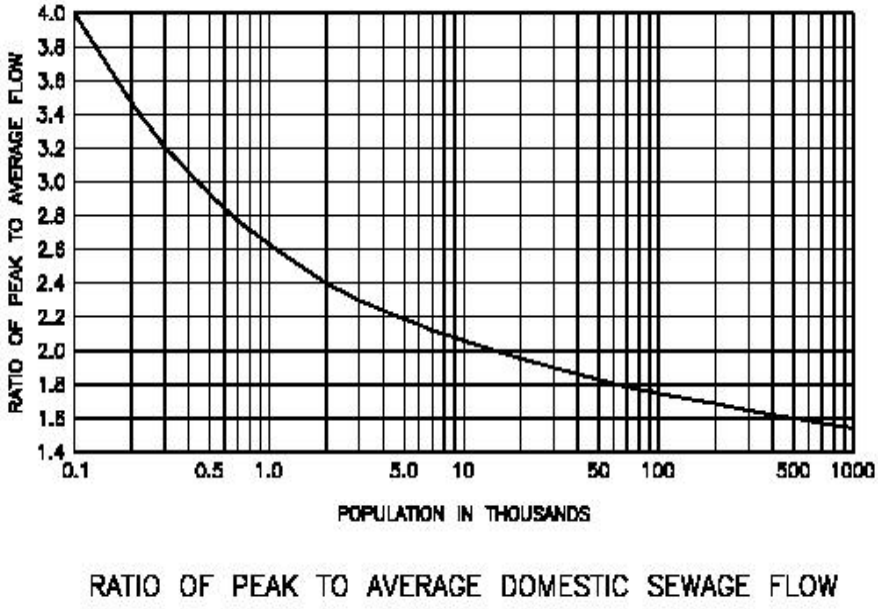


Figure 7

MCWD Procedures Guidelines and Design Requirements Figure 500-1

Groundwater Infiltration

Groundwater infiltration (GWI) is defined as groundwater entering the collection system through defective pipes, pipe joints and manhole walls. The magnitude of GWI depends on the depth of the groundwater table above the pipelines, the percentage of the system that is submerged, the physical condition of the system and the maintenance practices of the District. While GWI is affected by rainfall, it responds gradually and is not directly related to individual rainfall events. Given the soil conditions and groundwater elevation in the Ord Community, GWI is not considered to be significant.

Rainfall-Dependent Infiltration/Inflow

Rainfall-Dependent Infiltration/Inflow is rainwater that enters the collection system in direct response to the intensity and duration of individual rainfall

events. Rainfall-Dependent Infiltration/Inflow can be broken down into storm water inflow (SWI) and rainfall-dependant infiltration (RDI) components based on the pathways through which the water enters the sewers or manholes. SWI reaches the collection system by direct connection rather than by percolation through the soil. SWI sources include roof downspouts illegally connected to the sanitary sewers, yard drains, holes in manholes covers, cross-connections with storm drains, and catch basins. RDI enters defective pipes, pipe joints and manholes walls as the rainwater is percolating through the soil and passing through the pipe zone.

6.3 WET WEATHER FLOW

Infiltration and inflow (I/I) are terms used to describe the ways that storm water and groundwater enter the sanitary sewer system. I/I negatively impacts the sanitary sewer system hydraulic capacity. By removing sources of I/I, the collection system benefits with a reduction in surcharged sewers and associated problems of wastewater backups and overflows, more efficient operation of wastewater treatment facilities and the use of the collection system hydraulic capacity for wastewater flow rather than I/I flow.

Flow and rainfall monitoring was conducted to collect data on existing sewer flows and to estimate I/I.

6.3.1 Approach

Flow meters were installed inside sewers at representative locations in the service area. Flows were measured for a period of 5 weeks between January and March 2004. A total of seven flow monitoring sites were recorded.

6.3.2 Flow Monitors

Flow meter locations were based on sewer system maps provided by the District. The sites were field verified for feasibility of monitor installation. Two of the metering sites were re-located after 2 weeks due to minimal flows. Appendix B presents the flow monitoring locations.

Five Sigma 910 flow monitors were installed. Sigma 910 flow monitors are depth-velocity flow monitors. They can measure and record level, velocity, and flow. They use a pressure transducer to collect depth readings, and ultrasonic Doppler sensors on the probe to determine the average fluid velocity. Continuous depth and velocity readings were recorded by the flow meters in 15-miniute increments and downloaded to a computer spreadsheet program. Manual level and velocity readings were taken during the flow meter installation and again when removed, and compared to the reading of the flow meter to ensure proper calibration and accuracy.

6.3.3 Rainfall Results

One rain gauge was installed within the City of Marina to record rainfall events over the flow monitoring location. Three storm events occurred over the flow monitoring duration, as presented in Table 6-2 and Figure 8.

TABLE 6-2

Storm Event Summary

Event No.	Rainfall (inches)	Event Period	Event Description	Estimated Soil Condition
E1	0.78	1.25 Days 2/2 10:00 to 2/3 16:00-	Intermittent short duration moderate bursts between light intensity rainfall.	Lightly saturated: Sparse rainfall since 1/1/04
E2	0.87	14 Hours 2/17 19:00 to 2/18 09:00-	Moderate and consistent intensity rainfall for 14 hours	Lightly saturated
E3	1.07	2.1 Days 2/25 06:00 to 227 07:00-	Intermittent short duration moderate bursts between light intensity rainfall.	Moderately saturated

Figure 8

Rain over Monitoring Period

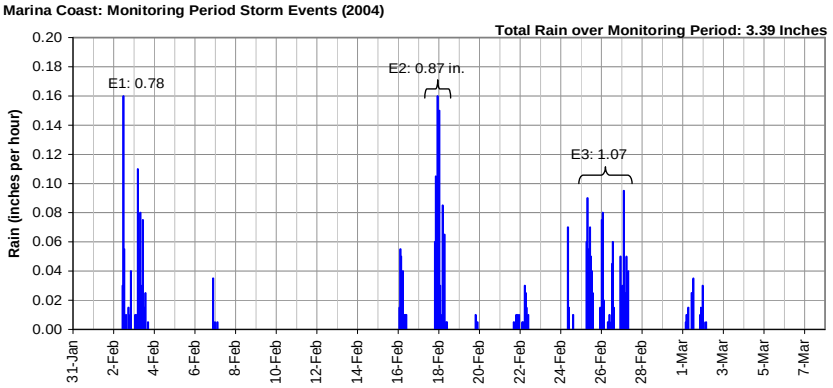
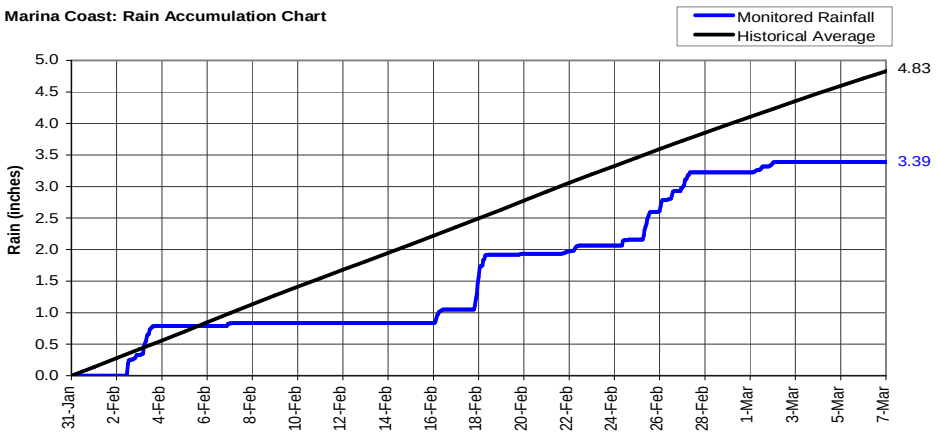


Figure 9 shows the total rain over the period and the historical average rainfall for Marina during the project duration. The total rainfall during the flow monitoring period was 3.39 inches with the three largest events accounting a total of 2.72 inches. Figure 9 shows that this is lower than the normal levels based on the average rainfall of 4.83 inches for the period between January 31 through March 7 of 2004. (Western Regional Climate Center At Station 045795 Monterey, California).

Figure 9

Rain Accumulation Chart



6.3.4 Dry Weather Flow Results

Flow monitoring data shows a diurnal wastewater pattern, with the average flows recording from 0.0003 to 0.37 million gallons per day (mgd) and peak flows of 0.001 to 0.73 mgd. Table 6-3 presents a summary of the average daily flow monitoring results. ADWF results from Sites 2 and 3 were noted to be very low due to minimal population upstream of the flow monitoring sites. These flow monitors were later relocated to more populated areas at Sites 6 and 7. Peak Dry Weather Flow (PDWF)/ADWF Ratio presents a dry weather peaking factor that is not used as design

criteria. The design criteria peaking factor is based upon peak wet weather conditions. The PDWF/ADWF Ratio for Sites 2,3,6, and 7 are in a higher range value due to the lower ADWF. As described previously, low ADWF has higher peaking factors than higher ADWF.

TABLE 6-3

Average Daily Flow Monitoring Results

Site No.	Average Dry Weather Flow	Average Peak Dry Weather Flow	PDWF/ADWF Ratio
1	0.39 MGD	0.73 MGD	1.88
2	0.2 gpm	1.8 gpm	8.71
3	0.3 gpm	0.7 gpm	2.50
4	0.12 MGD	0.21 MGD	1.73
5	0.37 MGD	0.67 MGD	1.83
6	2.7 gpm	6.4 gpm	2.38
7	7.3 gpm	26.9 gpm	3.67

6.3.5 Wet Weather Flow Results

Real time flow was plotted against dry weather flow and the hourly rainfall data to determine the I/I flow volume during each event as shown in Appendix B. Only Storm Event 2 had sufficient quantity and intensity of rainfall to capture discernable I/I response from flow monitoring sites with larger flows (Sites 1, 4, 5). Table 6-4 summarizes the I/I calculations for this study.

Dry weather or baseline flow can be expected to have a predictable diurnal flow pattern. If a site has a large percentage of groundwater infiltration occurring during the periods of flow measurement, the peaks and lows will appear to be dampened.

Based on observations of Peak-to-Average and Minimum-to-Average Flow Ratios, the Ord Community collection system does not appear to have high levels of groundwater infiltration.

TABLE 6-4

I/I Measurement

Item	Site 1	Site 4	Site 5
Storm Event 2 (0.87 inches)			
Totalized I/I (Gal):	85,000	17,000	15,000
Peak I/I (MGD):	0.36	0.07	0.09
Peak Flow (MGD):	0.79	0.21	0.67
Peaking Factor:	2.03	1.69	1.84
Peak Level (in):	14.38	2.13	12.30
d/D Ratio (total flow):	0.53	0.12	0.68

The District has expressed concern over wet weather flows because of the age and observed deteriorated condition of much of the Wastewater Collection System. Additionally, since new development will potentially result in the replacement of much of the system, a framework for estimating future wet weather impacts was identified as a key design issue. Therefore, workshops with the project team were conducted to focus on this topic (described in Section 7).

7 DESIGN CRITERIA

7.1 BACKGROUND

Design criteria sets forth the requirements for new facilities and for evaluating existing facilities. The criteria establishes how the design flows and the capacity of the sewers are to be calculated. Key issues addressed by the design criteria are:

- I/I from existing sewers under present conditions
- I/I anticipated in future sewers
- Average Base Wastewater Flows
- Sewer Hydraulic Capacity.

Workshop sessions were held involving key engineers and managers of the Project Team to address these and other design issues and to reach a consensus on their resolution for application in this project. The goal of the workshop sessions was to develop an informed consent of design parameters to be used in the development of the project hydraulic model and the development of capital improvement projects for the Ord Wastewater Master Plan. The Project Teams for the Ord Community Wastewater Master Plan Project and the City of Marina Wastewater Master Plan Project coordinated results from these workshop sessions. The workshop sessions focused on consent of the key design issues described in this section.

7.2 I/I FROM EXISTING SEWERS

Typical planning allowances for RDI are described in gallons per day per inch-diameter mile (gpd/idm). Units of gpd/idm predicts that the RDI increases as the pipeline diameter increases. Per ASCE studies (ASCE/WPCF, 1982), the national average for RDI planning allowances is 500 gpd/idm.

An RDI rate can be calculated for the existing collection system using the flow monitoring results. A typical design storm of 5-year, 6-hour storm of 1.1 inches for the City of Marina was used to establish the design parameter for RDI. The 5-year storm is a typical design parameter for municipalities in consideration of design for wet weather flows. Typical 5-year, 6-hour storm distribution for the design storm would yield a peak rainfall of 0.46 inches/hour. Extrapolating from the flow monitoring data from Site 1 to the design storm results in a peak I/I flow estimate at Site 1 of 725 gpm. Site 1 is considered for RDI interpolation because it captured a largest amount of flow and collected flows from the largest sewershed area as compared to the other flow monitoring sites.

Flow monitoring Site 1 is located at the downstream end of the collection system on the west side of Highway 1. There are approximately 23.4 miles of collection system pipelines upstream of Site 1 with an average pipeline diameter of 9.4 inches. The average pipeline diameter was calculated using a weighted average of pipeline diameter by length. Site 1 collects flows from a portion of the Cypress Knolls area, Marina Heights, Preston Park, CSUMB Housing, the Marina Airport, and UCMEST.

The RDI was calculated using the following formula:

$$RDI = \frac{\text{Peak I/I}_{\text{5-year storm}}\ \text{(gpd)}}{\text{Total Pipeline Length (miles) x Average Pipeline Diameter (inches)}}$$

The RDI for Site 1 is 4,728 gpd/idm. This is significantly greater than the national average. However, as described further in Section 2, Existing Collection System and Section 9, Condition Assessment, the known existing conditions of the wastewater collection system in the Ord Community is poor, and the RDI value is considered a reasonable

estimate. Table 7-1 presents a summary of I/I values for the Ord Community.

TABLE 7-1

Master Plan Application of RDI for Existing Sewers

INFILTRATION AND INFLOW		
Description	**Storm Intensity**	**I/I Factor**
Measured	<5-Year	598 gpd/idm
Extrapolated	5-Year	4,728 gpd/idm
National Average	-	500 gpd/idm

The peak dry weather flow is calculated by applying a peaking factor to the average dry weather wastewater flow (ADWF) per the MCWD Guidelines, Figure 500-1. The peak I/I flow is added to the peak dry weather flow to determine the peak wet weather flow, as described in the following equation:

Peak Wet Weather Flow = Average Dry Weather Flow * Peaking Factor + Peak I/I Flow

Within the H2OMap Sewer hydraulic modeling software program, an RDI value was applied to each pipeline on a gallon per inch-diameter mile basis. The I/I component is calculated for each pipeline segment. The I/I portion of the total flow within a pipeline is reported as a component of the total pipeline flow in the modeling software. This allows the user to determine the impact that I/I flow has relative to the capacity of the pipeline.

Condition assessments throughout the Ord Community indicate that the sanitary sewer collection system is in relatively poor condition. The conclusion of this analysis and of the project workshops is that existing pipelines with Ord Community are modeled with a RDI of 4,728 gdp/idm, or approximately 67% of the ADWF. This estimate of 67% of ADWF

assumes 50 foot residential lots with an occupancy of 3 persons per home. Existing conditions may be a greater factor of the ADWF due to the small existing residential population.

7.3 I/I FROM FUTURE SEWERS

Per MCWD's In-Tract Policy for Water and Wastewater Infrastructure, it is anticipated that new sewer pipelines will be installed within all new development projects, will be constructed of PVC pipe, with no illicit connections such as roof drains, and will be placed under paved roadways. Pipelines constructed beneath roadways would not be significantly affected by rainfall as the runoff from the street will flow directly into storm drains and the pipe zone would not become more saturated with rain. New construction will also eliminate illicit connections to the sewer system. New construction technologies and improved system maintenance are is anticipated to limit the quantities of rainfall induced I/I.

Per MCWD's In-Tract Water and Wastewater Infrastructure Policy, existing water and wastewater facilities to remain in new developments are subject to a condition assessment inspection to verify the need for higher maintenance costs. Existing sewers remaining within a development will continue to contribute some volume of I/I flows to the system, particularly where the existing sewers are not located beneath developed roadways and if illicit connections have not been corrected. Therefore, the I/I flow contribution of existing sewers that remain within a new development may have significant impacts to downstream sewer pipeline capacities depending on the length of existing pipelines that would remain. As a result, the District can expect higher maintenance costs associated with lift station operations, overflows, and the need to jet and/or clean roots, and additional MRWPCA costs for additional I/I related flows measured at the Interceptor. It is recommended that the District consider that existing wastewater collection facilities to remain in service within new developments be lined to reduce the impact of RDI flows.

It is anticipated that the future conditions of the Ord Community wastewater collection system will be similar to those seen within the City of Marina wastewater collection system, also owned and operated by MCWD. A City of Marina Sewer System Master Plan has been prepared by MCWD. The City of Marina wastewater collection system is approximately 30 years old, was designed to MCWD and AWWA standards, and regularly maintained by MCWD staff, reducing many of the poor conditions prevalent within the older Ord Community wastewater collection system.

The City of Marina and future portions of the Ord Community wastewater collection system are to be designed to include an I/I component to accommodate a 25-year, 1-hour storm. This I/I component is equal to 44% of the ADWF.

7.4 DESIGN WASTEWATER FLOW

The unit flow factors presented in Table 6-1 are used for the calculation of existing and future average base wastewater flows. Average Dry Weather Flows are presented in Table 7-2.

Diurnal variation in base wastewater flow are accounted for by the use of peaking factors established by Figure 500-1 in the MCWD Procedures and Guidelines. Peaking factors are determined by population and are calculated on a per manhole basis. It should be noted that the peaking factor is applied to the hydraulic model in a cumulative fashion as the flow works its way from its source, joins with other flows in the system and ultimately discharges into the MRWPCA interceptor. Because of this dynamic, PWWF are not shown in Table 7-2. To design any one particular feature in the collection system, the design should refer to the hydraulic model in Appendix C of this report to determine the PWWF estimate.

Peak I/I flow is calculated as described in Sections 5.2 and 5.3.

Design wastewater flow can be characterized in the following equation:

Design Wastewater Flow

=Average Dry Weather Flow * Peaking Factor+Peak I/I Flow

TABLE 7-2

AVERAGE DRY WEATHER FLOW

DEVELOPMENT	FIRST YEAR OF DEVELOPMENT	CUMULATIVE ADWF (gpd)			
		2005	2010	2015	2020
MARINA					
University Villages	2010	0	508000	508000	508000
Marina Heights	2005-2006	218000	218000	218000	218000
Cypress Knolls	2005-2006	98000	98000	98000	98000
Existing Marina	Existing	47000	47000	47000	47000
Marina Airport	2010	0	4000	6000	7000
DEL REY OAKS [1]	2007	103000	103000	227000	285000
CITY OF MONTEREY [1]	2010	0	11000	22000	33000
CITY OF SEASIDE					
Seaside Resort	2005	125000	125000	125000	125000
Seaside Highlands	Existing	123000	123000	123000	123000
Affordable House -- Surplus II	2005	87000	87000	87000	87000
First Tee Project [2]	2005	3000	3000	3000	3000
Chartwell School	2007	2000	2000	2000	2000
Monterey College of Law	2006	1000	1000	1000	1000
Brostrom Park	Existing	23000	23000	23000	23000
Navy Housing	2010	0	65000	65000	65000
South Side of Lightfighter	2011	0	62000	62000	62000
Regional Shopping Center at Lightfighter and Hwy 1	2010	0	10000	10000	10000
Surpus II area	2010	0	0	13000	13000
Fitch Middle School	Existing	2000	2000	2000	2000
Marshal Elementary School	Existing	2000	2000	2000	2000
Stillwell Elementary School	Existing	1000	1000	1000	1000
Hayes Elementary School	2010	0	2000	2000	2000
Sunbay Apartments	Existing	60000	60000	60000	60000

DEVELOPMENT	FIRST YEAR OF DEVELOPMENT	CUMULATIVE ADWF (gpd)			
East of General Jim Moore	2020	0	0	0	713000
CSUMB					
CSUMB-Seaside		0	72000	147000	184000
		2005	**2010**	**2015**	**2020**
CSUMB-County of Monterey	2010	0	1000	1000	2000
CSUMB-Marina	2005	66000	66000	67000	68000
CSUMB-Housing	Existing	126000	253000	278000	278000
ARMY		2005	2010	2015	2020
Hayes Park	2005	58000	58000	58000	58000
Fitch Park	2006	189000	189000	189000	189000
Marshall Park	2009	115000	115000	115000	115000
Upper Stillwell Park	2011	0	0	38000	38000
Lower Stillwell Park	2011	0	0	112000	112000
UCMBEST					
Central North and West Campus	2006-2007	182000	182000	182000	182000
MONTEREY COUNTY					
East Garrison	2008-2009	300000	300000	300000	300000

(1) Fows from Del Rey Oaks and City of Monterey assumed to flow to Seaside County Sanitation District.

(2) There may be additional information that the land use in this development area has changed since issuance of the Master Plan report, but has not been confirmed. The land use may change to a residential land use that can increase the volume of projected sewer flows. The District will continue discussions with the City of Seaside.

7.5 SEWER HYDRAULIC CAPACITY

The design flow computed in each sewer pipeline in the wastewater collection system is checked against the hydraulic capacity of the sewer to evaluate its adequacy. New sewer pipelines must be sized to have adequate capacity for the anticipated design flow at build-out. The capacity of a pipe flowing full can be computed using the Manning Formula. However, true capacity of the sewer may be reduced due to the presence of roots, debris, joint misalignments and head losses through manholes. A design capacity for each pipeline less than the theoretical full pipe capacity is adopted to accommodate this reduction in capacity. The degree of reduction of full pipe capacity varies depending on the size

of the sewer since the effect of roots and debris is greater in smaller diameter sewers.

The criteria for hydraulic design capacity adopted for this study are presented in Table 7-3.

TABLE 7-3

HYDRAULIC DESIGN CRITERIA

Pipe Diameter	Percent of Full Pipe Capacity (d/D)
12 or less	67
15 or greater	75
The Technical Review Committee for this project established the hydraulic design criteria for this project to be less than the criteria noted for pipelines 15 inches in diameter or greater in the District Procedures and Guidelines for the purposes of conservatism in this planning document.	

7.6 OTHER HYDRAULIC CRITERIA

A Manning's roughness value of 0.013 was used for all pipelines per MCWD Procedures and Guidelines. This value is used for both new and existing pipelines.

Minimum slope for new pipelines are per MCWD Procedures and Guidelines as follows:

TABLE 7-4

MINIMUM SLOPE CRITERIA

Diameter (Inches)	Minimum Slope in Feet per 100 Feet
8	0.40
10	0.32
12	0.28
15	0.15
18	0.12
21 and greater	0.10

Per MCWD Procedures and Guidelines, the maximum allowable velocity within a sewer force main is 6 fps to reduce the water hammer and the accumulation of corrosive gases.

8 COLLECTION SYSTEM ANALYSIS

8.1 INTRODUCTION

This section describes the evaluation of the existing collection system facilities and identifies improvements that are anticipated to be needed to meet the development projected by the land use jurisdictions with MCWD's Ord Community service area.

This section describes the theory and application of the hydraulic model and the results of the collection system analysis.

8.2 METHODOLOGY

A computer model was developed for the wastewater collection system using H20Map Sewer Version 6.0 computer software. The hydraulic model is included in Appendix C. The flow projections developed in the previous section of this report were used to populate the model. The model was used to evaluate the hydraulic capacities of the sewers to carry existing and projected build out peak flows per design criteria described in Section 7, Design Criteria.

The model contains approximately 1,400 pipe segments representing approximately 65 miles of existing pipeline. Manning's roughness value of 0.013 was used for all pipelines per MCWD guidelines. For pipes with unknown invert elevations, an average slope was calculated between known upstream and downstream elevations. For pipes without invert data for the entire reach, minimum slopes were used per MCWD guidelines.

Existing average dry weather (ADWF), and peak wet weather flows (PWWF) were calculated for every pipeline segment included in the hydraulic model.

Seaside County Sanitation District (SCSD) and MCWD staff are currently discussing diverting sewer flows from Del Rey Oaks and the City of Monterey through the SCSD sewer system. Pending MCWD and SCSD

Board approval of the flow diversion, these systems will be built accordingly. In light of these discussions and consistent with the SCSD's March 2004 Sanitary Sewer Master Plan which assumed such a diversion, this Master Plan also assumes the sewer flow from Del Rey Oaks and City of Monterey to flow through the SCSD. If these discussion do not result on sewer flows being diverted to SCSD, additional analysis will be required to route flows through the Ord Community.

The District is currently evaluating a direct connection of the Ord Village Lift Station force main to the MRWPCA Seaside Pump Station Interceptor, eliminating approximately 3,500 linear feet of the force main from the Ord Village Lift Station to Giggling Lift Station. This option requires further consideration by the District and MRWPCA, and thus, is not included in the project hydraulic model or this master plan.

The District has planned the following system improvements that are not included or considered within the hydraulic model or this master plan:

- Re-route flows from Jefferson Lift Station to San Pablo Lift Station. Decommission and remove Jefferson Lift Station.
- Relocate San Pablo Lift Station. Re-route discharge flow from San Pablo Lift Station to the City of Marina wastewater collection system.
- Pump and force main improvements at Landrum Lift Station.

These improvements should be included in an update of the hydraulic model and facility maps prior to the final design of these facilities.

8.3 COLLECTION SYSTEM ANALYSIS COMPUTER MODEL

To evaluate the wastewater collection system for the purpose of this Master Plan, the flow in each anticipated development is distributed evenly among all of the manholes within the development boundary because exact flow loading points may not be known at this time or may change. As jurisdiction further refine their developments and in-tract sewer systems, the District should refine the model to reflect a more

accurate flow distribution. For Peak Wet Weather Flow analysis, peaking factors are applied per Figure 500-1 of the MCWD Procedures Guidelines and Design Standards at each manhole. Wet weather flows are applied as described in Section 7, Design Criteria, as gallons per inch diameter mile for existing pipelines and as a factor of the ADWF for new developments. In each development, average and peak wet weather flows were calculated for every pipeline segment in the model for the 5-year planning periods to build-out conditions. The hydraulic model software has a function to treat the lift stations as if they are a portion of a gravity system or if they are pumping at full flow capacity. The hydraulic model is run with the lift stations running at full flow capacity to represent real world conditions.

8.4 RESULTS OF THE CAPACITY ANALYSIS

A hydraulic analysis was completed for average dry weather flows and peak wet weather flows for years 2005, 2010, 2015, and 2020. Peak wet weather flow deficiencies are presented, as they are the basis of the design criteria used to identify hydraulic deficiencies. Peak wet weather flow deficiencies would therefore also include any deficient conditions that would result for the average dry weather flow scenario.

This section presents the results of the hydraulic analysis for peak wet weather flows. Where deficient sewers were identified, replacement sewers were sized to convey the flow, in accordance with the d/D criteria established for this Master Plan. Table 8-1 provides a summary of the hydraulic evaluation criteria.

TABLE 8-1

HYDRAULIC EVALUATION CRITERIA

Task	Existing Condition	Build out Condition
Design Storm	5-Year, 6-hour	25-Year, 1-hour
Deficiency Criteria	12-inches or less, d/D = 0.67 15-inches or more, d/D = 0.75	12-inches or less, d/D = 0.67 15-inches or more, d/D = 0.75
Minimum Velocity	2 fps when flowing half-full	2 fps when flowing half-full
Maximum Velocity	8 fps	8 fps
Source: MCWD Procedures Guidelines and Design Standards; Technical Committee Workshop (See Section 7)		

8.4.1 Peak Wet Weather Flows Years 2005, 2010, 2015,2020

Based on information provided by the land use jurisdictions in the Ord Community, wastewater flow scenarios were developed for years 2005, 2010, 2015, 2020.

The hydraulic analysis shows that the sewer system does not have adequate capacity in specific pipeline segments to accommodate the anticipated Peak Wet Weather Flows. There are 69 deficient sewer pipeline segments with modeled flows greater than the design capacity (67 percent of pipe capacity (for pipelines 12-inches or less and/or greater then 75 percent of pipe capacity for pipelines 15-inches or less), totaling 22,000 feet or 4.2 miles. The deficient pipelines are presented in Tables 8-2 through 8-5. The hydraulic model does not calculate the hydraulic grade of the projected flows above the crown of the pipe, therefore, the hydraulic grade line may rise above the crown of the pipeline in the manhole.

TABLE 8-2

2005 PIPELINE DEFICIENCIES

Pipe ID	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing Diameter (in)	d/D
AA-16	AA-16	AA-8	240	6	100%
AA-7	AA-7	AA-6	200	8	79%
AA-6	AA-6	AA-5	210	8	82%
AA-5	AA-5	AA-4	80	8	70%
AA-4	AA-4	AA-3	340	8	100%
AA-3	AA-3	AA-2	370	8	100%
C2	C2	C3	274	8	75%
C6	C6	C7	386	12	100%
C7	C7	C8	342	12	100%
C8	C8	C9	323	12	100%
C9	C9	C10	377	12	100%
D701	D701	D700	63	8	71%
H324	H324	H323	288	10	71%
L1E	L1E	L1D	245	12	100%
L1D	L1D	L1C1	288	12	100%
L1C1	L1C1	L1B	221	12	100%
L1B	L1B	L1A	317	12	74%
E613	E613	E612	426	6	67%
E633	E633	E607	348	8	100%
E641	E641	E640	143	8	100%
E640	E640	E633	224	8	100%
L1A	L1A	L1	316	12	79%
L10	L10	L11	357	18	73%
L11	L11	L12	348	18	100%
L12	L12	L13	370	18	100%
L27	L27	L28	532	18	67%
L29	L29	L30	311	18	69%
M104	M104	BOOKER_WW	46	8	71%
10	L13	13	64	18	80%
11	13	12	162	18	100%
B901	B901	ORD_WW	501	12	80%
L40	L39	L22	464	18	75%
P31	P31	P30	350	12	100%
P30	P30	P29	350	12	100%
P29	P29	P28	350	12	81%
P28	P28	P27	350	8	81%

Pipe ID	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing Diameter (in)	d/D
P27	P27	P26	350	10	100%
P26	P26	P25	350	10	100%
P25	P25	P24	344	12	78%
P23	P23	P22	354	12	100%
P22	P22	P21	350	12	100%
P21	P21	P20	286	12	100%
P20	P20	P19	609	10	70%
P19	P19	P18	350	10	71%
P18	P18	P17	350	10	72%
P17	P17	P16	335	10	
P7	P1	Reservation_WW	188	12	100%
		TOTAL	**22647**		

TABLE 8-3

2010 PIPELINE DEFICIENCIES

Pipe ID	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing Diameter (in)	d/D
H319	H319	H317	339	8	69%
H323	H323	H322	333	8	71%
L28	L28	L29	533	12	67%
		TOTAL	**1205**		

TABLE 8-4

2015 PIPELINE DEFICIENCIES

Pipe ID	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing Diameter (in)	d/D
H319A	H319A	H319	204	10	67%
		TOTAL	**204**		

TABLE 8-5

2020 PIPELINE DEFICIENCIES

Pipe ID	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing Diameter (in)	d/D
E680	E680	E679	211	8	100%
E609	E609	E608	290	8	100%
E608	E608	E607	341	10	100%
E607	E607	E606	421	10	100%
E606	E606	E605	402	10	100%
E605	E605	E601	387	10	100%
E601	E601	E600	373	10	79%
E600	E600	E567	458	10	81%
E679	E679	E678	475	8	100%
E678	E678	E677	233	8	100%
E677	E677	E609	90	8	100%
G437	G437	G437A	148	12	82%
G442	G442	G443	287	15	75%
G443	G443	G444	391	15	71%
G444	G444	G445	425	15	71%
G445	G445	G446	537	18	82%
G446	G446	G447	440	18	100%
G449	G449	G450	361	18	100%
G437A	G437A	G438	242	12	100%
G501	G501	G500	84	15	100%
G561	G561	G560	417	15	100%
G560	G560	G559	370	15	100%
G559	G559	G501	91	15	100%
G565	G565	G562	309	12	67%
		TOTAL	**7784**		

8.5 NON-CONFORMANCE WITH SLOPE STANDARD

Preliminary hydraulic analysis indicates that an additional 25 pipeline segments have slopes that do not meet the District design criteria, are of positive slope, or are below the invert of the downstream pipeline. It is recommended that the District field verify these pipeline segments prior to consideration for replacement. Replacement of these pipelines may improve the operation of the wastewater collection system if they are constructed at slopes meeting District design criteria. Table 8-6 and Figure 11 presents pipeline improvements due to slope that do not meet District criteria.

TABLE 8-6

PIPELINES WITH NON-CONFORMING SLOPE

Pipe ID	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing Diameter (in)	Existing Slope (ft/ft)	Replacement Slope (ft/ft)
F548	F548	F547	250	6	0.0000	0.0040
F547	F547	F545	283	6	0.0088	0.0053
H254	H254	H311	288	24	0.0396	0.0045
H315A	H315A	H315	238	24	-0.0564	0.0044
H315	H315	H254	180	24	0.0376	0.0045
H316	H316	H315A	195	24	0.0039	0.0045
H321	H321	H320	225	10	0.0674	0.0247
H322	H322	H321A	183	10	0.0754	0.0246
H321A	H321A	H321	152	10	-0.0999	0.0246
L92	L92	L17	45	6	0.0000	0.0040
M9	M9	M8	337	12	0.0068	0.0039
M19A	M19A	M19	150	8	0.0000	0.0040
M19	M19	M18	269	8	0.0287	0.0264
M20	M20	M9	295	12	0.0000	0.0034
N210	N210	N209	679	8	0.0497	0.0452
N209	N209	N206	655	8	-0.0006	0.0040
N208	N208	N207	270	8	-0.3694	0.0040
N266	N266	N266A	277	10	-0.0079	0.0044
N266A	N266A	N253	184	10	-0.0535	0.0044
N265	N265	N266A	172	8	-0.0319	0.0040
N252	N252	N251	194	8	0.0194	0.0044
N251	N251	N250B	50	8	0.0086	0.0044
N250B	N250B	N250A	157	8	0.0159	0.0043
N250A	N250A	N250	221	8	0.0177	0.0044
N250	N250	N237	248	8	0.0147	0.0044

8.6 LIFT STATION CAPACITY ANALYSIS

It has been assumed in the collection system capacity analysis that the lift stations will be expanded and/or improved as required to handle the design peak wet weather flows. Improvements required for lift stations are presented in Table 8-7. Lift station improvements are assumed include the replacement of the required pumps and appurtenances to capacities adequate to accommodate Year 2020 wastewater flows. It is assumed that the District will determine the extent that existing facilities can be incorporated in the design of a new lift station during the design process.

TABLE 8-7

LIFT STATION ANALYSIS

Lift Station	Deficiency Year	Existing Flow Capacity (gpm)	Required Flow Capacity (PWWF) (gpm)
Imjin	2005	1490	2282
Jefferson	2005	41	89
Neeson (1)	2005	400	40
Giggling	2005	623	1043
East Garrison	2005	0	565
Schoonover	2005	480	537

(1) Existing Neeson lift station capacity creates downstream gravity pipeline deficiencies (d/D). Therefore, a reduced lift station capacity is recommended.

8.7 FORCE MAIN CAPACITY ANALYSIS

Force main improvements required for existing and future flows are presented in Table 8-8. Flow capacity is based on criteria for maximum 6 fps. Force main improvements include capacity replacement to accommodate Year 2020 wastewater flows.

TABLE 8-8

FORCE MAIN IMPROVEMENTS

Force Main	Existing Diameter (in)	Deficiency Year	Required Diameter (in)	Existing Flow Capacity (gpm)	Required Flow Capacity (gpm)
Imjin	10	2005	14	1454	2282
Giggling	8	2005	10	934	1009
Garrison	6	2005	8	0	565

8.8 ANALYSIS OF JEFFERSON AND SAN PABLO LIFT STATION FLOWS

As a project separate from this Master Plan, the Marina Heights Developer and the District are considering the reconfiguration the flows from the Jefferson and San Pablo Lift Station. The project would abandon Jefferson Lift Station and relocate San Pablo Lift Station to the

north east portion of the Marina Heights development and either convey flow through the Ord Community wastewater collection or the City of Marina wastewater system.

This Master Plan assumes the flows from San Pablo Lift Station will be conveyed to the Ord Community System. Should the District and the Marina Heights developer decide to convey the San Pablo Lift Station flows to the City of Marina, additional capacity would become available downstream.

8.9 ANALYSIS OF SEASIDE EAST FLOWS

There is no existing sewer trunk pipeline that ties the Seaside East development to the Ord Community wastewater collection system. The Seaside East development is located on the east side of General Jim Moore Blvd. south of Coe Avenue. A hydraulic analysis was completed to determine the most cost effective route to connect the Seaside East flows to the Ord Community system. The flow scenarios analyzed were:

- Lift station and force main to General Jim Moore Blvd.
- Lift station and force main to Coe Avenue.

The capacity analysis presented in this master Plan assumes the Seaside East flows are conveyed to General Jim Moore Blvd. because this scenario requires approximately 7000 LF gravity pipeline improvements.

Conveyance of the Seaside East Flows to Coe Avenue to the Ord Village Lift Station would require approximately 7000 LF of gravity pipeline improvements, 8000 LF of force main and two lift station improvements described in Tables 8-9 through 8-11.

TABLE 8-9

REQUIRED GRAVITY PIPELINE IMPROVEMENTS FOR SEASIDE EAST FLOWS TO CONVEY TO ORD VILLAGE LIFT STATION

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Existing (in)	d/D
C9	C9	C10	377	18	1
C8	C8	C9	323	18	1
C7	C7	C8	342	18	1
C6	C6	C7	386	18	1
C5	C5	C6	316	15	1
C4	C4	C5	303	12	1
C3	C3	C4	294	12	1
C2	C2	C3	274	12	1
C10	C10	GIGGLING_WW	427	15	0.67
C1	C1	C2	148	10	0.78
B963	B963	B962	288	10	1
B960	B960	B959	568	10	1
B959	B959	B958	385	10	1
B958	B958	B957	404	12	1
B957	B957	B956	368	10	1
B956	B956	B19	215	10	1
B903	B903	B902	259	15	1
B902	B902	B901	188	15	1
B901	B901	ORD_WW	501	18	1
B19	B19	B124	50	10	1
B124	B124	B123	41	10	1
B123	B123	B122	77	12	1
B121	B121	B120A	239	12	1
B119	B119	B11	286	21	1
B11	B11	B10	99	15	0.69

TABLE 8-10

REQUIRED FORCE MAIN IMPROVEMENTS FOR SEASIDE EAST FLOWS TO CONVEY TO ORD VILLAGE LIFT STATION

Force Main	Length (ft)	Pipe Diameter	
		Existing	Required
Giggling_FM	3728	8	16
Ord_FM	4130	10	12

TABLE 8-11

REQUIRED LIFT STATION IMPROVEMENTS FOR SEASIDE EAST FLOWS TO CONVEY TO ORD VILLAGE LIFT STATION

Lift Station	Existing Flow Capacity (gpm)	Required Flow Capacity (gpm)
Giggling_LS	623	2193
Ord_LS	800	1915

9 CONDITION ASSESSMENT

An evaluation of 1995 videotape inspections of select sections of the Ord Community wastewater collection system was conducted on December 14 – 15, 2005.

9.1 VIDEO TAPE INSPECTION CONCLUSIONS

Reviews of video inspection tapes conclude that cleaning and continued maintenance of the sewers is required, and replacement of some pipeline segment is recommended. Table 9-1 presents observations and recommendations for the selected pipeline segments. Pipeline segments reviewed were selected based upon results of the hydraulic analysis. Pipeline segments selected for videotape inspection are located immediately downstream or upstream of pipelines identified by the hydraulic model as having capacity deficiencies. Videotape review is to determine if those adjacent pipelines require capital improvement projects. Review of the videotape inspections was considered Figure 11 presents the location of the videotape inspection pipelines.

TABLE 9-1

Video Tape Inspection Conclusions

Pipeline Segment	Description	Observation	Recommendation
K4Z to K13Z	10-inch PVC	Joints in good condition; No root intrusion, no infiltration, no cracks; Some grease build up on soffit (evidence of surcharging); Sagging.	Cleaning.

Pipeline Segment	Description	Observation	Recommendation
K2Z	10-inch PVC	Joints in good condition; No root intrusion, no infiltration; Limited grease formation; One segment of pipeline had been replaced using PVC C900 Water Pipe (blue in color) Joint gaskets may not be suitable for sewage service.	Cleaning and Monitoring of pipeline for leakage.
K157	8-inch PVC	Joints good. No root intrusion, no infiltration, no cracks. Clean. At video measurement 125 there appears to be a horizontal and vertical grade break in alignment	Recommend inspection of manholes.
K187	8-inch PVC	Joints good. No root intrusion, no infiltration, no cracks. Soffit shows some grease build up. Needs cleaning. At measurement 440 flow is blocked by grease build-up and the pipe runs full. Low point exists in pipe 24 ft. in from MH 910 (upstream).	Recommend cleaning
G432 to G443	15-inch VCP.	Root intrusion at most joint locations. Extensive root intrusion at video measurements 15, 20,25 and 50. Minor infiltration, no cracks. Vertical offsets noticeable at several joints.	Recommend removing roots, cleaning sewer and reinspecting. Recommend cleaning.
G438	15-inch VCP	Root intrusion at most joint locations. Minor infiltration, no cracks	Recommend removing roots, cleaning sewer and reinspecting. Recommend cleaning
G441	15-inch VCP	Root intrusion at most joint locations. Minor infiltration, no cracks. Grease build-up. Manholes appear deteriorated.	Recommend removing roots, cleaning sewer and reinspecting.. Recommend cleaning
D463, D465 and D700	12-inch VCP	Flow at half full plus. Root intrusion at most joint locations. Minor infiltration. Longitudinal cracking along soffit. Grease build-up.	Recommend slip lining or replacement. Recommend cleaning.
D463	12-inch VCP	Root intrusion at most joint locations. Minor infiltration. Longitudinal cracking along soffit at video measurement 225 and 253. Heavy grease build-up. Grease and sludge restricting flow at MH D462	Recommend slip-lining or replacement. Recommend cleaning.

The assessments of the videotape inspections are consistent with field investigations of sewer pipelines and manholes within the Ord Community. Videotape of the Ord Collection System was collected in late 1990. New video of the collection system should be taken on a basin by basin basis.

9.2 FIELD INSPECTION PROGRAM

Inspection of sewer mains and manholes concluded that the sewer collection system is generally in poor condition. Field survey of sewer mains located disjointed pipelines with significant root intrusion. Inspection of manholes identified volumes of soft sediment within the pipeline. Manholes inspected were often covered with sand and vegetation, indicating that the manhole and pipeline had not recently been inspected or serviced. Manholes inspected had some visible corrosion and roots. Ladders were corroded. Manhole on 3rd Avenue & Imjin Rd. had a storm drain manhole cover and should be replaced with a proper sanitary sewer manhole cover

Appendix D presents photos of the field inspection.

9.3 LIFT STATION ASSESSMENTS

An assessment of the lift stations was completed on January 19, 2005. The purpose of the lift station evaluations was to document the physical condition of the lift station and to develop a list of condition-based projects for inclusion in the capital improvement program.

Following submittal of the Working Draft Report in February 2005, the District O&M staff completed maintenance and repair activities on the lift stations related to recommendations and observations noted in the working draft report. The observations and recommendations presented in this Draft Report April 2005, are based upon the initial site assessment

but do not include previous recommendations that have already been completed by the District staff.

Assessments were not completed for lift stations previously examined by Winzler and Kelly Consulting Engineers, as described in the Technical Memorandum for Lift Station Improvements 2004 (Appendix E). Those lift stations are Schoonover, Landrum, Imjin, San Pablo, and Ord Village Lift Station.

Field access to Fritsche Field Lift Station was unavailable at the time of submittal of this report.

Appendix D presents photos of the lift stations.

Booker Lift Station Recommendations

Booker Lift Station was constructed in approximately 1966 and was upgraded in 1997. The lift station has two pumps and has a total capacity of 760 gpm. It is a dry pit/wet well type lift station and is controlled by a sonic level sensor. The lift station is housed in a concrete block building. There was a strong sewage odor in the control room at the time of assessement. Access to the pump pit is by way of a ladder, making the access a confined space entry.

The diesel generator and fuel tank are properly contained and piping is epoxy coated. There is some coating failure on the fuel tank.

The lift station has SCADA controls.

The site has a local operations and maintenance log that indicate that the lift station is inspected daily.

An anti-fall device on the access ladder should be installed. The existing chain is not adequate. Corrosion sites on the fuel tank should be repaired.

Clark Lift Station Recommendations

Clark Lift Station is a Smith and Loveless packaged dry pit/wet well lift station that has 2-280 gpm pumps. It is controlled by an ultrasonic system. The lift station has had new telemetry installed. Entry and work within the pump pit should conform to confined space entry regulations. The pump seals have previously leaked but have been corrected.

There is a 250 gallon diesel tank and standby generator. The fuel tank had previously failed and the contaminated soil had been remediated and removed.

There is a non-conforming domestic water service hose bib within the site fence.

The container for these package type units are constructed of steel and installed with sacrificial anodes to protect the exterior buried surfaces from corrosion. It is suspected that these anodes may have been consumed, thus allowing corrosion attack of the structure.

The site has a local operations and maintenance log.

The generator and fuel tank should be replaced with contained units. The domestic water supply should be removed from within the fence and installed with an approved backflow prevention device. An unauthorized entry signal device should be installed to the pump pit access lid. Security wire should be installed on top of the fence. All entry and work in the pit should conform to confined space safety regulations. Portions of the buried structure should be exposed and testing for corrosion attack.

It is suggested that the entire lift station be replaced with a submersible type lift station.

DEH Lift Station Recommendations

DEH Lift Station is a duplex submersible type lift station that is controlled by a float switch. The lift station has been abandoned. The top of the

sump is secured with plywood. There is heavy corrosion on the pumps and piping. The fence has been repaired and vegetation has been cut back.

There is no inspection log at the lift station.

This lift station should be decommissioned and removed if the lift station is not required for future use. It should be replaced with a new submersible pump facility if the lift station is required for future development.

East Garrison Lift Station Recommendations

East Garrison Lift Station is a submersible lift station that was constructed in 1999, but was not operated or put into service. The lift station is inactive with an existing capacity of 350 gpm. The lift station is controlled by a float switch system. The site is large with sufficient room for pump expansion. The telemetry equipment is in storage. The wet well was full of rainwater at time of inspection. There is some corrosion evident on the discharge piping. There is no generator on site, although there is a pad for the generator.

A generator should be installed. The pumps should be removed, cleaned and stored while the facility is not in use. Corrosion damage on piping should be repaired and the piping should be repainted.

Giggling Lift Station Recommendations

Giggling Lift Station is a dry pit/wet well lift station that is controlled by a multi-rod level sensor. It has two pumps and has a total capacity of 850 gpm. The Flygt submersible pumps were converted to dry pit service. There is new telemetry and a 500 gallon diesel tank and generator with epoxy coated pipelines at the site. The lift station is housed in a concrete block building with the lights and fan in working condition.

There is no paved access to the site. The fuel tank has a coating failure. The control room contains quantities of debris. There is a small sewage leak from the pump seal that is collected in a bucket. The collected sewage is then disposed.

The site has local operations and maintenance log and shows that the lift station is inspected daily.

This lift station is in good condition, however it is recommended that the pump pit floor be cleaned and the leakage stopped and repaired. Corrosion damage should be repaired and repainted.

Hatten Lift Station Recommendations

Hatten Lift Station was construction in 1966 and is located at the end of the front yard of residential homes. At the time of inspection, children were noted playing in an adjacent grassy area. It is a duplex submersible pump lift station that is controlled by a float system with a capacity of40 gpm.

The lift station is not secure. The adjacent homeowner has previously objected to fencing. There is a non-conforming domestic water supply hose bib next to the wet well with an attached hose on the ground that is owned by the homeowner. The metal sump lid shows corrosion attack. The controller cabinet also is corroding.

It is recommended that the lift station be replaced with a conforming submersible facility. The site should be fenced and secured. A domestic water supply should be constructed by the District to meet Title 22 requirements.

Hodges Lift Station Recommendations

Hodges Lift Station was constructed in 1989 and is located in the back of a residential neighborhood between two occupied dwelling units. There is an unpaved access road. The lift station is a dual submersible lift station

that is controlled by a float system. There is a natural gas standby generator and a telemetry system with a capacity of 94 gpm.

There is a non-conforming domestic water supply hose bib within the fence with an attached hose on the ground. The generator and the control enclosure are corroded but repairs have been made with epoxy coating. There is no security lighting. The valve pit was not accessible at the time of inspection.

It is recommended that the access road be paved and that security lighting be added. The fence height should be increased and security wire should be added. The generator enclosure and generator control should be replaced. The domestic water supply should be upgraded to meet Title 22 requirements.

Jefferson Lift Station Recommendations

Jefferson Lift Station was constructed in 1964 and is a Smith and Loveless type packaged dry pit/wet well lift station. There are two pumps with a total capacity of 25 gpm controlled by a float system. There is a telemetry system. There is non-security type wire on top of the fence.

The lift station has had new telemetry installed. Entry and work within the pump pit should conform to confined space entry regulations.

There is a 250 gallon diesel tank and standby generator. There was a previous fuel leakage however contaminated soil has been remediated and removed. Corrosion attack on the fuel tank is evident.

There is a non-conforming domestic water service hose bib within the site fence.

The container for these package type units are constructed of steel and installed with sacrificial anodes to protect the exterior buried surfaces from corrosion. It is suspected that these anodes may have been consumed, thus allowing corrosion attack of the structure.

The site has a local operations and maintenance log that indicates daily inspection.

The generator and fuel tank should be replaced with contained units. The domestic water supply should be removed from within the fence and installed with an approved backflow prevention device. An unauthorized entry signal device should be installed to the pump pit access lid. Security wire should be installed on top of the fence. All entry and work in the pit should conform to confined space safety regulations. Portions of the buried structure should be exposed and tested for corrosion attack.

Neeson Lift Station Recommendations

The Neeson Lift Station is a float actuated duplex package sump type lift station that has 2 pumps and a total capacity of 400 gpm.

There is a receptacle for a portable generator. The wet well is constructed of concrete and the wet well lid is of steel construction. The coatings have severely deteriorated on the lid as well as on all piping and valves. A new discharge bypass line has been installed that is showing deterioration from ultraviolet radiation. The domestic water hose bib within the fence does not have backflow prevention device accepted by the California Code. An attached hose was lying on the ground. There is no telemetry or security lighting.

The site is inspected daily according to the local operations and maintenance log.

The domestic water supply should be upgraded to meet Title 22 requirements. The controls should be upgraded and security lighting should be added. The metallic surfaces should be recoated. All vegetation from within the fence should be cleared and the site should be paved. The electrical disconnect should be padlocked. Though not a code violation or health hazard, good housekeeping practices should be maintained and hose bibs should not be left on the ground.

Reservation Road Lift Station Recommendations

Reservation Road Lift Station was constructed in 1998 and is a dual submersible pump type system that is controlled by a multi-level road sensor. The site is located behind a fenced area and is accessible by a paved road.

The lift station is serviceable. There is rust bleed in the wet well coating that has been caused by condensation. The discharge piping coatings are deteriorating.

There is new telemetry and a diesel tank and generator. The diesel tank and generator require double walled piping. Brush has been cleared away from the generator.

The site is inspected daily according to the local operations and maintenance log.

The bulbs in the security lights should be replaced. The wet well coatings should be repaired. The piping should be cleaned and painted.

TAC Lift Station Recommendations

TAC Lift Station is a Smith and Loveless packaged dry pit/wet well type lift station that has 2 pumps and a capacity of 176 gpm. The lift station was disconnected in 1995, however, the facility is serviceable and may be usable in the future. It appears to be controlled by a float system. The site is not fenced. Entry and work within the pump pit should conform to confined space entry regulations.

The pump facility is serviceable. There is no electric meter, however, power is being provided through buss bars installed across meter contact plugs. The pumps and piping show corrosion attack.

The container for these package type units are constructed of steel and installed with sacrificial anodes to protect the exterior buried surfaces from corrosion. It is suspected that these anodes have long been consumed, thus allowing corrosion attack of the structure.

There is no inspection log at the lift station.

It is recommended that the pumps and motors be replaced. The generator and fuel tank should be replaced with contained units. An unauthorized entry signal device should be installed to the pump pit access lid. Security wire should be installed on top of a fence. All entry and work in the pit should conform to confined space safety regulations. Portions of the buried structure should be exposed and tested for corrosion attack.

Wittemeyer Lift Station Recommendations

Wittemeyer Lift Station was constructed in 1985 and is a dual submersible lift station that is controlled by a float system. The lift station has 2 pumps and a total capacity of 140 gpm. There is a new telemetry system at the lift station.

The diesel generator lies on top of the diesel fuel tank. The generator should be removed from the top of the fuel tank. Both the generator and fuel tank should be contained. The generator and control enclosures are corroded.

There is a non-conforming domestic water supply hose bib within the fence with attached hose on the ground.

There is no security lighting. The access road is unpaved and is between two occupied dwelling units. The access road gate has been removed.

The site is inspected daily according to the local operations and maintenance log.

It is recommended that the access road be paved and that security lighting be added. The enclosure the generator and the generator controls should be replaced. The domestic water supply should be upgraded to meet Title 22 requirements.

10 RECOMMENDED CAPITAL IMPROVEMENT PROGRAM

10.1 INTRODUCTION

The project team worked closely with MCWD staff to identify critical facilities requiring rehabilitation, replacement, upgrading, and/or up-sizing to meet the anticipated system requirements for the next 20 years. This section presents the recommended improvement projects resulting from the analysis of the wastewater system and the condition assessment.

The hydraulic and condition deficiencies of the Ord Community wastewater collection system are presented in Sections 8 and 9 of this report. The pipeline segments represent severe hydraulic bottlenecks and tend to be scattered throughout Ord Community and do not on their own conform to logical design or construction projects. In addition, it is generally less critical to eliminate isolated, short segments of hydraulic bottlenecks than to provide hydraulic relief for longer reaches of sewer that have inadequate capacity. The facilities are grouped into logical capital improvement projects in Appendix E. Each capital improvement project is described in detail with associated project cost and upstream flow contributors. Priorities were assigned to schedule the design and construction of projects with the following issues taken into consideration:

- Upstream and downstream operations;
- Locations of recently constructed street improvements per FORA Capital Improvement Program.

The District is currently designing improvements to the following lift stations:

- Schoonover
- Landrum
- Imjin
- San Pablo
- Ord Village

The District is also designing a Parshall Flume to be located at the headworks of the Main Garrison Wastewater Treatment Plant. These projects are not included in this Capital Improvement Program. However, it is recommended that the District periodically confirm the projected future wastewater flows at each facility with the results presented in this report. The Capital Improvement Program can then be periodically adjusted for actual development progress with respect to the projected flows. As part of the infrastructure improvements associated with the proposed Marina Heights development, the following projects are planned:

- Re-route flows to Jefferson Lift Station to the San Pablo Lift Station. Decommission and remove Jefferson Lift Station.
- Relocate San Pablo Lift Station and re-route flows from the San Pablo Lift Station discharge to the City of Marina wastewater collection system.

In addition, improvements to the Landrum Lift Station are also planned. Improvements include site improvements, new pumps and force main improvements.

At the time of the issuance of this Master Plan Report, these projects are in the design phase, but have not been incorporated within the hydraulic model or the Capital Improvement Program described in this report. Thus, pipeline capacities and capital improvement budgets require refinements to portray the new conditions. It is recommend that prior to final design of these projects, that they be included and confirmed within the hydraulic model.

10.2 BASIS OF OPINION OF PROBABLE COST

Engineering opinion of probable costs are based upon unit cost extracted from engineer's estimates and construction bids for similar work at the District and have been adjusted to reflect an Engineering New Record 20-City Construction Cost Index of 7297.58 (February 2005). Pipeline

construction costs are based upon an installed cost per inch-diameter foot. Assumptions included in developing this unit cost are:

- PVC Pipe materials;
- Average pipe trench cut depth of 7 to 15 feet;
- Local residential traffic conditions;
- Use of native materials for trench backfill.

TABLE 10-1

Pipeline Unit Cost

Diameter (in)	$/LF
8	$36
10	$41
12	$49
15	$62
18	$74
21	$86
24	$98

Lift station construction costs are estimated as a dollar per installed design capacity, per cost curve data developed by RBF Consulting.

Capital cost estimates include 20% of the construction cost as a contingency to account for unexpected costs that may not be apparent at this master planning level of investigation.

Soft cost budgets are developed as an appropriate percentage of the estimated construction cost for the following activities:

- 10% engineering design;
- 10% construction management and inspection
- 5% legal and administrative fees.

10.3 LIFT STATION CONSIDERATIONS

The District currently operates a combination of dry-well a submersible lift stations. It is recommended that the District standardize their lift stations for consistent operations and maintenance practices. Dry-well lift stations allow for easy access for visual inspection and maintenance. Submersible lift stations are less expensive than dry well lift stations and operate without frequent pump maintenance. They require less space and do not usually include large above ground structures and tend to blend in with the surrounding environment. The current industry wide trend is to replace dry-well lift stations less than 6,350 gpm with submersible lift stations due to lower cost, smaller footprint, and simplified O&M. Lift station improvement recommendations include replacement of existing dry-well lift stations with submersible lift stations.

Variable frequency drives (VFDs) are often used to optimize pump performance and minimize power use. VFDs can reduce the size and cost of the wet well and allow pumps to operate at maximum efficiency at a variety of flow conditions. Although there is energy saving potential, the capital cost for VFDs may not justify the energy savings. In addition, VFDs also require more room with the lift station and may produce more noise and heat than constant speed pumps. VFDs are not included within the recommended lift station improvements. However, VFDs may be considered during the preliminary design process.

10.4 SCHOONOVER FORCE MAIN REPLACEMENT AND RE-ALIGNMENT

As an analysis separate from this Master Plan and recommended in the Technical Memorandum for Lift Station Improvements 2004, the District is preparing a project for the replacement and re-alignment of the Schoonover Force Main. The existing force main connects to the Imjin Force Main, causing back-ups to the Schoonover Lift Station. The re-alignment of the Schoonover Lift Station is included as a Capital Improvement Project for Year 2005 and is described in Appendix F.

10.5 OVERALL PROJECT PRIORITIES

Estimates were made of likely construction scheduling for the facility improvements. Scheduling of capital improvements are based on consideration of the following factors:

- Timing that individual facilities may become deficient, based upon the modeled wastewater flows;
- Local knowledge of the timing of individual planned developments and roadway improvements anticipated in each of the jurisdictions throughout the Ord Community. The District should monitor these relationships to ensure that planned wastewater system facilities are constructed at the proper time.
- Results of the condition assessment of the pipelines and appurtenant facilities;
- An attempt to schedule capital projects to result in a consistent level of effort for the District to accomplish the final planning, engineering design bidding, construction and inspection/testing of the recommended improvements;

10.6 CAPITAL IMPROVEMENT PROJECTS

Detailed descriptions and opinion of probable cost of the recommended Capital Improvement Projects for Years 2005, 2010, 2015, and 2020 are included in Appendix F. Capital improvement project descriptions presented in Appendix F include a project prioritization ranking. Projects are prioritized based on the following scale:

1 Immediate potential for failure based on field observations and hydraulic analysis;

2 Maximum facility capacity exceeded;

3 District Guidelines regarding maximum allowable design parameter exceeded.

Table 10-2 presents a summary of the total annual capital improvement project costs.

TABLE 10-2

Capital Improvement Project Summary

YEAR	Pipeline Replacement	Lift Station and Force Main	Condition Assessment Recommendations	Total
2005	$ 1,886,300	$ 5,956,000	$ 1,454,350	$ 9,296,650
2010	$ -	$ -	$ -	$ -
2015	$ -	$ -	$ -	$ -
2020	$ 757,200	$ 1,867,300	$ -	$ 2,624,500
TOTAL	$ 2,643,500	$ 7,823,300	$ 1,454,350	$11,921,150

Table 10-2 presents the individual projects required for each 5-year CIP period.

TABLE 10-3

CIP Projects

CIP	Name	Allocation Year	Total Estimated Cost
1	Aleutian and Monterey Road Pipeline Replacement Project	2005	$ 83,900
2	Okinawa Road Pipeline Replacement Project	2005	$ 144,800
3	California Street Pipeline Replacement Project	2005	$ 3,800
4	4th St and 2nd Ave Pipeline Replacement Project	2005	$ 186,200
5	Imjin Pkwy Pipeline Replacement Project I	2005	$ 124,600
6	Imjin Pkwy Pipeline Replacement Project II	2005	$ 178,800
7	11th Street Pipeline Replacement Project	2005	$ 171,400
8	Hayes Circle Pipeline Replacement Project	2005	$ 69,600
9	3rd St Pipeline Replacement Project	2005	$ 117,900
10	Ord Village Pipeline Replacement Project	2005	$ 45,000
11	Imjin Pkwy Pipeline Replacement Project III	2005	$ 57,900

CIP	Name	Allocation Year	Total Estimated Cost
12	4th Avenue Pipeline Replacement Project	2005	$ 2,300
13	Mulheim Road Pipeline Replacement Project	2005	$ 27,800
14	4th St Pipeline Replacement Project I	2005	$ 76,600
15	4th St Pipeline Replacement Project II	2005	$ 97,800
16	Ardennes Circle Pipeline Replacement Project	2005	$ 22,200
17	Metz Road Pipeline Replacement Project	2005	$ 38,400
18	Trenton Road Pipeline Replacement Project	2005	$ 54,600
19	Reservation Road Pipeline Replacement Project	2005	$ 382,700
20	Imjin Lift Station and Force Main Improvements	2005	$ 2,134,400
21	Jefferson Lift Station Improvement	2005	$ 279,600
22	Neeson Lift Station Improvements	2005	$ 279,600
23	Giggling Lift Station and Force Main Improvements	2005	$ 1,470,400
24	East Garrison Lift Station and Force Main Improvements	2005	$ 944,000
25	Schoonover Lift Station and Force Main Improvements	2005	$ 848,000
26	Miscellaneous Lift Station Improvements	2005	$ 1,454,350
27	General Jim Moore Pipeline Replacement Project I	2020	$ 306,200
28	1st Avenue Pipeline Replacement Project	2020	$ 285,200
29	General Jim Moore Pipeline Replacement Project II	2020	$ 34,800
30	General Jim Moore Pipeline Replacement Project III	2020	$ 131,000
31	Seaside East Lift Station and Force Main Project	2020	$ 1,867,300
		TOTAL	**$ 11,921,150**

10.7 ADDITIONAL RECOMMENDATIONS

This Master Plan Project has identified the need for additional planning work and pre-design investigations that are beyond the scope of this master plan.

10.7.1 Replacement of Existing 4 & 6-inch Diameter Pipeline

Approximately 36% or 25 miles of the existing Ord Community wastewater collection system is comprised of 4 & 6-inch diameter pipeline that is inconsistent with MCWD Design Standards. It is recommended that the District implement a Capital Replacement Program to upgrade those pipelines not in conformance with current District Design Standards. The replacement program may

coincide with the District's In-tract policy for new developments. Approximately 90% of the 4 & 6-inch diameter pipelines are within planned future development. Cost to replace the remaining 10% of the nonstandard pipelines are approximately $820,000 assuming pipe bursting and reestablishment of service laterals. Figure 13 presents location of existing pipelines less than 8-inch diameter.

10.7.2 Additional Flow Monitoring

Additional flow monitoring is recommended for the Ord Community for the following purposes:

- Development of a historical database as a baseline and update of hydraulic requirements;
- Monitoring flows in critical pipeline reaches;
- Monitoring flows from areas contributing high I/I;
- Monitoring flows from rapidly growing areas.

Improvements to the individual lift stations should include the addition of flow-sensing and recording so that all flows including peak wet weather flows are recorded.

11 FIGURES

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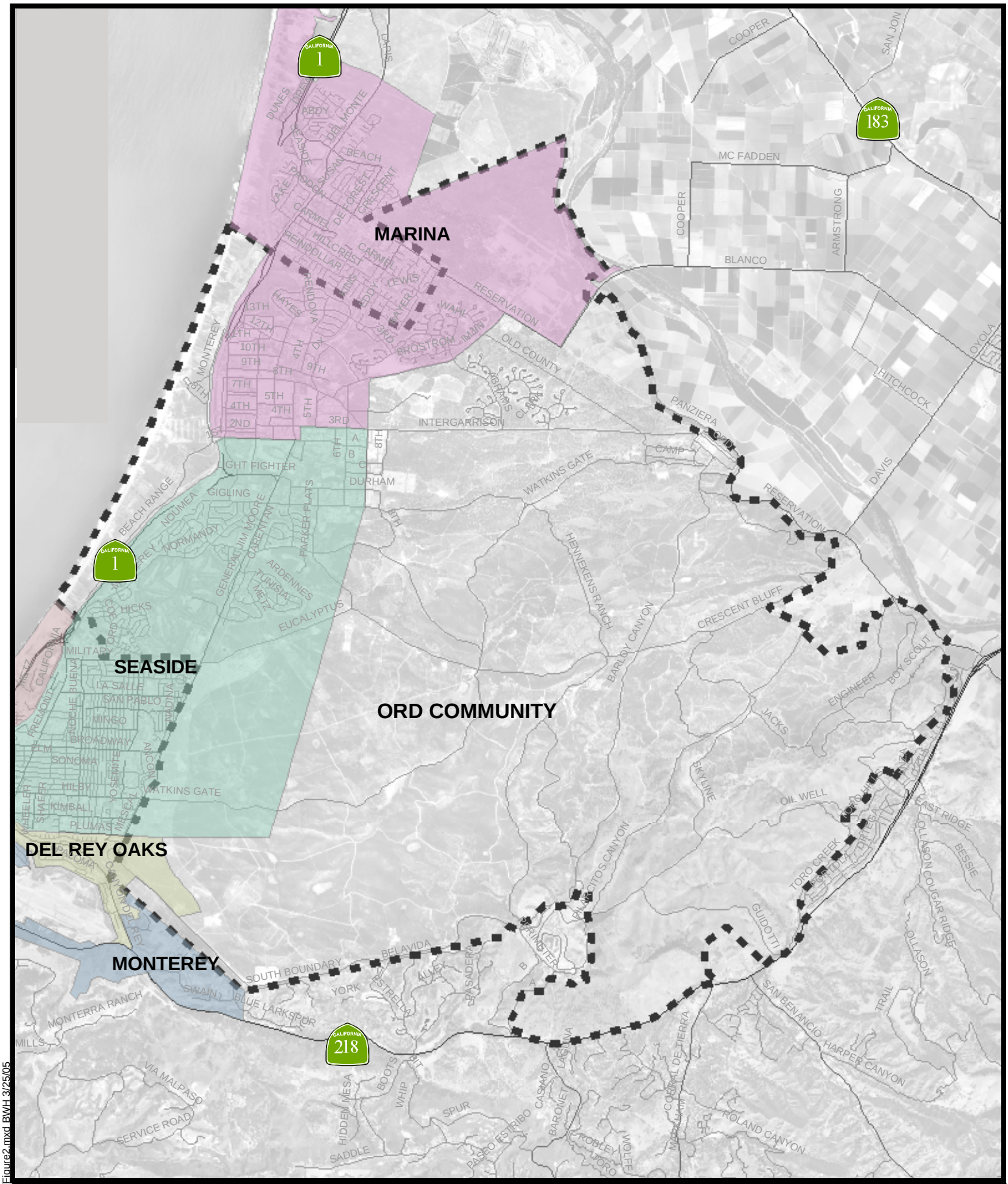
MARINA COAST WATER DISTRICT

MARINA COAST WATER DISTRICT
ORD COMMUNITY WASTEWATER MASTER PLAN

FIGURE 1
PROJECT LOCATION MAP



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MARINA COAST WATER DISTRICT

ORD COMMUNITY WASTEWATER MASTER PLAN

FIGURE 2
ORD COMMUNITY SERVICE AREA

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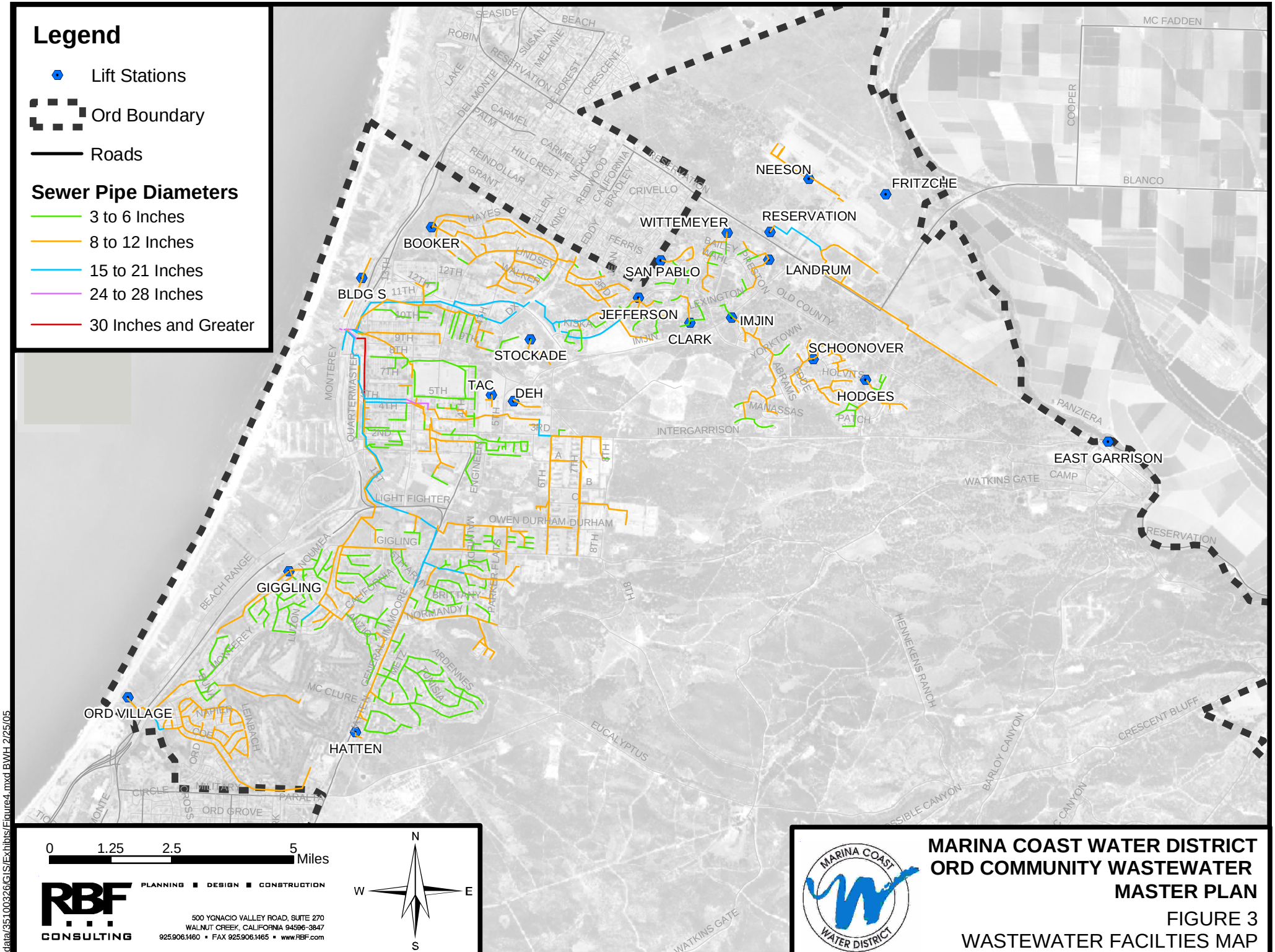
Legend
Lift Stations
Ord Boundary
Roads
Sewer Pipe Diameters
3 to 6 Inches
8 to 12 Inches
15 to 21 Inches
24 to 28 Inches
30 Inches and Greater
NEESON
FRITZCHE
WITTEMEYER
RESERVATION
BOOKER
LANDRUM
SAN PABLO
BLDG S
JEFFERSON
IMJIN
CLARK
SCHOONOVER
STOCKADE
TAC
DEH
HODGES
EAST GARRISON
GIGGLING
ORD VILLAGE
HATTEN
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ORD COMMUNITY WASTEWATER MASTER PLAN
FIGURE 3
WASTEWATER FACILTIES MAP
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Legend

- Lift Stations
- Ord Boundary
- Roads

DRAINAGE BASINS

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- D
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- J 800
- K
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- M
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- O
- P
- R
- S
- V
- W
- X
- Z

BOOKER
BLDG S
STOCKADE
TAC
DEH
GIGGLING
ORD VILLAGE
HATTEN
WITTEMEYER
SAN PABLO
CLARK
IMJIN
RESERVATION
LANDRUM
NEESON
FRITZCHE
SCHOONOVER
HODGES
EAST GARRISON

ENGINEERING EQUIPMENT
INTERGARRISON
OWEN DURHAM
GIGLING
PETERSBURG
PATCH
LIGHT FIGHTER
MC CLURE
EUCALYPTUS
WATKINS GATE
BARLOY CANYON
HENNEKENS RANCH
OLD COUNTY
CAMP

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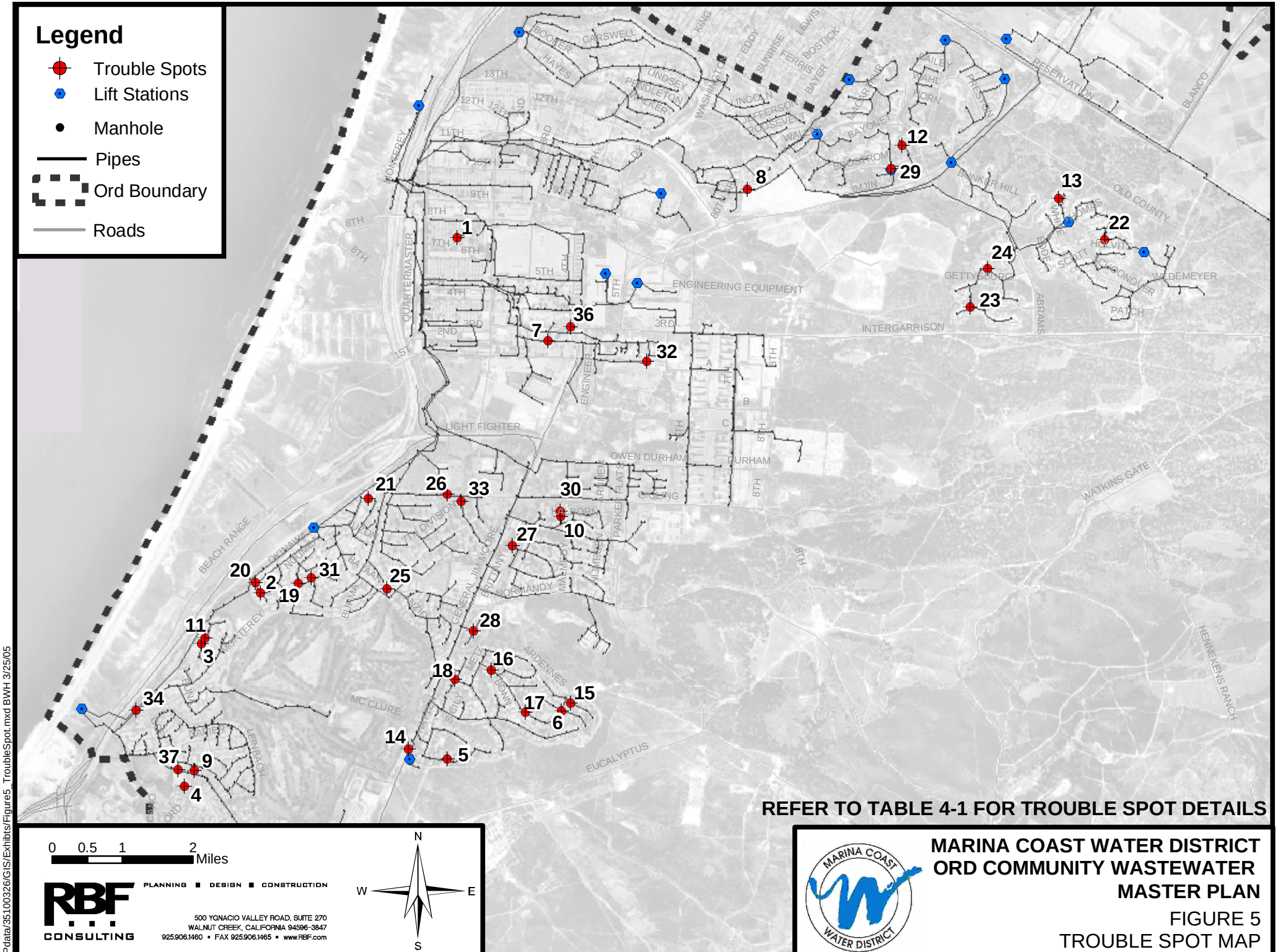
MARINA COAST WATER DISTRICT
ORD COMMUNITY WASTEWATER MASTER PLAN

FIGURE 4
SEWER BASINS MAP


Legend
Trouble Spots
Lift Stations
Manhole
Pipes
Ord Boundary
Roads
REFER TO TABLE 4-1 FOR TROUBLE SPOT DETAILS
0 0.5 1 2 Miles
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MASTER PLAN
FIGURE 5
TROUBLE SPOT MAP
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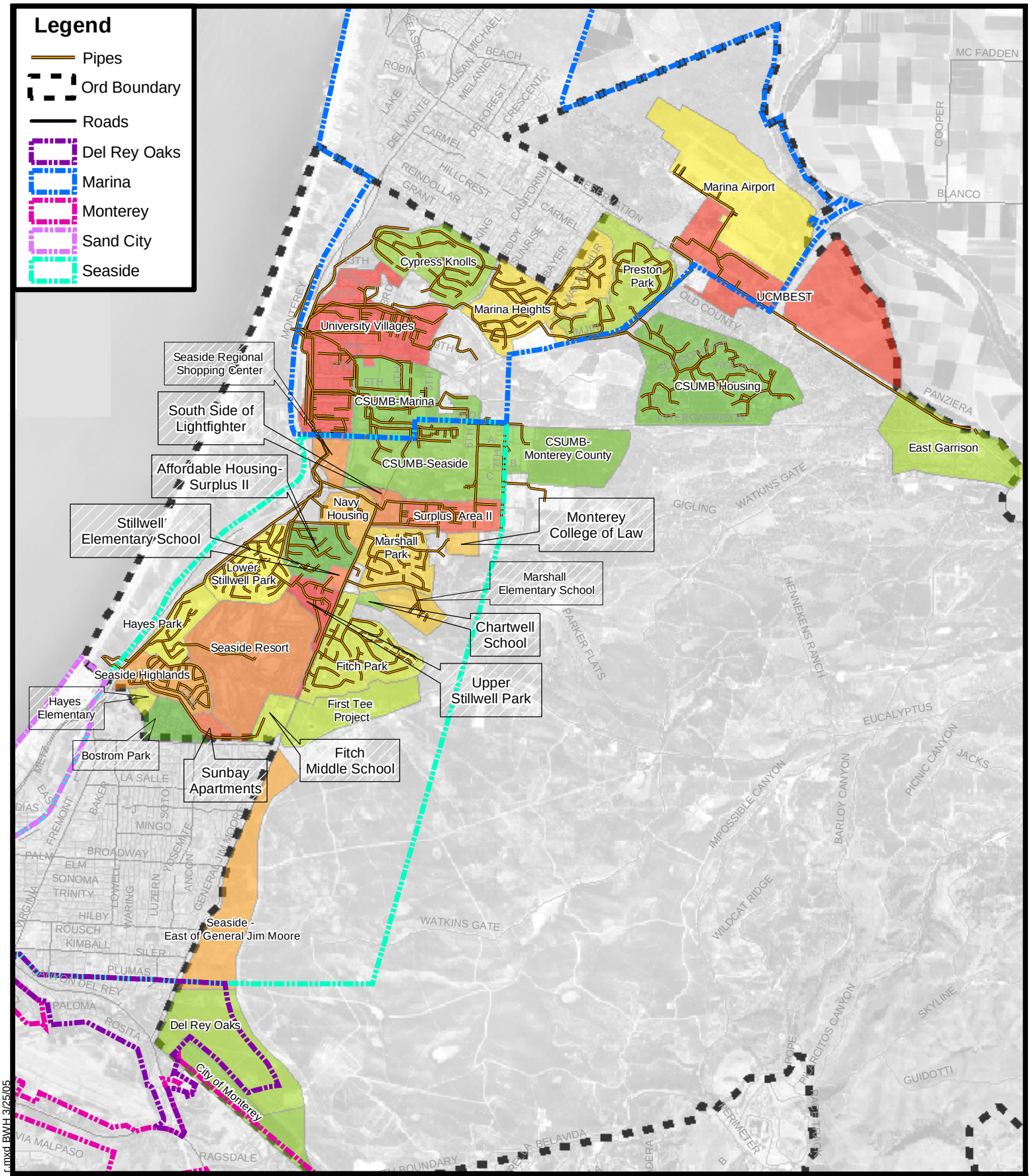
TABLE 4.1
TROUBLE SPOTS

SITE	DATE	LOCATION	DESCRIPTION
1	Historic: Pre-2001	Area bounded by 1st &2nd Avenues and 3rd & 10th Streets	Laterals are frequently clogged.
2	Historic: Pre- 2001	Okinawa Road	Frequent sewer spills in this area
3	Historic: Pre-2001	Corregidor Road	Sewer spills are frequent in this area. A tree is suspected of separating some of the lines.
4	Historic: Pre-2001	Hayes Park Redevelopment Area	There are sewer capacity issues along Coe Avenue. Potentially may be a result of an undersized portion of pipeline between Napier Street and Ord Avenue to handle flows recently added to the area.
5	Historic: Pre-2001	Fitch Park/Arloncourt Road	A section of pipeline along this road is frequently blocked
6	Historic: Pre-2001	Fitch Park/Coleman Road	A section of pipeline along this road requires maintenance four to five times a year.
7	Historic: Pre-2001	CSUMB	A sewer pipe bound by 1st and 3rd Streets and 3rd and 5th Avenues spills as frequently as once a month.
8	Historic: Pre-2001	Abrams Road between 3rd and 12th Street	The manholes along this section of road are corroded past repair and to be replaced. It is suspected that other manholes downstream are also corroded. The slope of pipeline along this section and the pipe receives flows many lift stations.
9	Historic: Pre-2001	Seaside High School	There have been clogged sewer lines near the school.
10	Historic: Pre-2001	Marshall Park, Malmedy Road	There are root problems in the main lines along Malmedy Road in Marshall Park.
11	January 3, 2003	164 Corregidor Rd.	Grease clog. Clog cleared from lateral from Manhole A-32)
12	November 13, 2001	2508 Carpenter Ct.	Debris Blockage
13	December 12, 2001	5614 Combs Court	Electrical failure caused by trenching contractor

TABLE 4.1
TROUBLE SPOTS

14	January 13, 2002	General Jim Moore Rd. and Arlon Court	Clog from grease and paper towels
15	February 11, 2002	232 Ardennes Ct.(Manhole E672)	Grease Buildup
16	No entry		
17	December 3, 2002	207 Tunisia Road (Manhole E657)	Grease Buildup
18	December 18, 2002	240 Tunisia Road (Manhole E661)	Grease Buildup
19	July 11, 2002	Hatten Road (Manhole E633)	Roots and Grease
20	February 23, 2001	135 Noumea	Grease Buildup
21	No entry		
22	June 20, 2002	215 Okinawa	Unknown Cause of Spill
23	June 24, 2003	110 Attu Rd.	Grease, roots, and hair.
24	January 21, 2002	Sherman Ct.	Grease and toilet paper
25	February 7, 2003	Petersburg Ct. (CSUMB Student Housing)	Vandalism. Various objects found within manhole
26	April 6, 2003	Fredricksburg St. (Manhole K18Z)	Grease and debris
27	July 5, 2004	187 Monterey Road (Manhole D820)	Roots
28	August 10, 2004	Between Giggling Road and 7th Division (Manhole D705)	Roots and Heavy Grease
29	July 10, 2004	Chapel Rd. (Manhole F536)	Grease and Roots
30	June 7, 2004	310 Aacehn Rd. (Manhole E602)	Grease and Roots
31	April 5, 2004	Clark Lift Station	Broken Force Main 6" PVC Pipe
32	No entry		
33	March 31, 2004	Between Kalborn & Giggling (Manhole F510 -F509)	Grease

TABLE 4.1 TROUBLE SPOTS			
34	February 23, 2004	Okinawa & Normandy (Manhole J884)	Roots
35	January 15, 2003	1st St. and 4th Ave.	Roots
36	January 13, 2004	6th Army Ave and Giggling	Roots and Grease
37	June 3, 2003	Coe Ave and Monterey Road (Manhole AA-2)	A grease/root mass approximately 100 feet downstream from Manhole #AA-2
38	September 3, 2002	Within CSUMB campus parking lot on corner of 3rd St. and 4th Avenue	Blockage caused by large amounts of raw vegetables.
39	December 4, 2002	Behind Hayes Elementary School, 150 ft. south of Manhole #922	Paper products from Seaside High School resulting in clog.



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ORD COMMUNITY WASTEWATER MASTER PLAN

FIGURE 6
LAND USE JURISDICTIONS & DEVELOPMENT LOCATIONS

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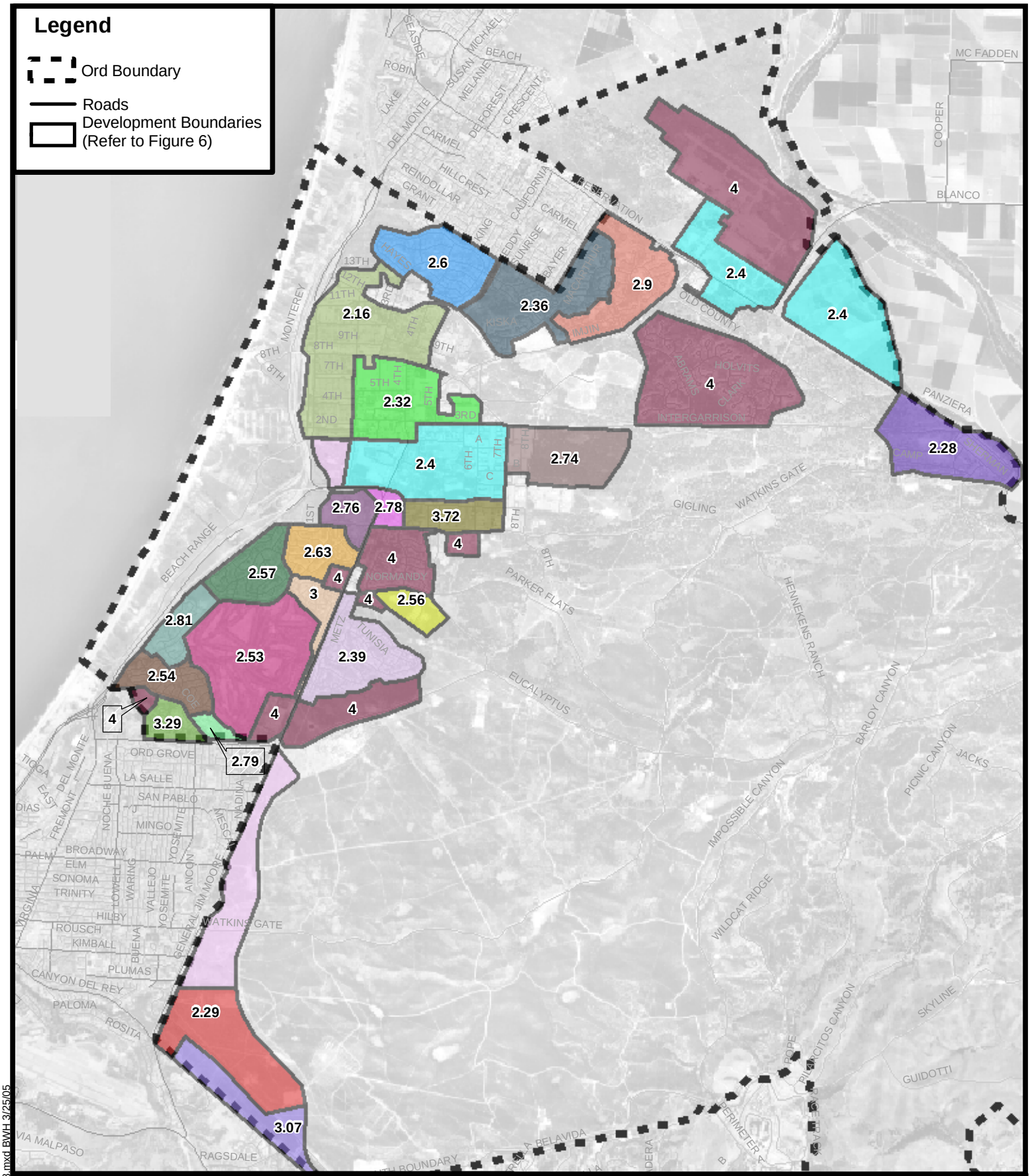
Legend
Ord Boundary
Roads
Development Boundaries
(Refer to Figure 6)
2.6
2.36
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2.4
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2.32
2.4
2.74
4
2.28
2.76
2.78
3.72
4
2.63
4
2.57
4
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4
3.29
2.79
2.29
3.07
MONTEREY
BEACH RANGE
GIGLING
WATKINS GATE
PARKER FLATS
NORMANDY
METZ
TUNISIA
EUCALYPTUS
HENNEKENS RANCH
BARLOY CANYON
IMPOSSIBLE CANYON
PICNIC CANYON
WILDCAT RIDGE
SKYLINE
GUIDOTTI
PANZIERA
OLD COUNTY
INTERGARRISON
ABRAMS
HOLVITS
CLARK
MC FADDEN
COOPER
BLANCO
ORD GROVE
LA SALLE
SAN PABLO
MINGO
BROADWAY
ELM
SONOMA
TRINITY
HILBY
ROUSCH
KIMBALL
PLUMAS
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FIGURE 8
PEAKING FACTORS
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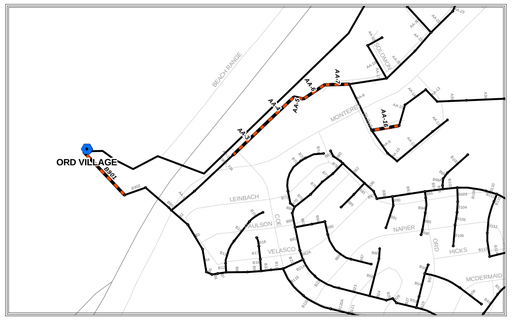


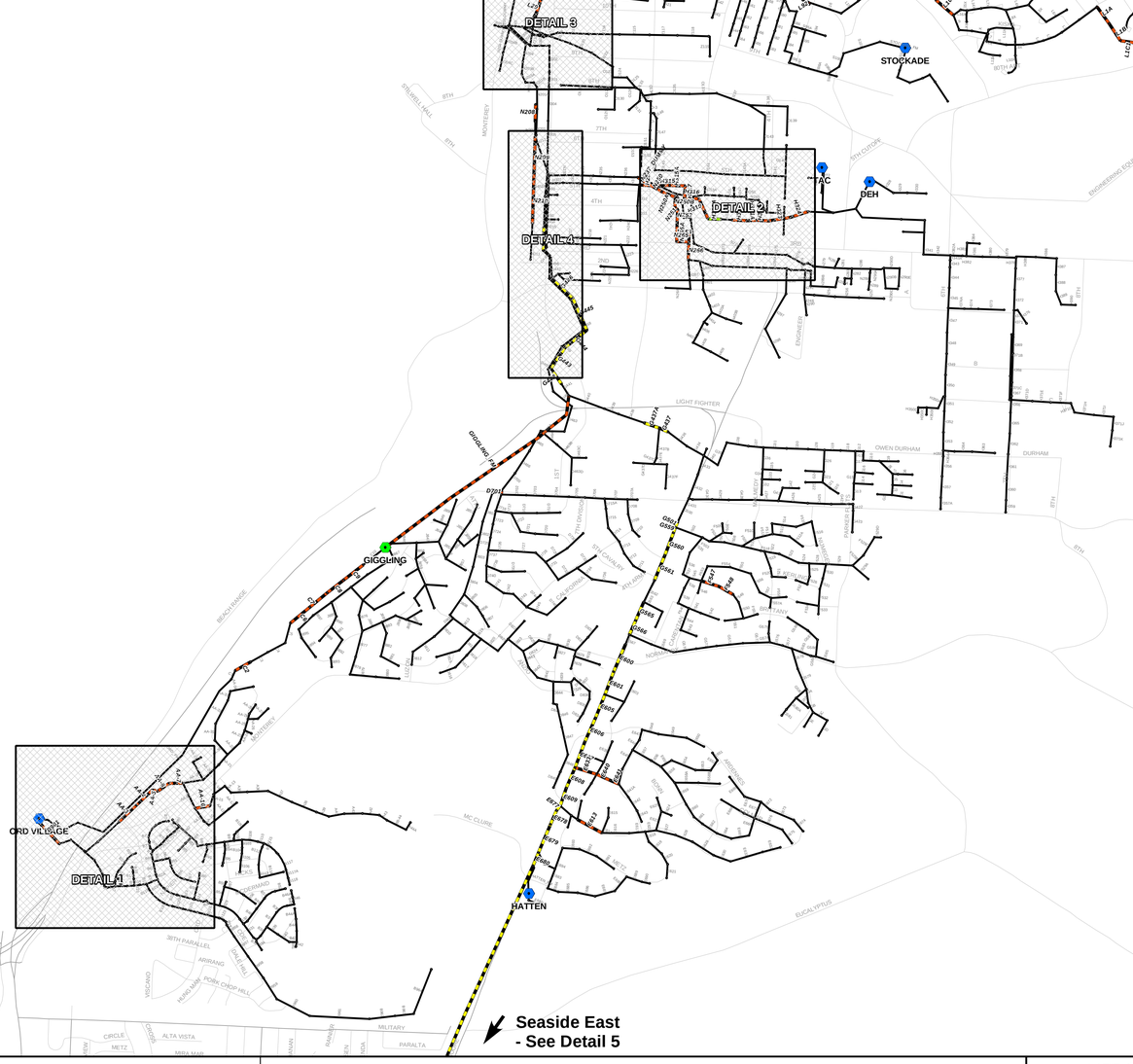
DETAIL AREA 1
1 inch equals 600 feet

DETAIL AREA 2
1 inch equals 450 feet

DETAIL AREA 3
1 inch equals 250 feet

DETAIL AREA 4
1 inch equals 350 feet

DETAIL AREA 5- SEASIDE EAST
1 inch equals 1,250 feet



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Prepared By: B. Holt
Reviewed By: R. Thomas
Date: 04/04/2005

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N W E S

Legend

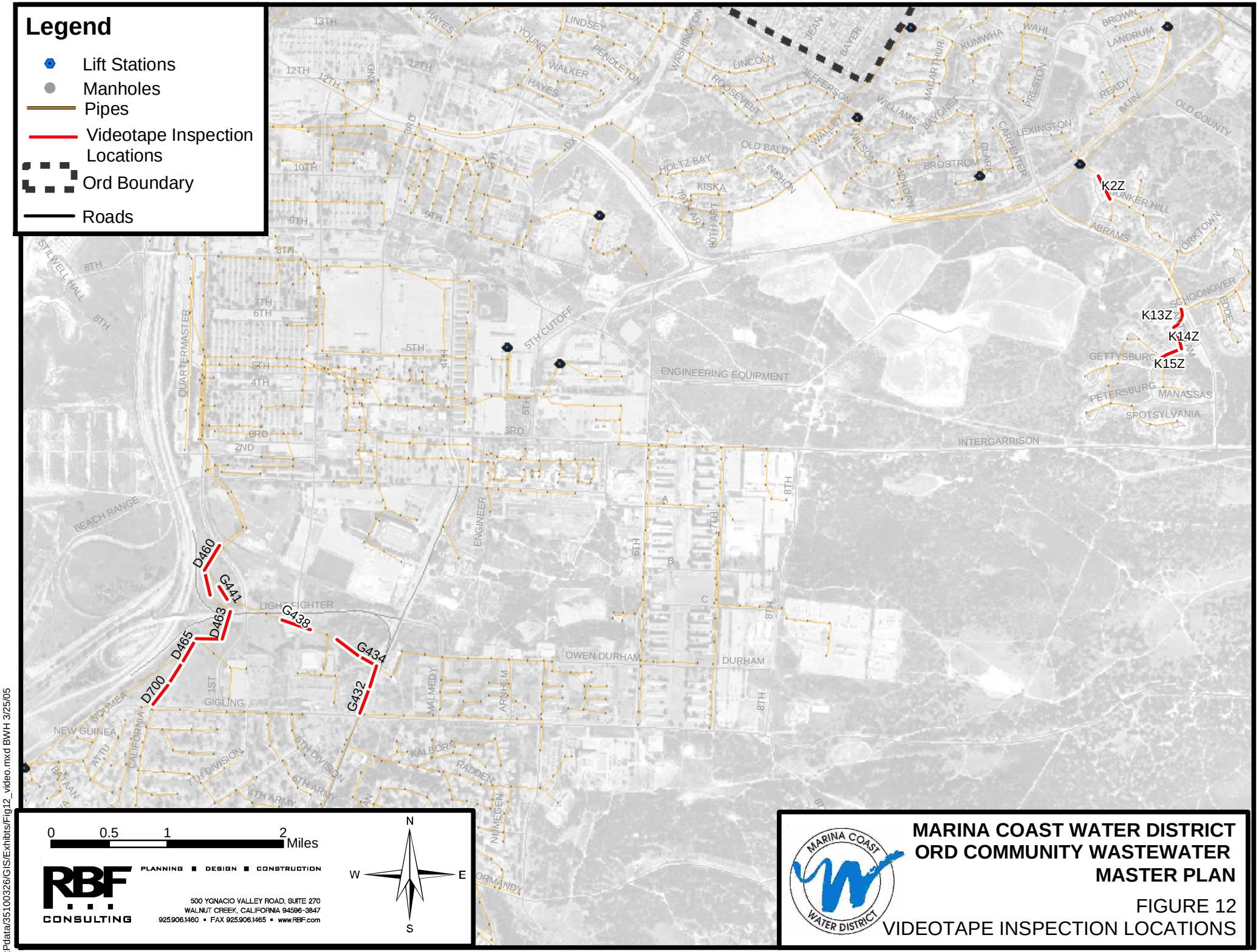
LIFT STATIONS
- LIFT STATIONS
- 2005 CIP
- 2010 CIP
- 2015 CIP
- 2020 CIP

PIPES
- 2020 CIP
- 2015 CIP
- 2010 CIP
- 2005 CIP
- ALL OTHER PIPES

- ROADS
- MANHOLES

MARINA COAST WATER DISTRICT

ORD COMMUNITY
WASTEWATER MASTER PLAN
SYSTEM DEFICIENCIES


Legend
Lift Stations
Manholes
Pipes
Videotape Inspection Locations
Ord Boundary
Roads
K2Z
K13Z
K14Z
K15Z
D460
G441
D463
G438
D465
G434
D700
G432
ENGINEERING EQUIPMENT
INTERGARRISON
OWEN DURHAM
DURHAM
GIGLING
LIGHTFIGHTER
BEACH RANGE
QUARTERMASTER
5TH CUTOFF
ENGINEER
MALMEDY
ARNHEM
NIJMEGEN
KALBORN
RADDEN
NEW GUINEA
NOUMEA
ATTU
BATAAN
CALIFORNIA
7TH DIVISION
6TH DIVISION
6TH ARMY
4TH ARMY
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HOLTZ BAY
KISKA
OLD BALDY
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CLARK
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LEXINGTON
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FIGURE 12
VIDEOTAPE INSPECTION LOCATIONS
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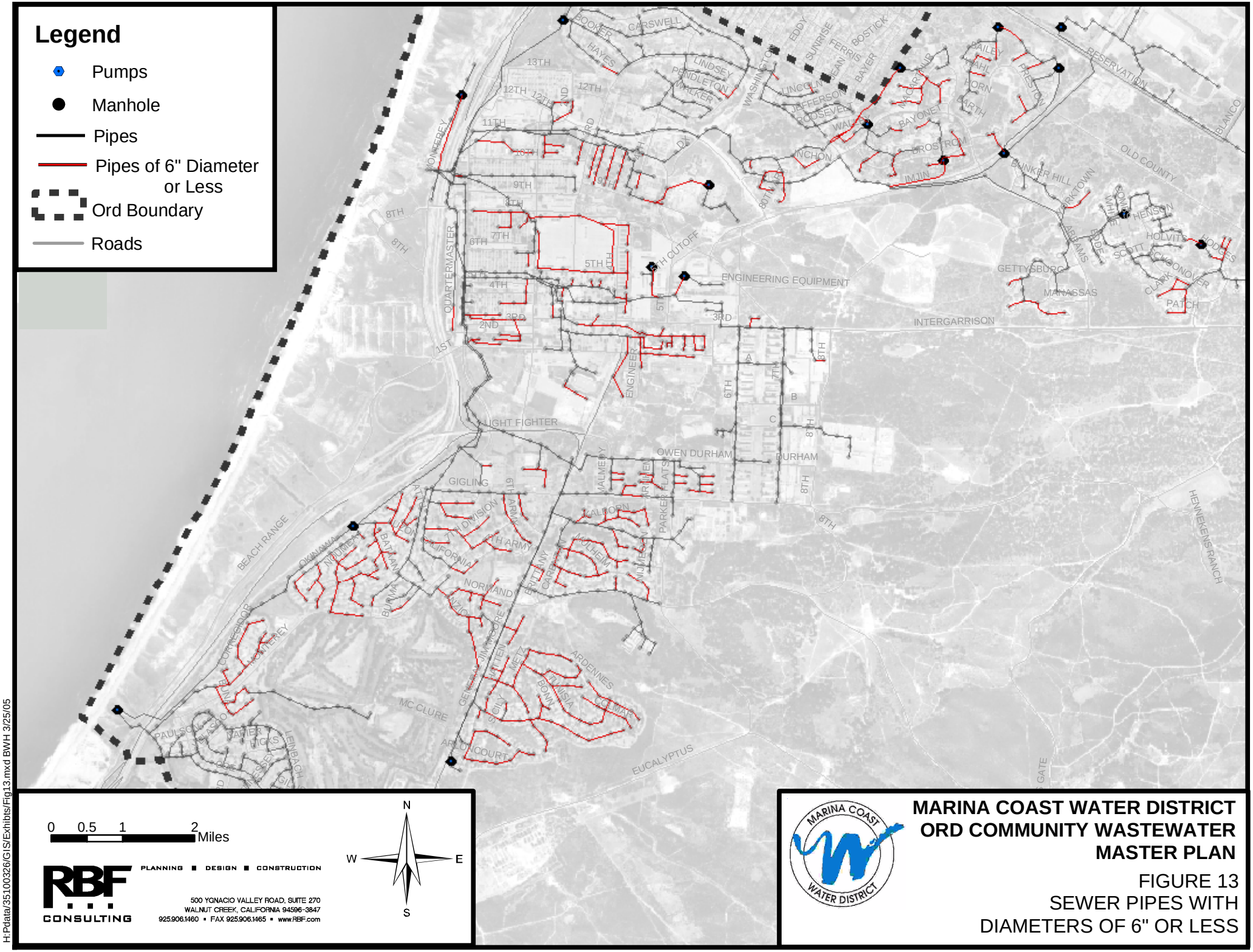
Legend
Pumps
Manhole
Pipes
Pipes of 6" Diameter or Less
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FIGURE 13
SEWER PIPES WITH DIAMETERS OF 6" OR LESS
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APPENDIX F
CAPITAL IMPROVEMENT PROGRAM

CIP #: 1 -- Aleutian and Monterey Road Pipeline Replacement

Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from Hayes Park and Seaside Resort developments. Wastewater flow from Hayes Park and Seaside Resort require the gravity sewer pipelines to flow at 70-100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Project Priority: 2 (Maximum Facility Capacity Exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
AA-16	Aleutian Road	AA-16	AA-8	240	1.00	6	8	$ 36	$ 8,600
AA-7	Parallel Monterey Road	AA-7	AA-6	200	0.69	8	10	$ 41	$ 8,200
AA-6	Parallel Monterey Road	AA-6	AA-5	210	0.81	8	10	$ 41	$ 8,600
AA-5	Parallel Monterey Road	AA-5	AA-4	80	0.70	8	10	$ 41	$ 3,300
AA-4	Parallel Monterey Road	AA-4	AA-3	340	1.00	8	10	$ 41	$ 13,900
AA-3	Parallel Monterey Road	AA-3	AA-2	370	1.00	8	10	$ 41	$ 15,200
TOTAL LENGTH				1440					
CONSTRUCTION COST									$ 57,800
20% CONTINGENCY									$ 11,600
25% MCWD Soft Costs [1]									$ 14,500
TOTAL PROJECT									$ 83,900

CIP #: 1 -- Aleutian and Monterey Road Pipeline Replacement Year Planned for Construction: 2005

Capacity Scenario: 2005 PWWF

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

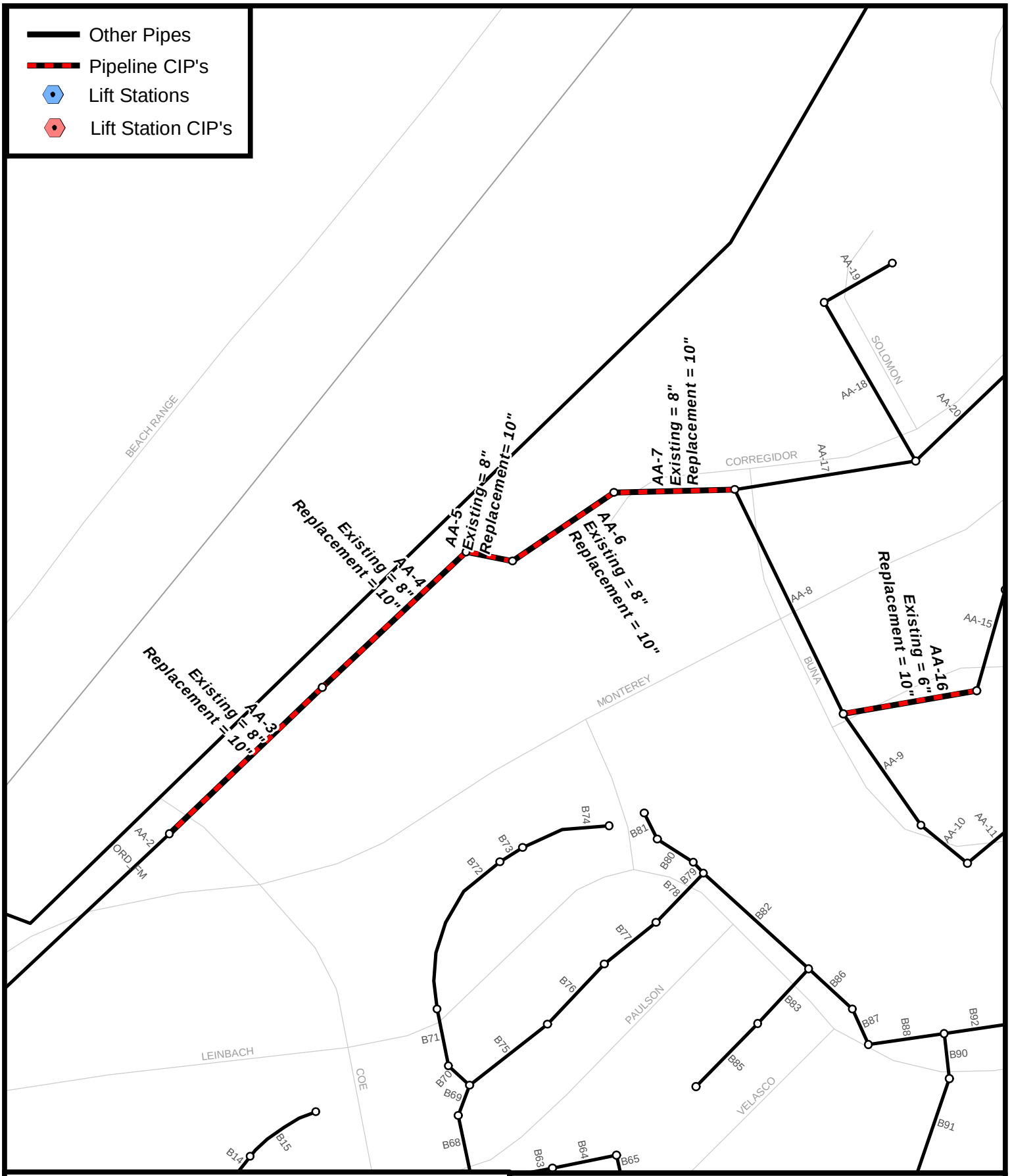
Project Solution: Replace approximately 1,440 LF of existing 6 and 8-inch diameter gravity sewer pipeline with appropriate 8 and 10-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow. Pipeline segments AA-7 through AA-3 are continuous pipeline segments that should be constructed as one project. Pipeline segment AA-16 is within the general vicinity and therefore is included in this project. Pipeline segment AA-8 has sufficient hydraulic capacity, however, the pipeline is 6-inches in diameter and does not conform to existing District Standards.

This CIP could be revised if the replacement of pipeline segment AA-8 with an 8-inch diameter pipeline was considered to be included in the project for pipeline diameter consistency within a continuous pipeline run. Pipeline AA-8 has not been included in this opinion of probable cost.

Upstream Flow Sources at Build-out: Hayes Park, Seaside Resort

Upstream Lift Stations: None

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 1: Aleutian & Monterey Road Pipeline Replacement Project

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CIP #: 2 Okinawa Road Pipeline Replacement Project Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from Hayes Park and Seaside Resort. Wastewater flow from those developments require the gravity sewer pipelines to flow at 75-100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan. Existing areas also contributing wastewater flow to these pipelines include Bostrom Park, Fitch Middle School, Sunbay apartment, and Seaside Highlands.

Project Priority: 2 (Maximum Facility Capacity Exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
C2	Parallel Hwy One and Okinawa Road	C2	C3	274	.75	8	10	$ 41	$ 11,300
C6	Parallel Hwy One and Okinawa Road	C6	C7	386	1.00	12	15	$ 62	$ 23,900
C7	Parallel Hwy One and Okinawa Road	C7	C8	342	1.00	12	15	$ 62	$ 21,200
C8	Parallel Hwy One and Okinawa Road	C8	C9	323	1.00	12	15	$ 62	$ 20,000
C9	Parallel Hwy One and Okinawa Road	C9	C10	377	1.00	12	15	$ 62	$ 23,400
TOTAL LENGTH				1703					
								CONSTRUCTION COST	$ 99,800
								20% CONTINGENCY	$ 20,000
								25% MCWD Soft Costs [1]	$ 25,000
								TOTAL PROJECT	$ 144,800

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

CIP #: 2 Okinawa Road Pipeline Replacement Project Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF

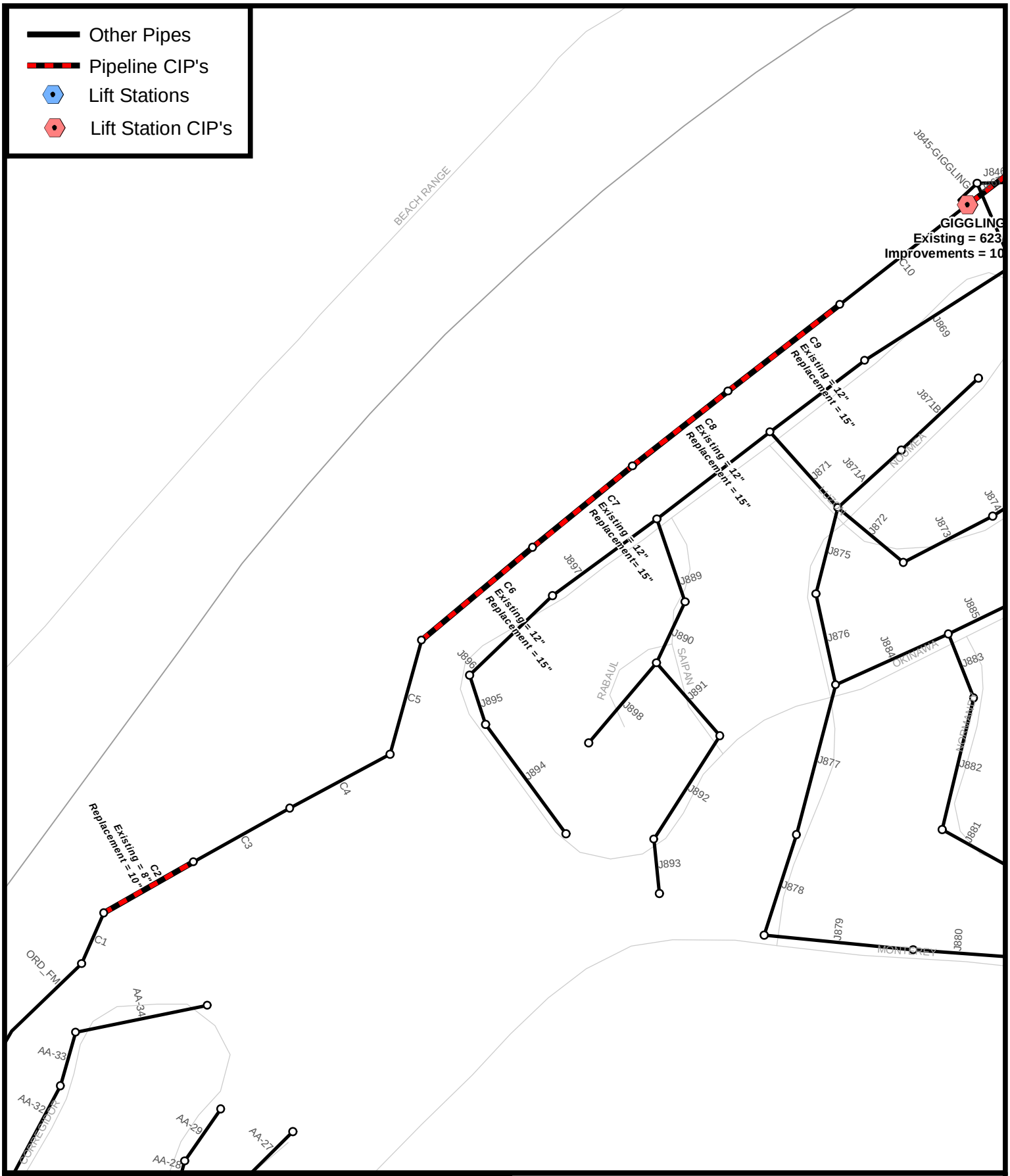
Project Description:
Replace existing 8 and 12 -inch diameter gravity sewer pipelines with appropriate 10 and 15-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow. Pipeline segments C6 through C9 are connecting pipeline segments that should be constructed as one project. Pipeline segment C2 is within the geographic vicinity and should be included in the project.

Pipeline segments C3 through C5, and pipeline segment C10 have sufficient hydraulic capacity to accommodate build-out flows, however, those pipeline segments may be considered for replacement for continuity of pipeline diameter within the pipeline run. Pipeline segments C3 through C5 and pipeline segment C10 are not included in this opinion of probable cost.

Upstream Flow Sources at Build-out: Hayes Park, Bostrom Park, Seaside Resort, Fitch Middle School, Sunbay Apartments, Seaside Highlands

Upstream Lift Stations: Ord Village

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 2: Okinawa Rd. Pipeline Replacement Project

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CIP # 3: California Street Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF

Reason for Project: Existing gravity sewer pipeline has insufficient capacity to accommodate new wastewater flows from Seaside Affordable Surplus Housing II and Navy Housing developments. Wastewater flow from those developments require the gravity sewer pipelines to flow at 71% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Project Priority: 3 (District guidelines regarding maximum allowable design parameters exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing d/D	Pipeline Diameter Existing (in)	Pipeline Diameter Replacement (in)	Unit Cost ($/LF)	Facility Cost ($)
D701	California St. and Giggling Road	D701	D700	63	.71	8	10	$ 41	$ 2,600
TOTAL LENGTH				63					
								CONSTRUCTION COST	$ 2,600
								20% CONTINGENCY	$ 500
								25% MCWD Soft Costs [1]	$ 700
								TOTAL PROJECT	$ 3,800

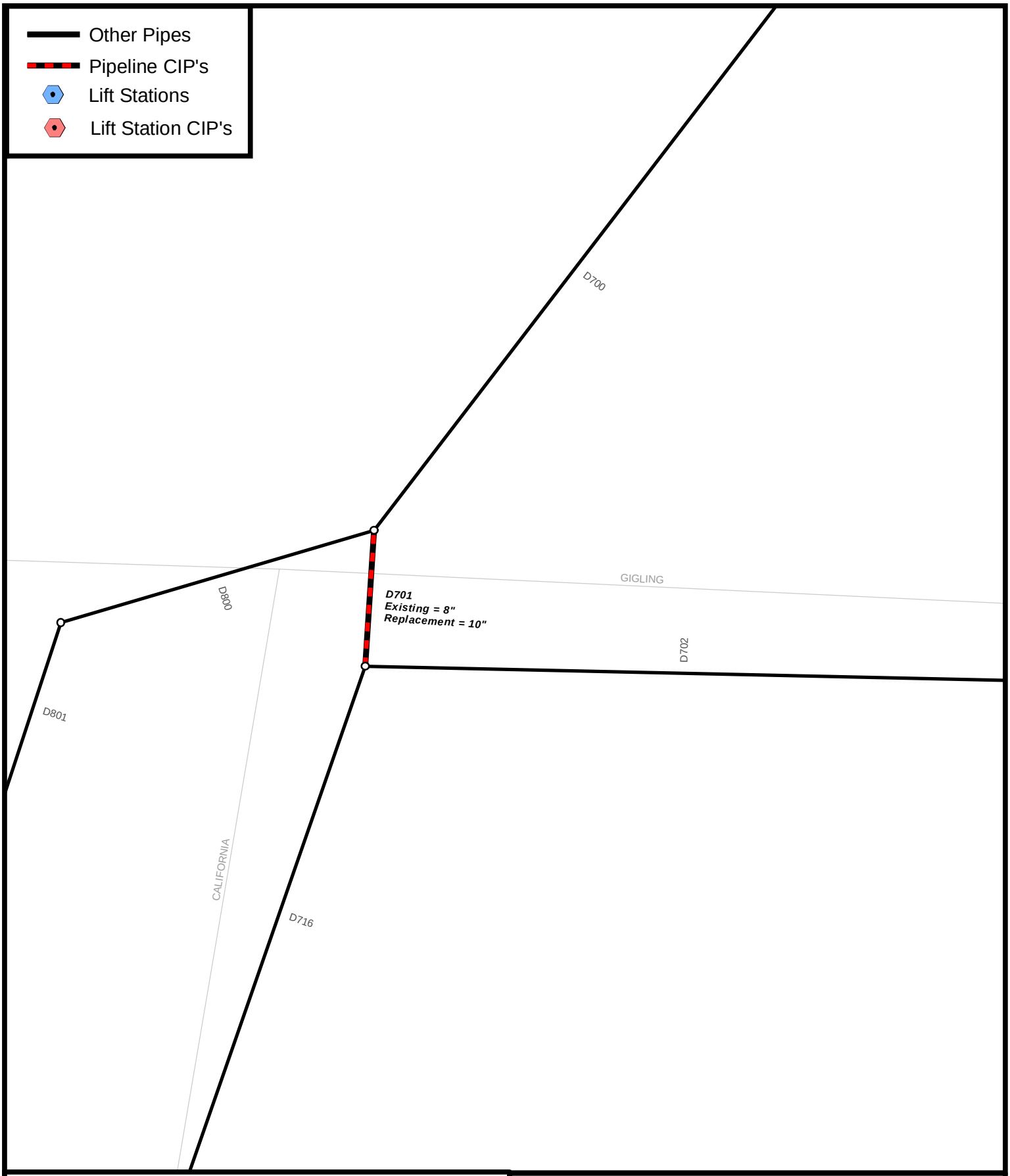
[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

Project Description:
Replace existing 8 -inch diameter gravity sewer pipeline with appropriate 10-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow.

Upstream Flow Sources at Build-out: Seaside Affordable Surplus Housing II, Navy Housing

Upstream Lift Stations: None

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 3: California Street Pipeline Replacement Project

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CIP # 4 – 4th Street And 2nd Avenue Pipeline Replacement Project Year Planned for Construction: 2005

Capacity Scenario: 2005 PWWF; 2005 ADWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from CSUMB Marina, CSUMB Seaside, CSUMB Monterey County, and Surplus Area II developments and do not conform to District standards for minimum slope. Wastewater flow from those developments require the gravity sewer pipelines to flow at 100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Project Priority: 2 (Maximum facility capacity exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
H319A	Approximately 4th Street and 2nd Avenue	H319A	H319	204	0.56	10	12	$ 49	$ 10,000
H319	Approximately 4th Street and 2nd Avenue	H319	H317	388	0.63	10	12	$ 49	$ 19,000
H317	Approximately 4th Street and 2nd Avenue	H317	H316	224	1.00	10	12	$ 49	$ 11,000
H316	Approximately 4th Street and 2nd Avenue	H316	H315A	195	0.18	24	24	$ 98	$ 19,100
H315A	Approximately 4th Street and 2nd Avenue	H315A	H315	238	1.00	24	24	$ 98	$ 23,400
H315	Approximately 4th Street and 2nd Avenue	H315	H254	180	0.11	24	24	$ 98	$ 17,700
H254	Approximately 4th Street and 2nd Avenue	H254	H311	288	0.10	24	24	$ 98	$ 28,200
TOTAL LENGTH				1125					
								CONSTRUCTION COST	$ 128,400
								20% CONTINGENCY	$ 25,700
								25% MCWD Soft Costs [1]	$ 32,100
								TOTAL PROJECT	$ 186,200

CIP # 4 – 4th Street And 2nd Avenue Pipeline Replacement Project Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF; 2005 ADWF

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

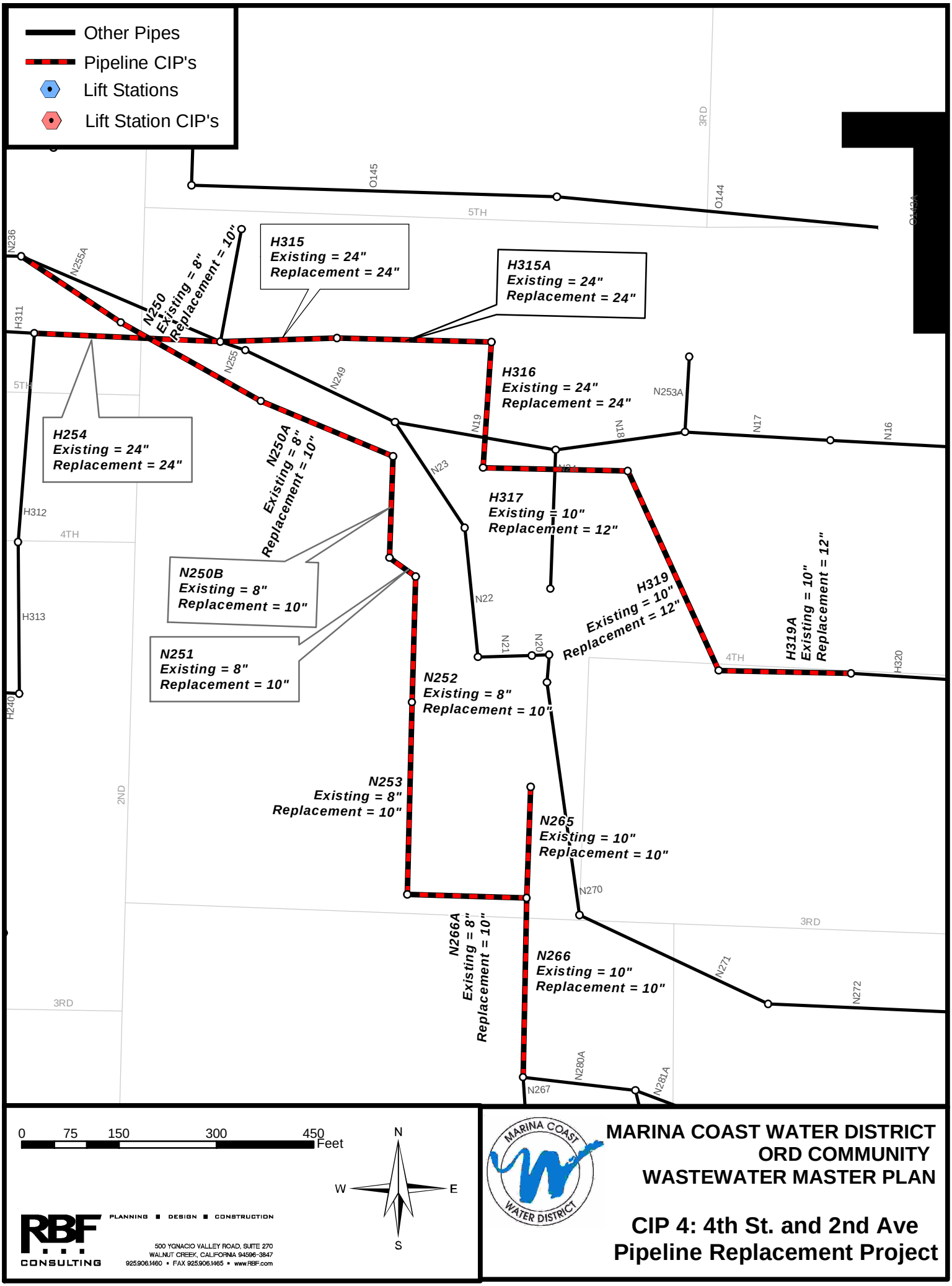
Project Description:
Replace existing 10 -inch diameter gravity sewer pipeline with appropriate 12-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow and to conform to minimum District slope criteria. Replace existing 24-inch diameter gravity sewer pipeline with equivalent gravity sewer pipeline at minimum District slope criteria. As described in Section 8-5, existing pipeline slopes should be field verified before beginning detailed design and construction. All pipeline segments are continuous and should be constructed as one project.

Pipeline segment H319 has sufficient hydraulic capacity for Year 2005 flows, however, will need replacement in Year 2010. Replacement of pipeline segment H319 is recommended to be included within this project. Pipeline segment H319A has sufficient hydraulic capacity for Year 2005 flows, however, will need replacement in Year 2015. Replacement of pipeline segment H319 is recommended to be included within this project.

Upstream Flow Sources at Build-out: CSUMB Marina, CSUMB Seaside, CSUMB Monterey County, Surplus Area II

Upstream Lift Stations: DEH, TAC

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.


Other Pipes
Pipeline CIP's
Lift Stations
Lift Station CIP's
H315
Existing = 24"
Replacement = 24"
H315A
Existing = 24"
Replacement = 24"
N250
Existing = 8"
Replacement = 10"
H316
Existing = 24"
Replacement = 24"
H254
Existing = 24"
Replacement = 24"
N250A
Existing = 8"
Replacement = 10"
H317
Existing = 10"
Replacement = 12"
N250B
Existing = 8"
Replacement = 10"
H319
Existing = 10"
Replacement = 12"
H319A
Existing = 10"
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N251
Existing = 8"
Replacement = 10"
N252
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CIP # 5 – Imjin Parkway Pipeline Replacement Project I

Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from UCMBEST, Marina Airport, East Garrison, and CSUMB Housing. Wastewater flow from those developments require the gravity sewer pipelines to flow at 74 - 100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan. Existing areas also contributing wastewater flow to these pipelines include the Existing Marina area.

The Imjin Lift Station is located immediately upstream of this section of pipelines. Therefore, the recommendations for this project are related to capacity increases at the lift station and should be coordinated with the planned improvements to the Imjin Lift Station.

Project Priority: 2 (Maximum facility capacity exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
L1E	Parallel Imjin Road	L1E	L1D	245	1.00	12	15	$ 62	$ 15,200
L1D	Parallel Imjin Road	L1D	L1C1	288	1.00	12	15	$ 62	$ 17,800
L1C1	Parallel Imjin Road	L1C1	L1B	221	1.00	12	15	$ 62	$ 13,700
L1B	Parallel Imjin Road	L1B	L1A	317	.74	12	15	$ 62	$ 19,600
L1A	Parallel Imjin Road	L1A	L1	316	.79	12	15	$ 62	$ 19,600
TOTAL LENGTH				1386					
								CONSTRUCTION COST	$ 85,900
								20% CONTINGENCY	$ 17,200
								25% MCWD Soft Costs [1]	$ 21,500
								TOTAL PROJECT	$ 124,600

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

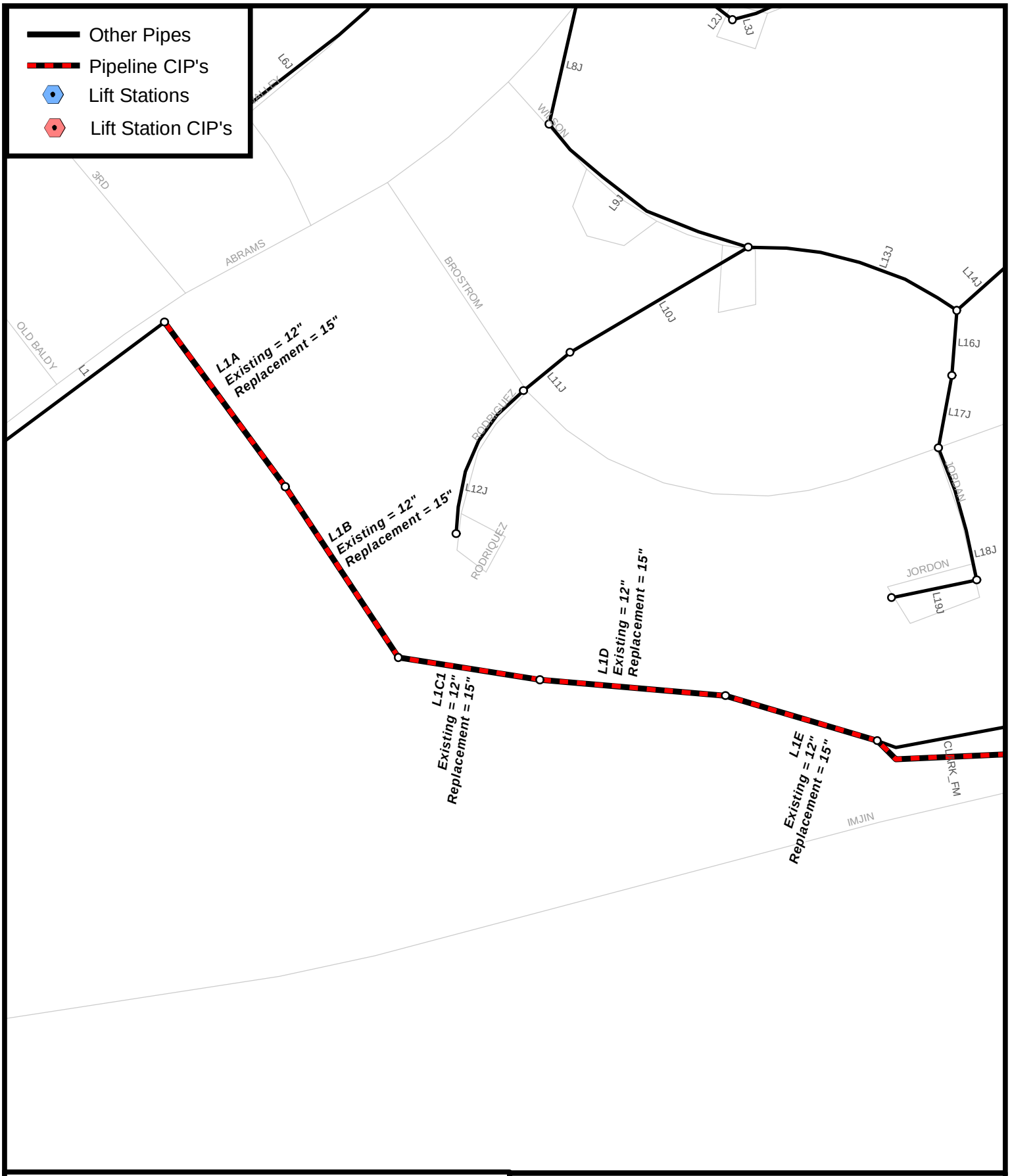
CIP # 5 – Imjin Parkway Pipeline Replacement Project I Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF

Project Description:
Replace approximately 1,386 LF of existing 12 -inch diameter gravity sewer pipeline with appropriate 15-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow. All pipeline segments are connecting and should be constructed as one project.

Upstream Flow Sources at Build-out: UCMBEST, Marina Airport, East Garrison, CSUMB Housing, Existing Marina

Upstream Lift Stations: Clark, Schoonover, Imjin, Reservation Road, Neeson, Hodges, Wittemeyer, Landrum.

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 5: Imjin Pkwy Pipeline Replacement Project I

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CIP # 6 -- Imjin Parkway Pipeline Replacement Project II

Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF; 2010 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from Marina Heights, UCMBEST, Marina Airport, East Garrison, and CSUMB Housing. Wastewater flow from those developments require the gravity sewer pipelines to flow at 67 - 100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan. Existing areas also contributing wastewater flow to these pipelines include the Existing Marina area.

Improvements to the existing capacity of the lift stations upstream of these pipelines are related to the recommendations included in this project.

Project Priority: 2 (Maximum facility capacity exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing d/D	Pipeline Diameter Existing (in)	Pipeline Diameter Replacement (in)	Unit Cost ($/LF)	Facility Cost ($)
L10	Parallel Imjin Parkway	L10	L11	357	.73	18	21	$ 86	$ 30,700
L11	Parallel Imjin Parkway	L11	L12	348	1.0	18	24	$ 98	$ 34,100
L12	Parallel Imjin Parkway	L12	L13	370	.67	18	21	$ 86	$ 36,300
10	Parallel Imjin Parkway	L13	13	64	.69	18	21	$ 86	$ 6,300
11	Parallel Imjin Parkway	13	12	162	1.0	18	24	$ 98	$15,900
TOTAL LENGTH				1301					
								CONSTRUCTION COST	$123,300
								20% CONTINGENCY	$ 24,700
								25% MCWD Soft Costs [1]	$30,800
								TOTAL PROJECT	$ 178,800

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

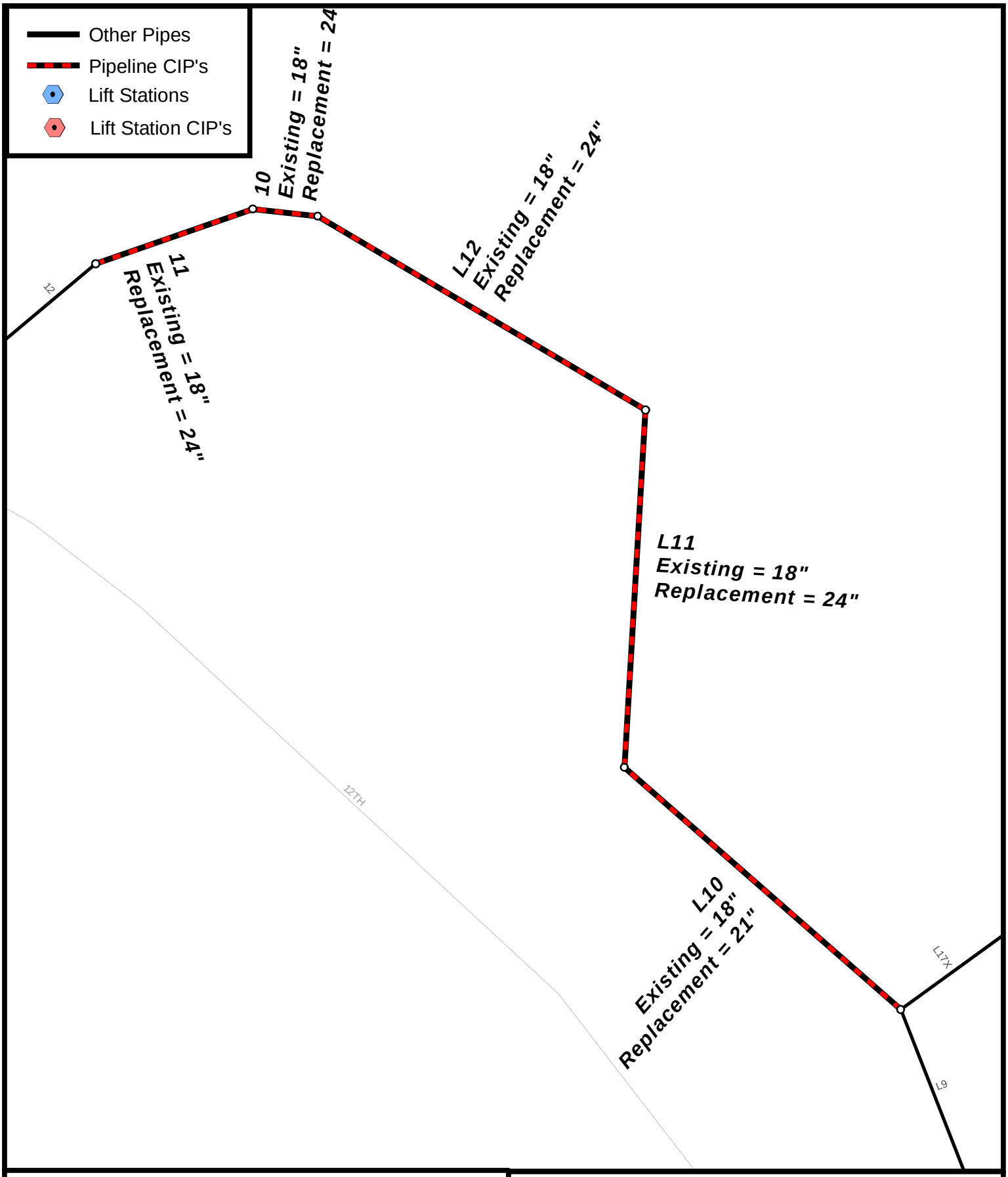
CIP # 6 -- Imjin Parkway Pipeline Replacement Project II Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF; 2010 PWWF

Project Description:
Replace existing 18 -inch diameter gravity sewer pipeline with appropriate 21 and 24-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow. All pipeline segments are connecting and should be constructed as one project.

Upstream Flow Sources at Build-out: Marina Heights, UCMBEST, Marina Airport, East Garrison, CSUMB Housing, and Existing Marina

Upstream Lift Stations: Jefferson, San Pablo, Clark, Schoonover, Imjin, Reservation Road, Neeson, East Garrison, Landrum, Wittemeyer

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 6: Imjin Pkwy Pipeline Replacement Project II

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CIP #: 7 -- 11th Street Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF; 2010 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from University Villages, Marina Heights, UCMBEST, Marina Airport, East Garrison, and CSUMB Housing. Wastewater flow from those developments require the gravity sewer pipelines to flow at 67 - 100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan. Existing areas also contributing wastewater flow to these pipelines the Existing Marina area.

Improvements to the existing capacity of the lift stations upstream of these pipelines are related to the recommendations included in this project.

Project Priority: 2 (Maximum facility capacity exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing d/D	Pipeline Diameter Existing (in)	Pipeline Diameter Replacement (in)	Unit Cost ($/LF)	Facility Cost ($)
L27	11th Street	L27	L28	532	.69	18	21	$ 86	$ 45,700
L28	11th Street	L28	L29	533	.67	18	21	$ 86	$ 45,800
L29	Parallel Highway One	L29	L30	311	1.0	18	21	$ 86	$ 26,700
TOTAL LENGTH				1375					
								CONSTRUCTION COST	$ 118,200
								20% CONTINGENCY	$ 23,600
								25% MCWD Soft Costs [1]	$ 29,600
								TOTAL PROJECT	$ 171,400

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

CIP #: 7 -- 11th Street Pipeline Replacement Project

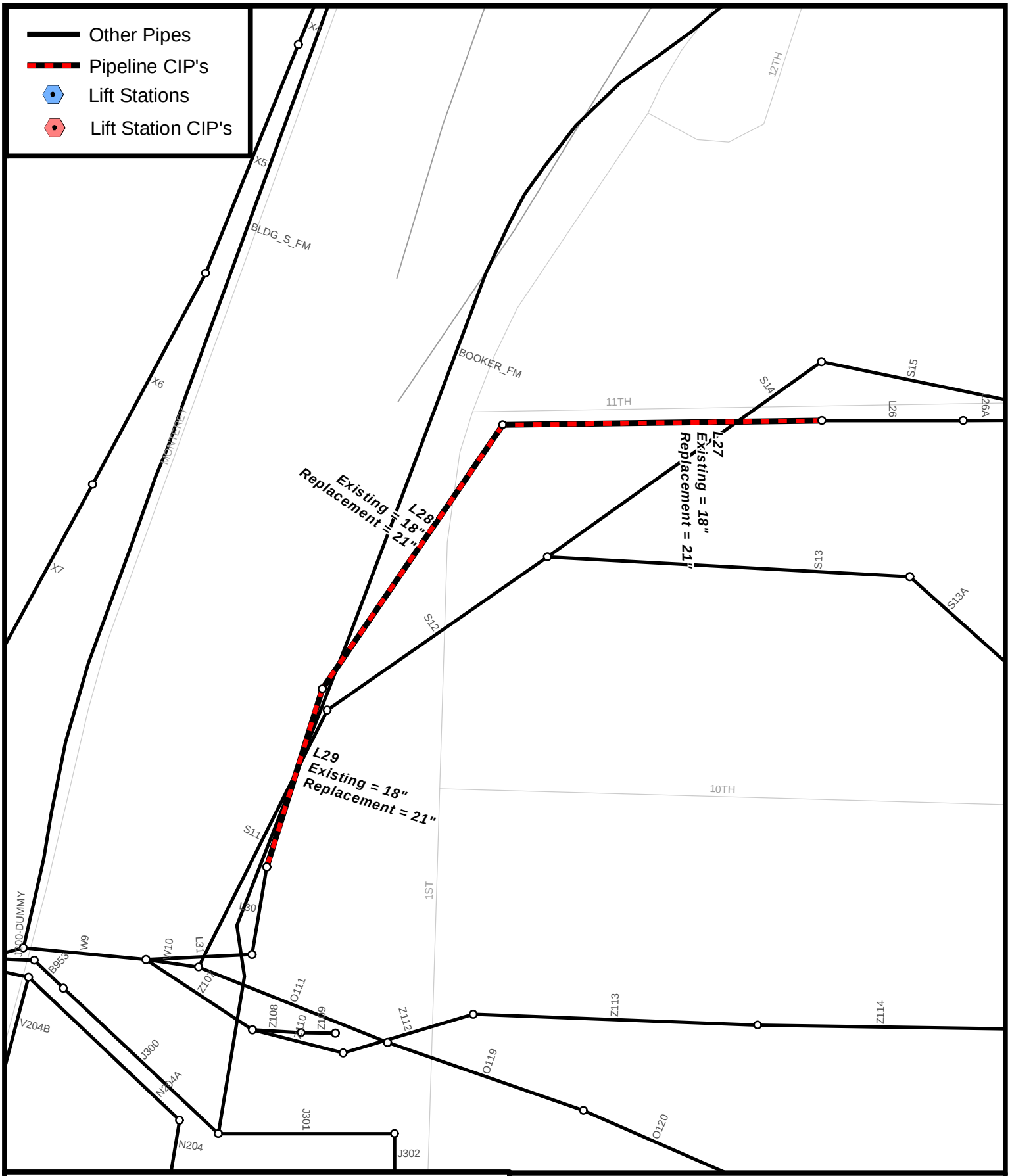
Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF; 2010 PWWF

Project Description:
Replace existing 18 -inch diameter gravity sewer pipeline with appropriate 21 diameter gravity sewer pipeline to provide required capacities for wastewater flow. All pipeline segments are within the same geographic vicinity and should be constructed as one project. Pipeline segment L28 has sufficient hydraulic capacity for Year 2005 flows, however, will need replacement in Year 2010. Replacement of pipeline segment L28 is recommended to be included within this project.

Upstream Flow Sources at Build-out: University Villages, Marina Heights, UCMBEST, Marina Airport, East Garrison, CSUMB Housing, Existing Marina

Upstream Lift Stations: Jefferson, San Pablo, Clark, Schoonover, Imjin, Reservation Road, Neeson, East Garrison, Landrum, Wittemeyer

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red. .


Other Pipes
Pipeline CIP's
Lift Stations
Lift Station CIP's
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Replacement = 21"
L28
Existing = 18"
Replacement = 21"
L29
Existing = 18"
Replacement = 21"
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BOOKER_FM
MONTEREY
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L26A
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CIP 7: 11th St. Pipeline
Replacement Project
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CIP #: 8 – Hayes Circle Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005 ADWF;2005 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows or adverse slope conditions from Cypress Knolls (M19A and M19 only have Cypress Knolls flow source), and Marina Heights developments. Wastewater flow from those developments require the gravity sewer pipelines to flow at 67 - 100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Project Priority: 2 (Maximum facility capacity exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
M104	Parallel Hayes Circle	M104	BOOKER_ WW	46	.71	8	10	$ 41	$ 1,900
M20	Booker St.	M20	M9	295	1.00	12	12	$ 49	$ 14,500
M9	Booker St.	M9	M8	337	0.01	12	12	$ 49	$ 16,500
M19A	Carswell St.	M19A	M19	150	1.00	8	8	$ 36	$ 5,400
M19	Carswell St.	M19	M18	269	.01	8	8	$ 36	$ 9,700
TOTAL LENGTH				1097					
								CONSTRUCTION COST	$ 48,000
								20% CONTINGENCY	$ 9,600
								25% MCWD Soft Costs [1]	$ 12,000
								TOTAL PROJECT	$ 69,600

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

CIP #: 8 – Hayes Circle Pipeline Replacement Project

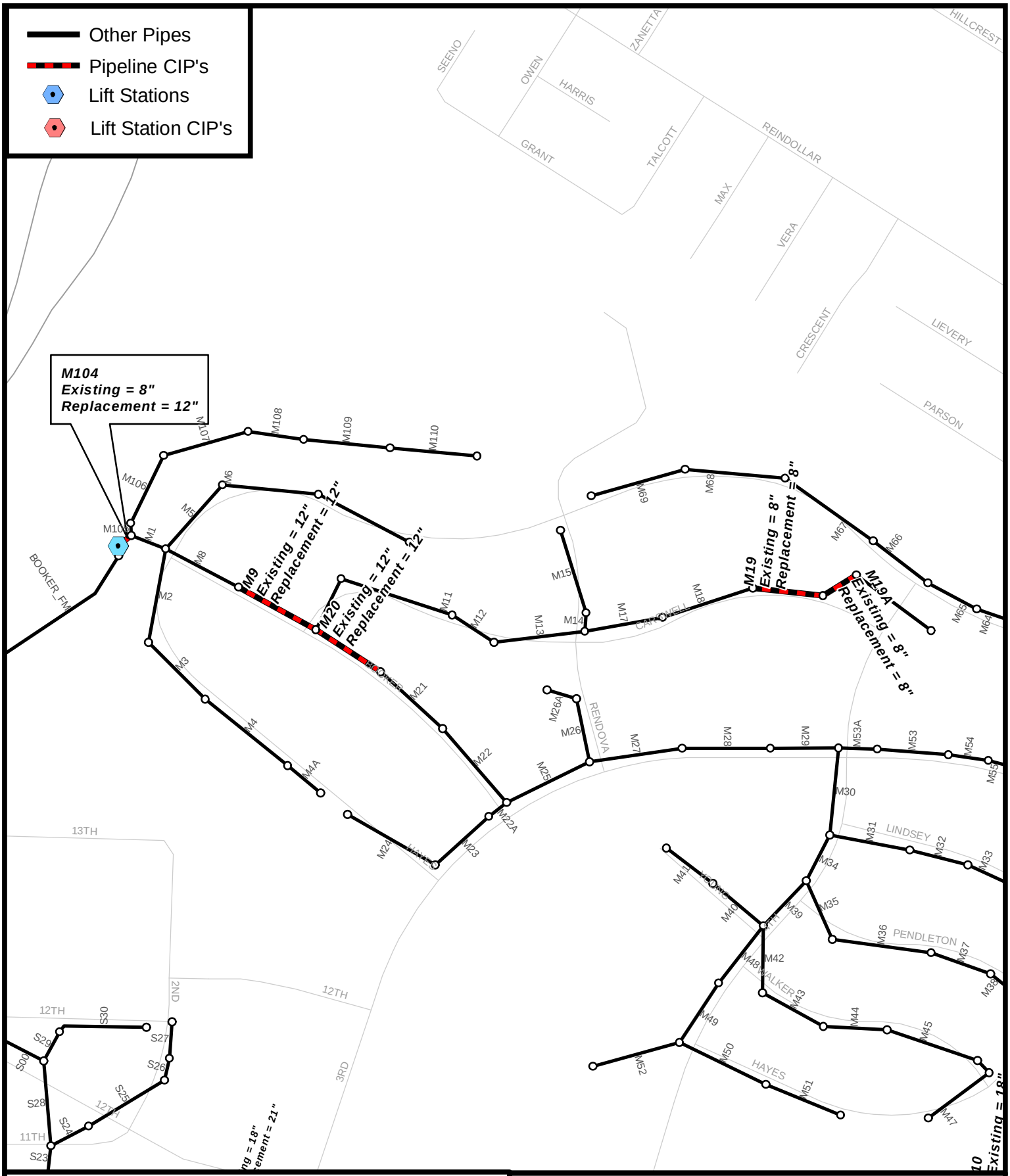
Year Planned for Construction: 2005
Capacity Scenario: 2005 ADWF;2005 PWWF

Project Description:
Replace existing 8-inch diameter gravity sewer pipeline with appropriate 10 -inch diameter gravity sewer pipeline to provide required capacities for wastewater flow. Replace existing 8 and 12-inch diameter gravity sewer pipeline with equivalent gravity sewer pipeline at minimum District slope criteria. As described in Section 8.5, existing pipeline slopes should be field verified before beginning detailed design and construction.

Upstream Flow Sources at Build-out: Cypress Knolls (M19A and M19 only have Cypress Knolls flow source), Marina Heights

Upstream Lift Stations: None

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 8: Hayes Ci. Pipeline Replacement Project

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CIP #: 9 – 3rd Street Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005 ADWF; 2005 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from CSUMB Marina and CSUMB Seaside developments. Wastewater flow from those developments require the gravity sewer pipelines to flow at 67 - 100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Project Priority: 2 (Maximum facility capacity exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
N266	Approximately 3rd Ave and 3rd Street	N266	N266A	277	1.00	10	10	$ 41	$ 7,600
N265	Approximately 3rd Ave and 3rd Street	N265	N266A	172	1.00	10	10	$ 41	$ 11,300
N266A	Approximately 3rd Ave and 3rd Street	N266A	N253	184	1.00	8	10	$ 41	$ 7,000
N253	Approximately 3rd Ave and 3rd Street	N253	N252	296	0.36	6	10	$ 41	$ 12,100
N252	Approximately 2nd Ave and 3rd Street	N252	N251	194	0.22	8	10	$ 41	$ 8,000
N251	Approximately 2nd Ave and 3rd Street	N251	N250B	50	0.27	8	10	$ 41	$ 2,000
N250B	Approximately 2nd Ave and 5th Street	N250B	N250A	157	0.24	8	10	$ 41	$ 6,400
N250A	Approximately 2nd Ave and 5th Street	N250A	N250	221	0.23	8	10	$ 41	$ 9,100
N250	Approximately 2nd Ave and 5th Street	N250	N237	248	0.25	8	10	$ 41	$ 10,200
N237	Approximately 2nd Ave and 5th Street	N237	N236	184	0.25	8	10	$ 41	$ 7,600
TOTAL LENGTH				1983					
								CONSTRUCTION COST	$ 81,300
								20% CONTINGENCY	$ 16,300
								25% MCWD Soft Costs [1]	$ 20,300
								TOTAL PROJECT	$ 117,900

CIP #: 9 – 3rd Street Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005 ADWF; 2005 PWWF

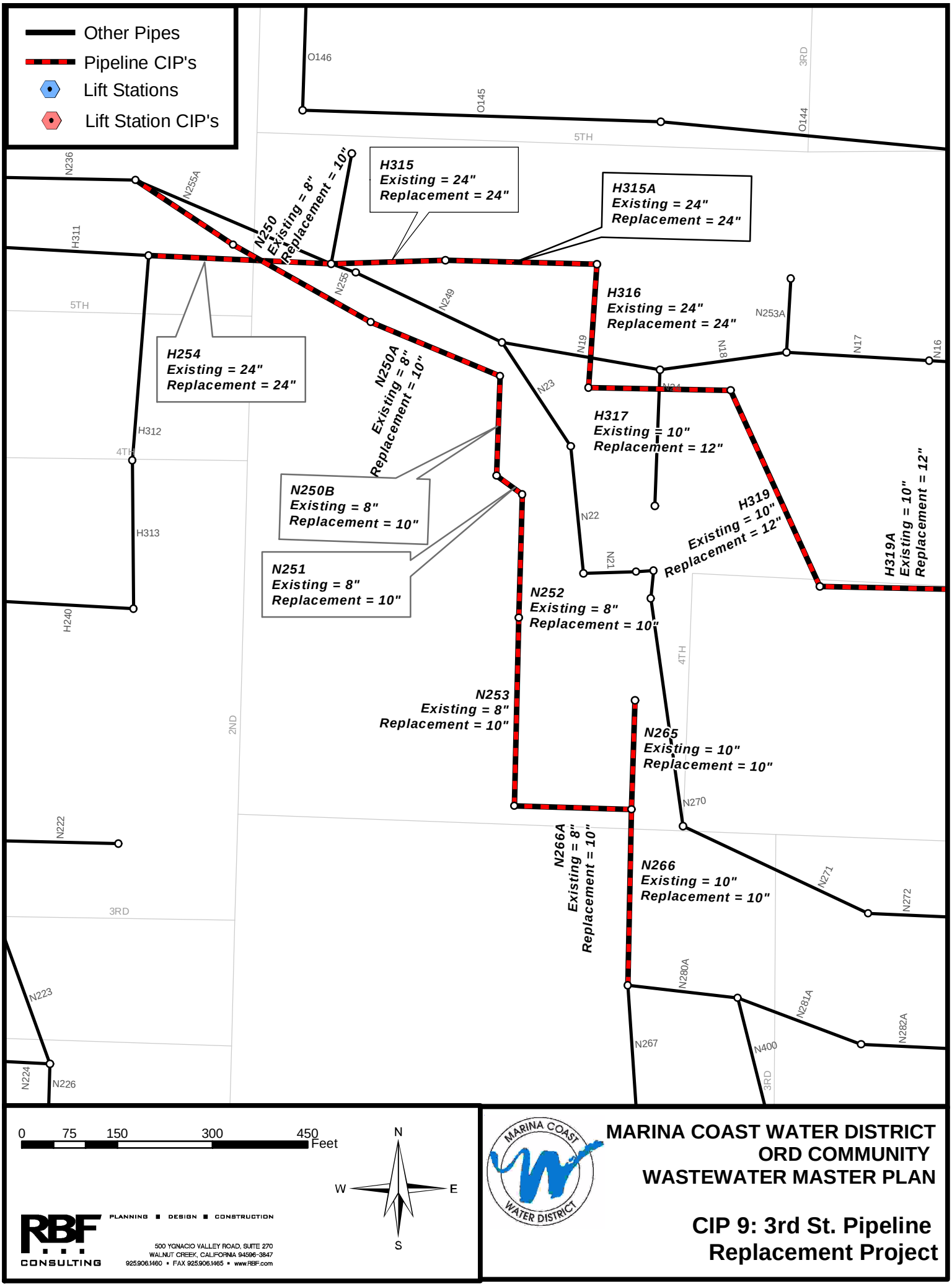
[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

Project Description:
Replace approximately 1983 LF existing 6 and 8-inch diameter gravity sewer pipeline with appropriate 10-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow and to meet minimum District slope criteria. As described in Section 8.5, existing pipeline slopes should be field verified before beginning detailed design and construction. All pipeline segments are connecting and should be constructed as one project.

Upstream Flow Sources at Build-out: CSUMB Marina, CSUMB Seaside,

Upstream Lift Stations: None

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.


Other Pipes
Pipeline CIP's
Lift Stations
Lift Station CIP's
O146
O145
O144
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N236
N255A
H311
H315
Existing = 24"
Replacement = 24"
H315A
Existing = 24"
Replacement = 24"
N250
Existing = 8"
Replacement = 10"
N255
N249
H316
Existing = 24"
Replacement = 24"
N253A
N19
N18
N17
N16
H254
Existing = 24"
Replacement = 24"
N250A
Existing = 8"
Replacement = 10"
N23
N24
H317
Existing = 10"
Replacement = 12"
H312
4TH
N250B
Existing = 8"
Replacement = 10"
N22
H319
Existing = 10"
Replacement = 12"
H319A
Existing = 10"
Replacement = 12"
H313
N21
N251
Existing = 8"
Replacement = 10"
N252
Existing = 8"
Replacement = 10"
H240
4TH
N253
Existing = 8"
Replacement = 10"
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N265
Existing = 10"
Replacement = 10"
N270
N222
N266A
Existing = 8"
Replacement = 10"
N266
Existing = 10"
Replacement = 10"
N271
N272
3RD
N280A
N281A
N282A
N223
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CIP #: 10 – Ord Village Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows Hayes Park, Seaside Resort and Hayes Elementary School developments. Wastewater flow from those developments require the gravity sewer pipelines to flow at 67 - 100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan. Existing areas also contributing wastewater flow to these pipelines include Bostrom Park, Fitch Middle School, Sunbay apartment, and Seaside Highlands.

Project Priority: 2 (Maximum facility capacity exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
B901	Parallel Highway One	B901	ORD_WW	501	.80	12	15	$ 62	$ 31,000
TOTAL LENGTH				501					
								CONSTRUCTION COST	$ 31,000
								20% CONTINGENCY	$ 6,200
								25% MCWD Soft Costs [1]	$ 7,800
								TOTAL PROJECT	$ 45,000

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

Project Description:
Replace existing 12 -inch diameter gravity sewer pipeline with appropriate 15 -inch diameter gravity sewer pipeline to provide required capacities for wastewater flow.

CIP #: 10 – Ord Village Pipeline Replacement Project Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF

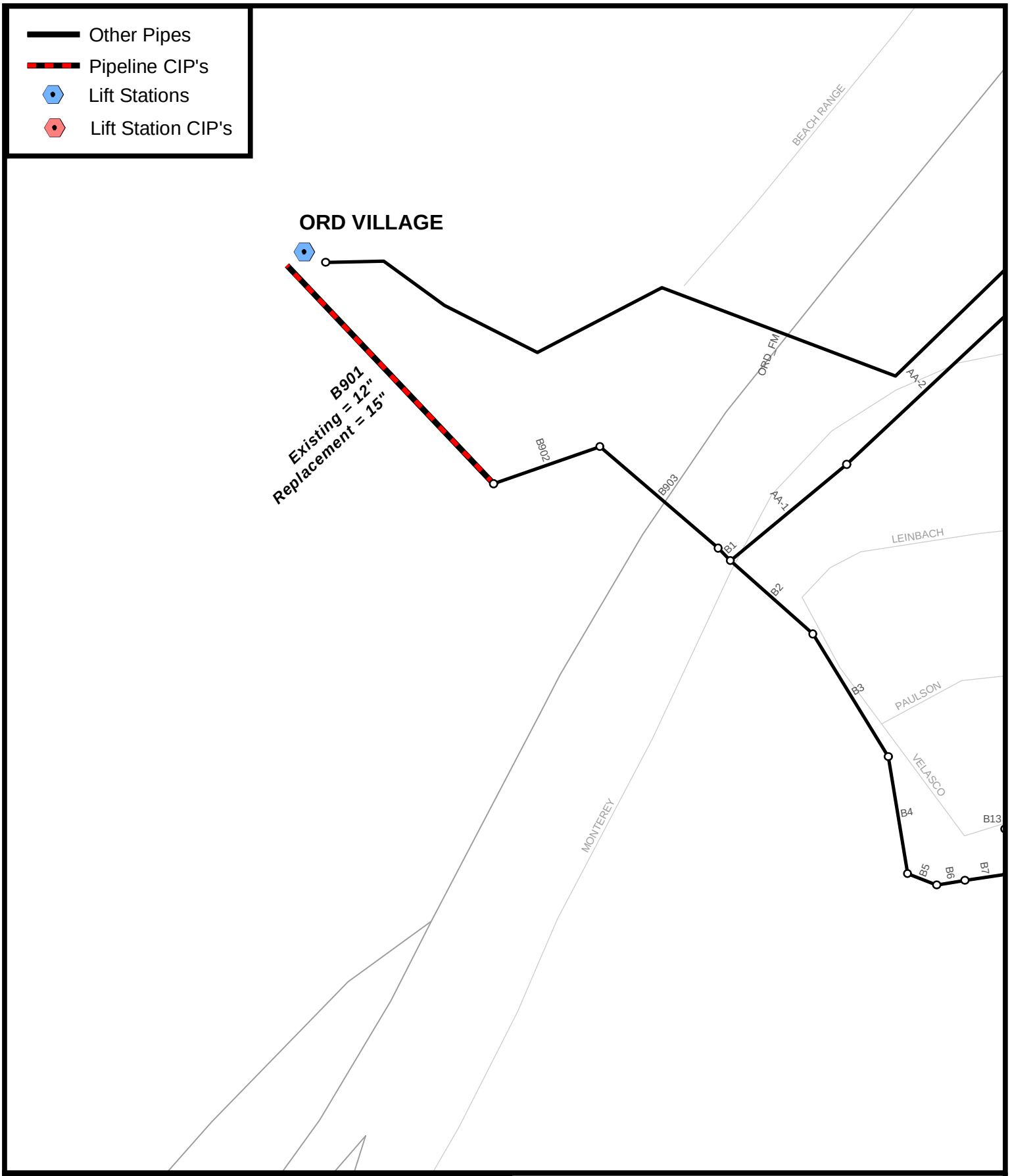
The District should also consider the following additional mitigation options to achieve sufficient capacity to the Ord Village Lift Station:

- Connect the Ord Village Lift Station directly to the MRWPCA interceptor and convert the existing force main that crosses the highway into a second gravity feed line, enabling increased flows from the east side of the highway to the west side.
- Build a second lift station on the east side of the highway that would take the flows that are above the capacity to the Ord Village Lift Station and pump those excess flows to a new force main toward the Giggling Lift Station.
- Build a second lift station on the east side of the Highway that would entirely replace the Ord Village Lift Station and pump the flow to Giggling Lift Station.
- Bore a second gravity pipeline to the Ord Village Lift Station to parallel the existing gravity pipeline.

Upstream Flow Sources at Build-out: Seaside Highlands, Hayes Park, Seaside Resort, Fitch Middle School, Hayes Elementary School, Bostrom Park, Sunbay Apartments

Upstream Lift Stations: None

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 10: Ord Village Pipeline Replacement Project

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CIP #: 11—Imjin Road Pipeline Replacement Project III Year Planned for Construction: 2005

Capacity Scenario: 2005 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from University Villages, Marina Heights, UCMBEST, Marina Airport, East Garrison, and CSUMB Housing developments. Wastewater flow from those developments require the gravity sewer pipelines to flow at 67 - 100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan. Existing areas also contributing wastewater flow to these pipelines include the Existing Marina area.

Improvements to the existing capacity of the lift stations upstream of these pipelines are related to the recommendations included in this project.

Project Priority: 3 (District guidelines regarding maximum allowable design parameter exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing d/D	Pipeline Diameter Existing (in)	Pipeline Diameter Replacement (in)	Unit Cost ($/LF)	Facility Cost ($)
L40	Imjin Road	L39	L22	464	0.75	18	21	$ 86	$ 39,900
TOTAL LENGTH				464					
								CONSTRUCTION COST	$ 39,900
								20% CONTINGENCY	$ 8,000
								25% MCWD Soft Costs [1]	$ 10,000
								TOTAL PROJECT	$ 57,900

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

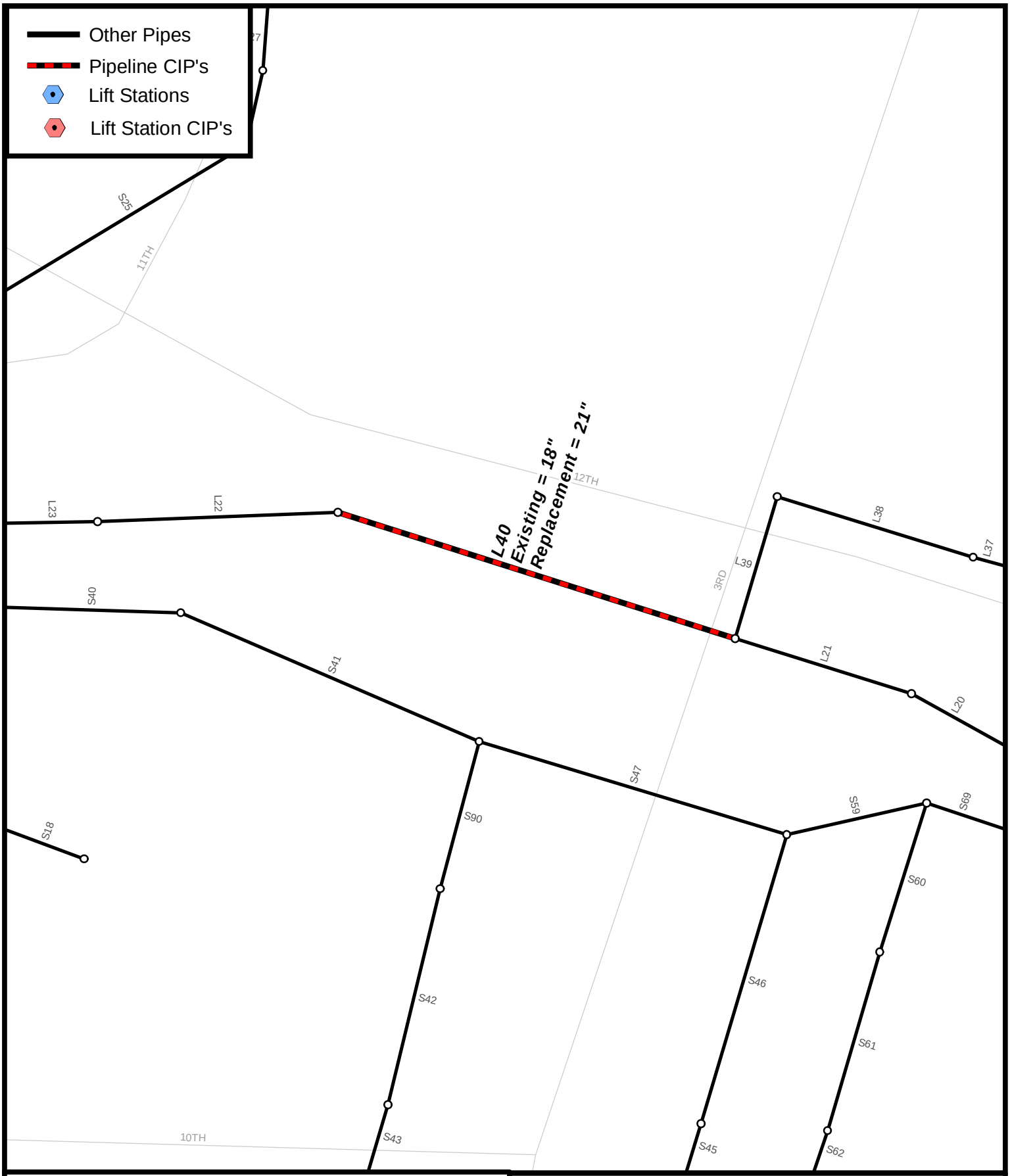
Project Description:
Replace existing 18 -inch diameter gravity sewer pipeline with appropriate 21-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow.

CIP #: 11—Imjin Road Pipeline Replacement Project III Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF

Upstream Flow Sources at Build-out: University Villages Marina Heights, UCMBEST, Marina Airport, East Garrison, CSUMB Housing, Existing Marina

Upstream Lift Stations: Jefferson, San Pablo, Clark, Schoonover, Imjin, Reservation Road, Neeson, East Garrison, Landrum, Wittemeyer

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 11: Imjin Pkwy Pipeline Replacement Project

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CIP #: 12 – 4th Avenue Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005 ADWF; 2005 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from University Villages' developments. Wastewater flow from those developments require the gravity sewer pipelines to flow at 67 - 100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Project Priority: 2 (Maximum facility capacity exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
L92	Approximately 4th Avenue and Imjin Parkway	L92	L17	45	1.00	6	8	$ 36	$ 1,600
TOTAL LENGTH				45					
								CONSTRUCTION COST	$ 1,600
								20% CONTINGENCY	$ 300
								25% MCWD Soft Costs [1]	$ 400
								TOTAL PROJECT	$ 2,300

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

Project Description:
Replace existing 6-inch diameter gravity sewer pipeline with an 8-inch diameter pipeline to achieve the required flow capacity.

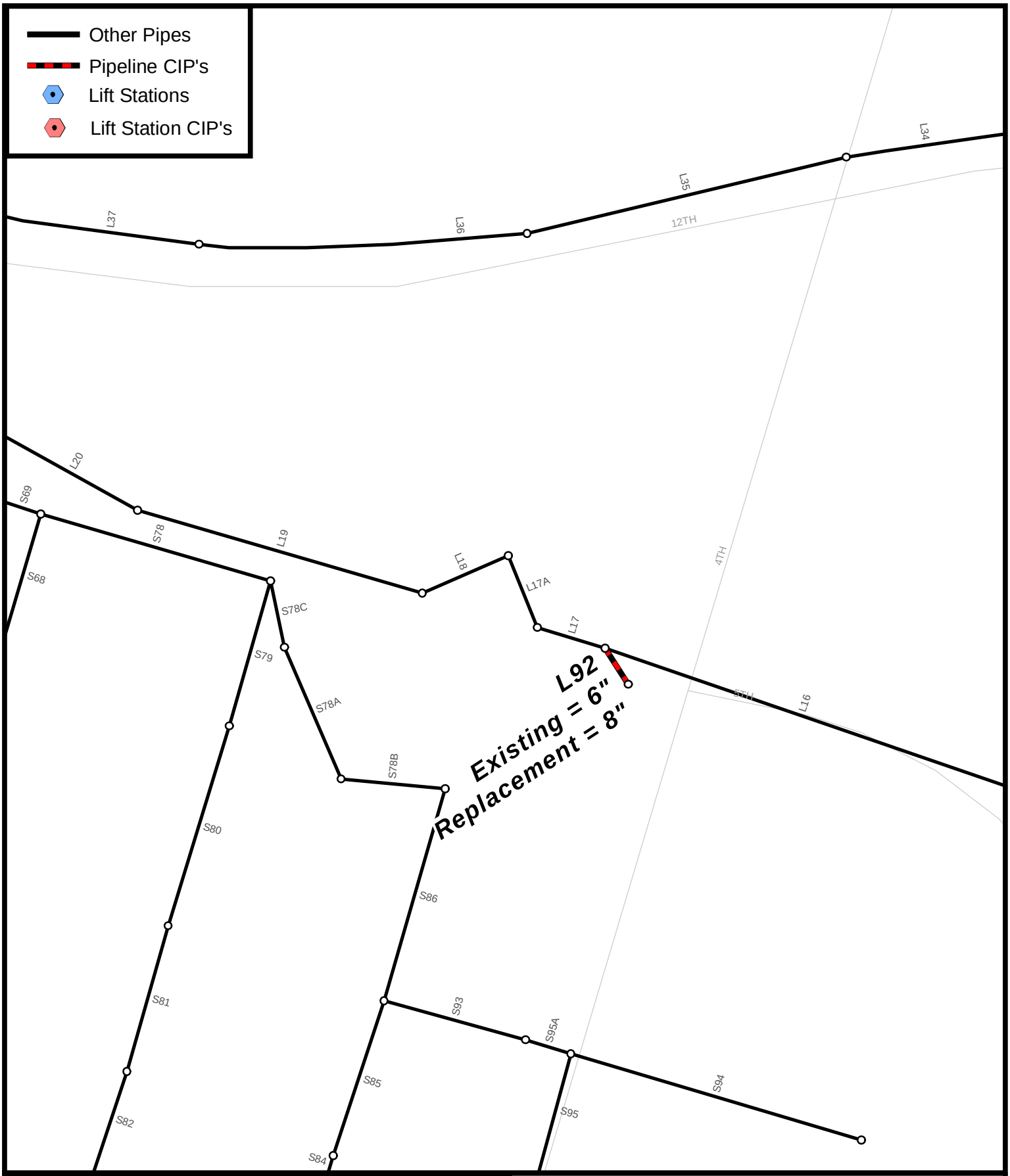
Upstream Flow Sources at Build-out: University Villages

Upstream Lift Stations: None

CIP #: 12 – 4th Avenue Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005 ADWF; 2005 PWWF

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red. .



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ORD COMMUNITY WASTEWATER MASTER PLAN

CIP 12: 4th Ave. Pipeline Replacement Project

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CIP #: 13 – Mulheim Road Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005,ADWF;2005 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from Marshall Park developments. Wastewater flow from those developments require the gravity sewer pipelines to flow at 67 - 100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Project Priority: 2 (Maximum facility capacity exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
F548	Mulheim Road	F548	F547	250	1.00	6	8	$ 36	$9,000
F547	Mulheim Road	F547	F545	283	0.25	6	8	$ 36	$ 10,200
TOTAL LENGTH				533					
								CONSTRUCTION COST	$ 19,200
								20% CONTINGENCY	$3,800
								25% MCWD Soft Costs [1]	$4,800
								TOTAL PROJECT	$ 27,800

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

Project Description:
Replace existing 6-inch diameter gravity sewer pipeline with 8-inch diameter pipeline to achieve the required flow capacity at minimum District slope criteria. As described in Section 8.5, existing pipeline slopes should be field verified before beginning detailed design and construction.

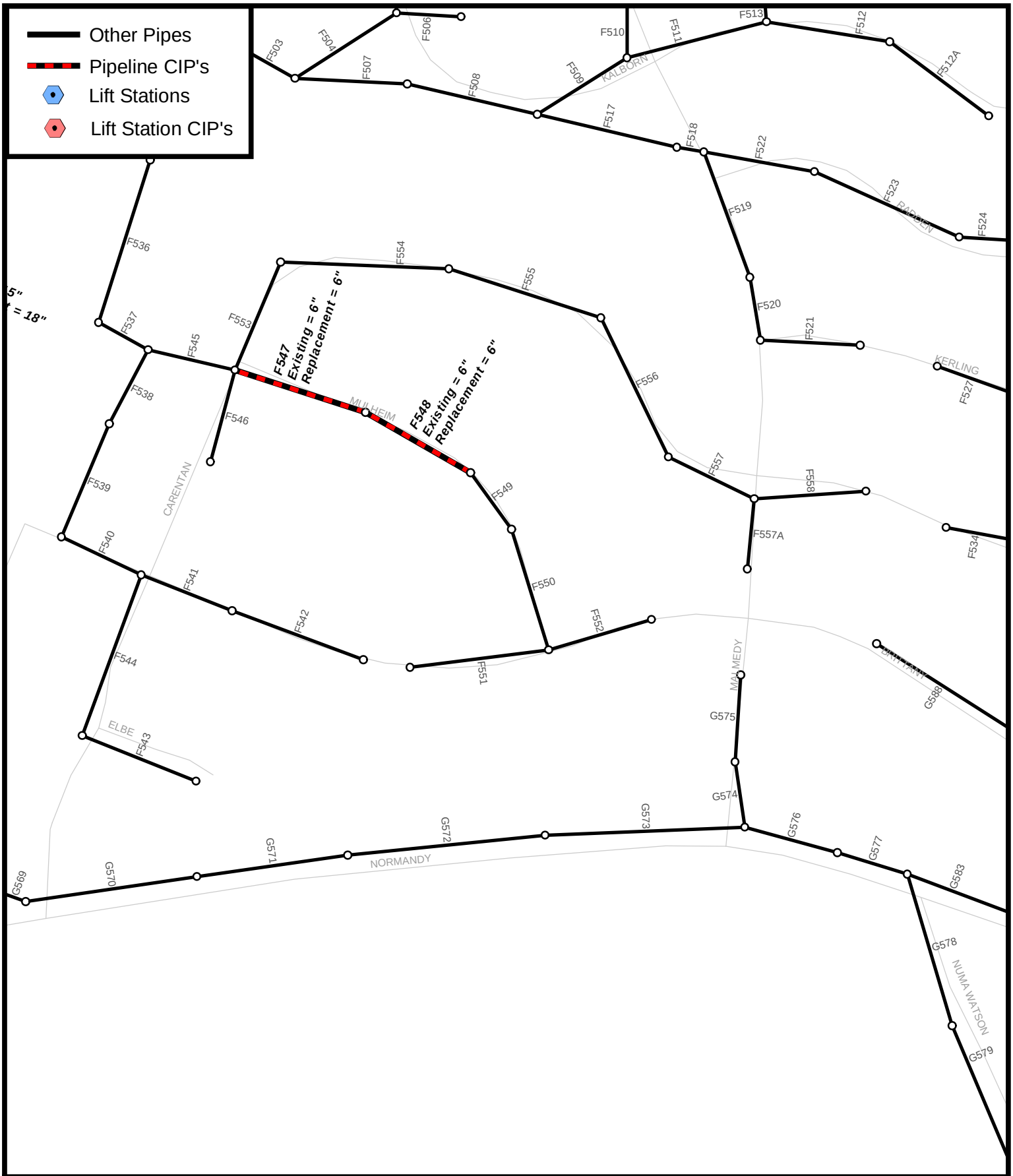
Upstream Flow Sources at Build-out: Marshall Park

CIP #: 13 – Mulheim Road Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005,ADWF;2005 PWWF

Upstream Lift Stations: None

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.


Other Pipes
Pipeline CIP's
Lift Stations
Lift Station CIP's
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F512A
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KALBORN
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CIP #: 14 – 4th Street Pipeline Replacement Project I

Year Planned for Construction: 2005
Capacity Scenario: 2005 ADWF; 2005 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from CSUMB Marina, CSUMB Seaside, CSUMB Monterey County, and Seaside Surplus Area II. Wastewater flow from those developments require the gravity sewer pipelines to flow at 67 - 100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Project Priority: 2 (Maximum facility capacity exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing d/D	Pipeline Diameter Existing (in)	Pipeline Diameter Replacement (in)	Unit Cost ($/LF)	Facility Cost ($)
H324	Approximately 4th Street and 4th Ave	H324	H323	288	0.71	10	12	$ 49	$ 14,100
H323	Approximately 4th Street and 4th Ave	H323	H324	322	0.64	10	12	$ 49	$ 15,800
H322	Approximately 4th Street and 4th Ave	H322	H321A	183	0.27	10	10	$ 41	$ 7,500
H321A	Approximately 4th Street and 4th Ave	H321A	H321	152	1.00	10	10	$ 41	$ 6,200
H321	Approximately 4th Street and 4th Ave	H321	H320	225	0.28	10	10	$ 41	$ 9,200
TOTAL LENGTH				1171					
								CONSTRUCTION COST	$ 52,800
								20% CONTINGENCY	$ 10,600
								25% MCWD Soft Costs [1]	$ 13,200
								TOTAL PROJECT	$ 76,600

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

CIP #: 14 – 4th Street Pipeline Replacement Project I

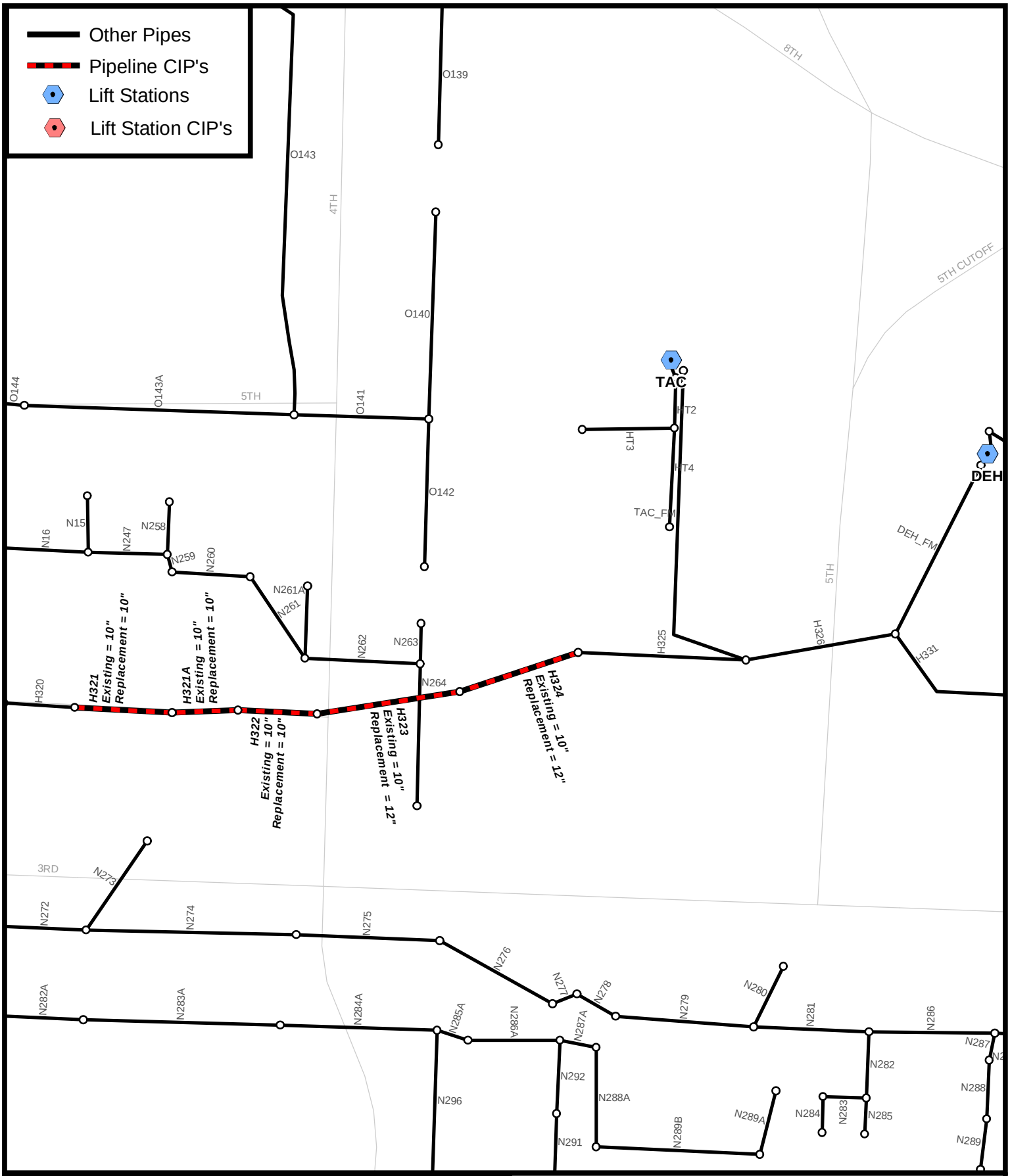
Year Planned for Construction: 2005
Capacity Scenario: 2005 ADWF; 2005 PWWF

Project Description:
Replace existing 10-inch diameter gravity sewer pipeline with appropriate 10 and 12-inch diameter gravity sewer pipeline to increase pipeline capacity and to attain minimum District slope criteria. As described in Section 8.5, existing pipeline slopes should be field verified before beginning detailed design and construction. Pipeline segment H323 has sufficient hydraulic capacity for Year 2005 flows, however, will need replacement in Year 2010. Replacement of pipeline segment H323 is recommended to be included within this project to maintain pipeline continuity.

Upstream Flow Sources at Build-out: CSUMB Marina, CSUMB Marina, CSUMB Seaside, CSUMB Monterey County, and Seaside Surplus Area II

Upstream Lift Stations: None

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 14: 4th St. Pipeline Replacement Project I

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CIP #: 15 – 4th Street Pipeline Replacement Project II

Year Planned for Construction: 2005
Capacity Scenario: 2005 ADWF; 2005 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from University Villages. Wastewater flow from those developments require the gravity sewer pipelines to flow at 67 - 100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan

Project Priority: 2 (Maximum facility capacity exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	Existing d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
N207	Parallel Highway One	N207	N206	270	1.00	8	8	$ 36	$ 9,700
N208	Parallel Highway One	N208	N207	270	0.05	8	8	$ 36	$ 9,700
N209	Parallel Highway One	N209	N206	655	1.00	8	8	$ 36	$ 23,600
N210	Parallel Highway One	N210	N209	679	1.00	8	8	$ 36	$ 24,400
TOTAL LENGTH				1872					
								CONSTRUCTION COST	$ 67,400
								20% CONTINGENCY	$ 13,500
								25% MCWD Soft Costs [1]	$ 16,900
								TOTAL PROJECT	$ 97,800

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

Project Description:
Replace approximately 1,872 LF of existing 8-inch diameter gravity sewer pipeline with equivalent gravity sewer pipeline at minimum District slope criteria. As described in Section 8.5, existing pipeline slopes should be field verified before beginning detailed design and construction.

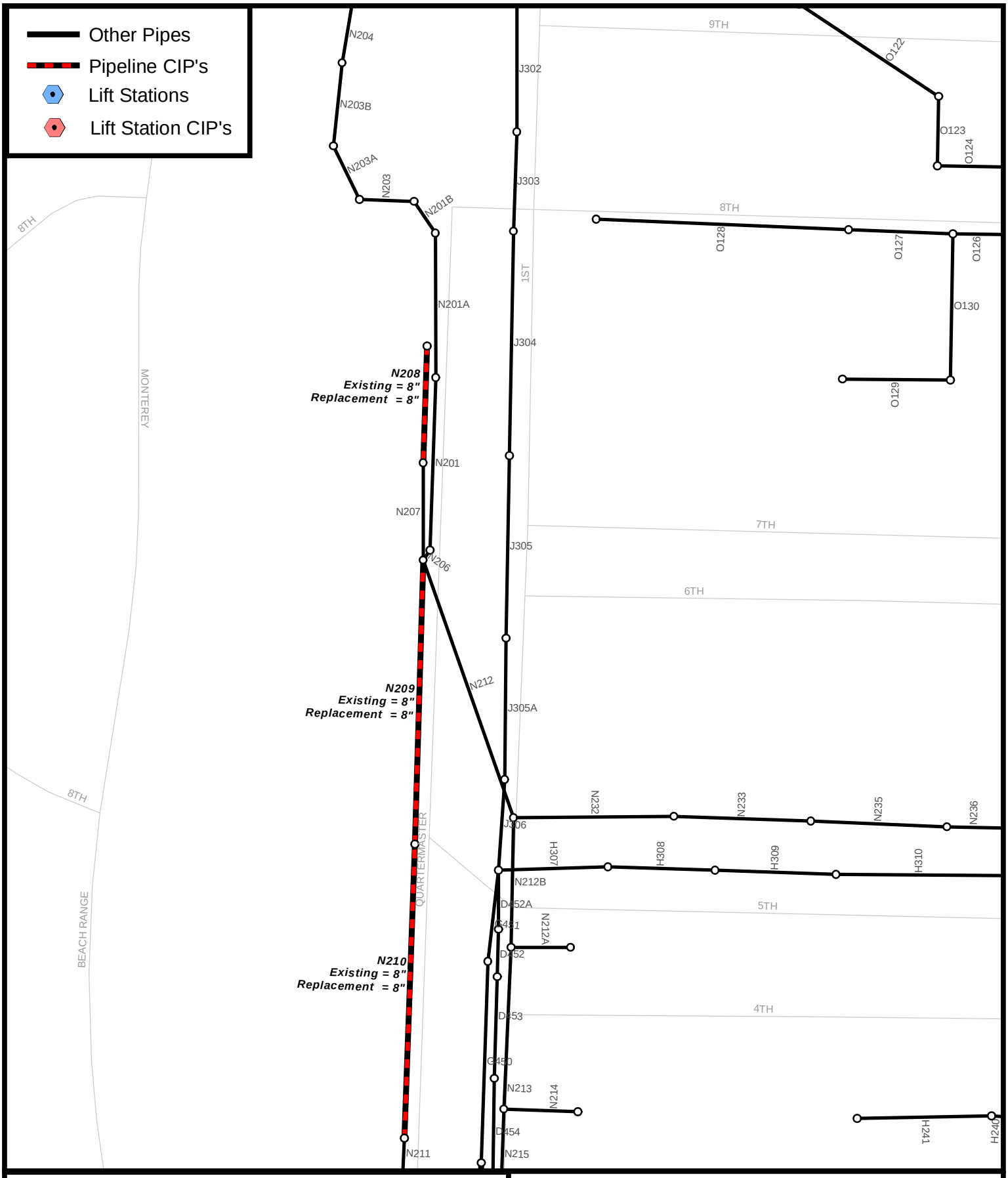
CIP #: 15 – 4th Street Pipeline Replacement Project II

Year Planned for Construction: 2005
Capacity Scenario: 2005 ADWF; 2005 PWWF

Upstream Flow Sources at Build-out: University Villages

Upstream Lift Stations: None

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 15: 4th St. Pipeline Replacement Project II

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CIP #: 16– Ardennes Circle Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005 ADWF; 2005 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from Fitch Park developments. Wastewater flow from Fitch Park require the gravity sewer pipelines to flow at 70-100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Project Priority: 3 (District guidelines regarding maximum allowable design parameter exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
E613	Ardennes Circle	E613	E612	426	0.67	6	8	$ 36	$ 15,300
TOTAL LENGTH				426					
								CONSTRUCTION COST	$ 15,300
								20% CONTINGENCY	$ 3,100
								25% MCWD Soft Costs [1]	$ 3,800
								TOTAL PROJECT	**$ 22,200**

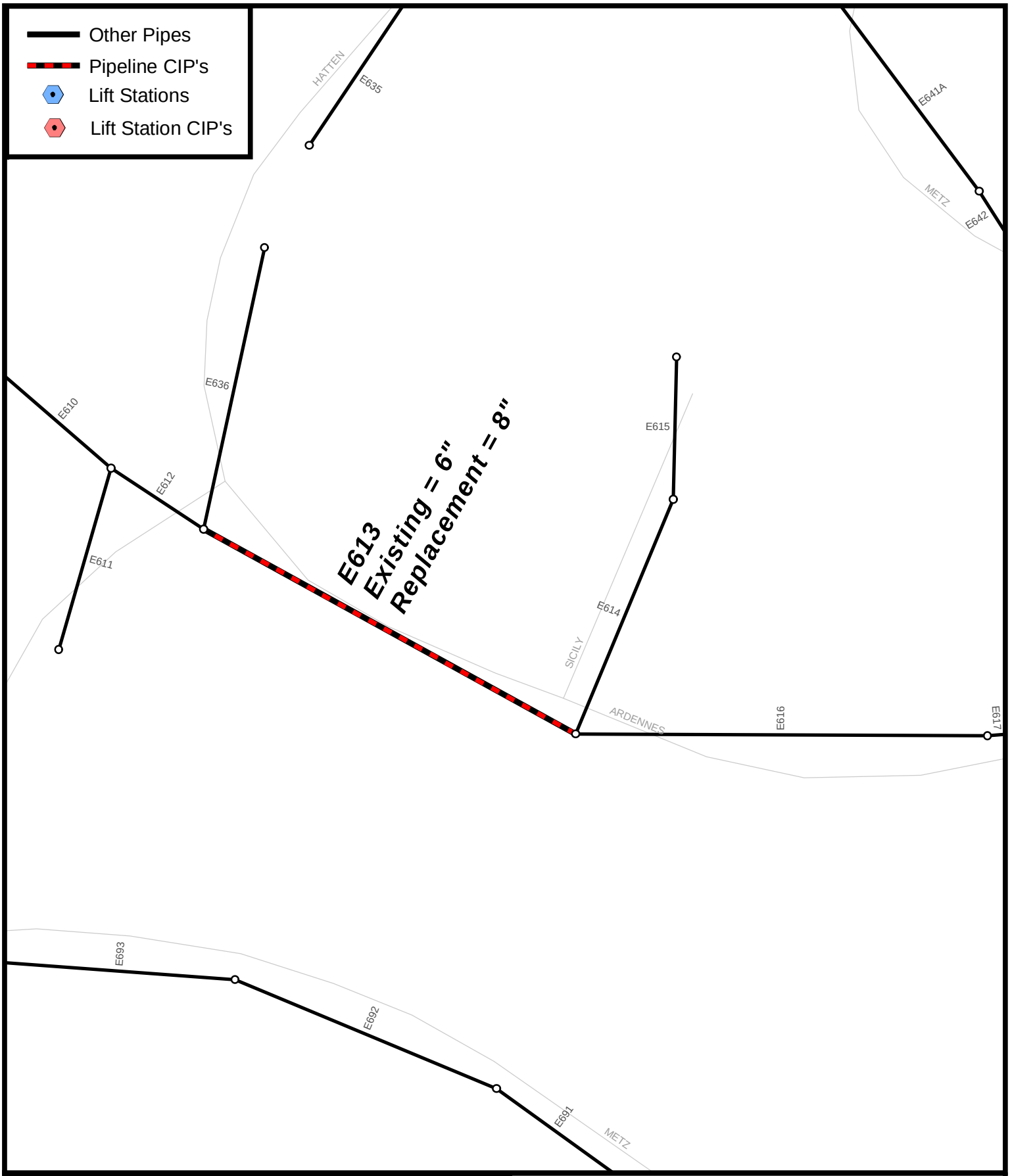
[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

Project Description:
Replace existing 6 -inch diameter gravity sewer pipeline with appropriate 8-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow.

Upstream Flow Sources at Build-out: Fitch Park

Upstream Lift Stations: None

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 16: Ardennes Ci. Pipeline Replacement Project

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CIP #: 17 –Metz Road Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005 ADWF; 2005 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from Fitch Park developments. Wastewater flow from Fitch Park require the gravity sewer pipelines to flow at 100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Project Priority: 2 (Maximum facility capacity exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
E633	Ardennes Circle and General Moore Road	E633	E607	348	1.00	6	8	$ 36	$ 12,500
E641	Metz Road	E641	E640	143	1.00	6	10	$ 41	$ 5,900
E640	Metz Road	E640	E633	224	1.00	6	8	$ 36	$ 8,100
TOTAL LENGTH				715					
								CONSTRUCTION COST	$ 26,500
								20% CONTINGENCY	$ 5,300
								25% MCWD Soft Costs [1]	$ 6,600
								TOTAL PROJECT	**$ 38,400**

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

Project Description:
Replace approximately 715 LF of existing 6-inch diameter gravity sewer pipeline with appropriate 8 and 10-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow. Pipeline segments are connecting pipeline segments that should be constructed as one project.

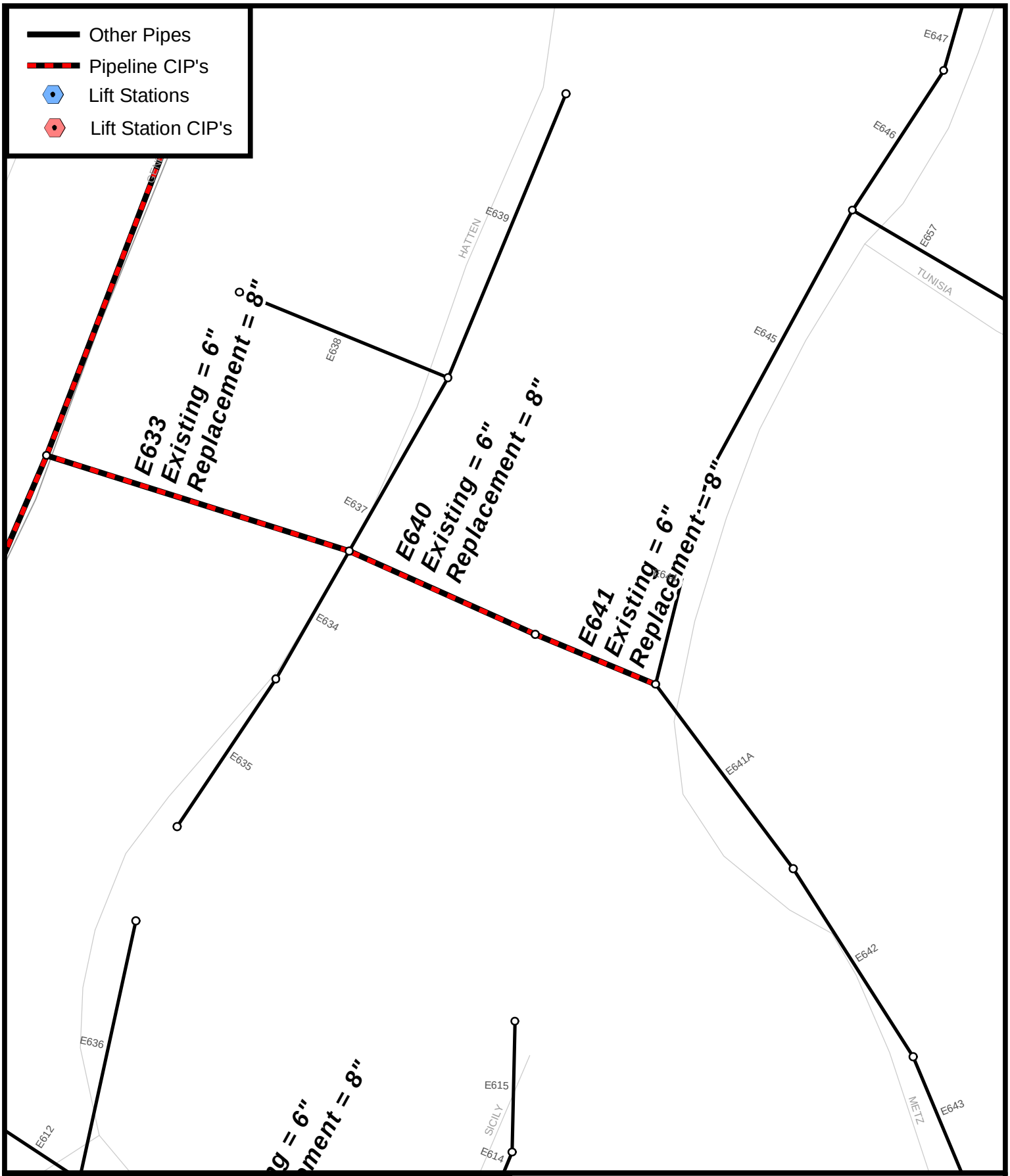
Upstream Flow Sources at Build-out: Fitch Park

Upstream Lift Stations: None

CIP #: 17 –Metz Road Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005 ADWF; 2005 PWWF

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 17: Metz Rd. Pipeline Replacement Project

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CIP #: 18 – Trenton Court Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005 ADWF; 2005 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from CSUMB developments. Wastewater flow from CSUMB Housing requires the gravity sewer pipelines to flow at 67% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Improvements to the existing capacity of the lift stations upstream of these pipelines are related to the recommendations included in this project. This project is not required until Schoonover Lift Station improvements are constructed.

Project Priority: 2 (Maximum facility capacity exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
K2Z	Parallel Trenton Court	K2Z	K1Z	360	1.00	10	15	$ 62	$ 22,300
K1Z	Parallel Trenton Court	K1Z	IMJIN_WW	315	0.67	10	12	$ 49	$ 15,400
TOTAL PROJECT				260					
								CONSTRUCTION COST	$ 37,700
								20% CONTINGENCY	$ 7,500
								25% MCWD Soft Costs [1]	$ 9,400
								TOTAL PROJECT	$ 54,600

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

Project Description:
Replace approximately 260 LF of existing 6-inch diameter gravity sewer pipeline with 8-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow.

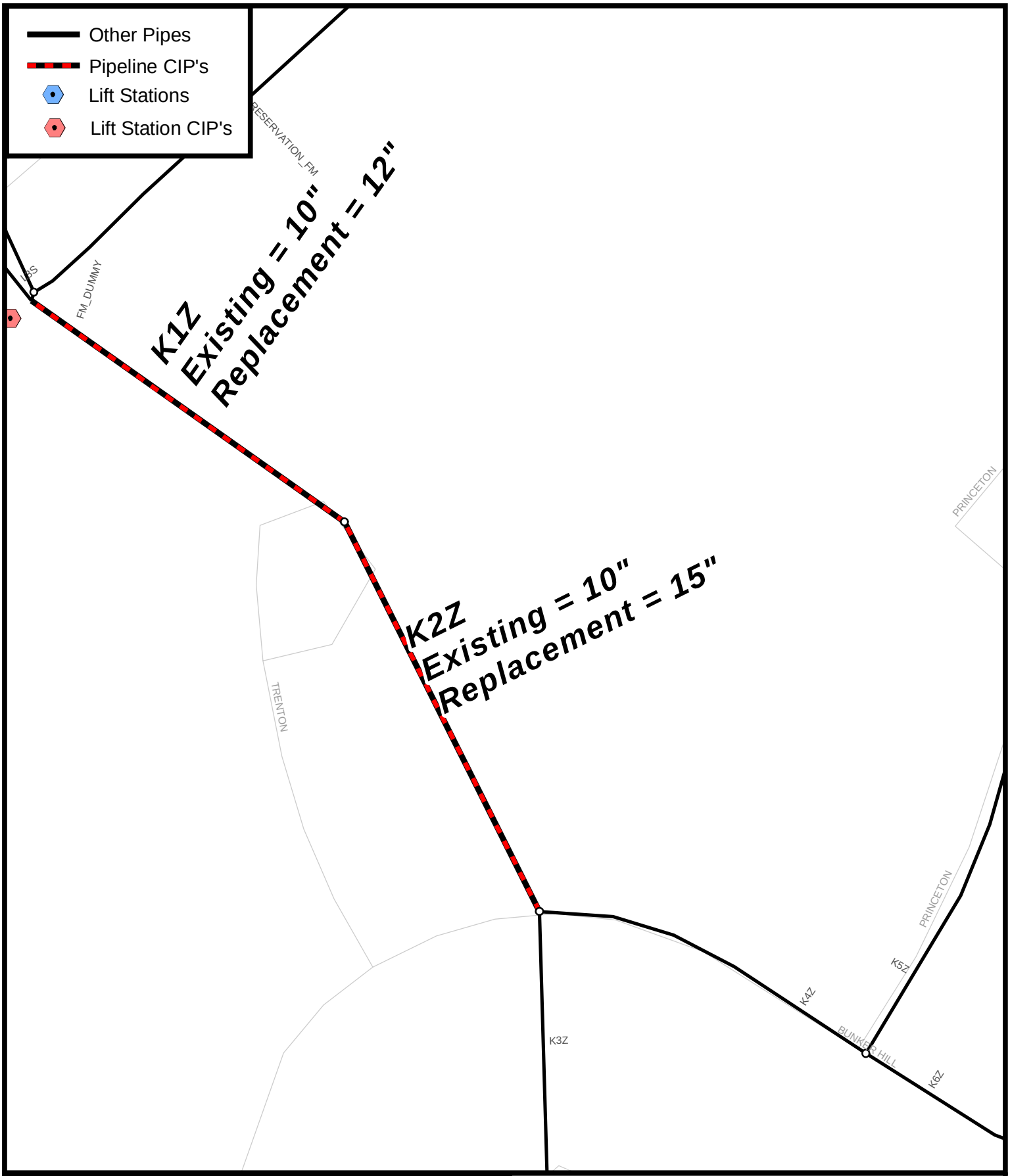
CIP #: 18 – Trenton Court Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005 ADWF; 2005 PWWF

Upstream Flow Sources at Build-out: CSUMB Housing

Upstream Lift Stations: None

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 18: Trenton Rd. Pipeline Replacement Project

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CIP #: 19 – Reservation Road Pipeline Replacement Project Year Planned for Construction: 2005

Capacity Scenario: 2005PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from East Garrison, UCMBEST, Marina Airport developments. Wastewater flow from East Garrison, UCMBEST, Marina Airport require the gravity sewer pipelines to flow at 70-100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Improvements to the existing capacity of the lift stations upstream of these pipelines are related to the recommendations included in this project. This project is not required until Schoonover Lift Station improvements are constructed.

Project Priority: 2 (Maximum facility capacity exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length Existing (ft)	d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
P31	Reservation Road	P31	P30	350	1.00	8	10	$ 41	$ 14,300
P30	Reservation Road	P30	P29	350	1.00	8	10	$ 41	$ 14,400
P29	Reservation Road	P29	P28	350	0.81	10	12	$ 49	$ 17,200
P28	Reservation Road	P28	P27	350	0.81	10	12	$ 49	$ 17,200
P27	Reservation Road	P27	P26	350	1.00	10	12	$ 49	$ 17,200
P26	Reservation Road	P26	P25	350	1.00	10	12	$ 49	$ 17,200
P25	Reservation Road	P25	P24	344	0.77	10	12	$ 49	$ 16,900
P23	Reservation Road	P23	P22	354	1.00	10	12	$ 49	$ 4,900
P22	Reservation Road	P22	P21	350	1.00	10	12	$ 49	$ 17,300
P21	Reservation Road	P21	P20	286	1.00	10	15	$ 62	$ 17,200
P20	Reservation Road	P20	P19	609	0.70	10	12	$ 49	$ 29,800
P19	Reservation Road	P19	P18	350	0.71	10	12	$ 49	$ 17,200
P18	Reservation Road	P18	P17	350	0.72	10	12	$ 49	$ 17,200
P17	Reservation Road	P17	P16	335	0.75	10	12	$ 49	$ 16,400
P1	Reservation Road	P1	Reservation WW	188	1.00	12	15	$ 62	$ 11,700
TOTAL LENGTH				5367					
CONSTRUCTION COST									$ 263,900
20% CONTINGENCY									$ 52,800

CIP #: 19 – Reservation Road Pipeline Replacement Project

Year Planned for Construction: 2005
Capacity Scenario: 2005PWWF

25% MCWD Soft Costs [1]	$ 65,975
TOTAL PROJECT	$ 382,700

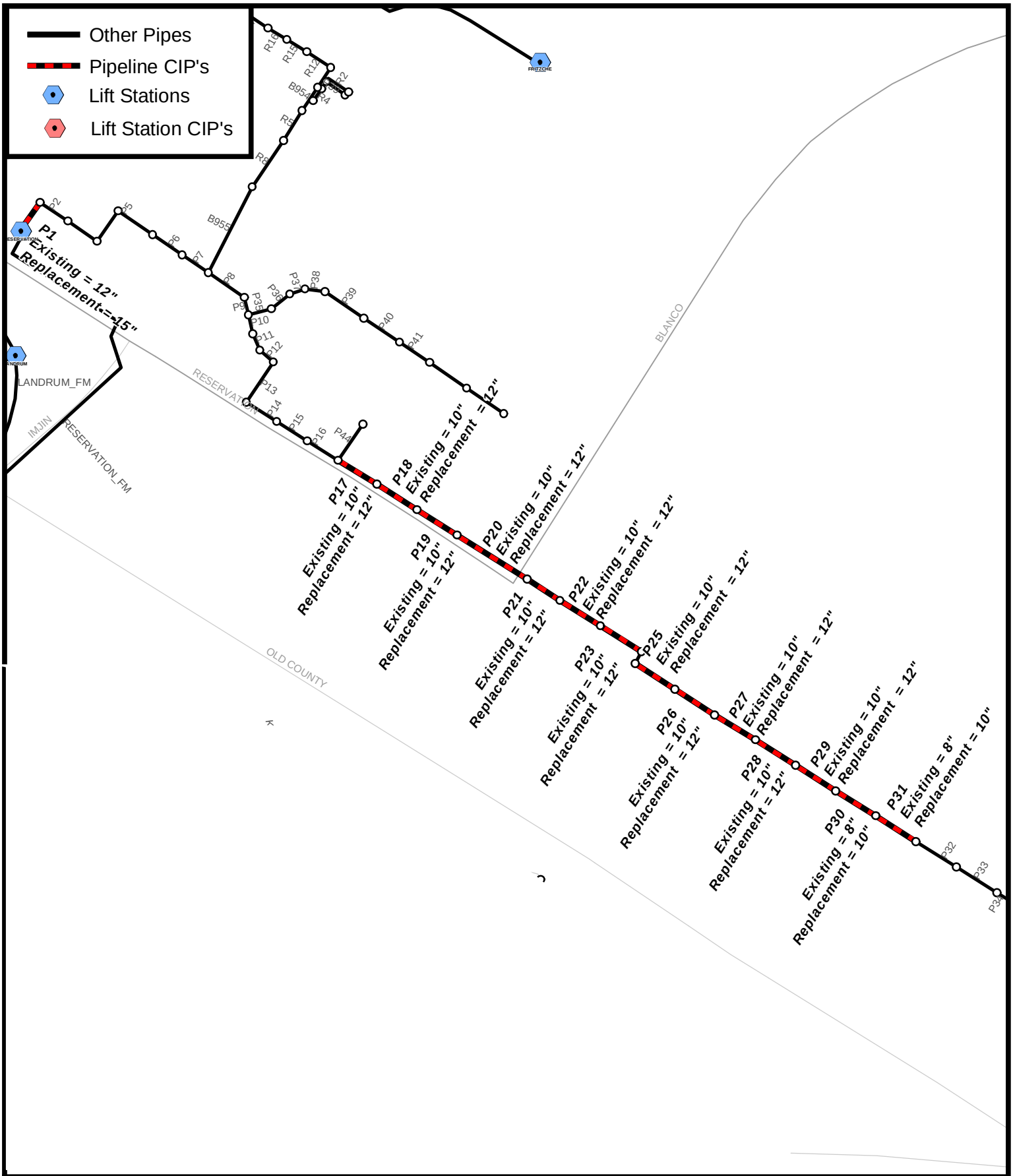
[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

Project Description:
Replace approximately 5,367 LF of existing 8, 10 and 12-inch diameter gravity sewer pipeline with 10, 12, and 15-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow. Pipeline segments are connecting pipeline segments that should be constructed as one project. Pipeline segment P24 has sufficient hydraulic capacity, however, this CIP could be revised if the replacement of pipeline segment P24 with an 12-inch diameter pipeline was considered to be included in the project for pipeline diameter consistency within a continuous pipeline run. Pipeline P24 has not been included in this opinion of probable cost.

Upstream Flow Sources at Build-out: East Garrison, UCMBEST, Marina Airport

Upstream Lift Stations: East Garrison Lift Station

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 19: Reservation Rd. Pipeline Replacement Project

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CIP #: 20 – Imjin Lift Station and Force Main Improvements

Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF, 2010 PWWF

Reason for Project: Existing lift station and force main have insufficient capacity to accommodate new wastewater flows from East Garrison, UCMBEST, Marina Airport, Existing Marina, CSUMB Housing. Force main velocities exceed allowable limits. Wastewater flow from those developments require the lift station to pump 2282 gpm, beyond the allowable flow capacity of the existing lift station.

Project Priority: Lift Station -- 2 (Maximum facility capacity exceeded); Force Main – 3 (District guidelines regarding maximum allowable design parameter exceeded)

Project Type: Lift Station and Force Main Upgrade Project

Engineering Opinion of Probable Cost:

Lift Station ID)	Capacity		Facility Cost
	Existing (gpm)	Year 2020 (gpm)	
IMJIN_LS	374.0	2282	$ 1,299,000
CONSTRUCTION COST			$ 1,299,000
20 % CONTINGENCY			$ 259,800
25% MCWD Soft Costs [1]			$ 325,000
TOTAL LIFT STATION PROJECT COST			$ 1,883,800

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

CIP #: 20 – Imjin Lift Station and Force Main Improvements

Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF, 2010 PWWF

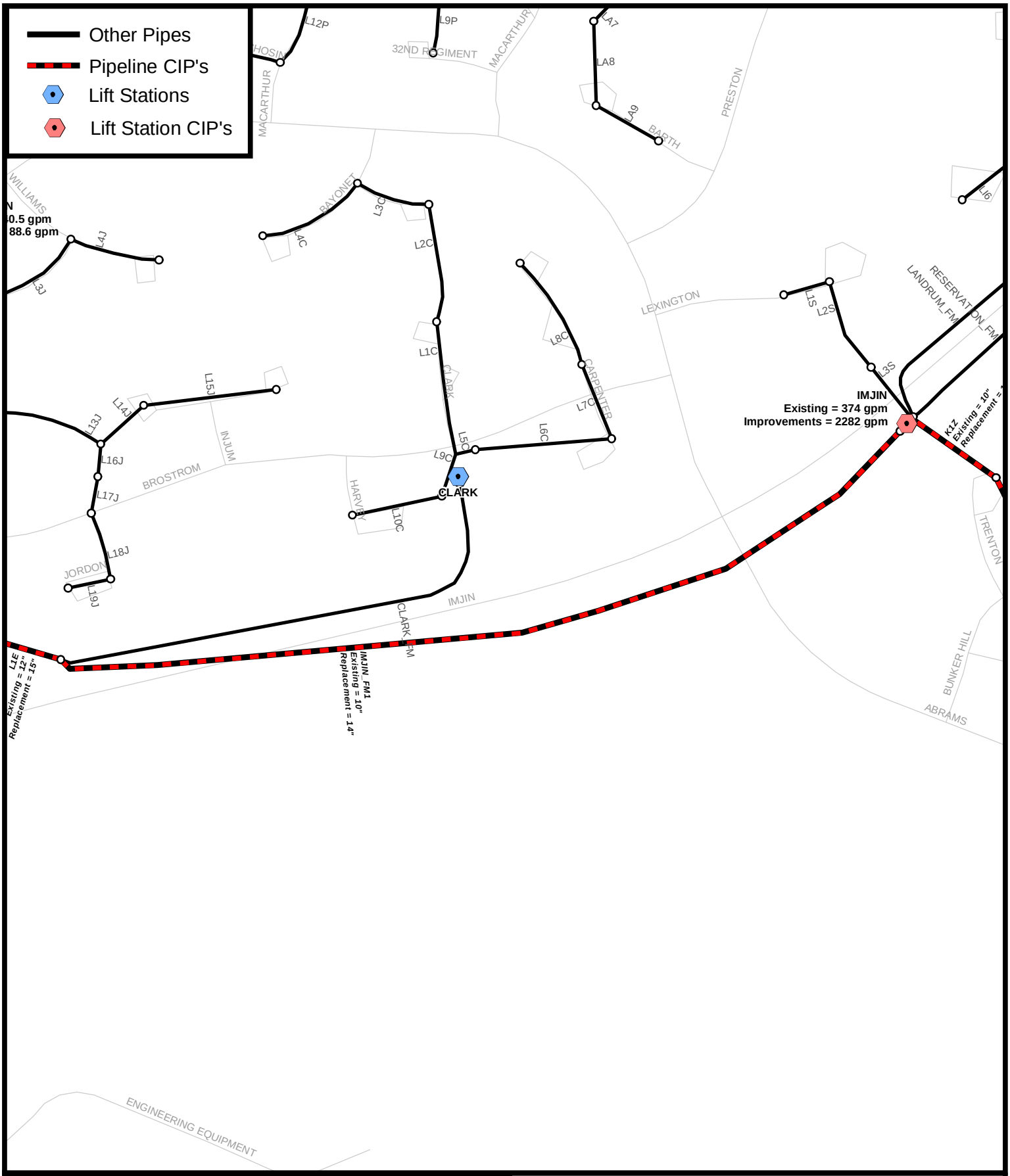
Force Main ID	Length (ft)	Capacity Scenario	Pipe Diameter Existing (in)	Pipe Diameter Replacement (in)	Unit Cost ($/LF)	Facility Cost ($)
IMJIN_FM1	2,786	2005 PWWF	10	14	$62.00	$ 172,800
					CONSTRUCTION COST	$ 172,800
					20 % CONTINGENCY	$ 34,600
					25% MCWD Soft Costs [1]	$ 43,200
					TOTAL FORCE MAIN PROJECT COST	$ 250,600
[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.						

Project Description:
Lift station requires additional pumping capacity. Project includes 2 pumps, appurtenances, and wet well.
The force main required additional flow capacity. Replace the existing 10-inch diameter force main with approximately 2,786 LF of new 14-inch force main.

Upstream Flow Sources at Build-out: East Garrison, UCMBEST, Marina Airport, Existing Marina, CSUMB Housing

Upstream Lift Stations: East Garrison, Neeson, Reservation Road, Landrum, Wittemeyer

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red. .



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CIP 20: Imjin Lift Station & Force Main Improvements

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CIP #: 21 – Jefferson Lift Station Improvements Year Planned for Construction: 2005

Capacity Scenario: 2005 PWWF

Reason for Project: Existing lift station and force main have insufficient capacity to accommodate new wastewater flows from Marina Heights. Wastewater flow from those developments require the lift station to pump 88.6 gpm, beyond the allowable flow capacity of the existing lift station

This project is contingent upon the in-tract developments of the Marina Heights developer.

Project Priority: 2 (Maximum facility capacity exceeded)

Project Type: Lift Station Upgrade Project

Engineering Opinion of Probable Cost:

Lift Station ID)	Capacity Existing (gpm)	Capacity Year 2020 (gpm)	Facility Cost
JEFFERSON_LS	40.5	88.6	$ 193,000
CONSTRUCTION COST			$ 193,000
20 % CONTINGENCY			$ 38,600
25% MCWD Soft Costs [1]			$ 48,000
TOTAL LIFT STATION PROJECT COST			$ 279,600

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

Project Description:

Lift station requires additional pumping capacity. Project includes 2 pumps, appurtenances, and wet well.

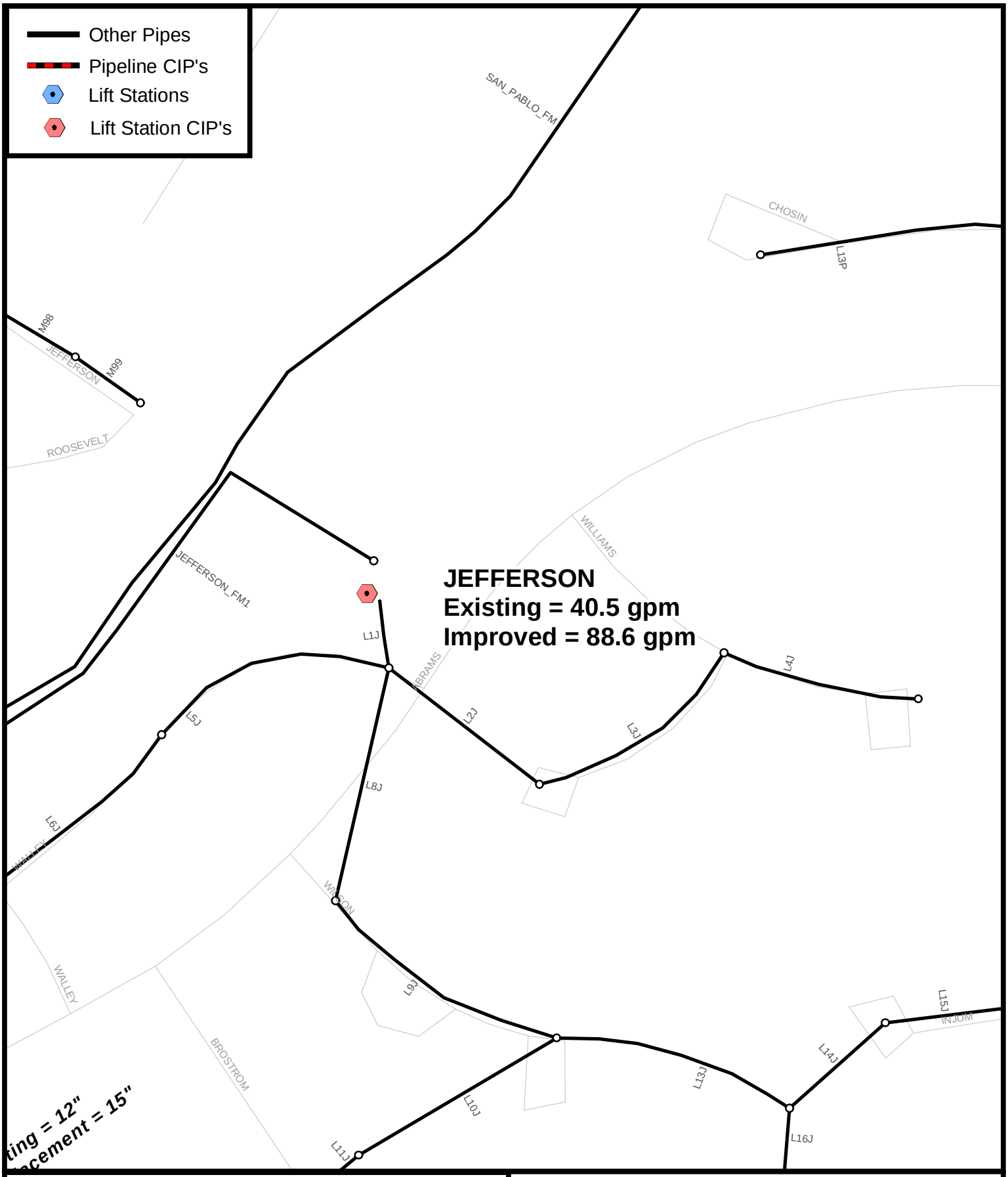
CIP #: 21 – Jefferson Lift Station Improvements

Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF

Upstream Flow Sources at Build-out: Marina Heights

Upstream Lift Stations: None

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 21: Jefferson Lift Station Improvements

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CIP #:22 – Neeson Lift Station Improvements

Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF

Reason for Project: Existing lift station capacity is oversized for the required flows from the Marina Airport area. Wastewater flow from those developments require the lift station to pump only 40 gpm, well below allowable flow capacity of the existing lift station. An oversized lift station would require the flows to remain in the wet well for a significant time period, allowing odors and hydrogen sulfide accumulation.

This project is contingent upon planned FORA roadway improvements at Neeson Road. Those roadway improvements are planned for 2006. The roadway improvements would include re-grading of the roadway, removal of the lift station and redirecting wastewater flows by gravity to the Reservation Road Lift Station.

Project Priority: 4 (Operational Improvement)

Project Type: Lift Station Upgrade Project

Engineering Opinion of Probable Cost:

	Capacity		
Lift Station ID)	Existing (gpm)	Year 2020 (gpm)	Facility Cost
NEESON_LS	400.0	40.0	$ 193,000
CONSTRUCTION COST			$ 193,000
20 % CONTINGENCY			$ 38,600
25% MCWD Soft Costs [1]			$ 48,000
TOTAL LIFT STATION PROJECT COST			$ 279,600

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

CIP #:22 – Neeson Lift Station Improvements

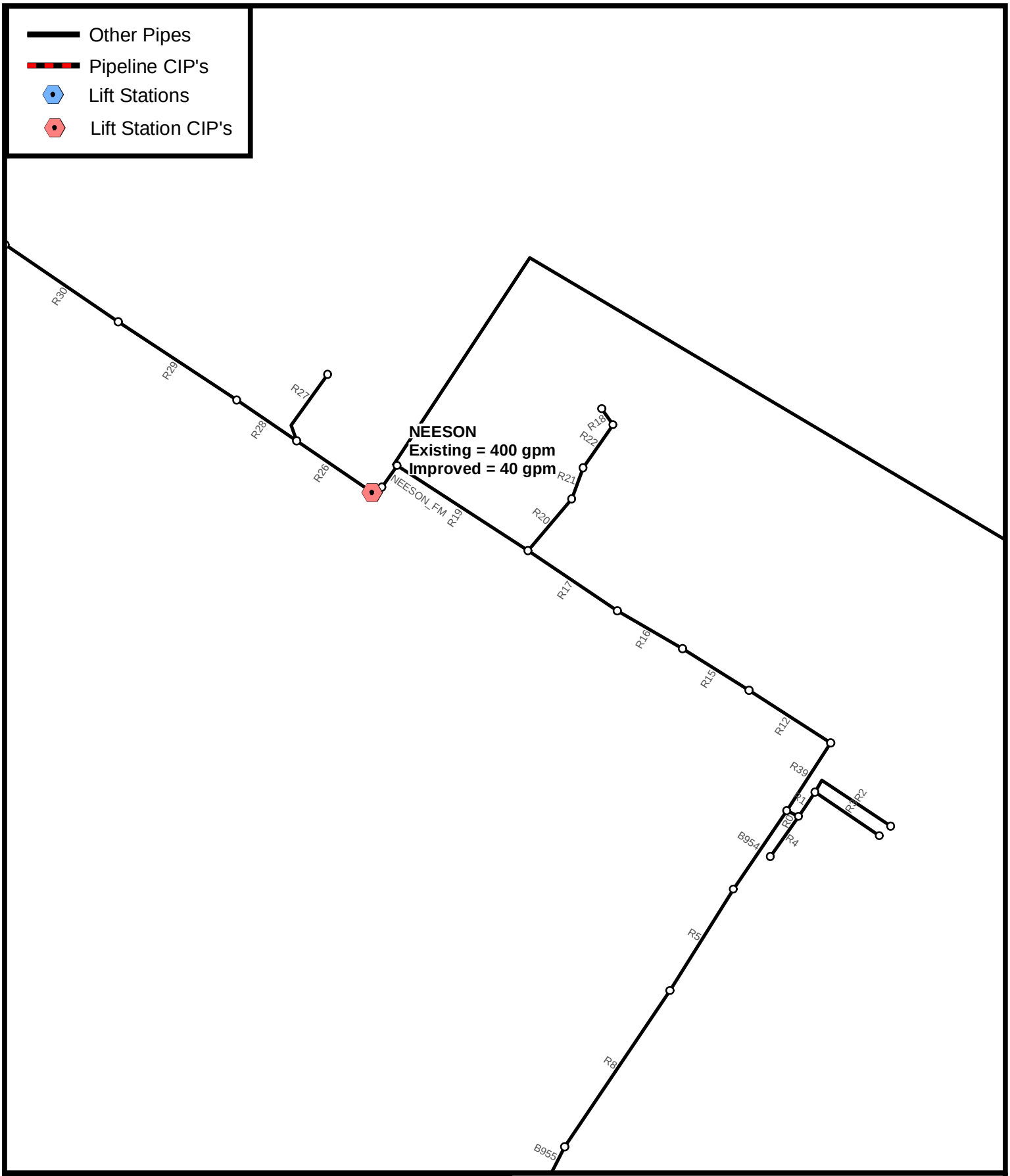
Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF

Project Description:
Removal of existing pumps. Installation of new pumps and reduced pumping capacity. The reduction in pump capacity eliminates the need for downstream gravity pipeline up-sizing.

Upstream Flow Sources at Build-out: Marina Airport

Upstream Lift Stations: None

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 22: Neeson Lift Station Improvements

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CIP #23 – Giggling Lift Station and Force Main Improvements

Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF

Reason for Project: Existing lift station and force main have insufficient capacity to accommodate new wastewater flows from Hayes Housing, Seaside Resort, Hayes Elementary, and Lower Stillwell Park. Wastewater flow from those developments require the lift station to pump 1040 gpm, beyond the allowable flow capacity of the existing lift station. Force main flows at velocities exceeding allowable limits. Existing areas also contributing wastewater flow to this lift station include Seaside Highlands, Fitch Middle School, Sunbay Apartment, and Bostrom Park.

Project Priority: Lift Station -- 2 (Maximum facility capacity exceeded); Force Main – 3 (District guidelines regarding maximum allowable design parameter exceeded)

Project Type: Lift Station and Force Main Upgrade Project

Engineering Opinion of Probable Cost:

Lift Station ID	Capacity		Facility Cost
	Existing (gpm)	Year 2020 (gpm)	
GIGGLING_LS	623.0	1042.5	$ 902,000
CONSTRUCTION COST			$ 902,000
20 % CONTINGENCY			$ 180,400
25% MCWD Soft Costs [1]			$ 226,000
TOTAL LIFT STATION PROJECT COST			$ 1,308,400

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

CIP #23 – Giggling Lift Station and Force Main Improvements

Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF

Force Main ID	Length (ft)	Capacity Scenario	Pipe Diameter		Unit Cost ($/LF)	Facility Cost ($)
			Existing (in)	Replacement (in)		
GIGGLING_FM	3,728	2005 PWWF	8	10	$ 30.00	$ 112,000
					CONSTRUCTION COST	$ 112,000
					20 % CONTINGENCY	$ 22,000
					25% MCWD Soft Costs [1]	$ 28,000
					TOTAL FORCE MAIN PROJECT COST	$ 162,000

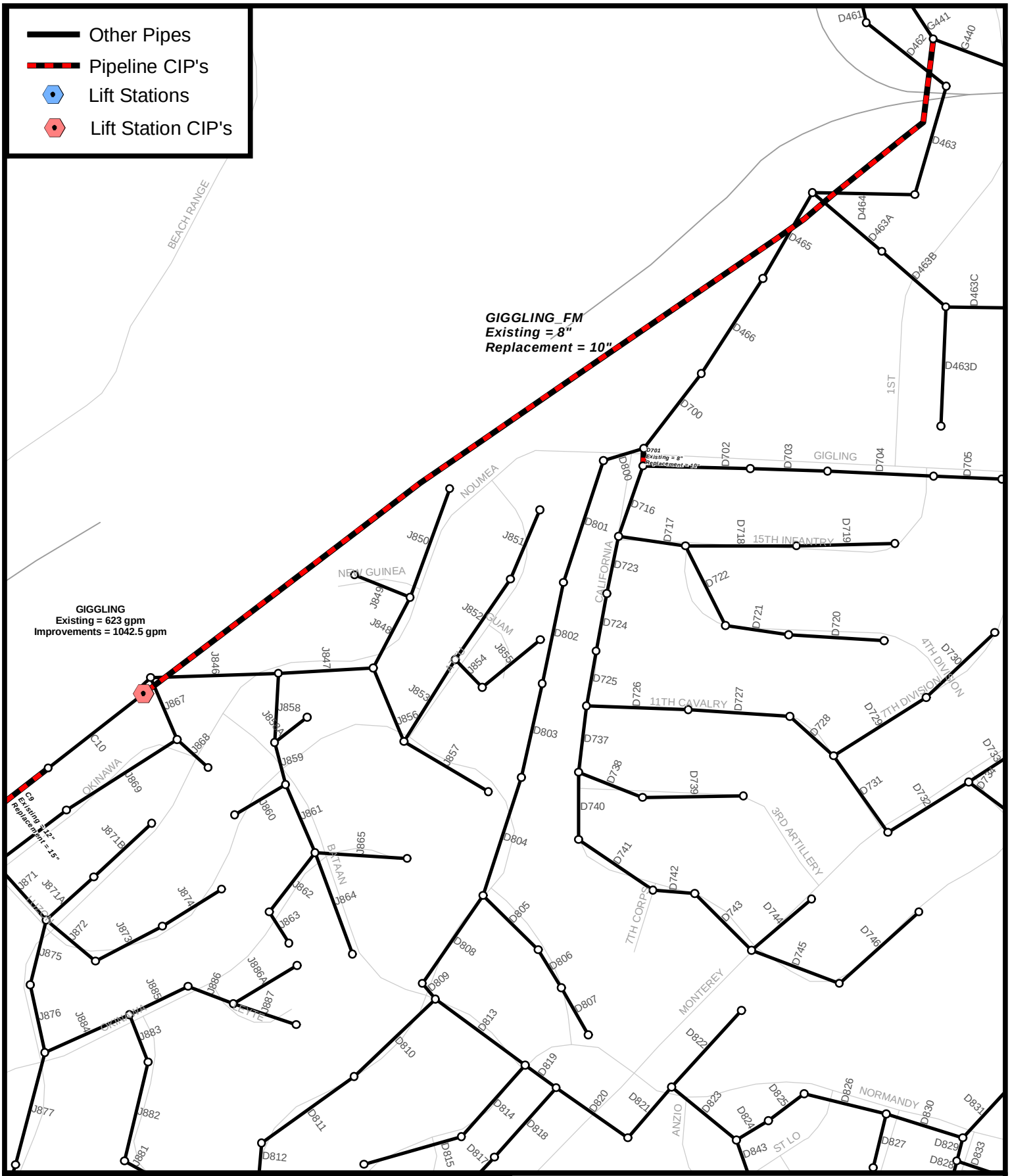
[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

Project Description:
Lift station requires additional pumping capacity. Project includes 2 pumps, appurtenances, and wet well. The force main required additional flow capacity. Replace the existing 8-inch diameter force main with approximately 3,728 LF of new 10-inch force main.

Upstream Flow Sources at Build-out*:* Seaside Highlands, Hayes Housing, Seaside Resort, Fitch Middle School, Sunbay Apartments; Bostrom Park, Hayes Elementary, Lower Stillwell Park

Upstream Lift Stations: Ord Village Lift Station

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 23: Giggling Lift Station & Force Main Improvements

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CIP #:24 – East Garrison Lift Station and Force Main Improvements Year Planned for Construction: 2005
Capacity Scenario: 2005 PWWF

Reason for Project: Existing lift station and force main have insufficient capacity to accommodate new wastewater flows from the East Garrison development. Wastewater flow from East Garrison requires the lift station to pump 565 gpm, beyond the allowable flow capacity of the existing lift station. The force main velocities are beyond allowable District guidelines.

Project Priority: Lift Station -- 2 (Maximum facility capacity exceeded); Force Main – 3 (District guidelines regarding maximum allowable design parameter exceeded)

Project Type: Lift Station and Force Main Improvements

Engineering Opinion of Probable Cost:

	Flow		
Lift Station ID)	Existing (gpm)	Year 2020 (gpm)	Facility Cost [1]
GARRISON_LS	300	565.0	$ 552,000.00
		CONSTRUCTION COST	$ 552,000
		20% CONTINGENCY	$ 110,000
		25% MCWD Soft Costs [1]	$ 138,000
		TOTAL PROJECT	$ 800,000
[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.			

CIP #:24 – East Garrison Lift Station and Force Main Improvements Year Planned for Construction: 2005

Capacity Scenario: 2005 PWWF

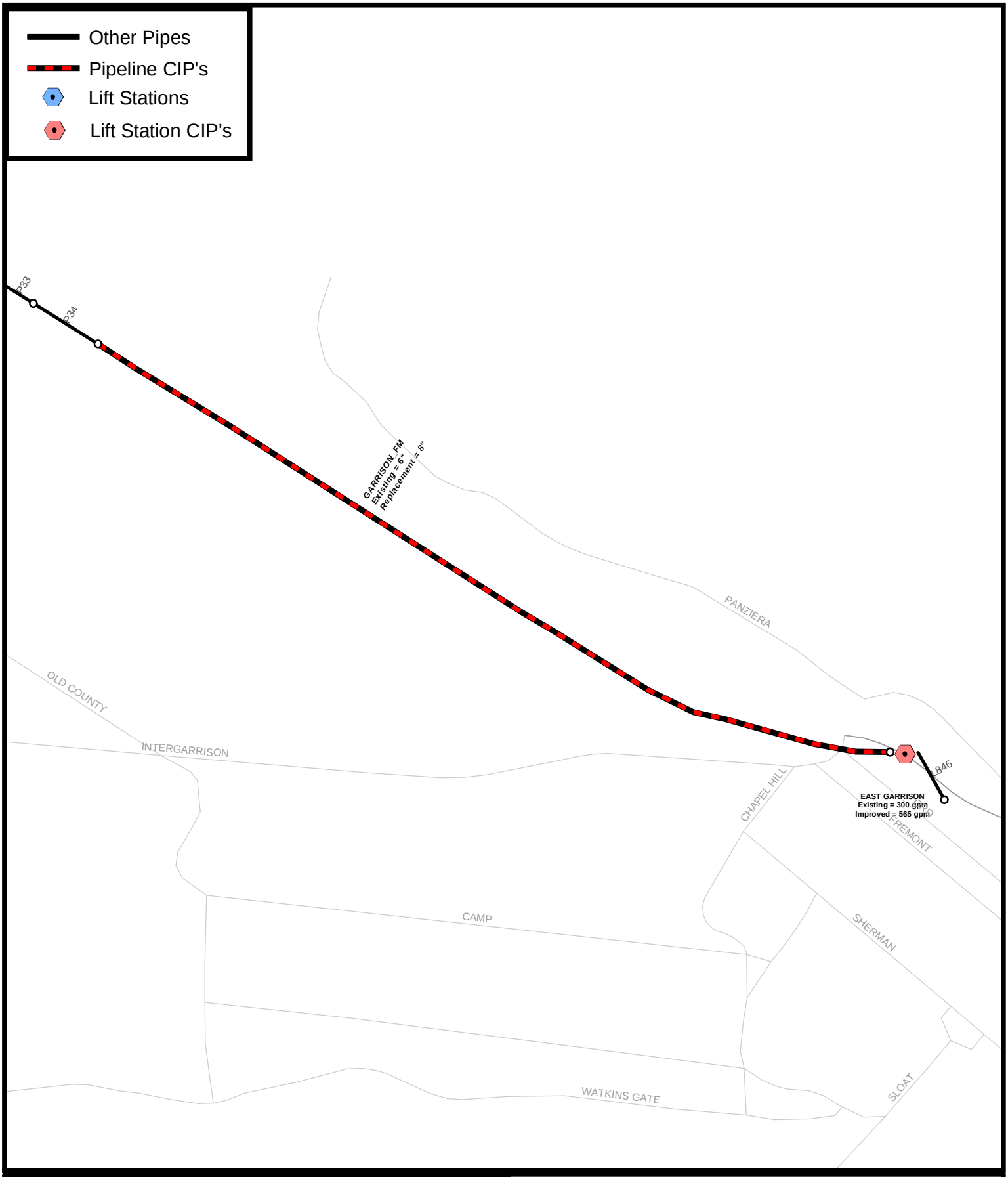
Force Main ID	Length (ft)	Capacity Scenario	Pipe Diameter		Unit Cost ($/LF)	Facility Cost ($)
			Existing (in)	Replacement (in)		
GARRISON_FM	4,116	2005 PWWF	6	8	$ 24.00	$ 99,000
					CONSTRUCTION COST	$ 99,000
					CONTINGENCY	$ 20,000
					SOFT COST	$ 25,000
					TOTAL 2005 CIP LIFT STATION PROJECT COST	$ 144,000
[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.						

Project Description:
Lift station requires additional pumping capacity. Project includes 2 pumps, appurtenances, and wet well.
Lift station capacity improvements should be constructed concert with recommendations for condition assessment improvements are described in Section 9, and in CIP #22 of the 2005 Capital Improvement Projects.
Replace the existing 6-inch diameter force main with approximately 4,116 LF of new 8-inch force main.

Upstream Flow Sources at Build-out: East Garrison

Upstream Lift Stations: None

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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ORD COMMUNITY WASTEWATER MASTER PLAN

CIP 24: East Garrison Lift Station & Force Main Improvements

H:Pdata/35100326/GIS/Exhibits/CIPGrid BWH 4/5/05

CIP #:25 – Schoonover Lift Station and Force Main Improvements Year Planned for Construction: 2005

Capacity Scenario: 2005 PWWF

Reason for Project: The existing lift station has insufficient capacity for new wastewater flows from CSUMB Housing expected to occur in years 2010 and 2015. The existing force main from Schoonover Lift Station combines with the Imjin Lift Station force main, resulting in capacity limitations when both lift station are running. The hydraulic restriction from the combined force main has resulted in backups and overflows upstream of the Schoonover Lift station. This project is recommended for inclusion in the 2005 CIP program to remain in concert with on-going District projects for the improvement of the lift station and re-alignment of the force main.

Project Priority: Lift Station -- 2 (Maximum facility capacity exceeded); Force Main – 3 (District guidelines regarding maximum allowable design parameter exceeded)

Project Type: Lift Station and Force Main Replacement Project

Engineering Opinion of Probable Cost:

	Flow		
Lift Station ID	Existing (gpm)	Year 2020 (gpm)	Facility Cost [1]
Schoonover_LS	240.0	555.0	$ 552,000.00
		CONSTRUCTION COST	$ 552,000
		CONTINGENCY	$ 110,000
		SOFT COST	$ 138,000
		TOTAL LIFT STATION PROJECT COST	$ 800,000

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

CIP #:25 – Schoonover Lift Station and Force Main Improvements Year Planned for Construction: 2005

Capacity Scenario: 2005 PWWF

Force Main ID	Length (ft)	Capacity Scenario	Pipe Diameter		Unit Cost ($/LF)	Facility Cost ($)
			Existing (in)	Replacement (in)		
Schoonover_FM	1380	2005 PWWF	6	8	$ 24.00	$ 33,000
					CONSTRUCTION COST	$ 33,000
					CONTINGENCY	$ 7,000
					SOFT COST	$ 8,000
					TOTAL 2005 CIP LIFT STATION PROJECT COST	$ 48,000
[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.						

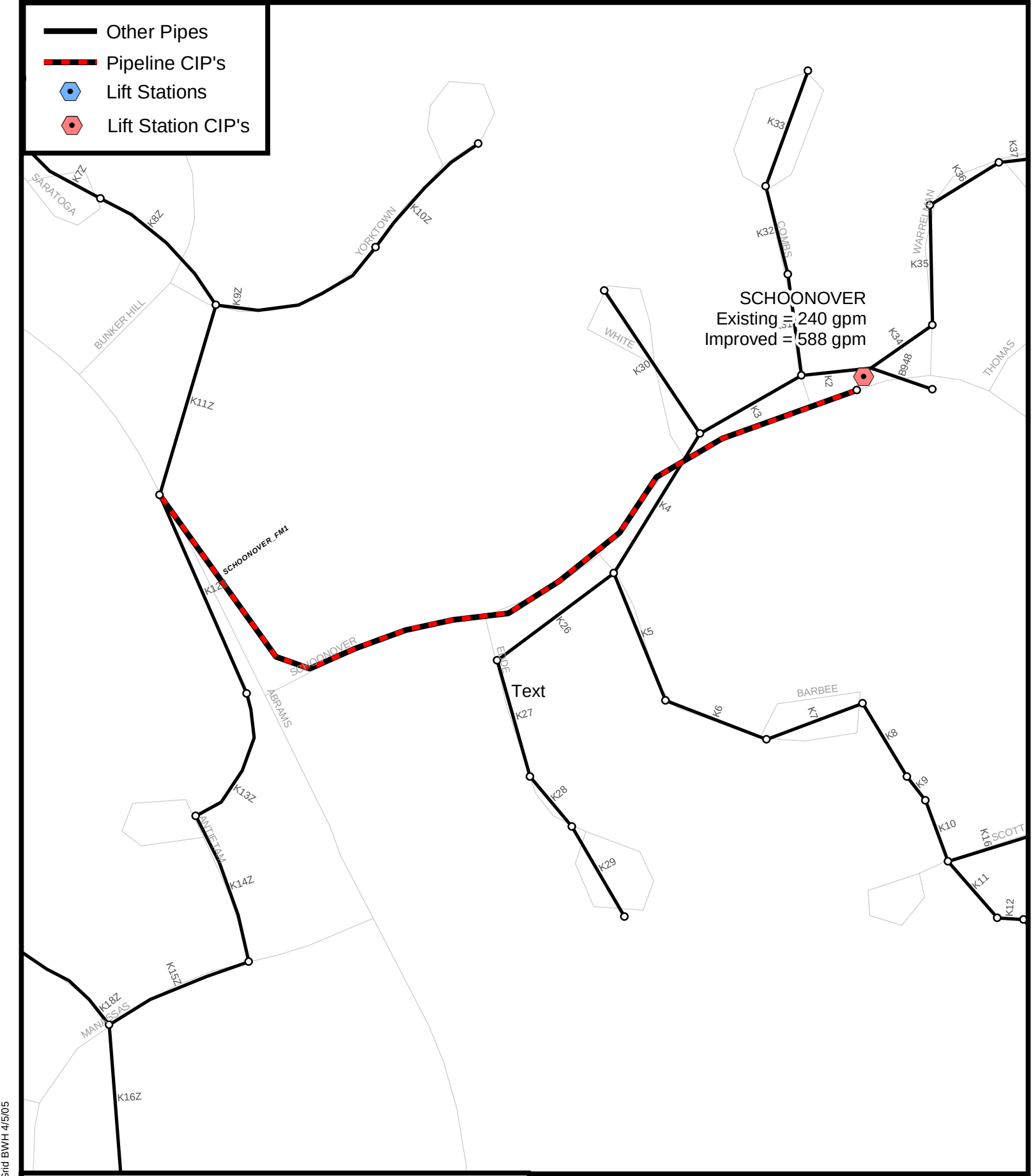
Project Description:
Lift station requires additional pumping capacity. Project includes 2 pumps, appurtenances, and wet well.
Lift station capacity improvements should be constructed concert with recommendations for condition assessment improvements are described in Section 9, and in CIP #26 of the 2005 Capital Improvement Projects.

This project would eliminate the connection between the Schoonover Force Main and the Imjin Force Main. This project includes connection of the existing force main to an existing manhole located in Schoonover Road. The remaining portion of the existing force main will be abandoned. The recommended alignment of this project was by direction of the District and is further analyzed in the Technical Memorandum Lift Station Improvements April 2005.

Upstream Flow Sources at Build-out: CSUMB Housing

Upstream Lift Stations: None

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 25: Schooner Lift Station & Force Main Improvements

H:Pdata/35100326/GIS/Exhibits/CIPGrid BWH 4/5/05

CIP #:26 – Miscellaneous Lift Station Improvements Year Planned for Construction: 2005

Reason for Project: General maintenance on the lift stations will increase the remaining life of the existing lift stations. Improvements will provide adequate health and safety measures.

Project Priority: 4 (Operational Improvements)

Project Type: Lift Station Condition Assessment Improvements

Engineering Opinion of Probable Cost:

LIFT STATION	IMPROVEMENTS	COST
Booker	Install anti-fall device, repair corrosion	$ 10,000
Clark	Replace pumps and motors; Replace generator and fuel tank with contained units; Replace domestic water supply to meet Title 22 requirements; Test pit for corrosion attack.	$ 700,000
DEH	Decommission and Remove	$ 10,000
East Garrison	Install telemetry antenna; install generator; repair corrosion	$ 60,000
Giggling	Clean pump pit floor; repair corrosion; Clean control room	$ 10,000
Hatten	Replace with new facility; Install fencing; Upgrade domestic water supply to meet Title 22 requirements	$ 30,000
Hodges	Pave access road; Added security lighting; Increase fence height and add security wire; replace generator enclosure; Upgrade domestic water supply to meet Title 22 requirements	$ 50,000
Jefferson	Replace generator and fuel tank with contained units; Upgrade domestic water supply to meet Title 22 requirements; Test pit for corrosion attack	$ 70,000
Neeson	Upgrade domestic water supply to meet Title 22 requirements; Upgrade controls; Add security lighting; Recoat metallic surfaces; clear vegetation and pave site; Padlock electrical disconnect	$ 25,000
Reservation Road	Repair security lights; Repair wet well coatings; Clean piping and repaint;	$ 3,000
TAC	Decommission and Remove	$ 10,000
Wittemeyer	Pave access road; Added security lighting; Increase fence height and add security wire; replace generator enclosure; Upgrade domestic water supply to meet Title 22 requirements	$ 25,000
	CONSTRUCTION COST	$ 1,003,000
	20 % CONTINGENCY	$ 200,600

CIP #:26 – Miscellaneous Lift Station Improvements Year Planned for Construction: 2005

25% MCWD Soft Costs [1]	$	250,750
TOTAL LIFT STATION IMPROVEMENT COST	$	1,454,350
[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.		

Project Description:
Improvements to each lift station are further described in Section 9 of this report.

The following lift stations are also considered for capital improvements due to capacity issues:

- Hodges
- Imijin
- Jefferson
- Neeson
- Giggling
- East Garrison
- Schoonover

Projects described in CIP #20-25, should be completed in concert with those improvements described within Section 9.

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.

CIP #: 27– General Jim Moore Pipeline Replacement Project I

Year Planned for Construction: 2020
Capacity Scenario: 2020 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from First Tee, Fitch Park, and Seaside East developments. Wastewater flow from those developments require the gravity sewer pipelines to flow at 79-100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Project Priority: 2 (Maximum Facility Capacity Exceeded)

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length (ft)	d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
E680	General Jim Moore Blvd	E680	E679	211	1.00	8	15	$ 62	$ 13,100
E679	General Jim Moore Blvd	E679	E678	475	1.00	8	12	$ 49	$ 23,300
E678	General Jim Moore Blvd	E678	E677	233	1.00	8	15	$ 62	$ 14,400
E677	General Jim Moore Blvd	E677	E609	90	1.00	8	15	$ 62	$ 5,600
E609	General Jim Moore Blvd	E609	E608	290	1.00	8	15	$ 62	$ 18,000
E608	General Jim Moore Blvd	E608	E607	341	1.00	10	15	$ 62	$ 21,100
E607	General Jim Moore Blvd	E607	E606	421	1.00	10	15	$ 62	$ 26,100
E606	General Jim Moore Blvd	E606	E605	402	1.00	10	15	$ 62	$ 24,900
E605	General Jim Moore Blvd	E605	E601	387	1.00	10	15	$ 62	$ 24,000
E601	General Jim Moore Blvd	E601	E600	373	0.79	10	12	$ 49	$ 18,300
E600	General Jim Moore Blvd	E600	E567	458	0.81	10	12	$ 49	$ 22,400
TOTAL LENGTH				3681					
								CONSTRUCTION COST	$ 211,200
								20% CONTINGENCY	$ 42,200
								25% MCWD Soft Costs [1]	$ 52,800
								TOTAL PROJECT	$ 306,200

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

CIP #: 27– General Jim Moore Pipeline Replacement Project I

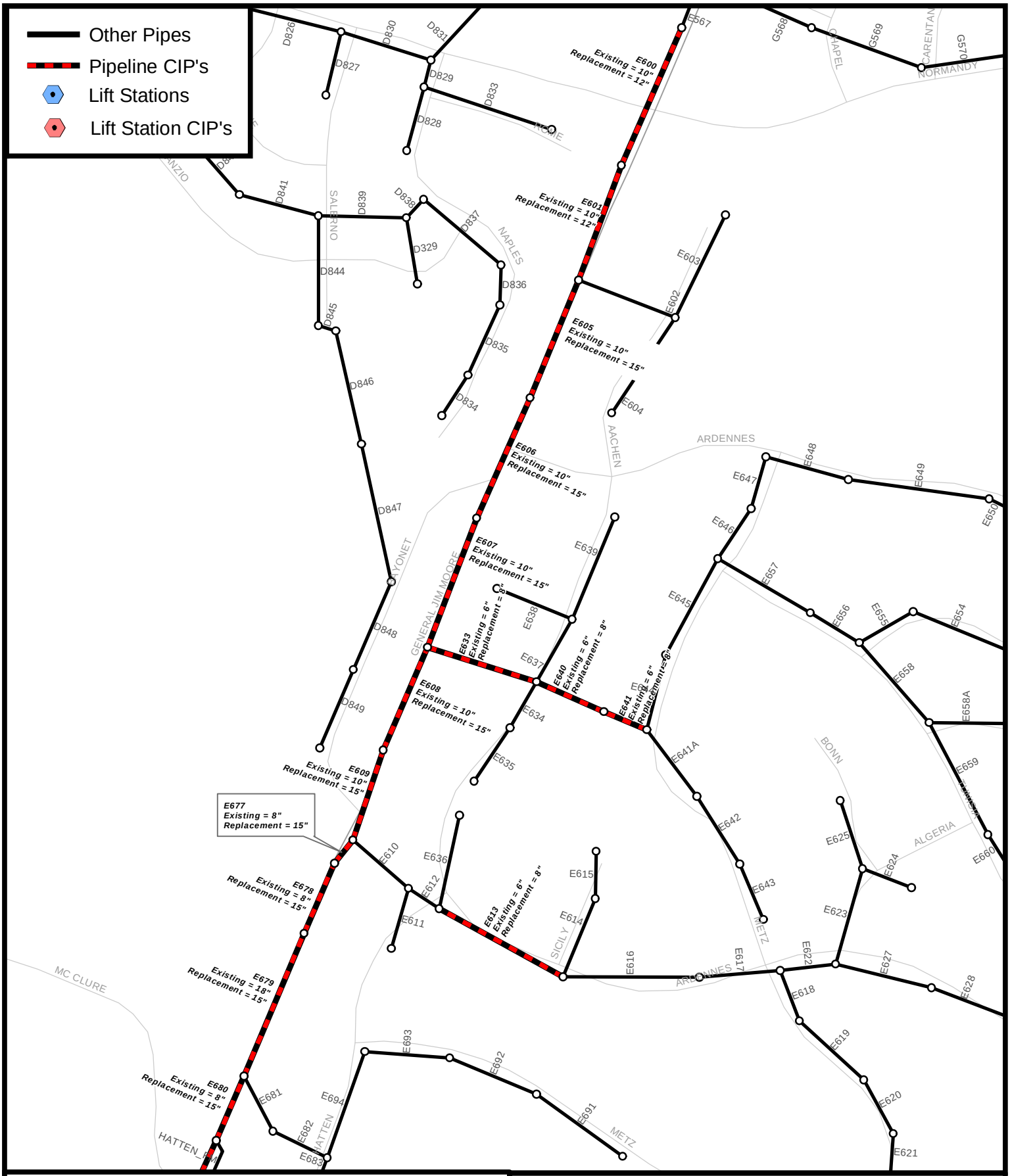
Year Planned for Construction: 2020
Capacity Scenario: 2020 PWWF

Project Description:
Replace approximately 3,681 LF of existing 8 and 10-inch diameter gravity sewer pipeline with appropriate 10 and 12-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow. Pipeline segments are connecting pipeline segments that should be constructed as one project.

Upstream Flow Sources at Build-out: First Tee, Fitch Park, Seaside East

Upstream Lift Stations: Hatten

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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ORD COMMUNITY WASTEWATER MASTER PLAN

CIP 27: Gen. Jim Moore Pipeline Replacement Project I

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CIP #: 28 1st Avenue Pipeline Replacement Project Year Planned for Construction: 2020
Capacity Scenario: 2020 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from Hayes Park, Bostrom Park, Seaside Resort, Fitch Middle School, Sunbay Apartments, Seaside Highlands, Lower Stillwell Park, Hayes Elementary, Chartwell School, Navy Housing, Surplus Area II, Southside of Lightfighter, Monterey College of Law, Marshall Park, Fitch Park, Marshall Elementary School, First Tee, Seaside East_ developments. Wastewater flow from those developments require the gravity sewer pipelines to flow at 54-100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Improvements to the existing capacity of the Giggling Lift Station upstream of these pipelines are related to the recommendations included in this project.

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length (feet)	d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
G442	1st Avenue	G442	G443	287	0.75	15	18	$ 74	$ 21,200
G443	1st Avenue	G443	G444	391	0.54	15	18	$ 74	$ 29,000
G444	1st Avenue	G444	G445	425	0.54	15	18	$ 74	$ 31,500
G445	1st Avenue	G445	G446	537	0.63	18	21	$ 86	$ 46,200
G446	1st Avenue	G446	G447	440	0.71	18	21	$ 86	$ 37,800
G449	1st Avenue	G449	G450	361	1.00	18	21	$ 86	$ 31,000
TOTAL LENGTH				2155					
								CONSTRUCTION COST	$ 196,700
								20% CONTINGENCY	$ 39,340
								25% MCWD Soft Costs [1]	$ 49,200
								TOTAL PROJECT	$ 285,200

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

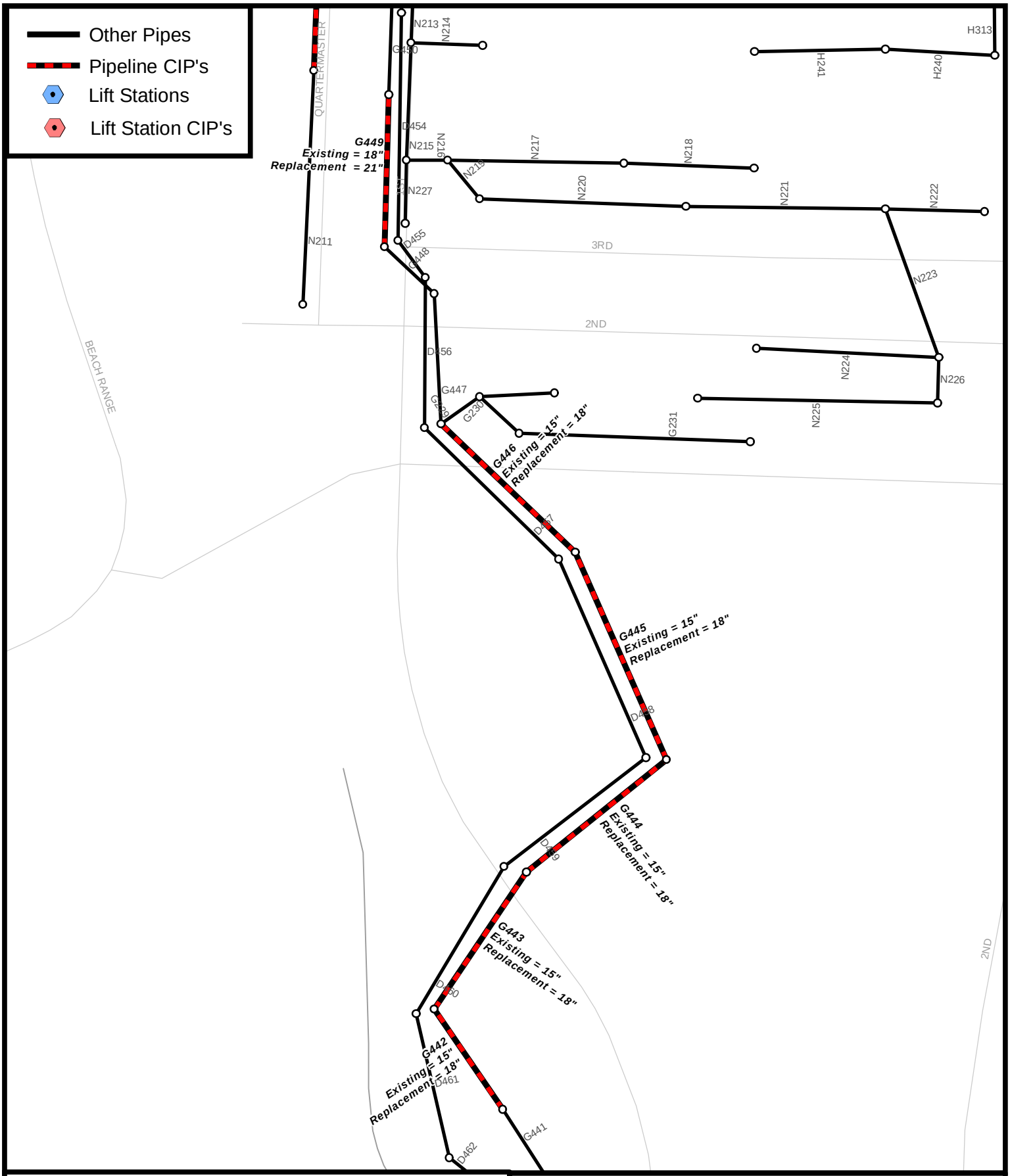
CIP #: 28 1st Avenue Pipeline Replacement Project Year Planned for Construction: 2020
Capacity Scenario: 2020 PWWF

Project Description:
Replace existing 15 and 18 -inch diameter gravity sewer pipeline with appropriate 18 and 21-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow. Pipeline segments are continuous pipeline segments that should be constructed as one project.

Upstream Flow Sources at Build-out: Hayes Park, Bostrom Park, Seaside Resort, Fitch Middle School, Sunbay Apartments, Seaside Highlands, Lower Stillwell Park, Hayes Elementary, Chartwell School, Navy Housing, Surplus Area II, Southside of Lightfighter, Monterey College of Law, Marshall Park, Fitch Park, Marshall Elementary School, First Tee, Seaside East

Upstream Lift Stations: Ord Village, Giggling, Hatten

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.


Other Pipes
Pipeline CIP's
Lift Stations
Lift Station CIP's
G449
Existing = 18"
Replacement = 21"
G446
Existing = 15"
Replacement = 18"
G445
Existing = 15"
Replacement = 18"
G444
Existing = 15"
Replacement = 18"
G443
Existing = 15"
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G442
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N214
G450
H313
H241
H240
D454
N215
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CIP 28: 1st Ave. Pipeline
Replacement Project
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CIP # 29 – General Jim Moore Pipeline Replacement Project II

Year Planned for Construction: 2020
Capacity Scenario: 2020 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from Navy Housing, Surplus Area II, Southside of Lightfighter, Monterey College of Law, Marshall Park, Fitch Park, Marshall Elementary School, First Tee, Seaside East, Chartwell School developments. Wastewater flow from those developments require the gravity sewer pipelines to flow at 53-69% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length (feet)	d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
G437	General Jim Moore Blvd	G437	G437A	148	0.53	12	15	$ 62	$ 15,000
G437A	General Jim Moore Blvd	G437A	G438	242	0.69	12	15	$ 62	$ 9,200
TOTAL LENGTH				390					
								CONSTRUCTION COST	$ 24,000
								20% CONTINGENCY	$ 4,800
								25% MCWD Soft Costs [1]	$ 6,000
								TOTAL PROJECT	$ 34,800

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

Project Description:
Replace existing 12 -inch diameter gravity sewer pipeline with appropriate 15-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow and to conform to District requirements for minimum slope. Pipeline segments are continuous pipeline segments that should be constructed as one project.

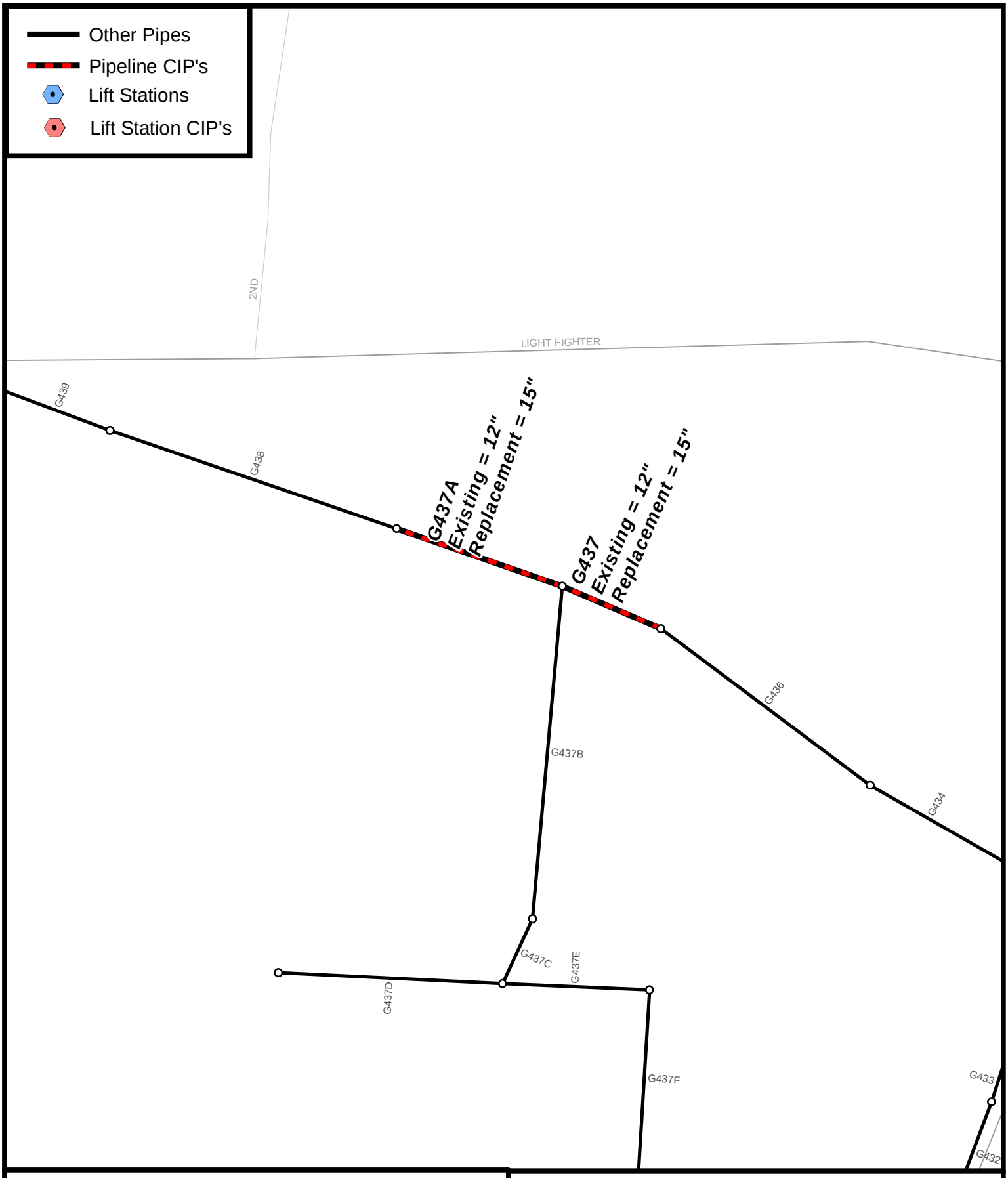
Upstream Flow Sources at Build-out: Navy Housing, Surplus Area II, Southside of Lightfighter, Monterey College of Law, Marshall Park, Fitch Park, Marshall Elementary School, First Tee, Seaside East, Chartwell School

Upstream Lift Stations: Hatten

CIP # 29 – General Jim Moore Pipeline Replacement Project II

Year Planned for Construction: 2020
Capacity Scenario: 2020 PWWF

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 29: Gen. Jim Moore Pipeline Replacement Project II

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CIP # 30 – General Jim Moore Pipeline Replacement Project III

Year Planned for Construction: 2020
Capacity Scenario: 2020 PWWF

Reason for Project: Existing gravity sewer pipelines have insufficient capacity to accommodate new wastewater flows from Marshall Park, Fitch Park, Marshall Elementary School, First Tee, Seaside East, Chartwell School developments. Wastewater flow from those developments require the gravity sewer pipelines to flow at 79-100% of full capacity, beyond the allowable flow capacities outlined for this Master Plan.

Project Type: Pipeline Replacement Project

Engineering Opinion of Probable Cost:

Pipe ID	Location	Upstream Manhole	Downstream Manhole	Length (feet)	d/D	Pipeline Diameter		Unit Cost ($/LF)	Facility Cost ($)
						Existing (in)	Replacement (in)		
G501	General Jim Moore Blvd	G501	G500	84	0.61	15	18	$ 74	$ 6,200
G561	General Jim Moore Blvd	G561	G560	417	0.62	15	18	$ 74	$ 30,800
G560	General Jim Moore Blvd	G560	G559	370	0.60	15	18	$ 74	$ 27,400
G559	General Jim Moore Blvd	G559	G501	91	0.66	15	18	$ 74	$ 6,700
G565	General Jim Moore Blvd	G565	G562	309	0.47	12	15	$ 62	$ 19,200
TOTAL LENGTH				1271					
								CONSTRUCTION COST	$ 90,300
								20% CONTINGENCY	$ 18,100
								25% MCWD Soft Costs [1]	$ 22,600
								TOTAL PROJECT	$ 131,000

[1] Soft Costs = 10% of construction cost for Engineering Design, 10% of construction cost for construction management and inspection, 5% of construction cost for legal and administrative fees.

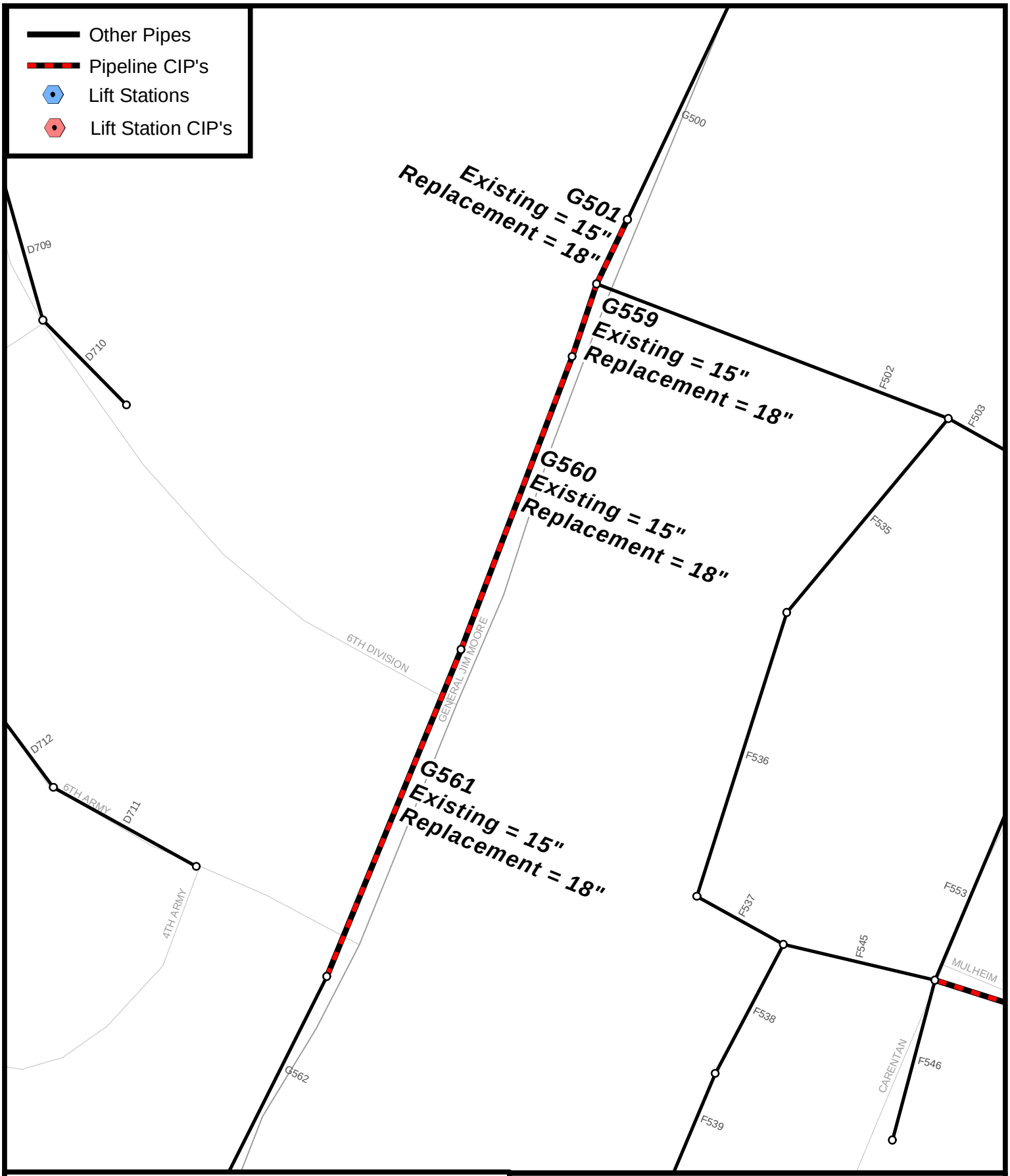
Project Description:
Replace existing 12 and 15-inch diameter gravity sewer pipeline with appropriate 15 and 18-inch diameter gravity sewer pipeline to provide required capacities for wastewater flow and to conform to District requirements for minimum slope. Pipeline segments are connecting pipeline segments that should be constructed as one project or are within the geographic vicinity.

CIP # 30 – General Jim Moore Pipeline Replacement Project III Year Planned for Construction: 2020
Capacity Scenario: 2020 PWWF

Upstream Flow Sources at Build-out: Marshall Park, Fitch Park, Marshall Elementary School, First Tee, Seaside East, Chartwell School

Upstream Lift Stations: Hatten

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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CIP 30: Gen. Jim Moore Pipeline Replacement Project III

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CIP # 31 – Seaside East Lift Station And Force Main Project

Year Planned for Construction: 2020
Capacity Scenario: 2020 PWWF

Reason for Project: There is no existing infrastructure to convey Seaside East development flows to the Ord Community. A new lift station and force main is required to tie-in to existing gravity pipelines in General Jim Moore Blvd.

Project Type: New lift station and force main

Engineering Opinion of Probable Cost:

Lift Station ID)	Flow		Facility Cost [1]
	Existing (gpm)	Year 2020 (gpm)	
SeasideEast_LS	N/A	1255.0	$ 909,300.00
		CONSTRUCTION COST	$ 909,300
		CONTINGENCY	$ 182,000
		SOFT COST	$ 227,000
		TOTAL LIFT STATION PROJECT COST	$ 1,318,300

Force Main ID	Length (ft)	Capacity Scenario	Pipe Diameter		Unit Cost ($/LF)	Facility Cost ($)
			Existing (in)	Replacement (in)		
Seaside East	12,607	2020 PWWF	N/A	10	$ 30.00	$ 378,000
					CONSTRUCTION COST	$ 378,000
					CONTINGENCY	$ 76,000
					SOFT COST	$ 95,000
					TOTAL FORCE MAIN PROJECT COST	$ 549,000

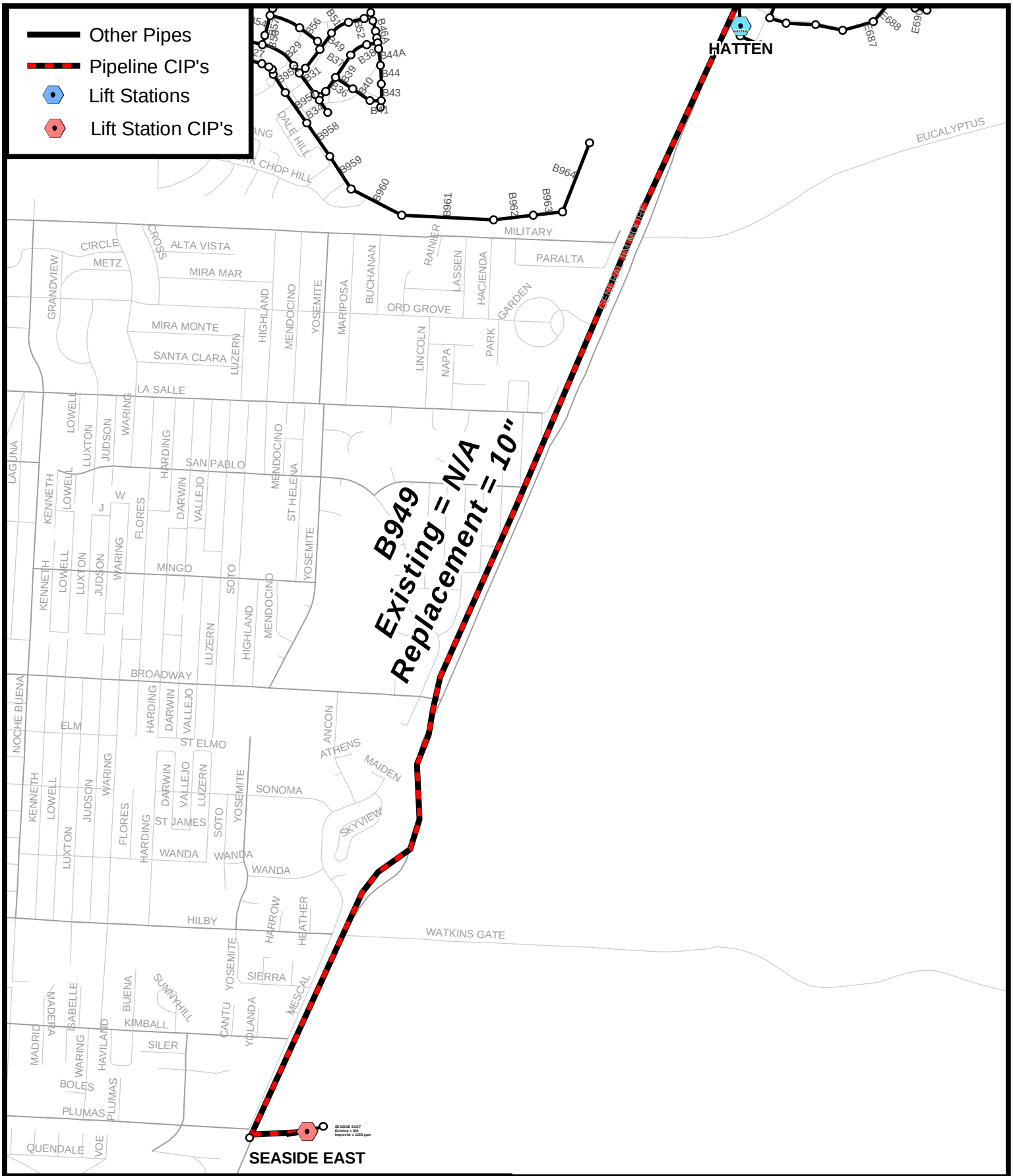
Project Description:
Construct a new 1255 gpm capacity submersible pump lift station to convey flows from Seaside East development to the Ord Community. Construct approximately 12,600 Lf of 10-inch force main to tie-in to the existing gravity pipelines. This CIP should be

refined as information regarding the Seaside East Development project description is more clear. The District may consider routing all or a portion of the seaside Ease wastewater flows through the Seaside wastewater collection system.

Upstream Flow Sources at Build-out: Seaside East

Upstream Lift Stations: None

Project Location Map: Attached on next page. Proposed CIP facilities are colored in red.



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