CITY OF GRANTS PASS

WASTEWATER COLLECTION SYSTEM MASTER PLAN

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Chapter 1

INTRODUCTION AND SERVICE AREA CHARACTERISTICS

1.1 INTRODUCTION

This chapter presents the objectives of this Wastewater Collection System Master Plan (CSMP), and a brief overview of the City of Grants Pass (City's) wastewater collection system. A list of abbreviations is provided at the end of this chapter to assist the reader in understanding the information presented in the Plan.

1.2 OBJECTIVE

The City's last CSMP was completed in 2004. A number of the recommended collection system improvements from the 2004 Plan have been implemented. Additionally, the City expanded and adopted new Urban Growth Boundary (UGB) and Urban Reserve Area (URA) in 2014. This update shall document changes since the last plan and provide a review of current planning, management, operations, and maintenance of the City's collection system. Additionally, this plan shall:

1. Evaluate the capacity of the existing sanitary collection system during peak wet weather flows under existing and future projected growth conditions,
2. Develop feasible alternatives to correct these deficiencies, and plan the infrastructure that will serve future development, and
3. Provide the City with a capital improvement program (CIP) that they can implement for a reliable wastewater collection system to serve the anticipated population in the service area.

The scope of this Master Plan update included the following main tasks:

- Policy & Criteria Review;
- Flow Projections;
- Condition of Existing Assets;
- Collection System Analysis;
- Capital Project Development; and
- Master Plan Preparation.

The selected planning years for this evaluation include the current year (2015), the short-term planning year (2025), and the long-term planning year (2035). The Plan also evaluates build-out conditions of the City.

1.3 BACKGROUND

The City of Grants Pass is located in the Rogue River Valley in the Klamath Mountain Range of Oregon. The City owns, maintains, and operates gravity wastewater pipelines and pump stations within their service area of approximately 8,522 acres and a population of 44,500[1]. The City collects wastewater from residential, commercial, institutional, and industrial customers within the service area.

The City's wastewater system consists of 23 drainage basins and 5 pump stations. Wastewater is collected and conveyed to the City's Water Restoration Plant (WRP), where it is measured and recorded daily by a dedicated meter.

The current land use assumptions in this CSMP are based on data from the City's Geographical Information System (GIS). Future land use assumptions were based on the City's Comprehensive Plan and projected future developments per the City's planning department.

1.3.1 Wastewater Service Area

Figure 1.1 illustrates the City's existing sewer service area, Urban Growth Boundary (UGB), Study Area, and Urban Reserves.

The existing sewer service area shows the extent of the area that is currently served by the sewer collection system. The UGB was updated and expanded in 2014 by the City and is shown in Figure 1.1. The Study Area includes existing sewer service area and future areas that are anticipated to be added to the City's existing service area in the 20-year planning horizon of this CSMP. The Study Area basically follows the UGB boundary and incorporates the Redwood Sanitary Sewer Service District (RSSSD).

The Study Area comprises of the following historic collection systems:

- The City of Grants Pass sewer collection system,
- Fruitdale - Harbeck collection system,
- Redwood Sanitary Sewer Service District (RSSSD), and
- Several expansion areas such as the area located North of Interstate 5 (I-5) or the Spalding area.

Management of the RSSSD was transferred to the City in approximately 2000, and a petition was approved in 2010 to dissolve the Fruitdale-Harbeck system and make it a part of the City's collection system. Further, RSSD was dissolved in 2013 and the area is now simply served by the City without a separate District. The area north of I-5 and the industrial Spalding area were included as part of the UGB expansion in 2014 and flows from the area will be addressed in this CSMP.

[1] Source: Population estimate for the existing service area (2015) from City of Grants Pass Water Restoration Plant Facilities Plan Update, 2014.

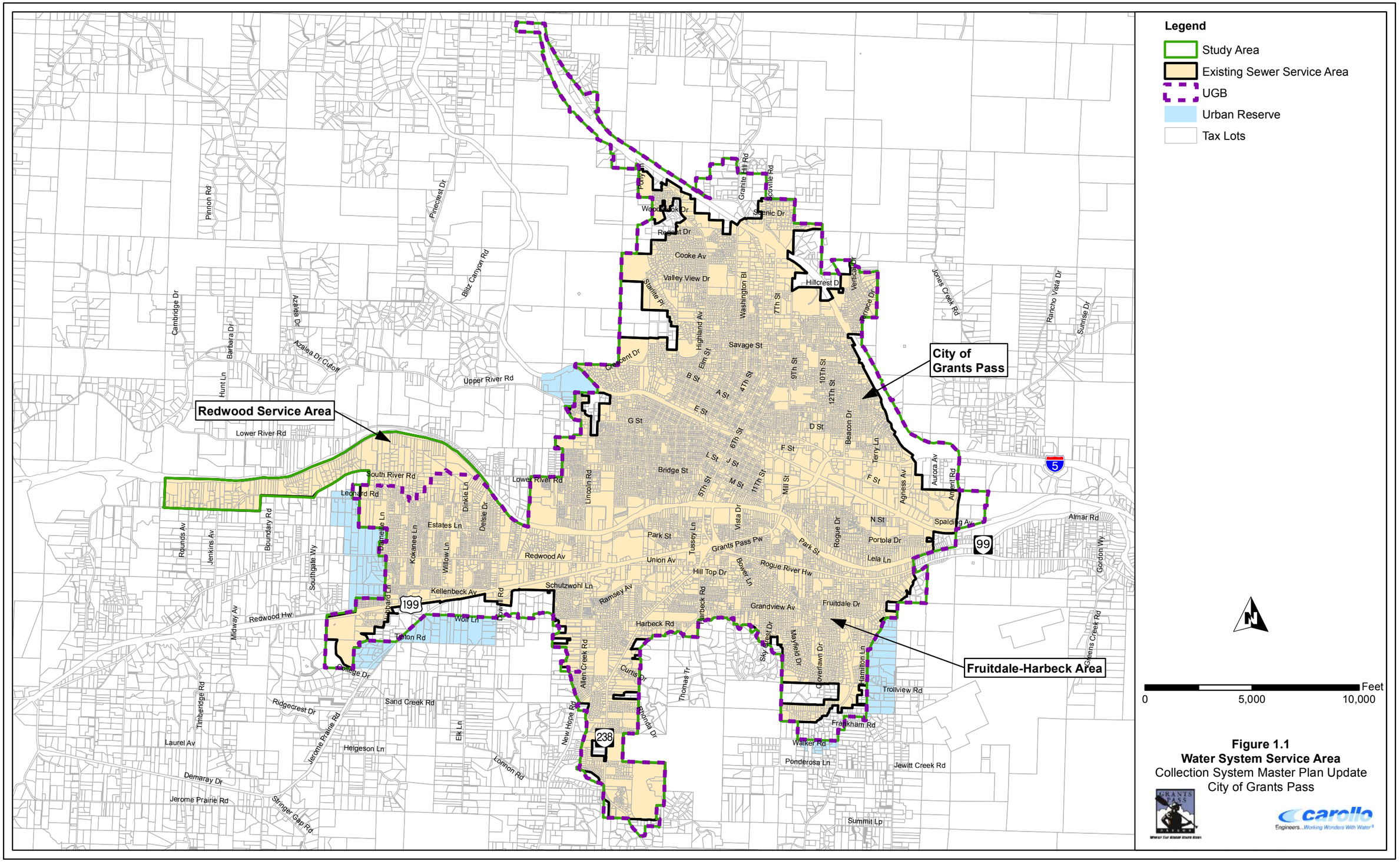


Figure 1.1
Water System Service Area
Collection System Master Plan Update
City of Grants Pass

The combined collection system discharges to the City's Water Restoration Plant (WRP), located centrally within the City and adjacent to the Rogue River.

The City adopted five urban reserve areas outside of the Study Area in 2014 as illustrated in 2014. Development and analysis of the urban reserve areas will be presented in a separate appendix of this CSMP (Appendix A).

1.3.2 Land Use

Land use information is an integral component in estimating the amount of wastewater generated within any City. The type of land use in an area will affect the volume of the wastewater generated. Additionally, the service area is typically comprised of both sewered and unsewered areas: Sewered areas contribute flow to the collection system, while unsewered areas are vacant or undeveloped land and do not currently contribute flow to the collection system. The following section describes the land use assumptions for the existing sewer service area and Study Area.

1.3.2.1 Existing Service Area Land Use

The existing land use is presented in Figure 1.2. Of the City's total existing service area of 8,522 acres, approximately 4,857 acres is sewered (i.e, contribute flows to the sewer system) and 3,669 acres are unsewered (vacant, undeveloped, right of ways, canals, etc.). Table 1.1 provides a summary of the land use zoning categories and acreages for the existing service area. The City's service area serves the population within the existing City limits (inside UGB) and a portion of the County that lies outside the UGB (Redwood service area).

Of the total service area (sewered and unsewered), the largest land use category is residential, which accounts for approximately 5,438 acres, or approximately 64 percent of total acreage. Commercial, business, and office space make up approximately 1,273 acres, or 15 percent of the total. Industrial makes up approximately 265 acres, or 3 percent of the total. Streets and canals make up approximately 1,538 acres, or 18 percent, and open space makes up 14 acres, or 0.2 percent of the total acreage; streets and canals and open space are considered unsewered areas.

1.3.2.2 Future Service Area Land Use

The future service area land use is presented in Figure 1.3 and corresponds to the adopted Comprehensive Land use Plan. The future service area includes build-out of the entire Study Area which includes the existing service area and UGB. Therefore, the future sewered service area includes existing sewered service area, infill of existing unsewered areas, and additional areas within the Study Area. Table 1.2 provides land use summary the Study Area. Approximately 1,370 acres will be added to the existing service area to make the future build-out service area of 9,892 acres. Land use data for the Urban Reserve areas is shown in Appendix A.

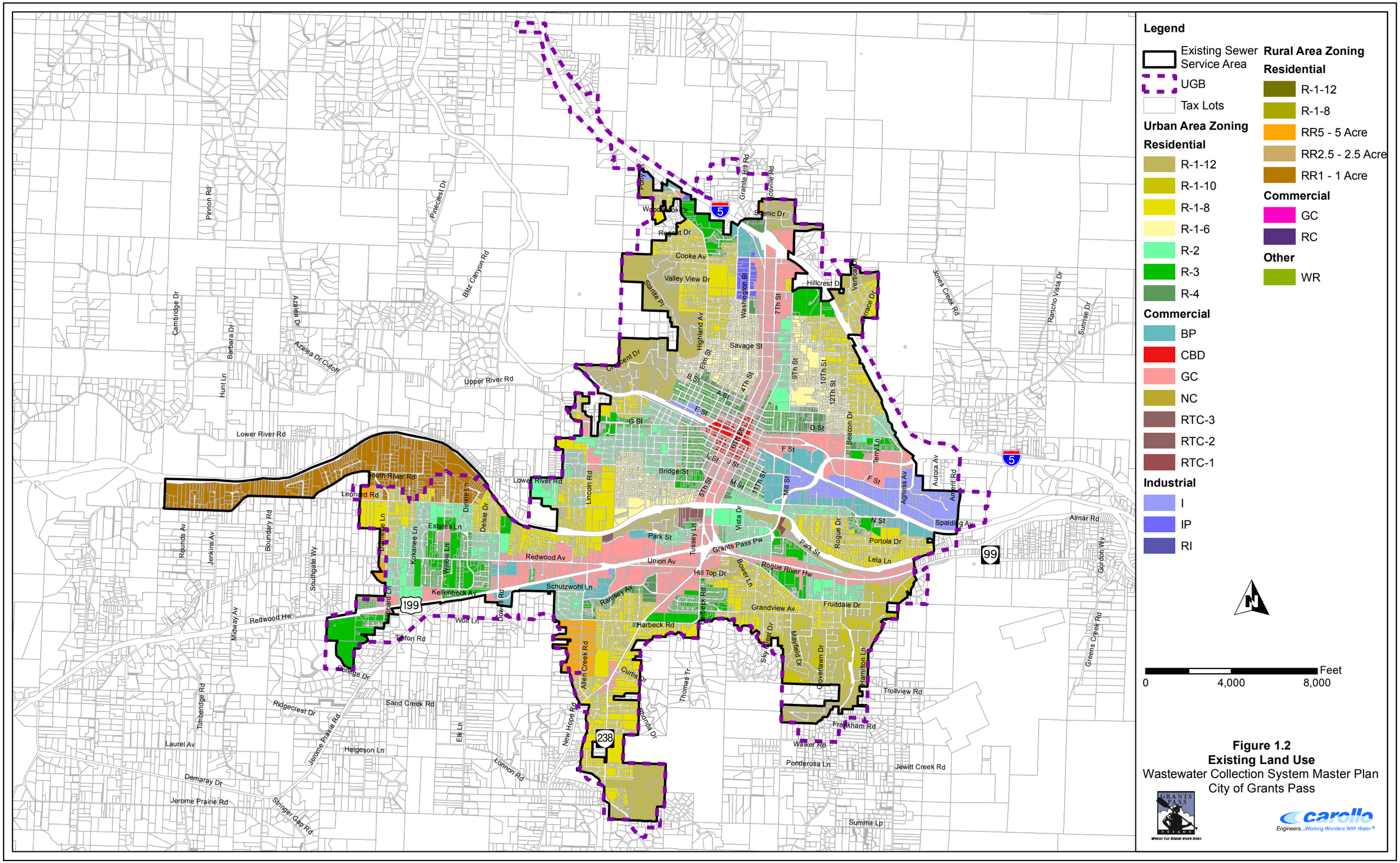
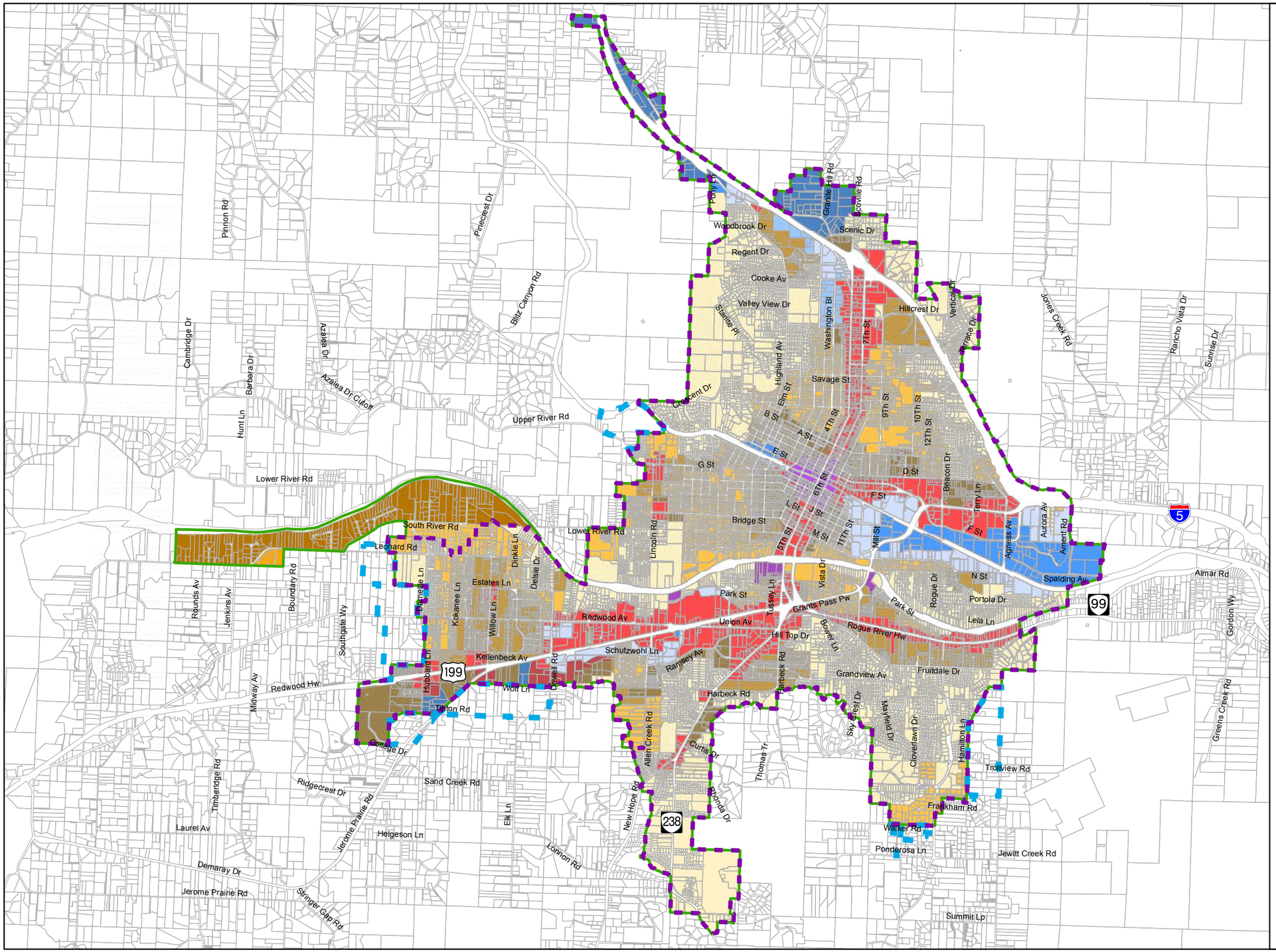


Figure 1.2
Existing Land Use
Wastewater Collection System Master Plan
City of Grants Pass



Legend

- Study Area
- UGB
- Urban Reserve
- Tax Lots

Comprehensive Plan Designations

- LR
- MR
- HR
- HRR
- NC
- CBD
- RTC
- GC
- COMM
- BP
- IP
- I
- EMP

County Zoning

- RR1
- RR5

Figure 1.3
Future Land Use
Collection System Master Plan Update
City of Grants Pass

Table 1.1 Existing Land Use Summary (Existing Sewer Service Area)
Wastewater Collection System Master Plan
City of Grants Pass

Zoning Category	Description	Total Area (acres)	Percent of Total Service Area (%)
Inside UGB Boundary (within Existing Sewer Service Area)			
BP	Business Park	147.7	1.7%
CBD	Central Business District	24.2	0.3%
GC	General Commercial	661.8	7.8%
I	Industrial	83.7	1.0%
IP	Industrial Park	18.8	0.2%
NC	Neighborhood Commercial	4.1	0.0%
R-1-10	Residential - Low Density	223.2	2.6%
R-1-12	Residential - Low Density	363.4	4.3%
R-1-6	Residential - Moderate Density	366.9	4.3%
R-1-8	Residential - Low Density	1,293.2	15.2%
R-2	Residential - Moderate Density	574.1	6.7%
R-3	Residential - High Density	557.5	6.5%
R-4	Residential - High-Rise Density	87.1	1.0%
RC	Rural Commercial	0.0	0.0%
RI	Rural Industrial	0.0	0.0%
RR1	Rural Residential 1 Acre	61.3	0.7%
RR2.5	Rural Residential 2.5 Acre	0.0	0.0%
RR5	Rural Residential 5 Acre	60.5	0.7%
RTC-1	Riverfront Tourist Commercial	5.0	0.1%
RTC-2	Riverfront Tourist Commercial	10.4	0.1%
RTC-3	Riverfront Tourist Commercial	0.0	0.0%
Vacant	Vacant, underdeveloped	2,001.9	23.5%
Outside UGB Boundary (within Existing Sewer Service Area)			
RR1	Rural Residential 1 Acre	291.5	3.4%
RR2.5	Rural Residential 2.5 Acre	4.4	0.1%
RR5	Rural Residential 5 Acre	18.2	0.2%
Vacant	Vacant, underdeveloped	128.8	1.5%
ROW	Right of ways, streets, canals	1,534.4	18.0%
Totals		**8,522.3**	**100.0%**

Table 1.2	Future Land Use Summary (Study Area) Wastewater Collection System Master Plan City of Grants Pass		
Zoning Category	**Description**	**Total Area (acres)**	**Percent of Total Service Area (%)**
Inside UGB Boundary (within Study Area)			
BP	Business Park	340.1	3.4%
CBD	Central Business Park	49.0	0.5%
COMM	Commercial	59.5	0.6%
EMP	Employment Area	220.6	2.2%
GC	General Commercial	943.9	9.5%
HR	High-Density Residential	794.3	8.0%
HRR	High-Rise Residential	392.3	4.0%
I	Industrial	275.4	2.8%
IP	Industrial Park	54.2	0.5%
LR	Low-Density Residential	3,078.1	31.1%
MR	Moderate-Density Residential	1,365.6	13.8%
NC	Neighborhood Commercial	5.8	0.1%
RTC	Riverfront Tourist Commercial	26.6	0.3%
Outside UGB Boundary (within Study Area)			
RR1	Rural Residential 1 Acre	371.3	3.8%
RR5	Rural Residential 5 Acre	64.4	18.7%
ROW	Right of ways, streets, canals	1,851.3	3.8%
Totals		**9,892.4**	**100.0%**

1.4 REPORT ORGANIZATION

The CSMP report contains six chapters, followed by appendices that provide supporting documentation for the information presented. The chapters are briefly described below:

Chapter 1 – Introduction and Service Area Characteristics. This chapter presents the background information for this Master Plan and the objectives of the study.

Chapter 2 – Policies & Criteria. This chapter presents the policies for ownership, operations, and maintenance of the collection system. It also reviews the criteria for evaluating the wastewater collection system.

Chapter 3 – Flow Projections. This chapter reviews historical wastewater flows and presents the methodology for average and peak flow projections. These flow projections are used throughout the rest of the CSMP for evaluating future conditions.

Chapter 4 – Existing Collection System and Condition Assessment. This chapter describes the existing wastewater collection system. In addition, it includes the collection system condition assessment for the City's major collectors, and pump stations. Recommendations for repairing infrastructure will be included.

Chapter 5 – Collection System Analysis. This chapter discusses the hydraulic evaluation of the collection system and the proposed projects that correct capacity deficiencies and serve future users.

Chapter 6 – Capital Improvement Plan. This chapter presents the capital improvement projects and cost estimates. This chapter is organized to assist the City in making financial decisions.

Chapter 7 – Capital Improvement Plan Detailed Summary Sheets.

1.5 ABBREVIATIONS

To conserve space and to improve readability, the following abbreviations are used in this report. This section will be completed at the end of the planning process as all the chapters are developed.

CSMP	Wastewater Collection System Master Plan
%	Percentage
AACE	Association for the Advancement of Cost Engineering
AC	Asbestos Cement
ADWF	Average Dry Weather Flow
AMP	Asset Management Program
BWF	Base Wastewater Flow
Carollo	Carollo Engineers, Inc
CCTV	Closed Circuit Television
CIP	Capital Improvement Plan
City	City of Grants Pass
CMOM	Capacity, Management, Operations, and Maintenance
CP	Concrete Pipe
CT/VCP	Clay Tile / Vitrified Clay Pipe
d/D	Pipe diameter ratio
DEQ	Oregon Department of Environmental Quality
DIP	Ductile Iron Pipe
DWF	Dry Weather Flow

ENR CCI	Engineering News Record Construction Cost Index
EPA	Environmental Protection Agency
FOG	Fats, Oils, and Grease
fps	Feet per second
ft	feet
FTE	Full-time Employee
GIS	Geographic Information System
gpad	gallong per acre day
gpd	gallon per day
gpm	gallon per minute
GWI	Groundwater Infiltration
HGL	Hydraulic Grade Line
I/I	Inflow and Infiltration
IGA	Interlocal Agreement
LF	Linear Feet
mgd	million gallon per day
n	Manning Coefficient
NASDCO	National Association of Sewer Service Companies
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
O&M	Operation an Maintenance
PACP	Pipeline Assessment and Certification Program
PS	Pump Station
PVC	Polyvinyl Chloride
PWWF	Peak Wet Weather Flow
R&R	Repair and Replacement
RDII	Rainfall Derived Inflow and Infiltration
ROW	Right-of-Way
RSSSD	Redwood Sanitary Sewer Service District
RUL	Remaining Useful Life
SAM-GAP	Strategic Asset Management Gap
SCADA	Supervisory Control And Data Acquisition
SCS	Soil Conservation Service
SSO	Sanitary Sewer Overflow

SWMM	Storm Water Management Model
TM	Technical Memorandum
UGB	Urban Growth Boundary
URA	Urban Reserve Area
V&A	V&A Consulting Engineers
VRV	Vacuum Release Valve
WaPUG	Wastewater Planning Users Group
Wastewater basin	City-defined tributary basins for various sections of the City's collection system
WRP	Water Restoration Plant
WWF	Wet Weather Flow
WWTP	Wastewater Treatment Plant

Chapter 2

POLICIES AND CRITERIA

2.1 INTRODUCTION

The City of Grants Pass (City) is responsible for managing and operating its wastewater system in accordance with all known local, state, and federal regulations. This update of the City's Wastewater Management Plan (Plan) is intended to meet the Planning Review requirements (OAR 660 Division 11 – Public Facilities Planning). To best manage the wastewater system and meet the regulations, the City has adopted wastewater system policies and criteria. These policies guide the development and financing of the infrastructure required to provide wastewater service, and document the City's commitments to current wastewater system customers, as well as those considering service from the City.

Existing policies and criteria can be found in several City documents and codes including the following:

- City of Grants Pass Municipal Code.
- City of Grants Pass Development Code.
- City of Grants Pass Comprehensive Community Development Plan.
- Sanitary Sewer Standards and Specifications.

The following sections outline existing and proposed policies and design criteria for the wastewater system. The policies and criteria summarized herein, both existing and recommended, will be used for planning purposes throughout this Wastewater Collection System Master Plan (CSMP).

2.2 POLICIES

The following sections summarize the City's existing wastewater policies in the following eight subject areas (these areas are summarized in Tables 2.1 through 2.4):

- Service Area.
- Environmental Stewardship.
- Management, Operation, and Maintenance Programs.
- Design Criteria.
- Financial.
- Capital Facilities Project Funding Priorities.

Reference numbers have been added to each policy in the tables below for the purpose of this document only. Policies that are recommended for the City to eventually incorporate into its

wastewater policies are also included and shown in italics to differentiate between existing and recommended policies.

2.2.1 Service Area

Table 2.1 summarizes the existing policies pertaining to the wastewater service area. The City is committed to eventually providing utility services to all areas within its Urban Growth Boundary (UGB), service areas incorporated into the City outside the UGB (Redwood Service Area), and areas within the Urban Reserves after they are brought into the UGB.

Table 2.1 Service Policies
Wastewater Collection System Master Plan
City of Grants Pass

Ref. No.	Subject	Policy	Source
1.1	Service Area	The City shall be responsible for development, coordination, and implementation of the Sanitary Sewer Facility and Management Plans for the Redwood, Fruitdale-Harbeck, and City service districts of the UGB to ensure predictable and logical provision of urban services to lands within the UGB.	Comp Plan Goal 10
1.2	Intergovernmental Agreements	The City maintains intergovernmental agreement (IGA) with Josephine County to provide wastewater service to Redwood service area, which is outside the UGB. These are included in Appendix B. The City may enter into intergovernmental agreements to extend sanitary sewer, water, surface water management and other services to other cities outside the UGB, and continue or enter into new agreements with existing service districts to provide public safety services and domestic water provided: a. These arrangements are in the City's financial interests; b. Adequate capacity exists to provide services; c. The quality and quantity of services to existing and future City residents are not diminished; and, d. Such actions are consistent with the City's Comprehensive Plan goals and policies pertaining to public facilities and services and urbanization.	Municipal Code Title 8

Table 2.1 Service Policies
Wastewater Collection System Master Plan
City of Grants Pass

Ref. No.	Subject	Policy	Source
1.3	Annexations	Unincorporated property shall be required to annex prior to the receipt of City sanitary sewer service or water service except as set forth below: a. The property shall be located within the City of Grants Pass Urban Growth Boundary; b. Existing sanitary sewer line operated by the City to which connection can be made is within 300 feet of the property; c. The extension of a sanitary sewer line to be connected to the City sanitary sewer line shall be subject to acceptance of an approved plan by the City Engineer.	Development Code Article 5
1.4	Connection Requirements	All structures or buildings normally used or inhabited by persons located within 300 feet of an accessible city sewer line shall connect to that line.	Development Code Article 28
1.5	Septic System Usage	Existing developments already using septic systems may continue to use the septic system until it is necessary to repair or replace the septic system, at which time connection to public sewer will be required if public sewer is within 300 feet of the property. All existing development utilizing septic systems located on a property which receives tentative plat approval for a subdivision or partition shall connect to public sewer and properly abandon the septic system prior to final plat approval.	Development Code Article 28
1.6	Service Laterals	The owner of a single parcel of property may apply for and receive as many utility service connections as he or his tenants may require, provided that his application or applications meet the requirements of Sewer Ordinance No 4481, City policies, rules, and regulations.	Sewer Ordinance No. 4481
1.7	Service Lateral Ownership	The service lateral from the main to the customer's premises shall be owned and maintained by the customer.	Sewer Ordinance No. 4481
1.8	Service Lateral Abandonment	All abandoned sanitary sewer services shall be plugged by exposing sanitary sewer service at the property line and plugging the line with concrete. Location of the said sewer line by measurement to the nearest property corner shall be recorded with the Engineering Division of the City. Before the line is backfilled, the owner shall call the Engineering Division of the City for an inspection. If during inspection it is determined the sewer lateral is made of unapproved material, the sewer line shall be plugged at the sewer main.	City of Grants Pass Development Code Article 28, 28:74

2.2.2 Environmental Stewardship

The City defines performance expectations and provides a framework to achieve their organizational goals as defined in the City's Work Plan (Appendix C). In order to meet the City's overall goals of environmental stewardship, the following policies, as presented in Table 2.2, relating to protecting the environment and promoting sustainability are included for the wastewater system.

Table 2.2 Environmental Stewardship
Wastewater Collection System Master Plan
City of Grants Pass

Ref. No.	Subject	Policy	Source
2.1	Sustainability	The City shall identify and implement appropriate sustainability practices for all sewer related projects and develop proactive solutions to community development challenges.	City Work Plan Goal 6
2.2	Resource Protection	The City shall comply with all NPDES permit requirements.	City Work Plan Goal 8
2.3	Community Enhancement	The City promotes creating and sustaining diverse neighborhoods where everyone can find and afford the values.	City Work Plan Goal 5
2.4	Source Water Protection	*Sewer mains must be laid at least 10 feet horizontally, measured edge to edge, from any existing or proposed water supply line. A reduction to 5 feet of separation may be allowed provided the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer. Additionally, all sanitary sewer crossings under water mains must be installed such that the top of the sewer pipe is at least 18 inches below the bottom of the water main. An 18-foot section of sewer pipe must be located at the crossing so the joints will be as far from the water supply main as possible. This installation may require special structural support for both the water and sewer pipes.*	Needs policy

2.2.3 Management, Operation, and Maintenance Programs

The following section summarizes the existing and recommended policies pertaining to system reliability. Several components of system reliability are missing in the City's current policies. Suggested policies, as shown in Table 2.3, include establishing security and reliability policies, additional operations and maintenance policies, creating and maintaining Emergency Response, Vulnerability Assessment, and Hazard Mitigation Plans, and maintaining equipment inventory. It is anticipated that some of these items will be addressed in a future capacity, management, operations, and maintenance (CMOM) program.

Also recommended is the development of a fats, oils, and grease (FOG) Control Plan and related policies pertaining to illegal discharges. A FOG Control Plan should include regulations that prevent fats, oils, and grease from entering the wastewater collection system.

Table 2.3 Management, Operation, and Maintenance Programs Wastewater Collection System Master Plan City of Grants Pass			
Ref. No.	**Subject**	**Policy**	**Source**
3.1	Operations & Maintenance	Operate wastewater treatment and collection facilities to meet or exceed federal, state, and local standards.	Comp Plan, Goal 10
3.2	Vulnerability Assessment & Hazard Mitigation Plan	The City shall prepare and maintain a Vulnerability Assessment & Hazard Mitigation Plan addressing risks associated with natural and human-made hazards on the wastewater system. The plan should identify how the public and environment may be damaged by such a hazard, and provide detailed procedures for responding to such an act to minimize harm to the public. The Vulnerability Assessment shall not be made available to the public.	Needs Policy
3.3	Overflow Response Plan	The City's updated Emergency Overflow Response Plan is attached in Appendix D.	Required by DEQ
3.4	Repair, Replacement Program	The City prioritizes repair and replacement of sewers per the CIP outlined in the Master Planning.	Comp Plan, Goal 10
3.5	Preventive Maintenance Practices	*The City maintains a Fats, Oils, and Grease (FOG) Control Program to address excessive buildup of FOG in the wastewater system.* Additionally, the City also has an I/I program that is approved by DEQ.	Required by DEQ

2.2.4 System Analysis

The City's Sanitary Sewer Standards and Specifications, March 2013 establishes City standards for the design and construction of sanitary sewer systems. Table 2.4 presents a summary of the design standards for the wastewater system.

Table 2.4 System Analysis Wastewater Collection System Master Plan City of Grants Pass			
Ref. No.	**Subject**	**Policy**	**Source**
4.1	DEQ Requirements	*All wastewater facilities and appurtenant structures shall be designed in conformance with the Oregon Department of Environmental Quality regulations, except as City standards differ.*	Sanitary Sewer Standards & Specifications
4.2	Design Storm	In accordance with all applicable federal, state, and local regulations, the City should design its wastewater system facilities to adequately and reliably convey peak hour flows associated with a 24-hour, 5-year	Sanitary Sewer Standards & Specifications

Table 2.4 System Analysis
Wastewater Collection System Master Plan
City of Grants Pass

Ref. No.	Subject	Policy	Source
		recurring storm event without overflowing or discharging to any water bodies.	
4.3	Preference of Gravity Systems	Gravity wastewater systems shall be used wherever feasible to provide wastewater service since they are less susceptible to interruption of service and require the least amount of maintenance.	Sanitary Sewer Standards & Specifications
4.4	Survey Datum	City of Grants Pass Vertical Datum NGVD29 based upon NGS benchmark F 56 (PID NZ0483) located at the southwest corner of the 6th Street Bridge in Grants Pass, Oregon. Record Elevation = 921.61 feet.	Sanitary Sewer Standards & Specifications
4.5	Design Flows	Wastewater system flows are composed of residential, institutional, commercial, and industrial sewage, along with infiltration and inflow. Wastewater systems must be capable of conveying the ultimate peak hour flows of these wastewater sources.	Sanitary Sewer Standards & Specifications
4.6	Surcharging Allowance (Existing Sewers)	The maximum allowable surcharge depth shall be two feet above crown of pipe in manhole during Peak Wet Weather Flow (PWWF).	Collection System Capacity Analysis, Feb 2013
4.7	Flow Depth Criteria	New sewers shall be designed for the following flow depth criteria (d/D): 1. d/D ratio = 0.5 for pipes for pipes less than or equal to 15 inches; 2. d/D = 0.74 for pipes for pipes for pipes greater than or equal to 18 inches	Collection System Capacity Analysis, Feb 2013
4.8	Design Life	*The design period is the length of time that a given facility will provide safe, adequate, and reliable service. The City assumes that all designed facilities operate optimally and continuously during their Project Service Life. The following table presents the Project Service Life for select City facilities.* ***ITEM*** — ***PROJECT SERVICE LIFE (Years)*** *Conveyance Pipes* — *100* *Force Main* — *50* *Manhole* — *50* *Sump* — *30* *Mechanical Equipment (e.g. pumps, process equipment)* — *25* *Structure (e.g. pump station)* — *50* *[Taken from the Portland BES Sewer & Drainage Facilities Design Manual]*	Needs Policy

Table 2.4 System Analysis
Wastewater Collection System Master Plan
City of Grants Pass

Ref. No.	Subject	Policy	Source
4.9	Sanitary Sewer Sizing	Minimum size shall be 8 inch diameter.	Sanitary Sewer Standards & Specifications
4.10	Sanitary Sewer Materials	Allowable materials for new wastewater mains include polyvinyl chloride (PVC) SDR 35, and Ductile Iron Class 50 min.	Sanitary Sewer Standards & Specifications
4.11	Manning's Coefficient	The Manning equation shall be used to design and analyze wastewater flow characteristics of the wastewater sewers. For new facilities, a Manning roughness coefficient of 0.013 shall be used.	Sanitary Sewer Standards & Specifications
4.12	Scouring Velocity	All sewers shall be laid on a grade to produce a mean velocity of at least two feet per second.	Sanitary Sewer Standards & Specifications
4.13	Minimum Sewer Slopes	**Pipe Diameter** / **Grade** 4" / 0.020 6" / 0.006 8" / 0.005 10" / 0.0028 12" / 0.002 15" / 0.0016 16" / 0.0016 18" and over / 0.0012	Sanitary Sewer Standards & Specifications
4.14	Separation from Water Mains	Horizontal separation: Minimum 10 feet edge to edge Vertical separation: 18 inches clearance.	Sanitary Sewer Standards & Specifications
4.15	Manhole Spacing	Manholes are required at the end of all sewer mains, change of slope/alignment/pipe diameter, at intersections of sewer mains, every 400 feet on sewer mains.	Sanitary Sewer Standards & Specifications
4.16	Manhole Diameter	Manholes 48 inches in diameter shall be used for sewer mains up to 18 inches in diameter and up to 15 feet deep. Manholes 60 inches shall be used for sewer mains up to 42 inches in diameter and up to 22 feet deep.	Sanitary Sewer Standards & Specifications

Table 2.4 System Analysis Wastewater Collection System Master Plan City of Grants Pass			
Ref. No.	**Subject**	**Policy**	**Source**
4.17	Pump Stations/ Lift Stations	All pump stations shall conform to the Oregon DEQ Guidelines for Design and Construction of Wastewater Pump Stations. Additionally, the City complies with the following design policies: – Each station must have a minimum of two pumps. – Lift suction and discharge openings must be a minimum of 4 inches in diameter. – Each lift station must have the capability of pumping the design flow with the largest pump in the station out of service (5-year 24-hour peak flow). – An emergency generator shall be provided for a minimum of 24 hours. – Wet well shall be sized such that the minimum time to overflow is 30 minutes.	Sanitary Sewer Standards & Specifications
4.18	Operations & Maintenance Manuals	Operation and Maintenance (O&M) manuals shall be prepared for all pump stations and shall conform to DEQ Guidelines for Writing Pump Station O&M Manuals.	Sanitary Sewer Standards & Specifications
4.19	Force mains	The City complies with the following design policies: – Force mains shall conform to the requirements of AWWA C900 if PVC is used. All other pressure sewer mains shall be ductile iron pipe. – Minimum pressure class for a force main is 100 pounds per square inch (psi). – Minimum velocity is 2 fps to keep solids from settling. – Maximum velocity at peak flows is 8 fps.	Sanitary Sewer Standards & Specifications

2.2.5 Capital Facilities Project Funding Priorities

The following criteria will be used to prioritize CIP projects for this CSMP:

- Projects that are needed to address public health hazards. This includes correction of system deficiencies and protection of the community's investment in existing infrastructure;
- Projects that protect water quality in sensitive waterways;
- Projects that have any regulatory issues or environmental concerns;
- Projects identified based on the condition and repair assessment per this CSMP;
- Projects identified based on capacity assessment per this CSMP.

Chapter 3

FLOW PROJECTIONS

3.1 INTRODUCTION

This chapter reviews the existing collection system wastewater flows, summarizes the flow monitoring program performed by the City of Grants Pass (City) during the 2011/2012 wet weather season, and presents the projected wastewater flows for future conditions within the study area. The planning years for this evaluation include the existing year (2012), the short-term planning year (2025), and the long-term planning year (2035).

3.2 SEWER COLLECTION SYSTEM FLOWS

Wastewater consists of dry weather flow (DWF) and wet weather flow (WWF). Dry weather flow is representative of routine discharges into the collection system from customers as well as groundwater infiltration into pipes and manholes. Wet weather flow, that is flow during or immediately after a storm, is higher than dry weather flows due to direct inflow into the system and increased groundwater infiltration. Figure 3.1 illustrates the different flow components discussed in the following sections.

3.2.1 Dry Weather Flow

3.2.1.1 Dry Weather Flow (DWF) Components

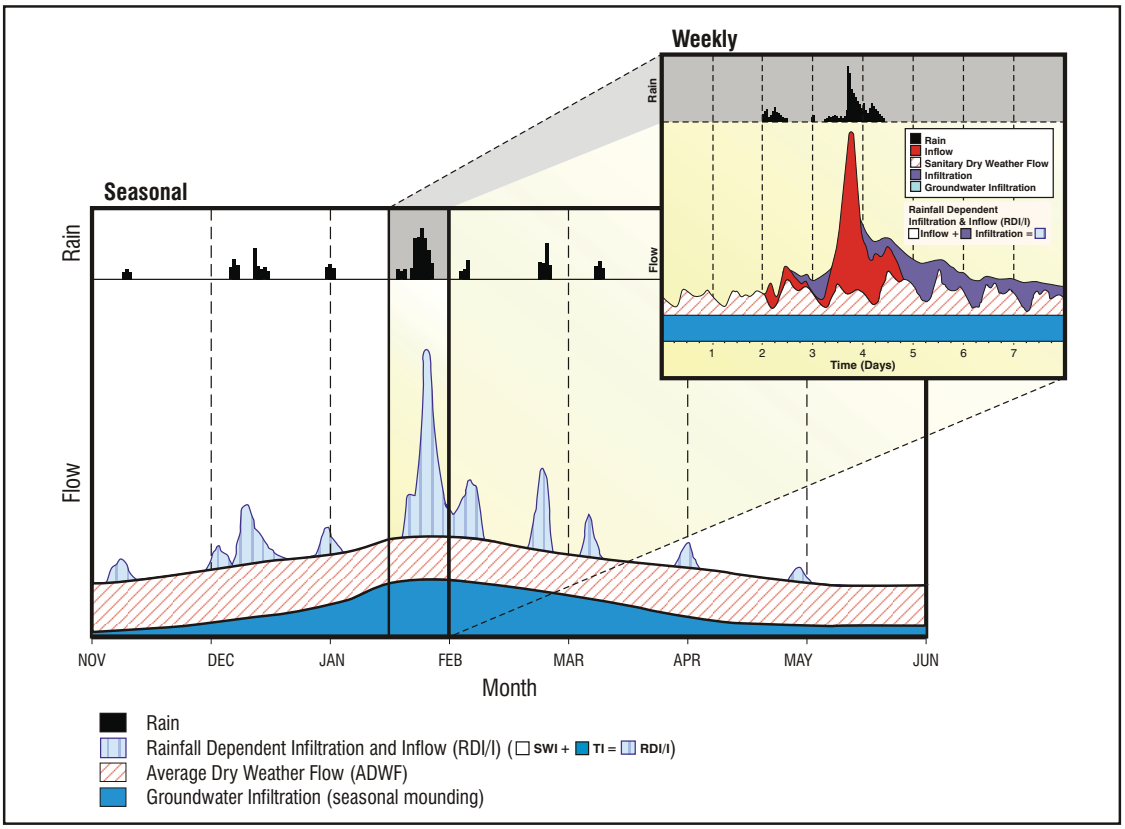
There are two primary components of DWF:

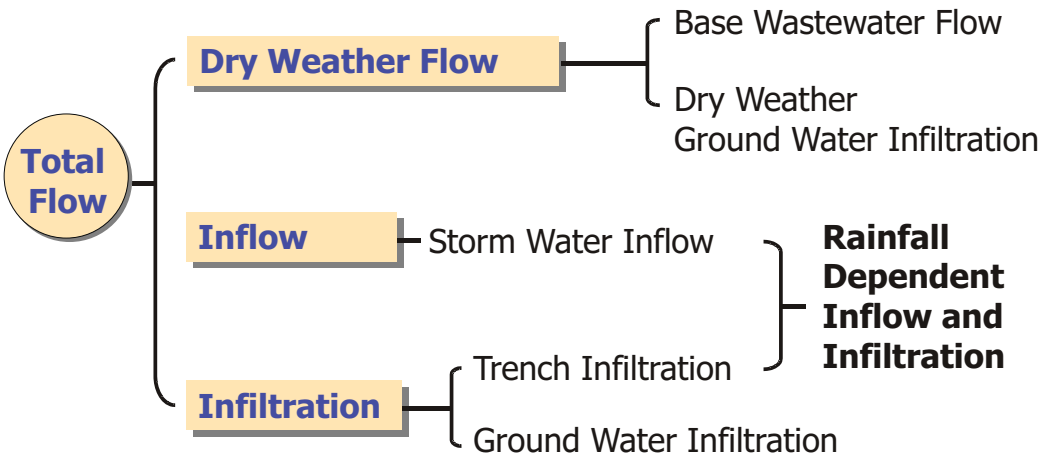
3.2.1.1.1 *Base Wastewater Flow (BWF)*

The BWF is the flow generated by routine water usage of the City's residential, commercial, and industrial customers. The flow has a diurnal pattern that varies with land use categories. Typically, a residential diurnal pattern has two peaks with the more pronounced peak following the wake-up hours of the day, and a less pronounced peak occurring in the evening. Commercial and industrial patterns, though they vary depending on the type of use, typically have more consistent higher flow patterns during business hours, and lower flows at night. Furthermore, the diurnal flow pattern experienced during a weekend may vary from the diurnal flow experienced during a weekday.

3.2.1.1.2 *Dry Weather Groundwater Infiltration (GWI)*

Dry weather GWI will enter the sewer system when the relative depth of the groundwater table is higher than the depth of the pipeline and when the susceptibility of the sanitary sewer pipe allows infiltration through defects such as cracks, misaligned joints, and broken pipelines. Dry weather GWI (or base infiltration) cannot easily be separated from BWF by flow measurement techniques. Therefore, dry weather GWI is typically grouped with BWF.





Note: This figure is not based on flow data specific to the City or this Master Plan

TYPICAL WASTEWATER FLOW COMPONENTS

FIGURE 3.1

CITY OF GRANTS PASS
WASTEWATER COLLECTION SYSTEM MASTER PLAN

carollo

3.2.1.2 Average Dry Weather Flow

Average Dry Weather Flow (ADWF) is the average flow that occurs on a daily basis during the dry weather season, and is usually estimated from a 5-year average of dry weather flows. Based on 5-year historic average flows to the WRP, the ADWF for the City is approximately 5.2 million gallons per day (mgd). The ADWF serves as the baseline flow in the hydraulic model. The ADWFs are applied to a diurnal (24-hour) pattern, and cumulatively make up the flows experienced at the WRP. The diurnal patterns utilized for the City's collection system basins are provided in Appendix E.

Usually, the dry weather flow that is derived from the data collected over the flow monitoring period is similar to or slightly greater than the ADWF, partially because the flow monitoring data is collected during the rainy season when flows are enhanced by I/I. For the City's flow monitoring program conducted between October 2011 and February 2012, the dry weather flow was calculated to be 4.3 mgd. While the hydraulic model was calibrated to 4.3 mgd and to the flow monitoring data, the flow coefficients (discussed in Section 3.4.2) were created so that an ADWF of 5.2 mgd was represented in the model for the capacity analysis.

3.2.2 Wet Weather Flow

Wet Weather Flow (WWF) includes two components:

3.2.2.1.1 *Inflow and Infiltration (I/I)*

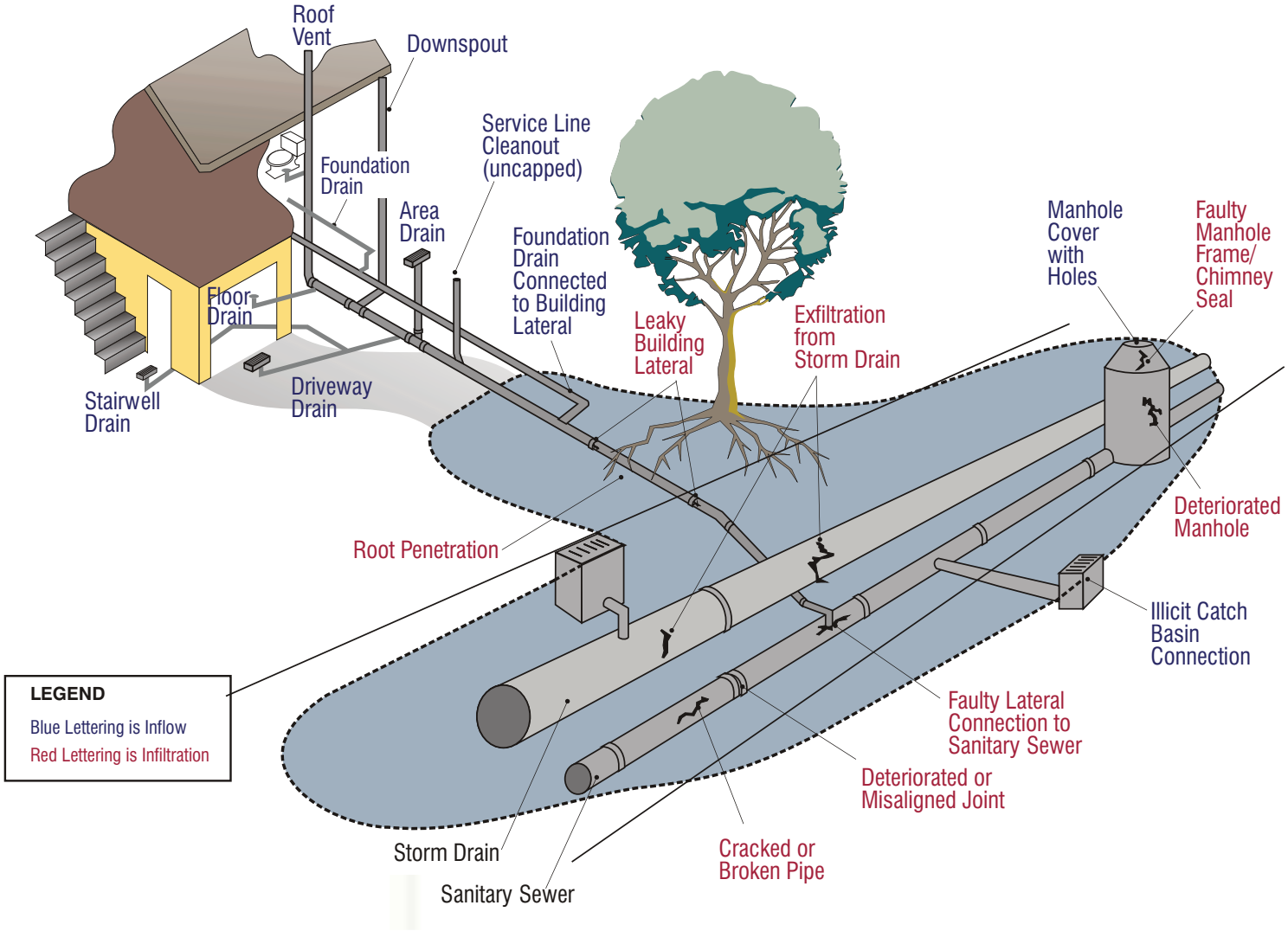
The stormwater inflow and infiltration response in the sewer system to rainfall is seen immediately (inflow) or within hours after the storm (infiltration).

3.2.2.1.2 *Groundwater Infiltration (GWI)*

GWI is not specific to a single rainfall event, but rather to the effects on the sewer system over the entire wet weather season. The depth of the groundwater table rising above the pipe invert elevation causes GWI. Sewer pipes within close proximity to a body of water can be greatly influenced by groundwater effects.

3.2.2.2 Inflow and Infiltration

Infiltration is stormwater that enters the sewer system by percolating through the soil and then through defects in pipelines, manholes, and joints. Inflow is stormwater that enters the sewer system via a direct connection to the system, such as roof drain and downspout connections, leaky manhole covers, and illegal storm drain connections. Some of the most common sources of I/I are shown in Figure 3.2. The adverse effects of I/I entering the sewer system is that it increases both the flow volume and peak flows such that the sewer system is operating at or above its capacity, as illustrated in Figure 3.3. If too much I/I enters the sewer system, sanitary sewer overflows (SSOs) could occur. For Grants Pass, the flow monitoring results indicate that the City collection system does have considerable I/I in certain parts of the system. The extent of the City I/I is described in Section 3.3.

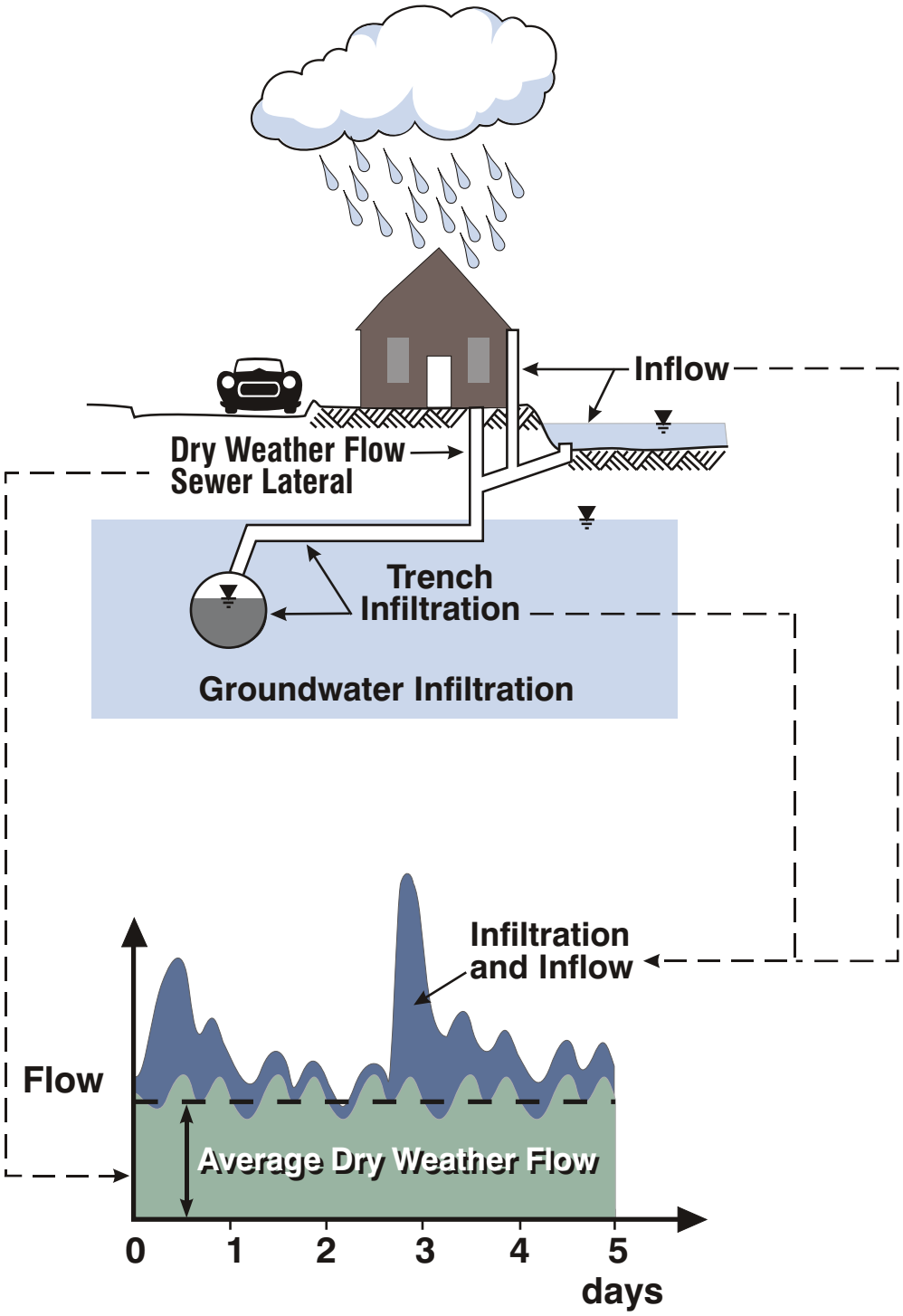


SOURCES OF INFLOW AND INFILTRATION

FIGURE 3.2

CITY OF GRANTS PASS
WASTEWATER COLLECTION SYSTEM MASTER PLAN

carollo



TYPICAL EFFECTS OF INFLOW AND INFILTRATION

FIGURE 3.3

CITY OF GRANTS PASS
WASTEWATER COLLECTION SYSTEM MASTER PLAN

I/I is modeled through the development of Rainfall Derived Inflow and Infiltration (RDII) Unit Hydrographs for the collection system. Typically, multiple RDII hydrographs are developed for a collection system to describe the I/I occurring at different locations throughout the system. This procedure provides a method for the hydraulic model to simulate the varying I/I that occurs based on the intensity and duration of storm events and the location within the collection system. RDII hydrographs are further discussed in Appendix E.

3.2.2.3 Groundwater Infiltration

Ground water infiltration, one of the components of I/I, is associated with extraneous water entering the sewer system through defects in pipes and manholes. GWI is related to the condition of the sewer pipes, manholes, and groundwater levels. GWI may occur throughout the year, although rates are typically higher in the late winter and early spring.

3.2.3 Peak Wet Weather Flow (Design Flow)

Peak Wet Weather Flow (PWWF) is the highest observed hourly flow that occurs following the design storm event, and is typically used for designing sewers and pump stations (therefore referred to as the “design flow”). PWWF occurs because wet weather I/I causes flows in the collection system to increase. While there is a peak flow associated with each storm event, in this study the PWWF represents the peak flow resulting from a design storm even, such as a 5-year, 24-hour design storm. PWWFs are modeled by simulating a storm event in the hydraulic model, after RDII unit hydrographs have been assigned to the collection system. The combination of the ADWFs and the I/I occurring from the storm event results in increased wet weather flows; during the design storm, these wet weather flows constitute the PWWF for the system.

3.3 FLOW MONITORING PROGRAM SUMMARY

Temporary flow monitoring was conducted to assist in the development of design flow criteria, and to correlate actual sewer system flows to the hydraulic model predicted flows. Flow monitoring data are used to calibrate the wastewater collection system hydraulic model for dry weather and wet weather flow.

Temporary flow monitoring was performed by the City during the 2011/2012 wet weather season. These flow monitoring programs, which began in October 2011 and continued through the beginning of February 2012, were used as part of this study to characterize both dry weather and wet weather flows in the City service area.

Carollo Engineers contracted with V&A Consulting Engineers (V&A) to conduct a temporary flow monitoring program at 10 monitoring sites within the City collection system. The meter sites were selected to best model the sewer areas and multiple sub-areas within the City’s collection system.

In addition to monitoring data from the 10 V&A flow meters, flow data was also available for the WRP for a portion of the flow monitoring period. Therefore, measured data from 11 total sites was available for use with model calibration. The V&A flow monitoring and inflow/infiltration report for the 11 sites where measured data was available is included in Appendix E. Flow monitoring data is further discussed in Appendix E where recorded dry weather flow, rainfall events and associated wet weather flows are detailed along with an I/I analysis study to determine the monitored basins with the highest contributing I/I. Flow monitor basins R42, I5, and H5 were shown experiencing the most significant I/I response, as shown on Figure 6 in Appendix E.

3.4 COLLECTION SYSTEM FLOW PROJECTIONS

This section summarizes the existing flows measured during the Flow Monitoring Program and presents the calculation of the design flows used to model the existing and future collection system.

3.4.1 Historic WRP Flows

In addition to flow monitoring data, historical influent data at the Water Reclamation Plant (WRP) were reviewed and presented in TM No. 3 - Water Restoration Plant Facility Plan, Influent Flows and Loads (Carollo, March 2013). The average monthly dry weather flow ranges from 4.94 mgd in 2008 to 5.32 mgd in 2010 with a 5-year average of 5.16 mgd. For this plan, the existing average dry weather flow equals to 5.21 mgd.

3.4.2 Wastewater Flow Coefficients

In order to develop wastewater flow projections and allocate future flows to the collection system, relationships between land use and wastewater generation were developed. These relationships, called wastewater flow factors are established based on the average wastewater flow generated for each existing land use type. The land use flow factors were established to project the estimated ADWF through build out of the City's wastewater collection system and project future flows within the study area boundary.

Average wastewater flow coefficients are rates, usually expressed in gallons per day per acre (gpda), applied to either gross or net acres for calculating average day flow generated from a particular land use. A flow coefficient was developed for each of the urban and rural land use classifications discussed previously. The flow coefficient provides a means to transform a land use category from acreage into wastewater flow. The resulting flow is then input into the appropriate sewer area in the sewer system model. Wastewater flow coefficients for residential areas can range between 1,000 to 4,000 gpda, and commercial and industrial areas might range from 500 to 2,500 gpda, with typical values averaging approximately 1,000 gpda. Land uses designated as open space and agriculture is assumed to generate negligible amounts of sewage flow, and as a result have a flow coefficient of zero.

The coefficients are developed using the following procedure:

- Average flows for each flow metering tributary area were derived from the flow-monitoring data (described in the Model Development and Calibration TM).
- Using GIS, the acres for each land use type contained in each flow-monitoring tributary area were calculated.
- Preliminary coefficients for each land use type were assumed based on typical values, which can be estimated from the approximate number of dwelling units per acre, the assumed per capita wastewater generation rates, and/or the typical number of people per dwelling unit for each land use type.
- The coefficients for each flow metering tributary area were adjusted up or down (balanced) within a reasonable amount (based on engineering judgment) until the calculated average flows from each tributary match what was measured during the flow monitoring period. If the flow coefficients produced average flows that were significantly different from the field measured flows, further investigation was conducted to verify that the tributary basins were delineated correctly and if the collection system configuration was correct.
- Once the coefficients for the 14 flow meter tributary areas were balanced, the weighted average of the coefficients for each land use type was calculated based on the acreage contribution from each metering tributary area.
- The flow coefficients were then adjusted to balance the calculated flows for the overall developed sewer service area, where flow-monitoring data was available. Since flow data for the WRP was available, the weighted average flow coefficients were adjusted to dry weather flow calculated for the flow monitoring period.
- The WRP dry weather flow was compared to the historical 5-year ADWF, and the coefficients were adjusted up to meet the ADWF of 5.20 mgd.

For example, for Flow Meter D60, the average day flow during the flow-monitoring period was approximately 0.611 mgd. The tributary service area upstream of this flow monitor is developed with buildings falling into a variety of zoning categories, including business park, commercial, industrial, and low-, medium-, and high-density residential. The preliminary flow coefficients were multiplied by the acreages for each land use designation and adjusted until the flows equaled 0.611 mgd. This process was repeated for each flow meter, and weighted flow coefficients were calculated for each land use category.

Table 3.1 presents the weighted wastewater flow coefficients and land use areas that represent the City's existing ADWF. The land use coefficients predict the ADWF to the WRP to be 5.21 MGD, a 0.1 percent different from the historical 5-year ADWF of 5.20 MGD. As with most cities, residential land use makes up the majority of developed land and wastewater flow. For Grants Pass, residential customers make up approximately 81 percent of the current flow.

Table 3.1 Flow Coefficients Development Summary
Wastewater Collection System Master Plan
City of Grants Pass

Zoning Category		Existing Service Area	Flow Coefficients	Flow Balance for Existing Service Area	
		Sewered Area (acre)	Adjusted ADWF Coefficient[1] (gpad)	Overall Wastewater Generation[2] (gpd)	Percent of Total Flow (%)
Urban Area					
BP	Business Park	147.7	1020	150,588	2.9%
CBD	Central Business District	24.2	1140	27,570	0.5%
GC	General Commercial	661.8	1050	694,922	13.3%
I	Industrial	83.7	1080	90,384	1.7%
IP	Industrial Park	18.8	1080	20,331	0.4%
NC	Neighborhood Commercial	4.1	1050	4,335	0.1%
OS	Open Space	0	0	0	0%
R-1-10	Residential - Low Density	223.2	690	156,026	3.0%
R-1-12	Residential - Low Density	363.4	960	348,816	6.7%
R-1-6	Residential - Moderate Density	366.9	1380	506,383	9.7%
R-1-8	Residential - Low Density	1,293.2	960	1,241,314	23.8%
R-2	Residential - Moderate Density	574.1	1380	792,169	15.2%
R-3	Residential - High Density	557.5	1620	903,119	17.3%
R-4	Residential - High-Rise Density	87.1	1800	156,854	3.0%
RI	Rural Industrial	0	1080	0	0%
RTC-1	Riverfront Tourist Commercial	5.0	960	4,823	0.1%
RTC-2	Riverfront Tourist Commercial	10.4	960	9,989	0.2%
RTC-3	Riverfront Tourist Commercial	0	960	0	0%
	Subtotal	**4,421.1**		**5,107,622**	**98.1%**
Rural Area					
GC	General Commercial	0	1050	0	0%
R-1-12	Residential - Low Density	0	960	0	0%
R-1-8	Residential - Low Density	0	960	0	0%
RC	Rural Commercial	0	1050	0	0%
RR1	Rural Residential 1 Acre	352.8	240	84,689	1.6%
RR2.5	Rural Residential 2.5 Acre	4.4	210	931	0.02%
RR5	Rural Residential 5 Acre	78.7	180	14,127	0.3%
WR	Woodlot Resource	0	0	0	0%
	Subtotal	**435.9**		**99,746**	**1.9%**
--	Streets, Canals, etc.	0.0	0	0	0%
	Grand Total	**4,857.0**		**5,207,368**	**100%**
	Total Predicted Flow[3]			**5.21 MGD**	
	5-Year Average Dry Weather Flow[4]			**5.20 MGD**	
	Percent Difference			**0.1%**	

Notes:
(1) Flow coefficients were generated by determining the coefficients that would result in the predicted flows equaling the measured flows over the course of the flow monitoring period. Basin-specific flow coefficients were developed, and an overall weighted average coefficient for each land use category was developed. Then, the coefficients are adjusted up to meet the WRP's historical annual ADWF of 5.2 mgd. The DWF to the WRP during the monitoring period was less than the ADWF (4.3 mgd compared to 5.2 mgd, respectively), so the flow coefficients were increased to represent the historical ADWF.
(2) Overall wastewater generation is the adjusted average coefficient multiplied by the existing sewered acreage. This value serves as a flow balance against the ADWF.
(3) Total predicted flow is calculated by multiplying the adjusted flow coefficient for each land use category by the existing sewered service area for that category. This step serves as a check that the ADWF is being correctly represented.
(4) Total ADWF represents the historical 5-year annual average dry weather flow, based on historical flow data from the WRP.

As presented in Chapter 2, future land use designations are different from the existing designations. The City provided a relationship between existing and future designations. Table 3.2 summarizes this relationship and details flow factors that will be used in the future flow projections.

Table 3.2 Existing Zoning and Future Land Use Correlation
Wastewater Collection System Master Plan
City of Grants Pass

Comprehensive Plan Land Use	Existing Zoning Designation
LR	R-1-12/R-1-10/R-1-8
MR	R-1-6/R-2
HR	R-3/R-3-2
HRR	R-4/R-4-2/R-5
NC	NC
CBD	CBD
RTC	RTC-1/RTC-2/RTC-3
GC	GC
COMM	COMM
BP	BP
IP	IP
I	I/RI
EMP	I/IP/BP

3.4.3 Industrial Customers

The City's four industrial dischargers within the study area are:

- Riverside Ready Mix, located 531 SE Mill Street.
- Metal Finishers, located 817 SW Foundry Street.
- Timber Products, located 1090 SE "M" Street.
- Clearwater Technology located 111 Haines Ln (Outside Study Area, trucked to the WRP Plant).

The location of these customers is illustrated in Figure 3.4. Four years' worth of data was summarized for each of the City's industrial dischargers. Figure 3.5 presents the historic total flows and projected flows. The City does not plan on adding additional industrial customers to the study area.

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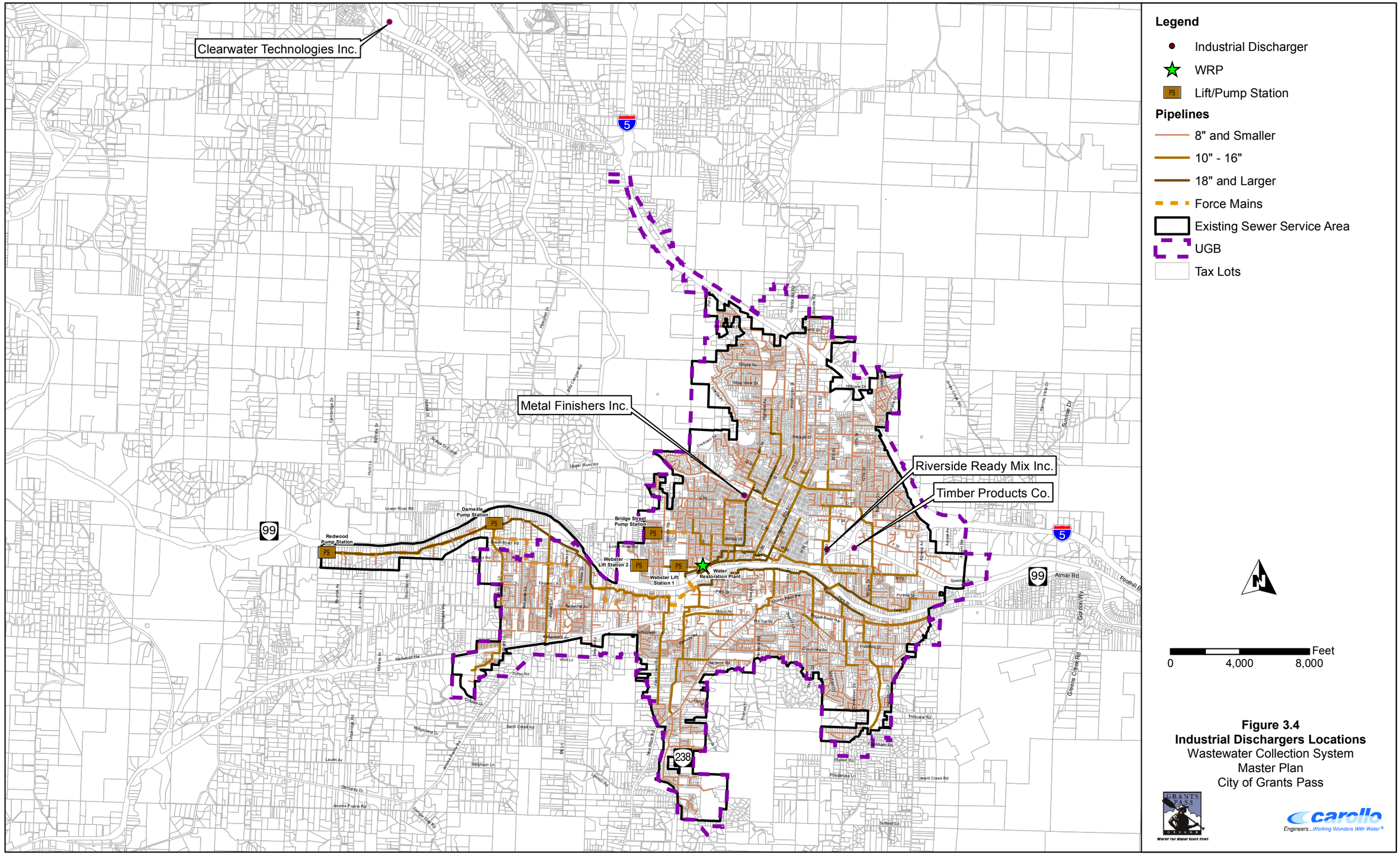

Figure 3.4
Industrial Dischargers Locations
Wastewater Collection System
Master Plan
City of Grants Pass

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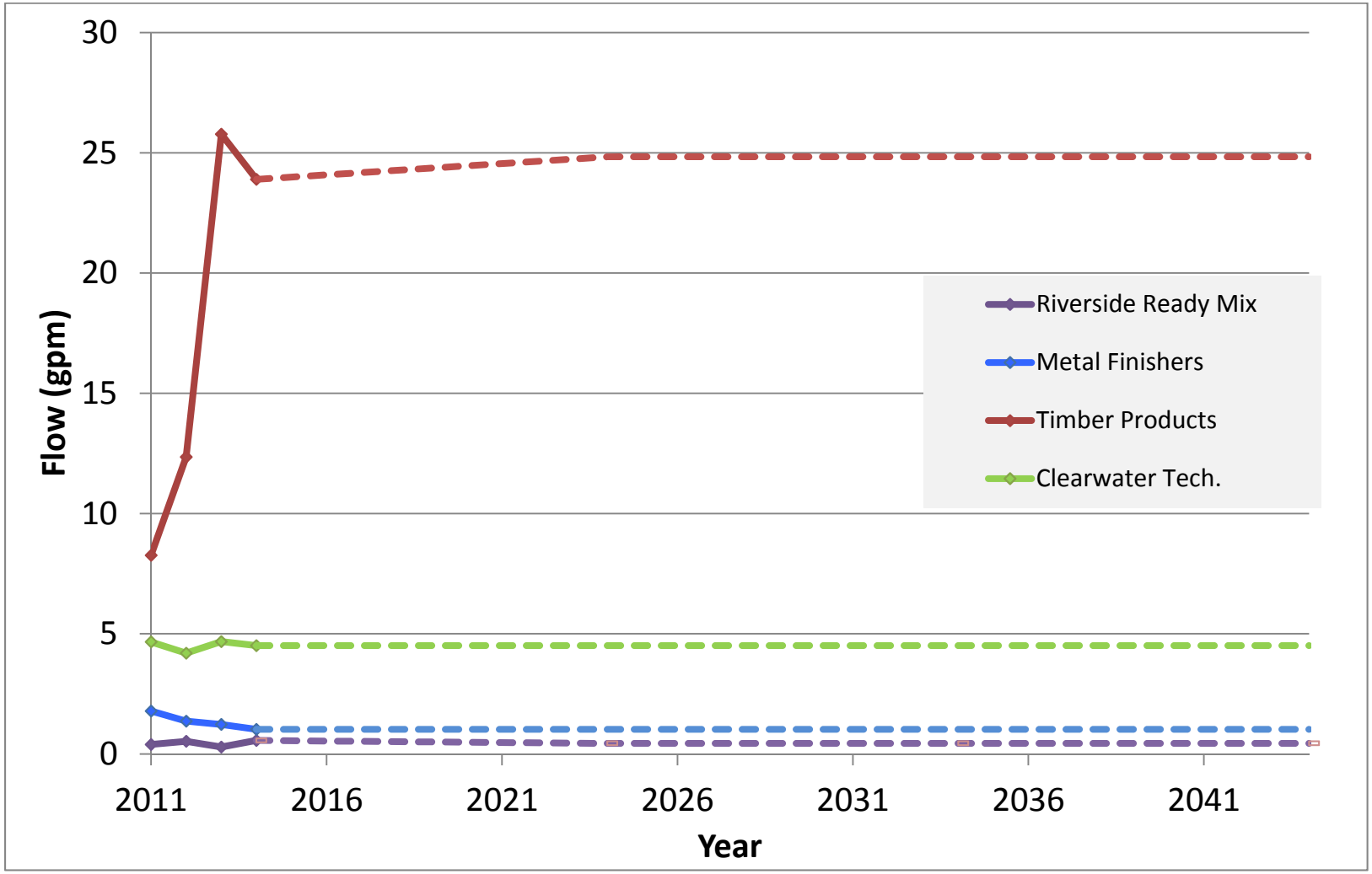

HISTORIC AND PROJECTED INDUSTRIAL DISCHARGERS FLOWS

FIGURE 3.5

CITY OF GRANTS PASS
WASTEWATER COLLECTION SYSTEM MASTER PLAN

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3.4.4 Future Customer Connection Assumptions

Some areas in the City's study area are currently undeveloped but not connected to the collection system. As these areas develop, the City will need to expand its existing collection system to serve these new customers.

Figure 3.6 shows the assumptions on where these areas are planned to be connected. Infrastructure recommendations to serve the future undeveloped area are developed as part of Chapter 5 - Collection System Analysis.

3.4.5 Wastewater Basins

To identify capacity requirements for specific facilities throughout the system, flows were developed for each wastewater basins. These wastewater basins are based on the understanding of the system. The City's collection system consists of 23 wastewater basins, as shown in Figure 3.7.

Future wastewater basins were named with a double letter based on which basin they are designated to flow. For instance, future basin FF flows to existing basin F.

3.4.6 Existing and Projected Average Dry Weather Flow

Developing an accurate estimate of the future quantity of wastewater generated at build out of the collection system is an important step in maintaining and sizing sewer system facilities, for both existing conditions and future scenarios.

Base flow can be estimated for a wastewater system by comparing dry weather flow and wet weather flow at the various flow monitoring locations. To estimate ADWF for more specific areas, such as individual wastewater basins, dry weather flows are typically estimated based on the area contributing to flows and flow coefficients developed for each land use type. This method is developed based on the assumption that areas with similar land uses, such as low density residential parcels, produce equivalent quantities of wastewater flow. System-wide flows can be compared to known flows at flow monitors, or at the treatment plant to verify accuracy. This method of estimating base flows is an industry standard for planning and provides sufficiently accurate data for planning purposes.

3.4.6.1 Existing Average Dry Weather Flows

The City’s current base flows were derived by calculating the areas of land currently contributing flow to the wastewater collection system. The total acreage only accounts for the developed properties that are currently connected to the collection system. As presented in Section 3.3, the existing dry weather flow for the entire collection system is estimated at 5.21 mgd.

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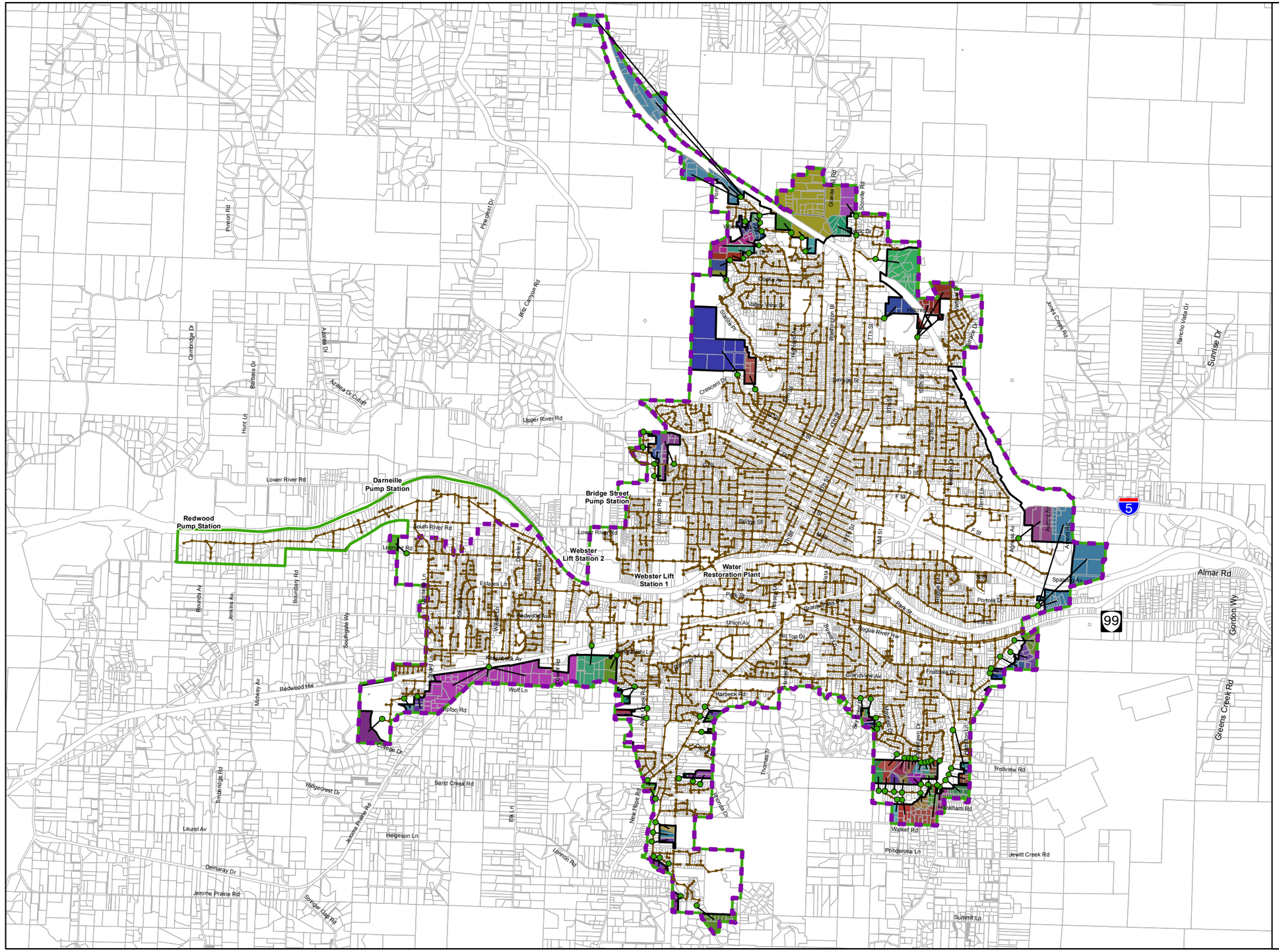

Legend

- Contributing Manholes
- Other Manholes
- Flow Contributing Manhole
- Other Pipelines
- Future Growth Areas
- Study Area Boundary
- Existing Sewer Service Area
- UGB

N

0 5,000 10,000 Feet

Figure 3.6
Future Customer Connection Assumptions
Collection System Master Plan Update
City of Grants Pass

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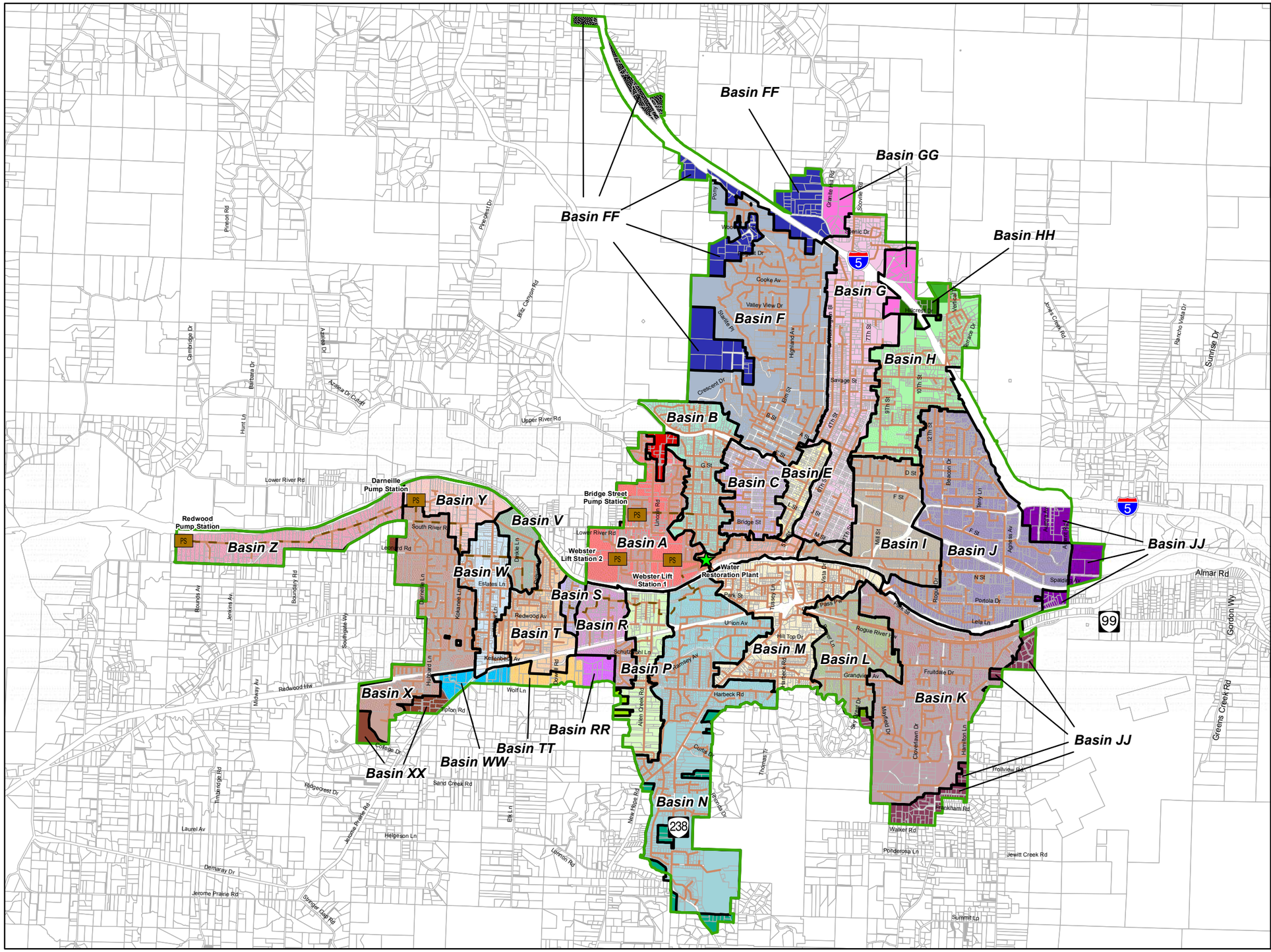

Legend

- WRP
- Lift/Pump Station
- Tax Lots
- Study Area
- Collection System Sewer Basins

Existing Wastewater Basins

- Basin A
- Basin B
- Basin C
- Basin D
- Basin E
- Basin F
- Basin G
- Basin H
- Basin I
- Basin J
- Basin K
- Basin L
- Basin M
- Basin N
- Basin P
- Basin R
- Basin S
- Basin T
- Basin V
- Basin W
- Basin X
- Basin Y
- Basin Z

Future Wastewater Basins

- AA
- FF
- GG
- HH
- JJ
- KK
- LL
- NN
- PP
- RR
- TT
- WW
- XX

N

0 5,000 10,000 Feet

Figure 3.7
Wastewater Basins
Collection System Master Plan Update
City of Grants Pass

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3.4.6.2 Projected Average Dry Weather Flows

The projected dry weather flows were developed based on the future land-use map presented in Chapter 2. Historical and projected flows are shown in Figure 3.8. Future average base flows for the study area are anticipated to increase to 7.01 mgd by the year 2025, and 9.07 mgd by the year 2035.

Projected flows were generated in a similar manner as the existing ADWF. The flow coefficients developed for the existing land use categories were applied to the future build-out land use (acres) to project the wastewater flow generated from infill and new development. The resulting flows represent the projected inflow in the hydraulic model.

3.4.6.2.1 *Short-Term Projections (2025)*

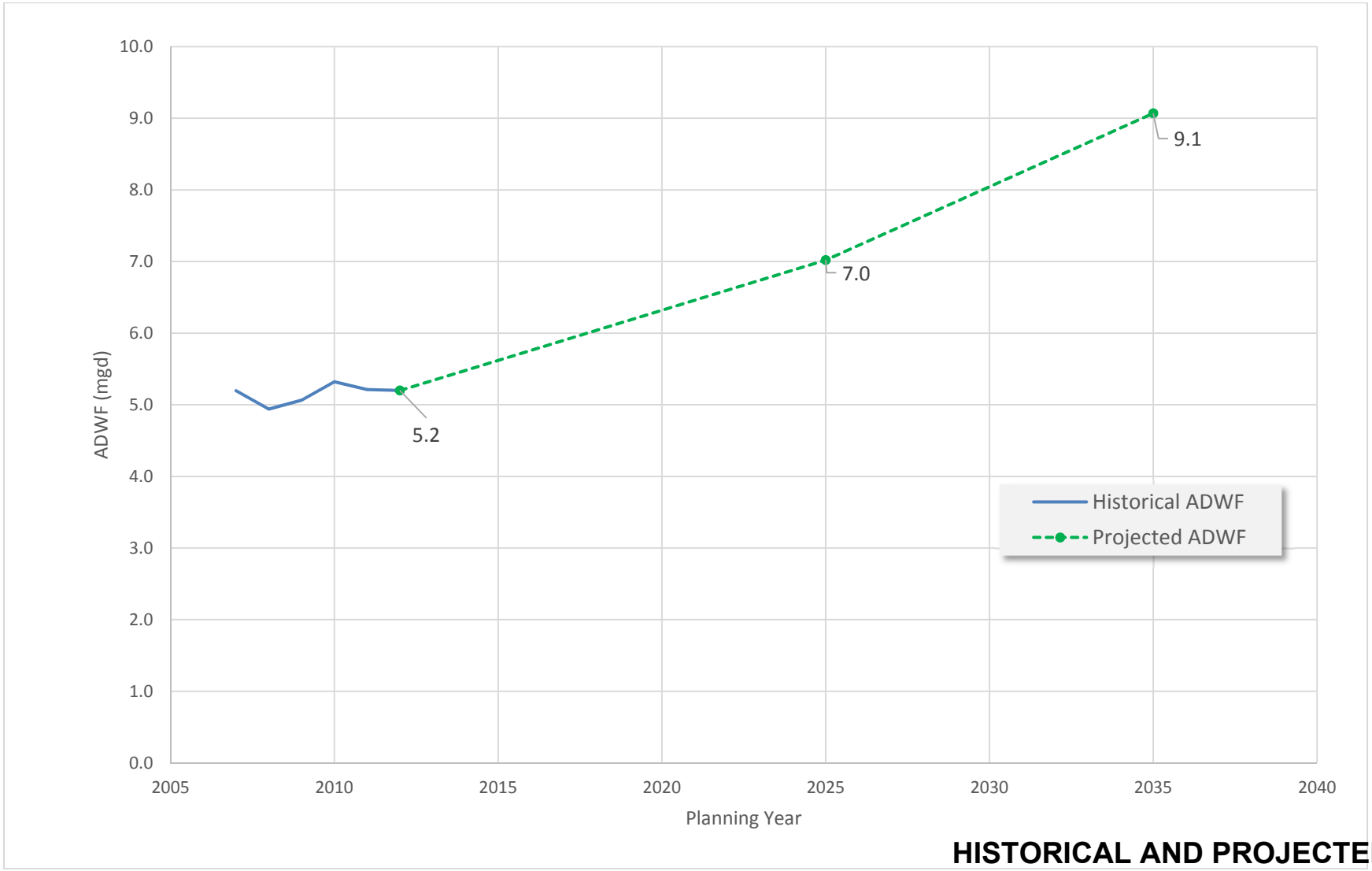
The total average dry weather for the City's collection system is based on the rates of growth used in the WRP Facility Plan (Carollo, March 2013). The WRP Facility Plan plans a rate of growth of 2.1 percent per year between existing conditions and year 2025. The existing dry weather flow of 5.21 mgd is therefore raised by 27 percent to a total of 7.01 mgd in 2025. The next step in short-term flow projections is to spatially allocate the additional 1.78 mgd of dry weather flow into the collection system.

The City provided assumptions on where to allocated short-term dry weather flows. All vacant parcels within the existing service area are assumed to be build-out by 2025 at the exception of three areas:

- Along the frontage on Highland/Vine.
- The industrial area on Foothill.
- The easterly portion of the Spalding area.

3.4.6.2.2 *Long-Term Projections (2035)*

The City plans on its Study area to be build-out by planning year 2033, therefore, the long-term projected flows assume 100 percent development and occupancy of all land areas within the study area. Using the flow coefficients presented in Section 3.4.2 and the City's GIS future land use data presented in Chapter 2, build-out flows are developed for the collection system. Build-out dry weather flows when the study area is considered build-out is estimated at 9.07 mgd.



HISTORICAL AND PROJECTED ADWF TREND

FIGURE 3.8

CITY OF GRANTS PASS
WASTEWATER COLLECTION SYSTEM MASTER PLAN

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3.4.6.3 Average Dry Weather Flow Projection Summary

All of the various flow coefficients summarized in this chapter helped to ultimately develop short-term and long-term sanitary dry weather flows. Table 3.3 presents the existing and projected trend of dry weather flows within the City's study area and Figure 3.8 graphically illustrates the flow projection results.

Table 3.3 ADWF Projections Summary by Sewer Basin
Wastewater Collection System Master Plan
City of Grants Pass

Sewer Basin ID	Existing ADWF (mgd)	2025 ADWF (mgd)	2035 ADWF (mgd)
Basins A/AA	0.15	0.37	0.45
Basin B	0.22	0.26	0.27
Basin C	0.18	0.19	0.20
Basin D	0.06	0.08	0.08
Basin E	0.05	0.07	0.08
Basins F/FF	0.59	0.75	1.24
Basins G/GG	0.40	0.52	0.69
Basins H/HH	0.28	0.43	0.49
Basin I	0.27	0.35	0.37
Basins J/JJ	0.52	0.73	0.90
Basins K/KK	0.38	0.54	0.81
Basins L/LL	0.22	0.26	0.26
Basin M	0.32	0.42	0.44
Basins N/NN	0.53	0.77	0.82
Basins P/PP	0.10	0.11	0.24
Basins R/RR	0.11	0.14	0.20
Basin S	0.03	0.03	0.04
Basins T/TT	0.22	0.25	0.32
Basin V	0.05	0.05	0.08
Basins W/WW	0.16	0.19	0.31
Basins X/XX	0.33	0.43	0.60
Basin Y	0.03	0.03	0.06
Basin Z	0.03	0.03	0.05
Total (mgd)	**5.21**	**7.01**	**9.07**

3.4.7 Peak Wet Weather Flow Development

Peak wet weather flows in a wastewater collection system are caused by rainfall dependent I/I. Peak hour flows can result in flows more than ten times the base flow, causing utilities to construct high-capacity infrastructure to convey and treat these extraneous flows. This section describes the methodology used for developing existing and future peak hour flows within the City's sewer system, which was subsequently used for performing the capacity analysis as described in Chapter 5.

3.4.7.1 Design Storm

Design storms are rainfall events used to analyze the performance of a collection system under peak flows and volumes, and have specific recurrence interval and rainfall duration. Developing a design storm can be accomplished in different ways. If historic data is not available, a synthetic design storm can be developed. For locations in Oregon, the National Oceanic and Atmospheric Administration (NOAA) publishes isopluvial (rainfall contour) maps that can be used to approximate the total rainfall depth for a range of design storms. For the City, the 5-year, 24-hour design storm was chosen to represent the design flows. The 5-year, 24-hour design storm event for the area surrounding Grants Pass is 3.5 inches. In Oregon, the 5-year, 24-hour design storm is typical for use with modeling wet weather flows in collection systems. Essentially, this design storm has a five percent chance (1/20) that 3.5 inches of rain will fall in any 24-hour period in a given year.

For the distribution of the design storm, it is possible to utilize a synthetic distribution or to establish a custom distribution based on historical data. The Natural Resources Conservation Service (NRCS), formally known as the Soil Conservation Service (SCS), method is typically used to distribute the rainfall volume and establish a peak intensity over a given storm duration. The NRCS method includes the use of developed normalized rainfall hyetograph distribution curves based on the storm's geographical location. However, during the planning of this capacity analysis, it was determined that utilizing a synthetic distribution for the design storm would result in peak flows that do not represent the intensity of storms that are typical for Grants Pass. The NRCS distributions would result in a storm intensity that is relatively high for the area, and would result in over-conservative design recommendations due to these inflated peak flows.

The alternative was to develop a custom design storm based on historical storm events that have occurred in Grants Pass, and to utilize a distribution that resulted in lower intensities but equivalent volumes to the design storm. Over the flow monitoring period, the highest volume storm that occurred was between January 18 and January 20, 2012. During this storm, the 24-hour period with the highest rain resulted in a total rainfall of approximately 1.95 inches, with the whole 46.5-hour storm event dropping approximately 2.95 inches of

rain.[1] The January 18-20 storm event distribution was used as the basis for the City's custom design storm. The 3.5-inch NOAA 5-year, 24-hour design magnitude was applied to the City's custom design distribution to produce the custom design storm.

Figure 3.9 shows the custom design storm used for the capacity analysis. The custom storm resulted in a peak rainfall intensity of 0.34 inches, compared to the NRCS peak intensity of 0.55 inches. As shown, antecedent rain was included before the 3.5-inch, 24-hour storm. This antecedent rain is actual rain data measured during the flow monitoring period from the rain gauge Grant10, which measured the highest amount of rain out of the five gauges monitored during the January 18-20 storm event. The purpose of including the antecedent rain was to mimic typical rainfall patterns in the region and to ensure that the peak flows through the system were appropriately conservative for planning. By using the custom distribution, excessive peak intensities were avoided. However, to ensure that the custom distribution provided conservative enough estimates of peak flows for planning, the antecedent rainfall was included prior to the design storm event.

3.4.7.2 I/I Development Methodology

Assumptions are made to estimate I/I in the sewer collection system are described in the sections below:

- Assumptions for existing customers;
- Assumptions for new customers.

All assumptions below are included in the results presented in section 3.4.7.3.

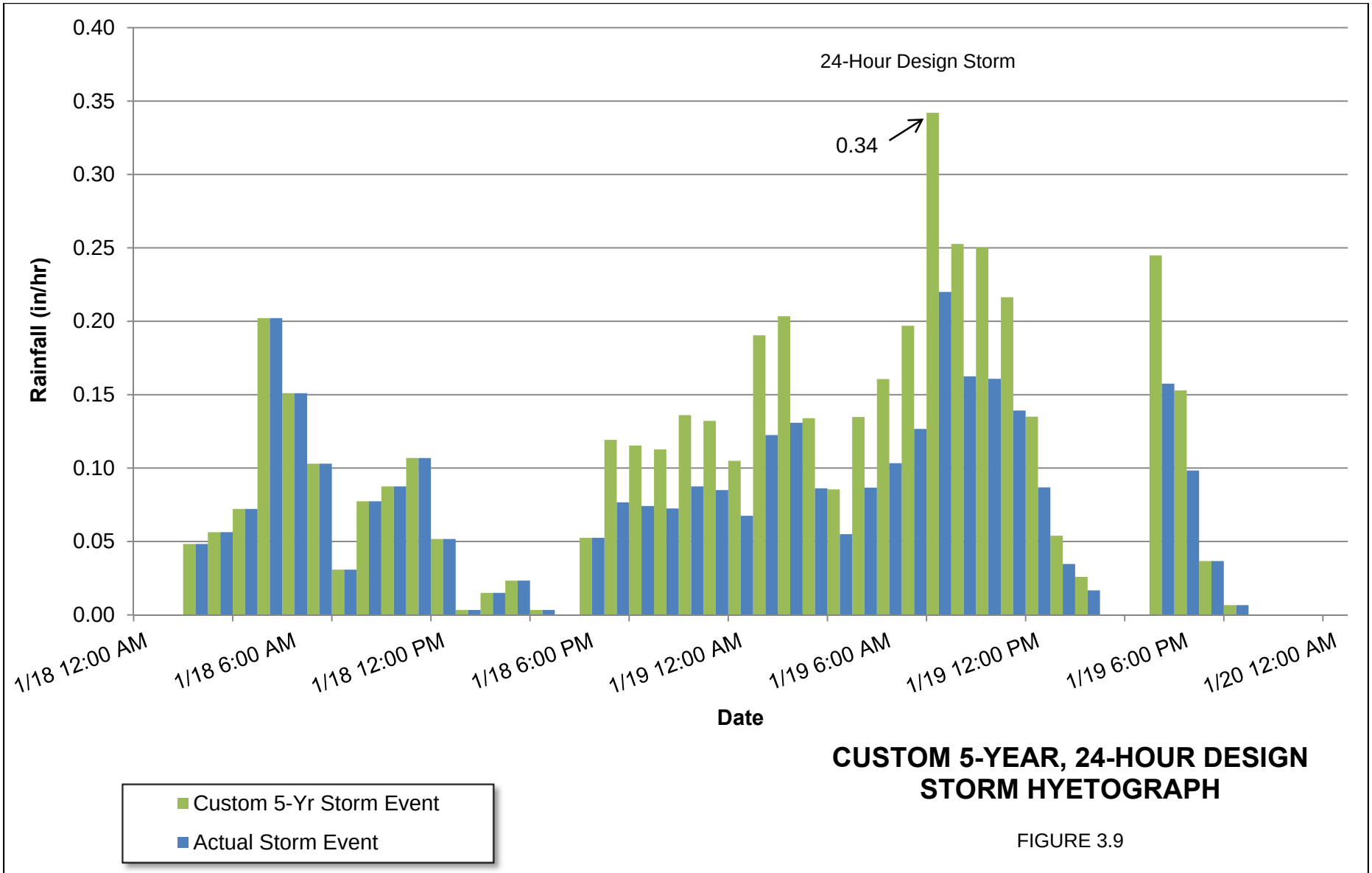
3.4.7.2.1 *I/I Assumptions for Existing Condition*

The I/I resulting from the design storm is simulated using the RDII unit hydrographs developed for the existing service area and each flow meter basin. The unit hydrographs are developed as a part of the wet weather calibration process of the hydraulic model, and are described in further detail in Appendix E. To simulate I/I, the calibrated RDII unit hydrographs were applied to each sewer basin during the design storm. The I/I that occurs during the design storm is representative of the I/I coming from the existing infrastructure.

3.4.7.2.2 *I/I Degradation Assumption*

The City wishes to account for degradation of their existing system in the future scenarios. Degradation is the slow decline in condition of the sewer collection system that allows an increase in I/I in the system. For the purpose of this study, it is assumed that degradation is 6 percent per decade. New sewer collection system should degrade less than old systems, therefore, degradation is a percentage of the existing I/I.

[1] Source: V&A Flow Monitoring Data, average rainfall for the January 18-20, 2012 storm from rain gauges VA Gauge, Grant4, and Grant10. These three rain gauges were the most representative gauges based on proximity to the City and influence on the collection system.



CUSTOM 5-YEAR, 24-HOUR DESIGN STORM HYETOGRAPH

FIGURE 3.9

CITY OF GRANTS PASS
WASTEWATER COLLECTION SYSTEM MASTER PLAN

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3.4.7.2.3 *Direct Inflow for Future Service Area Assumption*

To model I/I from infill and new development in the future service area, a direct inflow technique is used. Instead of simulating I/I using an RDII unit hydrograph, I/I is simulated by assuming a constant I/I flow factor per acre of new development. I/I flow factors can range from 1,000 to over 10,000 gpd/acre in the northwest. As detailed in Section 3.4.7.4 below, existing I/I flow factors for the City range from 1,231 gpd/acre to 9,320 gpd/acre.

An I/I Flow Factor of 1,000 gpd/acre is a reasonable assumption for estimating I/I in areas of new development to reflect improved construction methods and integrity of new materials. Therefore, the generation constant used for new development areas was 1,000 gpd/acre.

3.4.7.2.4 *Capacity Bottleneck Assumption*

The peak flows (existing and future) for the wastewater basins presented in Table 3.4 include improvements to correct capacity deficiencies presented in Chapter 5 - System Analysis. The improvement projects alleviate capacity bottlenecks upstream in each basin, which allows higher peak flows to be conveyed through the system. All values below represent the flows to the WRP if the capacity bottlenecks are resolved. This ensures that the PWWF truly represents the peak hour flow, without dampening due to upstream capacity deficiencies. Peak flows without improvements would be underestimates of actual peak system inflow.

3.4.7.3 Existing and Projected Peak Wet Weather Flows

The PWWF represents the maximum hourly flow rate under the selected design storm presented in Section 3.4.7.1 and growth conditions. Components of the design flow include the ADWF predicted for the scenario and the peak I/I rate predicted by the model using the assumptions described above. To develop the design flows in the hydraulic model, the design storm is routed through the model and the resulting I/I from existing and future development creates the design flow. Table 3.4 provides the peak hour design flow under both existing and future scenarios for each wastewater basin.

As shown in Table 3.4, projected growth increases the PWWFs predicted by the hydraulic model throughout the collection system. For the 5-year, 24-hour design storm, PWWFs up to 27.2 mgd are predicted for the existing condition. PWWFs up to 32.9 mgd and 37.6 mgd are predicted for the short-term and long-term conditions, respectively.

Table 3.4 Design Flows by Wastewater Basin(1)
Wastewater Collection System Master Plan
City of Grants Pass

Wastewater Basin	Existing Peak Flow (mgd)	2025 Peak Flow (mgd)	2035 Peak Flow (mgd)
Basins A/AA	1.71	3.45	4.07
Basin B	1.70	2.24	2.56
Basin C	3.58	4.32	5.26
Basin D	7.68	9.73	11.24
Basin E	0.75	0.86	0.97
Basins F/FF	2.73	3.40	4.28
Basins G/GG	4.89	5.93	6.58
Basins H/HH	1.92	2.45	2.66
Basin I	1.54	2.30	2.34
Basins J/JJ	2.80	3.42	3.74
Basins K/KK	1.06	1.47	2.16
Basins L/LL	1.18	1.30	1.42
Basin M	6.27	7.67	8.86
Basins N/NN	1.43	2.07	2.42
Basins P/PP	1.56	1.68	1.78
Basins R/RR	2.14	2.35	2.60
Basin S	2.27	2.49	2.72
Basins T/TT	3.23	3.56	4.02
Basin V	3.60	3.95	4.44
Basins W/WW	0.44	0.52	0.70
Basins X/XX	1.10	1.37	1.64
Basin Y	5.91	6.32	7.29
Basin Z	0.47	0.53	0.54
Total (mgd)	**27.2**	**32.9**	**37.6**

Notes:
(1) These conditions represent the flows to the WRP if the capacity bottlenecks are resolved. This ensures that the PWWF truly represents the peak hour flow, without dampening due to upstream capacity deficiencies.

3.4.7.4 Peaking Factors and Peak I/I Rates

There are several metrics used to quantify the severity of the system's I/I. For this analysis, two metrics were used: Instantaneous Peaking factor and Peak I/I Rate. Table 3.5 presents

the calculated peak I/I rates and instantaneous peaking factors for each wastewater basin for current and future conditions under the 5-year, 24-hour design storm. It should be noted that these values are directly related to the volume and intensity of the design storm. A smaller rainfall event would produce lower values.

3.4.7.4.1 *Instantaneous Peaking Factor*

The instantaneous peaking factor was estimated by dividing the peak flow by the base flow. The PWWF:ADWF peaking factors reflect the nature of the projected I/I response with new development; as new development is added to the service area, the ratio decreases because the predicted I/I for new areas is less than that for existing development. However, in some cases, the ratio might increase as the City also plans for I/I degradation for existing customers.

The City's overall peaking factor under existing conditions is 5.2. In general, a system with a peaking factor value of more than 5 is usually considered to be experiencing significant I/I. Under future scenarios, the peaking factor decreases down to 4.1 due to the addition of new development to the collection system.

3.4.7.4.2 *Peak I/I Rate (gpad)*

The peak I/I rate is calculated by subtracting the base flow from the peak flow at the time the peak flow occurred. The base flow corresponds to the dry weather flow at the time the peak flow occurs. The base flow is therefore different from the ADWF. The base flow occurring at the time of the peak was determined using the diurnal curves for each basin. In general, a peak I/I per acre value greater than 3,500 gpad represents a high response of a collection system, while a peak I/I per acre value greater than 6,000 or 7,000 gpad is considered significantly high.

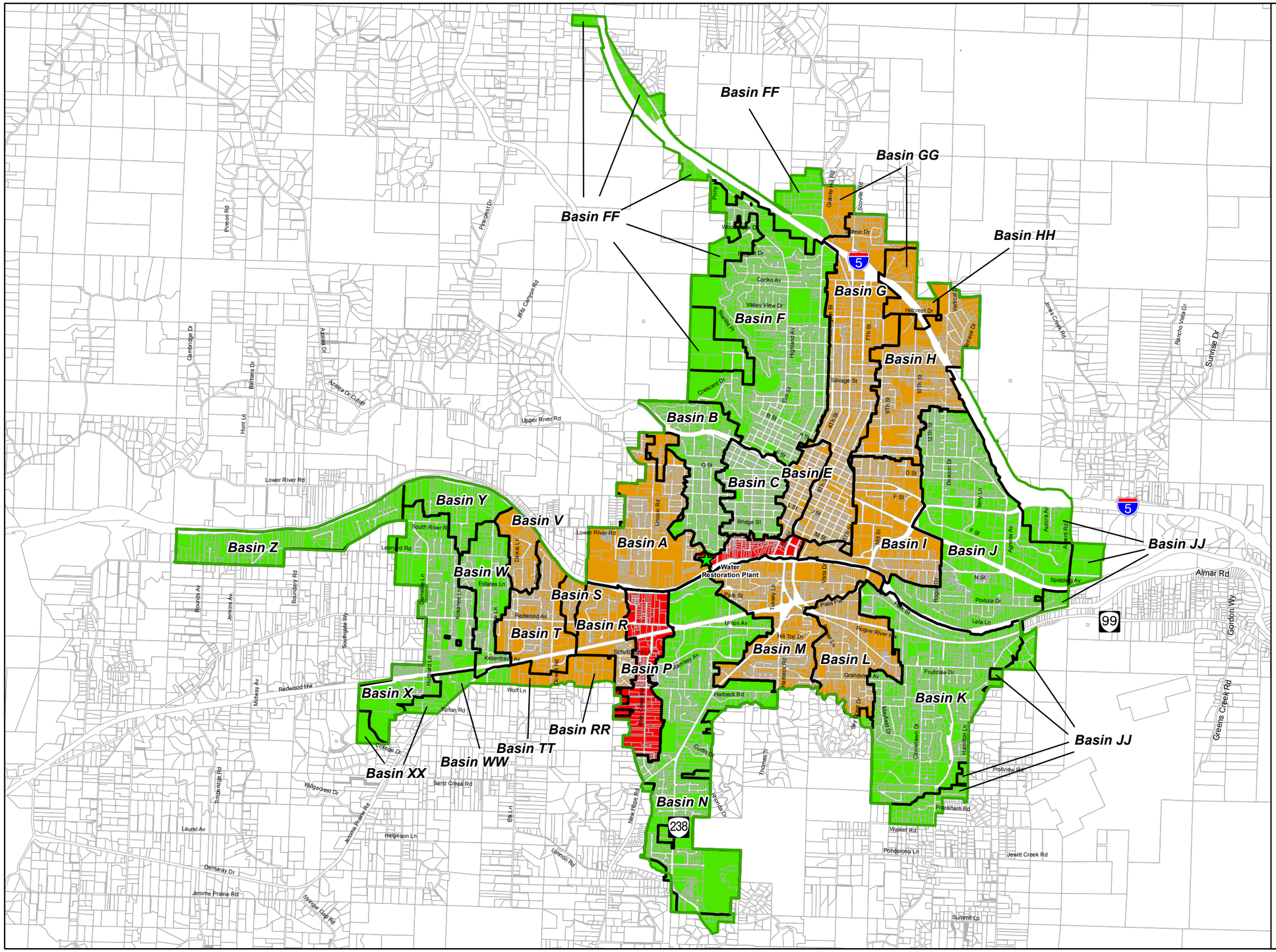
The highest peak I/I per acre rate under existing conditions is approximately 9,320 gpad in Basin D, which is considered significantly high. The City's overall existing peak I/I rate value is approximately 3,390 gpad. Out of the City's 23 wastewater basins, 11 basins have a peak I/I rate higher than 3,500 gpad with 2 basins with values above the 6,000 gpad threshold. Figure 3.10 classifies the wastewater basins based on their existing peak I/I rate value. This map ranks the basins from lowest value in green (<3,500 gpad) to highest value in red (> 6,000 gpad). Wastewater basins with significant I/I include basin D and basin P. This is consistent with the findings from the I/I analysis performed as part of the flow monitoring program.

In basins, where significant growth is planned, the peak I/I rate decreases because the predicted I/I for new areas is less than that for the existing development, however, in basins where little growth is expected, the peak I/I rate increases because of the I/I degradation of 6 percent per decade assumption. Some basins have a peak I/I rate value almost constant due to the average between degradation and new growth.

Table 3.5 Peaking Factors and Peak I/I Rates
Wastewater Collection System Master Plan
City of Grants Pass

Wastewater Basin	Existing Conditions		2025 Conditions		2035 Conditions	
	Peaking Factor	Peak I/I Rate (gpda)	Peaking Factor	Peak I/I Rate (gpda)	Peaking Factor	Peak I/I Rate (gpda)
Basins A/AA	5.6	5,597	4.1	3,322	3.9	3,071
Basin B	4.7	3,389	3.9	3,611	3.9	3,634
Basin C	4.7	3,294	4.4	3,657	3.7	3,637
Basin D	4.3	9,320	4.0	12,025	3.8	13,304
Basin E	3.3	4,412	3.2	4,286	3.6	4,910
Basins F/FF	5.2	3,337	4.8	4,053	3.6	2,314
Basins G/GG	4.2	4,310	3.9	5,177	3.8	3,664
Basins H/HH	6.2	5,336	5.0	4,852	4.8	4,465
Basin I	4.9	3,786	4.5	3,782	4.7	3,529
Basins J/JJ	5.3	3,483	4.5	3,522	4.1	2,872
Basins K/KK	3.2	1,231	2.9	1,505	2.8	1,579
Basins L/LL	8.1	4,115	6.9	4,300	7.3	4,267
Basin M	5.3	4,039	4.4	3,861	4.1	3,623
Basins N/NN	5.5	1,845	3.9	1,907	3.7	1,883
Basins P/PP	7.1	7,673	6.8	7,223	7.1	6,770
Basins R/RR	7.9	4,020	7.2	3,629	6.8	4,174
Basin S	8.3	3,583	7.5	3,864	7.0	3,004
Basins T/TT	7.8	4,041	7.0	4,305	6.3	4,645
Basin V	8.2	4,037	7.3	4,229	6.7	4,176
Basins W/WW	4.0	1,778	3.5	2,050	3.1	1,448
Basins X/XX	6.1	2,571	4.6	2,632	3.7	2,463
Basin Y	7.6	2,043	6.4	1,177	5.4	977
Basin Z	26.5	2,563	25.8	2,212	23.7	1,780
Total (mgd)	**5.2**	**3,391**	**4.7**	**3,513**	**4.1**	**2,969**

Notes:
(1) Peak I/I rate equals to the peak I/I divided by the total acreage contributing to I/I for each wastewater basin.
(2) When subtracting flows between basins, the accuracy in reported peak flows decreases. Most basins require subtraction of more than 2 flow streams from upstream basins. The "level of confidence" in peaking factor and Peak I/I rates for these basins is less than for basins located directly upstream.
(3) These conditions represent the flows to the WRP if the capacity bottlenecks are resolved. This ensures that the PWWF truly represents the peak hour flow, without dampening due to upstream capacity deficiencies.



Legend

- WRP
- Tax Lots
- Study Area
- Collection System Sewer Basins

Wastewater Basins Peak I/I gpad

- Peak I/I rate less than 3,500 gpad
- Peak I/I rate between 3,500 gpad and 6,000 gpad
- Peak I/I rate above 6,000 gpad

Feet
0 5,000 10,000

Figure 3.10
Peak I/I Rates Ranking for Existing Conditions
Collection System Master Plan Update
City of Grants Pass

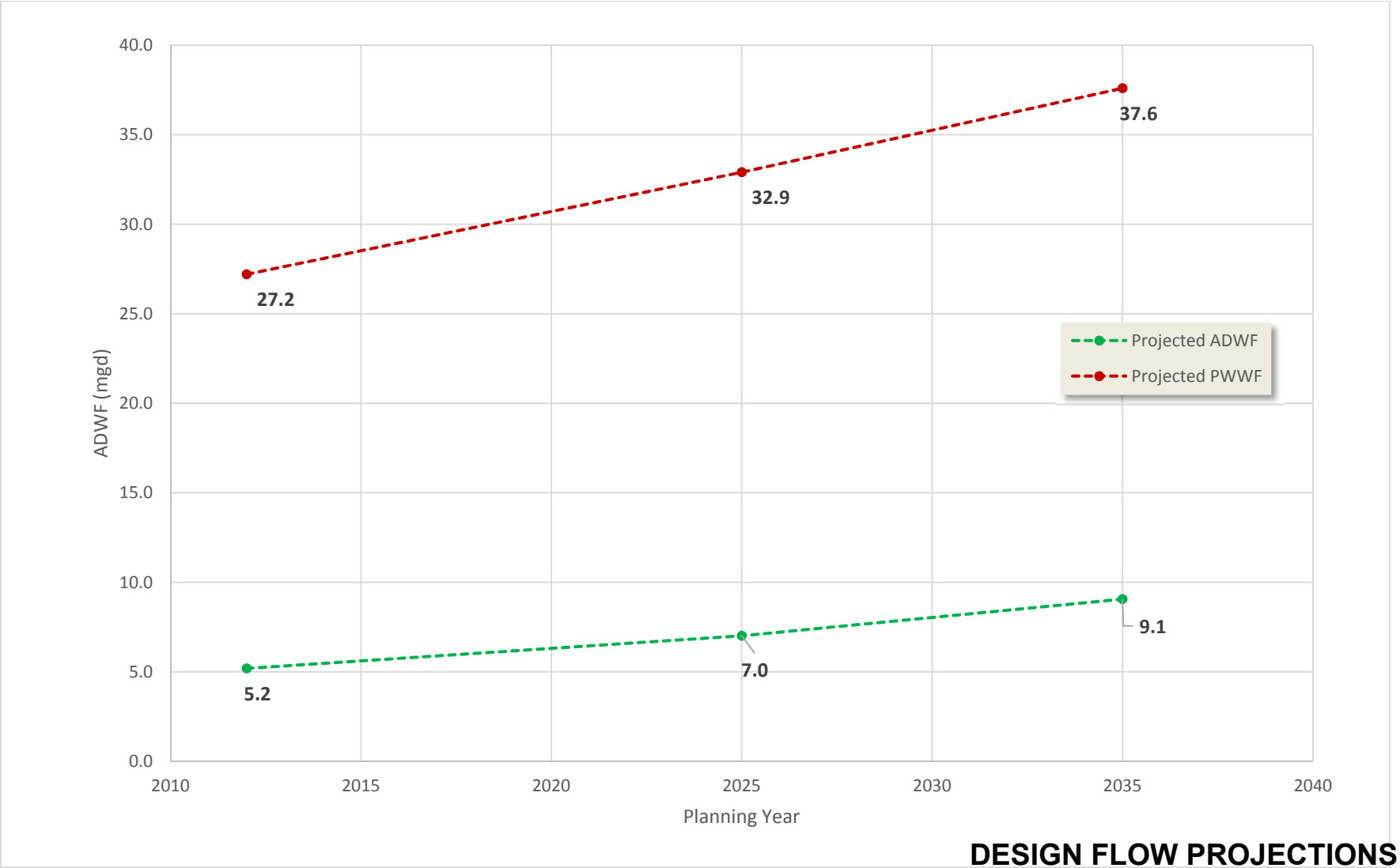
3.4.8 Flow Projection Summary

This section summarizes the flow projection results developed in the above sections. Figure 3.11 summarizes the flow projections. In the long-tern, the maximum peak wet weather flow is estimated at 37.6 mgd at the WRP, as shown in Table 3.6. All conditions reflect PWWF predictions for existing and future development conditions, but with capacity bottlenecking minimized throughout the system. PWWFs from these scenarios more closely represent the wastewater inflows to the system and the potential existing and future PWWFs to the WRP once necessary improvements are implemented.

Table 3.6 Existing and Projected Wastewater Flows to WRP
Wastewater Collection System Master Plan
City of Grants Pass

Condition(3)	Average Dry Weather Flow (ADWF) (mgd)	Peak Wet Weather Flow (PWWF)(1) (mgd)	Peaking Factor (PWWF:ADWF)(2)
Existing	5.2	27.2	5.2
Short-Term (2025)	7.0	32.9	4.7
Long-Term (2035)	9.1	37.6	4.1

Notes:
(1) The PWWF flow (design flow) is the peak hourly flow.
(2) Peaking factor is the Peak Wet Weather Flow divided by the Average Dry Weather Flow.
(3) These conditions represent the flows to the WRP if the capacity bottlenecks are resolved. This ensures that the PWWF truly represents the peak hour flow, without dampening due to upstream capacity deficiencies.



DESIGN FLOW PROJECTIONS

FIGURE 3.11

CITY OF GRANTS PASS
WASTEWATER COLLECTION SYSTEM MASTER PLAN

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Chapter 4

EXISTING COLLECTION SYSTEM AND CONDITION ASSESSMENT

4.1 INTRODUCTION

This chapter provides an overview of the City of Grants Pass (City's) existing wastewater collection system. The City operates and maintains approximately 181 miles of wastewater collection pipes and five pump stations, as shown in Figure 4.1.

This chapter provides a description of the City's existing collection system and a condition assessment of the facilities. The preliminary condition assessment of the City's existing sewer pipes, and pump stations was a cursory evaluation to provide an overall understanding of the City's collection system infrastructure. This included a review of age, remaining useful life, and recent maintenance and structural records. The assessment is useful for identifying improvement projects to extend the useful life of City infrastructure, and prevent failure in the system.

4.2 COLLECTION SYSTEM FACILITIES

The City's collection system consists of approximately 175 miles of gravity mains, 6 miles of force mains, and 5 pump stations that collect and convey wastewater to the Water Restoration Plant (WRP) located at 1200 SW Greenwood Ave. Figure 4.1 presents the City's existing collection system.

4.2.1 Wastewater Basins

The City's collection system is divided into 23 wastewater basins that are denoted alphabetically. Wastewater basin boundaries almost always follow topographic features such as ridge lines, streams, and rivers. The City established the basin boundaries to aid operation and maintenance efforts that follow topographic features.

Figure 4.2 shows the new areas from the UGB expansion discharge flow into the existing basins. These new areas are denoted with a double alphabet such as "AA" representing that new area "AA" will be incorporated into existing wastewater basin A.

4.2.2 Gravity Collection System

The City's existing sanitary sewer collection system is comprised of approximately 175 miles of gravity mains up to 48 inches in diameter. Table 4.1 provides an inventory of the gravity mains within the City's collection system. The collection system ranges in size from 4-inches to 48-inches in diameter with about 80 percent (%) of the system 8 inches or less in diameter, where 75.2% are 8-inch sewers.

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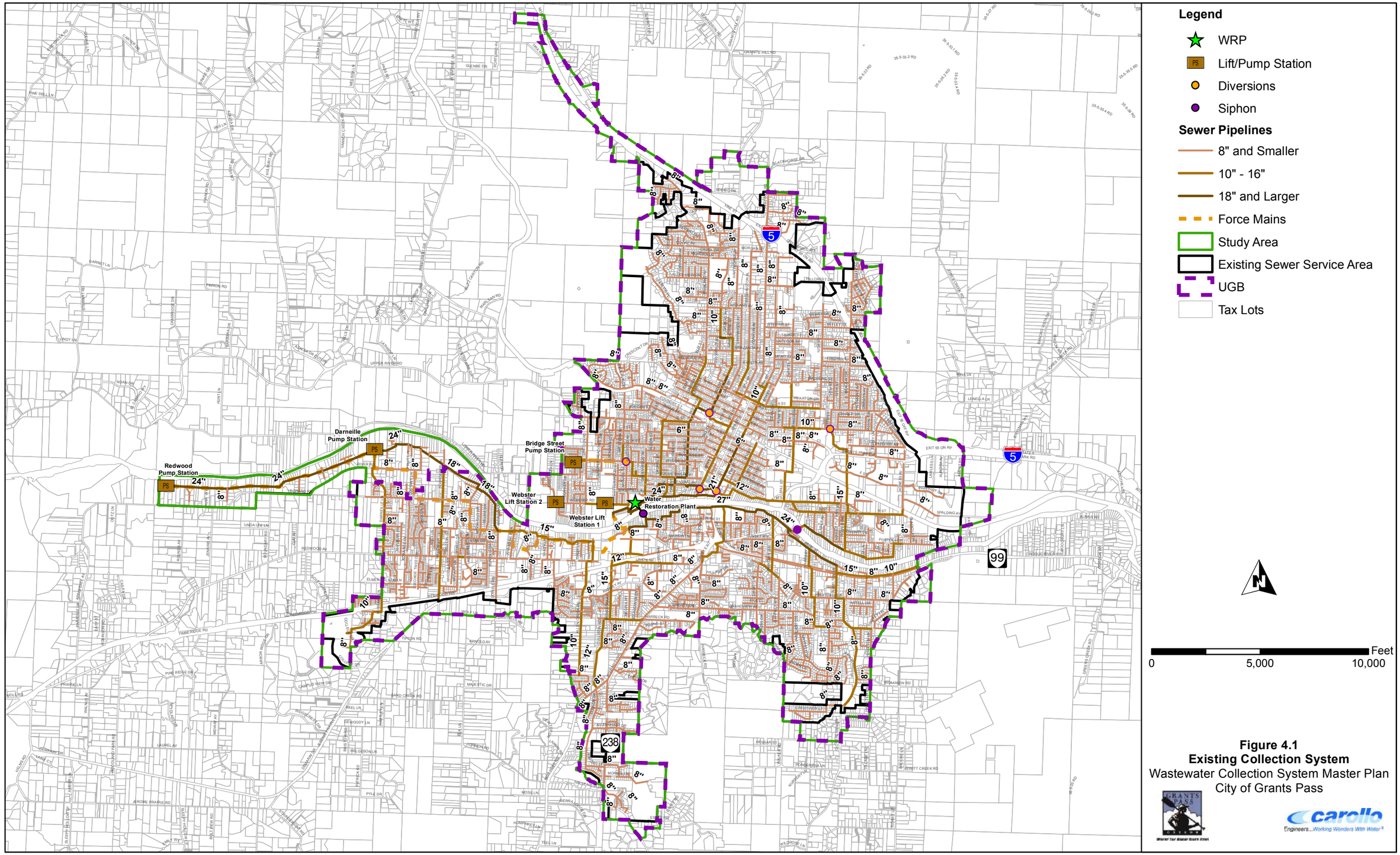

Figure 4.1
Existing Collection System
Wastewater Collection System Master Plan
City of Grants Pass

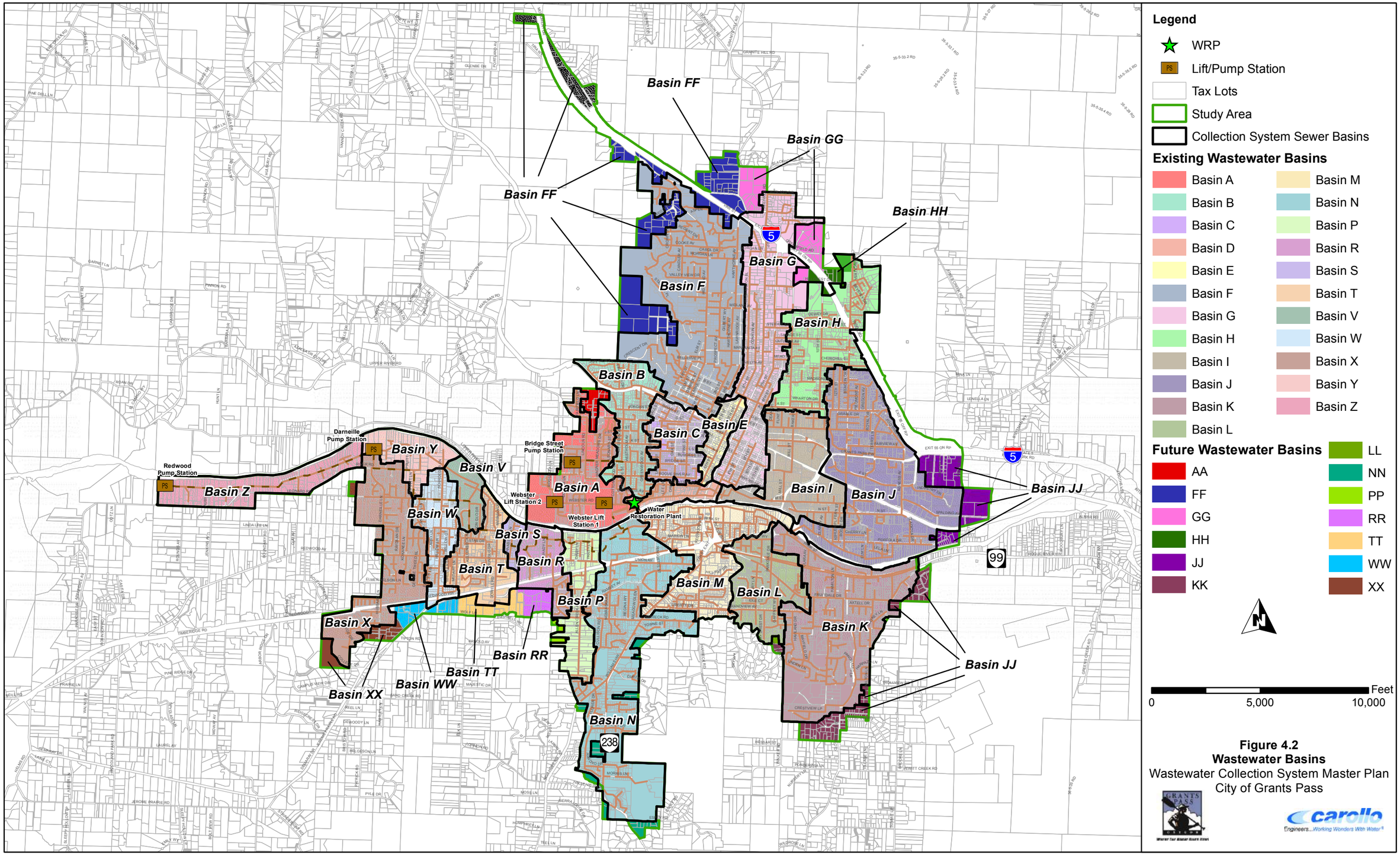

Figure 4.2
Wastewater Basins
Wastewater Collection System Master Plan
City of Grants Pass

Table 4.1 Collection System Gravity Main Inventory Wastewater Collection System Master Plan City of Grants Pass		
Diameter (inches)	**Length (feet)**	**Percent of Total Gravity Mains**
6" and Smaller	43,733	4.7%
8"	693,138	75.2%
10"	56,701	6.2%
12"	54,131	5.9%
14"	66	0.0%
15"	19,869	2.2%
18"	19,932	2.2%
21"	4,773	0.5%
24"	15,829	1.7%
27"	5,668	0.6%
30"	6,856	0.7%
36"	530	0.1%
42"	240	0.0%
48"	22	0.0%
Total (feet)	921,489	100.0%
Total (miles)	174.6	100.0%

4.2.3 Diversion Structures

The City also has diversion structures located throughout the collection system. These diversions are illustrated in Figure 4.1 as orange dots and detailed in Table 4.2. Diversions shunt flow from over-capacity pipelines to adjacent pipelines and effectively reduce peak flows in the over-capacity pipelines during rain events. Diversions can be an operationally effective and economic means of alleviating hydraulic constraints and preventing sanitary sewer overflows (SSOs). Despite the diversions, SSOs still occur within the collection system. SSOs that occurred since the last Master Plan in 2004 are listed in Table 4.3.

Table 4.2 Diversion Structures Locations Wastewater Collection System Master Plan City of Grants Pass	
Structure ID	**Location**
J41	At NE 11th Street and NE D Street
D57	At SE 7th Street and Voorhies Way
D33	On SW 5th Street 150 feet south of SW Central Avenue
B30	At SW Spruce Street and SW Bridge Street
Y35	At the Darneille Pump Station
F511	At NW 2nd Street and NW F Street

F511 is a special diversion that has a closed valve which if open would divert flow from Basin F to Basin E.

Table 4.3 Collection System Sanitary Sewer Overflows (2004 to Present) Wastewater Collection System Master Plan City of Grants Pass		
Date	**Location**	**Cause**
Jan 1, 2010	333 NE Fetzner Street	Mainline blockage resulted in spill to Skunk Creek
Feb 21, 2010	170 SE Smokey Lane	Mainline blockage
Dec 30, 2005	959 SE N Street	Storm event
Dec 30, 2005	NE A Street at NE 9th Street	Storm event resulted in spill to Skunk Creek
Dec 30, 2005	NE A Street at NE Flint Street	Storm event resulted in spill to Skunk Creek
Dec 30, 2005	730 NW 2nd Street (3 times during the same day)	Storm event resulted in spill to Gilbert Creek
Dec 30, 2005	506 SW Alder Street	Storm event resulted in spill to Gilbert Creek
Dec 31, 2005	730 NW 2nd Street	Storm event resulted in spill to Gilbert Creek
Dec 31, 2005	NE A Street at NE 9th Street	Storm event resulted in spill to Skunk Creek
Dec 31, 2005	NE A Street at NE Flint Street	Storm event resulted in spill to Skunk Creek
Dec 31, 2005	959 SE N Street	Storm event

4.2.4 Siphons

The City also has siphoned pipes located throughout the collection system. They are mainly necessary to cross the Rogue River. These structures are illustrated in Figure 4.1 as purple dots. One siphon is located east of Highway 199 between E Park Street and Le Karen Drive. The second river crossing is located south of the WRP.

4.2.5 Recent Pipe Projects Completed

The City recently completed several replacement projects that were identified in the previous Master Plan completed in 2004. As part of the Plan, six structural repair areas were identified and prioritized.

Since 2004, the City started replacing pipes in two of the highest priority structural repair areas. Figure 4.3 illustrates the pipes the City replaced since 2004.

- Pipes identified along Pine Street and connecting to Pine Street were replaced. The sewer along Pine Street between A Street and Central Avenue was upsized to help with capacity issues. Most of the rest of the sewers identified in this area were also replaced. Approximately 10,860 feet of pipes were replaced in this area, or about 73% of the recommended improvements were completed.
- The City started replacing the priority sewers in the vicinity of 5th Street. Approximately 5,280 feet of pipes were replaced as part of this priority area (35% of the proposed improvements completed).

The City plans to continue replacing the pipes identified with structural and maintenance issues. This chapter presented updated priority areas identified with the latest information provided by the City, which is presented in Section 4.3.

4.2.6 Pump Stations

The topography of the City's service area is such that most of the system is operated under gravity flow conditions, at the exception of some areas that require pumping to higher elevations. The City operates and maintains five pump stations as illustrated in Figure 4.1. Figure 4.4 presents the pump station tributary areas and Table 4.4 summarizes the location and key features of each station.

The five pump stations in the system include the following:

- Webster Lift Station No. 1.
- Webster Lift Station No. 2.
- Bridge Street Pump Station.
- Redwood Pump Station.
- Darneille Pump Station.

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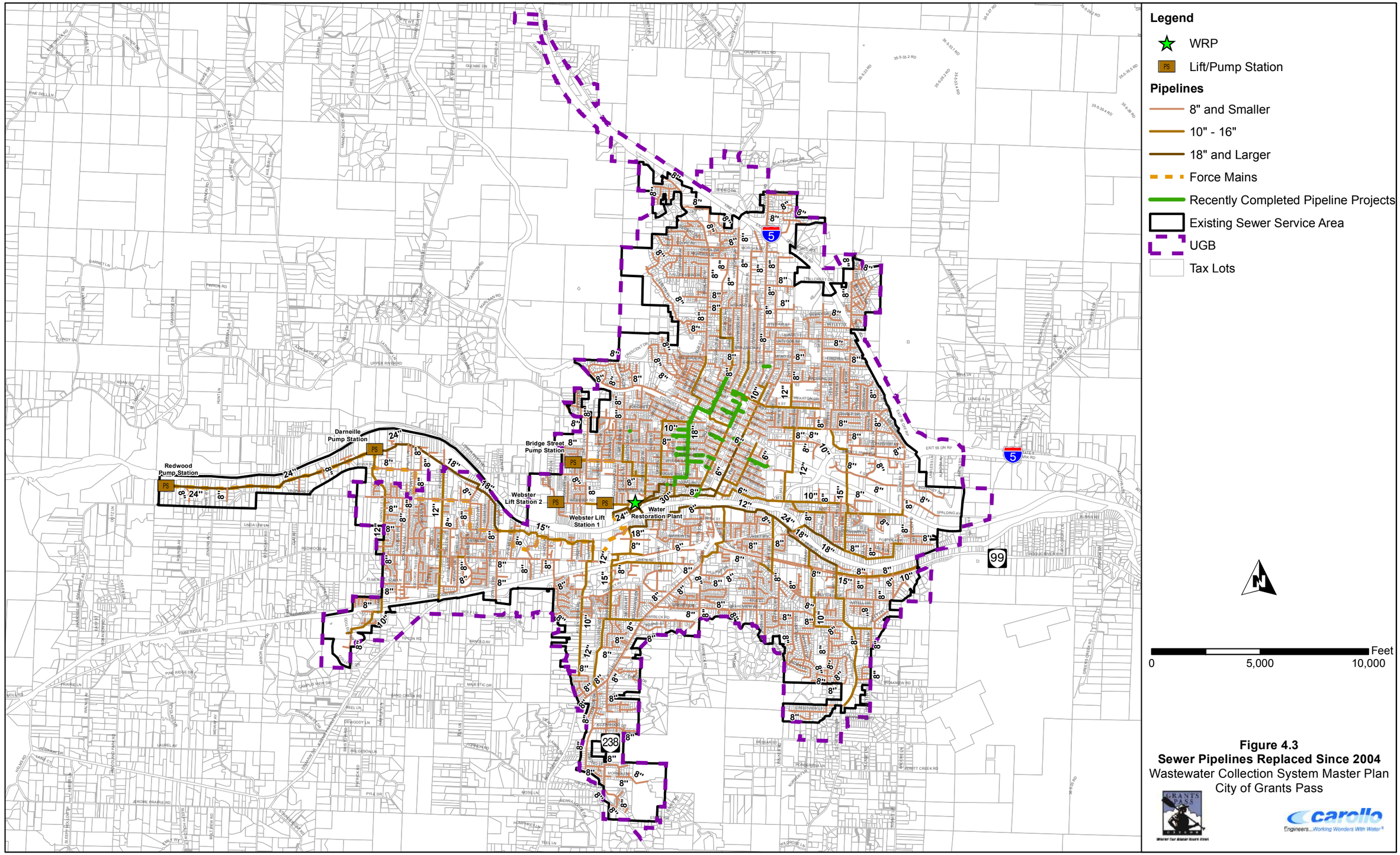

Figure 4.3
Sewer Pipelines Replaced Since 2004
Wastewater Collection System Master Plan
City of Grants Pass

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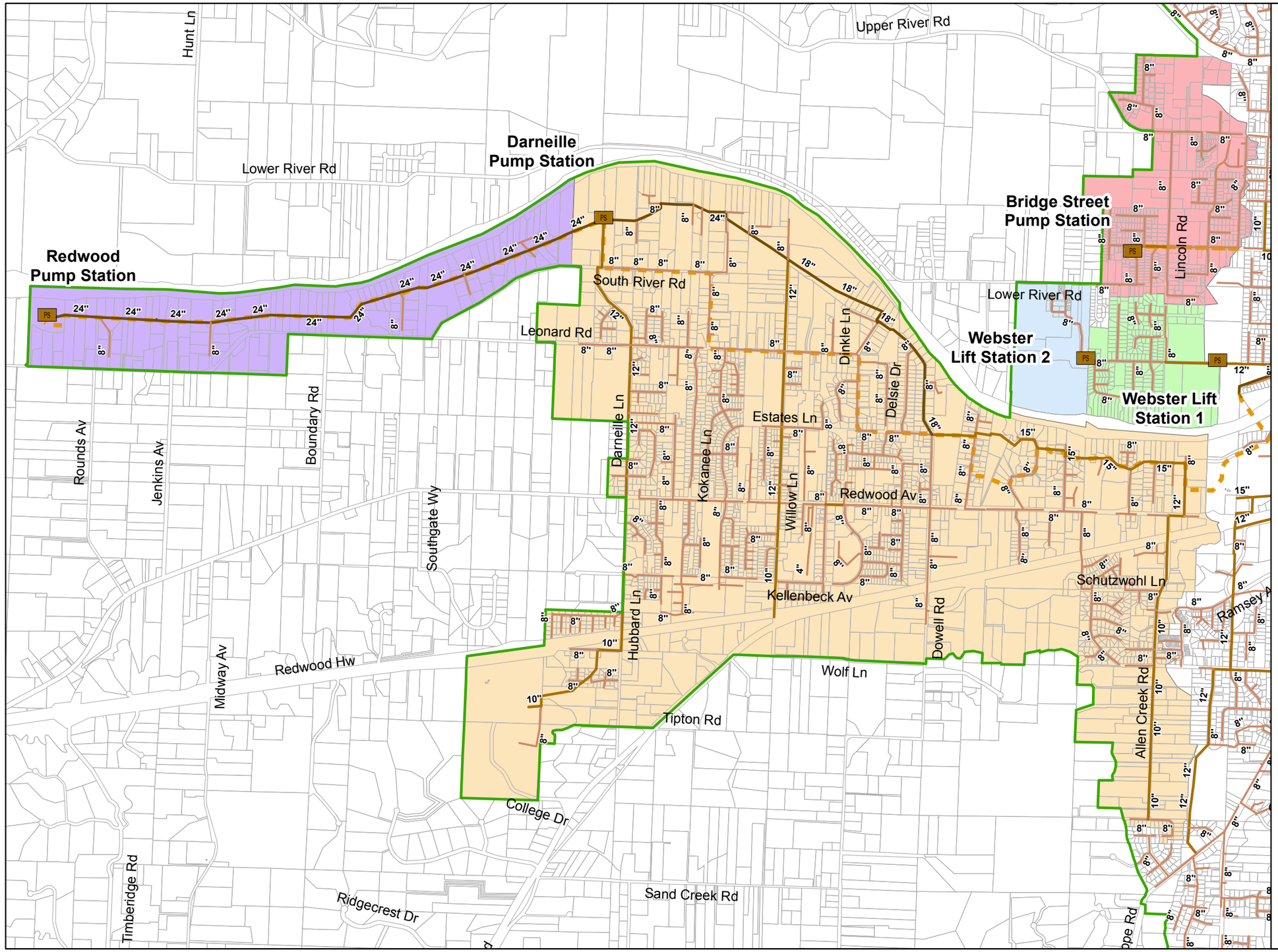


Figure 4.4
Pump Station Tributary Areas
Wastewater Collection System Master Plan
City of Grants Pass

Table 4.4 Existing Pump Stations
Wastewater Collection System Master Plan
City of Grants Pass

Pump Station	Sewer Basin	Address	Number of Pumps	Horsepower (hp)	Head (feet)	Pump Type	Pump Station Capacity		Year Constructed/ Rehabilitated
							Total (gpm)	Firm (gpm)	
Webster Lift Station No. 1	Basin A	1690 SW Webster Road	2 (1 duty, 1 standby)	7.5	10	Self-priming, vertical close-coupled, non-clog centrifugal; constant speed	200	100	1967
Webster Lift Station No. 2	Basin A	2240 SW Webster Road	2 (1 duty, 1 standby)	3	10	Self-priming, vertical close-coupled, non-clog centrifugal; constant speed	200	100	1967
Bridge Street Pump Station	Basin A	2171 SW Bridge Street	2 (1 duty, 1 standby)	20	75	Submersible, non-clog centrifugal; variable speed	1,300	650	1994/ 2010
Redwood Pump Station	Basin Z	4690 Leonard Road	2 (1 duty, 1 standby)	40	163	Submersible, non-clog centrifugal; variable speed	670	335	2000
Darneille Pump Station	Basin Y	3100 South River Road	3 (2 duty, 1 standby)	110	180	Submersible, non-clog centrifugal; variable speed	4,380	2,920	2000

4.2.6.1 Webster Lift Station No. 1

Webster Lift Station No. 1 was constructed in 1967 to serve a low lying area west of the Water Restoration Plant (WRP) in wastewater basin A. Webster Lift Station No. 1 receives flow from a 12-inch gravity sewer, lifts it approximately 6.3 feet (El. 891.52 to 897.79), and discharges back into the 12-inch gravity sewer. The pump station is located in the Webster Road Right-of-Way at the Reinhart Sports Park and predominantly serves mobile home parks and the sports park.

Webster Lift Station No. 1 includes a flow diversion manhole, wet well (manhole), buried pump dry pit, short force main, discharge manhole, power and SCADA systems, and ancillary appurtenances. The pump pit is equipped with two 7.5 horsepower (HP) vertical, non-clog centrifugal pumps with one providing duty service and the other in standby. The capacity of each pump is approximately 100 gallons per minute (gpm), with a total firm capacity of 100 gpm. The lift station is designed not to overflow.

4.2.6.2 Webster Lift Station No. 2

Similar to Webster Lift Station No. 1, Webster Lift Station No. 2 was constructed in 1967 to serve a low lying area west of the Water Restoration Plant (WRP). Webster Lift Station No. 2 receives flow from an 8-inch gravity sewer, lifts it approximately 4.4 feet (El. 895.18 to 899.53), and discharges back into an 8-inch gravity sewer. The 6-inch force main has a total length of 15 feet. The lift station is located at the east end of Rogue Lea Estates and the west end of Webster Road. Flow from Webster Lift Station No. 2 feeds Webster Lift Station No. 1.

Webster Lift Station No. 2 also includes a wet well (manhole), buried pump dry pit, short force main, discharge manhole, power and SCADA systems, and ancillary appurtenances. The pump pit is equipped with two 3 HP vertical, non-clog centrifugal pumps with one providing duty service and the other in standby. The capacity of each pump is approximately 100 gallons per minute (gpm), with a total firm capacity of 100 gpm. The pump station is designed not to overflow.

4.2.6.3 Bridge Street Pump Station

The Bridge Street Pump Station is a duplex submersible type station with a firm capacity of 650 gpm located at the southeast corner of Bridge Street and Tami Road. The pump station receives flow from a 12-inch gravity sewer and discharges approximately 1,900 feet away into the existing gravity system on Cottonwood Street via a 4-inch force main to manhole B111 and an 8-inch force main to manhole B195.

The station was originally constructed in 1994 to serve the area generally between the Lower and Upper River Roads, from the eastern edge of Reinhart Sports Park to the western edge of the UGB. Construction of this station was very difficult due to extensive groundwater and sloughing soil issues. This station was planned to serve a very large area west of Leonard and Cottonwood Streets to the western edge of the UGB. However, due to construction issues at the pump station, several shallow sewers were built along the Lower River Road, which prevent

gravity sewer extensions beyond Schaeffers lane. Several building lots in this area are served with individual grinder pump stations and long small-diameter force mains to the existing shallow gravity sewer.

The Bridge Street Pump Station and force main were improved in 2010. This involved a new pig port vault and addition of a flowmeter at the pump station; and adding approximately 650 feet of new 8-inch diameter force main piping to Manhole B195.

4.2.6.4 Redwood Pump Station

The Redwood Pump Station is located at the old Redwood Wastewater Treatment Plant (WWTP) on the western edge of the City's service area (outside the UGB). The pump station receives flow from a relatively small tributary area, as well as diverted flow from the Darneille Pump Station when peak flows exceed the capacity of Darneille as shown in Figure 4.4.

The Redwood Pump Station is a duplex submersible pump station with a firm capacity of 335 gpm. From the pump station, flow is routed through approximately 10,300 feet of 6-inch diameter force main to an influent manhole at the Darneille Pump Station.

4.2.6.5 Darneille Pump Station

The Darneille Pump Station is the largest of the City's pump stations. It receives flows from the southwest portion of the City as well as some areas outside the UGB, within the RSSSD service area. The total existing capacity of this pump station is 4,380 gpm (6.3 mgd) and the firm capacity is 2,920 gpm (4.2 mgd). The station is a wet pit/dry pit type station with above-grade electrical panels, generator, and chemical feed system (similar to the Redwood Pump Station). The station conveys flows through two parallel, 18,000-foot long, 12-inch force mains to a common 1,000-foot long, 14-inch force main that travels over the Rogue River via a pedestrian bridge, before discharging to the gravity system that drains to the WRP. The station has a Bioxide chemical injection system with two 3,000 gallon storage tanks.

The configuration and operation of this pump station is unique for several reasons.

- The City uses the 24-inch gravity interceptor upstream of the Darneille wet well as temporary storage for wastewater. The City uses the temporary storage in this interceptor intentionally, both during peak flow periods when pump station capacity is limited, and under normal operation (due to pump level setpoints). If influent flows exceed the capacity of Darneille, the City utilizes the interceptor as temporary storage until the pump station can "catch up" and pump the stored wastewater to the WRP.
- There is a diversion pipeline just upstream of the Darneille wet well that allows some of the stored wastewater to flow through another 24-inch interceptor to the Redwood Pump Station. The diversion helps reduce the extent of surcharging upstream of Darneille and helps prevent SSOs in the vicinity of the Darneille pump station.
- The force main from the Redwood Pump Station discharges just upstream of the Darneille wet well. During low-flow periods, this configuration does not cause any issues because

Darneille has adequate capacity to convey both the inflow to Darneille and the inflow from the Redwood force main. However, when flows exceed the Darneille pumping capacity and the upstream diversion is used, the operation of the pump stations essentially creates a circular pumping pattern from Redwood, to the diversion upstream of the Darneille wet well, and back to the Redwood Pump Station. This circular pumping scenario employs the available storage in the 24-inch interceptor, which has a limited volume. When the interceptor volume is consumed, capacity-related SSOs frequently occur at the Redwood Pump Station.

A schematic of the current operation is presented in Figure 4.5.

4.3 PIPE REMAINING USEFUL LIFE AND CONDITION ASSESSMENT

The structural condition of a collection system is a critical issue to examine when considering system upgrades or expansion. Repeated structural failure (such as pipes collapsing or the development of sink holes) at various locations along a pipeline alignment will make replacing such a pipeline a priority item. Maintenance history should also be considered since a high level of required maintenance for a pipeline can be an indicator of potential or pending structural problems. The analysis of the existing collection system was based on an examination of both condition and maintenance data that the City maintains in a GIS database.

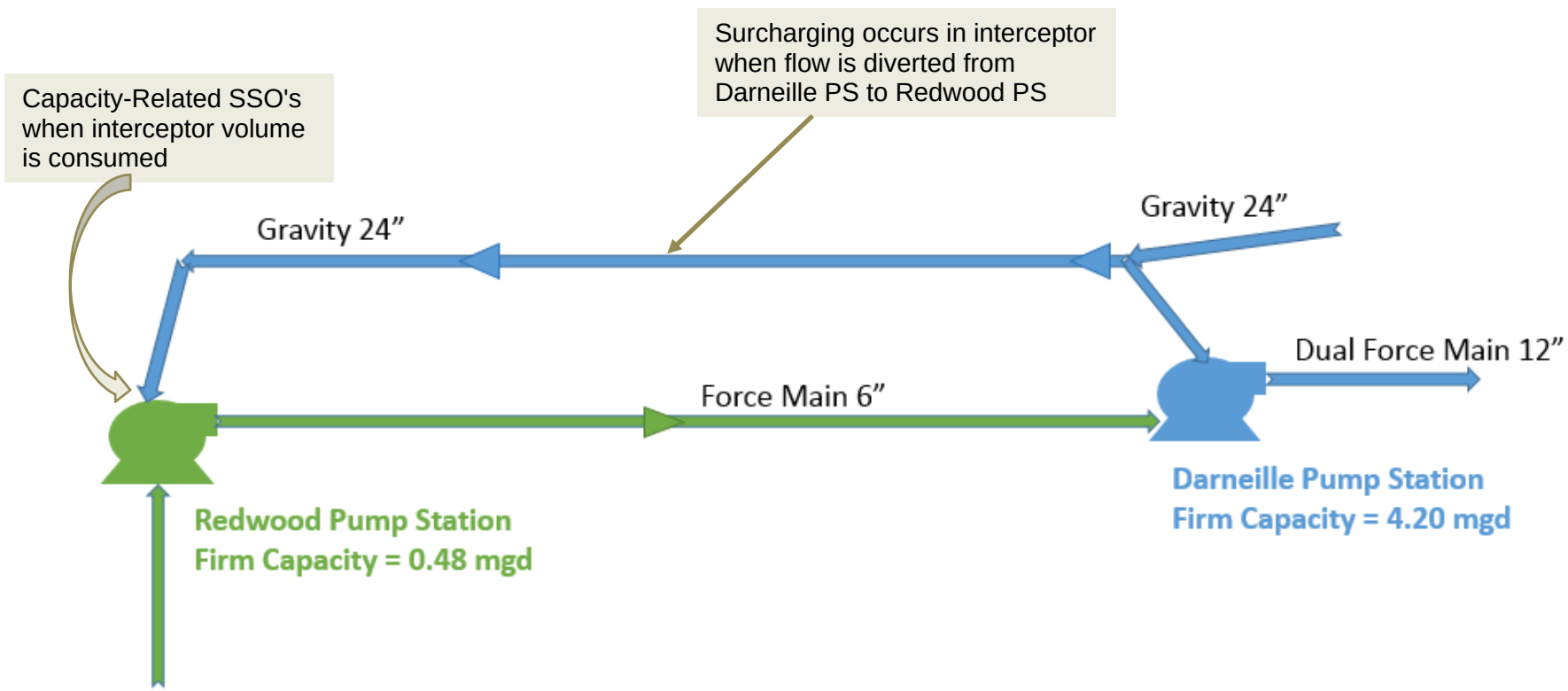
4.3.1 Data Inventory Introduction

Identifying and prioritizing near- and further-term sewer repair/renewal/replacement projects requires obtaining accurate information on the condition of the sewer collection system. Three sets of data were used for this analysis:

- Material and Installation Years are used to perform a Remaining Useful Life (RUL) Analysis (Section 4.3.2).
- Maintenance Records Data (Section 4.3.3).
- Structural Data (Section 4.3.4).

This data was evaluated to develop a comprehensive analysis as follows:

- The RUL analysis results were used to determine how much of the system is reaching its RUL in the next 20 years, and are directly related to how old the collection system is.
- Both structural and maintenance data was used to prioritize pipes identified in the RUL analysis that need replacement in the collection system. This prioritization method is detailed in Section 4.3.5.1.



DARNEILLE AND REDWOOD PUMP STATION CURRENT OPERATION SCHEMATIC

FIGURE 4.5

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WASTEWATER COLLECTION SYSTEM MASTER PLAN

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4.3.2 Remaining Useful Life (RUL)

Both age and condition of the collection system manholes and pipelines impact the quantity of inflow and infiltration (I/I) able to enter the system. Typically, older sewer pipes have a greater potential of allowing significant I/I into the collection system. Older pipelines are a priority when considering pipelines for rehabilitation.

The length of time that a pipe is anticipated to remain functional, commonly called the useful life, depends largely on the pipe material, but can also depend on soil conditions, wastewater constituents, and installation. Beyond the useful life, the increasing costs of maintenance associated with a failing pipe will likely warrant replacement.

Table 4.5 presents the estimated useful lives of various types of pipe materials. Unknown pipe materials in the system were assumed to have a useful life of 60 years. These values were customized based on staff's knowledge of the collection system.

Table 4.5 Useful Life of Pipes
Wastewater Collection System Master Plan
City of Grants Pass

Pipe Material	Useful Life Assumptions (years)
Asbestos Cement (AC)	60
Concrete Pipe (CP)	60
Ductile Iron (DIP)	80
Polyvinyl Chloride (PVC)	80
Clay Tile/ Vitrified Clay Pipe (CT/VCP)	75
Unknown	60

Both the age and type of material were used to determine the RUL of the City's pipe collection system. The RUL can be defined as the length of time before a pipe will reach the end of its useful life, and is helpful for identifying upcoming rehabilitation or replacement projects due to the age and condition of a pipe. Information obtained from the City's GIS data was used to identify the pipe materials and years of installation. Figure 4.6 graphically presents the installation years throughout the City's collection system, while Figure 4.7 presents pipe material. All sewer pipes are taken into account for this analysis.

Table 4.6 presents the total length of pipe according to the year installed and material. The cells of the table are color-coded to indicate the RUL of pipes for each of the four categories below:

- Red indicates pipe that is beyond its predicted useful life,
- Dark orange indicates pipe that is expected to reach the end of their useful life in the next 10 years,
- Light orange represents pipe with an RUL of between 10 and 20 years, and
- Yellow represents pipe that has a remaining useful life of over 20 years.

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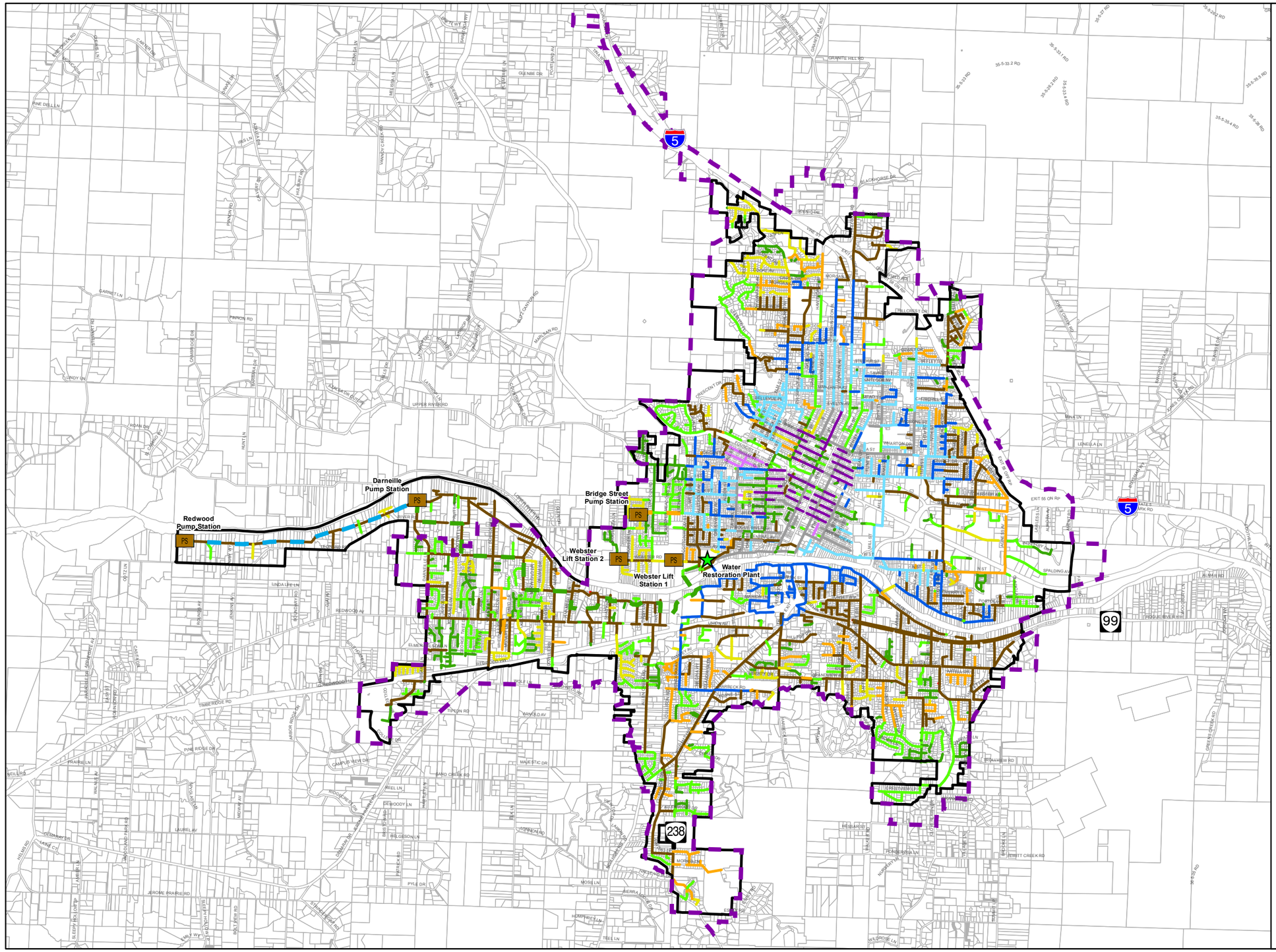

Legend

- WRP
- Lift/Pump Station
- Existing Sewer Service Area
- UGB
- Tax Lots

Force Main Installation Year

- 1993
- 1999
- 2000

Gravity Main Installation Year

- Unknown
- 1915 - 1924
- 1925 - 1934
- 1935 - 1944
- 1945 - 1954
- 1955 - 1964
- 1965 - 1974
- 1975 - 1984
- 1985 -1994
- 1995 - 2004
- 2005 - 2015

N

0 5,000 10,000 Feet

Figure 4.6
Collection Pipe by Installation Years
Wastewater Collection System Master Plan
City of Grants Pass

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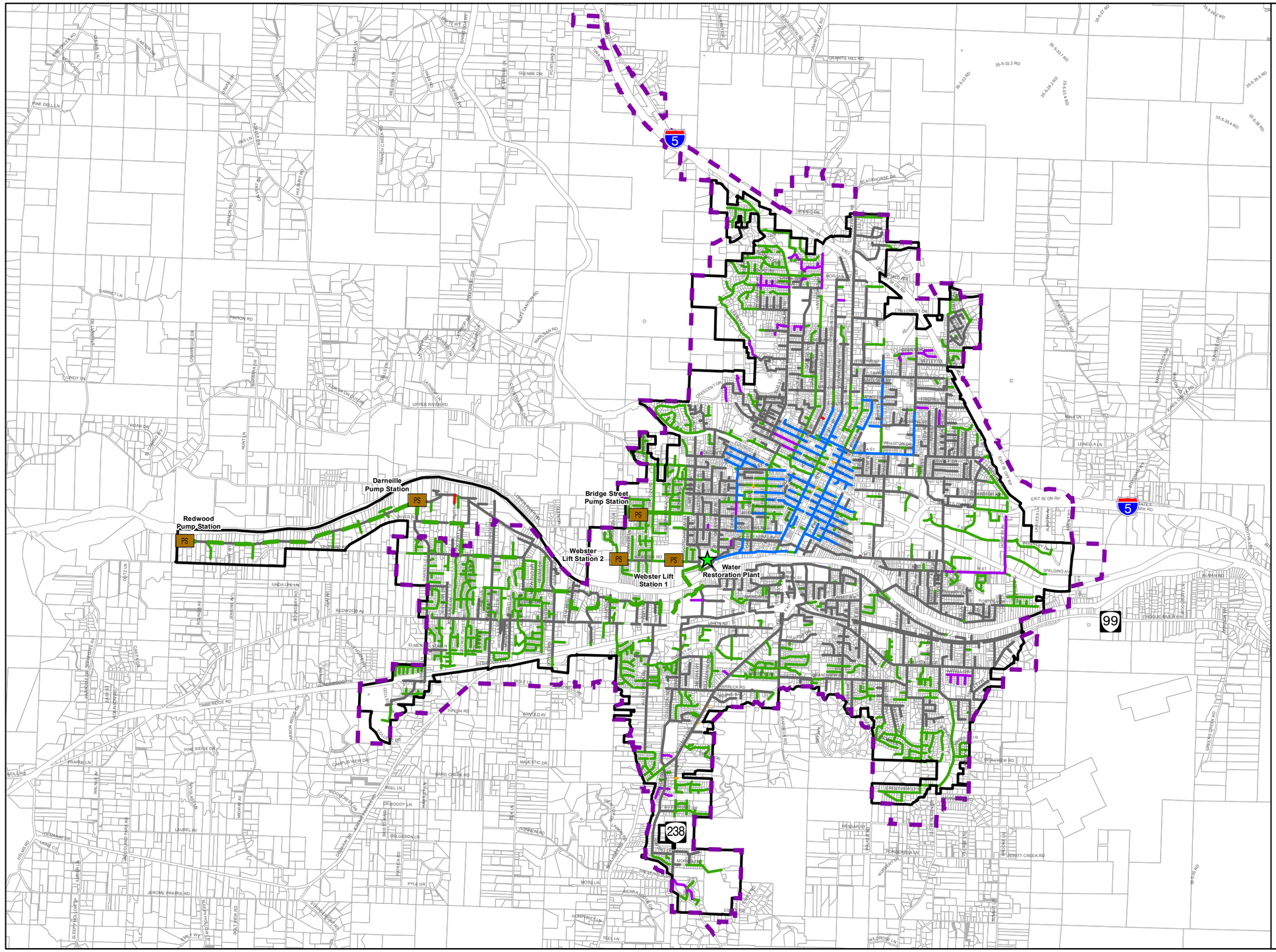

Legend

- WRP
- Lift/Pump Station
- Existing Sewer Service Area
- UGB
- Tax Lots

Gravity Main Material

- Unknown
- Asbestos Concrete
- Concrete
- Clay Tile/Vitrified Clay
- Ductile Iron Pipe
- Polyvinyl Chloride

Force Main Material

- Polyvinyl Chloride

N

0 5,000 10,000 Feet

Figure 4.7
Collection System Pipe
by Type of Material
Wastewater Collection System Master Plan
City of Grants Pass

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Table 4.6 Pipe Length of Major Collectors
Wastewater Collection System Master Plan
City of Grants Pass

Major Pipelines Length by Year Installed and Material Type

Total Length (ft) by Year Installed(1)

Material Type	Unknown	1915-1924	1925-1934	1935-1944	1945-1954	1955-1964	1965-1974	1975-1984	1985-1994	1995-2004	2005-2015	Percent Total System (%)
DIP		284				33	241	270	50	48	69	**994**
PVC					1,723	22	2,821	19,259	79,812	193,271	92,703	**389,610**
VCP		20,263	33,287	5,261	1,610	646	302		101	91	704	**62,266**
CT			19								39	**58**
AC			573					26,025	796		58	**27,451**
CP		156	2,168		79,416	92,847	280,695	28,788	3,605	1,356	1,319	**490,401**
Unknown		896	239		13	10	53	68		233	367	**1,965**
Total Length (ft)	(2)	**21,600**	**36,287**	**5,262**	**82,774**	**93,571**	**284,153**	**74,421**	**84,376**	**195,028**	**95,273**	**972,745**
Percent Total System (%)	**0.0%**	**2.2%**	**3.7%**	**0.5%**	**8.5%**	**9.6%**	**29.2%**	**7.7%**	**8.7%**	**20.0%**	**9.8%**	**100.0%**

Notes:
(1) Total Length includes both gravity and force main pipes.
(2) Pipes with unknown installation year were allocated throughout the different years according to the distribution of existing pipes of known installation year.

Legend

RUL-Remaining Useful Life			
	Over 20 years of RUL	433,583	45.5%
	Between 10 and 20 years of RUL	283,159	29.7%
	Between 0 and 10 years of RUL	94,481	9.9%
	0 years of RUL	142,590	14.9%

Approximately 142,590 LF of collection pipes, which represents 14.9 percent of the pipes with known installation year, have reached their RUL, 94,481 LF or 9.9 % have an RUL of 10 years or less. Approximately 283,159 LF of pipe, or 29.7 % will reach the end of its useful life between 10 and 20 years from 2015, and the rest of the collection pipes have an RUL of over 20 years. In total, approximately 54.5 percent of the existing collection pipes with known installation year are expected to reach the end of their useful lives by the end of the planning period (2035). Pipes with unknown installation years have an unknown. These pipes (142 LF or 0.01%) were allocated throughout the different years according to the distribution of existing pipes of known installation year.

The location of the pipes reaching the end of their useful life in the planning period is shown in Figure 4.8.

Figure 4.9 is a graphical representation that shows the total length of pipe reaching the end of its assumed useful life in each of the coming planning years, and until 2095. This graph shows the life cycle of the system and will be used in Section 4.3.5.5 to help prioritize repair and replacement.

It is estimated that approximately 522,578 LF of pipe will be reaching the end of their useful life within the planning period, or about 24,885 LF of pipe per year for the next 20 years.

4.3.3 Maintenance Data Assessment

The City keeps track and maintains all maintenance data using their GIS database. The most recent data only (since 2010) was included and evaluated in this section.

4.3.3.1 <u>6-Months Cleaning</u>

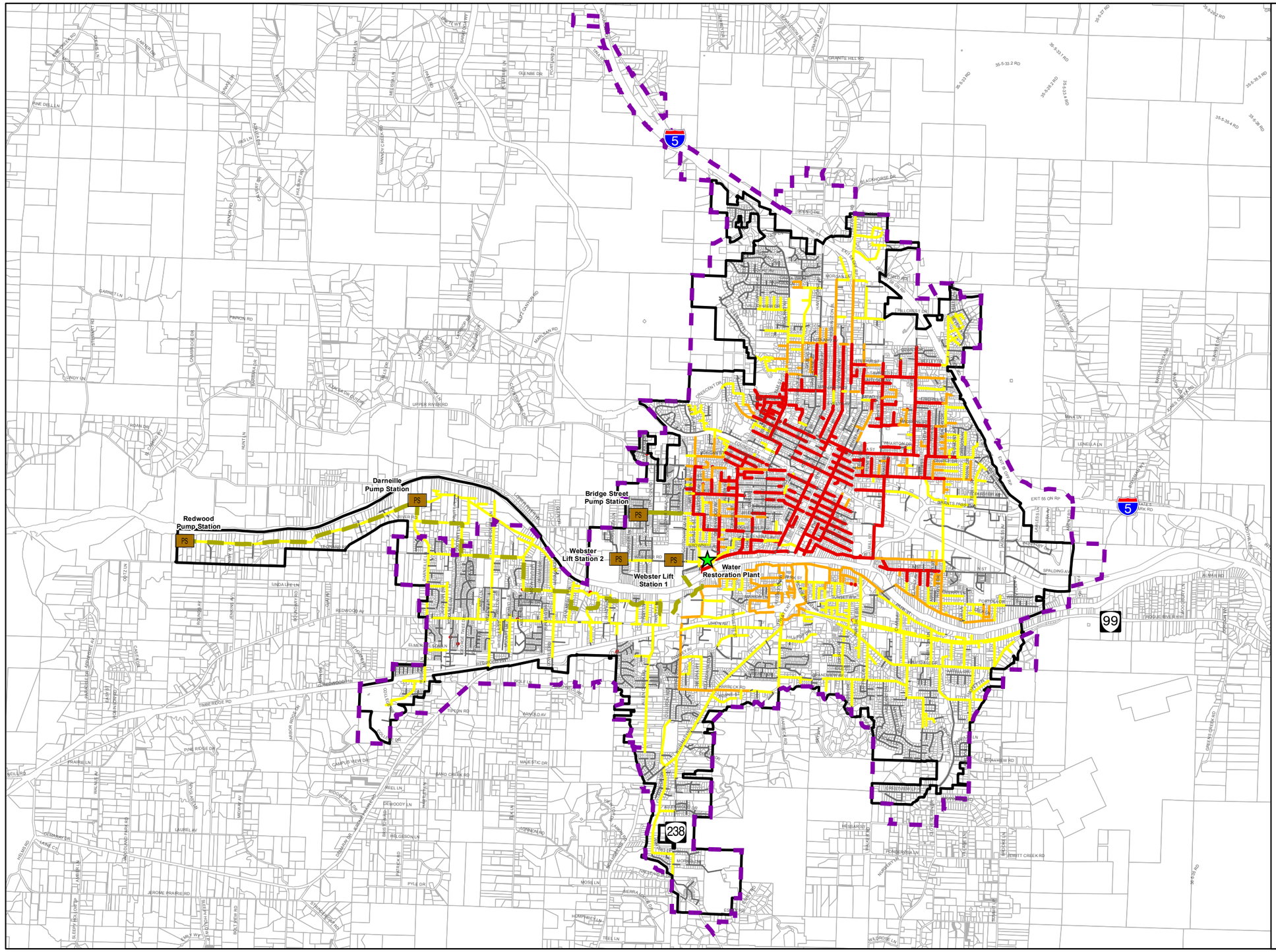
The City performs a routine cleaning program every 6-month on approximately 7 percent of their collection system. These pipes are determined based on staff's knowledge of recurring issues in these areas. Figure 4.10 shows the locations of the pipes that are included in the 6-month cleaning program.

4.3.3.2 <u>Rocks and Sand</u>

During each cleaning and maintenance action, the City estimates the total volume of rocks and sand removed from each sewer pipe and classifies the pipes in three categories:

- Volume removed less than 6 gallons,
- Volume removed between 3 and 5 gallons,
- Volume removed between 1 and 2.5 gallons.

Figure 4.11 shows the locations of the issues related to rocks and sand that were experienced since 2010.



Legend

- WRP
- Lift/Pump Station
- Force Main
- Existing Sewer Service Area
- UGB
- Tax Lots

Pipelines Reaching end of Useful Life

- Before 2015
- Before 2025
- Before 2035
- After 2036

N

Feet
0 4,000 8,000

Figure 4.8
Location of Pipelines Reaching End of Useful Life by 2035
Wastewater Collection System Master Plan
City of Grants Pass

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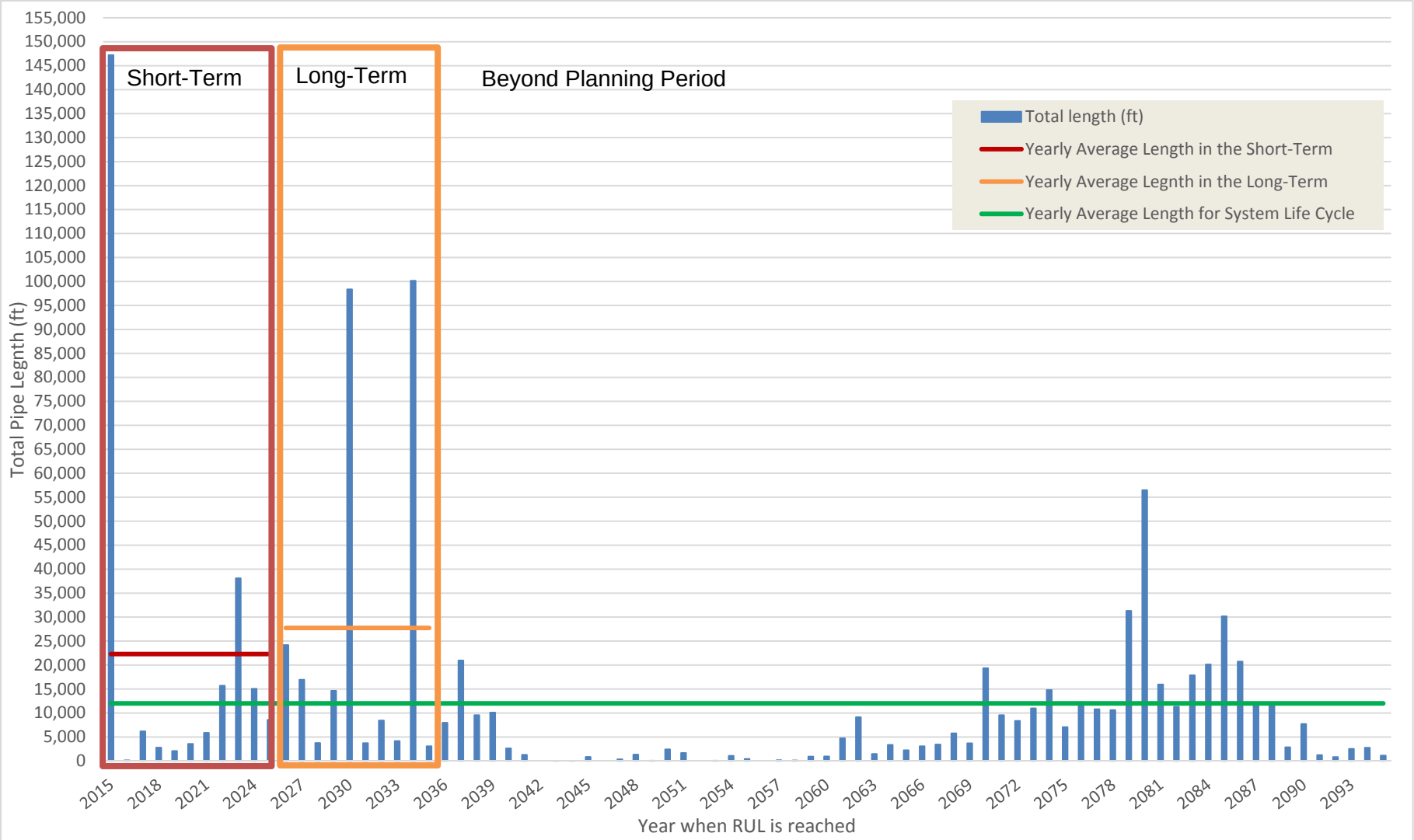

LENGTH OF PIPELINES REACHING RUL BEFORE 2025 AND 2035

FIGURE 4.9

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WASTEWATER COLLECTION SYSTEM MASTER PLAN

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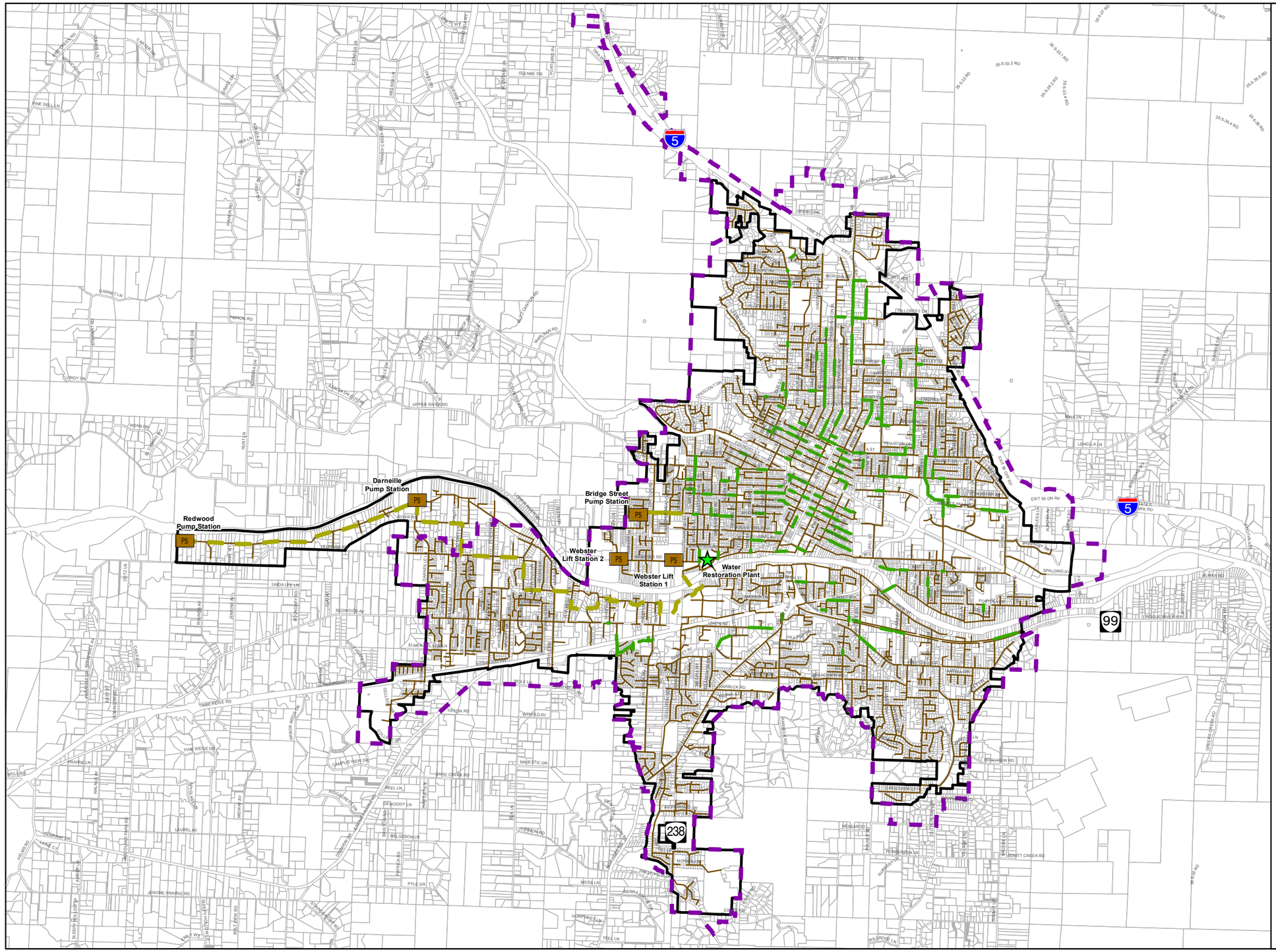

Legend

- 6 Month Sewer Cleaning Records
- WRP
- Lift/Pump Station
- Gravity Main
- Force Main
- Existing Sewer Service Area
- UGB
- Tax Lots

N

0 5,000 10,000 Feet

Figure 4.10
6-Month Cleaning Program Locations
Wastewater Collection System Master Plan
City of Grants Pass

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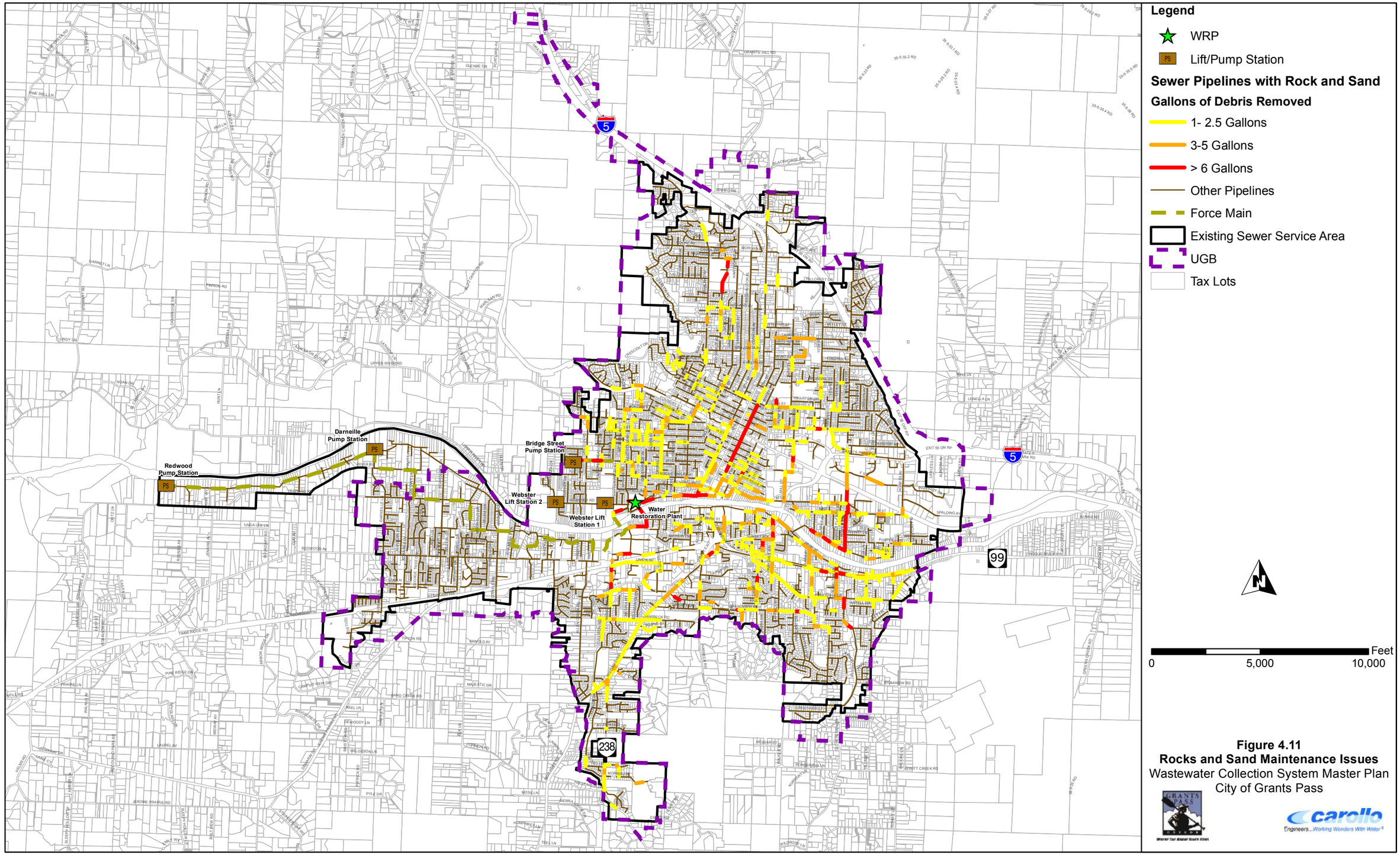

Figure 4.11
Rocks and Sand Maintenance Issues
Wastewater Collection System Master Plan
City of Grants Pass

4.3.3.3 Grease

The City also keeps track of grease issues throughout the collection system and classifies the field observed results into three categories based on severity:

- Heavy grease,
- Medium grease,
- Light grease.

Figure 4.12 shows where the issues related to grease occurred since 2010 and highlights in most severe pipes in red. Grease accumulation can cause blockages and buildups in the system increasing the risk for overflows.

4.3.3.4 Roots

The City inventories root intrusion problems throughout the system using their GIS database. Roots encroachment related issues are also classified in three categories:

- Heavy root encroachment,
- Medium root encroachment,
- Light root encroachment.

Figure 4.13 shows the locations where the issues related to root intrusion occurred since 2010 and highlights the most severe areas in red. Sewers are vulnerable to root intrusions due to material, joints, and other factors. Clay and cast iron pipes seem to be more vulnerable to root intrusions. Root intrusions can be responsible for blockage, sewer backups and compromise the integrity of the sewer pipe.

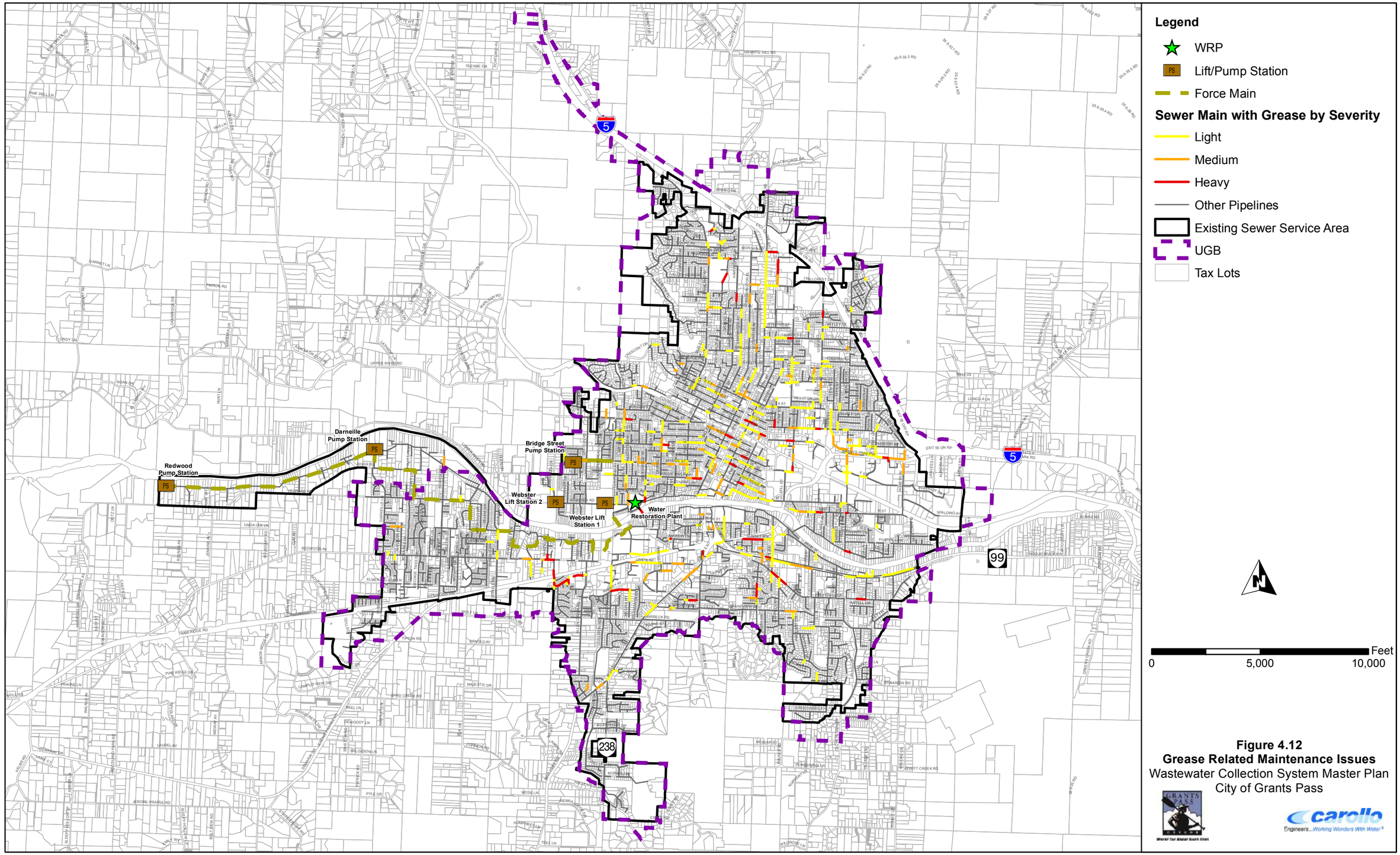

Figure 4.12
Grease Related Maintenance Issues
Wastewater Collection System Master Plan
City of Grants Pass

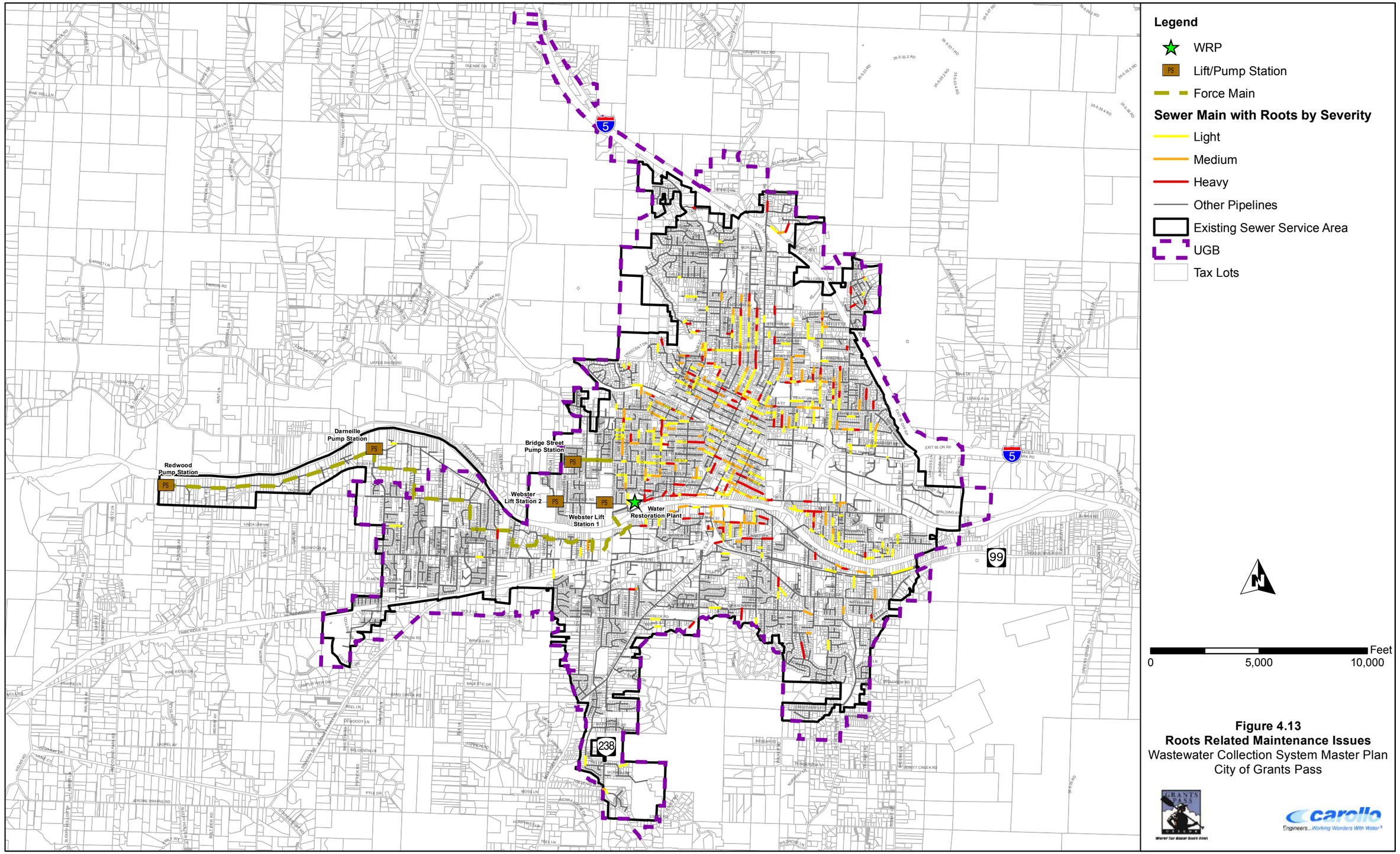

Figure 4.13
Roots Related Maintenance Issues
Wastewater Collection System Master Plan
City of Grants Pass

4.3.4 Structural Data Assessment

Video inspection using closed circuit television (CCTV) is the basic method used to assess gravity sewer condition. The City regularly performs video inspections of their system. CCTV records are not assigned a score, however the City keeps track of the defects in GIS describing the extent of the structural issue. Structural inspection databases were provided by the City for analysis. Only data after 2010 were evaluated in this section. Each pipe flagged under CCTV inspection by the City was assigned a specific type of defect based on the City' comments to each pipe.

Two different categories each with three types of structural defects were used:

- Structural Holes:
  - Missing Pipe,
  - Hole in Pipe,
  - Broken Pipe,
- Structural Cracks:
  - Circumferential Crack,
  - Longitudinal Crack,
  - Crack (other).

Figures 4.14 and 4.15 show the structural defect locations color coded by the type of defect.

The City also provided corrosion data based on CCTV inspections that were also classified into three categories based on its severity:

- Heavy corrosion,
- Medium corrosion,
- Light corrosion.

Figure 4.16 illustrates the issues with pipe corrosion color coded by severity. Pipes noted as "corroded" only in the City's database with no additional description were categorized as "Light corrosion."

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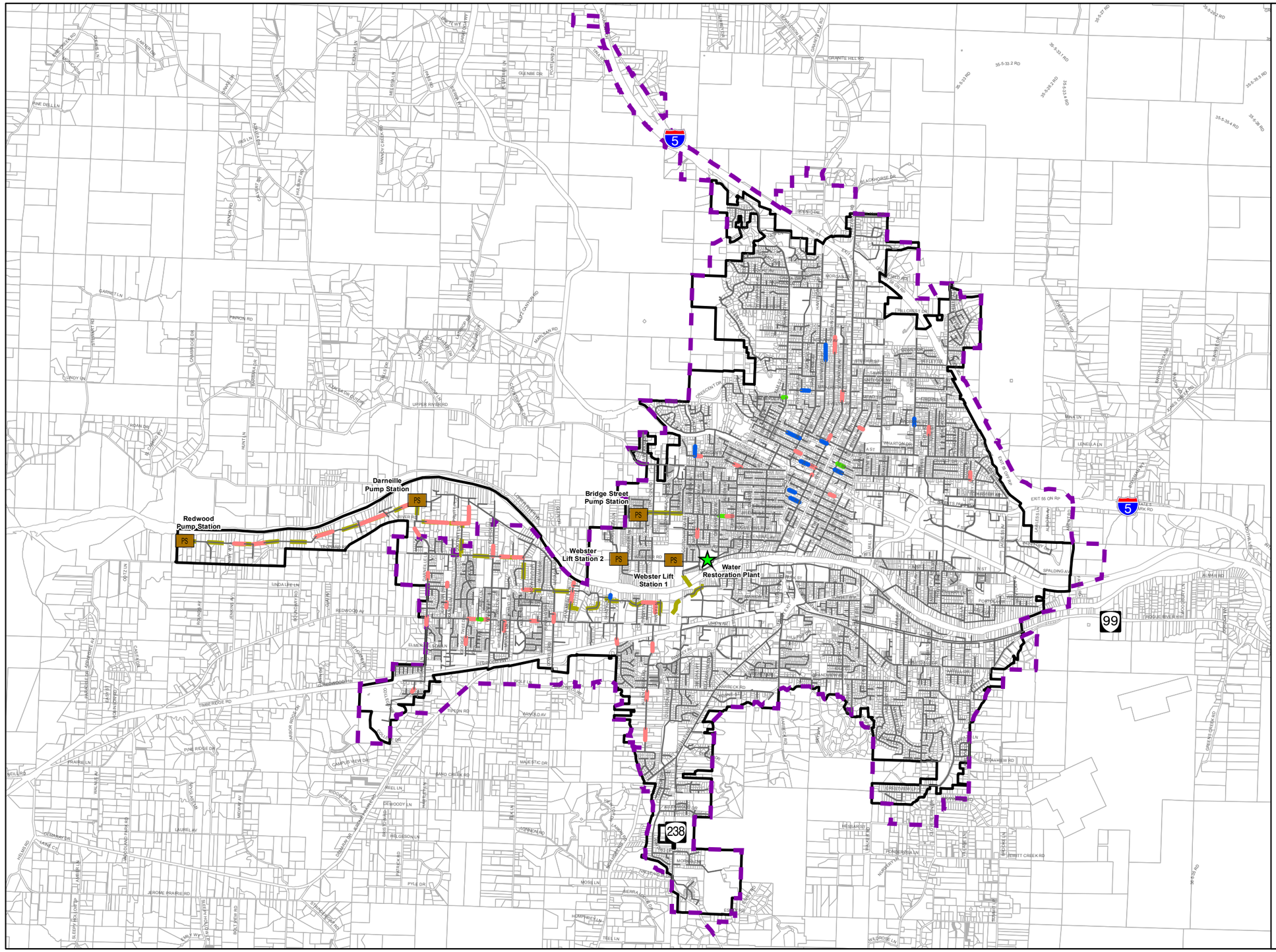

Legend

- WRP
- Lift/Pump Station
- Force Main

Sewer Main with Holes

- Missing Pipe
- Hole in Pipe
- Broken Pipe
- Other Pipelines
- Existing Sewer Service Area
- UGB
- Tax Lots

N

0 5,000 10,000 Feet

Figure 4.14
Pipes with Holes
Wastewater Collection System Master Plan
City of Grants Pass

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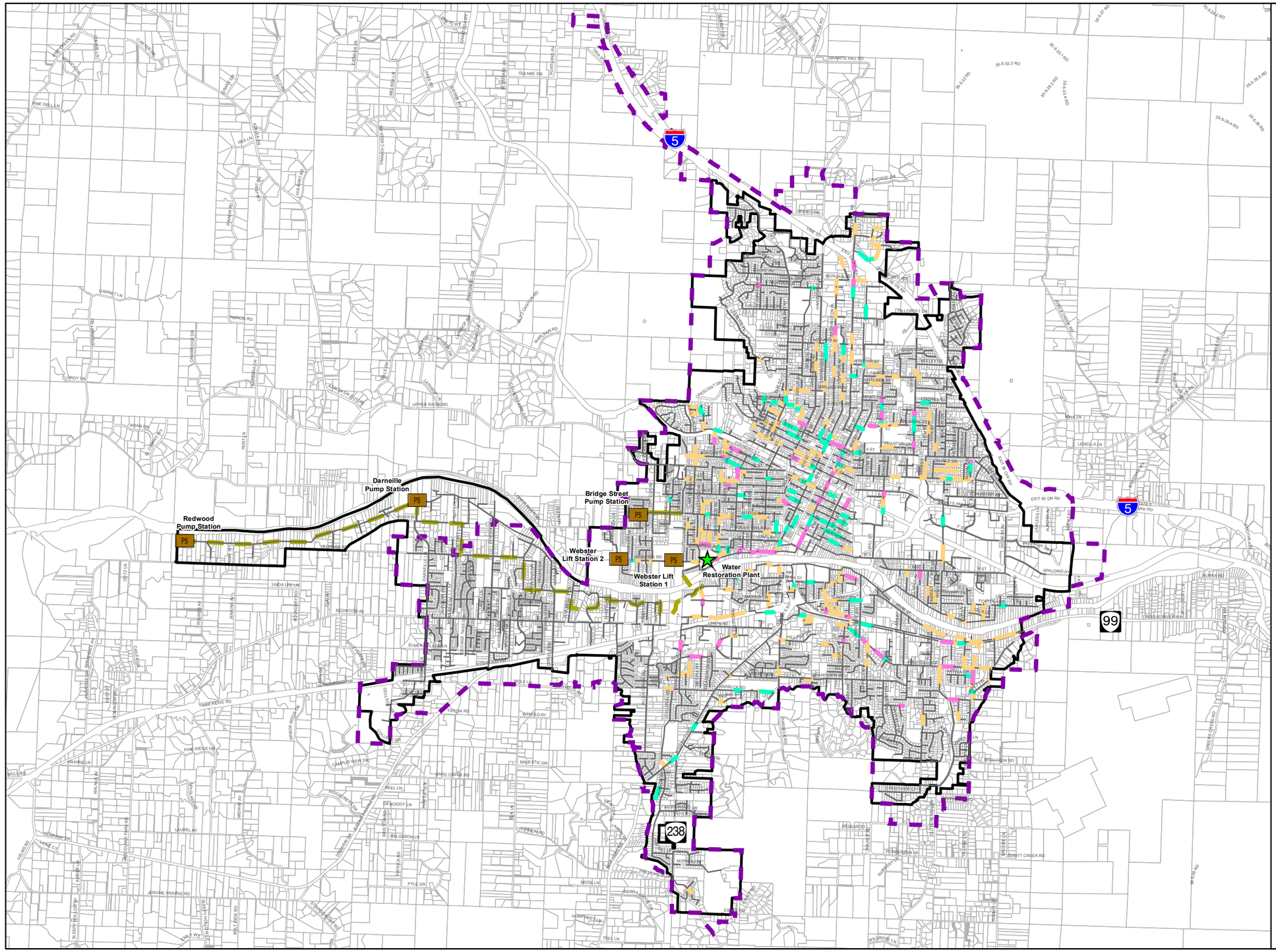

Legend

- WRP
- Lift/Pump Station
- Force Main

Sewer Main with Cracks

- Circumferential Crack
- Crack (Other)
- Longitudinal Crack
- Other Pipelines
- Existing Sewer Service Area
- UGB
- Tax Lots

N

0 5,000 10,000 Feet

Figure 4.15
Pipes with Cracks
Wastewater Collection System Master Plan
City of Grants Pass

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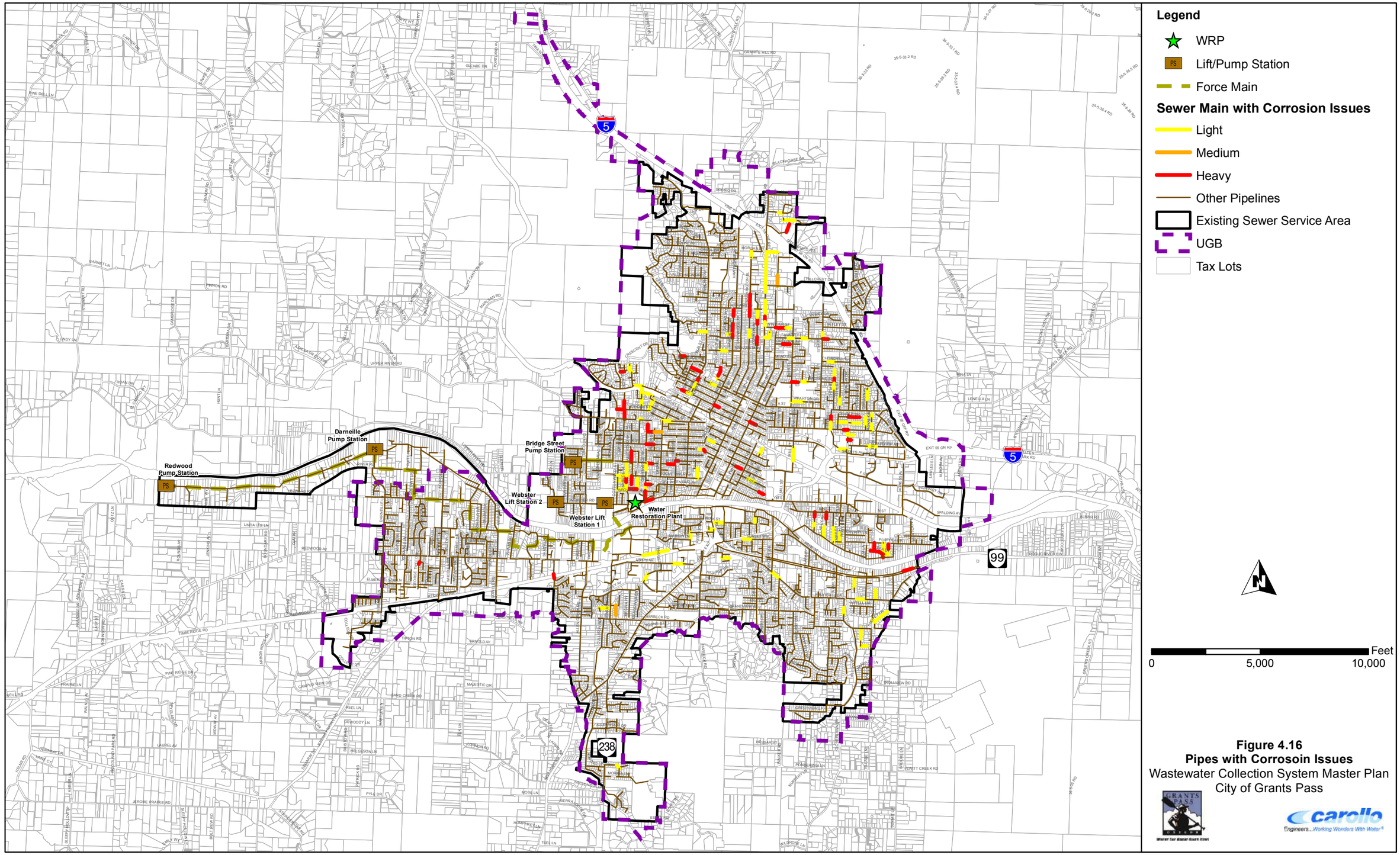

Figure 4.16
Pipes with Corrosoin Issues
Wastewater Collection System Master Plan
City of Grants Pass

4.3.5 Repair and Replacement Prioritization - RUL and Condition Scoring

Each defect or condition presented in the sections above was assigned a score based on its condition. Maintenance and structural scores were added together to determine the highest priority pipes and were compared to the RUL results presented in Section 4.3.2 to help with prioritization.

4.3.5.1 Methodology

As part of the previous Master Plan, the City developed a customized scoring method using weighting factors to rank pipe defects and issues based on its magnitude. Both method and factors were updated to match the new data provided by the City and analysis performed. Table 4.7 summarizes the weighted factors used in this analysis. The total score obtained by each pipeline once evaluated with the scores below is an indication of the need for repair or replacement. Maintenance and structural scoring will then be used to help prioritize pipe replacement identified in the RUL analysis.

Table 4.7 Weighting Factors for Condition Assessment Wastewater Collection System Master Plan City of Grants Pass

Maintenance Data			Structural Data	
Maintenance Effort/Condition		**Weight**	**Defect**	**Weight**
6-Month Cleaning	Yes	7	Missing Pipe	10
	No	0	Hole in Pipe	9
Gallons of Rocks and Sand Removed During Cleaning	> 6	7	Broken Pipe	8
	3- 5	5	Circumferential Crack	5
	1 -2.5	3	Longitudinal Crack	7
Grease	Heavy	4	Crack (Other)	6
	Medium	2	Light Corrosion	4
	Light	1	Medium Corrosion	6
Roots	Heavy	5	Heavy Corrosion	8
	Medium	3		
	Light	2		

Notes:
Scoring values to evaluate condition assessment of the pipes in the City's collection system was taken from the former Master Plan and adjusted to reflect latest available data.

4.3.5.2 Maintenance Scoring

Figure 4.17 shows the summary of all maintenance criteria the City keeps track of. Pipes shown in the red are the pipes with the highest score which correspond to the most severe maintenance issues. These pipes are located mainly in wastewater basins A, B, and H.

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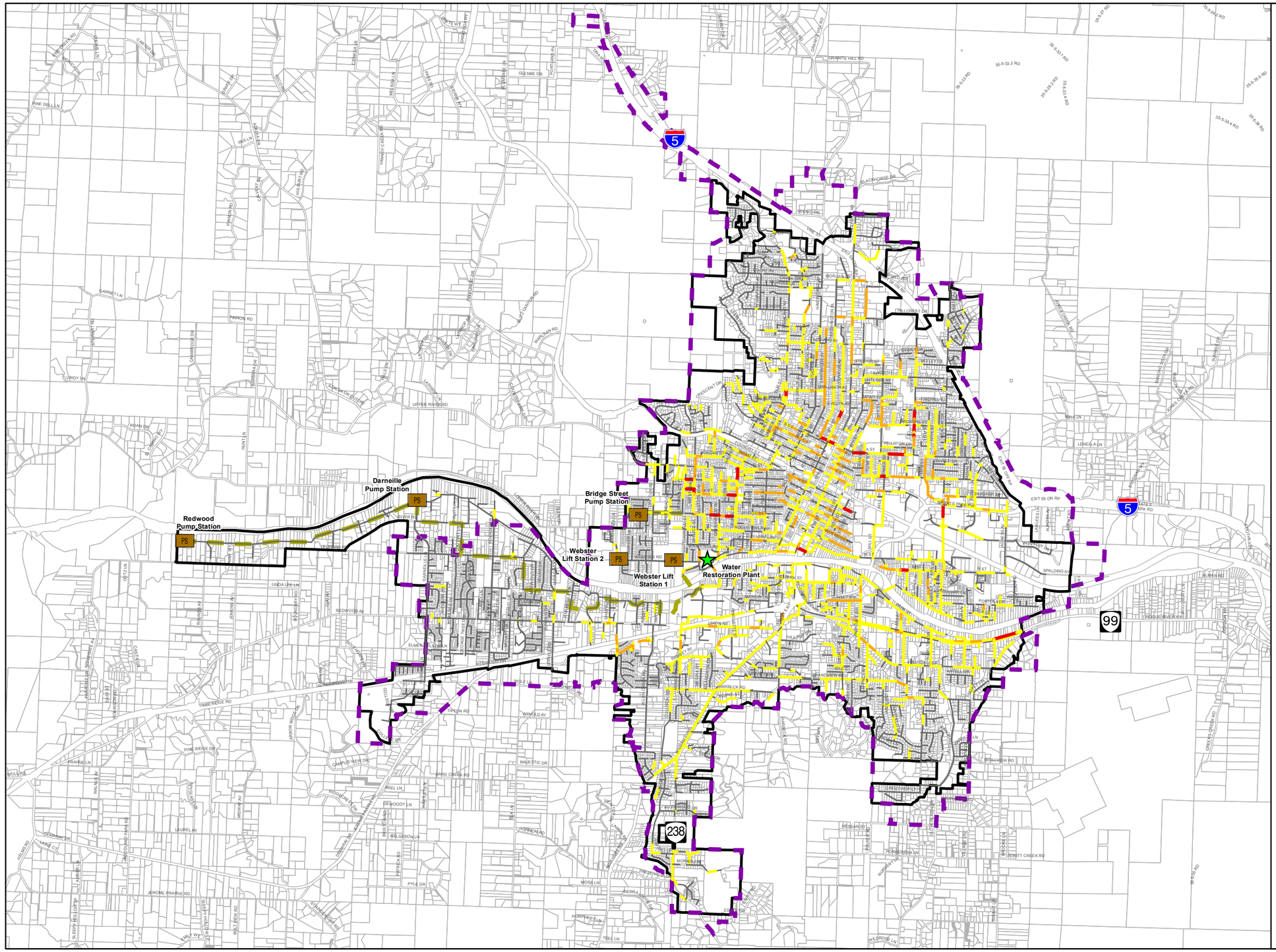

Legend

- WRP
- Lift/Pump Station
- Force Main

Total Maintenance Score

- 21 - 30
- 11 - 20
- 1 - 10
- 0
- Existing Sewer Service Area
- UGB
- Tax Lots

N

0 5,000 10,000 Feet

Figure 4.17
Maintenance Data Scoring
Wastewater Collection System Master Plan
City of Grants Pass

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4.3.5.3 Structural Scoring

Figure 4.18 shows the summary of all structural defects identified by the City. Pipes with the highest structural score are shown in red on the figure and the ones with the least structural issues are shown in yellow. Pipes with the highest structural score are mainly located in the downtown core of the City, in wastewater basins B, G, and E.

4.3.5.4 Combined Structural and Maintenance Scoring

Both maintenance and structural analysis were combined to help prioritize pipes identified as part of the RUL evaluation and help focus the City's repair and replacement program. Figure 4.19 highlights in red the highest scoring pipes for both maintenance and structural data.

These are mainly located in the basins located in the downtown core of the City: wastewater basins A, C, E, G, and H. A few pipes are highlighted south of the Rogue River.

4.3.5.5 Pipe Replacement Prioritization

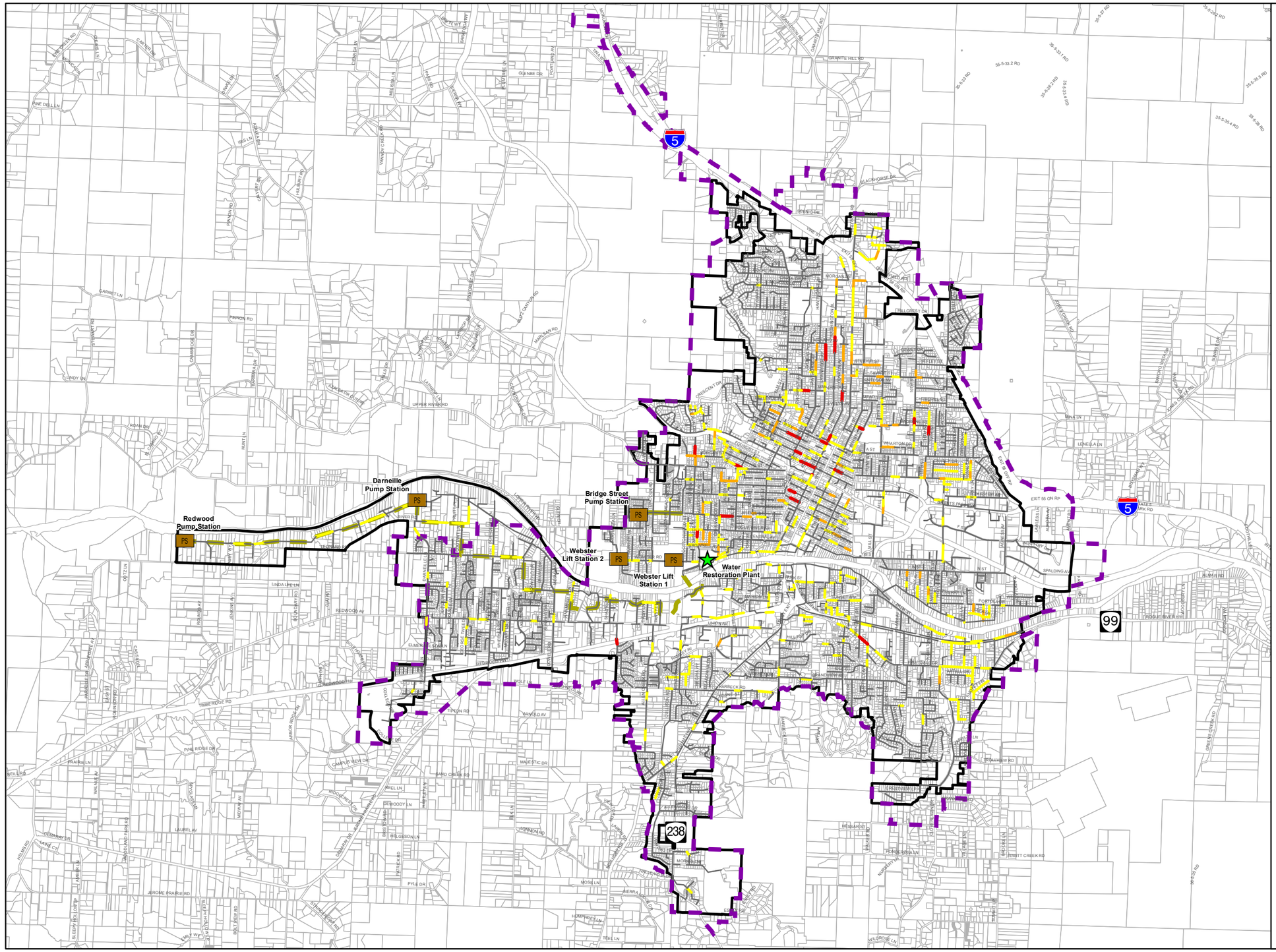
As shown in the RUL analysis, the City has old pipes, especially in the downtown area of the City. Approximately 146,000 LF of pipes (15.3 %) were installed more than 60 years ago.

The RUL analysis itself shows that 54.5% of the collection system would need to be replaced in the next 20 years, which would consist of replacing around 25,000 LF of pipes per year. However, some of these pipes do not present any maintenance or structural issues as identified by the City, and replacement could be pushed out to a later date after the end of the planning period (2035). In order to spread out repair and replacement and avoid having year where no pipes or too many need to be replaced, the life cycle of the entire system was taken into consideration. Using this assumption, approximately 12,000 LF of pipes would need to be replaced each year, which corresponds to approximately 250,000 LF (47 miles) of pipes to replace in the next 20 years.

Table 4.8 compares the linear feet of pipes reaching its RUL by planning period with the combined maintenance and structural score. Cells highlighted in red are recommended to be replaced in the next 5 years, the ones in orange, between 2021 and 2025 and the ones in yellow in the Long-Term planning period (after 2025). Approximately 250,000 LF of pipes is recommended to be replaced in the planning period (about 6.5% of the collection system per year in the next 20 years).

When an opportunity to replace a sewer main with known maintenance or structure issues by City staff occurs (road paving, other projects in the vicinity,…), the City should take the opportunity to replace the main regardless of pipe priorities.

All pipes highlighted in either red, orange, or yellow on Figure 4.20 are included in the CIP under the repair and replacement program (Chapter 6 - Capital Improvement Plan).



Legend

- WRP
- Lift/Pump Station
- Force Main

Total Structural Score

- 16 - 25
- 11-15
- 1-10
- 0
- Existing Sewer Service Area
- UGB
- Tax Lots

N

0 5,000 10,000 Feet

Figure 4.18
Structural Data Scoring
Wastewater Collection System Master Plan
City of Grants Pass

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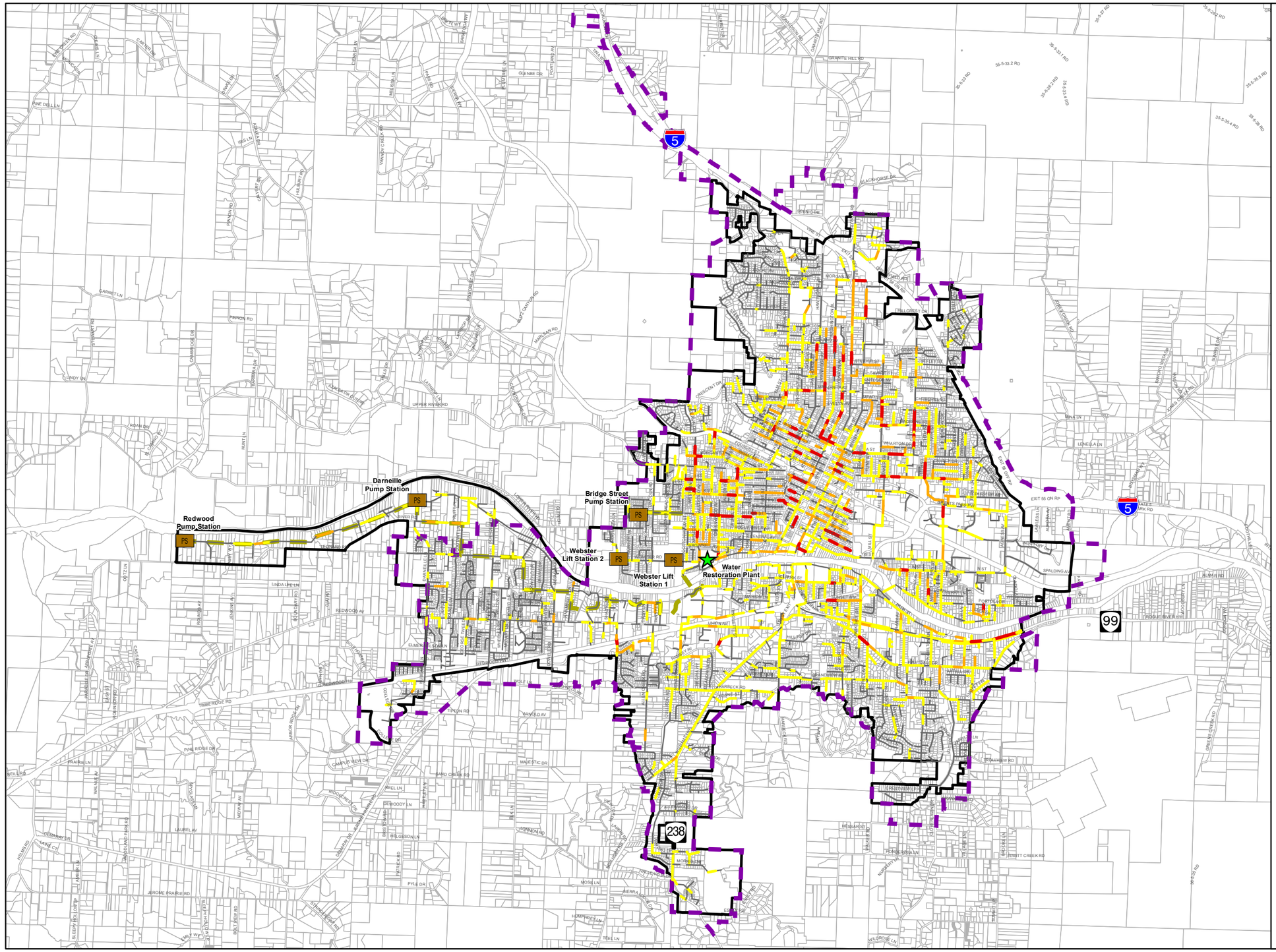

Legend

- WRP
- Lift/Pump Station
- Force Main

Maintenence and Structural Data Scoring

- 21 - 40
- 11 - 20
- 1 -10
- 0
- Existing Sewer Service Area
- UGB
- Tax Lots

N

0 5,000 10,000 Feet

Figure 4.19
Maintenance and Structural Data Scoring
Wastewater Collection System Master Plan
City of Grants Pass

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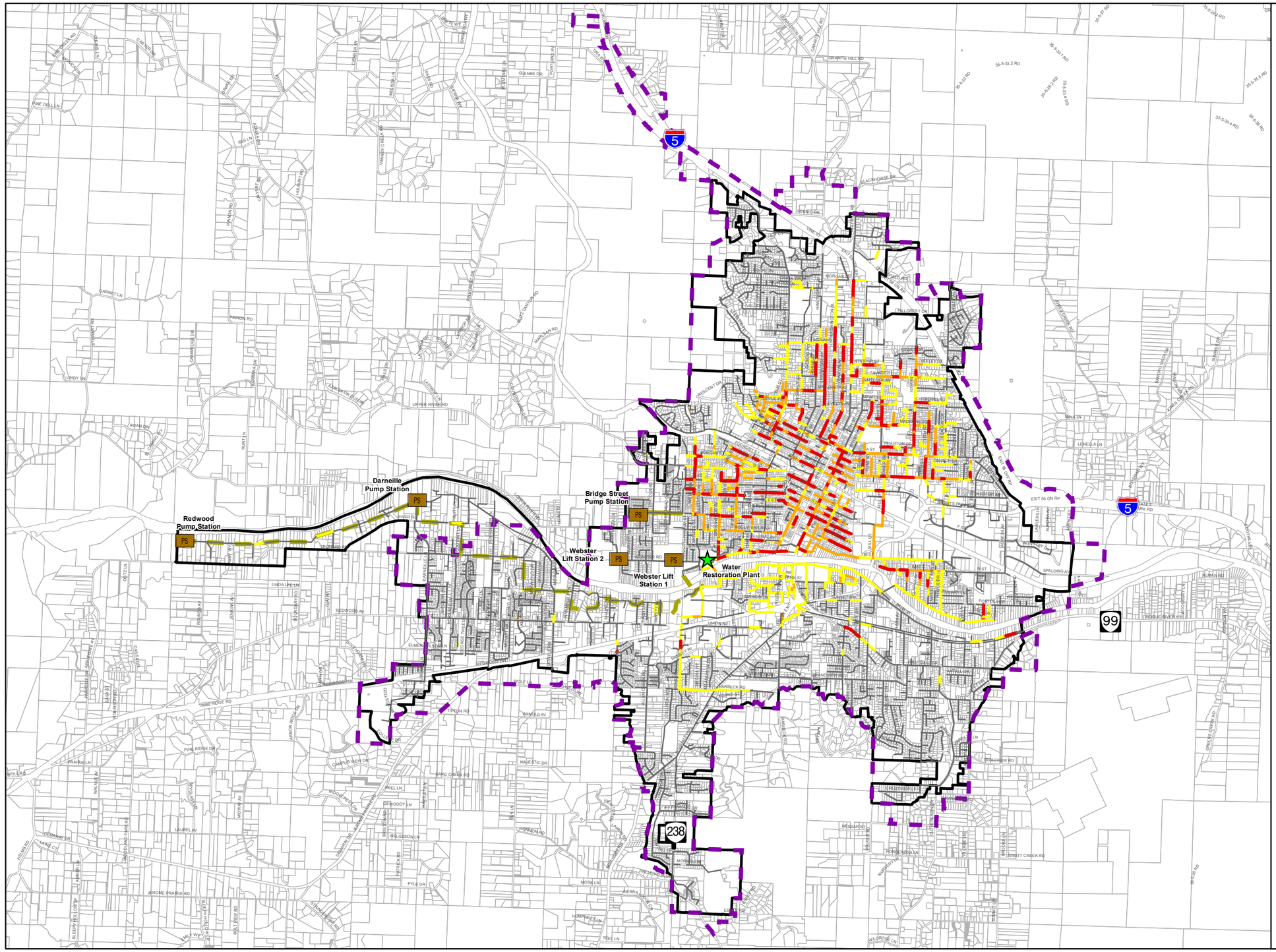


Legend

- WRP
- Lift/Pump Station
- Force Main

Pipes Recommended to be Replaced or Repaired

- 2015 - 2020
- 2021 - 2025
- 2026 - 2035
- Other Gravity Main
- Existing Sewer Service Area
- UGB
- Tax Lots

N

0 5,000 10,000 Feet

Figure 4.20
Condition Assessment Prioritization
Wastewater Collection System Master Plan
City of Grants Pass

Table 4.8 Weighting Factors for Condition Assessment
Wastewater Collection System Master Plan
City of Grants Pass

		Combined Maintenance and Structural Score									
		0	**1-5**	**6-10**	**11-15**	**16-20**	**21-25**	**26-30**	**31-35**	**36-40**	**Total (ft)**
RUL Score	**Over 20 years of RUL**	394,765	43,353	10,276	4,297	0	339	0	210	0	**452,516**
	Between 10 and 20 years of RUL	129,246	67,246	52,722	20,024	8,336	3,489	1,341	462	0	**283,159**
	Between 0 and 10 years of RUL	32,119	28,721	18,855	7,108	4,396	1,542	445	343	543	**94,481**
	0 years of RUL	28,674	32,909	24,124	21,892	14,938	10,344	7,007	1,215	1,477	**142,590**
	Total Length (ft)	**584,804**	**172,228**	**105,976**	**53,321**	**27,671**	**15,714**	**8,793**	**2,230**	**2,020**	**972,745**
	Percentage (%)	**60.1%**	**17.7%**	**10.9%**	**5.5%**	**2.8%**	**1.6%**	**0.9%**	**0.2%**	**0.2%**	**100.0%**

Proposed Replacement Year	Length (ft)	Percent System (%)
After 2035	722,267	74.3%
2026-2035	121,745	12.5%
2021-2025	64,141	6.6%
2015-2020	64,604	6.6%
Total (ft)	**972,745**	**100.0%**

4.3.6 Recommendations

This section provides guidelines for video inspection and condition assessment, including establishing standardized observation codes, data documentation procedures, and condition grading. Effective use of CCTV inspection data requires that the data recorded be consistent, complete, and capture in a format that can be readily accessed for analysis. Current industry best practice is to use the Pipeline Assessment and Certification Program (PACP) standards developed by the National Association of Sewer Service Companies (NASSCO). This program specifies observation codes and grades to be applied to all structural and maintenance-related defects.

The City has complete maintenance and structural data, and it is recommended that the City continues CCTV inspections and keeps updating its maintenance records. It is also recommended that PACP standards be adopted to facilitate analysis of data in the future. Under the PACP standards, all structural defects in any pipeline section are assigned a grade of 1 to 5, with 5 being the most critical condition. PACP standards also cover maintenance defects to use for maintenance planning purposes.

It is also recommended that the City develop an Asset Management Program (AMP) to store results and help making decisions on their repair and replacement (R&R) program. AMPs help utilities find the optimal timing for repair or replacement of assets by weighting the costs of continued maintenance against the costs of R&R. These plans also prioritize projects to reduce operation and maintenance risks with the goal of lowering cost to the ratepayers. An AMP includes level of risk, risk factors, results of risk-based analysis based on vulnerability and critically scoring, and implementation schedule. The AMP should be updated regularly (annually) to reflect changes made to the system. More detail on AMP recommendation can be found in Chapter 6 - Capital Improvement Plan.

4.4 CONDITION ASSESSMENT OF EXISTING PUMP STATIONS

A summary of condition assessment of the pump stations is presented in this section. Detailed pump station evaluation is presented in Appendix F.

4.4.1 Webster Lift Station No. 1

The Webster Lift Station No. 1 has the following issues as noted during site visit. Webster Lift Station No. 1 is currently under design. Construction is planned to begin in 2016.

1. *Access and Maintenance*. Access to the buried dry pit is through a vehicle rated access hatch. This arrangement requires two staff for completing maintenance procedures due to confined space entry restrictions. Additionally, access hatches/manholes are not lined up with the pumps, making removal of pumps difficult.
2. *Corrosion*. The pump dry pit steel housing is corroded on visual inspection. The wet-pit manhole has no signs of hydrogen sulfide corrosion on concrete and appears to be in

good condition. The original sewer was replaced by a 12-inch PVC sewer in the mid 1990's. The PVC sewer and manholes are in good condition.

3. *Aged Equipment*. The City replaced the impeller on one of the two pumps. The other pump has a worn impeller. The pump with the worn impeller discharges about one-third the capacity of the pump with the new impeller.
4. *SCADA Communication*. The SCADA equipment at the pump station is aged and nearing obsolescence. SCADA communication is currently through older hard wire telephone lines. Nuisance alarms occur which may be caused by shorting of wires.
5. *Public Visibility*. The existing pump station is in the roadway visible from the ball park and walkway. The City wishes to relocate to an area less intrusive and away from the roadway such that the operation and maintenance practices cause minimal disruption to park activities.

4.4.1.1 Webster Lift Station No. 1 Force Main

Since the lift station lifts flow and discharges back into the 12-inch gravity sewer, there is minimal piping and valving associated with this lift station. The maintenance crew generally does not have issues with Webster Lift Station No. 1.

4.4.2 Webster Lift Station No. 2

Webster Lift Station No. 2 is similar to Webster Lift Station No. 1 and has all the similar issues listed under 4.4.1.

4.4.3 Bridge Street Pump Station

The Bridge Street Pump Station has significant capacity and reliability issues related to the pump, guide rail, and level control issues at the pump station. These include:

1. *Poor fit of pumps and base elbow assemblies.* The fit of one pump is so severe that a large portion of the pumped flow discharges back into the wet well, reducing its capacity. Additionally, wear of the pump flange and/or base elbow may have occurred over time leading up to the current capacity issue.
2. *Severe Wear.* There is severe wear at the pump rail attachment points in addition to failing upper rail supports. The pumps cannot be accurately be positioned or reliable removed using the current guide rails.
3. *Unreliable Level Controls.* The pumps are started and stopped based on wet well level. However, level controls are unreliable and pumps may not be starting and stopping at the correct wet well level.
4. *Seismic Reliability.* Batteries for generators are not fastened for seismic restraint.

4.4.3.1 Bridge Street Force Main

The Bridge Street 8-inch and 4-inch force mains are in relatively good condition. The maintenance crew cleans the wet well using vactor trucks, and pigs the force mains once a year

during low flow conditions. The odor control provided through carbon canisters along the force main routes are adequate. The City does not receive odor complaints.

4.4.4 Redwood Pump Station

The Redwood pump station is in generally good condition. The following major issues were noted:

1. *Safety.* Currently there is no safety grate below the hatch on the wet well. Installing a safety grate below the hatch would provide additional safety for staff observing the wet well. Additionally, above grade fuel tank may be subjected to vandalism. The above grade diesel tank is currently being replaced by an above grade propane tank.
2. *Seismic Reliability.* It is recommended to have the electrical and control panels restrained.
3. *Generator:* The generator at Redwood Pump Station is failing. A replacement has been purchased by the City.

4.4.4.1 Redwood Force Main

Similar to the Bridge Street force mains, the City maintenance crew cleans the wet well using vactor trucks once a year as part of their routine maintenance protocol.

4.4.5 Darneille Pump Station

Darneille pump station is relatively new pump station, however, the staff has reported several concerns:

1. *Wet Well Grease and Scum Issues.* Wet well design is a typical self-cleaning trench style channel. The City has stopped operating pumps in the self-cleaning mode because the pump at the end of the channel would clog.
2. *Wet Well Liner Issues.* The liner applied to the concrete wet well walls de-laminated from the concrete. Water got behind the liner resulting in bulges. In 2014, the City removed the liner from the wet well to keep the liner from plugging pump suctions leaving the concrete unprotected. The maintenance personnel noted that the concrete surface was soft when the liner was removed.
3. *Odor.* Hydrogen sulfide odor was detected out of carbon canisters, which had corroded tops and bolts.
4. *HVAC Issues.* The 18-inch diameter buried PVC exhaust air duct for the lower level of the pump room has a leak. Water drained from the duct into the room damaging sound attenuation panels. The City disconnected a transition duct from the exhaust fan to the PVC duct to allow the water to drain into the room. With the duct removed, the exhaust fan discharges back into the room. Additionally, all exhaust is from the ceiling of the pump room. There is no way to exhaust air from the floor level.
5. *Seismic Reliability.* Pipes, electrical and control panels do not have seismic bracing.

4.4.5.1 Darneille Force Main

The Darneille force main has significant grease and plastics issues. The City maintenance crew spends roughly 4-6 hours every week cleaning the wet well using their vactor truck to control the amount of grease and plastics conveyed through the system. In addition to cleaning the wet well, the force main vacuum release valves (VRVs) and ARVs are cleaned periodically.

The staff encounters the following issues during valve maintenance:

- Valve boxes for Darneille force main are located on busy streets requiring the staff adopt traffic control.
- Requires confined space entry.
- Heavy metal valves are difficult to work with and foul easily. Staff has replaced all VRVs with newer plastic body valves that are lighter and more stable.

4.4.6 Pump Station Condition Assessment Recommendations

A summary of condition assessment rating for each pump station is presented in Table 4.9. Each pump station was assessed on six categories based on a rating scale of 1 to 5 (1 being poor condition/least favorable and 5 is most favorable). These were based on visual inspection of the facilities, input from the City, and existing pump station records.

Based on these assessments, Webster Lift Station No. 1 and Bridge Street Pump Station will be replaced and rehabilitated, respectively within the current 5-year Capital Improvement Plan (CIP). The Webster Lift Station No. 2 is recommended to be replaced in the short - term (before 2025). Darneille Pump Station alternative analysis is recommended to be completed within the current 5-year CIP. Further discussion on Darneille Pump Station recommendation is located in Chapter 5 - Capacity Analysis.

Investigation in the Redwood area is recommended to address grease and plastics issues.

Table 4.9 Pump Station Condition Assessment Summary
Wastewater Collection System Master Plan
City of Grants Pass

Pump Station	Structural	Mechanical	Electrical	I&C	Site/ Civil	O&M	Rehab Anticipated During Planning Period?
Webster No. 1	1	1-2	1	1	2	1	Yes, under design
Webster No. 2	1	1-2	1	1	3	1	Yes, before 2025
Bridge Street	4	2	4	4	5	3	Yes, Before 2020
Redwood	5	5	5	5	4	4	No
Darneille	1 (wet well) 2 (superstructure)	2-4	5	5	4	2	Yes, Before 2025

Rating Scale:
(1) Poor condition.
(2) Needs work.
(3) Can live with it.
(4) Performs well.
(5) Want to see this at all our sites.

Chapter 5

COLLECTION SYSTEM ANALYSIS

5.1 INTRODUCTION

This chapter describes the capacity analysis of the City's collection system based on the projected growth scenarios, developed in Chapter 3 - Flow Projections, identifies deficiencies from future infill and new development, and proposes improvements to mitigate these deficiencies.

An existing H2OMAP® SWMM hydraulic model of the City's collection system was developed by Carollo in 2012, and was used to perform the capacity analysis for the two growth scenarios described herein. Development and calibration of the City's hydraulic model is described in Appendix E.

5.2 HYDRAULIC MODEL DEVELOPMENT

A wastewater collection system model is a simplified representation of the real sewer system. Sewer system models can assess the conveyance capacity for a collection system. Sewer system models can also perform "what if" scenarios to assess the impacts of future developments and land use changes. The model was the primary tool to evaluating the collection system.

The City updated and calibrated its collection system model in 2012 and details on this task can be found in Appendix E. The sections below summarize the important information to the purpose of this plan.

5.2.1 Hydraulic Model Update

The City's hydraulic model was converted to Innovyze's H2OMap SWMM in 2012. The hydraulic modeling engine for the H2OMap SWMM software package uses the Environmental Protection Agency's (EPA) Storm Water Management Model (SWMM), which is widely used throughout the world for planning, analysis, and design related to stormwater runoff, combined sewers, sanitary sewers, and other drainage systems. Version 14 of H2OMap SWMM is used to perform the capacity analysis as part of this plan. The conversion and update is documented in Appendix E.

Figure 5.1 illustrates the City's modeled collection system.

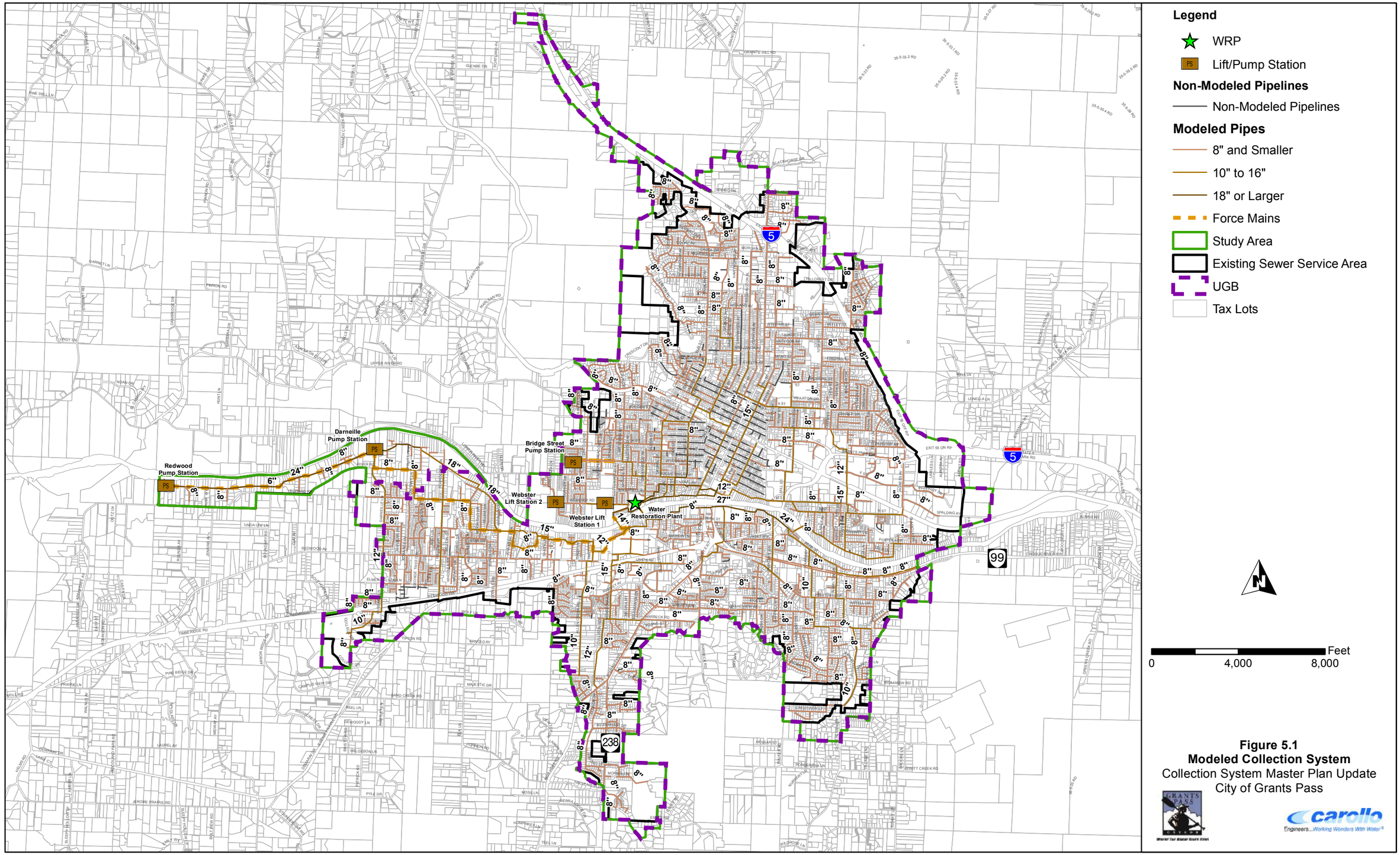


Figure 5.1
Modeled Collection System
Collection System Master Plan Update
City of Grants Pass

5.2.2 Hydraulic Model Calibration

Model calibration is a crucial component of the hydraulic modeling effort. The purpose of the sanitary sewer collection system hydraulic model is to estimate, or predict how, the collection system will respond under a given set of conditions. To this end, the model was calibrated against field measured data recorded during the City's flow monitoring program.

Calibrating the model to match data collected during the flow monitoring program ensures the most accurate results possible. The calibration process consists of calibrating to both dry and wet weather conditions.

For this project, both dry and wet weather calibration were conducted. Dry weather flow (DWF) calibration ensures an accurate depiction of base wastewater flow generated within the study area. The wet weather flow (WWF) calibration consists of calibrating the hydraulic model to a specific storm event or events to simulate the peak and volume of infiltration/inflow (I/I) into the sewer system. The amount of I/I is essentially the difference between the WWF and DWF components.

The model was calibrated in accordance with international modeling standards. The Wastewater Planning Users Group (WaPUG), a section of the Chartered Institution of Water and Environmental Management, has established principles for model verification that have been generally agreed-upon. The wet weather calibration for this project focused on meeting the recommendations on model verification contained in the “Code of Practice for the Hydraulic Modeling of Sewer Systems,” version 3.001, published by the WaPUG.

The WaPUG criteria for hydraulic model calibration are summarized below:

- **Dry Weather Flow Calibration.** The DWF hydrographs should closely follow each other in shape and magnitude, and meet the following criteria as a general guide:
  - Timing of flow peaks and troughs should be within one hour.
  - The peak flow rate should be in the range of ±10 percent.
  - The volume of flow (or average flow) should be in the range of ±10 percent, with care taken to exclude periods of missing or inaccurate data.
- **Wet Weather Flow Calibration.** The WWF hydrographs should closely follow each other in shape and magnitude until the flow has substantially returned to the dry weather flow rates, and meet the following criteria as a general guide:
  - Timing of flow peaks and troughs should be similar having regard to the duration of the event.
  - The peak flow rate should be in the range of +25 percent to -15 percent.
  - The volume of flow (or average flow) should be in the range of +20 percent to -10 percent, with care taken to exclude periods of missing or inaccurate data.

Calibration results and additional information on the calibration are detailed in Appendix E.

5.3 SYSTEM EVALUATION CRITERIA

Capacity analysis of the wastewater collection system was performed in accordance with the criteria established in this chapter. The City's Sewer Standards for Design, Construction, and Testing of the Sanitary Sewer System stipulate general policies of the City and outline sewer design criteria. Some of these criteria are discussed below; for criteria that are not discussed in this section, the reader should assume that the design criteria conform to the Sewer Standards. Sewer pipe capacities are dependent on many factors, including roughness of the pipe, the maximum allowable depth of flow, minimum velocity, and slope of pipe. Assumptions of these factors are discussed below.

5.3.1 Design Criteria

Design Criteria including Manning Coefficient (n), velocities and minimum slopes and change in pipe size are detailed in Table 2.4 located in Chapter 2 – Policies and Criteria.

5.3.2 Performance Criteria

5.3.2.1 Design Storm

The hydraulic capacity analysis was performed using a customized 5-year, 24-hour design storm with antecedent rainfall. The design storm is discussed in Chapter 3 - Flow Projections.

5.3.2.2 Conveyance System

The primary criterion used to identify capacity-deficient trunk sewers or to size new improvements is the maximum flow depth to pipe diameter ratio (d/D). The d/D value is defined as the depth (d) of flow in a pipe during peak flow conditions divided by the pipe's diameter (D). The operating criterion varies for existing sewers and for new sewers.

When evaluating existing sewers, using a conservative d/D ratio may lead to unnecessary replacement of existing pipelines. During PWWF, water levels were allowed to rise up to two feet above the pipe crown within the manhole. Sewers were allowed to surcharge under these maximum flow conditions. If the flow depth was greater than the maximum allowed, then the sewer was deemed deficient and a larger sewer was proposed to provide greater flow capacity.

When designing new sewers, it is common practice to adopt variable flow depth criteria for different pipe sizes. Design d/D ratios typically range from 0.5 to 0.92, with the lower values used for smaller pipes, which may experience flow peaks greater than design flow or may experience blockages from debris, paper or rags. The City's Sewer Standards define the acceptable d/D values for design of new sewers. Sewers equal to or less than 15-inches in diameter shall be designed to flow half full (d/D of 0.5) at peak flow rates. Sewers 18 inches and greater in diameter shall be designed to flow at a d/D of 0.75 at peak flow rate.

The maximum allowable d/D ratios for design flow conditions are summarized in Table 5.1. These design flow depths are relatively conservative and provide for some flexibility capacity if projected flows change as a result of modifications in flow generation assumptions or land uses.

Table 5.1 Flow Depth Criteria Used in Modeling Wastewater Collection System Master Plan City of Grants Pass	
Existing Sewers	
Flow Condition	**Maximum Surcharge Depth**
Peak Wet Weather Flow (Design Flow)	Two feet above pipe crown in manhole
New Sewers	
Diameter	**Design Flow Maximum d/D Ratio**
Less than or equal to 15-inches	0.50
Greater than or equal to 18-inches	0.75

5.3.2.3 Lift Stations and Force Mains

According to City Sewer Standards and as presented in Chapter 2 – Policies and Criteria, pump capacity shall be provided to handle the ultimate peak flow, also known as the peak wet weather flow (PWWF), from a tributary area with the largest pump out of service. Therefore, the City's sewage lift stations should have sufficient firm capacity (capacity with the largest pump out of service) to pump the PWWF until the end of the planning period (2035).

The evaluation of existing force mains is based on a maximum pipe velocity of 9 feet per second (fps) as well as a pressure limitation of 200 feet (approximately 85 psi) at the pump station, as this upper limit encroaches on the need for series pumping systems. Beyond this natural pressure boundary of non-clog wastewater pumps, the availability of acceptable pumps is inconsistent.

5.4 COLLECTION SYSTEM CAPACITY EVALUATION

A capacity analysis of the modeled collection system was performed using the City's calibrated hydraulic model and using the system evaluation criteria outlined above. The capacity analysis entailed identifying areas in the sewer system where the planning criteria for surcharging was exceeded, or where the capacity of pump stations was exceeded. The collection system was evaluated for the existing, short-term (2025) and, long-term (2035) conditions, based on the PWWF generated using the 5-year, 24-hour design storm. The City has several Urban Reserve Areas (URA) they are looking to expand to, but are currently not incorporated in their UGB and study area. Analysis for these areas is presented independently in Appendix A.

5.4.1 Gravity Collection System Evaluation

The capacity analysis entailed identifying areas in the sewer collection system where flow restrictions occur or where capacity is insufficient to convey PWWF.

5.4.1.1 Surcharge Due To Backwater

Pipelines with a Hydraulic Grade Line (HGL) that encroached within two feet above pipe crown in manhole are not necessarily capacity deficient. Surcharging of a pipe can occur due to backwater effects of a downstream pipe, not due to insufficient capacity of the pipe itself. If the downstream pipe is capacity deficient, it can cause backup - and even reversal - of flow in the upstream pipe, resulting in surcharge of the upstream pipe that otherwise is not capacity limited. If the downstream pipe capacity is increased, then the upstream pipe may no longer require capacity improvements. An illustration of backwater effects is shown in Figure 5.2. Therefore, it is recommended that the City address downstream issues to limit the overall cost of the CIP, rather than backwater improvements.

For this reason, the hydraulic model was analyzed to identify the pipeline segments that are the cause of the surcharged conditions.

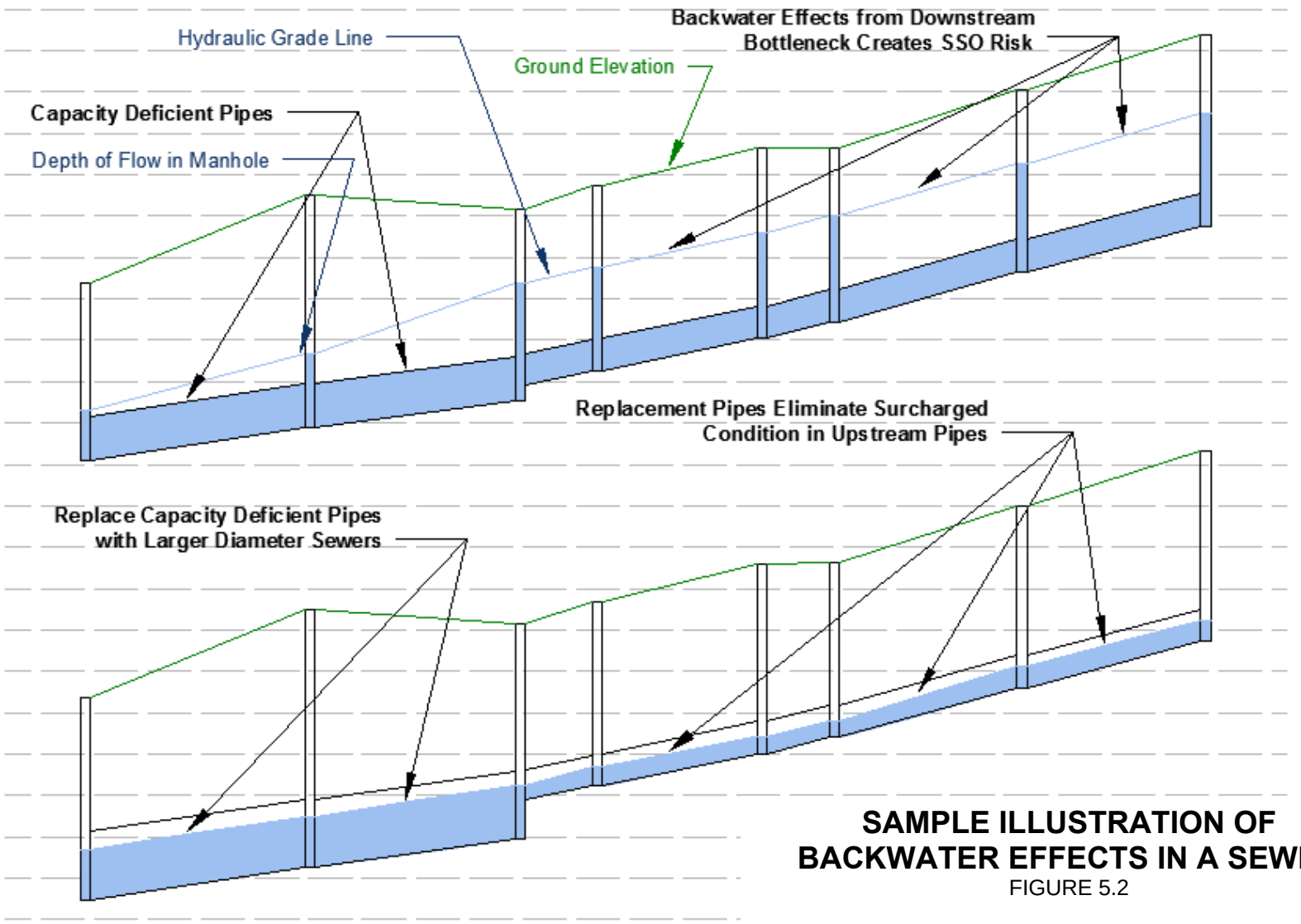
5.4.1.2 Existing System

For the existing sewer collection system, the PWWF was routed through the hydraulic model. In accordance with the established criteria for existing sewers, manholes where the HGL encroached within two feet of the pipe crown were identified. Capacity deficiencies were identified that will require improvements prior to serving future users.

In general, the small sewer main lines (8 inches) throughout the City have sufficient capacity to convey existing and future flows. The primary capacity issues derive from the larger trunk lines or interceptors that receive flow from multiple collection basins, and that convey sewage to the WRP.

There are 5 main pockets of deficiencies flagged in the hydraulic model under existing conditions. The deficiencies are mainly located in wastewater basins I, H, B, and T. Deficiencies in Basin Z are due to Darneille Pump Station’s incapacity to convey existing PWWF.

Following the completion of the existing system analysis, improvement projects and alternatives were identified in order to mitigate existing system pipeline capacity deficiencies. The recommended improvement projects are discussed in greater detail in Section 5.5.



SAMPLE ILLUSTRATION OF BACKWATER EFFECTS IN A SEWER

FIGURE 5.2

CITY OF GRANTS PASS
WASTEWATER COLLECTION SYSTEM MASTER PLAN

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5.4.1.3 New Sewers Assumptions

Assumptions on where future flow will be routed into the existing conveyance system were presented in Chapter 3 - Flow Projections. These were further analyzed as part of this chapter to develop high-level conceptual projects on how to connect the identified major growth areas.

The proposed improvements to serve future users are sized for build-out conditions. As the City continues to grow, it is recommended that the proposed pipeline diameters be constructed so that the facilities have sufficient capacity for build out conditions. The timing for the development of these areas is discussed in the sections below.

Three areas were identified as challenging mainly due to physical constraints:

- Spalding Area.
- South Highway.
- North I-5.

These three areas are described in more detailed in the sections below and conceptual projects to connect these areas to the existing system are presented in Figures 5.3 to 5.5. Other growth areas are considered more straightforward as it mainly consists in extending existing pipes into the undeveloped parcels, and are therefore not further evaluated.

5.4.1.3.1. Spalding Area

This area is located in the east of the City's conveyance system, just north of the Rogue River. Carollo completed a technical memorandum in 2015 to provide an opinion of the capital cost to provide wastewater service to the Spalding industrial area. This analysis confirmed that a pump station located approximately west of Jones Creek on the eastern edge of the Urban Growth Boundary (UGB) and a force main are needed to convey flows from the Spalding industrial area to the existing sewer in Portola Drive. Appendix G is a TM detailing the analysis performed by Carollo in 2015 for the Spalding Area.

Figure 5.3 shows the location of the new proposed pump station and force main and piping to develop in both short- and long-term planning periods.

Due to the expected partial development of this area in the short-term planning period (2025), the proposed pump station will need to be constructed before 2025 when the area is scheduled to start developing. However, the infrastructure will be sized to handle projected build-out 2035 PWWFs. High-level planning analysis revealed that the estimated build-out ADWF is 55 gpm, while the projected PWWF is 110 gpm under build-out conditions.

5.4.1.3.1. South Highway

This growth area is located south of the Redwood Highway. Most of the area is planned to connect to the sewer pipe located along Willow Ln. Eight-inch gravity pipes are recommended to collect flows in this area, as shown on Figure 5.4.

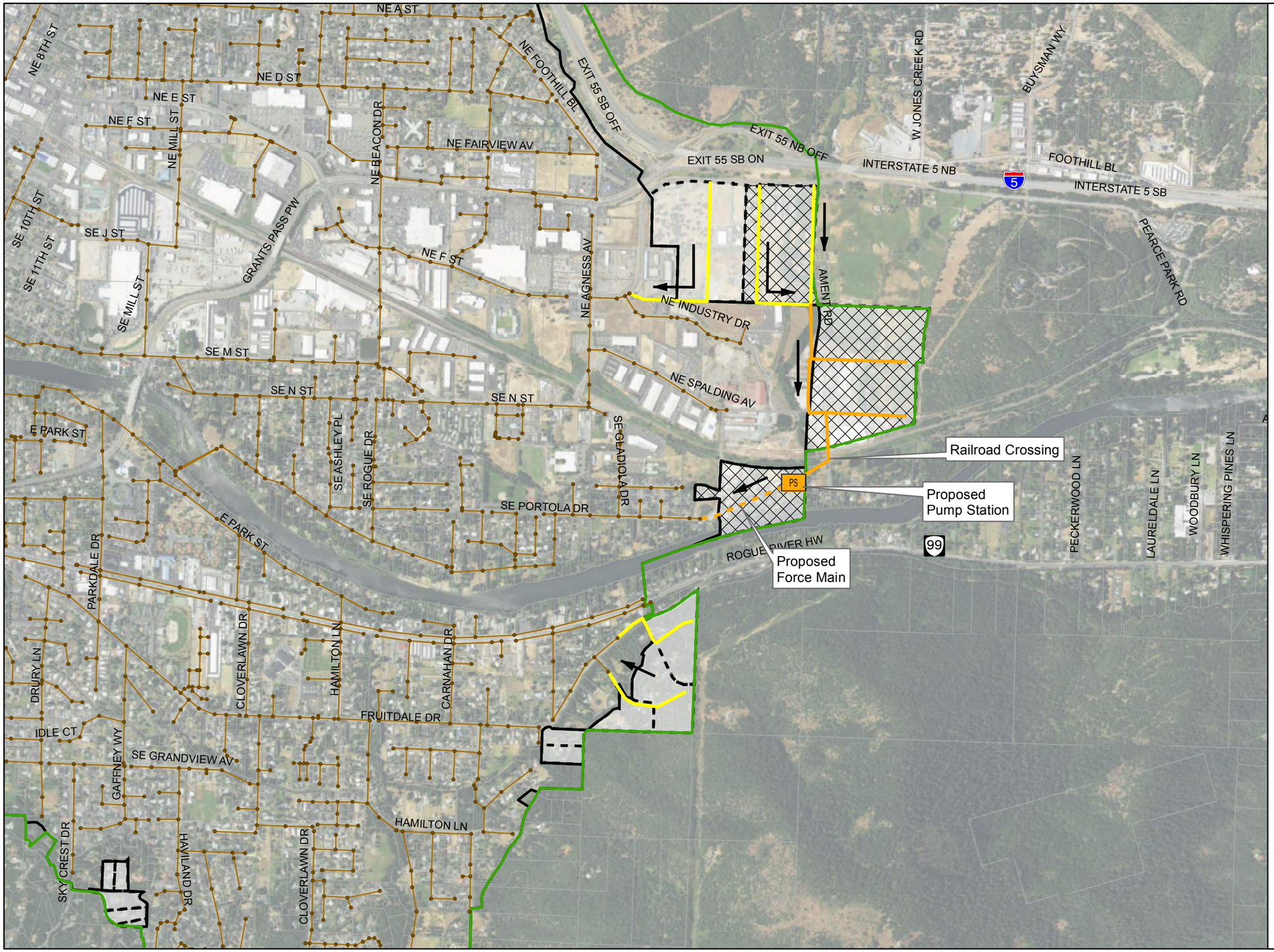
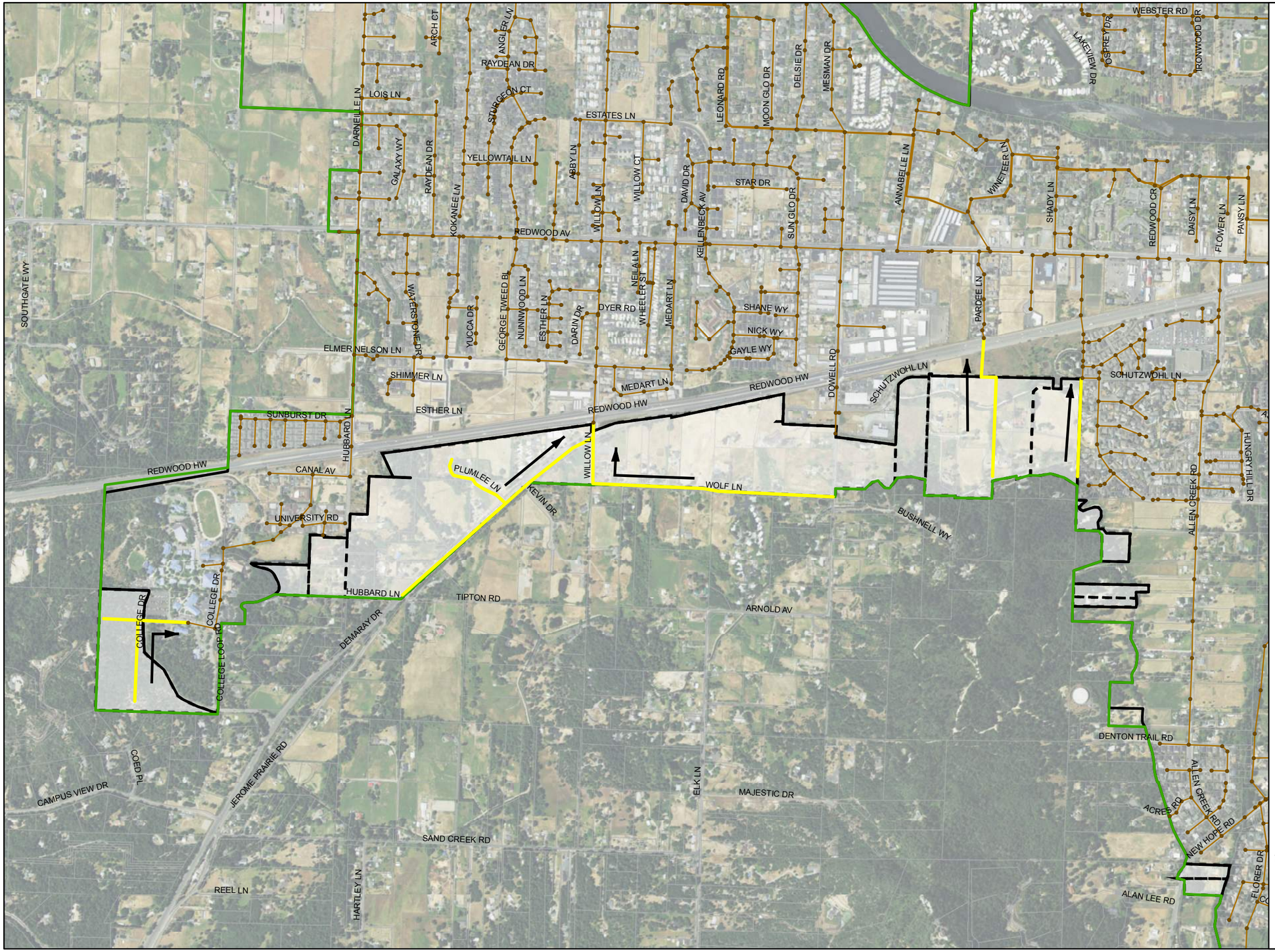


Figure 5.3
Spalding Area Proposed Connection Projects
Wastewater Collection System Master Plan
City of Grants Pass



Legend

- Long-Term Proposed Gravity Main (2035)
- Flow Direction
- Existing Manholes
- Existing Pipeline
- Existing Sewer Service Area
- Study Area Boundary
- Future Growth Areas to Serve
- Tax Lots

N

0 1,000 2,000 Feet

Figure 5.4
South Highway Area
Proposed Connection Projects
Wastewater Collection System Master Plan
City of Grants Pass

5.4.1.3.1. North I-5

The growth area located north of I-5 is challenging to connect to the existing system for several reasons:

1. Growth occurs on the other side of the highway from where the existing piping system is located.
2. Topology in the area varies significantly.

Highway crossings and a new pump station are recommended to connect these areas to the existing collection system. Figure 5.5 illustrates the proposed infrastructures.

Due to the cost and complexity of crossing I-5, it is recommended that a large diameter crossing be constructed to tie into the existing system. Three crossings are proposed in order to route al the flow from these to the existing system:

- At the intersection of Highland Avenue with I-5,
- Across I-5 at the latitude of Cherokee Ln dead-end, and
- At the intersection of Heidi Lane with I-5.

A typical Jack and Bore is the recommended technology to cross I-5. Jack and Bore is a trenchless method of horizontal boring construction. Pipe ramming can also be considered, but is not recommended due to potential impacts of vibration on the highway during construction.

A new pump station is necessary to capture flows coming from the north-west, as the slope gradient in this area is towards the west, and the flow needs to be routed to the east to the existing system. The area that this new pump station would catch is highlighted on Figure 5.5. High-level planning analysis was performed to size both pump station and force main. The new pump station and force main will need to be able to handle projected build-out flows from this area. Build-out ADWF for the area is estimated at 35 gpm, while the projected PWWF is 95 gpm.

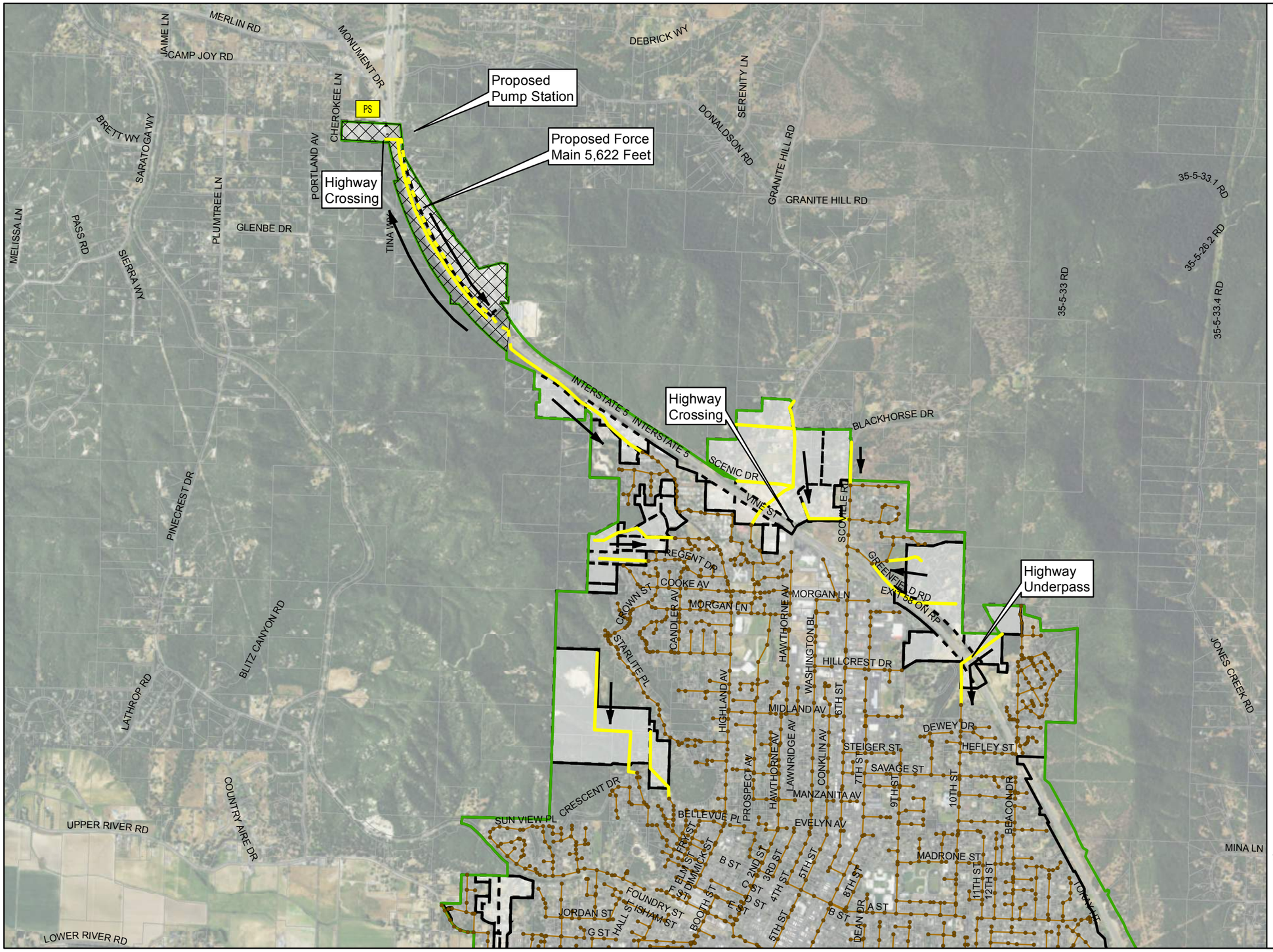
5.4.1.4 Short-Term Planning Period (Year 2025)

The 2025 system analysis was performed in a similar manner to the existing system analysis. The Short-Term scenario evaluated whether or not the sewers are adequately sized to convey the 2025 PWWFs.

The additional projected flows from the future 2025 development intensify the capacity issue, exacerbating the existing deficiency. The additional pockets of deficiencies are located in basins A, V, F, H, T; and J.

Deficiencies observed in Basin A are mostly due to the fact that the Webster No. 1 Pump Station becomes capacity deficient and the flow that this pump station cannot handle backs up in the system upstream causing the HGL to raise above the recommended criteria. The additional deficiencies located in Basin J are mainly due to the connection of part of the Spalding industrial area to the existing collection system.

DRAFT



Legend

- Long-Term Proposed Pump Station (2035)
- Long-Term Proposed Gravity Main (2035)
- Long-Term Proposed Foce Main (2035)
- New Pump Station Tributary Area
- Flow Direction
- Existing Manholes
- Existing Pipeline
- Existing Sewer Service Area
- Study Area Boundary
- Future Growth Areas to Serve
- Tax Lots

Feet
0 2,200 4,400

Figure 5.5
North I-5 Area Proposed Connection Projects
Wastewater Collection System Master Plan
City of Grants Pass

There were several deficiencies identified as resulting solely from the new development proposed in the short-term planning period. These additional locations not satisfying the performance criteria are shown on Figure 5.6 in orange.

5.4.1.5 Long-Term Planning Period (Year 2035)

The 2035 system analysis was performed in a similar manner to the existing and 2025 system analyses. The purpose of the 2035 system evaluation is to verify that the existing system improvements were appropriately sized to convey build out PWWFs, and to identify the locations of sewers that are adequately sized to convey existing PWWFs, but cannot convey build out PWWFs. It is to be noted that it is assumed that the study area will be completely build-out in 2035.

At build out, the City's wastewater flows are expected to almost double compared to existing conditions. As such, there are some areas of the existing collection system that cannot convey the build out PWWF without flows backing up above allowable levels. The observed additional deficiencies in 2035 are located in the same basins as the existing and 2025 deficient spots. The deficiencies worsen due to additional flows in the system and the connection of all growth areas in the upstream of the collection system. No new area is flagged under build-out conditions.

These locations are shown on Figure 5.6 in yellow. Figure 5.6 clearly shows the impact of connecting the growth areas located in the outskirts of the existing system (green parcels on the figure).

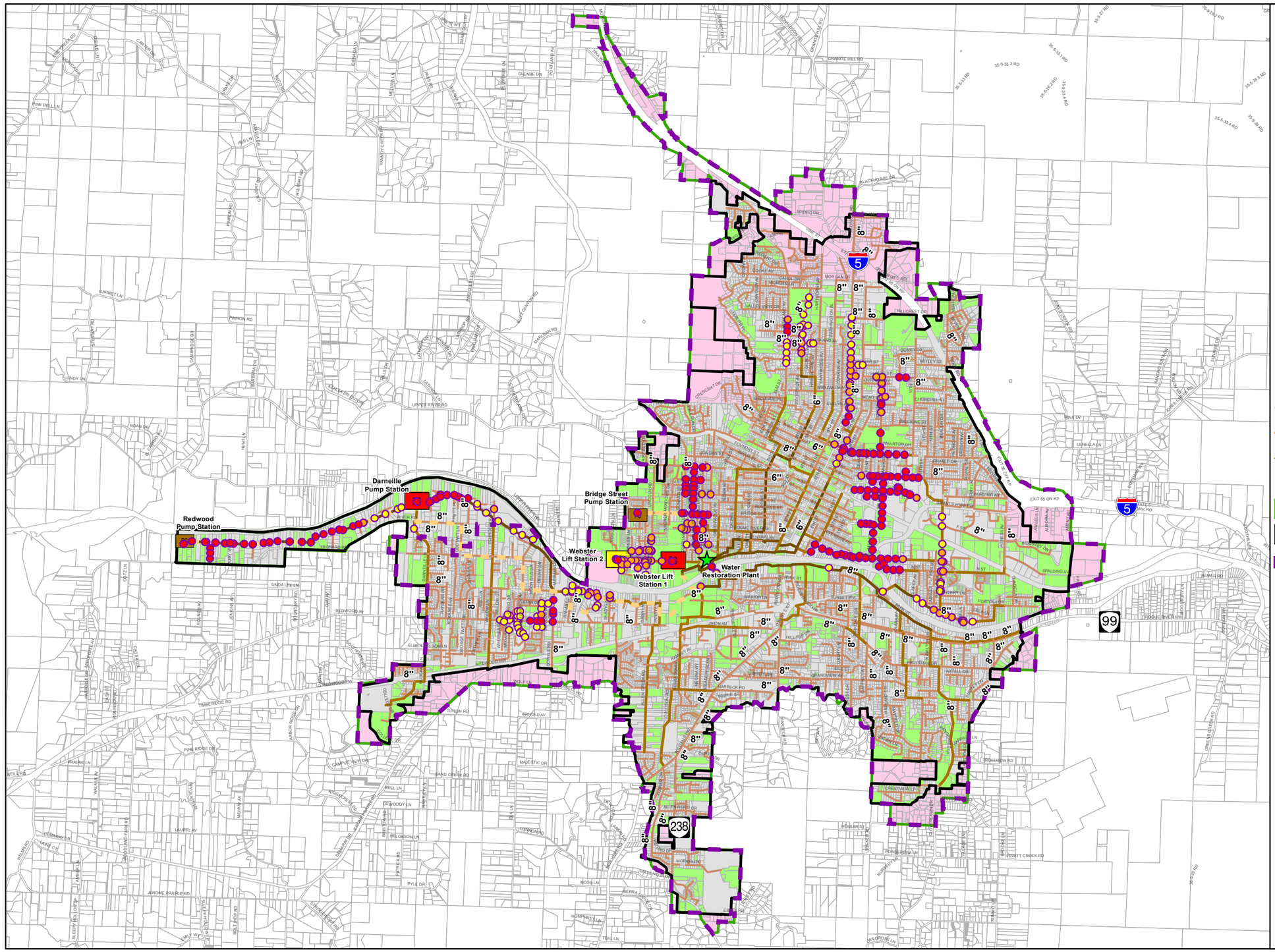
5.4.2 Pump Station Evaluation

Ensuring that pump stations have adequate capacity to convey peak flows is important for preventing unwanted wastewater overflows at pump stations. In accordance with the established planning criteria, the City's existing modeled lift stations were evaluated to determine if each one has available capacity to convey existing and future PWWFs. Lift stations with an influent PWWF above the existing firm capacity were flagged as deficient.

If a pump station has inadequate capacity to pump peak flows, the water level in the wet well may rise to the overflow point, discharging wastewater to stormwater collection systems that eventually discharge to water bodies. The following sections present the pump station capacity evaluation, which compares the estimated current and future peak flows to the pump station firm capacities. Recommendations to address identified deficiencies are presented in Section 5.5.

The City's hydraulic model includes five pump stations located in the City's study area. Table 5.2 summarizes the results of the lift station evaluation. The firm capacity of each pump station is compared to the projected PWWFs coming from each pump station tributary area for the existing, short-term and long-term conditions. The firm capacity of a pump station is defined as the capacity with the largest pump out of service.

The design data includes the number of pumps, individual pump capacity, firm capacity, and total capacity.



Legend

- Existing Deficiencies (> 2 ft above pipe crown)
- 2025 Deficiencies (>2ft above pipe crown)
- 2035 Deficiencies (>2ft above pipe crown)
- PS Existing Lift/Pump Station Deficency
- PS 2035 Lift/Pump Station Deficency

Development Type

- 2035 Development
- 2025 Development
- Existing Developed
- WRP
- PS Lift/Pump Station

Pipelines

- 8" and Smaller
- 10" - 16"
- 18" and Larger
- Force Mains
- Study Area Boundary
- Existing Sewer Service Area
- UGB
- Tax Lots

N

0 4,000 8,000 Feet

Figure 5.6
Collection System Capacity Analysis Deficiencies
Wastewater Collection System Master Plan
City of Grants Pass

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Table 5.2 Pump Station Evaluation
Wastewater Collection System Master Plan
City of Grants Pass

Pump Station	Firm Capacity	Existing		Short-Term (2025)		Long-Term (2035)	
		Modeled PWWF (mgd)	Deficiency	Modeled PWWF (mgd)	Deficiency	Modeled PWWF (mgd)	Deficiency
Bridge Street	0.94	0.48	0.46	0.71	0.22	0.92	0.02
Webster No. 1	0.14	0.28	-0.14	0.50	-0.36	0.66	-0.52
Webster No. 2	0.14	0.02	0.13	0.10	0.04	0.23	-0.08
Darneille	4.20	6.10	-1.90	6.80	-2.60	7.78	-3.58
Redwood	0.48	0.52	-0.04	0.53	-0.05	0.55	-0.06

Notes:
(1) Assumes piping improvements upstream of each pump station is incorporated.
(2) Assumes Darneille and Redwood pump stations are working independently (no flow is diverted from Darneille to Redwood Pump Station).

As shown in Table 5.2, three of the five modeled lift stations were flagged as deficient under both existing and 2025 conditions. An additional pump station (Webster PS No. 2) becomes not adequately sized to convey the model simulated 2035 PWWF.

5.4.2.1 Bridge Street Pump Station

This pump station is adequately sized to convey all estimated existing, 2025, and 2035 PWWFs.

5.4.2.2 Webster No. 1 Lift Station

This lift station is capacity deficient under existing, 2025, and 2035 conditions by 0.14 mgd, 0.36 mgd, and 0.52 mgd, respectively. The Webster No. 1 Lift Station receives flow from the Webster No. 2 Lift Station and residential development. The insufficient capacity of Webster No. 1 causes upstream surcharging above the design goal. The hydraulic model suggests that once build-out of the study area is achieved, that the insufficient capacity at Webster No. 1 could cause sanitary sewer overflows (SSOs) from manholes upstream of the pump station.

This lift station will be replaced in 2016 and the new lift station is currently under design. The anticipated design capacity is 0.57 mgd (395 gpm) with an ultimate capacity of 0.69 mgd (480 gpm).

5.4.2.3 Webster No. 2 Lift Station

This lift station currently collects flow from a relatively small residential area, and has sufficient capacity to convey the PWWFs from the existing and short-term conditions. However, the projected development from the 2035 condition adds residential area that will generate PWWFs that exceeds the firm capacity of this lift station. The total deficiency for the peak hour flows is minimal and is approximately 0.08 mgd.

5.4.2.4 Darneille Pump Station

The Darneille Pump Station is the largest of the City's pump stations and receives flows from the southwest portion of the City. The tributary area for this pump station is shown on Figure 4.4 located in Chapter 4 - Existing System and Condition Assessment. The total existing capacity of this pump station is 4,380 gpm (6.3 mgd) and the firm capacity is 2,920 gpm (4.2 mgd).

The hydraulic model shows the Darneille Pump station cannot handle PWWFs starting under existing conditions. The existing deficiency is estimated at 1.90 mgd, while the short-term (2025) deficiency is projected to increase to 2.60 mgd. Long-term (2035) scenario requires a capacity increase of the pump station of 3.58 mgd, which corresponds to a hydraulic capacity increase of more than 85% over its existing firm capacity.

Hydraulic modeling results also show that the 14-inch force main downstream of the dual 12-inch force mains upstream of the WRP exceeds the threshold of 9 fps in both 2025 and 2035 planning conditions. Velocity in the 14-inch force main under 2025 PWWF condition reaches 9.8 fps (6.8 mgd) while it reaches up to 11.3 fps (7.8 mgd) under the 2035 PWWF condition.

5.4.2.5 Redwood Pump Station

The Redwood Pump Station is located on the western edge of the City's study area. The assumption to operate Redwood and Darneille pump stations separately is made for the capacity evaluation. Due to the assumption to send the flows from the Darneille PS tributary area directly to the WRP and not divert towards Redwood PS, the Redwood PS receives flow from a relatively small tributary area. The analysis shows this pump station to be deficient starting under existing conditions. Relatively minimal growth is expected in this pump station tributary area and the estimated capacity deficiency only increases from 0.04 mgd under existing conditions to 0.06 mgd under long-term (2035) conditions.

5.4.3 Capacity Evaluation Summary

Several locations were identified starting under existing conditions to violate the capacity criteria of the HGL not exceeding two feet above pipe crown. These deficiencies are mainly located on larger trunks collecting most of the flow from the system.

Four pump station capacity deficiencies for conveying future flows are identified for the City's collection system. It is projected that Webster No. 1, Darneille and Redwood pump stations are deficient under the existing conditions and that Webster No. 2 becomes deficient under the Long-term (2035) conditions. Project to increase capacity at Webster No. 1 Lift Station is already underway.

Figure 5.6 summarizes all the capacity deficiencies flagged in this analysis based on the performance criteria presented in Section 5.3.2.

5.5 RECOMMENDED COLLECTION SYSTEM IMPROVEMENTS

This section presents the proposed sewer improvements on both pipes and pump stations to correct existing, short-term and long-term identified deficiencies and to serve future users.

5.5.1 Pipe Improvement Assumptions

When an increase to capacity is required, existing sewers can be upgraded or a parallel or relief sewer can be constructed. For the purposes of this study, unless otherwise stated, we assumed that a capacity deficient sewer would be upgraded to a larger diameter. The upgraded pipeline generally followed the same slope as the existing pipeline, with the exception where survey data revealed negative or flat slopes in an existing alignment.

In essence, there are two alternatives for every trunk sewer project, but the decision to replace or construct a parallel sewer should be made during the preliminary design phase.

During the preliminary design phase, the existing sewer should be inspected by closed circuit television (CCTV) to determine its structural condition. If severely deteriorated, the existing sewer should be upgraded. If moderately deteriorated, slip lining or cured-in-place pipe lining can rehabilitate the existing sewer.

As the City continues to grow, it is recommended that the proposed pipeline diameters be constructed so that the facilities have sufficient capacity for build out conditions. Building a smaller interim project with the plans of upsizing in the future to account for further growth is not recommended due to the extended useful life of the improvements proposed herein. The proposed pipe diameter represents the ultimate diameter for build out conditions.

Both Figure 5.7 and Table 5.3 should be used together to locate the proposed improvement and to gain details of the improvement (length, diameter, street location, etc.). The improvement identification number links the figure and table. The improvements summarized in Table 5.3 use a cross-referenced number system. The columns used in Table 5.3 refer to the following:

- **Project ID**: Assigned unique identifier associated with each improvement project. This is an alphanumeric number that starts with one letter indicating the type of improvement P= Pipe, LS = Lift Station and continues with a number and a letter.
- **Type of improvement**: Pipelines, lift stations, force mains, and jacked steel casings.
- **Street Description**: Street in which the improvement is proposed.
- **Installation Year**: This is the year or decade the existing pipe was initially installed.
- **Existing Size**: This is the size of the existing pipeline/facility. It represents the diameter of the existing pipelines (inches), and the total capacity of lift stations (mgd).
- **Proposed Size**: This is the size of the proposed improvement. It represents the diameter of the proposed pipelines (inches), and the total capacity of lift stations (mgd). Additionally, for jacked steel casings, the size of the casing as well as the carrier pipe are indicated (inches).

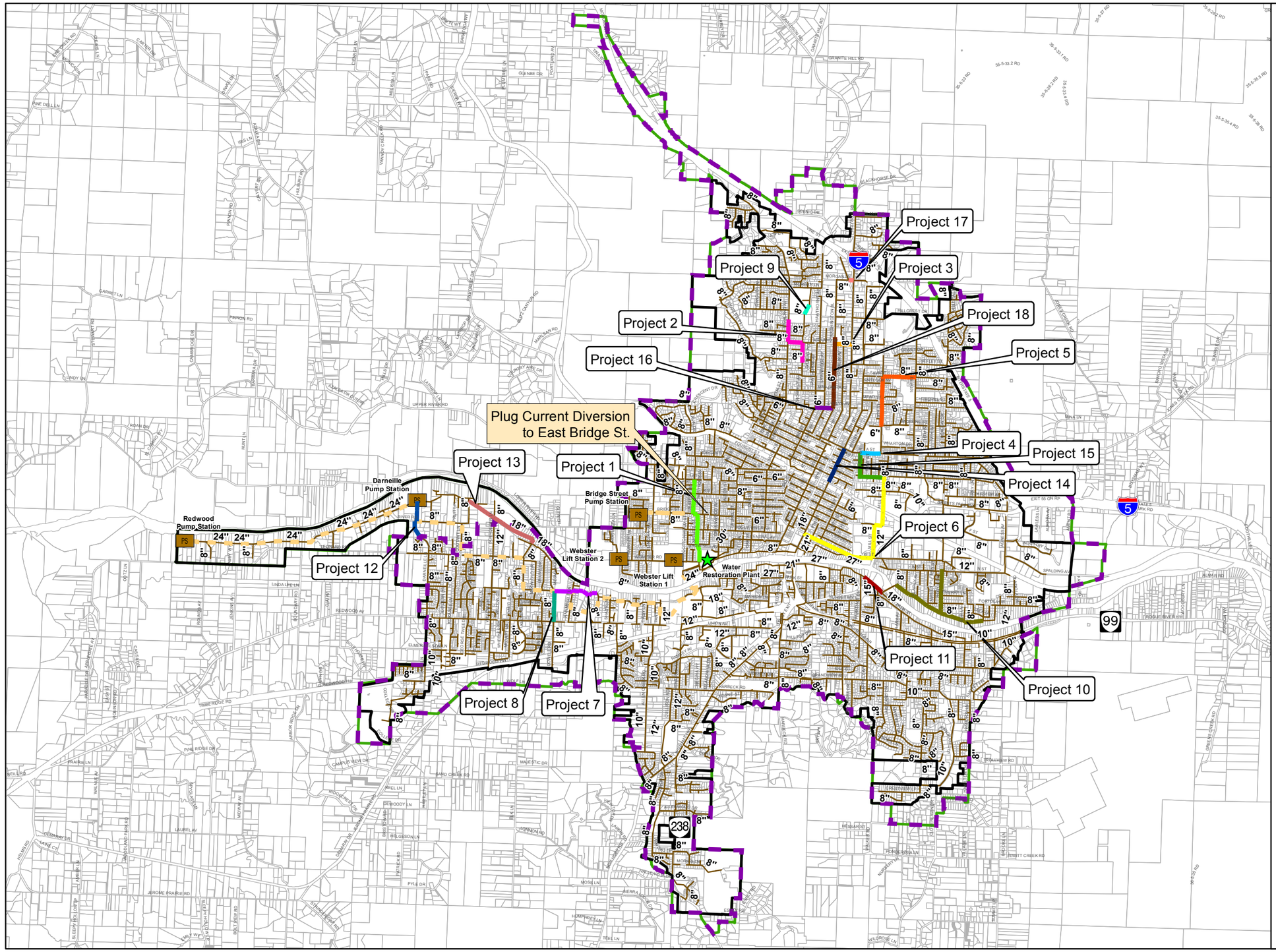
- **Action**: Indicates whether the proposed improvement is a replacement pipeline, parallel pipeline, or a new facility.
- **Length**: Estimated length of the proposed improvement (in feet). It should be noted that the length estimates do not account for re-routing the alignment to avoid unknown conditions.
- **Reason**: This section explains the reason why this improvement is proposed and needed (surcharging, flow diversions,…)

5.5.2 Recommended System Piping Improvements

This section provides a description of the recommended improvements to alleviate the capacity issues under the three planning conditions. Improvements to provide sufficient capacity throughout the system include upgrades to pipe diameters and pump stations capacities. Figure 5.7 illustrates the proposed sewer improvements required to meet the planning criteria, including the proposed pipeline diameter for the improvement.

In accordance with the established planning criteria, new sewer pipelines were sized such that the maximum flow depth to pipe diameter ratio (d/D) did not exceed the values summarized in Table 5.2. In other words, flows in recommended improvements were not allowed to surcharge during PWWF conditions.

Table 5.3 provides more detail of each improvement, including the diameter and length of the improvement, and corresponds to the improvements shown in Figure 5.7.



Legend

Proposed Pipe Capacity-Related Improvement Projects

- Project 1 - SW Western Street / SW Spruce Street
- Project 2 - NW Highland Street / NW Prospect Street
- Project 3 - NW Midland Ave
- Project 4 - NE A Street
- Project 5 - NE Savage Street / NE 9th Street
- Project 6 - SE Mill Street / SE Rogue View Lane
- Project 7 - Anabelle Ln
- Project 8 - Leonard Road
- Project 9 - Gilbert Creek Park
- Project 10 - Rogue Drive / SE Blue Bird Drive
- Project 11 - Park Street
- Project 12 - Darneille Lane
- Project 13 - Mesman Drive to Coutant Lane
- Project 14 - NE 7th Street
- Project 15 - NE Dean Dr / NE D St
- Project 16 - NW Evelyn Ave
- Project 17 - NW Morgan Ln
- Project 18 - NW Washington Blvd
- WRP
- Lift/Pump Station
- Other Gravity Mains
- Force Mains
- Study Area Boundary
- Existing Sewer Service Area
- UGB
- Tax Lots

0 4,000 8,000 Feet

Figure 5.7
Proposed Pipe Capacity-Related Improvement Projects
Wastewater Collection System Master Plan
City of Grants Pass

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Table 5.3 Proposed Pipe Projects Improvements
Wastewater Collection System Sewer Master Plan
City of Grants Pass

Project ID	Type of Improvement	Street Description	Installation Year	Existing Size (inch/MGD)	Proposed Size (inch)	Action	Length (ft)	Reason
Project 1 - SW Western Street / SW Spruce Street								
P-1A	Pipe	Along SW Western Ave between I St and K St	1947	8	12	Replace	581	Surcharging over performance criteria
P-1B	Pipe	Along SW Western Ave between K St and SW Bridge St	1947	10	15	Replace	546	Surcharging over performance criteria
P-1C	Pipe	Along SW Spruce St between SW Bridge St and Webster Rd	1966	8	18	Replace	1,998	Surcharging over performance criteria
P-1D	Pipe	Along SW Bridge St between SW Western Ave and SW Westhom Ave	1947	10	18	Replace	481	Surcharging over performance criteria
P-1E	Diversion	Diversion to east Bridge St	-	10	-	Plug	-	Diversion not needed anymore - alleviate Basin C
Project 2 - NW Highland Street / NW Prospect Street								
P-2A	Pipe	Along NW Highland Ave between 300 ft north of NW Parker Dr and NW Midland Ave	1966	8	12	Replace	939	Surcharging over performance criteria
P-2B	Pipe	Along NW Midland Ave between NW Highlands Ave and NW Prospect Ave	1963	8	12	Replace	623	Surcharging over performance criteria
P-2C	Pipe	Along NW Prospect Ave between NW Midland Ave and 150 feet south of NW Sandy Dr	1963	10	15	Replace	834	Surcharging over performance criteria
Project 3 - NW Midland Ave								
P-3A	Pipe	Along Midland Ave between NW 6th St and NW Washington Blvd	-	-	12	New	710	Divert flows away from NW 6th St on NW Washington Blvd to help with surcharging on 6th Street
Project 4 - NE A Street								
P-4A	Pipe	Along NE A St between NE 9th St and NE 7th St	1926	12	18	Replace	844	Surcharging over performance criteria
Project 5 - NE Savage Street / NE 9th Street								
P-5A	Pipe	Along NE Savage St between NE 10th St and NE 9th St and along NE 9th St between NE Savage St and NE Josephine St	1928 - 1947	8	12	Replace	3,431	Surcharging over performance criteria
Project 6 - SE Mill Street / SE Rogue View Lane								
P-6A	Pipe	Along SE Mill St between NE D St and SE M St	1947	12	18	Replace	3,755	Surcharging over performance criteria
P-6B	Pipe	Along SE M St between SE Mill St and SE 12th St	1947	12	21	Replace	907	Surcharging over performance criteria
P-6C	Pipe	Along SE M St between SE 12th St and SE 7th St	-	-	21	New	2,177	Replace existing pipe south of SE M St difficult to access.
Project 7 - Annabelle Lane								
P-7A	Pipe	RSSD Interceptor between Wineteer Ln To Leonard Rd	1974	15	21	Replace	1,948	Surcharging over performance criteria
Project 8 - Leonard Road								
P-8A	Pipe	Along Leonard Rd between Redwood Ave to south of Mesman Dr	1974	8	12	Replace	888	Surcharging over performance criteria
P-8B	Pipe	Along Leonard Rd between south of Mesman Dr and intersection of Leonard Rd with Mesman Dr	1974	8	15	Replace	384	Surcharging over performance criteria
Project 9 - Gilbert Creek Park								
P-9A	Pipe	Along Gilbert Creek Park 500 ft north of NW Parker Dr and west of NW Hawthorne Ave	1967	8	12	Replace	451	Surcharging over performance criteria

Table 5.3 Proposed Pipe Projects Improvements
Wastewater Collection System Sewer Master Plan
City of Grants Pass

Project ID	Type of Improvement	Street Description	Installation Year	Existing Size (inch/MGD)	Proposed Size (inch)	Action	Length (ft)	Reason
Project 10 - Rogue Drive / SE Blue Bird Drive								
P-10A	Pipe	Along Rogue Dr between SE N St and SE Blue Bird Dr	1962 - 1967	15	18	Replace	1,831	Surcharging over performance criteria
P-10B	Pipe	Through properties on north bank of river, south of Waterman Ln and Lela Ln to Blue Bird Dr	1962	12	15	Replace	1,890	Surcharging over performance criteria
P-10C	Pipe	Through properties on north bank of river, from Blue Bird Dr to just upstream of pipe split under Rogue River	1962	18	24	Replace	2,208	Surcharging over performance criteria
Project 11 - Park Street								
P-11A	Pipe	Through properties on south bank of the river between Mystic Dr and Gold River Ln	1962	18	27	Replace	202	Surcharging over performance criteria
P-11B	Pipe	Through properties on south bank of the river between Gold River Dr and SE Acacia Ln	1962	24	27	Replace	795	Surcharging over performance criteria
Project 12 - Darneille Lane								
P-12A	Pipe	Along Darneille Ln between the intersection of Darneille Ln with SW Harvest Dr and Darneille PS	1974	12	18	Replace	1,551	Surcharging over performance criteria
Project 13 - Mesman Drive to Coutant Lane								
P-13A	Pipe	RSSD Interceptor between Mesman Dr and Schroeder Ln	1974	18	21	Replace	2,047	Surcharging over performance criteria
P-13B	Pipe	RSSD Interceptor between Schroeder Ln and Coutant Ln	1974	18	24	Replace	1,282	Surcharging over performance criteria
Project 14 - NE 7th Street								
P-14A	Pipe	Along NE 7th Street between NE A St and NW F St	1926	12	18	Replace	1,531	Surcharging over performance criteria
Project 15 – NE Dean Drive/ NE D Street								
P-15A	Pipe	Along NE Dean Dr and NE D St from NE A St to SE Mill St	-	-	18	New	2,009	Divert flows from wastewater basin H towards basin I and help with deficiencies on 7th Street
Project 16 – NW Evelyn Avenue								
P-16A	Pipe	Along Evelyn Ave between NW 6th St and NW 2nd St	-	-	8	New	727	Divert flows from wastewater basin G towards basin C and help with deficiencies on 6th Street and 7th Street
Project 17 – NW Morgan Lane								
P-17A	Pipe	Along Morgan Ln between NW 6th St and NW Washington Blvd	-	-	12	New	208	Divert flows away from 6th Street on NW Washington Blvd to help with surcharging on 6th Street
Project 18 - NW Washington Boulevard								
P-18A	Pipe	Along NW Washington Blvd between NW Midland Ave and NW Manzanita Ave	1947	8	12	Replace	2,239	Surcharging over performance criteria due to diversion of flows from 6th St to this trunk.
P-18B	Pipe	Along NW Washington Blvd between NW Manzanita Ave and NW Evelyn Ave	1947	10	12	Replace	727	Surcharging over performance criteria due to diversion of flows from 6th St to this trunk.

5.5.2.1 Project 1 - SW Western Street / SW Spruce Street

The sewer pipes located in wastewater basin B, along Western Avenue and SW Spruce Street severely lacks capacity to convey design flows and shows significant surcharging starting under existing conditions.

Project 1 consists of replacing approximately 3,955 feet of existing 8- and 10-inch pipes with 12-, 15-, and 18-inch pipes. The portion of the sewer along Bridge Street shows a very low slope (approximately zero based on available GIS data). It is recommended that the slope in this segment be increased to keep the recommended diameters consistent with upstream and downstream pipelines and help with low velocities and deposits. Two force mains (one 4-inch and one 8-inch) discharge to Manhole No. B111 and Manhole B195 respectively, into an existing 8-inch pipe.

Once this project completed, the diversion located on Bridge Street can be removed or plugged. This existing 10-inch diversion splits flow from Bridge Street to both SW Spruce Street and west on Bridge Street. The diversion was originally installed to relieve the Western Avenue and SW Spruce Street sewers. Removing this connection will alleviate existing and build-out capacity issues caused by peak flows along SW Silver Maple Way. Additionally, flow was diverted towards wastewater basin C, where manholes are shallow and risk of overflow higher. The 8-inch force main discharges to manhole B195 downstream of the 10-inch diversion to the east. The force main connection will need to be rerouted to west of the 10-inch diversion to be plugged so flows from the 8-inch force main flow to SW Spruce Street.

5.5.2.2 Project 2 – NW Highland Street / NW Prospect Street

The existing trunk traveling south on NW Highland Ave, east on NW Midland Ave, and south on NW Prospect Ave lacks the hydraulic capacity to convey modeled peak flows. Project 2, located in wastewater basin F consists of upsizing about 2,396 feet of existing 8-, and 10-inch diameter sewers with new 12- and 15-inch diameter pipes.

In the existing condition, surcharging above the criteria occurs in NW Highlands Street only, while surcharging above two above pipe crown occurs in NW Prospect Street under 2025 conditions. Therefore, the projected infill and new development served by this trunk intensifies the recommendations related to this improvement.

5.5.2.3 Project 3 – NW Midland Avenue

The existing interceptors that run along NE 7th Street and NE 6th Street shows surcharging above the performance criteria and lacks the hydraulic capacity to convey modeled peak flows. Field observations collected by City maintenance staff showed that the existing sewers on NE 6th Street and NE 7th Street surcharge in the manholes during high flows, which confirms the results obtained using hydraulic modeling.

Both NE 6th Street and NE 7th Street are some of the largest and busiest streets of the City. The City expressed its desire of finding an improvement solution that would not impact these two arterials significantly. This project consists of diverting flows from NE 6th St to NW Washington Boulevard. Additional diversion pipes are implemented (Projects 15, 16, and 17) to free some capacity in the NE 6th Street and NE 7th Street sewers.

Project 3 consists of constructing 710 feet of new 12- inch sewers along NW Midland Ave between NE 6th St and NW Washington Blvd. The implementation of all four diversions in the short-term allows to divert enough flow away from NE 6th St to prevent replacing the NE 6th St Trunk where deficiencies are observed.

5.5.2.4 Project 4 – NE A Street

The existing trunk sewer that runs along NE A Street, between NE 9th Street and NE 7th Street, is flagged as capacity deficient in the hydraulic model starting under existing conditions, which results in surcharging above the planning criteria during PWWF.

Project 4 consists of replacing approximately 844 feet of existing 12-inch pipe with a new 18-inch pipeline. Resolving the surcharging issue in this segment along NE A Street removes the flow bottlenecking issue in this trunk, resulting in higher peak flows through the NE 7th Street interceptor. Therefore, it will be strategic to coordinate construction of the NE A Street improvements with the NE 7th Street interceptor improvements (see Project 14 - NE 7th Street) to ensure sufficient downstream capacity in the system to convey design peak flows.

5.5.2.5 Project 5 – NE Savage Street / NE 9th Street

The existing 8-inch trunk along NW Savage Street and NE 9th Street has insufficient capacity to convey design flows and creates bottlenecks.

Project 5 consists of upsizing 3,431 feet of the existing 8-inch pipe with a 12-inch trunk. Some of the current pipes in this project have low slopes, which increases the HGL in some pipes to above the design d/D value of 0.5. During design of the new pipes, it is recommended to maximize pipe slopes to avoid flat slopes and minimize d/D values.

5.5.2.6 Project 6 – SE Mill Street / SE Rogue View Ln

The existing 12-inch trunk travelling along SE Mill Street (beginning south of the train tracks), SE M Street, and along the river easement to SE 8th Street lacks capacity to convey the modeled design flow. Surcharging above the performance criteria in the manholes along this section is observed starting under existing conditions.

Existing pipelines alignment may be challenging to implement due to their location along an easement through riverside properties. However, the capacity deficiency in this segment is significant, and should be a priority to alleviate. This project is part of the backbone of the system and was constructed in 1947, and as the system grows, it is important that these interceptors be sized adequately.

Access to the manholes is poor along this section of pipes. Therefore, instead of replacing the existing pipelines, a new pipeline will be installed along M Street west from the intersection of Mill Street to the SE 8th Street and then south on SE 8th Street to a new crossing west of NE 7th Street to connect to the 21-inch along SE 7th St, connecting to the existing 30-inch trunk line going to the WRP. The old existing 12-inch pipe could then be lined without concerns about its capacity in the future, improving accessibility of major trunks.

Project 6 also recommends that 907 feet of existing 12-inch pipes located just south of the train tracks to SE 8th Street be replaced with 21-inch diameter pipes and 3,755 feet of existing 12-inch pipes with a new 18-inch sewer along SE Mill Street from NE D Street to SE M Street. This project will need to be coordinated with the implementation of Project 15, which diverts flows from wastewater basin H towards the Mill Street trunk instead of the NE 7th Street trunk. The current pipe immediately downstream of the train tracks has a low slope. During design of this project, the slope of this pipe is recommended to be maximized to minimize the d/D value during PWWF.

5.5.2.7 Project 7 - Annabelle Lane

The primary interceptor in the Redwood area runs westerly along the Rogue River. While portions of this pipeline surcharge during the PWWF due to low pipe slopes, only one section of the pipeline, between Wineteer Lane and Dowell Road, experiences surcharging above the performance criteria. Therefore, this segment of 15-inch pipeline is capacity deficient and 1,948 feet of pipes are recommended to be replaced with a 21-inch diameter. Per hydraulic modeling, this projected deficiency starts occurring in the short-term conditions. It is to be noted that the dual 12-inch force mains are parallel to this segment. Easements for construction of the dual force mains took a considerable amount of time to obtain and easements for the gravity portion of the sewer system were not enlarged at that time as well.

Project 7 consists of replacing the existing 1,948 feet of 15-inch pipe with a 21-inch pipe, which is greater than the upstream (15-inch) and downstream (18-inch) pipe diameters. The recommendation for the larger 21-inch pipe diameter is necessary based on existing pipe slopes of this segment and a design d/D value of 0.75. During design of this improvement project, the slope of these pipes should be maximized to minimize the d/D value during PWWF.

5.5.2.8 Project 8 - Leonard Road

The existing 8-inch sewer along Leonard Road, located between Redwood Avenue and the intersection of Leonard Road with Mesman Drive, lack sufficient capacity to convey the model design flow. Surcharging above the performance criteria is observed starting under existing conditions.

Project 8 consists of replacing the existing 8-inch main with 888 feet of 12-inch and 384 feet of 15-inch pipes. While there are similar flow rates through the entire improvement segment, the upgrade to the 15-inch for a portion of the improvement is necessary to maintain the design d/D

value of 0.5 based on existing pipe slopes. During design of this improvement project, the slope of this pipe should be maximized to minimize the d/D value during PWWF.

5.5.2.9 Project 9 - Gilbert Creek Park

The existing trunk traveling south through the football field and track of the North Middle School lacks the hydraulic capacity to convey build-out design flows. Project 9 consists of replacing 451 feet of existing 8-inch diameter pipe with a new 12-inch diameter trunk sewer. This improvement is located north of project 2, and helps to reduce capacity deficiencies in this area of the City. The pipe to replace is flat relatively to the surrounding pipe, which creates a bottleneck along this line. Upsizing this pipe will help alleviate the surcharging caused by this section of pipe.

5.5.2.10 Project 10 - Rogue Drive / SE Blue Bird Drive

The existing interceptor that runs along the north bank of the Rogue River, just south of SE Rogue Drive, SE Blue Bird Drive, and SE Oriole Street, experiences surcharging above the stated surcharging criteria and lacks the hydraulic capacity to convey the design flows starting in the short-term planning period. This deficiency is mainly due to the connection of the Spalding industrial area to the existing collection system. Project 10 will need to be implemented concurrently with the construction of the Spalding pump station.

Project 10 runs from south of Waterman Lane and Lela Lane to just upstream of the split pipeline flowing under the Rogue River, and along Rogue Drive. To alleviate the identified deficiencies, approximately 4,098 feet of 15- , and 24-inch pipelines are recommended to replace the existing 12- and 18- inch sewers, respectively along SE Blue Bird Drive and 1,831 feet of 18-inch to replace the existing 15-inch along Rogue Drive.

This project has many easement issues. There is, however, very limited possibility to build a new trunk line in this part of the system and convert this section of pipes into a local collector line only as recommended for project 6 - SE Mill Street / SE Rogue View Lane because of the depth of the existing transmission main. Access to manholes is very poor along this section of piping and there is a need to improve it to facilitate repair and maintenance from the City crew.

This interceptor receives wastewater flow from a large portion of the eastern side of the City, and is impacted by the development proposed in this area.

5.5.2.11 Project 11 – Park Street

The existing interceptor located downstream of the siphon south of the Rogue River along Park Street experiences surcharging above the stated surcharging criteria and lacks capacity immediately downstream the siphon causing backwater and high HGL in the siphon. To alleviate the deficiency, the segment of pipe located between the siphon and the 27-inch sewer between MH K158 and MH M170 will need to be upsized. Project 11 consists of upsizing 202 feet of 18-inch and 795 feet of existing 24-inch with 24-inch and 27-inch diameter sewers, respectively. Hydraulic capacity of the siphon was checked and the siphon appears adequately sized to convey build-out 2035 PWWFs.

5.5.2.12 Project 12 - Darneille Lane

Portions of the existing trunk sewer that runs along Darneille Lane, between SW Harvest Drive and the Darneille Pump Station are capacity deficient and result in surcharging above the planning criteria during build-out PWWF.

There are two separate parts to project 12, which include replacing a total of 1,551 feet of existing 12-inch sewers with 18-inch pipelines. These two segments of pipeline currently experience surcharging above the criteria primarily mainly due to their slopes. Resolving the surcharging issue in this segment removes surcharging above the criteria and helps prevent flow bottlenecking upstream of the Darneille Pump Station.

5.5.2.13 Project 13 – Mesman Drive to Coutant Lane

This improvement is located along the primary interceptor in the Redwood area that runs westerly along the Rogue River. The additional flow from build-out conditions causes surcharging above the planning criteria for the portion of the interceptor between Mesman Drive and Coutant Lane.

Project 13 consists of replacing the existing 18-inch main with 2,047 feet of 21-inch pipeline and 1,282 feet of 24-inch. Lower pipe slopes in this portion of the interceptor contribute to surcharging and require the use of a larger diameter interceptor. During the design of this project, slopes of these pipes should be maximized to minimize the d/D value during PWWF. As part of these improvements, the City needs to get better access to this line for future repair and maintenance of these new pipelines.

5.5.2.14 Project 14 - NE 7th Street

Portions of the existing trunk sewer that runs along NE 7th Street, south of A Street, are capacity deficient which results in surcharging above the planning criteria during build-out PWWF. This deficiency is a Long-Term period issue that should be address when development occurs upstream and the flows are augmenting.

Project 14 consists of replacing the existing 1,531 feet of 12-inch with an 18-inch pipeline along NE 7th Street between NE F Street and NE A Street.

For the improvements located along NE 7th Street between NE A Street and the train tracks, the d/D criteria for the 18-inch improvement is exceeded in some locations. This is mainly due to the existing low pipe slopes in these areas. During design of the improvements, it will be important to maximize pipe slopes in this area to minimize d/D values.

5.5.2.15 Project 15 – NE Dean Dr / NE D Street

Flows from wastewater basin H currently flows west on NE A Street towards NE 7th Street, overloading the NE 7th Street trunk. The City expressed its desire of finding an improvement solution that would impact the NE 6th Street and NE 7th Street trunks minimally, as both NE 6th Street and NE 7th Street are some of the largest and busiest streets of the City.

A new pipeline along NE Dean Drive and NE D Street from NE A Street to SE Mill Street is proposed. The purpose of this new collector is to redirect flows away from NE 7th Street towards wastewater basin I. Project 15 consists of constructing 2,009 feet of new 18-inch pipeline. Project 6 will need to be implemented as soon as this diversion becomes on-line.

5.5.2.16 Project 16 – NW Evelyn Street

Projects 3 and 17 consist of routing flows from NW 6th Street to Washington Boulevard to help alleviate the 6th Street trunk located on one of the busiest streets of the City. Project 16 also routes these diverted flows from NW 6th Street towards NW 2nd Street.

This improvement consists of redirecting flows from Washington Boulevard towards wastewater basin C and NW 2nd Street. The existing sewer on NW 2nd Street has capacity availability and is able to receive diverted flows from NE 6th Street with no additional improvements.

Project 16 consists of constructing 1,446 feet of new 12-inch sewer along NW Evelyn Street between Washington Boulevard and NW 2nd Street.

5.5.2.17 Project 17 – NW Morgan Lane

Flows from part of the North I-5 area (wastewater basin GG on Figure 4.2) is planned to be connected to the NE 6th Street trunk, significantly increasing future flows in this collector. Project 17 consists of constructing 208-feet of new 8-inch sewer between manholes G113 and G58.

This improvement is located along NW Morgan Lane. This project consists of creating a new diversion from NE 6th Street to NW Washington Boulevard to relieve both NE 6th Street and NE 7th Street, and free capacity in the NE 6th Street sewer trunk.

5.5.2.18 Project 18 - NW Washington Boulevard

As shown with Projects 3 and 17, flows from the NE 6th St trunk are diverted to NW Washington Blvd to alleviate the 6th St Trunk located on one of the busiest streets of the City. NW Washington Blvd now gets significant flows from 6th St in the future and capacity in this trunk becomes insufficient (above 2ft above pipe crown) in the long-term (2035).

In order to keep moving flows away from NE 6th St to the Washington Blvd trunk, Washington Blvd would need to be upsized in the long-term between Midland Ave and Evelyn Ave.

Project 18 consists of upsizing 2,966 of existing 8-inch and 10-inch sewer with a 12-inch sewer along NW Washington Blvd between NW Midland Ave and NW Evelyn Ave.

Project 18 is only required under build-out conditions (year 2035) and the City should take advantage of any pavement or other projects along NW 6th Street to replace this sewer pipe segment.

5.5.3 Recommended Pump Station Improvements

The capacity analysis performed on the pump stations in this study resulted in the identification of a variety of planning options in terms of improvements to pump stations and routing of flow, particularly with respect to the Darneille Pump Station. Three potential options are presented and a cost / feasibility comparison is performed as part of Chapter 6 – Capital Improvement Project.

Of the City's five pump stations, three are proposed for improvements to increase firm capacity to pump the PWWF.

5.5.3.1 Bridge Street Pump Station

Bridge Street Pump Station is capable of handling PWWFs under all scenarios, and therefore, no improvements are recommended for this pump station based on the capacity evaluation. However, the condition assessment analysis performed in Chapter 4 – Existing System and Condition Assessment revealed that the Bridge Street Pump Station is in poor condition and needs immediate attention.

5.5.3.2 Webster No. 1 Lift Station

The hydraulic model suggests that once the study area is build-out, the insufficient capacity at Webster No. 1 could cause sanitary sewer overflows (SSOs) from manholes upstream of the pump station. Upgrading this lift station before infill and new development occurs upstream of this area will be important to ensuring sufficient capacity in the collection system.

This lift station is currently under design and is being sized to convey projected build-out flows for the design storm. No challenges will exist when the new Lift Station is in place. Construction is planned to begin in 2016.

5.5.3.3 Webster No. 2 Lift Station

This lift station is expected to be deficient by year 2035. The 2035 deficiency for the peak hour flows is minimal, and equals approximately 0.08 mgd. While it is recommended that Webster No. 2 be upgraded to facilitate the additional flows for build-out of this area, other lift station improvements should rank higher in priority based on the magnitude of their deficiencies in comparison to Webster No. 2. Improvements to this lift station can be made when the station reaches its useful life and pumps need to be upgraded.

5.5.3.4 Darneille Pump Station

As shown in Table 5.2, Darneille Pump Station is significantly undersized to handle PWWFs starting under existing conditions. By 2035, PWWF is projected to be almost twice as much as current pump station firm capacity. This area serves the Redwood service area and flow monitoring revealed significant amount of Inflow and Infiltration on these basins. Inflow is an issue upstream of the Darneille Pump Station where significant flow enters the system through leaking manholes and private sewer laterals. In this area, most of the main lines are either relatively new or free from defects such as cracks, holes, or missing pipes. It is recommended

that the City looks into its direct inflow issue in this area in an attempt to reduce peak flows to the Darneille Pump Station.

The upgrade to the Darneille Pump Station pumping capacity is necessary to resolve the capacity limitations and eliminate upstream surcharging that is currently greater than the 2-feet criteria. In addition, increasing the pumping capacity at Darneille will reduce the related capacity issues at Redwood Pump Station that occur when all flow that Darneille pump station cannot handle is diverted towards Redwood Pump Station.

Five high level options were developed as part of this Plan to improve Darneille Pump Station.

1. Option 1: Darneille Pump Station Upgrade - This option consists of upgrading the existing Darnielle Pump Station to the firm capacity of 7.8 mgd and allow higher than design criteria velocities through the 14-inch force main under the bridge crossing the Rogue River upstream of WRP. The Redwood diversion will be removed.

   This option will be the easiest to gain approvals from the regulatory agencies and simplest for the O&M personnel since there will not be any significant changes in the operation. However, this option does not provide River crossing redundancy that the City desires. Any upgrade to the existing pump station has to include processes which significantly remove plastics and Fat, Oil, and Grease (FOG) from the discharge pipelines.

2. Option 2: New Pump Station and River Crossing - This option consists of building a new pump station south of the Rogue River and along Dowell. Road A new river crossing for a new 14-inch force main is needed along with a force main north of and along the Rogue River to the WRP. Any new pump station design needs to include provisions for the removal of plastics for the force main system and better management of FOG.

3. Option 3: Peak Flow Storage - This option consists of building an equalizing tank at the Darneille Pump Station site to hold a peak flow of 1.5 mgd and upgrade the Darneille Pump Station to the maximum capacity the 14-inch force main across the Rogue River can handle without exceeding velocity criteria (i.e. 6.5 mgd).

4. Option 4: Redwood Treatment and Discharge - This option consists of using the discharge permit to the Rogue River the City has at the Redwood Pump Station. Under this option, the Darneille Pump Station is upgrades to the maximum capacity of the 14-inch force main upstream of the WRP. Peak flows above this value will be routed towards the Redwood Pump Station through the existing diversion. The Redwood Pump Station will then need to be upgraded to handle this additional peak flow. A new physical/chemical treatment system will be installed at the Redwood Pump Station before discharging peak flows to the Rogue River during wet weather season.

5. Option 5: Treatment with Natural Systems - This option consists of routing Peak Flows from the Darneille Pump Station across the Rogue River north, to the 250 acres site owned by the City for natural treatment.

Option 5 will be similar to Option 4 except the final effluent will be applied to engineered treatment wetlands. This provides the City with thermal load offset that may be imposed by DEQ in the future. In addition, this option provides the City with River crossing redundancy.

A recommendation for Darneille Pump Station should be made following an Alternative Analysis evaluating costs and other parameters in further detail to develop a recommended solution to the capacity limitations at the Darneille Pump Station. Maps illustrating the proposed options are located in Appendix H. A summary of alternative analysis is presented in Table 5.4. This table compares each alternative against five parameters presented below, using a rating scale of 1 to 5 (1 being least favorable and 5 is most favorable):

1. Ease to get regulatory approval,
2. Provides redundant river crossing,
3. Offsets existing WRP expansion/provides additional thermal benefits,
4. Reduces operational and maintenance challenges, and
5. Cost implication to the City.

Table 5.4 Darneille Pump Station Improvement Options
Wastewater Collection System Master Plan
City of Grants Pass

Option	Regulatory	River Xing Redundancy	New Treatment	O&M	Flow Division	Cost
Option 1	5	1	3	5	2	5
Option 2	4	5	3	5	3	4
Option 3	5	1	3	3	3	3
Option 4	2	1	5	3	5	2
Option 5	2	5	5	2	5	1

5.5.3.5 Redwood Pump Station

Redwood Pump Station becomes slightly deficient in 2035 by 0.06 mgd. The evaluation of Redwood Pump Station should be included in the Alternatives Analysis for Darneille Pump Station.

The City developed a special planning criteria should be utilized for the capacity assessment of the Redwood Pump Station to utilize available temporary storage in pipelines. The PWWF firm capacity criteria for the Redwood Pump station was changed for Basin Z. Instead of recommending that the pump station be designed to pump the PWWF with its firm capacity, it is recommended that the existing pump station remain as it is currently, and that the pipes upstream of Redwood be allowed to surcharge up to 3 feet below the manhole rim. If surcharging occurred upstream of the Redwood Pump Station above the 3-foot criteria, a pump

station improvement would be recommended. For all planning scenarios evaluated, the 3-feet below manhole rim criteria are met for the upstream pipelines.

Additionally, minimal growth is expected in wastewater basin Z and sewers in this part of the system are relatively deep; therefore, the City was confident in changing the performance criteria to 3 feet below manhole rim for the manholes located in the Redwood pump station tributary area.

5.5.4 Project Phasing

Prioritizing the required capital improvements for the City's sewer collection system is an important aspect of this study. The improvement projects were prioritized based on the following factors:

- Upgrading existing facilities to mitigate current capacity deficiencies and to serve future users.
- Building the new trunks necessary to serve future users.

Improvements to existing facilities will provide sufficient capacity to mitigate existing issues and to convey increased flows resulting from future growth. Future development will require the construction of sewers to serve new users. To assist in future planning, all proposed improvements presented above are grouped in accordance with four priorities that were defined upon urgency of needs:

- Phase 1 (2015-2020): Proposed facilities located in areas flagged as deficient under existing modeling conditions for the design storm that needs to be addressed first. Timing for these projects is planned between 2015 and 2020.
- Phase 2 (2021- 2025): Proposed facilities located in areas flagged as deficient under Short-Term (2025) modeling conditions for the design storm and proposed facilities to service major growth areas to be developed in the short-term.
- Phase 3 (2026-2035): Proposed facilities located in areas flagged as deficient under Long-Term (2035) modeling conditions for the design storm and proposed facilities to service major growth areas to be developed in the long-term.

The projects were phased based on the best available information for how the City will develop moving forward. The actual implementation of the improvements serving future users ultimately depends on growth. The priorities presented below are estimates, and will change with the City's planning assumptions or growth projections, which could increase or decrease the priority of each improvement. Table 5.5 shows all projects allocated to the three phasing period.

Figure 5.8 illustrates the recommended projects by priority phasing.

Table 5.5 Proposed Projects Phasing Assumptions
Wastewater Collection System Master Plan
City of Grants Pass

Project Description			Project Phasing		
Improv. ID	**Type of Improv.**	**Description/Street**	**Phase 1 2015-2020**	**Phase 2 2021-2025**	**Phase 3 2026-2035**
Project 1 - SW Western Street / SW Spruce Street					
P-1A	Pipe	Along SW Western Ave between I St and K St	x		
P-1B	Pipe	Along SW Western Ave between K St and SW Bridge St	x		
P-1C	Pipe	Along SW Spruce St between SW Bridge St and Webster Rd	x		
P-1D	Pipe	Along SW Bridge St between SW Western Ave and SW Westhom Ave	x		
P-1E	Diversion	Diversion to east Bridge St	x		
Project 2 - NW Highland Street / NW Prospect Street					
P-2A	Pipe	Along NW Highland Ave between 300 ft north of NW Parker Dr and NW Midland Ave	x		
P-2B	Pipe	Along NW Midland Ave between NW Highlands Ave and NW Prospect Ave		x	
P-2C	Pipe	Along NW Prospect Ave between NW Midland Ave and 150 feet south of NW Sandy Dr		x	
Project 3 - NW Midland Ave					
P-3A	Pipe	Along Midland Ave between NW 6th St and NW Washington Blvd	x		
Project 4 - NE A Street					
P-4A	Pipe	Along NE A St between NE 9th St and NE 7th St	x		
Project 5 - NE Savage Street / NE 9th Street					
P-5A	Pipe	Along NE Savage St between NE 10th St and NE 9th St and along NE 9th St between NE Savage St and NE Josephine St	x		
Project 6 - SE Mill Street / SE Rogue View Lane					
P-6A	Pipe	Along SE Mill St between NE D St and SE M St	x		
P-6B	Pipe	Along SE M St between SE Mill St and SE 12th St	x		
P-6C	Pipe	Along SE M St between SE 12th St and SE 7th St	x		
Project 7 - Annabelle Lane					
P-7A	Pipe	RSSD Interceptor between Wineteer Ln To Leonard Rd		x	
Project 8 - Leonard Road					
P-8A	Pipe	Along Leonard Rd between Redwood Ave to south of Mesman Dr	x		
P-8B	Pipe	Along Leonard Rd between south of Mesman Dr and intersection of Leonard Rd with Mesman Dr	x		
Project 9 - Gilbert Creek Park					
P-9A	Pipe	Along Gilbert Creek Park 500 ft north of NW Parker Dr and west of NW Hawthorne Ave			x
Project 10 - Rogue Drive / SE Blue Bird Drive					
P-10A	Pipe	Along Rogue Dr between SE N St and SE Blue Bird Dr		x	
P-10B	Pipe	Through properties on north bank of river, south of Waterman Ln and Lela Ln to Blue Bird Dr		x	
P-10C	Pipe	Through properties on north bank of river, from Blue Bird Dr to just upstream of pipe split under Rogue River			x
Project 11 - Park Street					
P-11A	Pipe	Through properties on south bank of the river between Mystic Dr and Gold River Ln		x	
P-11B	Pipe	Through properties on south bank of the river between Gold River Dr and SE Acacia Ln		x	
Project 12 - Darneille Lane					
P-12A	Pipe	Along Darneille Ln between the intersection of Darneille Ln with SW Harvest Dr and Darneille PS			x
Project 13 - Mesman Drive to Coutant Lane					
P-13A	Pipe	RSSD Interceptor between Mesman Dr and Schroeder Ln			x
P-13B	Pipe	RSSD Interceptor between Schroeder Ln and Coutant Ln			x
Project 14 - NE 7th Street					
P-14A	Pipe	Along NE 7th Street between NE A St and NW F St			x
Project 15 - NE Dean Dr / NE D St					
P-15A	Pipe	Along NE Dean Dr and NE D St from NE A St to SE Mill St	x		
Project 16 - NW Evelyn Ave					
P-16A	Pipe	Along Evelyn Ave between NW 6th St and NW 2nd St	x		
Project 17 - NW Morgan Ln					
P-17A	Pipe	Along Morgan Ln between NW 6th St and NW Washington Blvd		x	
Project 18 - NW Washington Boulevard					
P-18A	Pipe	Along NW Washington Blvd between NW Midland Ave and NW Manzanita Ave			x
P-18B	Pipe	Along NW Washington Blvd between NW Manzanita Ave and NW Evelyn Ave			x
Project 19 - Darneille Pump Station					
PS-19A	Pump Station	Alternatives Analysis Study	x		
PS-19B	Pump Station	Darneille PS	x		
Project 20 - Webster No.1 Lift Station					
PS-20A	Pump Station	Webster No. 1 PS	x		
Project 21 - Webster No.2 Lift Station					
P-21A	Pump Station	Webster No. 2 PS			x
Project 22 - Spalding Area Development Expansion					
PS-22A	Pump Station	SE Portola Dr		x	
P-22B	Force Main	From Spalding PS to NE Portola Dr		x	
P-22C	Gravity	In Spalding Area		x	
P-22D	Gravity	In Spalding Area			x
P-22E	Casing	Railroad crossing		x	
Project 23 - North I-5 Area Development Expansion					
PS-23A	Pump Station	Monument Dr and I-5			x
P-23B	Force Main	From I-5 PS to pipe on Pony Ln and NW Highland Ave			x
P-23C	Gravity	In I-5 North Area			x
P-23D	Casing	I-5 Crossings (3)			x
Project 24 - South Highway Development Expansion					
P-24A	Gravity	In South Highway Area			x

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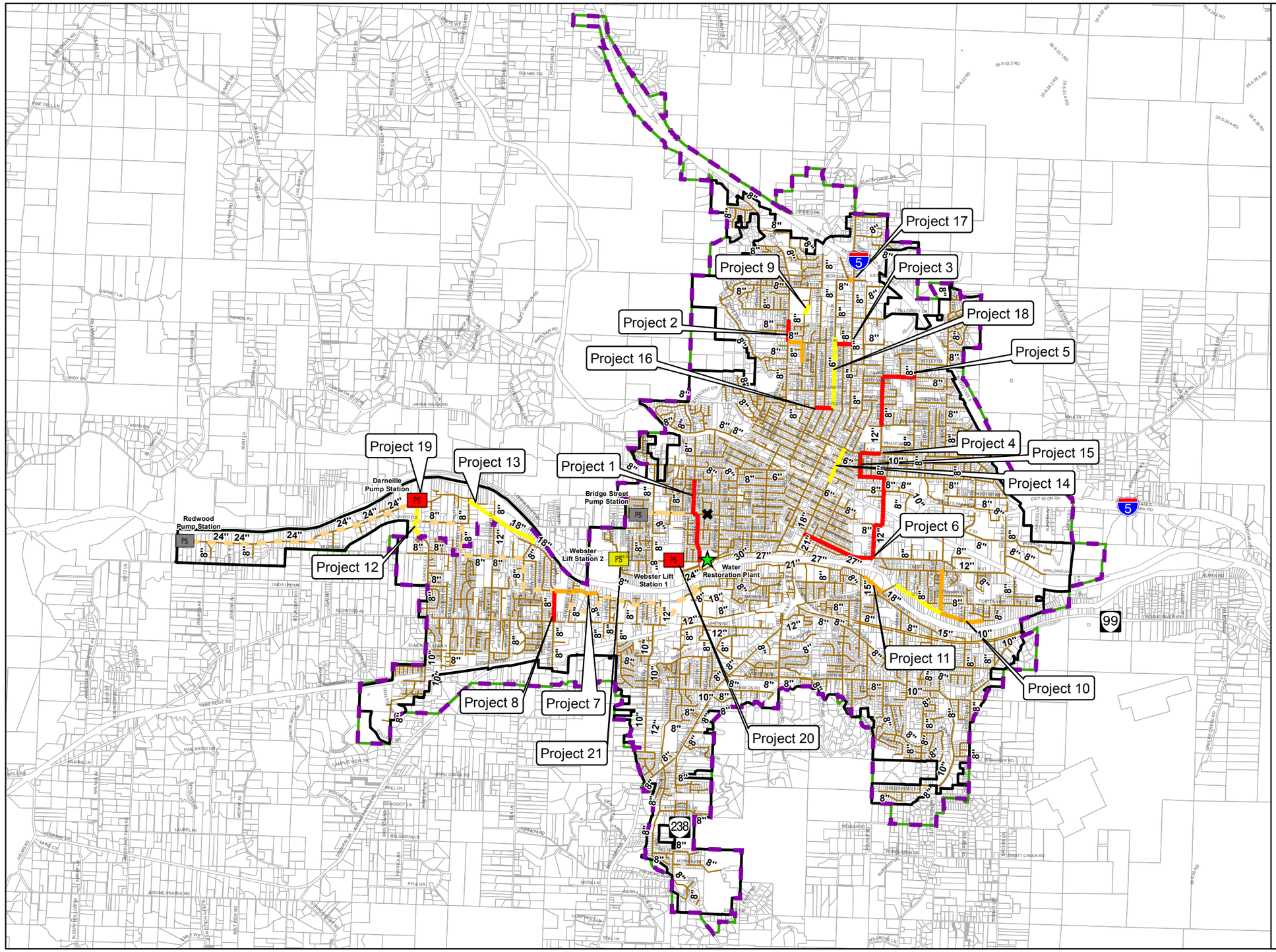

Legend

Proposed System Improvement Projects Phasing

- Phase 1 (2015-2020)
- Phase 2 (2021-2025)
- Phase 3 (2026-2035)

Lift/Pump Station Proposed Improvements

- Phase 1 (2015 - 2020)
- Phase 3 (2026 - 2035)
- Lift/Pump Station No Improvement
- Remove Diversion
- WRP
- Other Gravity Main
- Force Mains
- Existing Sewer Service Area
- UGB
- Study Area Boundary
- Tax Lots

N

0 4,000 8,000 Feet

Figure 5.8
Proposed System Improvement Projects Phasing
Wastewater Collection System Master Plan
City of Grants Pass

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5.5.5 Proposed Improvements Summary

A total of about 40,744 linear feet of pipes ranging from 12-inch to 27-inch are recommended to alleviate capacity deficiencies identified in this chapter for all three planning conditions (existing, 2025, and 2035). Three out of the five City's pump stations will need to be upgraded in the near future in order to handle the projected PWWFs with the largest pump out of service. Table 5.6 shows all projects identified phased in this chapter for capacity purposes.

These improvements will be combined with the recommended improvements that were recommended for condition purposes in Chapter 4 - Existing System and Condition Assessment. If projects are overlapping between capacity and condition projects, it is assumed that the highest phase between the two will be picked. Therefore, phasing of these projects might slightly change in Chapter 6 - CIP and some projects might be moved forward for condition purposes.

Costs estimates will be provided for each project in Chapter 6 – Capital Improvement Plan.

Table 5.6 Improvement Projects Summary
Wastewater Collection System Master Plan
City of Grants Pass

Proposed Project	Phase 1	Phase 2	Phase 3
Existing Pipe Upsize(1)	20,377 ft	8,331 ft	12,036 ft
System Expansion (New Pipes) (2)	-	6,106 ft	56,811 ft
Darneille PS(3)	X		
Webster No.1(3)	X		
Webster No.2(3)			X
New Spalding PS(2)		X	
New North I-5 PS(2)			X

Notes:
(1) Summary of section 5.5.1 of this Chapter.
(2) Summary of section 5.4.1.3 of this Chapter, and summarizes the proposed new pipes in Figures 5.3, 5.4, and 5.5 to connect the new growth areas to the existing collection system.
(3) Summary of section 5.4.2 of this Chapter.

Chapter 6

CAPITAL IMPROVEMENT PLAN

This chapter presents the recommended capital improvement plan (CIP) for the City of Grants Pass (City) collection system and a summary of the capital costs. This chapter is organized to assist the City in making financial decisions, and is based on the evaluation of the City's sewer system. This chapter combines the City of Grants Pass pipeline, pump station, and other general projects that were recommended in the previous chapters, i.e., Chapter 4 - Existing System and Condition Assessment and Chapter 5 - System Analysis. The CIP consists of the cost estimates and schedule for the recommended improvements.

6.1 INTRODUCTION

The cost estimates presented in this study are opinions developed from bid tabulations, cost curves, information obtained from previous studies, and Carollo Engineers, Inc. (Carollo) experience on other projects. The costs are based on an Engineering News Record Construction Cost Index (ENR CCI) 20-City Average of 10,037 (July 2015).

The following sections provide estimated planning-level capital project costs for the proposed improvements presented in Chapter 4 - Existing System and Condition Assessment and Chapter 5 – System Analysis. The capacity and condition upgrades and new service projects set the foundation for the City's sewer system CIP.

The City is also considering expanding its current collection system into five urban reserve areas and results are presented in Appendix A.

For the purpose of this plan, the following terms will be used to represent projects associated with condition problems, capacity requirements, and potential new service areas:

- "Repair/Replacement (R&R)" = Repair or rehabilitation of infrastructure. These projects are recommended to renew infrastructure in poor condition, as recommended and prioritized in Chapter 4 – Existing System and Condition Assessment.
- "Capacity" = Increase in capacity of infrastructure to meet capacity requirements of the existing service area. These projects are recommended to meet the capacity evaluation criteria, as recommended and prioritized in Chapter 5 – Capacity Analysis.
- "Expansion" = Construct new infrastructure to meet capacity requirements of areas of service area expansion. These projects are recommended to meet the wastewater conveyance requirements of potential future service areas, as recommended in Chapter 5 – Capacity Analysis.
- "General" = Other general projects for the wastewater collection system.

Recommended projects have been assigned a project name associated with the type of project. The following abbreviations were used:

- “P” = Pipeline (includes gravity, force main, or casing).
- “PS” = Pump Station.
- “G” = General.

6.2 COST ESTIMATING ACCURACY

The cost estimates presented in the CIP have been prepared for general infrastructure planning purposes and for guidance in project evaluation and implementation. Final costs of a project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors such as preliminary alignment generation, investigation of alternative routings, and detailed utility and topography surveys.

Acquisition of property, easements, and right-of-way (ROW) may be required for some of the recommended projects. However, for the purpose of this Plan, pipeline corridors, or easements are assumed to be in public ROW, and therefore do not require land acquisition. For this reason, land acquisition is not included in the cost estimated. Chapter 5 acknowledged that some pipes recommended to be replaced are difficult to access, even sometimes impossible, to perform routine maintenance actions, and that there is a need to improve it to facilitate repair and maintenance from the City crew. These will need to be addressed as much as possible with the project, but no cost specific to easement was included in the CIP.

The Association for the Advancement of Cost Engineering (AACE) defines an Order of Magnitude Estimate, deemed appropriate for master plan studies, as an approximate estimate made without detailed engineering data. It is normally expected that an estimate of this type would be accurate within plus 50 percent (%) to minus 30%. This section presents the assumptions used in developing order of magnitude cost estimates for recommended facilities.

6.3 COST ESTIMATING ASSUMPTIONS

Project cost estimates are calculated based on elements, such as the project location, size, length, land acquisition needs, and other factors. Allowances for project contingencies consistent with an “Order of Magnitude” estimate are also included in the project costs prepared as part of this study, as outlined in this section.

6.3.1 Baseline Unit Cost

The Baseline Construction Cost is the total estimated construction cost, in dollars, of the proposed improvements. The construction cost estimates below are representative of collection system facilities under normal construction conditions and schedules.

6.3.1.1 Gravity Pipeline Unit Costs

For pipes, Baseline Construction Costs are calculated by multiplying the estimated new pipe length by a proposed unit cost. Sanitary sewer collection system improvements range in size from 8- to 24-inches in diameter, and associated pipeline unit costs are shown in Table 6.1. Existing 6-inch and less in diameter pipes recommended to be replaced based on the condition analysis in Chapter 4 are replaced with 8-inch pipes. The unit costs are for "typical" field conditions with construction in stable soil at a depth ranging between 10 to 15 feet. Where there are existing pipes proposed for replacement, the unit costs assume in-place replacement, either in roadways or in right-of-way (ROW) areas.

Table 6.1 Gravity Pipeline Construction Unit Costs
Wastewater Collection System Master Plan
City of Grants Pass

Pipe Size (inches)	Unit Cost ($/LF)	Cost Per Linear Foot ($/foot)(1)
8	134	16.8
10	147	14.7
12	162	13.5
15	183	12.2
18	203	11.3
21	223	10.6
24	244	10.2

Note:
(1).This corresponds to the unit cost standardized for the pipe size and is calculated by dividing the unit cost with the pipe size.

6.3.1.2 Force Main Unit Costs

Force main pipeline costs are independent from pump station costs presented in Section 6.3.1.4. Force main unit costs using used for the CIP are presented in Table 6.2.

Table 6.2 Force Main Construction Unit Costs
Wastewater Collection System Master Plan
City of Grants Pass

Pipe Size (inches)	Unit Cost ($/LF)	Cost Per Linear Foot ($/foot)
4	144	36.0
6	147	24.5
8	151	18.9
10	156	15.6
12	160	13.3
24	336	14.0

6.3.1.3 Casing Unit Costs

Pipe casings up to 21-inches in diameter are included for major crossings (e.g., creeks, highways, and railroad) of the trunk sewers. Table 6.3 shows the unit costs for pipeline casings. The sizes in this table represent both pipeline diameter and associated casing size.

Table 6.3 Pipeline Casing for Major Crossings Construction Unit Costs Wastewater Collection System Master Plan City of Grants Pass

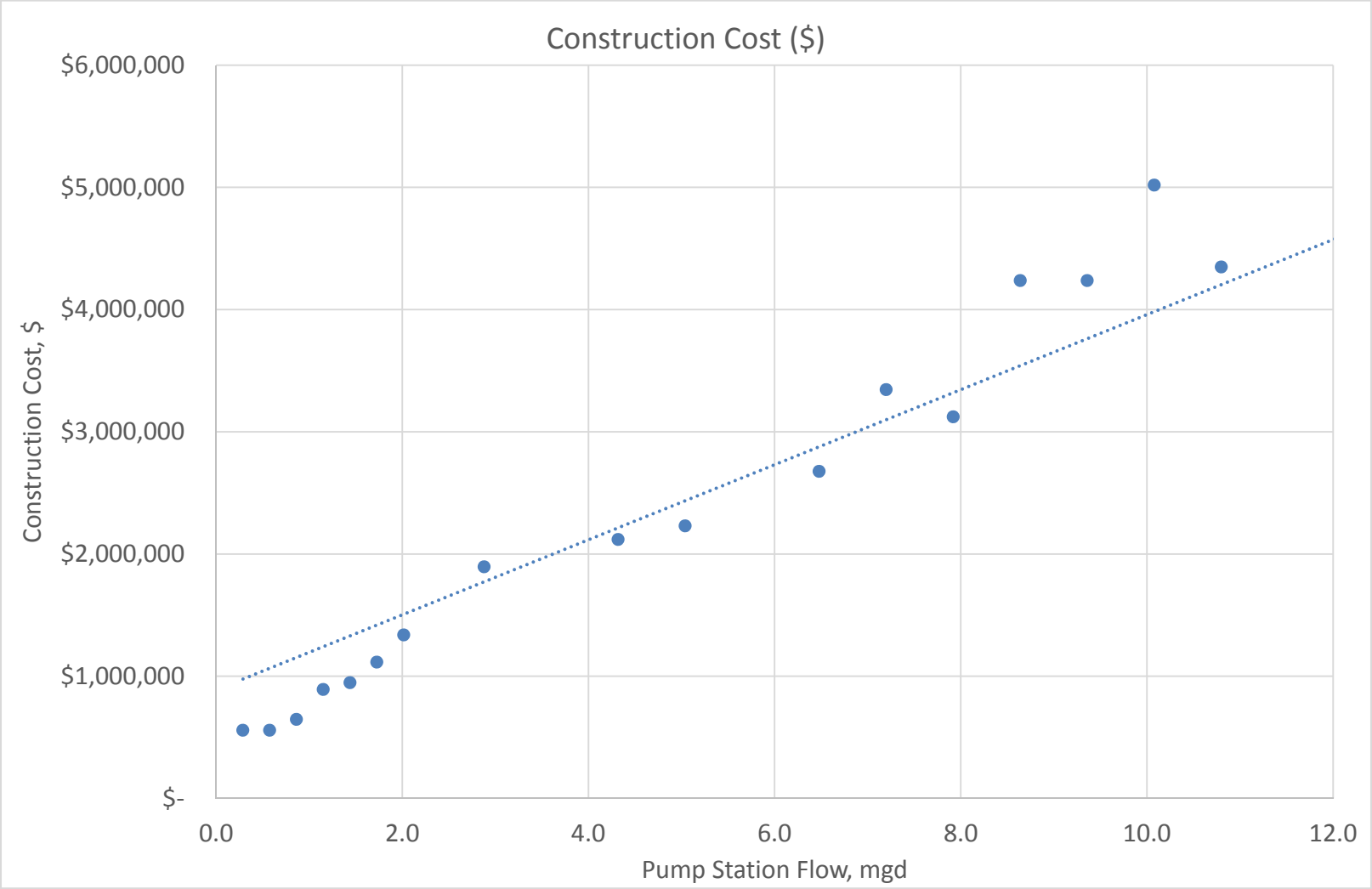
Pipe Size (inches)(1)	Cost Per Linear Foot ($/foot)
12/24	988
15/30	1,235
21/42	1,729

Note:
(1) Size represents pipeline diameter and associated casing size.

6.3.1.4 Pump Station Unit Costs

Recent pump station rehabilitation projects completed by the City, as well as Carollo Engineers, were used to create the pump station cost curve shown in Figure 6.1. All points on the curve are total construction costs dollars. This cost curve was used to estimate the construction cost of pump station repair and upgrade projects in the City's CIP. As shown in Figure 6.1, the pump station construction cost is highly variable depending on the actual project conditions and other ancillary improvements tacked to the project. However, the average trend line correlates well when pump station flows are above 2 mgd. Therefore this trend line was used for estimating Darneille Pump Station project.

Preliminary cost estimates were prepared for Bridge Street Pump Station as part of the Capacity and Reliability Study. Webster Lift Station No. 1 cost was obtained from the actual bid, and a similar cost was assigned to Webster Lift Station No. 2.



PUMP STATION COST CURVE

FIGURE 6.1

CITY OF GRANTS PASS
WASTEWATER COLLECTION SYSTEM MASTER PLAN

6.3.2 Baseline Construction Cost

This is the total estimated construction cost, in dollars, of the proposed improvement for pipelines and lift stations. Baseline construction costs were calculated by multiplying the estimated length by the unit cost.

6.3.3 Estimated Construction Cost

Contingency costs must be reviewed on a case-by-case basis because they will vary considerably with each project. Consequently, it is appropriate to allow for uncertainties associated with the preliminary layout of a project. Such factors as unexpected construction conditions, the need for unforeseen mechanical items, and variations in final quantities are a few of the items that can increase project costs for which it is wise to make allowances in preliminary estimates. To assist the City in making financial decisions for these future construction projects, a contingency cost will be added to the Baseline Construction Cost as a percentages of the Baseline Construction Cost.

Since knowledge about site-specific conditions of each proposed project is limited at the current planning stage, a 20% contingency was applied to the Baseline Construction Cost to account for unforeseen events and unknown conditions. The Estimated Construction Cost for the proposed collection system improvement consists of the Baseline Construction Cost plus the 20% construction contingency.

6.3.4 Total Allied Project Cost

Project allied costs include costs associated with project engineering, construction phase professional services, and project administration. Engineering services associated with new facilities include preliminary investigations and reports, Right of Way (ROW) acquisition, foundation explorations, preparation of drawings and specifications during construction, surveying and staking, sampling of testing material, and start-up services. Construction phase professional services cover such items as construction management, engineering services, materials testing, and inspection during construction. Finally, there are project administration costs, which cover such items as legal fees, financing expenses, administrative costs, and interest during construction.

The cost of these items can vary, but for the purpose of this study, it is assumed that the Total Allied Project Costs will equal approximately 30% of the Estimated Construction Cost.

6.3.5 Total Capital Improvement Cost

The costs presented in this Plan are high-level planning costs to help the City in making financial decisions. A planning contingency cost will be added to the Total Allied Project Cost to account for unforeseen events and unexpected conditions through the design process of these projects.

As shown in the following sample calculation of the capital improvement cost, the total cost of all project contingencies (construction, and planning), and allied costs (engineering services, construction management, and project administration) is 95.9% of the baseline construction cost.

Example:

Baseline Construction Cost	**$1,000,000**
Construction Contingency (20%)	$200,000
Estimated Construction Cost	**$1,200,000**
Engineering Cost + Construction Management + Project Administration (30%)	$360,000
Total Allied Project Cost	**$1,560,000**
Planning Contingency (25%)	$390,000
Total Capital Improvement Cost	**$1,959,000**

6.4 CAPITAL IMPROVEMENT IMPLEMENTATION

As discussed in Chapter 4 - Existing System and Condition Assessment and Chapter 5 - System Analysis, the capital improvement implementation (CIPs) are prioritized based on their urgency to mitigate existing deficiencies and issues and, for servicing anticipated growth.

It is recommended that improvements to mitigate existing deficiencies be constructed as soon as possible. The deficiencies in the future system have a significant total capital cost that is best distributed based on the order in which the City is expected to develop. The timing for implementing these improvement projects is based on the growth assumptions made for this Plan and is subject to growth. It is recommended that the City monitor growth and adjust project implementation accordingly.

The capital improvement implementation phases are separated into 3 phases:

- Phase 1 (2015-2020). Proposed facilities located in areas flagged as deficient under existing modeling conditions for the design storm that needs to be addressed first, and as high priority during the condition assessment. Timing for these projects is planned between 2015 and 2020.
- Phase 2 (2021- 2025). Proposed facilities located in areas flagged as deficient under Short-Term (2025) modeling conditions for the design storm, proposed facilities to service major growth areas to be developed in the short-term, and medium priority during the condition assessment.
- Phase 3 (2026-2035). Proposed facilities located in areas flagged as deficient under Long-Term (2035) modeling conditions for the design storm, proposed facilities to service major growth areas to be developed in the long-term, and low priority during the condition assessment.

When capital projects are overlapping between repair and replacement (chapter 4) and capacity (chapter 5) projects, it is assumed that the highest phase between the two will be picked. For instance, if a pipe upsize is recommended in Phase 1 to mitigate capacity deficiencies and the same pipe is recommended to be replaced or repaired only in phase 2, the pipe in question will be prioritized under Phase 1.

6.5 CAPITAL IMPROVEMENT PROGRAM

6.5.1 Capital Improvement Program Overview

This section presents a summary of the proposed collection sewer system CIP. More details on cost can be found in Appendix I.

As detailed in section 6.1, the proposed capital projects are divided into four main types of projects: repair and replacement, capacity, expansion, and general. Table 6.4 summarizes total costs by project type and by phasing.

Table 6.4 CIP Summary by Implementation Phase Wastewater Collection System Master Plan City of Grants Pass

Project Type	Phase 1 (2015-2020)	Phase 2 (2021-2025)	Phase 3 (2026-2035)	Total Capital Cost ($M.)
Capacity	$ 1,924,000	$ 914,000	$ 2,257,000	$ 5,095,000
Repair & Replacement	$ 16,546,000	$ 16,130,000	$ 32,179,000	$ 64,855,000
Capacity and R&R	$ 11,938,000	$ 3,426,000	$ 1,989,000	$ 17,353,000
Expansion	$ –	$ 2,971,000	$ 17,219,000	$ 20,190,000
General	$ 150,000	$ 300,000	$ 300,000	$ 750,000
Total ($M.)	**$** 30,558,000	**$** 23,741,000	**$** 53,944,000	**$ 108,243,000**
Annual Total ($M)	**$** 5,093,000	**$** 3,392,000	**$** $5,394,000	**$ 5,154,000**

The implementation timeframe was based on the priority of each project to correct existing deficiencies or accommodate future users.

As seen in Table 6.4, the CIP recommends investing $30.6M into the wastewater system for Phase 1 (2015-2020). This high cost includes several critical programs, including $13.9M for capacity improvements (also benefiting system condition) to reduce surcharging manholes, and $16.5M in repair projects to address aging infrastructure. The annual Phase 1 cost for all recommended programs is approximately $5.1M per year from 2015 to 2020. For the Phase 2 (2021-2025), the CIP recommended an additional $23.7M be invested to continue these programs. The annual Phase 3 cost is approximately $5.4M per year from 2026 to 2035.

The total CIP cost, including contingencies and allied costs, is approximately $108.2M.

Detailed sheets for each CIP project presented in this chapter can be found in the following chapter, Chapter 7 - CIP Detailed Sheets.

Table 6.5 summarizes the total estimated capital costs by facility type. Gravity pipelines account for $95.2M of the $108.2M. (i.e. 87.9 %) of the total CIP. Pump Stations and force mains account for $10.5M (10 %), and highway crossings for $1.8M (1.7 %). The remaining $750,000 is associated with general projects.

Table 6.5 CIP Summary by Facility Type
Wastewater Collection System Master Plan
City of Grants Pass

Facility Type	Unit Cost ($M.)	Percent (%)
Gravity Pipeline	$ 95,152,000	87.9%
Pump Station	$ 8,549,000	7.9%
Casing / Highway Crossing	$ 1,830,000	1.7%
Force Main	$ 1,962,000	1.8%
General	$ 750,000	0.7%
Total ($M.)	**$ 108,243,000**	**100.0%**

Figures 6.2 and Figure 6.3 are graphs showing the cost repartition of cost of all repair and replacement, capacity, expansion, and general projects based on project purpose and implementation phase, respectively.

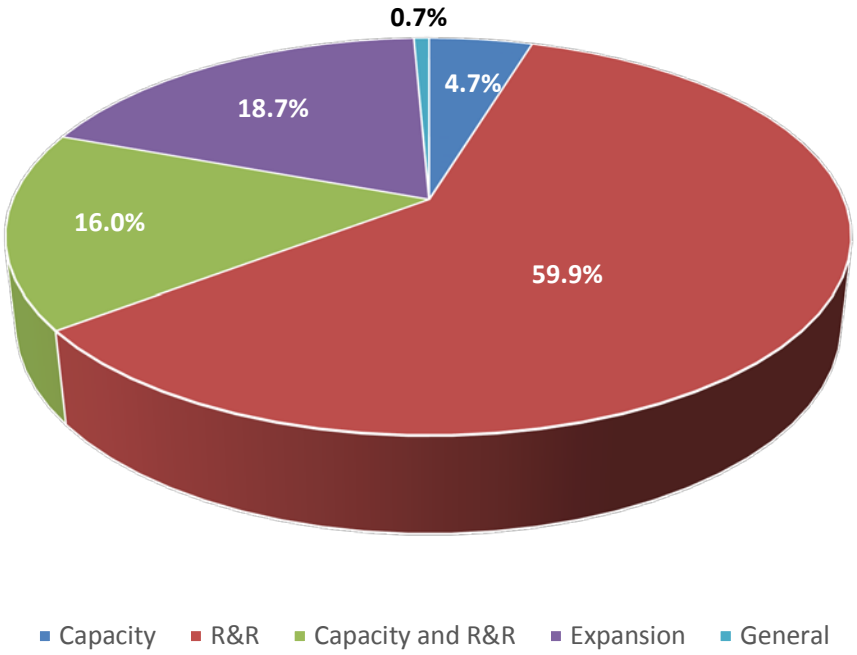


Figure 6.2 Total CIP Cost Repartition by Project Purpose

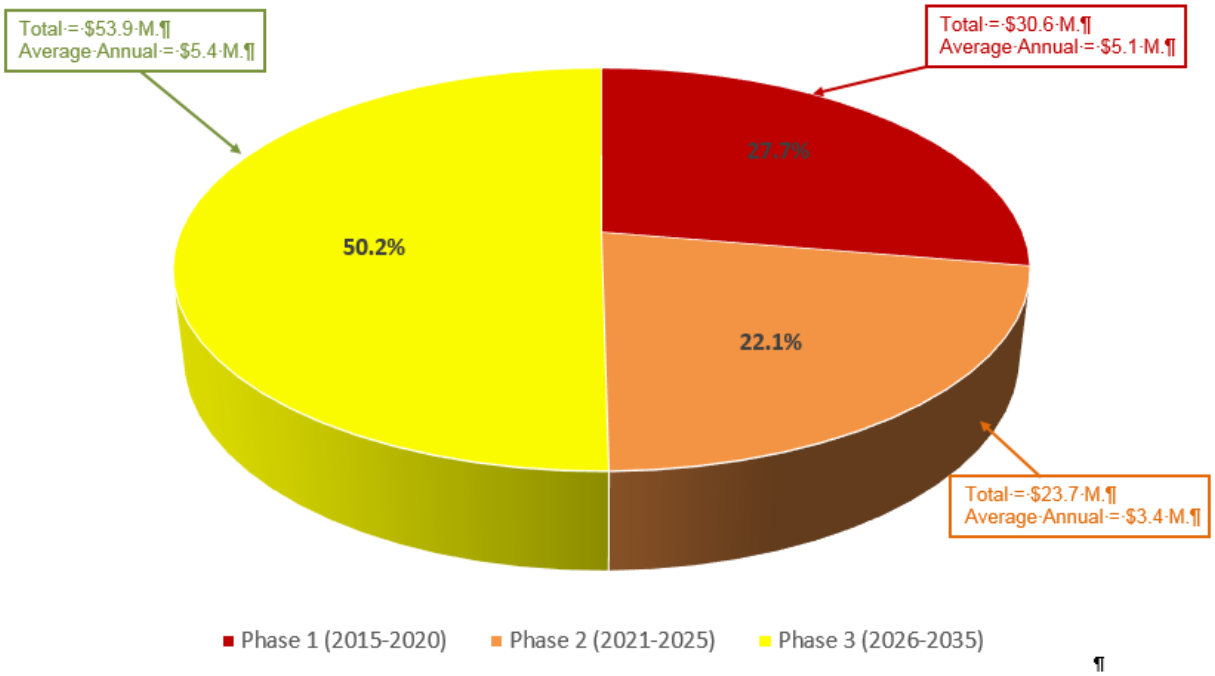


Figure 6.3 Total CIP Cost Repartition by Implementation Phase

6.5.2 Repair and Replacement Projects

This section describes the Repair and Replacement (R&R) recommendations for the City's pipelines and pump stations.

These projects were identified as part of the evaluation performed in Chapter 4 - Existing System and Condition Assessment. These projects are based on the remaining useful life (RUL) analysis, maintenance, and structural records that City is gathering over time in a GIS database. Several R&R projects are recommended to address the condition-related deficiencies. Implementing an Asset Management Program to prioritize these and other repair projects is recommended.

Figure 6.4 shows the locations of the repair and replacement projects.

6.5.2.1 Pipeline R&R Projects

Many of the City's pipelines have less than 20 years of remaining useful life. The cost of maintaining these aging pipes will likely increase in the next 25 years as pipe deterioration continues.

Chapter 4 evaluated all of the City's sewer pipelines. The RUL analysis itself shows that 54.5% of the collection system would need to be replaced in the next 20 years, which would consist of replacing around 25,000 LF of pipes per year. However, some of these pipes do not present any maintenance or structural issues as identified by the City, and replacement could be pushed out to a later date after the end of the planning period (2035). In order to spread out repair and replacement and avoid having year where no pipes or too many need to be replaced, the life cycle of the entire system was taken into consideration. Using this assumption, approximately 12,000 LF of pipes would need to be replaced each year, which corresponds to approximately 250,000 LF (47 miles) of pipes to replace in the next 20 years.

It is recommended that an Annual Pipeline Repair Program be implemented. The Annual Pipeline Repair is estimated to require a total cost of $16.5M under Phase 1, $16.1M under Phase 2, and $32.2M under Phase 3. This corresponds to an average annual cost of $3.1M over the course of the entire planning period (2015-2035), as shown in Table 6.6.

Table 6.6 Repair and Replacement Pipelines Cost Summary Wastewater Collection System Master Plan City of Grants Pass	
Improvement Project ID	**Total Capital Improvement Cost ($)**
Project 26 - Condition Only Projects - Phase 1 North of Rogue River	$16,238,000
Project 27 - Condition Only Projects - Phase 1 South of Rogue River	$283,000
Project 28 - Condition Only Projects - Phase 2 North of Rogue River	$15,275,000
Project 29 - Condition Only Projects - Phase 2 South of Rogue River	$855,000
Project 30 - Condition Only Projects - Phase 3 North of Rogue River	$19,095,000
Project 31 - Condition Only Projects - Phase 3 South of Rogue River	$13,084,000
Total Repair and Replacement Pipeline Projects	**$64,830,000**

Some projects needed for capacity improvements are also beneficial to the condition of the system and these pipes are not included in the Annual Pipeline Repair Program. The Annual Pipeline Repair Program is divided into four projects based on their location and implementation phase:

- Project 26 – Condition Only Projects – Phase 1 North of the River
- Project 27- Condition Only Projects – Phase 1 South of the River
- Project 28 – Condition Only Projects – Phase 2 North of the River
- Project 29- Condition Only Projects – Phase 2 South of the River
- Project 30 – Condition Only Projects – Phase 3 North of the River
- Project 31- Condition Only Projects – Phase 3 South of the River

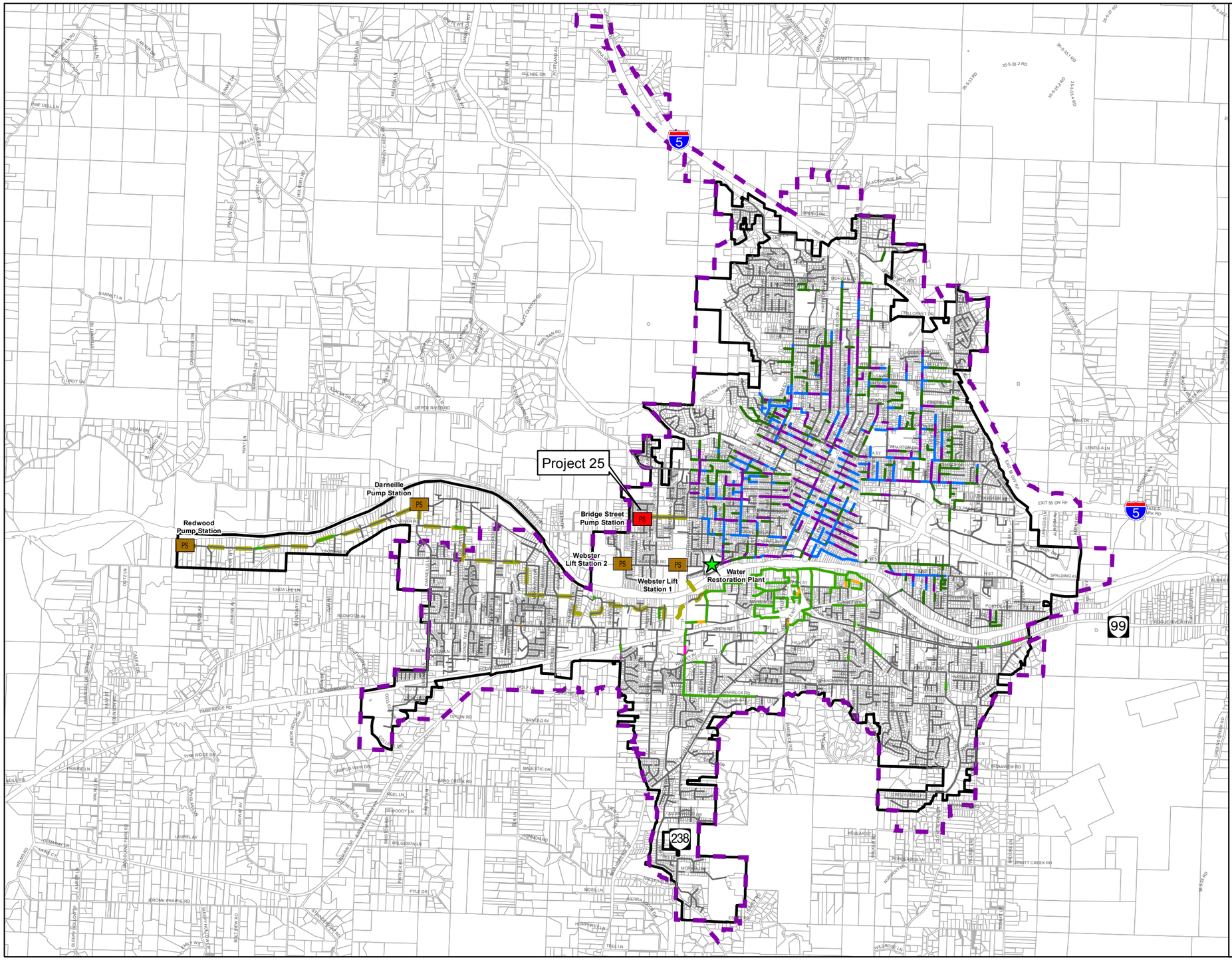
Projects 26 through 31 in Table 6.4 are R&R projects only and are illustrated in Figure 6.4.

6.5.2.2 Pump Stations R&R Projects

The City's existing pump stations were reviewed for general conditions and overall compliance with regulatory standards, as discussed in Chapter 4 - Existing System and Condition Assessment. Pump Stations recommendations are based on a general condition review, visual inspection of the facilities, input from the City, and existing pump station records.

Four pump stations are recommended for improvements based on the condition review presented in Chapter 4 – Existing System and Condition Assessment:

- Bridge Street Pump Station,
- Webster No. 1 Lift Station,
- Webster No. 2 Lift Station,
- Darneille Pump Station.



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- WRP
- Lift/Pump Station
- Force Main
- Project 25 - Bridge Street Pump Station

Pipes Recommended to be Replaced or Repaired

North of the River

- Project 26 - Condition Only Projects - Phase 1 North of the River
- Project 28 - Condition Only Projects - Phase 2 North of the River
- Project 30 - Condition Only Projects - Phase 3 North of the River

South of the River

- Project 27 - Condition Only Projects - Phase 1 South of the River
- Project 29 - Condition Only Projects - Phase 2 South of the River
- Project 31 - Condition Only Projects - Phase 3 South of the River
- Other Gravity Main
- Existing Sewer Service Area
- UGB
- Tax Lots

0 5,000 10,000 Feet

Figure 6.4
Repair and Replacement Recommended Project Locations and Phasing
Wastewater Collection System Master Plan
City of Grants Pass

All pump stations, except Bridge Street Pump Station, identified as needed repair improvements are also identified as needed capacity upgrade in the future. These pump stations will be discussed in the capacity section of this chapter. A detailed pre-design is recommended when the City is prepared to replace these pump stations to more accurately estimate costs and define the layout.

6.5.2.2.1 *Project 25 - Bridge Street Pump Station*

Bridge Street Pump Station is recommended for repair and replacement under Phase 1 due to reliability issues related to the pump, guide rail, and level control issues at the pump station. Preliminary cost estimates were prepared for Bridge Street Pump Station as part of the Capacity and Reliability Study and total capital improvement cost was estimated at $25,000.

6.5.3 Capacity Projects

This section summarizes the recommended improvement program, which includes all recommended improvement projects needed to meet capacity requirements and the City's performance criteria under existing and future flow conditions. These capacity-related projects were identified using hydraulic modeling and were identified through the system analysis performed in Chapter 5. A majority of the recommended capacity projects are also beneficial to condition of the collection system.

Figure 6.5 shows the locations of the capacity projects and Figure 6.6 shows their recommended implementation phase.

6.5.3.1 Pipeline Capacity Projects

Modeled City's pipelines in the wastewater system were evaluated against the criterion of keeping the water surface two feet or less above pipe crown during a custom 5-year storm event. The hydraulic model was used to show that several trunks could not meet this criterion and developed optimized pipe projects under existing and future conditions. All projects are sized for system build-out flow conditions.

Total CIP for all capacity-related pipeline projects is estimated at $15.7M. 66% of these projects are also required as part of the repair and replacement analysis performed in Chapter 4 - Existing System and Condition Assessment. Table 6.7 summarizes all capacity-related recommended pipe projects.

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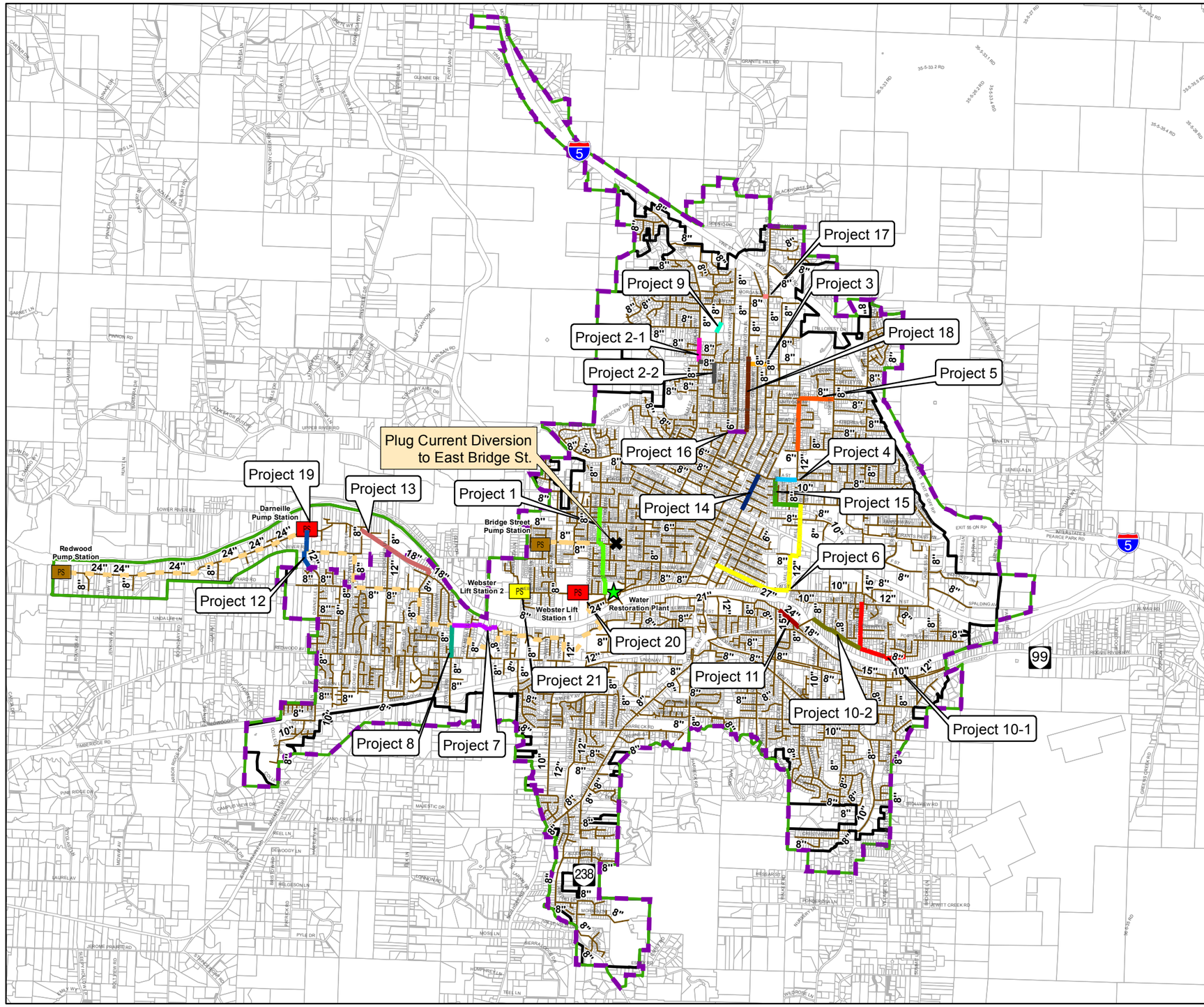

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Proposed Pipe Capacity-Related Improvement Projects

- Project 1 - SW Western Street / SW Spruce Street
- Project 2-1 - NW Highland Street
- Project 2-2 - NW Prospect Street
- Project 3 - NW Midland Ave
- Project 4 - NE A Street
- Project 5 - NE Savage Street / NE 9th Street
- Project 6 - SE Mill Street / SE Rogue View Lane
- Project 7 - Anabelle Ln
- Project 8 - Leonard Road
- Project 9 - Gilbert Creek Park
- Project 10-1 - Rogue Drive / SE Blue Bird Drive
- Project 10-2 - West SE Blue Bird Drive
- Project 11 - Park Street
- Project 12 - Darneille Lane
- Project 13 - Mesman Drive to Coutant Lane
- Project 14 - NE 7th Street
- Project 15 - NE Dean Dr / NE D St
- Project 16 - NW Evelyn Ave
- Project 17 - NW Morgan Ln
- Project 18 - NW Washington Blvd
- Other Gravity Mains
- Existing Lift/Pump Station Defiency
- 2035 Lift/Pump Station Deficency
- Lift/Pump Station
- WRP
- Force Mains
- Study Area Boundary
- Existing Sewer Service Area
- UGB
- Tax Lots

N

0 4,000 8,000 Feet

Figure 6.5
Recommended Capacity Improvement Project Locations
Wastewater Collection System Master Plan
City of Grants Pass

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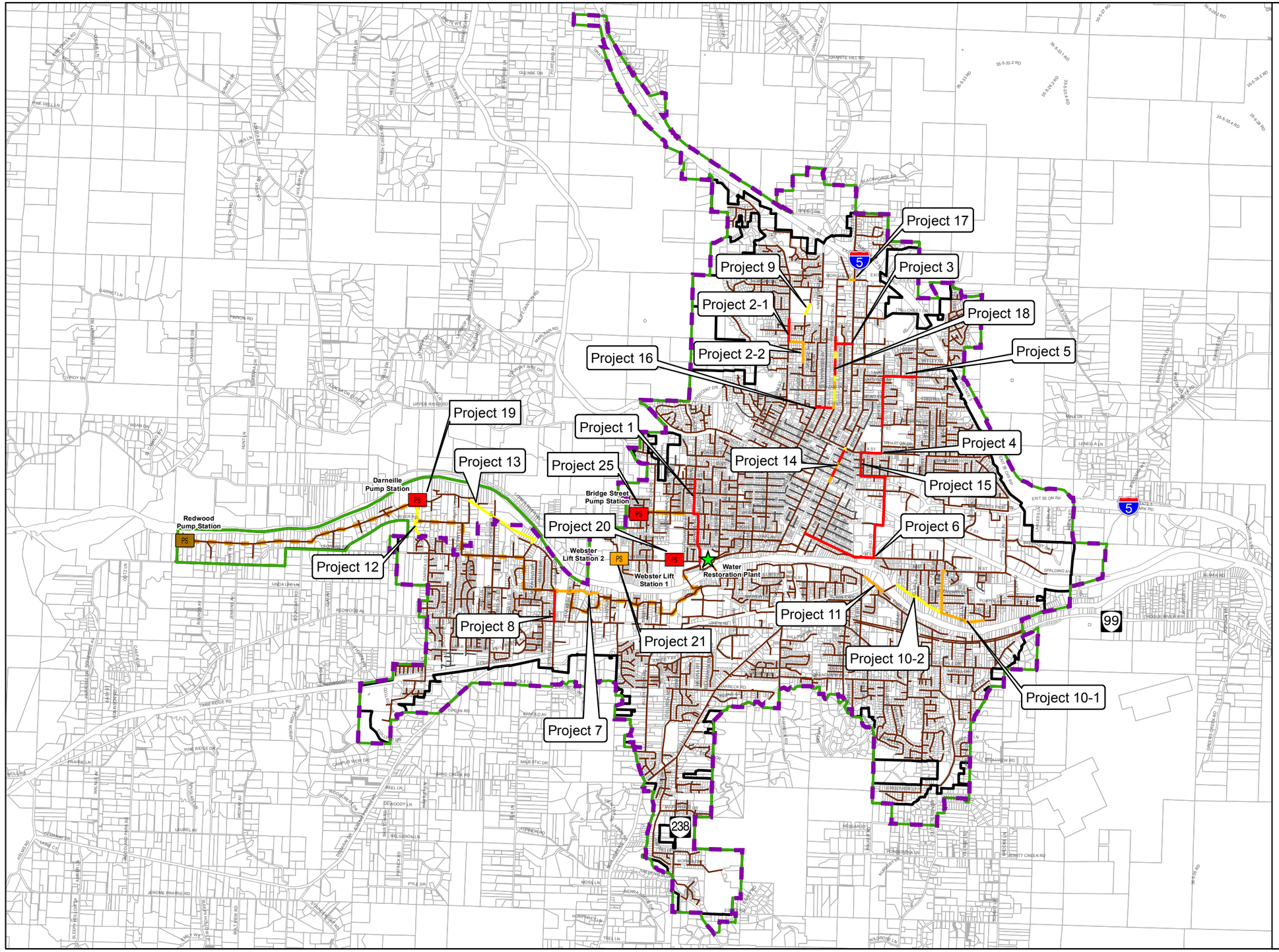

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Proposed Improvements Phasing

Lift/Pump Station

- Phase 1 (2015-2020)
- Phase 2 (2021-2025)
- Phase 3 (2026-2035)
- No Improvement

Pipelines

- Phase 1 (2015-2020)
- Phase 2 (2021-2025)
- Phase 3 (2026-2035)
- Modeled Pipes
- Modeled Force Mains
- All Other Pipelines
- WRP
- Study Area Boundary
- Existing Sewer Service Area
- UGB
- Tax Lots

N

0 4,000 8,000 Feet

Figure 6.6
Recommended Capacity Improvement Project Phasing
Wastewater System Master Plan Update
City of Grants Pass

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Table 6.7 Capacity-Related Pipeline Projects Cost Summary
Wastewater Collection System Master Plan
City of Grants Pass

Project ID	Total Capital Improvement Cost ($)	Phase 1 (2015-2020)	Phase 2 (2021-2025)	Phase 3 (2026-2035)
Project 1 - SW Western / SW Spruce Street	$1,360,000	$1,360,000	–	–
Project 2-1 - NW Highland Street	$296,000	$296,000	–	–
Project 2-2 - NW Prospect Street	$494,000	–	$494,000	–
Project 3 - NW Midland Avenue	$224,000	$224,000	–	–
Project 4 - NE A Street	$334,000	$334,000	–	–
Project 5 - NE Savage Street / NE 9th St.	$1,084,000	$1,084,000	–	–
Project 6 - SE Mill Street / SE Rogue View Ln.	$2,827,000	$2,827,000	–	–
Project 7 - Annabelle Lane	$848,000	–	$848,000	–
Project 8 - Leonard Road	$419,000	$419,000	–	–
Project 9 - Gilbert Creek Park	$143,000	–	–	$143,000
Project 10-1 - Rogue River / SE Blue Bird Dr.	$1,400,000	–	$1,400,000	–
Project 10-2 - Rogue River / SE Blue Bird Dr.	$1,051,000	–	–	$1,051,000
Project 11 - Park Street	$534,000	–	$534,000	–
Project 12 - Darneille Lane	$614,000	–	–	$614,000
Project 13 - Mesman Drive to Coutant Lane	$1,500,000	–	–	$1,500,000
Project 14 - NE 7th Street	$606,000	$606,000	–	–
Project 15 - NE Dean Drive / NE D Street	$795,000	$795,000	–	–
Project 16 - NE Evelyn Avenue	$190,000	$190,000	–	–
Project 17 - NW Morgan Lane	$66,000	–	$66,000	–
Project 18 - NW Washington Boulevard	$938,000	–	–	$938,000
Total Capacity-Related Pipeline Projects	**$15,723,000**	**$8,135,000**	**$3,342,000**	**$4,246,000**
Total Capacity-Related Projects Phasing Percent		**51.7%**	**21.3%**	**27.0%**

Projects 1 through 18 presented in the sections below consist of the recommended capacity-related projects.

6.5.3.1.1 *Project 1 - SW Western Street / SW Spruce Street*

The sewer pipes located in wastewater basin B, along Western Avenue and SW Spruce Street severely lacks capacity to convey design flows and shows significant surcharging starting under existing conditions. Project 1 consists of replacing approximately 3,955 feet of existing 8- and 10-inch pipes with 12-, 15-, and 18-inch pipes.

Once this project completed, the diversion located on Bridge Street can be removed or plugged. The 8-inch force main connection from Bridge Street Pump Station will need to be rerouted to west of the 10-inch diversion to be plugged so flows from the 8-inch force main flow to SW Spruce Street.

This project is planned under Phase 1 and total cost is estimated at $1.4M.

6.5.3.1.2 *Project 2-1 – NW Highland Avenue*

The existing trunk traveling south on NW Highland Ave lacks the hydraulic capacity to convey modeled peak flows. Project 2-1, located in wastewater basin F consists of upsizing about 939 feet of existing 8-inch diameter sewers with new 12-inch diameter pipes along NW Highland Ave between 300 feet north of NW Parker Dr and NW Midland Ave.

Project 2-1 is planned under Phase 1 and is estimated at $296,000.

6.5.3.1.3 *Project 2-2 – NW Prospect Street*

The existing trunk traveling east on NW Midland Ave, and south on NW Prospect Ave lacks the hydraulic capacity to convey modeled peak flows. Project 2-2, located in wastewater basin F consists of upsizing about 1,457 feet of existing 8-, and 10-inch diameter sewers with new 12- and 15-inch diameter pipes along NW Midland Ave between NW Highland Ave and NW Prospect Ave and along NW Prospect Ave between NW Midland Ave and 150 feet south of NW Sandy Dr.

Project 2-2 is planned under Phase 2 and is estimated at $494,000.

6.5.3.1.4 *Project 3 – NW Midland Avenue*

One of the main areas of deficiencies observed is located along the NE 6th and 7th Streets trunk. These trunks are located along two of the busiest streets in the whole City. The City expressed its desire to prevent as much as possible projects along these streets. Flows were diverted away to different wastewater basins by proposing diversion pipes between NE 6th Street and adjacent trunks that had sufficient capacity to free up these surcharging trunks. Table 6.4 describes all capacity-related pipeline projects.

The existing interceptors that run along NE 7th Street and NE 6th Street shows surcharging above the performance criteria and lacks the hydraulic capacity to convey modeled peak flows.

Project 3 consists of constructing 710 feet of new 12- inch sewers along NW Midland Ave between NE 6th St and NW Washington Blvd. The implementation of this diversion and the ones from Projects 15, 16, and 17 in the short-term allows to divert enough flow away from NE 6th St to prevent replacing the NE 6th St Trunk where deficiencies are observed.

Total cost for Project 3 is estimated at $224,000.

6.5.3.1.5 *Project 4 – NE A Street*

The existing trunk sewer that runs along NE A Street, between NE 9th Street and NE 7th Street, is flagged as capacity deficient in the hydraulic model starting under existing conditions, which results in surcharging above the planning criteria during PWWF.

Project 4 consists of replacing approximately 844 feet of existing 12-inch pipe with a new 18-inch pipeline. It will be strategic to coordinate construction of the NE A Street improvements with the NE 7th Street interceptor improvements (see Project 14 - NE 7th Street) to ensure sufficient downstream capacity in the system to convey design peak flows.

Project 4 is estimated to be implemented under Phase 1 and cost $334,000.

6.5.3.1.6 *Project 5 – NE Savage Street / NE 9th Street*

The existing 8-inch trunk along NW Savage Street and NE 9th Street has insufficient capacity to convey design flows and creates bottlenecks.

Project 5 consists of upsizing 3,431 feet of the existing 8-inch pipe with a 12-inch trunk. Some of the current pipes in this project have low slopes, which increases the HGL in some pipes to above the design d/D value of 0.5.

Project 5 is planned under Phase 1 and total cost for this project is estimated at $1.1M.

6.5.3.1.7 *Project 6 – SE Mill Street / SE Rogue View Ln*

The existing 12-inch trunk travelling along SE Mill Street (beginning south of the train tracks), SE M Street, and along the river easement to SE 8th Street lacks capacity to convey the modeled design flow. Surcharging above the performance criteria in the manholes along this section is observed starting under existing conditions.

A new pipeline will be installed along M Street west from the intersection of Mill Street to the SE 8th Street and then south on SE 8th Street to a new crossing west of NE 7th Street to connect to the 21-inch along SE 7th St, connecting to the existing 30-inch trunk line going to the WRP.

Project 6 also recommends that 907 feet of existing 12-inch pipes located just south of the train tracks to SE 8th Street be replaced with 21-inch diameter pipes and 3,755 feet of existing 12-inch pipes with a new 18-inch sewer along SE Mill Street from NE D Street to SE M Street to facilitate manhole access for maintenance and repair. This project will need to be coordinated with the implementation of Project 15, which diverts flows from wastewater basin H towards the Mill Street trunk instead of the NE 7th Street trunk.

Project 6 is planned under Phase 1 and is estimated at $2.8M.

6.5.3.1.8 *Project 7 - Annabelle Lane*

The primary interceptor in the Redwood area runs westerly along the Rogue River. The segment of 15-inch pipeline located between Wineteer Ln and Dowell Rd is capacity deficient and 1,948 feet of pipes are recommended to be replaced with a 21-inch diameter.

Project 7 consists of replacing the existing 1,948 feet of 15-inch pipe with a 21-inch pipe, which is greater than the upstream (15-inch) and downstream (18-inch) pipe diameters. The recommendation for the larger 21-inch pipe diameter is necessary based on existing pipe slopes of this segment and a design d/D value of 0.75.

Project 7 is planned under Phase 2 and is estimated at $848.000.

6.5.3.1.9 *Project 8 - Leonard Road*

The existing 8-inch sewer along Leonard Road, located between Redwood Avenue and the intersection of Leonard Road with Mesman Drive, lack sufficient capacity to convey the model design flow. Surcharging above the performance criteria is observed starting under existing conditions.

Project 8 consists of replacing the existing 8-inch main with 888 feet of 12-inch and 384 feet of 15-inch pipes.

Project 8 is planned under Phase 1 and total project cost is estimated at $419,000.

6.5.3.1.10 *Project 9 - Gilbert Creek Park*

The existing trunk traveling south through the football field and track of the North Middle School lacks the hydraulic capacity to convey build-out design flows. Project 9 consists of replacing 451 feet of existing 8-inch diameter pipe with a new 12-inch diameter trunk sewer.

This project is planned under Phase 3 and is estimated at $143,000.

6.5.3.1.11 *Project 10-1 - Rogue Drive / SE Blue Bird Drive*

The existing interceptor that runs along the north bank of the Rogue River, just south of SE Rogue Drive, SE Blue Bird Drive, and SE Oriole Street, experiences surcharging above the stated surcharging criteria and lacks the hydraulic capacity to convey the design flows starting in the short-term planning period. Project 10-1 will need to be implemented concurrently with the construction of the Spalding pump station.

Project 10-1 runs from south of Waterman Lane and Lela Lane to just upstream of the split pipeline flowing under the Rogue River, and along Rogue Drive. To alleviate the identified deficiencies, approximately 3,720 feet of 15-, and 18-inch pipelines are recommended to replace the existing 12- and 15- inch sewers.

Project 10-1 is planned under Phase 2 and is estimated at $1.4M.

6.5.3.1.12 *Project 10-2 – West SE Blue Bird Drive*

Additional flows from the Spalding expansion area trigger deficiencies along SE Blue Bird Drive. Project 10-2 runs along SE Blue Bird Drive, west of Rogue Drive, and helps alleviate deficiencies identified on the interceptor running along the north bank of the Rogue River.

Project 10-2 is recommended under Phase 3 and will need to be implemented concurrently with the development of the Spalding industrial expansion area. This project consists of upsizing 2,208 feet of 18-inch with 24-inch and its total capital improvement cost is estimated at $1.1M.

6.5.3.1.13 *Project 11 – Park Street*

The existing interceptor located downstream of the siphon south of the Rogue River along Park Street experiences surcharging above the stated surcharging criteria and lacks capacity immediately downstream the siphon causing backwater and high HGL in the siphon. Project 11 consists of upsizing 202 feet of 18-inch and 795 feet of existing 24-inch with 24-inch and 27-inch diameter sewers, respectively.

Project 11 is phased in Phase 2 and is estimated at $534,000.

6.5.3.1.14 *Project 12 - Darneille Lane*

Portions of the existing trunk sewer that runs along Darneille Lane, between SW Harvest Drive and the Darneille Pump Station are capacity deficient and result in surcharging above the planning criteria during build-out PWWF.

This project consists of replacing a total of 1,551 feet of existing 12-inch sewers with 18-inch pipelines.

Project 12 is prioritized under Phase 3 and its total capital cost is estimated at $614,000M.

6.5.3.1.15 *Project 13 – Mesman Drive to Coutant Lane*

This improvement is located along the primary interceptor in the Redwood area that runs westerly along the Rogue River. The additional flow from build-out conditions causes surcharging above the planning criteria for the portion of the interceptor between Mesman Drive and Coutant Lane.

Project 13 consists of replacing the existing 18-inch main with 2,047 feet of 21-inch pipeline and 1,282 feet of 24-inch.

Project 13 is planned under Phase 3 and is estimated at $1.5M.

6.5.3.1.16 *Project 14 - NE 7th Street*

Portions of the existing trunk sewer that runs along NE 7th Street, south of A Street, are capacity deficient which results in surcharging above the planning criteria during build-out PWWF.

Project 14 consists of replacing the existing 1,531 feet of 12-inch with an 18-inch pipeline along NE 7th Street between NE F Street and NE A Street.

Project 14 is planned under Phase 1 after combining phasing from the capacity analysis and the repair and replacement analysis. Capacity-wise only, this project is only required under phase 3 (2026-2035). However, as shown on Figure 6.6, the repair and replacement analysis performed in Chapter 4 identified these pipes as needing sooner attention and repair due to structural and maintenance issues. Chapter 4 showed that these pipes were needed either under Phase 1 or under Phase 2 based on the data the City collected, however, most of this trunk was identified as required under Phase 1, therefore, this project was recommended under Phase 1.

This project was kept as one project, as it is located on one of the busiest streets in the City, to reduce costs and avoid disturbance, but is not as high of a priority as some other Phase 1 projects. The total capital improvement cost for this project is estimated at $606,000.

6.5.3.1.17 *Project 15 – NE Dean Dr / NE D Street*

Flows from wastewater basin H currently flows west on NE A Street towards NE 7th Street, overloading the NE 7th Street trunk.

A new pipeline along NE Dean Drive and NE D Street from NE A Street to SE Mill Street is proposed. The purpose of this new collector is to redirect flows away from NE 7th Street towards wastewater basin I. Project 15 consists of constructing 2,009 feet of new 18-inch pipeline. Project 6 will need to be implemented as soon as this diversion becomes on-line.

Project 15 is planned under Phase 1 and its total capital improvement cost is estimated at $795,000.

6.5.3.1.18 *Project 16 – NW Evelyn Street*

Projects 3 and 17 consist of routing flows from NW 6th Street to Washington Boulevard to help alleviate the 6th Street trunk located on one of the busiest streets of the City. Project 16 also routes these diverted flows from NW 6th Street towards NW 2nd Street.

Project 16 consists of constructing 1,446 feet of new 12-inch sewer along NW Evelyn Street between Washington Boulevard and NW 2nd Street. The existing sewer on NW 2nd Street has capacity availability.

Project 16 is planned under Phase 1 and its total capital improvement cost is estimated at $190,000.

6.5.3.1.19 *Project 17 – NW Morgan Lane*

Flows from part of the North I-5 area (wastewater basin GG on Figure 4.2) is planned to be connected to the NE 6th Street trunk, significantly increasing future flows in this collector. Project 17 consists of constructing 208-feet of new 8-inch sewer between manholes G113 and G58. This is a new diversion from NE 6th Street to NW Washington Boulevard to relieve both NE 6th Street and NE 7th Street.

Project 17 is planned under Phase 2 and is estimated at $66,000.

6.5.3.1.20 *Project 18 - NW Washington Boulevard*

As shown with Projects 3 and 17, flows from the NE 6th St trunk are diverted to NW Washington Blvd to alleviate the 6th St Trunk located on one of the busiest streets of the City. NW Washington Blvd now gets significant flows from 6th St in the future and capacity in this trunk becomes insufficient (above 2ft above pipe crown) in the long-term (2035).

Project 18 consists of upsizing 2,966 of existing 8-inch and 10-inch sewer with a 12-inch sewer along NW Washington Blvd between NW Midland Ave and NW Evelyn Ave.

This project is not recommended before Phase 3 (2026-2035) from a capacity standpoint. However, as shown on Figure 6.6, the repair and replacement analysis showed that a few section of this project might be required before that (Phase 1 and Phase 2).

To reduce costs and traffic disturbance, it is recommended that this project be implemented under a single phase instead of splitting it under three implementation phases. It is therefore recommended that this project be implemented under Phase 3, however, the City should monitor the pipes identified as Phase 1 repair and replacement and move this project ahead as necessary.

Total capital improvement cost for Project 18 is estimated at $938,000.

6.5.3.2 Pump Station Capacity Projects

The City's existing pump stations were evaluated against the redundancy criterion of having adequate firm capacity to pump peak flows during the custom 5-year design storm event. Chapter 5 recommended several pump station improvement projects for meeting this criterion.

It is projected that Webster No. 1, Darneille and Redwood pump stations are deficient under the existing conditions and that Webster No. 2 becomes deficient under the Long-term (2035) conditions. It is recommended that the existing Redwood Pump Station remain as it is currently, and that the pipes upstream of Redwood be allowed to surcharge up to 3 feet below the manhole rim. If surcharging occurred upstream of the Redwood Pump Station above the 3-foot criteria, a pump station improvement would be recommended.

Table 6.8 summarizes the recommended capacity-related pump station project costs.

Table 6.8 Capacity-Related Pump Station Projects Cost Summary
Wastewater Collection System Master Plan
City of Grants Pass

Pump Station Project ID	Project Description	Total Capital Improvement Cost ($)	Recommended Phase
Project 19	Darneille Pump Station	$ 5,113,000	Phase 1
Project 20	Webster No. 1 Lift Station	$ 614,000	Phase 1
Project 21	Webster No. 2 Lift Station	$ 998,000	Phase 2

6.5.3.2.1 *Project 19 - Darneille Pump Station*

Five high level options were developed as part of this Plan to improve Darneille Pump Station's capacity. It is highly recommended that the City perform an Alternative Analysis to optimize potential improvements at Darneille Pump Station. A recommendation for Darneille Pump Station should be made following an Alternative Analysis evaluating costs and other parameters in further detail to develop a recommended solution to the capacity limitations at the Darneille Pump Station.

Darneille Pump Station cost was estimated using the cost curve presented in Figure 6.1. Total Capital Cost for the pump station was estimated at $5.1M. This cost is likely to change after the Alternatives Analysis is completed and once an optimal option to upgrade this station is recommended.

6.5.3.2.2 *Project 20 - Webster No.1 Lift Station*

Project 20 consists of increasing its firm capacity of 0.66 mgd. Project to increase capacity at Webster No. 1 Lift Station is already underway and is planned to begin construction in 2016 (Phase 1).

Webster Lift Station No. 1 cost was obtained from the actual bid received as part of the design process, which is a total capital cost of $614,000.

6.5.3.2.3 *Project 21 - Webster No.2 Lift Station*

Project 21 consists of increasing its firm capacity to 0.23 mgd. The same cost as Webster No;1 Lift Station was assigned to Webster Lift Station No. 2, but an additional 25% planning contingency was added for unforeseen conditions as this pump station has not been through design process yet.

6.5.4 Expansion Projects

This section presents a summary of the expansion projects required specifically for new service areas. The recommended expansion projects to serve future growth areas were evaluated in Chapter 5, and consisted of evaluating options to expand the existing sewer system into three main expansion areas: North I-5, Spalding, and South Highway:

- Spalding Area Development Expansion.
- North I-5 Area Development Expansion.
- South Highway Development Expansion.

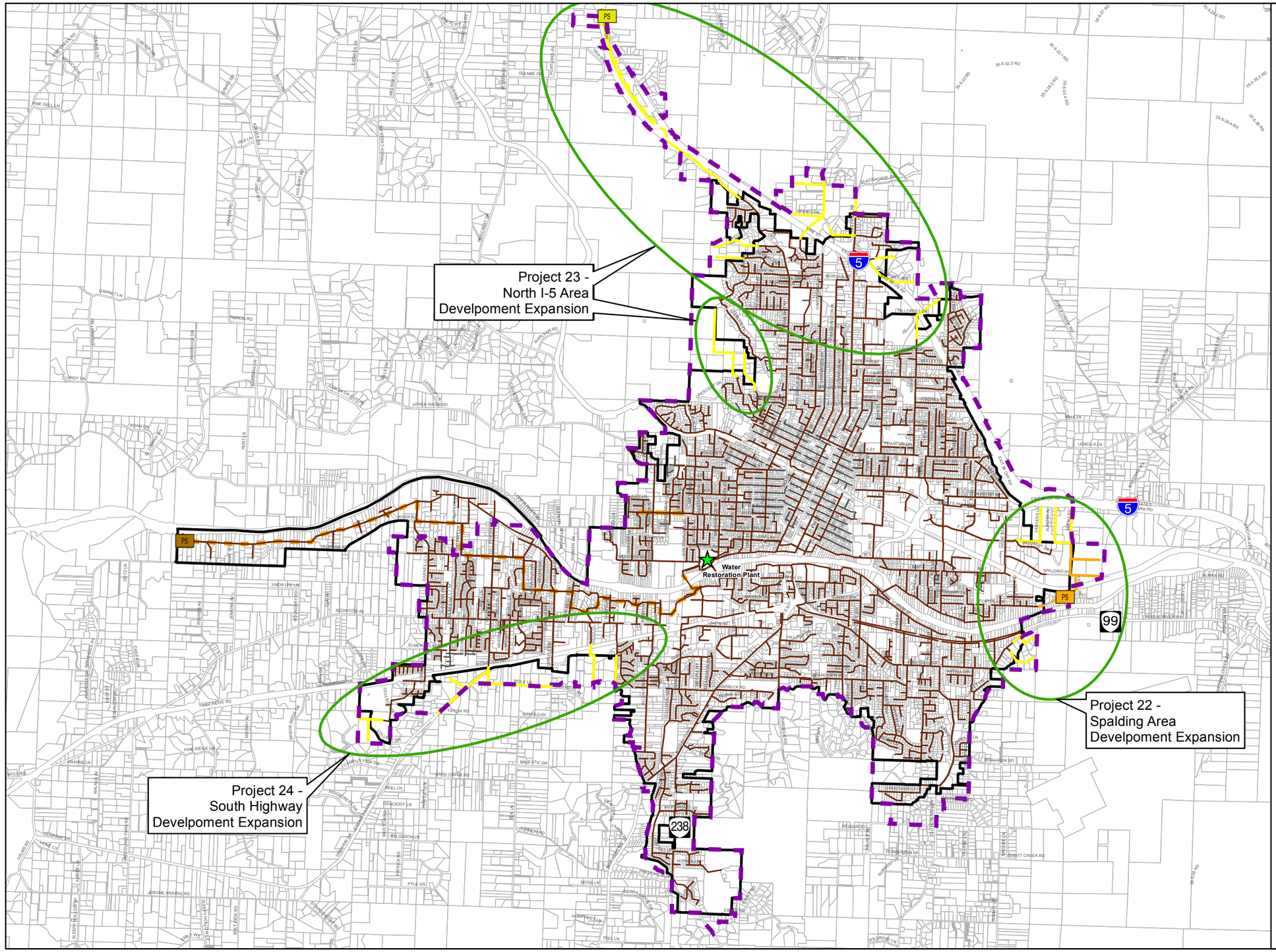
The ability of existing infrastructure to serve future areas of service was evaluated in Chapter 5. In general, the existing infrastructure was shown to have adequate capacity to serve most new service areas, with the exception of the Spalding area, and part of the area located north of I-5. Addition of these flows in the system saturates or helps saturate the already deficient areas.

Connection of these areas will need to be coordinated with the necessary capacity improvements within the existing system, presented above in Section 6.5.3.

Figure 6.7 shows the location and phasing of all proposed expansion projects into the three growth areas identified as part of the system analysis.

A combination of new pipes, highway crossings, pump stations, and force mains is recommended to connect these areas located in the outskirts of the currently served areas.

Table 6.9 presents a summary of the recommended expansion projects total capital improvement costs by implementation phase.



Legend

Proposed Expansion Projects

Lift/Pump Station

- Phase 1 (2015-2020)
- Phase 2 (2021-2025)
- Phase 3 (2026-2035)
- No Improvement

Pipelines

- Phase 1 (2015-2020)
- Phase 2 (2021-2025)
- Phase 3 (2026-2035)
- Modeled Pipes
- Modeled Force Mains
- All Other Pipelines
- Expansion Areas
- WRP
- Existing Sewer Service Area
- UGB
- Tax Lots

N

0 4,000 8,000 Feet

Figure 6.7
Proposed System
Expansion Project Locations
Wastewater System Master Plan Update
City of Grants Pass

carollo
Engineers...Working Wonders With Water

Table 6.9 Proposed Expansion Projects Cost Summary
Wastewater Collection System Master Plan
City of Grants Pass

Project ID	Improvement Type	Address Description	Total Capital Improvement Cost ($)	Phase 1 (2015-2020)	Phase 2 (2021-2025)	Phase 3 (2026-2035)
Project 22 - Spalding Area Development Expansion						
PS-22A	Pump Station	SE Portola Dr.	$986,000		$986,000	
P-22B	Force Main	From Spalding PS to NE Portola Dr.	$351,000		$351,000	
P-22C	Gravity	In Spalding Area (Phase 2)	$1,249,000		$1,249,000	
P-22D	Gravity	In Spalding Area (Phase 3)	$2,211,000			$2,211,000
P-22E	Casing	Railroad crossing	$385,000		$385,000	
Total Project 22 - Spalding Area Development Expansion			**$5,182,000**	**–**	**$2,971,000**	**$2,211,000**
Project 23 - North I-5 Area Development Expansion						
PS-23A	Pump Station	Monument Dr. and I-5	$813,000			$813,000
P-23B	Force Main	From I-5 PS to pipe on Pony Ln and NW Highland Ave	$1,611,000			$1,611,000
P-23C	Gravity	In I-5 North Area	$8,166,000			$8,166,000
P-23D	Casing	I-5 Crossings (3)	$1,445,000			$1,445,000
Total Project 23 - North I-5 Area Development Expansion			**$12,035,000**	**–**	**–**	**$12,035,000**
Project 24 - South Highway Development Expansion						
P-24A	Gravity	In South Highway Area	$2,973,000			$2,973,000
Total Project 24 - South Highway Development Expansion			**$2,973,000**	**–**	**–**	**$2,973,000**
Total Expansion Project Costs			**$20,190,000**	**–**	**$2,971,000**	**$17,219,000**

6.5.4.1.1 *Project 22 - Spalding Area Development Expansion*

A new pump station with 1,227 feet of force main, and approximately 13,240 feet of gravity pipes are proposed to connect the Spalding industrial area located east of the system and north of the Rogue River. Part of the area is planned to develop under Phase 2 and the rest under Phase 3.

Carollo completed a memorandum in 2015 entitled "Spalding Pump Station Analysis" (Appendix G) where costs were presented for this new pump station. These costs were used for the Plan and updated to the latest ENR (10,037 - July 2015). The pump station capital cost only is estimated at $986,000. The single force main capital cost is estimated at $281,000.

It is to be noted that incorporation of this expansion area will need to be properly timed with the incorporation of proposed piping projects 10 on Rogue Drive/SE Blue Bird Drive and 11 on Park Street.

6.5.4.1.2 *Project 23 - North I-5 Area Development Expansion*

A new pump station with 5,622 miles of force main, three I-5 crossings, and 31,251 feet of gravity pipes are proposed to connect the area north of I-5. Expansion of this area is planned to occur in the long-term under Phase 3.

The proposed I-5 North pump station cost was estimated based on the cost curve presented in Figure 6.1 and total capital cost is estimated at $650,000.

6.5.4.1.3 *Project 24 - South Highway Development Expansion*

This project consists of expanding the existing collection system into a new area located south of the highway. This area is planned to develop in the long-term under Phase 3 and consist of approximately 11,377 feet of gravity pipes.

6.5.5 Pipelines and Pump Stations Projects Summary

This section summarizes all projects presented in Sections 6.5.1 through 6.5.3. Table 6.10 summarizes all gravity pipeline projects by total linear feet and by total capital improvement cost. Table 6.11 shows similar statistics, but for pump stations and associated force mains.

Table 6.10 Capital Improvement Plan Summary -- Gravity Pipelines Wastewater Collection System Master Plan City of Grants Pass					
Project Type	**Phase 1**	**Phase 2**	**Phase 3**	**Total Pipelines**	**Percent (%)**
Pipeline Linear Feet (ft)					
Capacity	10,750	2,239	4,423	17,412	5.3%
R&R	59,897	57,766	109,496	227,158	68.7%
Capacity & R&R	13,271	7,101	2,960	23,332	7.1%
Expansion	-	6,106	58,811	62,917	19.0%
Total (ft)	**83,918**	**73,212**	**175,690**	**330,819**	**100%**
Pipeline Capital Improvement Costs ($)					
Capacity	$1,924,000	$914,000	$2,257,000	$5,095,000	5.4%
R&R	$16,521,000	$16,130,000	$32,179,000	$64,830,000	68.1%
Capacity & R&R	$6,211,000	$2,428,000	$1,989,000	$10,628,000	11.2%
Expansion		$1,249,000	$13,350,000	$14,599,000	15.3%
Total (ft)	**$24,656,000**	**$20,721,000**	**$49,775,000**	**$95,152,000**	**100%**

Table 6.11 Capital Improvement Plan Summary -- Pump Stations and Force Mains Wastewater Collection System Master Plan City of Grants Pass					
Project Type	**Phase 1**	**Phase 2**	**Phase 3**	**Total Capital Improvement Cost**	**Percent (%)**
Pump Station Capital Improvement Costs ($)					
Capacity	–	–	–	$0	**–**
R&R	$25,000	–	–	$25,000	**0.3%**
Capacity and R&R	$5,727,000	$998,000	–	$6,725,000	**62.7%**
Expansion	–	$1,337,000	$2,424,000	$3,761,000	**37.0%**
Total (ft)	**$5,752,000**	**$2,335,000**	**$2,424,000**	**$10,511,000**	**100%**

6.5.6 General Projects

Two general projects are included in the Improvement Program: an Asset Management Program, and additional Master Plan Updates. These projects are summarized in Table 6.4 and are described in detail in the following sections.

6.5.6.1 G.1 - Asset Management Program

Chapter 4 includes a recommendation to implement an Asset Management Program (AMP) to further assist the City in prioritizing repair and replacement of its entire aging wastewater infrastructure. Asset management plans help utility providers find the optimal timing for repair or replacement (R&R) of assets by weighing the costs of continued maintenance against the costs of R&R. These plans also prioritize projects to reduce operation and maintenance risks resulting in overall lower costs burdened by ratepayers.

The recommendation for implementing an AMP includes the following initial steps to be taken by the City:

- Continue to update data, such as pipe material, year installed, and invert elevations, in the City's Geographic Information Systems (GIS) and Computerized Maintenance Management Software.
- Standardize condition assessments and closed-circuit television (CCTV) reports using the Pipeline Assessment and Certification Program (PACP). This may entail working with non-City contractors performing CCTV inspections. Possibly obtain training for City staff on PACP scoring.
- Take the Strategic Asset Management Gap (SAM-GAP), a free, online utility self-assessment tool.

These steps will help the City prepare to implement an AMP. Costs for these recommendations were not developed as they are assumed to be performed by current City staff. In addition to the above steps, the following strategy is recommended for the City to develop and implement an AMP:

1. Assess the City's Current Asset Management Practices.
2. Review Appropriate Asset Management Tools.
3. Identify and Prioritize Gaps in Current Asset Management Practices.
4. Prepare an Asset Management Plan.
5. Implement Asset Management Plan.

Costs for steps 1 through 4 assume the City will have assistance from a consultant to develop the plan. Depending on the level of detail requested by the City, costs may range from $75,000 to $150,000. Table 6.4 assumes the higher cost for budgeting purposes. It is anticipated that during development of the AMP, the equivalent of one full time employee (FTE) will be required by the City for program administration. Development of the AMP is estimated to take approximately six months. Following development of the AMP, one FTE is anticipated to be required for another six months to complete inventory and data entry of the system. Thus, one FTE is required for one year to develop the AMP.

Implementing the AMP (Step 5) is anticipated to require 0.25 FTEs to continue to monitor data integration, update prioritization of repair projects, and update the AMP as necessary. Costs for implementing the projects prioritized in the AMP are assumed to come from other annual repair program budgets.

The City may opt to implement asset management for other utilities including water and stormwater, and due to economies of scale, the City would achieve a costs savings by integrating these asset groups into one overall AMP.

6.5.6.2 G.2 - Master Plan Updates

This project assumes that the City will update its Wastewater Collection System Master Plan every ten years, beginning in 2025. These updates are estimated to cost $300,000 each. These updates to the Wastewater Collection Master Plan include several items:

- Policy and Criteria Review;
- Condition of Existing Assets;
- Flow Monitoring and Flow Projections;
- Hydraulic Model Update and Calibration to recent data;
- Collection System Analysis;
- Capital Project Development; and
- Master Plan Preparation.

6.6 CAPITAL IMPROVEMENTS PLAN DETAILS

This section gives more details concerning all recommended projects presented in the above sections. Table 6.12 shows the detailed recommended CIP. This table identifies the projects, provides a brief description of the projects, identifies facility size (e.g. pipe diameter and length), and the total capital improvement cost. Table 6.12 also shows the proposed phase in which the project is recommended to be implemented.

Figures 6.8 through 6.10 illustrate the Phase 1, Phase 2, and Phase 3 improvement projects, respectively, for all repair and replacement, capacity, and expansion projects. The figures are located at the end of this chapter, after Table 6.12.

Detailed sheets for each CIP project presented in this chapter can be found in the following chapter, Chapter 7 - CIP Detailed Sheets.

Table 6.12 Detailed Capital Improvement Plan
Wastewater Collection System Master Plan
City of Grants Pass

Project Description				Project Size and Cost				Total CIP	Total CIP Cost ($) - Project Phasing		
Improv. ID	Improv. Type	Project Purpose	Address Description	Existing Size	Proposed Size	Replace/ New	Length (ft)	Total Capital Improvement Cost($)	Phase 1 (2015-2020)	Phase 2 (2021-2025)	Phase 3 (2026-2035)
Project 1 - SW Western Street / SW Spruce Street											
P-1A	Gravity	Capacity and R&R	Along SW Western Ave between I St and K St	8	12	Upsize	581	$184,000	$184,000		
P-1B	Gravity	Capacity and R&R	Along SW Western Ave between K St and SW Bridge St	10	15	Upsize	546	$195,000	$195,000		
P-1C	Gravity	Capacity and R&R	Along SW Spruce St between SW Bridge St and Webster Rd	8	18	Upsize	1,998	$791,000	$791,000		
P-1D	Gravity	Capacity and R&R	Along SW Bridge St between SW Western Ave and SW Westhom Ave	10	18	Upsize	481	$190,000	$190,000		
P-1E	Diversion	Capacity	Diversion to east Bridge St	10	-	Plug	-	-	-		
Total Project 1 - SW Western / SW Spruce Street								**$1,360,000**	**$1,360,000**	**$0**	**$0**
Project 2-1 - NW Highland Street											
P-2A	Gravity	Capacity	Along NW Highland Ave between 300 ft north of NW Parker Dr and NW Midland Ave	8	12	Upsize	939	$296,000	$296,000		
Total Project 2-1 - NW Highland Street								**$296,000**	**$296,000**	**$0**	**$0**
Project 2-2 - NW Prospect Street											
P-2B	Gravity	Capacity and R&R	Along NW Midland Ave between NW Highland Ave and NW Prospect Ave	8	12	Upsize	623	$196,000		$196,000	
P-2C	Gravity	Capacity and R&R	Along NW Prospect Ave between NW Midland Ave and 150 feet south of NW Sandy Dr	10	15	Upsize	834	$298,000		$298,000	
Total Project 2-2 - NW Prospect Street								**$494,000**	**$0**	**$494,000**	**$0**
Project 3 - NW Midland Avenue											
P-3A	Gravity	Capacity	Along Midland Ave between NW 6th St and NW Washington Blvd	-	12	New	710	$224,000	$224,000		
Total Project 3 - NW Midland Avenue								**$224,000**	**$224,000**	**$0**	**$0**
Project 4 - NE A Street											
P-4A	Gravity	Capacity and R&R	Along NE A St between NE 9th St and NE 7th St	12	18	Upsize	844	$334,000	$334,000		
Total Project 4 - NE A Street								**$334,000**	**$334,000**	**$0**	**$0**
Project 5 - NE Savage Street / NE 9th Street											
P-5A	Gravity	Capacity and R&R	Along NE Savage St between NE 10th St and NE 9th St and along NE 9th St between NE Savage St and NE Josephine St	8	12	Upsize	3,431	$1,084,000	$1,084,000		
Total Project 5 - NE Savage Street / NE 9th Street								**$1,084,000**	**$1,084,000**	**$0**	**$0**
Project 6 - SE Mill Street / SE Rogue View Lane											
P-6A	Gravity	Capacity and R&R	Along SE Mill St between NE D St and SE M St	12	18	Upsize	3,755	$1,486,000	$1,486,000		
P-6B	Gravity	Capacity and R&R	Along SE M St between SE Mill St and SE 12th St	12	21	Upsize	907	$395,000	$395,000		
P-6C	Gravity	Capacity and R&R	Along SE M St between SE 12th St and SE 7th St	-	21	New	2,177	$946,000	$946,000		
Total Project 6 - SE Mill Street / SE Rogue View Lane								**$2,827,000**	**$2,827,000**	**$0**	**$0**
Project 7 -Annabelle Lane											
P-7A	Gravity	Capacity	RSSD Interceptor between Wineteer Ln To Leonard Rd	15	21	Upsize	1,948	$848,000		$848,000	
Total Project 7 - Annabelle Lane								**$848,000**	**$0**	**$848,000**	**$0**
Project 8 -Leonard Road											
P-8A	Gravity	Capacity	Along Leonard Rd between Redwood Ave to south of Mesman Dr	8	12	Upsize	888	$281,000	$281,000		
P-8B	Gravity	Capacity	Along Leonard Rd between south of Mesman Dr and intersection of Leonard Rd with Mesman Dr	8	15	Upsize	384	$138,000	$138,000		
Total Project 8 - Leonard Road								**$419,000**	**$419,000**	**$0**	**$0**
Project 9 - Gilbert Creek Park											
P-9A	Gravity	Capacity	Along Gilbert Creek Park 500 ft north of NW Parker Dr and west of NW Hawthorne Ave	8	12	Upsize	451	$143,000			$143,000
Total Project 9 - Gilbert Creek Park								**$143,000**	**$0**	**$0**	**$143,000**
Project 10-1 - Rogue Drive / SE Blue Bird Drive											
P-10A	Gravity	Capacity and R&R	Along Rogue Dr between SE N St and SE Blue Bird Dr	15	18	Upsize	1,831	$725,000		$725,000	
P-10B	Gravity	Capacity and R&R	Through properties on north bank of river, south of Waterman Ln and Lela Ln to Blue Bird Dr	12	15	Upsize	1,890	$675,000		$675,000	
Total Project 10-1 - Rogue River / SE Blue Bird Drive								**$1,400,000**	**$0**	**$1,400,000**	**$0**
Project 10-2 - West SE Blue Bird Drive											
P-10C	Gravity	Capacity and R&R	Through properties on north bank of river, from Blue Bird Dr to just upstream of pipe split under Rogue River	18	24	Upsize	2,208	$1,051,000			$1,051,000
Total Project 10-2 - Rogue River / SE Blue Bird Drive								**$1,051,000**	**$0**	**$0**	**$1,051,000**
Project 11 - Park Street											
P-11A	Gravity	Capacity and R&R	Through properties on south bank of the river between Mystic Dr and Gold River Ln	18	27	Upsize	20 2	$108,000		$108,000	
P-11B	Gravity	Capacity and R&R	Through properties on south bank of the river between Gold River Dr and SE Acacia Ln	24	27	Upsize	795	$426,000		$426,000	
Total Project 11 - Park Street								**$534,000**	**$0**	**$534,000**	**$0**

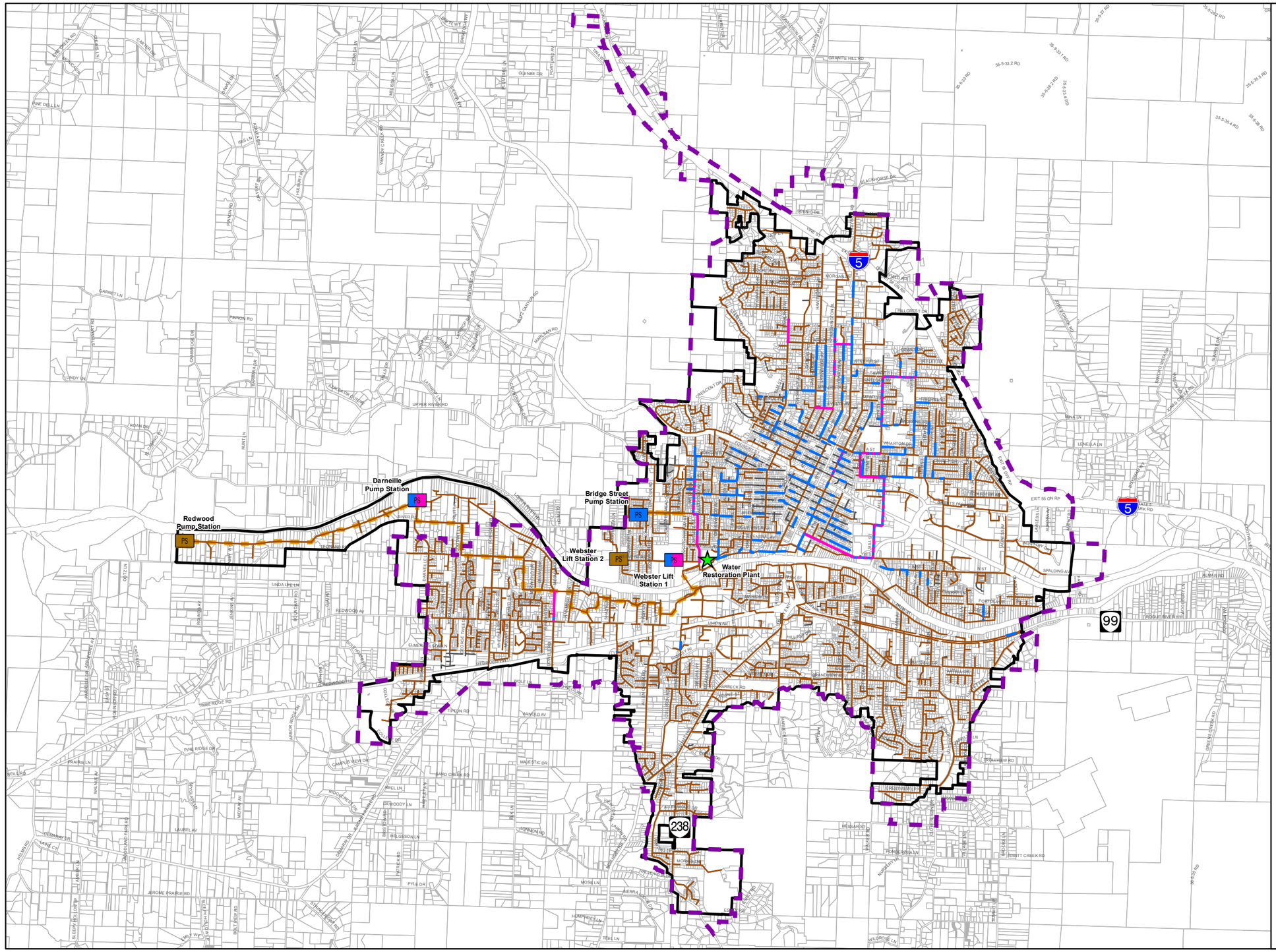
Table 6.12 Detailed Capital Improvement Plan
Wastewater Collection System Master Plan
City of Grants Pass

Project Description				Project Size and Cost				Total CIP	Total CIP Cost ($) - Project Phasing		
Improv. ID	Improv. Type	Project Purpose	Address Description	Existing Size	Proposed Size	Replace/ New	Length (ft)	Total Capital Improvement Cost($)	Phase 1 (2015-2020)	Phase 2 (2021-2025)	Phase 3 (2026-2035)
Project 12 - Darneille Lane											
P-12A	Gravity	Capacity	Along Darneille Ln between the intersection of Darneille Ln with SW Harvest Dr and Darneille PS	12	18	Upsize	1,551	$614,000			$614,000
Total Project 12 - Darneille Lane								**$614,000**	**$0**	**$0**	**$614,000**
Project 13 - Mesman Drive to Coutant Lane											
P-13A	Gravity	Capacity	RSSD Interceptor between Mesman Dr and Schroeder Ln	18	21	Upsize	2,047	$890,000			$890,000
P-13B	Gravity	Capacity	RSSD Interceptor between Schroeder Ln and Coutant Ln	18	24	Upsize	1,282	$610,000			$610,000
Total Project 13 - Mesman Drive to Coutant Lane								**$1,500,000**	**$0**	**$0**	**$1,500,000**
Project 14 - NE 7th Street											
P-14A	Gravity	Capacity and R&R	Along NE 7th Street between NE A St and NW F St	12	18	Upsize	1,531	$606,000	$606,000		
Total Project 14 - NE 7th Street								**$606,000**	**$606,000**	**$0**	**$0**
Project 15 - NE Dean Drive / NE D Street											
P-15A	Gravity	Capacity	Along NE Dean Dr and NE D St from NE A St to SE Mill St	-	18	New	2,009	$795,000	$795,000		
Total Project 15 - NE Dean Drive / NE D Street								**$795,000**	**$795,000**	**$0**	**$0**
Project 16 - NW Evelyn Avenue											
P-16A	Gravity	Capacity	Along Evelyn Ave between Washington Boulevard and NW 2nd St	-	8	New	727	$190,000	$190,000		
Total Project 16 - NE Evelyn Avenue								**$190,000**	**$190,000**	**$0**	**$0**
Project 17 - NW Morgan Lane											
P-17A	Gravity	Capacity	Along Morgan Ln between NW 6th St and NW Washington Blvd	-	12	New	208	$66,000		$66,000	
Total Project 17 - NW Morgan Lane								**$66,000**	**$0**	**$66,000**	**$0**
Project 18 - NW Washington Boulevard											
P-18A	Gravity	Capacity and R&R	Along NW Washington Blvd between NW Midland Ave and NW Manzanita Ave	8	12	Upsize	2,239	$708,000			$708,000
P-18B	Gravity	Capacity and R&R	Along NW Washington Blvd between NW Manzanita Ave and NW Evelyn Ave	10	12	Upsize	727	$230,000			$230,000
Total Project 18 - NW Washington Boulevard								**$938,000**	**$0**	**$0**	**$938,000**
Project 19 - Darneille Pump Station											
PS-19A	Pump Station	Capacity and R&R	Alternatives Analysis Study	-	-	Study	1	$75,000	$75,000		
PS-19B	Pump Station	Capacity and R&R	Darneille PS	4.2	7.8	Upsize	1	$5,038,000	$5,038,000		
Total Project 19 - Darneille Pump Station								**$5,113,000**	**$5,113,000**	**$0**	**$0**
Project 20 - Webster No.1 Lift Station											
PS-20A	Pump Station	Capacity and R&R	Webster No. 1 PS	0	0.66	Upsize	1	$614,000	$614,000		
Total Project 20 - Webster No. 1 Pump Station								**$614,000**	**$614,000**	**$0**	**$0**
Project 21 - Webster No.2 Lift Station											
PS-21A	Pump Station	Capacity and R&R	Webster No. 2 PS	0	0.23	Upsize	1	$998,000		$998,000	
Total Project 21 - Webster No. 2 Pump Station								**$998,000**	**$0**	**$998,000**	**$0**
Project 22 - Spalding Area Development Expansion											
PS-22A	Pump Station	Expansion	SE Portola Dr	-	0.16	New	1	$986,000		$986,000	
P-22B	Force Main	Expansion	From Spalding PS to NE Portola Dr	-	6	New	1,227	$351,000		$351,000	
P-22C	Gravity	Expansion	In Spalding Area	-	8	New	4,779	$1,249,000		$1,249,000	
P-22D	Gravity	Expansion	In Splading Area	-	8	New	8,461	$2,211,000			$2,211,000
P-22E	Casing	Expansion	Railroad crossing	-	12/24	New	200	$385,000		$385,000	
Total Project 22 - Spalding Area Development Expansion								**$5,182,000**	**$0**	**$2,971,000**	**$2,211,000**
Project 23 - North I-5 Area Development Expansion											
PS-23A	Pump Station	Expansion	Monument Dr and I-5	-	0.14	Upsize	1	$813,000			$813,000
P-23B	Force Main	Expansion	From I-5 PS to pipe on Pony Ln and NW Highland Ave	-	6	New	5,622	$1,611,000			$1,611,000
P-23C	Gravity	Expansion	In I-5 North Area	-	8	New	31,251	$8,166,000			$8,166,000
P-23D	Casing	Expansion	I-5 Crossings (3)	-	12/24	New	750	$1,445,000			$1,445,000
Total Project 23 - North I-5 Area Development Expansion								**$12,035,000**	**$0**	**$0**	**$12,035,000**
Project 24 - South Highway Development Expansion											
P-24A	Gravity	Expansion	In South Highway Area	-	8	New	11,377	$2,973,000			$2,973,000
Total Project 24 - South Highway Development Expansion								**$2,973,000**	**$0**	**$0**	**$2,973,000**
Project 25 - Bridge Street Pump Station											
PS-25A	Pump Station	R&R	Bridge Street	0.94	0.94	Upgrade	1	$25,000	$25,000		
Total Project 25 - Bridge Street Pump Station								**$25,000**	**$25,000**	**$0**	**$0**

Table 6.12 Detailed Capital Improvement Plan
Wastewater Collection System Master Plan
City of Grants Pass

Project Description				Project Size and Cost				Total CIP	Total CIP Cost ($) - Project Phasing		
Improv. ID	Improv. Type	Project Purpose	Address Description	Existing Size	Proposed Size	Replace/ New	Length (ft)	Total Capital Improvement Cost($)	Phase 1 (2015-2020)	Phase 2 (2021-2025)	Phase 3 (2026-2035)
Project 26 - Condition Only Projects - Phase 1 North of Rogue River											
P-26A	Gravity	R&R	North of Rogue River	8 and less	8	Replace	48,231	$12,603,000	$12,603,000		
P-26B	Gravity	R&R	North of Rogue River	10	10	Replace	5,262	$1,509,000	$1,509,000		
P-26C	Gravity	R&R	North of Rogue River	12	12	Replace	2,060	$651,000	$651,000		
P-26D	Gravity	R&R	North of Rogue River	15	15	Replace	104	$38,000	$38,000		
P-26E	Gravity	R&R	North of Rogue River	18	18	Replace	923	$365,000	$365,000		
P-26F	Gravity	R&R	North of Rogue River	21	21	Replace	1,926	$838,000	$838,000		
P-26G	Gravity	R&R	North of Rogue River	24	24	Replace	492	$234,000	$234,000		
Total Project 26 - Condition Only Projects - Phase 1 North of Rogue River								**$16,238,000**	**$16,238,000**	**$0**	**$0**
Project 27 - Condition Only Projects - Phase 1 South of Rogue River											
P-27A	Gravity	R&R	South of Rogue River	8 and less	8	Replace	60	$15,000	$15,000		
P-27B	Gravity	R&R	South of Rogue River	10	10	Replace	462	$133,000	$133,000		
P-27C	Gravity	R&R	South of Rogue River	15	15	Replace	378	$135,000	$135,000		
Total Project 27 - Condition Only Projects - Phase 1 South of Rogue River								**$283,000**	**$283,000**	**$0**	**$0**
Project 28 - Condition Only Projects - Phase 2 North of Rogue River											
P-28A	Gravity	R&R	North of Rogue River	8 and less	8	Replace	38,468	$10,051,000		$10,051,000	
P-28B	Gravity	R&R	North of Rogue River	10	10	Replace	8,581	$2,460,000		$2,460,000	
P-28C	Gravity	R&R	North of Rogue River	12	12	Replace	6,618	$2,090,000		$2,090,000	
P-28D	Gravity	R&R	North of Rogue River	18	18	Replace	1,278	$506,000		$506,000	
P-28E	Gravity	R&R	North of Rogue River	21	21	Replace	385	$168,000		$168,000	
Total Project 28 - Condition Only Projects - Phase 2 North of Rogue River								**$15,275,000**	**$0**	**$15,275,000**	**$0**
Project 29 - Condition Only Projects - Phase 2 South of Rogue River											
P-29A	Gravity	R&R	South of Rogue River	8 and less	8	Replace	1,402	$366,000		$366,000	
P-29B	Gravity	R&R	South of Rogue River	10	10	Replace	76	$21,000		$21,000	
P-29C	Gravity	R&R	South of Rogue River	15	15	Replace	417	$149,000		$149,000	
P-29D	Gravity	R&R	South of Rogue River	30	30	Replace	542	$319,000		$319,000	
Total Project 29 - Condition Only Projects - Phase 2 South of Rogue River								**$855,000**	**$0**	**$855,000**	**$0**
Project 30 - Condition Only Projects - Phase 3 North of Rogue River											
P-30A	Gravity	R&R	North of Rogue River	8 and less	8	Replace	59,905	$15,653,000			$15,653,000
P-30B	Gravity	R&R	North of Rogue River	10	10	Replace	6,181	$1,773,000			$1,773,000
P-30C	Gravity	R&R	North of Rogue River	12	12	Replace	2,760	$871,000			$871,000
P-30D	Gravity	R&R	North of Rogue River	15	15	Replace	433	$155,000			$155,000
P-30E	Gravity	R&R	North of Rogue River	18	18	Replace	217	$86,000			$86,000
P-30F	Gravity	R&R	North of Rogue River	21	21	Replace	243	$106,000			$106,000
P-30G	Gravity	R&R	North of Rogue River	24	24	Replace	914	$435,000			$435,000
P-30H	Gravity	R&R	North of Rogue River	48	48	Replace	22	$16,000			$16,000
Total Project 30 - Condition Only Projects - Phase 3 North of Rogue River								**$19,095,000**	**$0**	**$0**	**$19,095,000**
Project 31 - Condition Only Projects - Phase 3 South of Rogue River											
P-31A	Gravity	R&R	South of Rogue River	8 and less	8	Replace	19,049	$4,978,000			$4,978,000
P-31B	Gravity	R&R	South of Rogue River	10	10	Replace	3,525	$1,010,000			$1,010,000
P-31C	Gravity	R&R	South of Rogue River	12	12	Replace	4,499	$1,421,000			$1,421,000
P-31D	Gravity	R&R	South of Rogue River	15	15	Replace	2,556	$913,000			$913,000
P-31E	Gravity	R&R	South of Rogue River	18	18	Replace	1,228	$486,000			$486,000
P-31F	Gravity	R&R	South of Rogue River	24	24	Replace	1,164	$554,000			$554,000
P-31G	Gravity	R&R	South of Rogue River	27	27	Replace	5,276	$2,824,000			$2,824,000
P-31H	Gravity	R&R	South of Rogue River	30	30	Replace	1,524	$898,000			$898,000
Total Project 31 - Condition Only Projects - Phase 3 South of Rogue River								**$13,084,000**	**$0**	**$0**	**$13,084,000**
Project 32 - General Projects											
G-1	General	General	Asset Management Program	-	-	-	1	$150,000	$150,000		
G-2A	General	General	Master Plan Updates (2021)	-	-	-	1	$300,000		$300,000	
G-2B	General	General	Master Plan Updates (2031)	-	-	-	1	$300,000			$300,000
Total Project 32 - General Projects								**$750,000**	**$150,000**	**$300,000**	**$300,000**
Total CIP ($)								**$108,243,000**	**$30,558,000**	**$23,741,000**	**$53,944,000**
Total CIP (%)									**28.2%**	**21.9%**	**49.8%**

Notes:
(1) ENR CCI = 10,037 (20-City Average, July 2015).
(2) Capital Improvement Cost includes a 20% construction contingency applied to the Baseline Construction Cost to account for unforeseen events and unknown conditions, a 30% allied cost applied to the Estimated Construction Cost to account for engineering services, construction management, and project administration, and a 25% planning contingency applied to the Total Allied Project Costs.



Legend

Proposed Improvements - Phase 1 (2015-2020)

Lift/Pump Station

- Repair and Replacement
- R&R and Capacity
- Other Pump Stations

Pipelines

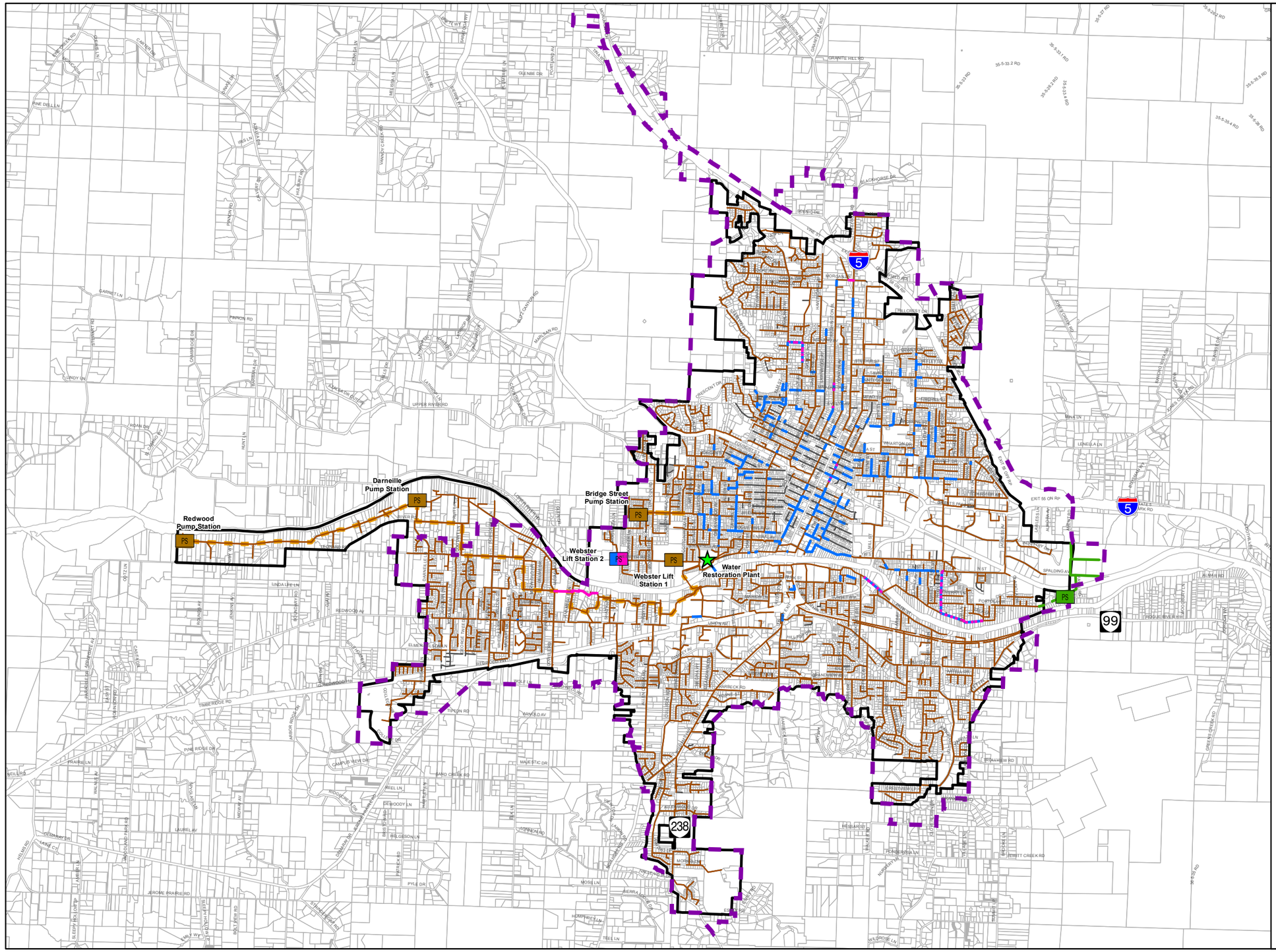
- Capacity
- Repair and Replacement
- R&R and Capacity
- Modeled Pipes
- Modeled Force Mains
- All Other Pipelines
- WRP
- Existing Sewer Service Area
- UGB
- Tax Lots

N

0 4,000 8,000 Feet

Figure 6.8
Phase 1 (2015-2020)
Improvement Projects
Wastewater System Master Plan Update
City of Grants Pass

carollo
Engineers...Working Wonders With Water



Legend

Proposed Improvements - Phase 2 (2016-2020)

Lift/Pump Station

- RR and Capacity
- Expansion Pump Station
- Other Lift/Pump Stations

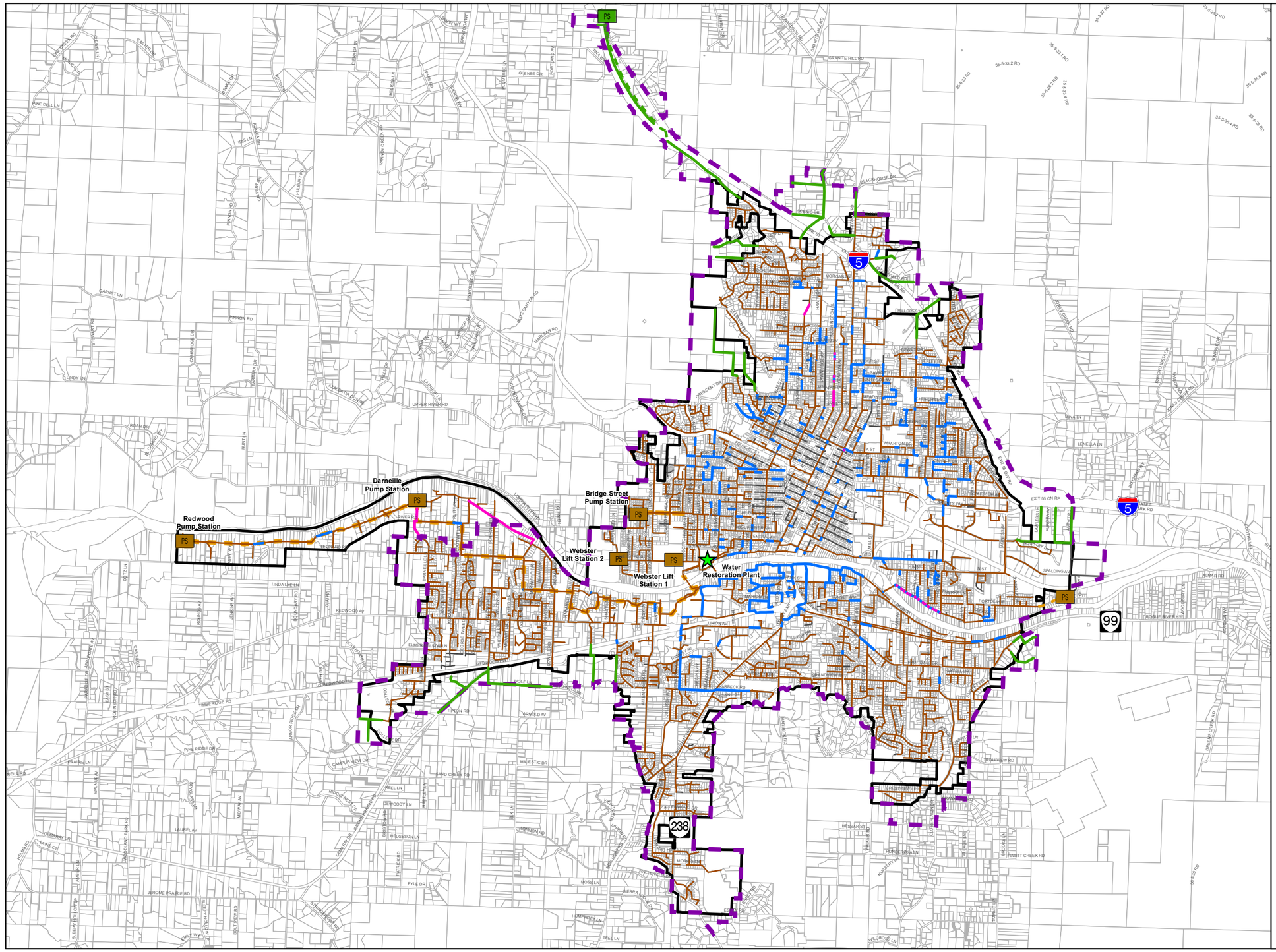
Pipelines

- Capacity
- Repair and Replacement
- R&R and Capacity
- Expansion (Gravity)
- Expansion (Force Main)
- Modeled Pipes
- Modeled Force Mains
- All Other Pipelines
- WRP
- Existing Sewer Service Area
- UGB
- Tax Lots

N

0 4,000 8,000 Feet

Figure 6.9
Phase 2 (2021-2025)
Improvement Projects
Wastewater System Master Plan Update
City of Grants Pass



Legend

Proposed Improvements - Phase 3 (2026-2035)

Lift/Pump Station

- Expansion
- Other Lift/Pump Stations

Pipelines

- Capacity
- Repair and Replacement
- R&R and Capacity
- Expansion (Gravity)
- Expansion (Force Main)
- Modeled Pipes
- Modeled Force Mains
- All Other Pipelines
- WRP
- Existing Sewer Service Area
- UGB
- Tax Lots

Feet
0 4,000 8,000

Figure 6.10
Phase 3 (2026-2035)
Improvement Projects
Wastewater System Master Plan Update
City of Grants Pass

Chapter 7

CAPITAL IMPROVEMENT PROJECT DETAIL SUMMARY SHEETS

This chapter presents the detail summary sheets for the 32 projects developed in Chapter 4 - Existing System and Condition Assessment and Chapter 5 - System Analysis and summarized in Chapter 6 - CIP. The project summary sheet includes capital improvement costs, project location and details, and a project detail map.

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 1

Project ID: **Project 1**

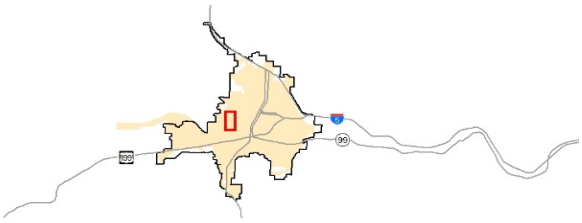
Description: **SW Western Street/SW Spruce Street**

Improvements: **P-1A through P-1E**

Project Type: Capacity and R&R

Funding Type:

Project Vicinity Map



Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	697,000
Construction Contingency	$	139,400
Estimated Construction Cost	$	836,400
Engineering Services, Construction Management and Project Administration	$	523,600
Total Capital Improvement Cost	**$**	**1,360,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location

Along SW Western Ave Between I St and SW Bridge St and along SW Spruce St

Project Details

Replace the existing 8-inch, and 10-inch diameter sewers on SW Western Street and SW Spruce Street between I Street and SW Westhom Ave with a new 3,605 foot long reach of 12-inch, 15-inch, and 18-inch diameter sewers.

Project Justification

This project is required to mitigate surcharged conditions on SW Western Street and SW Spruce Street for existing PWWFs.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

- Manholes
- Modeled Pipelines
- Modeled Pump Station

0 150 300 600 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 2-1

Project ID: **Project 2-1**

Description: **NW Highland Street**
Improvements: **P-2A**

Project Type: Capacity and R&R

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	152,100
Construction Contingency	$	30,400
Estimated Construction Cost	$	182,500
Engineering Services, Construction Management and Project Administration	$	113,500
Total Capital Improvement Cost	**$**	**296,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location
Along NW Highland Ave between 300 ft north of NW Parker Dr and NW Midland Ave

Project Details
Upsize about 939 feet of existing 8-inch diameter sewers with new 12-inch diameter pipes along NW Highland Ave between 300 feet north of NW Parker Dr and NW Midland Ave.

Project Justification
The existing trunk traveling south on NW Highland Ave lacks the hydraulic capacity to convey modeled peak flows started under existing conditions.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

- Manholes
- Modeled Pipelines
- Modeled Pump Station

0 100 200 400 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 2-2

Project ID: **Project 2-2**

Description: **NW Prospect Street**
Improvements: **P-2B through P-2C**

Project Type: Capacity and R&R

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	x
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	253,500
Construction Contingency	$	50,700
Estimated Construction Cost	$	304,200
Engineering Services, Construction Management and Project Administration	$	189,800
Total Capital Improvement Cost	**$**	**494,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location
Along NW Midland Ave, and south along NW Prospect Ave

Project Details
Upsize about 1,457 feet of existing 8-, and 10-inch diameter sewers with new 12- and 15-inch diameter pipes along NW Midland Ave between NW Highland Ave and NW Prospect Ave and along NW Prospect Ave between NW Midland Ave and 150 feet south of NW Sandy Dr.

Project Justification
The existing trunk traveling east on NW Midland Ave, and south on NW Prospect Ave lacks the hydraulic capacity to convey modeled peak flows started under existing conditions.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

- Manholes
- Modeled Pipelines
- Modeled Pump Station

0 100 200 400 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 3

Project ID: **Project 3**
Description: **NW Midland Avenue**
Improvements: **P-3A through P-3A**

Project Type: Capacity Only

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	115,000
Construction Contingency	$	23,000
Estimated Construction Cost	$	138,000
Engineering Services, Construction Management and Project Administration	$	86,000
Total Capital Improvement Cost	**$**	**224,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location
Along Midland Ave between NW 6th St and NW Washington Blvd

Project Details
Construct 710 feet of new 12- inch sewers along NW Midland Ave between NE 6th St and NW Washington Blvd.

Project Justification
This project consists of diverting flows from NE 6th St to NW Washington Boulevard. Additional diversion pipes are implemented (Projects 15, 16, and 17) to free some capacity in the NE 6th Street and NE 7th Street sewers.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

- Manholes
- Proposed Manholes
- Modeled Pipelines
- Modeled Pump Station

Feet 0 65 130 260

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 4

Project ID: **Project 4**
Description: **NE A Street**
Improvements: **P-4A**

Project Type: Capacity and R&R

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	171,300
Construction Contingency	$	34,300
Estimated Construction Cost	$	205,600
Engineering Services, Construction Management and Project Administration	$	128,400
Total Capital Improvement Cost	**$**	**334,000**

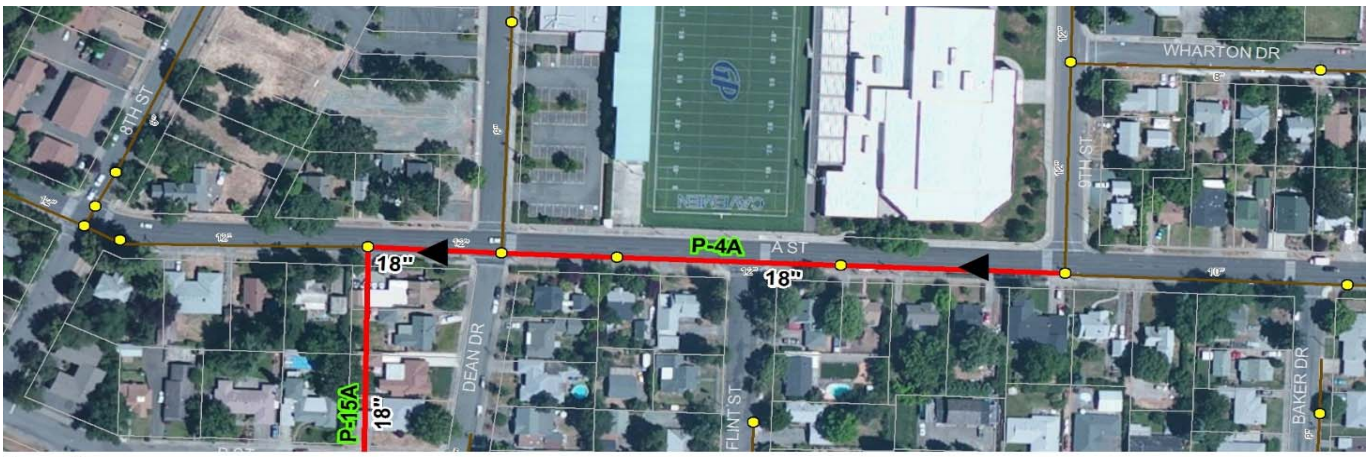
ENR CCI = 10,037 20-City Average, July 2015

Project Location
NE A Street from NE 7th Street to NE 9th Street.

Project Details
Replace approximately 844 feet of 12-inch diameter pipeline with a new 18-inch diameter sewer on NE A Street between NE 7th Street and NE 9th Street.

Project Justification
This project is required to mitigate existing capacity deficiencies in the existing 12-inch diameter gravity sewer on NE A Street.

Project Detail Map



Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

- Manholes
- Modeled Pipelines
- Modeled Pump Station
- WRP

0 62.5 125 250 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 5

Project ID: **Project 5**
Description: **NE Savage Street / NE 9th Street**
Improvements: **P-5A**

Project Type: Capacity and R&R

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	555,700
Construction Contingency	$	111,100
Estimated Construction Cost	$	666,800
Engineering Services, Construction Management and Project Administration	$	417,200
Total Capital Improvement Cost	**$**	**1,084,000**

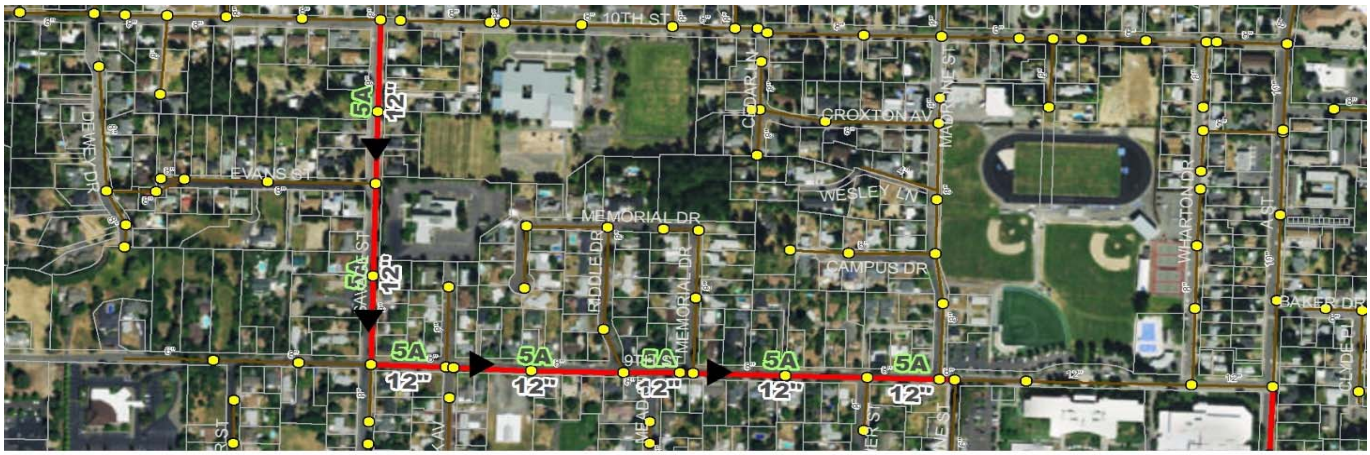
ENR CCI = 10,037 20-City Average, July 2015

Project Location
Along NE Savage St and along NE 9th St

Project Details
Replace approximately 3,431 feet of existing 8-inch diameter pipeline with a new 12-inch diameter sewer along NE Savage St between NE 10th St and NE 9th St and along NE 9th St between NE Savage St and NE Josephine St.

Project Justification
The existing 8-inch trunk along NW Savage Street and NE 9th Street has insufficient capacity to convey design flows and creates bottlenecks.

Project Detail Map



Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

- Manholes
- Modeled Pipelines
- Modeled Pump Station
- WRP

0 187.5 375 750 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 6

Project ID: **Project 6**

Description: **SE Mill Street / SE Rogue View Lane**

Improvements: **P-6A through P-6C**

Project Type: Capacity and R&R

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	1,450,100
Construction Contingency	$	290,100
Estimated Construction Cost	$	1,740,200
Engineering Services, Construction Management and Project Administration	$	1,086,800
Total Capital Improvement Cost	**$**	**2,827,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location

SE Mill Street, SE Rogue View Lane and SE 8th Street

Project Details

Install a new pipeline along M Street west from the intersection of Mill Street to the SE 8th Street and then south on SE 8th Street to a new crossing west of NE 7th Street to connect to the 21-inch along SE 7th St. Replace 907 feet of existing 12-inch pipes located just south of the train tracks to SE 8th Street with 21-inch diameter pipes and 3,755 feet of existing 12-inch pipes with a new 18-inch sewer along SE Mill Street from NE D Street to SE M Street.

Project Justification

The existing 12-inch trunk travelling along SE Mill Street (beginning south of the train tracks), SE M Street, and along the river easement to SE 8th Street lacks capacity to convey the modeled design flow. Surcharging above the performance criteria in the manholes along this section is observed starting under existing conditions.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

- Manholes
- Modeled Pipelines
- Modeled Pump Station
- WRP

0 450 900 1,800 Feet

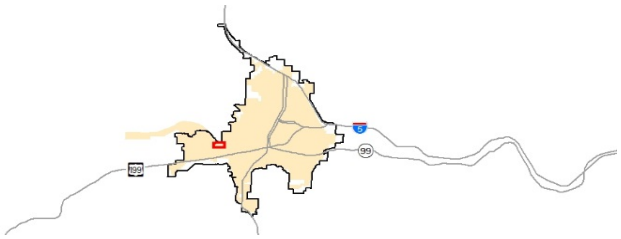
City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 7

Project ID: **Project 7**
Description: **Anabelle Road**
Improvements: **P-7A**

Project Type: Capacity Only

Funding Type:

Project Vicinity Map



Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	x
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	434,400
Construction Contingency	$	86,900
Estimated Construction Cost	$	521,300
Engineering Services, Construction Management and Project Administration	$	326,700
Total Capital Improvement Cost	**$**	**848,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location
W. 11th Street/Oakdale Street/E. 12th Street from Park Avenue to Chestnut Street Alley

Project Details
Replace the existing 1,948 feet of 15-inch pipe with a 21-inch pipe, which is greater than the upstream (15-inch) and downstream (18-inch) pipe diameters. The recommendation for the larger 21-inch pipe diameter is necessary based on existing pipe slopes of this segment and a design d/D value of 0.75.

Project Justification
The primary interceptor in the Redwood area runs westerly along the Rogue River. While portions of this pipeline surcharge during the PWWF due to low pipe slopes, only one section of the pipeline, between Wineteer Lane and Dowell Road, experiences surcharging above the performance criteria.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

Manholes
Modeled Pipelines
Modeled Pump Station
WRP

0 75 150 300 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 8

Project ID: **Project 8**
Description: **Leonard Road**
Improvements: **P-8A through P-8B**

Project Type: Capacity Only

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	214,200
Construction Contingency	$	42,900
Estimated Construction Cost	$	257,100
Engineering Services, Construction Management and Project Administration	$	161,900
Total Capital Improvement Cost	**$**	**419,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location

Along Leonard Road between Redwood Avenue and Mesman Road

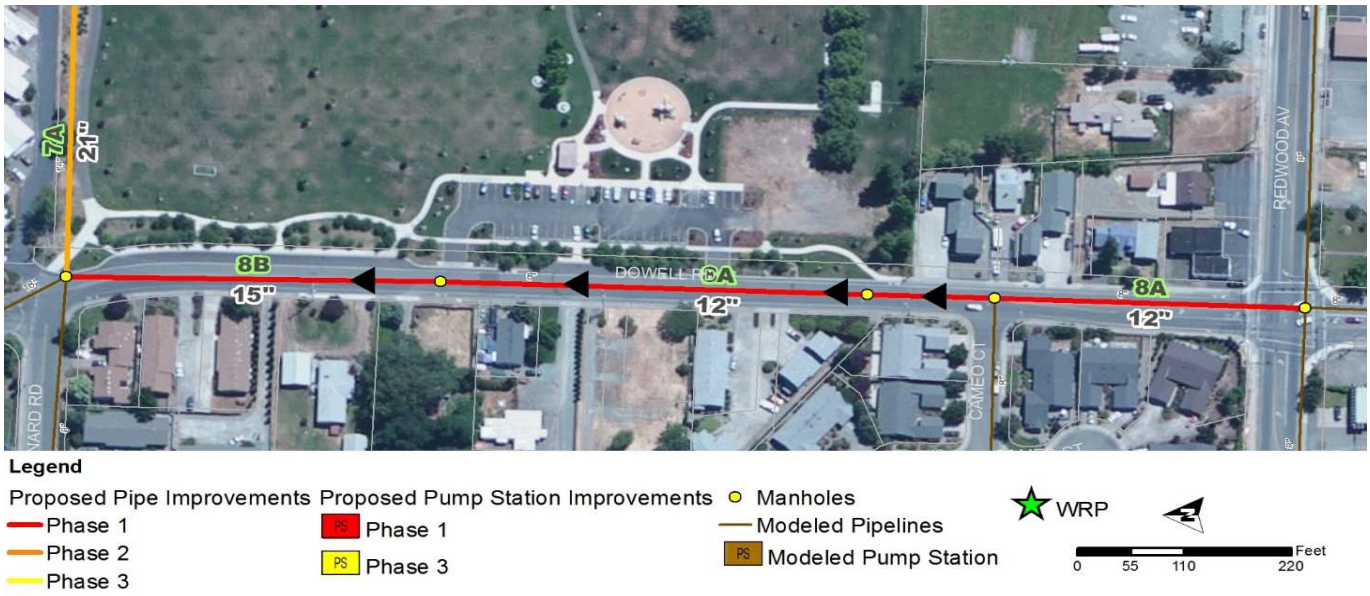
Project Details

Replace the existing 8-inch main with 888 feet of 12-inch and 384 feet of 15-inch pipes. While there are similar flow rates through the entire improvement segment, the upgrade to the 15-inch for a portion of the improvement is necessary to maintain the design d/D value of 0.5 based on existing pipe slopes.

Project Justification

The existing 8-inch sewer along Dowell Road, located between Redwood Avenue and Leonard Road, lack sufficient capacity to convey the model design flow. Surcharging above the performance criteria is observed starting under existing conditions.

Project Detail Map



City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 9

Project ID: **Project 9**
Description: **Gilbert Creek Park**
Improvements: **P-9A**

Project Type: Capacity Only

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	x

Capital Improvement Costs

Baseline Construction Cost	$	73,100
Construction Contingency	$	14,600
Estimated Construction Cost	$	87,700
Engineering Services, Construction Management and Project Administration	$	55,300
Total Capital Improvement Cost	**$**	**143,000**

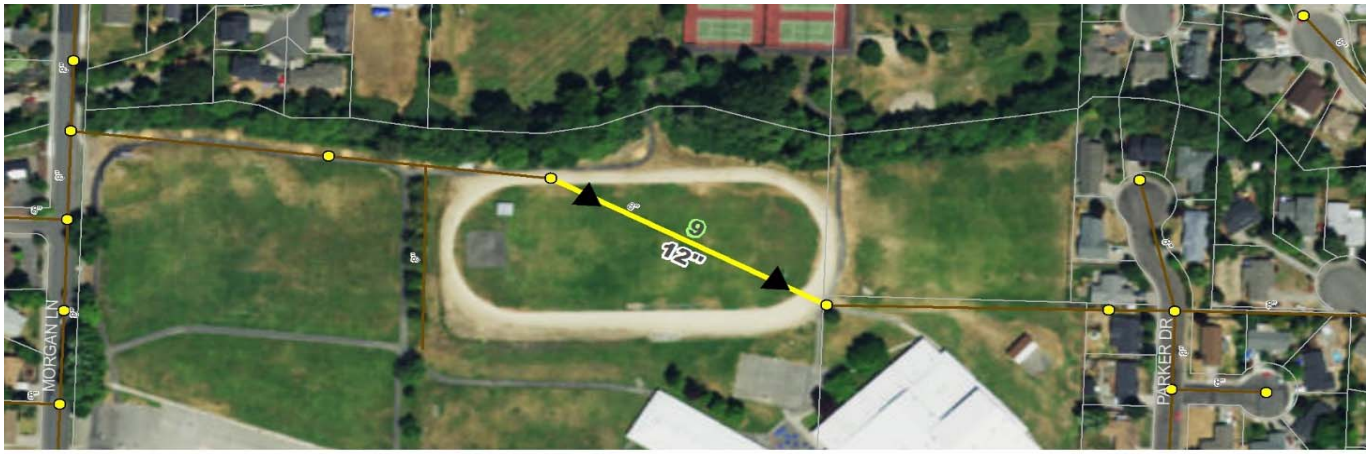
ENR CCI = 10,037 20-City Average, July 2015

Project Location
Along Gilbert Creek Park 500 ft north of NW Parker Dr and west of NW Hawthorne Ave

Project Details
Replace 451 feet of existing 8-inch diameter pipe with a new 12-inch diameter trunk sewer located through the football field and track of the North Middle School. The pipe to replace is flat relatively to the surrounding pipe, which creates a bottleneck along this line.

Project Justification
The existing trunk traveling south through the football field and track of the North Middle School lacks the hydraulic capacity to convey build-out design flows.

Project Detail Map



Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

- Manholes
- Modeled Pipelines
- Modeled Pump Station
- WRP

0 75 150 300 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 10-1

Project ID: **Project 10-1**
Description: **Rogue Dr / SE Blue Bird Dr**
Improvements: **P-10A through P-10B**

Project Type: Capacity and R&R

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	x
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	717,400
Construction Contingency	$	143,500
Estimated Construction Cost	$	860,900
Engineering Services, Construction Management and Project Administration	$	539,100
Total Capital Improvement Cost	**$**	**1,400,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location

Along Rogue Dr and through properties on north bank of the river

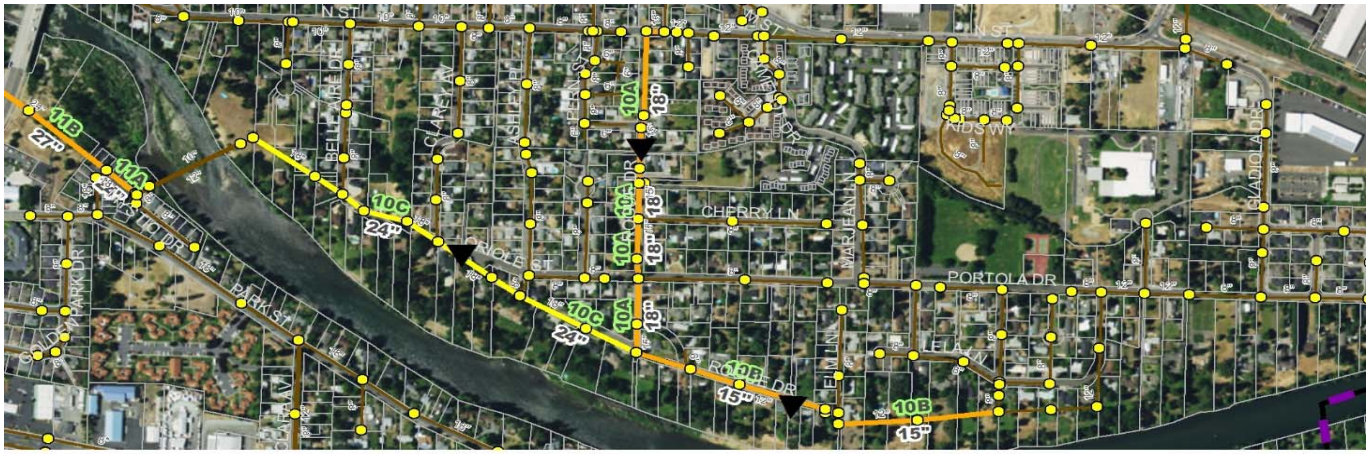
Project Details

Project 10-1 runs from south of Waterman Lane and Lela Lane to just upstream of the split pipeline flowing under the Rogue River, and along Rogue Drive. To alleviate the identified deficiencies, approximately 3,720 feet of 15-, and 18-inch pipelines are recommended to replace the existing 12- and 15- inch sewers.

Project Justification

The existing interceptor that runs along the north bank of the Rogue River, just south of SE Rogue Drive, SE Blue Bird Drive, and SE Oriole Street, experiences surcharging above the stated surcharging criteria and lacks the hydraulic capacity to convey the design flows starting in the short-term planning period. This deficiency is mainly due to the connection of the Spalding industrial area to the existing collection system. Project 10-1 will need to be implemented concurrently with the construction of the Spalding pump station.

Project Detail Map



Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

- Manholes
- Modeled Pipelines
- Modeled Pump Station
- WRP

0 250 500 1,000 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 10-2

Project ID: **Project 10-2**
Description: **West SE Blue Bird Dr**
Improvements: **P-10C**

Project Type: Capacity and R&R

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	x

Capital Improvement Costs

Baseline Construction Cost	$	538,800
Construction Contingency	$	107,800
Estimated Construction Cost	$	646,600
Engineering Services, Construction Management and Project Administration	$	404,400
Total Capital Improvement Cost	**$**	**1,051,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location

Along Rogue Dr and through properties on north bank of the river

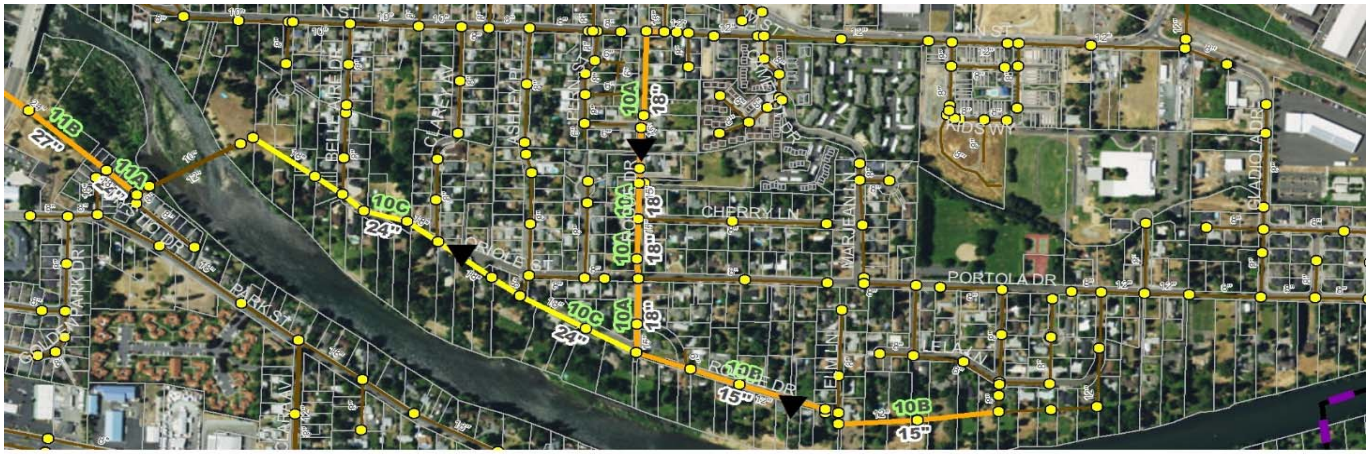
Project Details

Project 10-2 runs through the properties on the north bank of the river, west of Rogue Dr. Project 10-2 consists of upsizing 2,208 feet of 18-inch with 24-inch. Project 10-2 will need to be implemented concurrently with the development of the east and north part of the Spalding industrial area in the long-term.

Project Justification

The existing interceptor that runs along the north bank of the Rogue River, just south of SE Rogue Drive, SE Blue Bird Drive, and SE Oriole Street, experiences surcharging above the stated surcharging criteria and lacks the hydraulic capacity to convey the design flows starting in the short-term planning period. This deficiency is mainly due to the connection of the Spalding industrial area to the existing collection system.

Project Detail Map



Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

- Manholes
- Modeled Pipelines
- Modeled Pump Station
- WRP

Feet 0 250 500 1,000

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 11

Project ID: **Project 11**
Description: **Park Street**
Improvements: **P-11A through P-11B**

Project Type: Capacity and R&R

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	x
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	273,700
Construction Contingency	$	54,800
Estimated Construction Cost	$	328,500
Engineering Services, Construction Management and Project Administration	$	205,500
Total Capital Improvement Cost	**$**	**534,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location
Along Park Street downstream of the siphon crossing the Rogue River

Project Details
Upsize 202 feet of 18 inch and 795 feet of existing 24-inch with 24-inch and 27-inch diameter sewers, respectively along Park Street on the south side of the Rogue River.

Project Justification
The existing interceptor located downstream of the siphon south of the Rogue River along Park Street experiences surcharging above the stated surcharging criteria and lacks capacity immediately downstream the siphon causing backwater and high HGL in the siphon.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

- Manholes
- Modeled Pipelines
- Modeled Pump Station
- WRP

0 90 180 360 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 12

Project ID: **Project 12**
Description: **Darneille Lane**
Improvements: **P-12A**

Project Type: Capacity Only

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	x

Capital Improvement Costs

Baseline Construction Cost	$	314,800
Construction Contingency	$	63,000
Estimated Construction Cost	$	377,800
Engineering Services, Construction Management and Project Administration	$	236,200
Total Capital Improvement Cost	**$**	**614,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location
Along Darneille Lane, between SW Harvest Dr and the Darneille Pump Station

Project Details
Replace a total of 1,551 feet of existing 12-inch sewers with 18-inch sewer pipelines upstream of the Darneille Pump Station.

Project Justification
Portions of the existing trunk sewer that runs along Darneille Lane, between SW Harvest Drive and the Darneille Pump Station are capacity deficient and result in surcharging above the planning criteria during build-out PWWF.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

- Manholes
- Modeled Pipelines
- Modeled Pump Station
- WRP

0 100 200 400 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 13

Project ID: **Project 13**
Description: **Mesman Drive to Coutant Lane**
Improvements: **P-13A through P-13B**

Project Type: Capacity Only

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	x

Capital Improvement Costs

Baseline Construction Cost	$	769,200
Construction Contingency	$	153,900
Estimated Construction Cost	$	923,100
Engineering Services, Construction Management and Project Administration	$	576,900
Total Capital Improvement Cost	**$**	**1,500,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location
RSSD Interceptor between Mesman Dr and Coutant Ln

Project Details
Upsize the existing 18-inch main with 2,047 feet of 21-inch pipeline and 1,282 feet of 24-inch.

Project Justification
This improvement is located along the primary interceptor in the Redwood area that runs westerly along the Rogue River. The additional flow from build-out conditions causes surcharging above the planning criteria for the portion of the interceptor between Mesman Drive and Coutant Lane.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

- Manholes
- Modeled Pipelines
- Modeled Pump Station
- WRP

0 250 500 1,000 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 14

Project ID: **Project 14**
Description: **NE 7th Street**
Improvements: **P-14A**

Project Type: Capacity and R&R

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	310,800
Construction Contingency	$	62,200
Estimated Construction Cost	$	373,000
Engineering Services, Construction Management and Project Administration	$	233,000
Total Capital Improvement Cost	**$**	**606,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location
Along NE 7th St between NE A St and NE F St

Project Details
Upsize the existing 1,531 feet of 12-inch with an 18-inch pipeline along NE 7th Street between NE F Street and NE A Street.

Project Justification
Portions of the existing trunk sewer that runs along NE 7th Street, south of A Street, are capacity deficient which results in surcharging above the planning criteria during build-out PWWF. This deficiency is a Long-Term period issue that should be address when development occurs upstream and the flows are augmenting.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

Manholes
Modeled Pipelines
Modeled Pump Station
WRP

0 120 240 480 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 15

Project ID: **Project 15**
Description: **NE Dean Drive / NE D Street**
Improvements: **P-15A**

Project Type: Capacity Only

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	407,800
Construction Contingency	$	81,600
Estimated Construction Cost	$	489,400
Engineering Services, Construction Management and Project Administration	$	305,600
Total Capital Improvement Cost	**$**	**795,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location

Along NE Dean Dr and NE D St from NE A St to SE Mill St

Project Details

A new pipeline along NE Dean Drive and NE D Street from NE A Street to SE Mill Street is proposed. Construct 2,009 feet of new 18-inch diversion pipeline. Project 6 will need to be implemented as soon as this diversion becomes on-line.

Project Justification

Flows from wastewater basin H currently flows west on NE A Street towards NE 7th Street, overloading the NE 7th Street trunk.

A new pipeline along NE Dean Drive and NE D Street from NE A Street to SE Mill Street is proposed. The purpose of this new collector is to redirect flows away from NE 7th Street towards wastewater basin I.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

- Manholes
- Modeled Pipelines
- Modeled Pump Station
- WRP

0 125 250 500 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 16

Project ID: **Project 16**
Description: **NW Evelyn Street**
Improvements: **P-16A**

Project Type: Capacity Only

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	97,400
Construction Contingency	$	19,500
Estimated Construction Cost	$	116,900
Engineering Services, Construction Management and Project Administration	$	73,100
Total Capital Improvement Cost	**$**	**190,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location
Along Evelyn Ave between Washington Boulevard and NW 2nd St

Project Details
Construct a new 12-inch diameter trunk sewer along Evelyn Avenue that would connect Washington Boulevard with NW 2nd Street.

Project Justification
This improvement consists of redirecting flows from NE 6th Street towards wastewater basin C and NW 2nd Street. Projects 17 and 18 divert flows from NE 6th Street to Washington Boulevard and this project reroutes these flows to NW 2nd Street. The existing sewer on NW 2nd Street has capacity availability and is able to receive diverted flows from NE 6th Street with no additional improvements.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- PS Phase 1
- PS Phase 3

- Manholes
- Modeled Pipelines
- PS Modeled Pump Station
- WRP

0 75 150 300 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 17

Project ID: **Project 17**
Description: **NW Morgan Lane**
Improvements: **P-17A**

Project Type: Capacity Only

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	x
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	33,700
Construction Contingency	$	6,700
Estimated Construction Cost	$	40,400
Engineering Services, Construction Management and Project Administration	$	25,600
Total Capital Improvement Cost	**$**	**66,000**

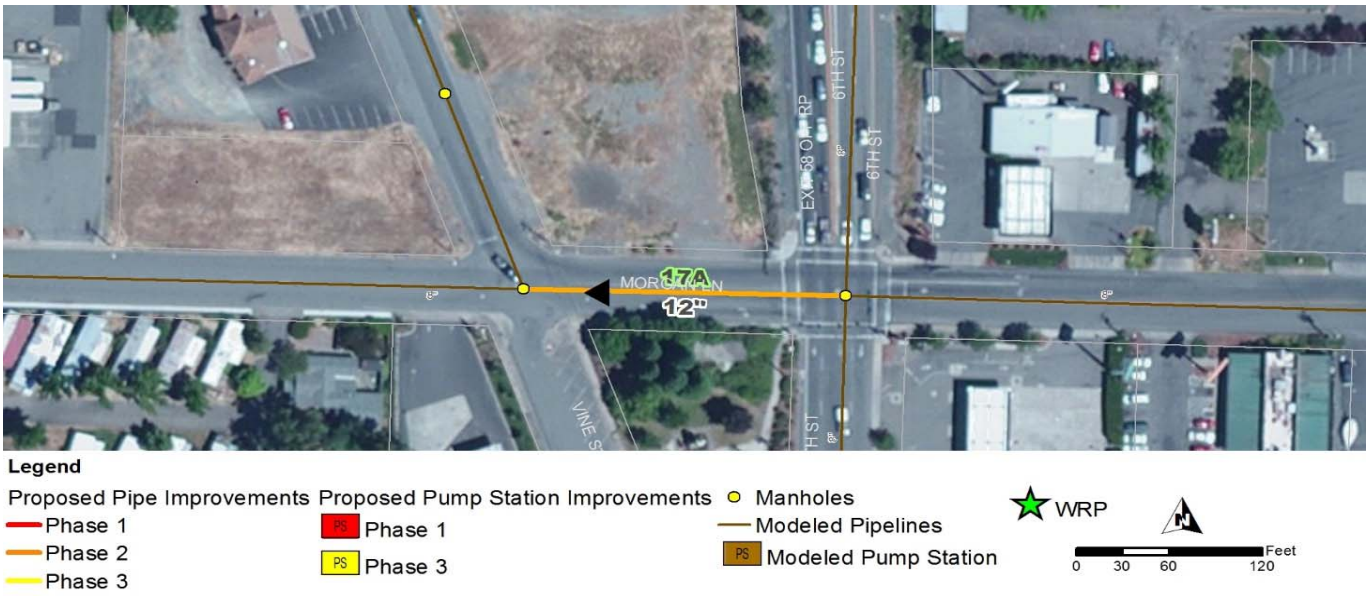
ENR CCI = 10,037 20-City Average, July 2015

Project Location
Along Morgan Ln between NW 6th St and NW Washington Blvd

Project Details
Construct a 208-feet long new 8-inch diameter trunk sewer along NW Morgan Lane that would connect NW 6th Street with Washington Boulevard.

Project Justification
Flows from part of the North I-5 area (wastewater basin GG on Figure 4.2) is planned to be connected to the NE 6th Street trunk, significantly increasing future flows in this collector. This project consists of creating a new diversion on NW Morgan Lane from NE 6th Street to NW Washington Boulevard to relieve both NE 6th Street and NE 7th Street, and free capacity in the NE 6th Street sewer trunk.

Project Detail Map



Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

- Manholes
- Modeled Pipelines
- Modeled Pump Station
- WRP

0 30 60 120 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 18

Project ID: **Project 18**
Description: **NW Washington Boulevard**
Improvements: **P-18A through P-18B**

Project Type: Capacity and R&R

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	x

Capital Improvement Costs

Baseline Construction Cost	$	480,500
Construction Contingency	$	96,100
Estimated Construction Cost	$	576,600
Engineering Services, Construction Management and Project Administration	$	361,400
Total Capital Improvement Cost	**$**	**938,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location

Along NW Washington Blvd between NW Midland Ave and NW Evelyn Ave

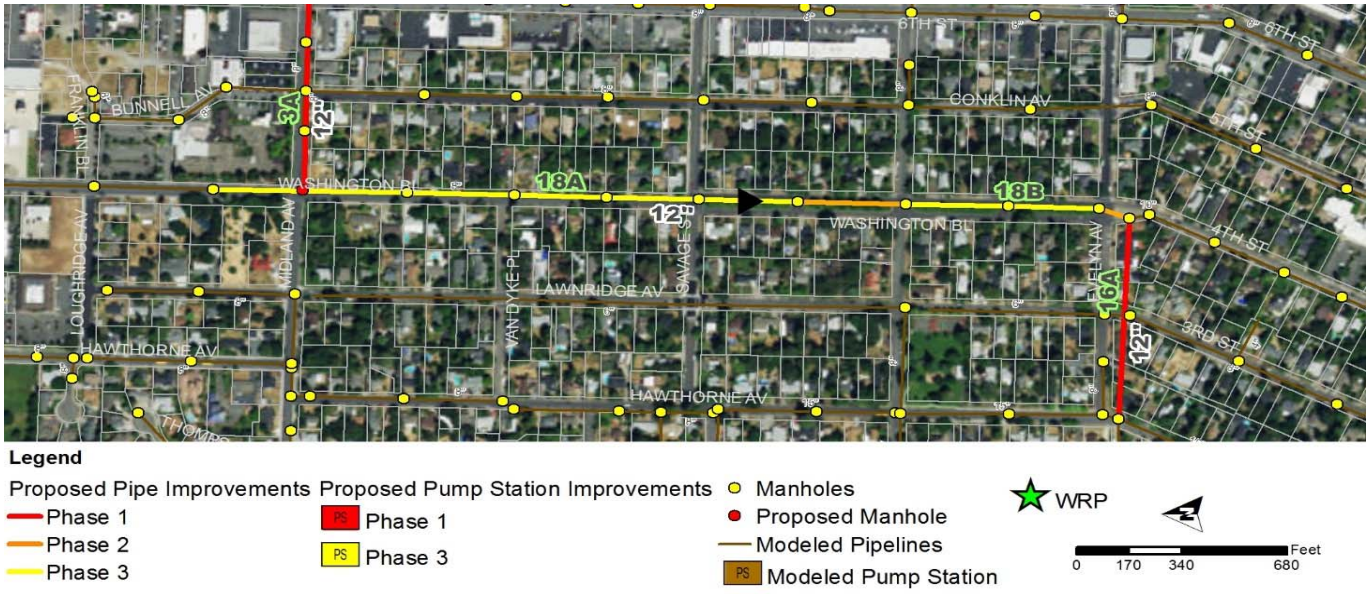
Project Details

Upsize 2,966 of existing 8-inch and 10-inch sewer with a 12-inch sewer along NW Washington Blvd between NW Midland Ave and NW Evelyn Ave.

Project Justification

As shown with Projects 3 and 17, flows from the NE 6th St trunk are diverted to NW Washington Blvd to alleviate the 6th St Trunk located on one of the busiest streets of the City. NW Washington Blvd now gets significant flows from 6th St in the future and capacity in this trunk becomes insufficient (above 2ft above pipe crown) in the long-term (2035).

Project Detail Map



City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 19

Project ID: **Project 19**
Description: **Darneille Pump Station**
Improvements: **PS-19A through PS-19B**

Project Type: Capacity and R&R

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	2,518,500
Construction Contingency	$	627,700
Estimated Construction Cost	$	3,146,200
Engineering Services, Construction Management and Project	$	1,966,800
Total Capital Improvement Cost	**$**	**5,113,000**

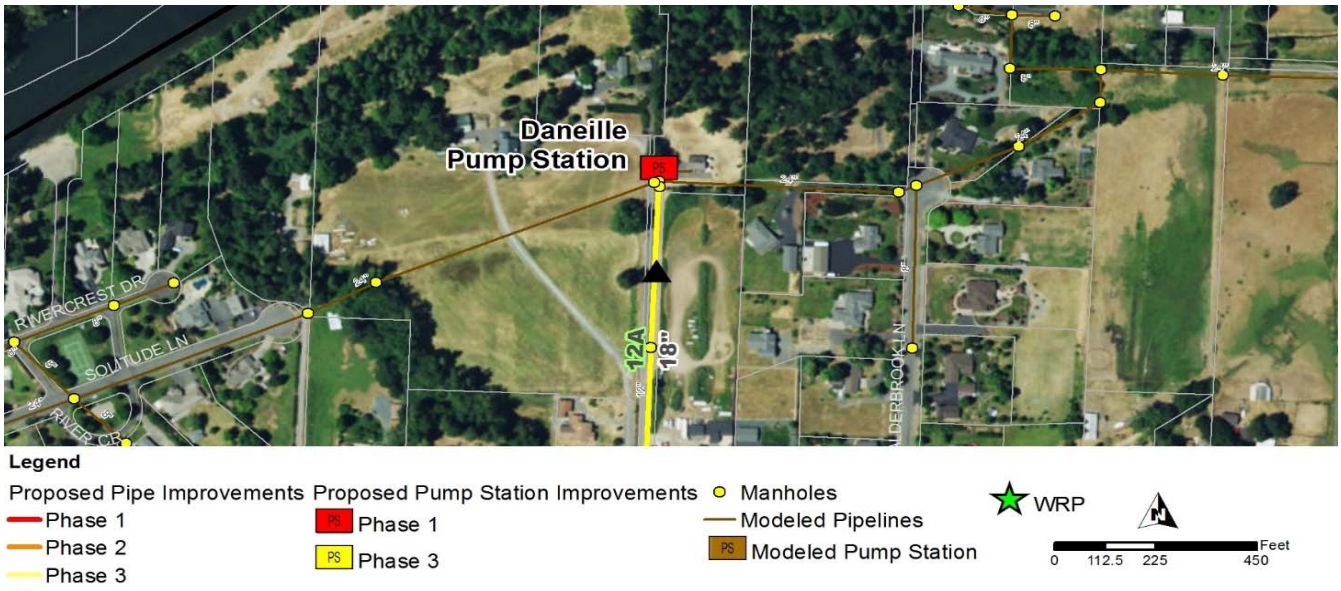
ENR CCI = 10,037 20-City Average, July 2015

Project Location
Darneille Pump Station

Project Details
Five high level options were developed as part of this Plan to improve Darneille Pump Station. A recommendation for Darneille Pump Station should be made following an Alternative Analysis evaluating costs and other parameters in further detail to develop a recommended solution to the capacity limitations at the Darneille Pump Station. This project includes an Alternatives Analysis and a placeholder for recommended project.

Project Justification
By 2035, PWWF is projected to be almost twice as much as current pump station firm capacity. This area serves the Redwood service area and flow monitoring revealed significant amount of Inflow and Infiltration on these basins. Inflow is an issue upstream of the Darneille Pump Station where significant flow enters the system through leaking manholes and private sewer laterals.

Project Detail Map



City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 20

Project ID: **Project 20**
Description: **Webster No.1 Lift Station**
Improvements: **PS-20A**

Project Type: Capacity and R&R

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	368,400
Construction Contingency	$	92,100
Estimated Construction Cost	$	460,500
Engineering Services, Construction Management and Project	$	153,500
Total Capital Improvement Cost	**$**	**614,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location
Webster No.1 Lift Station

Project Details
Upgrade Webster No.1 to a firm capacity of 0.66 mgd. This lift station is currently under design and is being sized to convey projected build-out flows for the design storm. No challenges will exist when the new Lift Station is in place. Construction is planned to begin in 2016.

Project Justification
The hydraulic model suggests that once the study area is build-out, the insufficient capacity at Webster No. 1 could cause sanitary sewer overflows (SSOs) from manholes upstream of the pump station. Upgrading this lift station before infill and new development occurs upstream of this area will be important to ensuring sufficient capacity in the collection system.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- PS Phase 1
- PS Phase 3

- Manholes
- Modeled Pipelines
- PS Modeled Pump Station

WRP

Feet 0 125 250 500

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 21

Project ID: **Project 21**
Description: **Webster No.2 Lift Station**
Improvements: **PS-21A**

Project Type: Capacity and R&R

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	x
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	491,200
Construction Contingency	$	122,800
Estimated Construction Cost	$	614,000
Engineering Services, Construction Management and Project	$	384,000
Total Capital Improvement Cost	**$**	**998,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location
Webster No.2 Lift Station

Project Details
Upgrade Webster No.2 to a firm capacity of 0.23 mgd. Improvements to this lift station can be made when the station reaches its useful life and pumps need to be upgraded.

Project Justification
This lift station is expected to be deficient by year 2035. The 2035 deficiency for the peak hour flows is minimal, and equals approximately 0.08 mgd. While it is recommended that Webster No. 2 be upgraded to facilitate the additional flows for build-out of this area, other lift station improvements should rank higher in priority based on the magnitude of their deficiencies in comparison to Webster No. 2.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- PS Phase 1
- PS Phase 3

- Manholes
- Modeled Pipelines
- PS Modeled Pump Station
- WRP

0 125 250 500 Feet

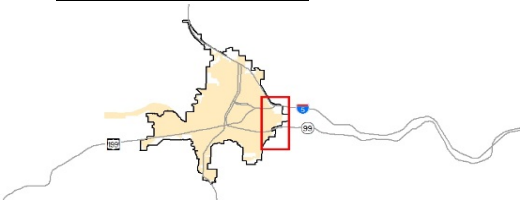
City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 22

Project ID: **Project 22**
Description: **Spalding Area Development Expansion**
Improvements: **PS-22A through P-22E**

Project Type: Expansion

Funding Type:

Project Vicinity Map



Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	x
Phase 3 (2026-2035)	x

Capital Improvement Costs

Baseline Construction Cost	$	2,566,500
Construction Contingency	$	534,000
Estimated Construction Cost	$	3,100,500
Engineering Services, Construction Management and Project Administration	$	2,081,500
Total Capital Improvement Cost	**$**	**5,182,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location
Spalding Area Development Expansion

Project Details
Due to the expected partial development of this area in the short-term planning period (2025), the proposed pump station will need to be constructed before 2025 when the area is scheduled to start developing. High-level planning analysis revealed that the estimated build-out ADWF is 55 gpm, while the projected PWWF is 110 gpm under build-out conditions. Construct 13,240 feet of gravity sewers to connect this area to the existing system.

Project Justification
This area is located in the east of the City's conveyance system, just north of the Rogue River. Carollo completed a technical memorandum in 2015 to provide an opinion of the capital cost to provide wastewater service to the Spalding industrial area. This analysis confirmed that a pump station located approximately west of Jones Creek on the eastern edge of the Urban Growth Boundary (UGB) and a force main are needed to convey flows from the Spalding industrial area to the existing sewer in Portola Drive.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- PS Phase 1
- PS Phase 3

- Manholes
- Modeled Pipelines
- PS Modeled Pump Station
- WRP

0 500 1,000 2,000 Feet

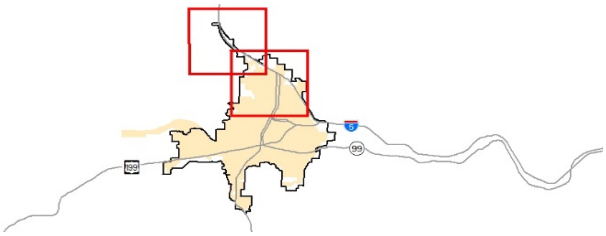
City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 23

Project ID: **Project 23**
Description: **North I-5 Area Development Expansion**
Improvements: **PS-23A through P-23D**

Project Type: Expansion

Funding Type:

Project Vicinity Map



Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	x

Capital Improvement Costs

Baseline Construction Cost	$ 6,155,200
Construction Contingency	$ 1,251,000
Estimated Construction Cost	$ 7,406,200
Engineering Services, Construction Management and Project	$ 4,628,800
Total Capital Improvement Cost	**$ 12,035,000**

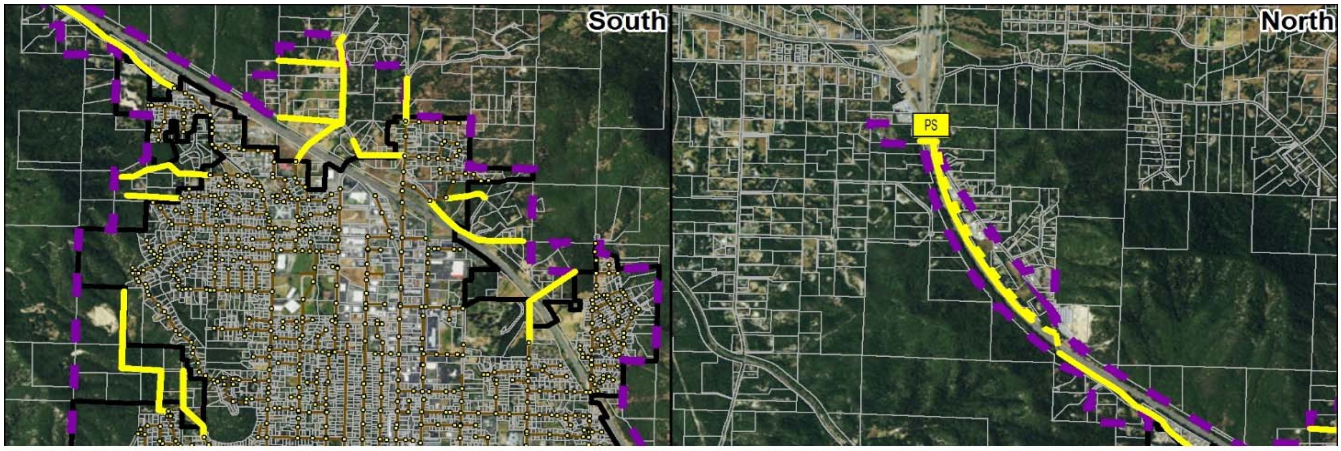
ENR CCI = 10,037 20-City Average, July 2015

Project Location
North I-5 Area Development Expansion

Project Details
Highway crossings and a new pump station of 95 gpm of firm capacity are recommended to connect these areas to the existing collection system. Three crossings are proposed in order to route al the flow from these to the existing system:
- At the intersection of Highland Avenue with I-5,
- Across I-5 at the latitude of Cherokee Ln dead-end, and
- At the intersection of Heidi Lane with I-5.

Project Justification
The growth area located north of I-5 is challenging to connect to the existing system. A new pump station is necessary to capture flows coming from the north-west, as the slope gradient in this area is towards the west, and the flow needs to be routed to the east to the existing system.

Project Detail Map



Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- PS Phase 1
- PS Phase 3

- Manholes
- Modeled Pipelines
- PS Modeled Pump Station

WRP

0 1,125 2,250 4,500 Feet

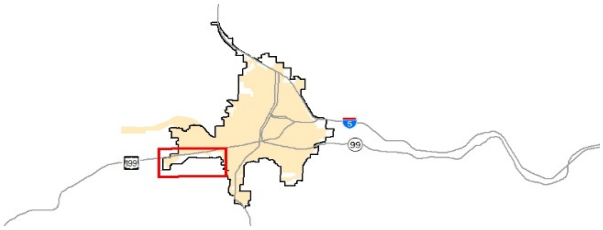
City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 24

Project ID: **Project 24**
Description: **South Highway Area Development Expansion**
Improvements: P-24A

Project Type: Expansion

Funding Type:

Project Vicinity Map



Implementation Phase

Phase 1 (2015-2020)	___
Phase 2 (2021-2025)	___
Phase 3 (2026-2035)	x

Capital Improvement Costs

Baseline Construction Cost	$	1,524,500
Construction Contingency	$	304,900
Estimated Construction Cost	$	1,829,400
Engineering Services, Construction Management and Project	$	1,143,600
Total Capital Improvement Cost	**$**	**2,973,000**

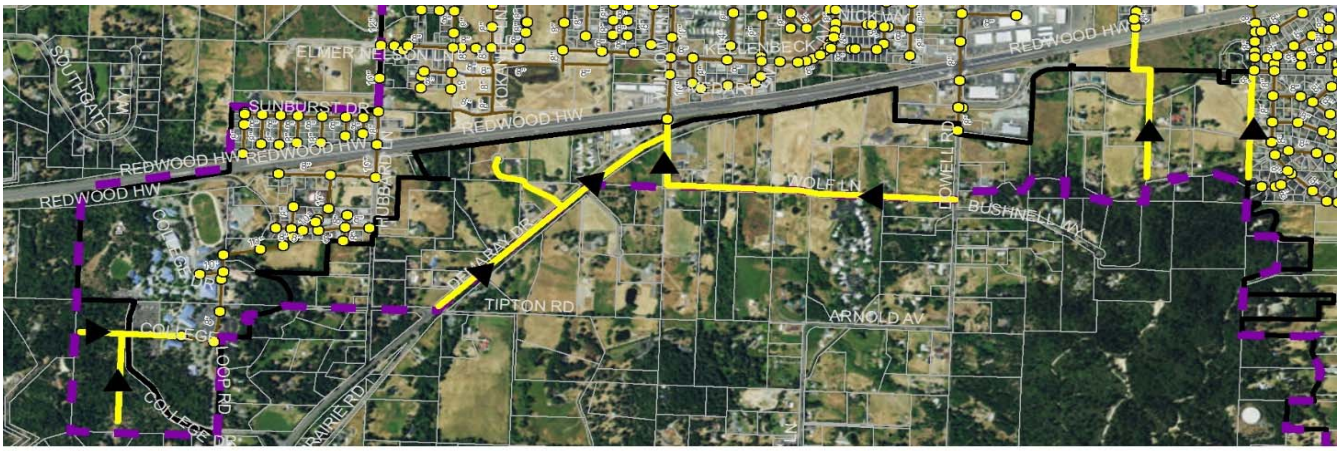
ENR CCI = 10,037 20-City Average, July 2015

Project Location
South Highway Area Development Expansion

Project Details
This growth area is located south of the Redwood Highway. Most of the area is planned to connect to the sewer pipe located along Willow Lane. Eight-inch gravity pipes are recommended to collect flows in this area.

Project Justification
This project corresponds to high-level planning improvement to connect th area locate south of the Redwood Highway.

Project Detail Map



Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 3

Manholes
Modeled Pipelines
Modeled Pump Station
WRP

0 500 1,000 2,000 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 25

Project ID: **Project 25**
Description: **Bridge Street Pump Station**
Improvements: **PS-25A**

Project Type: R&R Only

Funding Type:

Project Vicinity Map

Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	14,000
Construction Contingency	$	3,500
Estimated Construction Cost	$	17,500
Engineering Services, Construction Management and Project	$	7,500
Total Capital Improvement Cost	**$**	**25,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location
Bridge Street Pump Station

Project Details
Rehabilitate Bridge Street Pump Station to meet condition standards.

Project Justification
The Bridge Street Pump Station has significant capacity and reliability issues related to the pump, guide rail, and level control issues at the pump station.

Project Detail Map

Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- PS Phase 1
- PS Phase 2
- PS Phase 3

- Manholes
- Modeled Pipelines
- PS Modeled Pump Station
- WRP

N

0 120 240 480 Feet

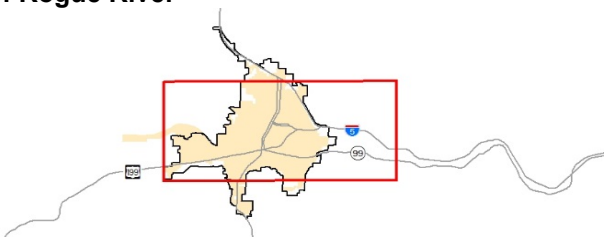
City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 26

Project ID: **Project 26**
Description: **Condition Only Projects - Phase 1 North of Rogue River**
Improvements: P-26A through P-26G

Project Type: R&R Only

Funding Type:

Project Vicinity Map



Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$ 8,326,000
Construction Contingency	$ 1,665,200
Estimated Construction Cost	$ 9,991,200
Engineering Services, Construction Management and Project	$ 6,246,800
Total Capital Improvement Cost	**$ 16,238,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location

Condition Only Projects - Phase 1 North of Rogue River

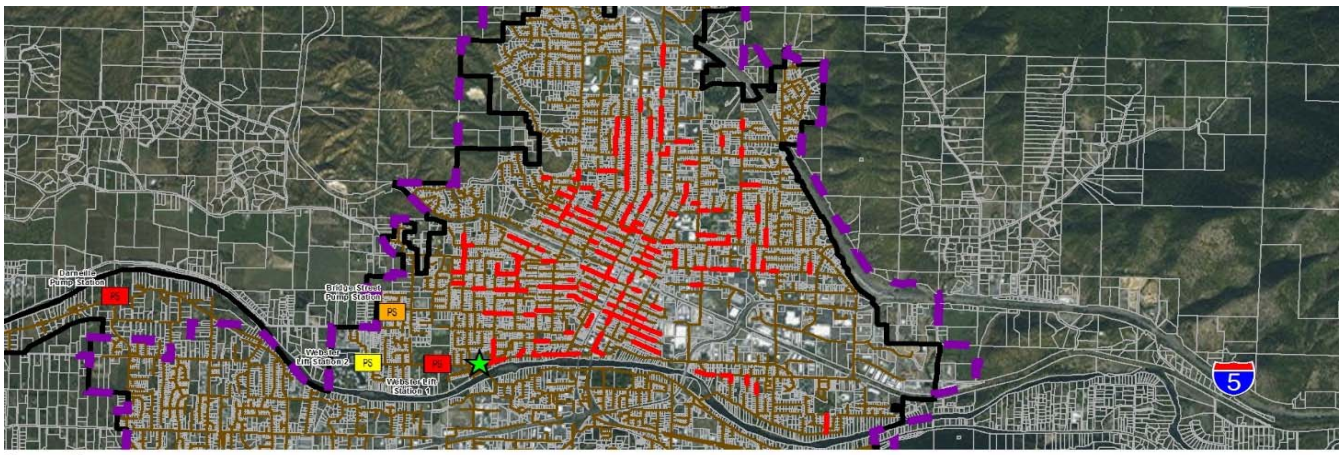
Project Details

Repair or replace the identified pipelines for condition purposes in Phase 1 (2015-2020).

Project Justification

These pipes located north of the Rogue River have already reached their remaining useful lifes or will in the next 20 years and also present major structural defects and/or maintenance issues.

Project Detail Map



Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 2
- Phase 3

Modeled Pipelines
- Modeled Pump Station
- WRP

0 1,800 3,600 7,200 Feet

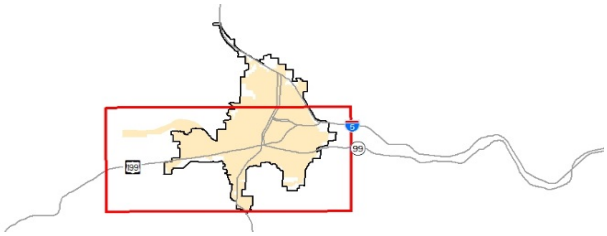
City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 27

Project ID: **Project 27**
Description: **Condition Only Projects - Phase 1 South of Rogue River**
Improvements: **P-27A through P-27C**

Project Type: R&R Only

Funding Type:

Project Vicinity Map



Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	145,100
Construction Contingency	$	29,000
Estimated Construction Cost	$	174,100
Engineering Services, Construction Management and Project	$	108,900
Total Capital Improvement Cost	**$**	**283,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location

Condition Only Projects - Phase 1 South of Rogue River

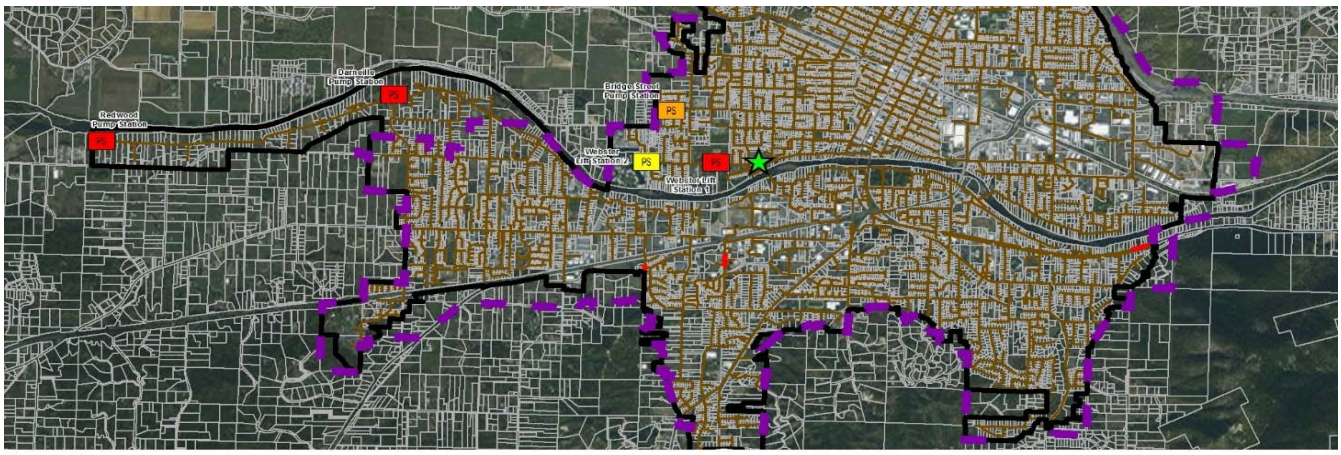
Project Details

Repair or replace the identified pipelines for condition purposes in Phase 1 (2015-2020).

Project Justification

These pipes located south of the Rogue River have already reached their remaining useful lifes or will in the next 20 years and also present major structural defects and/or maintenance issues.

Project Detail Map



Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 2
- Phase 3

Modeled Pipelines
- Modeled Pump Station
- WRP

0 1,800 3,600 7,200 Feet

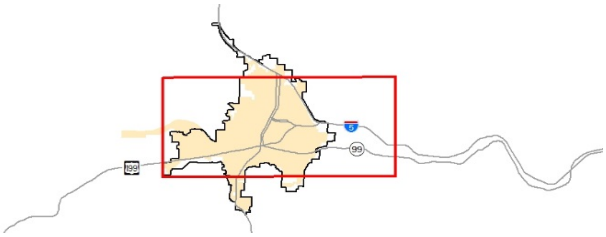
City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 28

Project ID: **Project 28**
Description: **Condition Only Projects - Phase 2 North of Rogue River**
Improvements: **P-28A through P-28E**

Project Type: R&R Only

Funding Type:

Project Vicinity Map



Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	x
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$ 7,833,300
Construction Contingency	$ 1,566,700
Estimated Construction Cost	$ 9,400,000
Engineering Services, Construction Management and Project	$ 5,875,000
Total Capital Improvement Cost	**$ 15,275,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location

Condition Only Projects - Phase 2 North of Rogue River

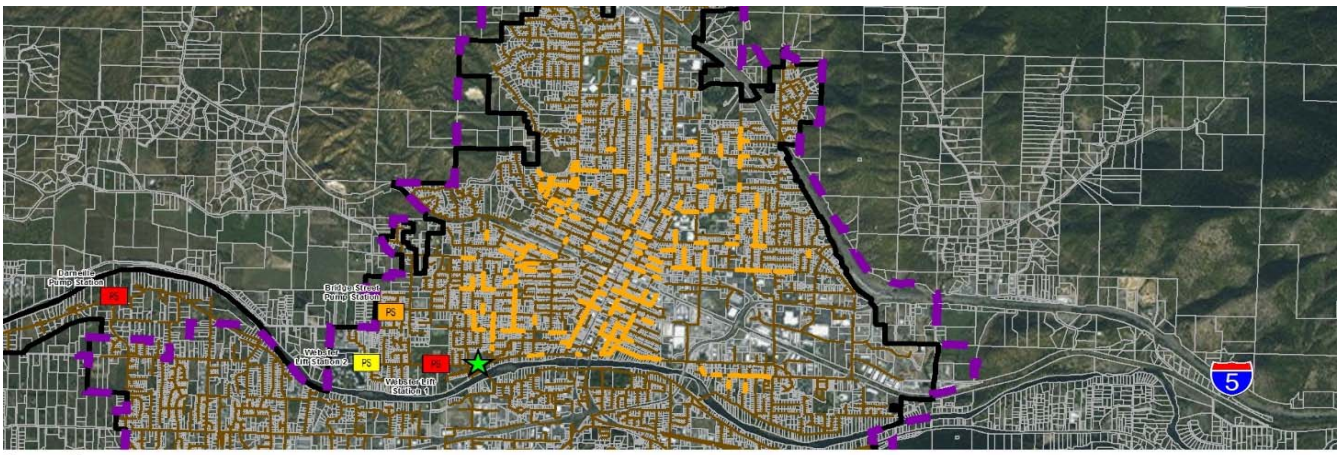
Project Details

Repair or replace the identified pipelines for condition purposes in Phase 2 (2021-2025).

Project Justification

These pipes located north of the Rogue River have already reached their remaining useful lifes or will in the next 20 years and also present significant structural defects and/or maintenance issues.

Project Detail Map



Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 2
- Phase 3

Modeled Pipelines
- Modeled Pump Station
- WRP

0 1,800 3,600 7,200 Feet

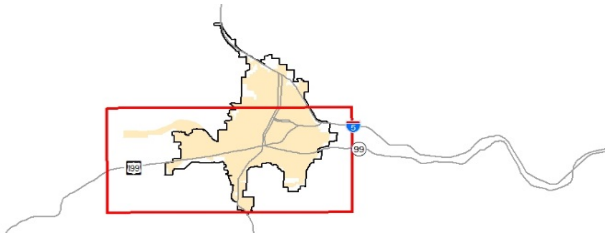
City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 29

Project ID: **Project 29**
Description: **Condition Only Projects - Phase 2 South of Rogue River**
Improvements: **P-29A through P-29D**

Project Type: R&R Only

Funding Type:

Project Vicinity Map



Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	x
Phase 3 (2026-2035)	

Capital Improvement Costs

Baseline Construction Cost	$	439,000
Construction Contingency	$	87,800
Estimated Construction Cost	$	526,800
Engineering Services, Construction Management and Project	$	328,200
Total Capital Improvement Cost	**$**	**855,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location

Condition Only Projects - Phase 2 South of Rogue River

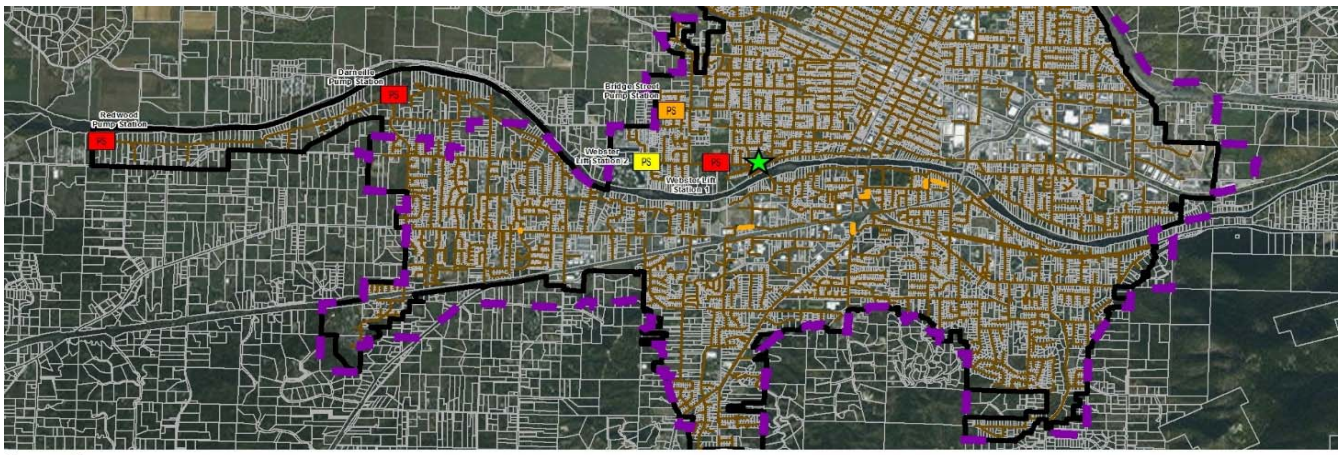
Project Details

Repair or replace the identified pipelines for condition purposes in Phase 2 (2021-2025).

Project Justification

These pipes located south of the Rogue River have already reached their remaining useful lifes or will in the next 20 years and also present significant structural defects and/or maintenance issues.

Project Detail Map



Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 2
- Phase 3

Modeled Pipelines
- Modeled Pump Station
- WRP

0 1,800 3,600 7,200 Feet

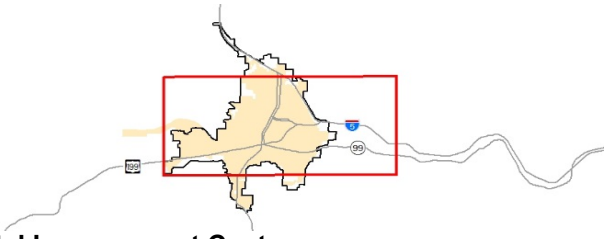
City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 30

Project ID: **Project 30**
Description: **Condition Only Projects - Phase 3 North of Rogue River**
Improvements: P-30A through P-30H

Project Type: R&R Only

Funding Type:

Project Vicinity Map



Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	x

Capital Improvement Costs

Baseline Construction Cost	$ 9,791,700
Construction Contingency	$ 1,958,200
Estimated Construction Cost	$ 11,749,900
Engineering Services, Construction Management and Project	$ 7,345,100
Total Capital Improvement Cost	**$ 19,095,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location

Condition Only Projects - Phase 3 North of Rogue River

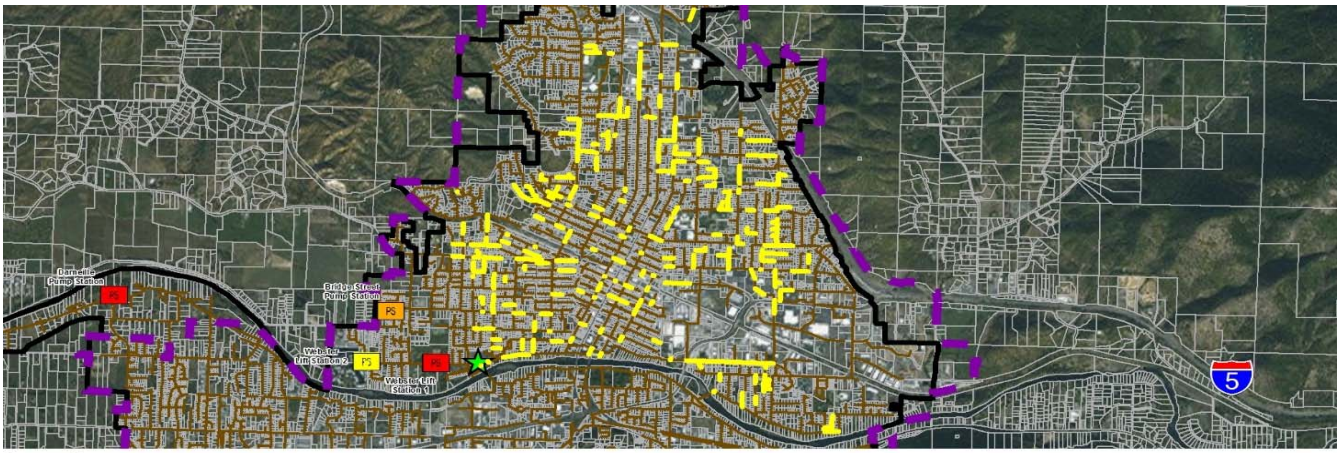
Project Details

Repair or replace the identified pipelines for condition purposes in Phase 3 (2026-2035).

Project Justification

These pipes located north of the Rogue River will be reaching the end of their remaining useful lifes in the next 20 years and also aready present some structural defects and/or maintenance issues.

Project Detail Map



Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 2
- Phase 3

Modeled Pipelines
- Modeled Pump Station
- WRP

N

0 1,800 3,600 7,200 Feet

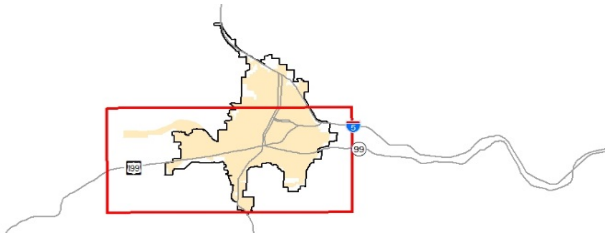
City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 31

Project ID: **Project 31**
Description: **Condition Only Projects - Phase 3 South of Rogue River**
Improvements: **P-31A through P-31H**

Project Type: R&R Only

Funding Type:

Project Vicinity Map



Implementation Phase

Phase 1 (2015-2020)	
Phase 2 (2021-2025)	
Phase 3 (2026-2035)	x

Capital Improvement Costs

Baseline Construction Cost	$ 6,709,400
Construction Contingency	$ 1,341,900
Estimated Construction Cost	$ 8,051,300
Engineering Services, Construction Management and Project	$ 5,032,700
Total Capital Improvement Cost	**$ 13,084,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location

Condition Only Projects - Phase 3 South of Rogue River

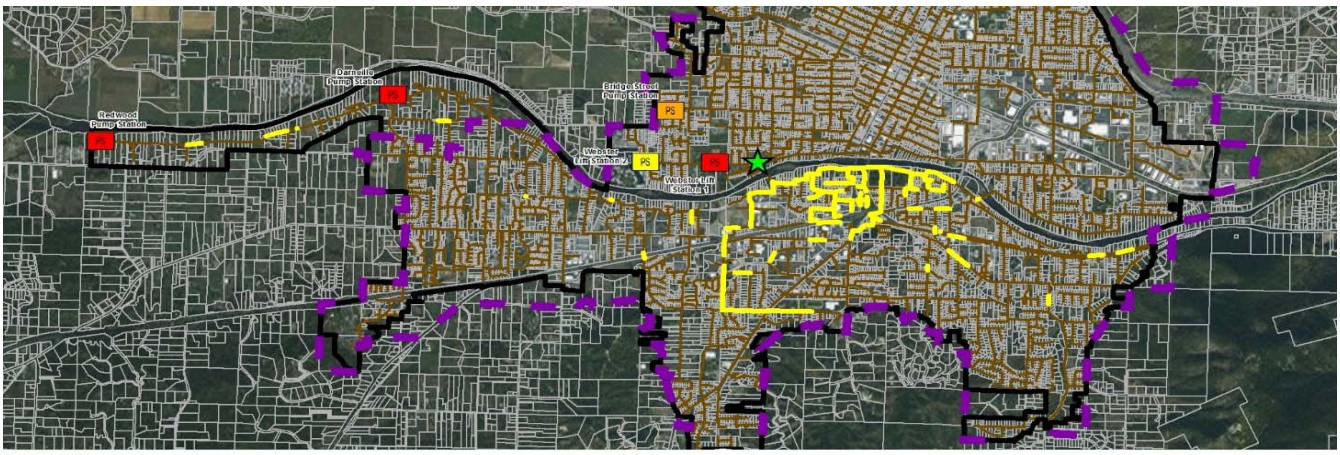
Project Details

Repair or replace the identified pipelines for condition purposes in Phase 3 (2026-2035).

Project Justification

These pipes located south of the Rogue River will be reaching the end of their remaining useful lifes in the next 20 years and also aready present some structural defects and/or maintenance issues.

Project Detail Map



Legend

Proposed Pipe Improvements
- Phase 1
- Phase 2
- Phase 3

Proposed Pump Station Improvements
- Phase 1
- Phase 2
- Phase 3

Modeled Pipelines
- Modeled Pump Station
- WRP

0 1,800 3,600 7,200 Feet

City of Grants Pass
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN PROJECT 32

Project ID: **Project 32**
Description: **General Projects**
Improvements: **G-1 through G-2B**

Project Vicinity Map

N/A

Project Type: General

Funding Type:

Implementation Phase

Phase 1 (2015-2020)	x
Phase 2 (2021-2025)	x
Phase 3 (2026-2035)	x

Capital Improvement Costs

Baseline Construction Cost	$	437,000
Construction Contingency	$	105,400
Estimated Construction Cost	$	542,400
Engineering Services, Construction Management and Project	$	207,600
Total Capital Improvement Cost	**$**	**750,000**

ENR CCI = 10,037 20-City Average, July 2015

Project Location
General Projects

Project Details
These projects are general projects and include the implementation of an Asset Management Program and the updates to the wastewater collection system master plan.

Project Justification

Project Detail Map

N/A