Grants Pass Stormwater Master Plan

Final

February 2016

KELLER associates

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City of Grants Pass, Oregon

Stormwater Master Plan

Final

KELLER associates

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Keller Associates
707 13th St. SE. Suite 280
Salem, OR 97301

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REGISTERED PROFESSIONAL ENGINEER
2/15/16
83510PE
OREGON
NOV. 10, 2009
PETER OLSEN
EXPIRES: 12/31/16

Signed by:
Peter Olsen, P.E.
Project Manager

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ACRONYMS, ABBREVIATIONS, AND SELECTED DEFINITIONS

Add'l	additional
AF	Allen-Fruitdale basin
BMPs	best management practices
CAD	computer aided design
CCTV	closed-circuit television
cf	cubic feet
cfs	cubic feet per second
CIP	Capital Improvement Plan
DEQ	Department of Environmental Quality
e.g.	abbreviation meaning "for example"
EPA	Environmental Protection Agency
F	farenheit
FEMA	Federal Emergency Management Agency
ft	feet (or) foot
FTE	full-time employee
G	Gilbert basin
GPID	Grants Pass Irrigation District
gpm	gallons per minute
HEC-1	Hydrologic Engineering Center software
i.e.	abbreviation for "that is"
in	inch
min	minute
MOU	memorandum of understanding
MS4	Municipal Separate Storm Sewer System
NOAA	National Oceanic and Atmospheric Administration
NPDES	national pollution discharge elimination system
NRCS	National Resource Conservation Service
ODOT/APWA	Oregon Department of Transportation/American Public Works Association
PVC	polyvinyl chloride plastic
RVCOG	Rogue Valley Council of Governments
S	Sand Creek basin
SBUH	Santa Barbara Urban Hydrograph
SDC	system development charge
SJ	Skunk-Jones basin
SWMM	stormwater management model
SWMP	stormwater master plan
TMDL	total maximum daily load
TR-55	Technial Release 55 "Urban Hydrology for Small Watersheds"
UGB	urban growth boundary
XPSWMM	software modeling package
1D	one dimensional
2D	two dimensional

EXECUTIVE SUMMARY

ES1. Introduction

The City of Grants Pass owns and operates a large and complex stormwater system that accommodates rainfall runoff from nearly 27,000 acres of land in and around the city. This contributing area and various political boundaries are illustrated in Figure ES1.

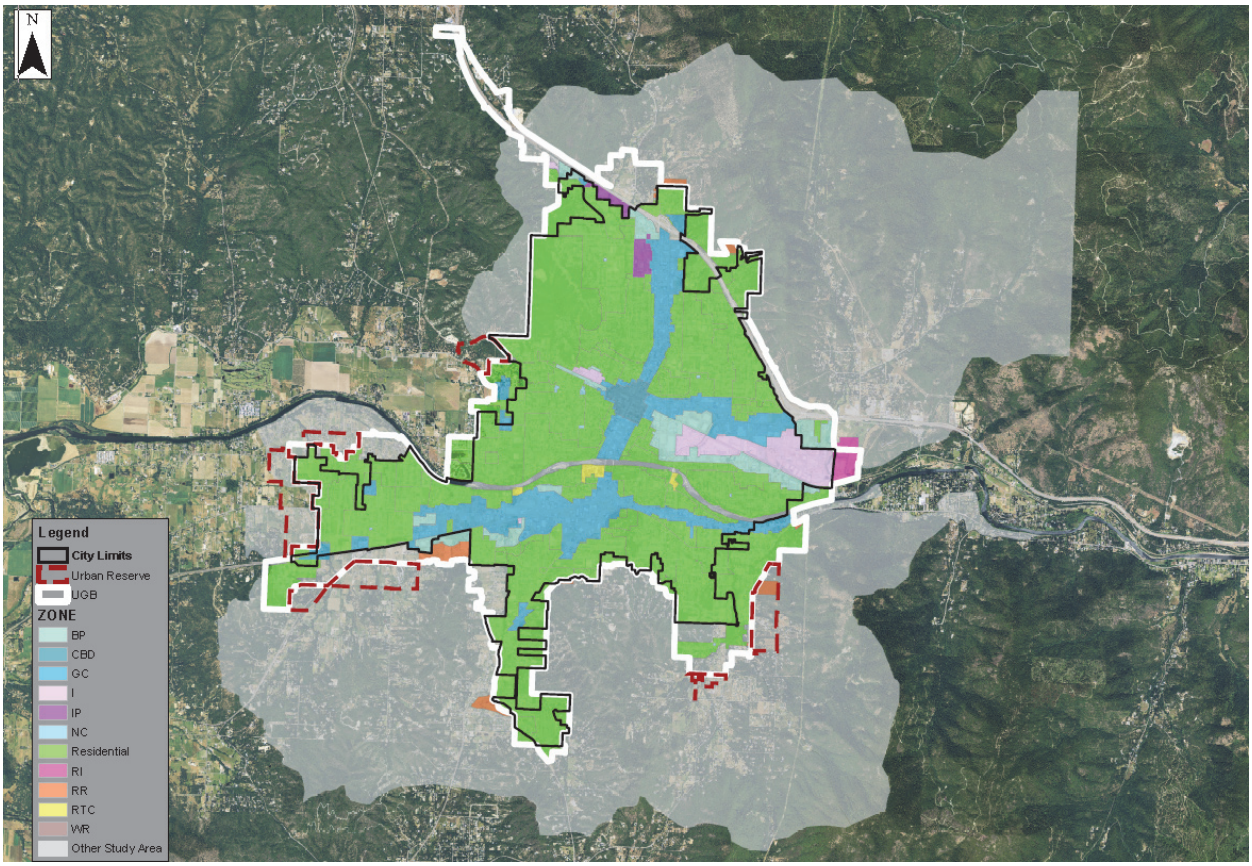


Figure ES1. Grants Pass Stormwater Study Area.

The fundamental purpose of the stormwater system is to keep Grants Pass a vibrant and livable community. Stormwater problems are more than just a periodic and temporary nuisance. If not for the stormwater system, destructive flooding and erosion would quickly turn unmanageable. Unchecked stormwater runoff can leave critical roadways impassible for emergency services. What's more, harmful urban pollution would be picked up by runoff and carried directly to the Rogue River and other natural water ways.

This Stormwater Master Plan provides a clear path for maintaining and improving the function of the Grants Pass stormwater system.

ES2. Things As They Are Today

The existing stormwater system consists of about 138 miles of underground piping. This is enough pipe to lay a route along I-5 from Grants Pass to Eugene. In addition to the piping,

there is an expansive network of open channel waterways, ponds, diversion structures, manholes, and interconnections with the Grants Pass Irrigation District facilities.

The stormwater system is divided into four major stormwater basins. These basins are illustrated in Figure ES2.1.

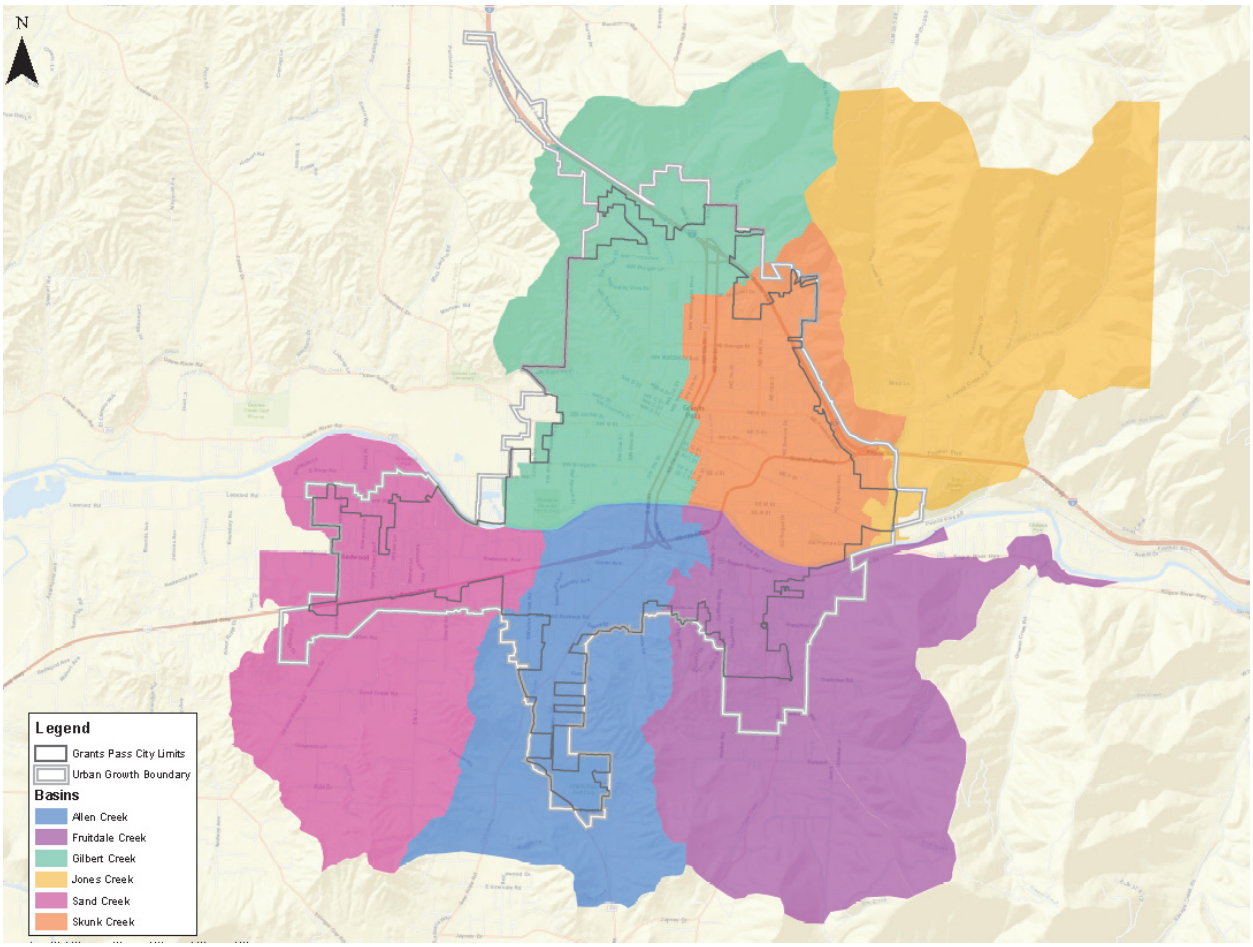


Figure ES2.1 Major Stormwater Basins in Grants Pass, Oregon.

An enormous amount of effort was put forth by City crews, GPID crews and consulting staff to investigate, understand, and map out the stormwater and irrigation systems. The data gathered by their efforts enabled the creation of a detailed computer model of the stormwater system. The computer model was calibrated to match observed system conditions, and then used to evaluate the stormwater system under a variety of scenarios. The scenarios used in the existing system evaluation are based on performance standards consistent with state and federal requirements, but are also customized specifically for Grants Pass.

The model is able to predict when and where flooding from runoff is most likely to occur. It can also be used to provide clues about the likely causes of flooding and how the system might be improved to eliminate or mitigate failures in the stormwater system.

Through this evaluation process, several problem areas and their corresponding solutions were identified. For example, Figure ES2.2 illustrates flooding locations and their statistical

probability of occurrence for one of the four major basins, Allen-Fruitdale, which is located south of the Rogue River.

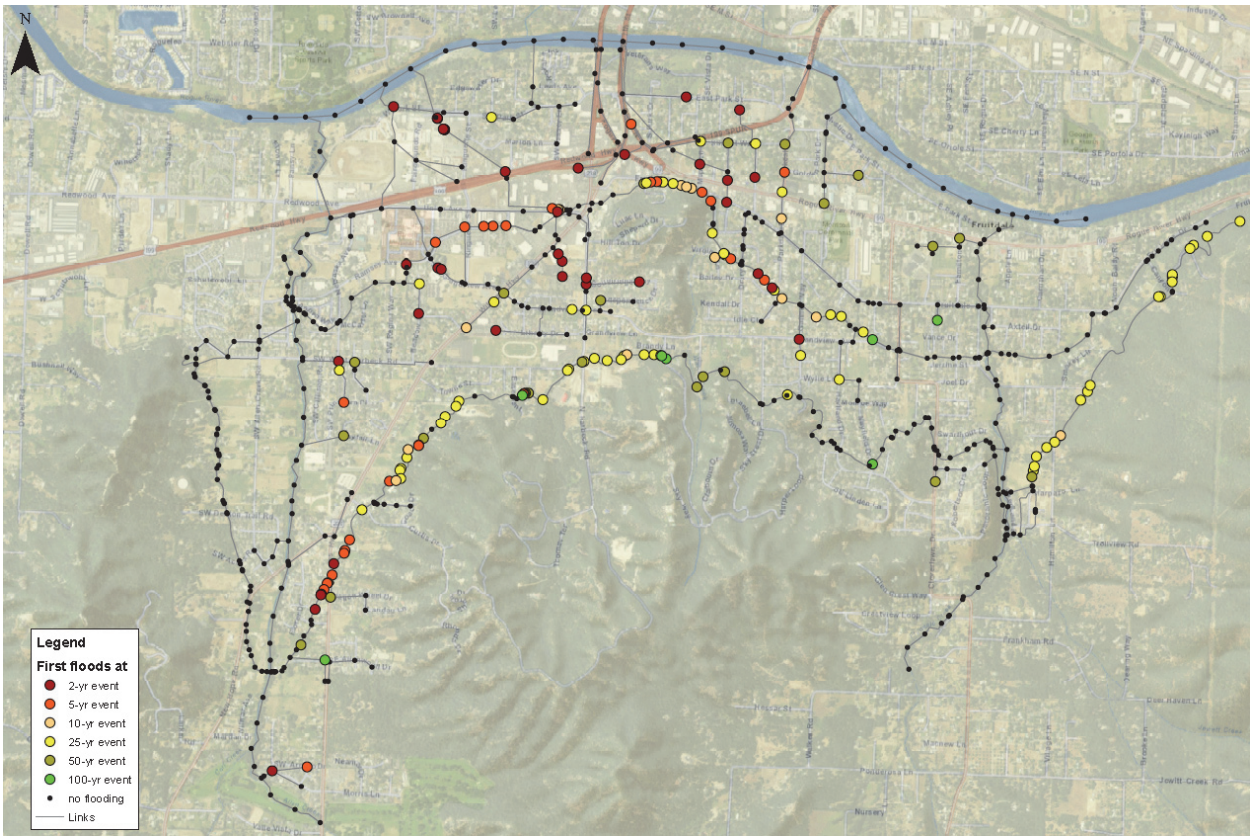


Figure ES2.2 Flooding Locations and Probabilities in the Allen-Fruitdale Basin.

Note: A 2-year storm event has a 1 in 2 chance of occurring every year (i.e. 100%÷2 = 50%) and a 25-year event has a 1 in 25 chance of occurring every year (i.e. 100%÷25 = 4%). The 2-year event brings much less rainfall than a 25-year storm event.

ES3. A Clear Path Forward

With such a large stormwater system, and natural limitations on resources, it can be a challenge to know where to begin. In coordination with City staff, priorities have been established to guide the improvement process. The highest priority (1A) has been given to residential areas flooded most severely and frequently (e.g. 2-year events), closely followed by priority (1B) for commercial areas flooded most severely and frequently (e.g. 2 to 5-year events). As the severity and frequency decreases, so does the priority level (e.g. 2A, 2B, 3A, 3B, and 3C) for the recommended improvement.

Where practical, projects in close proximity were grouped together for saving on construction costs and minimizing disturbance. Potential downstream effects of upstream improvements were also taken into consideration.

In summary, the recommended improvements include:

- 20 improvement projects in the Allen-Fruitdale basin, including 16 priority 1A, one priority 1B, two priority 3A, and one Priority 4 project.
- 10 improvement projects in the Gilbert basin, including nine priority 1A, and one priority 1B.
- 16 improvement projects in the Sand Creek basin, including 12 priority 1A, one priority 1B, and three priority 3A.
- 13 improvement projects in the Skunk-Jones basin, including one priority 1A, five priority 1B, one priority 2A, one priority 2B, two priority 3A, two priority 3B, and one priority 3C.

Each improvement recommendation has been described in Chapter 6 of this report and mapped out in Appendix A (Figures 11A through 12D). An example of these figures is included here for illustration only (see Figure ES3).

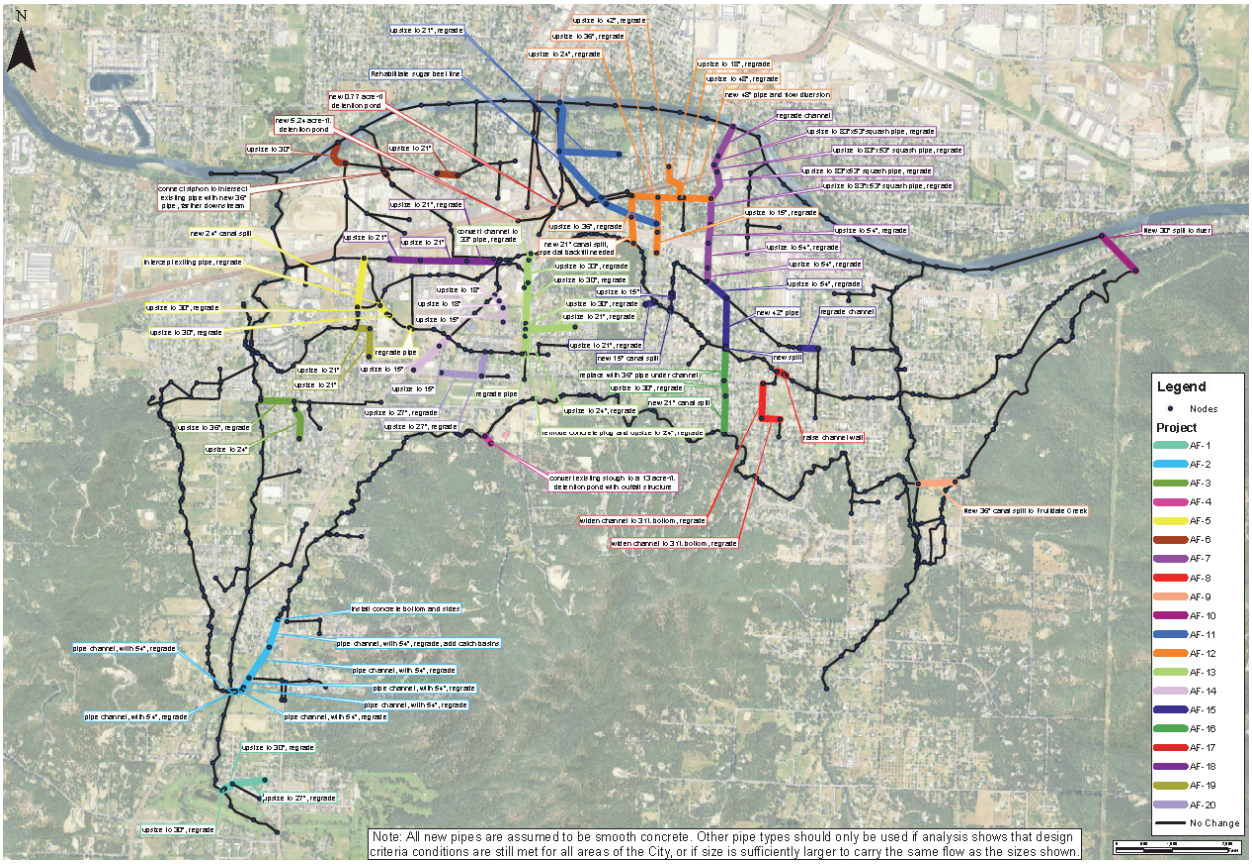


Figure ES3. Recommended Priority Improvements in the Allen-Fruitdale basin.

In addition to capital improvements, operational and maintenance recommendations have also been provided in Chapter 7. Some of these recommendations include:

- Pipeline cleaning every three years at a minimum
- CCTV inspection every 5-10 years
- Clean catch basins every three years
- Clean detention outlets every 6 months
- Apply weed control to detention facilities annually

- Sweep the streets weekly to every-other month depending on area
- Initiate a system replacement program to keep up with aging infrastructure. This is independent of the recommended capital improvements.

It should also be noted that the City has received communication from the DEQ that NPDES MS4 Phase II permitting compliance will soon be required. Additional detail on the permitting requirements have been provided in Chapter 7.

ES4. How much will all of this Cost?

A planning level opinion of probable cost for the recommended improvements can be found in Chapter 6, Tables 6-1 through 6-3 with supporting details in Appendix F. The highest priority improvements (1A) are estimated at roughly $32 million, and another $15 million is estimated for all other stormwater system improvements.

Of the estimated $32 million for priority 1A improvements, projects in the Allen-Fruitdale basin, Sand Basin, and Gilbert basin account for $13.7 million, $12.1 million, and $6.1 million respectively.

The current operations and maintenance budget is estimated to be $198,500 annually ($158,000 for current street sweeping contract). The recommended increase to this existing budget is an additional $480,000 annually. As an extension of regular operations and maintenance, a system replacement budget is recommended to keep up with the aging infrastructure. The replacement budget is recommended at $2.5 million annually.

There is a wide variety of funding and cost sharing options for these improvements. A financial analysis and utility rate study will be completed at a later time in order to determine which option will best meet the City's need.

ES5. Conclusion

The stormwater system is a vital part of Grants Pass infrastructure and is a significant resource to the community. As with all other utilities, the stormwater system requires continuous investment and prudent management to keep it functioning at its best.

This master plan provides the information needed by City managers and elected officials to make informed decisions for the benefit of Grants Pass both now and for years to come.

1.0 INTRODUCTION

1.1 MASTER PLAN PHASES

The City of Grants Pass selected Keller Associates to update their Storm Water Master Plan. The master plan update is being completed in a phased approach that was created through a coordinated effort by the City of Grants Pass, the Grants Pass Irrigation District (GPID), and Keller Associates. Some phases are being completed concurrently, while some depend on the results of preceding phases. The following graphic outlines the approach. Each phase is discussed in the following sections.

1.2 PHASE 1 SUMMARY

Phase 1 consisted of a preliminary review of existing information and determining a plan of action. Relevant stormwater documents and the existing stormwater model were assessed to determine the scope of work for the master plan update. City, County, and GPID staff were interviewed to identify areas of concern and potential solutions. Other pertinent information was gathered during Phase 1 that assisted in performing the services for the remaining phases of the master plan.

1.3 PHASE 2 SUMMARY

Phase 2 started with creating the basis for evaluation, including assumptions regarding the state of the irrigation network and general stormwater design criteria. The existing hydraulic computer models of the stormwater system were updated for both software and modeling techniques. This phase also included a thorough review of all model inputs, and the addition of irrigation canal segments to the model. The City surveyor walked the four major irrigation canals, capturing cross-sections and video. Portable flow meters and rain gauges were installed at several locations throughout the City's stormwater system. The data collected were used to validate the model's predictions. City staff investigated areas where discrepancies between the model and the field data were discovered. Completion of this phase resulted in a better model and more accurate mapping records of the City's stormwater system.

1.4 PHASE 3 SUMMARY

Phase 3 consists of writing a memorandum of understanding between GPID and the City, with the intent to create an intergovernmental agreement on the use and maintenance of shared drainage and irrigation facilities. The memorandum of understanding was signed and has expired as of July 31, 2015. An intergovernmental agreement was drafted up and given to the GPID. As of November 2015, the City and GPID are still in the process of negotiating the terms of the agreement.

1.5 PHASE 4 SUMMARY

Phase 4 consists of creating a stormwater utility. In an effort to obtain funding for needed capital improvements, and to cost share with GPID for shared facilities, the City has decided to pursue implementation of a stormwater utility fee and system development charge (SDC). The rates have not yet been finalized. The initial goal was to set up a simple utility rate that would provide for minimal amounts of operation and maintenance of the stormwater system. Since then, the City has decided to postpone the stormwater utility until after the capital improvement plan presented in this report can be adopted.

1.6 PHASE 5 SUMMARY

Phase 5 consists of creating this stormwater master plan. In addition to compiling all of the information already gathered and presented into one document, Phase 5 included analyzing the models to identify stormwater problem areas and the best apparent solutions. Both capital improvements and operational changes are recommended. This report represents the culminating efforts of Phase 5.

1.7 GPID

The City and GPID share many facilities within the Grants Pass Urban Growth Boundary (UGB). The City and GPID use the irrigation canals to carry stormwater runoff from their respective territories. GPID also uses the City storm drains in the irrigation season to reach most of its customers. The two systems are intertwined to such an extent that it would take tens of millions

of dollars to separate the two systems. In addition, cost sharing for facilities benefits both parties.

1.8 NPDES MS4 PHASE II

The City will soon be required to meet the conditions of an MS4 Phase II NPDES permit. The six minimum control measures that will be required to meet the NPDES MS4 Phase II permit requirements are:

1. Public education program
2. Public participation
3. Illicit discharge detection and elimination
4. Construction site stormwater runoff control
5. Post-construction stormwater management in new development and redevelopment
6. Pollution prevention in municipal operations

The City currently contracts with the Rogue Valley Council of Governments (RVCOG) to accomplish activities required by the Rogue Basin TMDL Implementation Plan. This includes community outreach and education, preparation of an annual report, and restoration of riparian areas. These activities, particularly community education, may satisfy some of the minimum control measures required in an MS4 Phase II permit. Ongoing City programs and policies may be sufficient to address other requirements such as construction and post-construction storm water management. However, additional activities will be needed to satisfy all required control measures, including illicit discharge detection/elimination and pollution prevention in municipal operations. These two measures may involve:

- Structural and non-structural best management practices (BMPs) that the permittee or another entity will implement for each of the stormwater minimum control measures
- Measurable goals for each of the BMPs, including milestones and the frequency of the action
- Rationale for how and why the permittee selected each of the BMPs, and measurable goals for the permittee's Stormwater Management Program
- A timetable for completing each of these actions

It is estimated that an additional 0.25 fulltime employee will be needed for activities related to the NPDES MS4 Phase II permit requirements.

1.9 HYDRAULIC COMPUTER MODEL

XPSWMM is the software modeling package utilized for modeling the City's stormwater collection system. XPSWMM was used for the 2007 master planning efforts and remains an appropriate choice for continuing the modeling and planning efforts.

Because the Grants Pass stormwater network is so vast, there are four separate but interconnected models. Each of these models has been updated from version 9.10 to version 15.0 of XPSWMM.

1.10 UPDATES TO THE 2007 DRAFT MASTER PLAN

The 2007 draft master plan provided a starting point for this current planning effort. The information added since the last master plan includes field surveys of the irrigation canals, reconciliation of conflicting construction records, identification and population of previously unknown facilities, and calibration of the hydraulic models to recent flow monitoring data.

Since the system is so interdependent on the irrigation canals, more details collected by City staff (including many more cross-sections and slopes), allowed for the creation of more accurate models. Failure to account for this interaction could result in overestimating problems in some areas and underestimating them in other areas. The primary goal of this effort is to develop a capital improvement plan that accurately reflects the true needs and priorities of the City's stormwater system. Through field work and reviewing City records, Keller Associates and City staff were able to update the model to more accurately reflect basin boundaries, previously unaccounted-for large diameter pipelines, drainage connectivity, proper pipe sizes, and functionality of irrigation spills. Additionally, hydrologic model inputs such as soil infiltration and impervious land cover percentages were updated.

2.0 STUDY AREA

This section discusses the study area and its physical characteristics. Also discussed are pertinent land use and planning criteria.

2.1 STUDY AREA

The study area is comprised of the areas within the City limits, the Urban Growth Boundary (UGB), and additional area outside of these two boundaries where stormwater runoff collects before it drains into the City's storm system. The City's UGB (UGB & Urban Reserve) is made up of 9,992 acres of land. Adding outside drainage areas brings the total study area to approximately 27,000 acres. Figure 1 in Appendix A illustrates the City limits, the UGB, and the study area.

2.2 PHYSICAL ENVIRONMENT

The physical environment of the study area includes climate, soil characteristics, and topography.

2.2.1 Climate

Grants Pass lies within the Rogue River Valley, which has a relatively mild climate characterized by cool, wet winters and hot, dry summers. A summary of climate data for Grants Pass is shown in Table 2.1.

Table 2-1: Climatological Data (1893-2015) – Grants Pass, Oregon

	Jan	Feb	Mar	Apr	May	June	July
Precipitation (in)	5.45	4.17	3.27	1.86	1.40	0.75	0.25
Snowfall (in)	2.2	0.9	0.4	0	0	0	0
High Temperature (F)	47.2	54.1	60.4	67.1	74.3	81.3	89.9
	Aug	Sep	Oct	Nov	Dec	Annual Average	
Precipitation (in)	0.28	0.78	2.23	4.58	5.58	30.61	
Snowfall (in)	0	0	0	0.1	0.9	4.5	
High Temperature (F)	89.6	82.9	69.8	53.9	46.5	68.1	

*Source of data: Western Regional Climate Center

2.2.2 Soils

In general, soils within the study area are primarily sandy loam, mixed in with other types of loam. Slopes vary from 0 to 60 percent. Soils data from the area was obtained from the NRCS website. A soils map and listing of soils within the study area can be found in Figure 2 in Appendix A. Soils characteristics pertinent to this study include both slope, depth to groundwater, and runoff infiltration capacities. Sandy loam soils will generally soak up more runoff than high clay soils.

2.2.3 Topography

Grants Pass is divided by the Rogue River, which runs from the east to the west across the study area. The highest elevations are on the far north side and far south side. Surrounding hills are significantly steeper than downtown areas. Ground elevations in the study area range from a low of approximately 860 feet above mean sea level near the Rogue River, to approximately 1790 feet above mean sea level near the northeastern boundary of the study area. The overland slopes in the City typically average 2.6%. The study area topography is shown in Figure 3 in Appendix A.

2.3 STORMWATER BASINS

Stormwater from the study area generally drains into six receiving streams: Jones Creek, Skunk Creek, Gilbert Creek, Fruitdale Creek, Allen Creek, and Sand Creek. All water eventually drains to the Rogue River. The storm systems that drain to each of these receiving streams is delineated in Figure 4 in Appendix A, and the approximate percentages of the study area draining to each are summarized in Table 2.2.

Table 2-2: Percent of Study Area Draining for Each Major Drainage Basin

Jones Creek	Skunk Creek	Gilbert Creek	Fruitdale Creek	Allen Creek	Sand Creek
20%	10%	18%	21%	14%	17%

2.4 LAND USE

The City of Grants Pass includes lands designated as open, commercial, industrial, public right-of-way (e.g. transportation roadways), and residential. Existing land use for the study area is shown in Figure 1 in Appendix A. It is anticipated that future development will not substantially increase stormwater peak runoff rates since the recommended policy within the study area requires post-development runoff rates to be limited to pre-existing conditions.

2.5 UGB STATUS

The City of Grants Pass expanded their UGB in November 2014. A report from the City suggests there could be 60,564 total residents in the existing and expanded UGB by 2050. The figures in Appendix A of this report reflect the new UGB.

3.0 BASIS FOR EVALUATION

3.1 IRRIGATION NETWORK CONDITIONS

The hydraulic conditions in the GPID facilities vary widely by season. The condition that was chosen by the City to be modeled is the winter drainage scenario, which corresponds to the period when the larger storm events generally occur. In this scenario, the gates (referred to as spills) from the irrigation canals are typically open to allow flow into the creeks and river. A few exceptions to this were discovered in the calibration process. Most irrigation laterals (drainage ways branching off the main canal) are closed under the winter scenario. Only drainageways used as drainage spills remain open. Figures 5A through 5D in Appendix A show the locations of each spill.

For the winter drainage scenario, irrigation water has been shut off and is not passing through the canals for distribution. The only water entering the canal system is from rainfall runoff. The scope of this project includes the evaluation of only one drainage scenario. It is possible that a storm event during the irrigation season, when the canals are already full, presents an equal or greater risk to the system. When additional funding becomes available, the summer condition should be evaluated.

3.2 PLANNING CRITERIA

Stormwater system planning criteria encompass the fundamental standards of performance in evaluating the existing system and planning for future expansion of the system. After reviewing regional, industry, state, and federal standards, the criteria ultimately selected and applied in this study were tailored to fit the needs of Grants Pass.

The aim of establishing planning criteria is to provide consistent guidelines and methods with which to evaluate the existing and future system.

To establish planning criteria for Grants Pass, established policies of other communities were investigated. Findings from these investigations and recommended standards for Grants Pass are summarized in Table 3-1. Some communities directly adopt the standards developed by others. This is the case with Josephine County, which uses the ODOT/APWA standards. For this reason, Josephine County was not included in the table as a separate column. Other smaller communities' standards were also considered, but were not included in Table 3-1. Additional details on the basis for each item's recommendation are provided in the following sections.

Table 3-1: Storm Drainage Design Criteria Comparison

Item	Grants Pass (Recommended)	Grants Pass 2007 SWMP	ODOT	Eugene	Ashland	Portland
Model Approach	SWMM (runoff)	SWMM (runoff)	SBUH	TR55, Rational, HEC-1, SWMM	TR-55, Rational	Various
Storm Distribution	NRCS 1A	NRCS 1A	NRCS 1A	Specific Historic Storms	NRCS 1A	NRCS 1A
24 hr Storm Precipitation	NOAA	NOAA	NOAA	Specific Historic Storms	NOAA	NOAA
PVC "n" value	0.013	0.010*	0.013	None Specified	0.011	0.013
Min. Pipe Diameter	12"	None Specified	12"	None Specified	12" for trunklines	12"
Design Storm: For Conveyance	25 yr	25 yr	50 yr	25 yr - sewers & channels 50 yr - culverts on arterials	25 yr for sewers 50 yr for culverts	25 yr
Design Standards For Detention Facilities on New Developments	Pre- and post-development runoff the same up to 50yr, 100yr overflow	None Specified	10 yr volume with 100 yr emergency overflow	Must Bypass 100 yr through Overflow	Overflow supports 25 yr event for <50cfs, or 100 yr >50cfs	Maximum Practicable
Detention Facilities Allowed Inside Floodway/ Flood Plains?	Floodway: No Floodplain: with Approval	None Specified	Floodway: No Floodplain: Yes	Has specific instructions for facilities above and below 500 ft.	None Specified	Floodway: No Floodplain: No
Infiltration Policy	Case-by-Case	Yes, with requirements	Not Allowed	Yes, with requirements	Discussed in Master Plan	Allowable
Roof Drains to Gutter or Yard?	Yard	Pervious Areas**	Gutter	None Specified	None Specified	Gutter

*From City of Grants Pass Sanitary Sewer Design Standards & Specifications
**From Grants Pass Comprehensive Plan

3.3 POLICY AND STANDARDS

3.3.1 Design Storms

The design storm is a theoretical storm event with typical characteristics for storms in a given region. The design storm becomes the standard used to measure the performance of the storm drain system.

One parameter of a design storm is the total depth of rainfall expected to occur over a given time period, or duration. Another parameter is the recurrence interval, or the average time interval between equal events. For example, a 100-year storm event is likely to occur on average once every 100 years, or in other words, has a 1% percent chance of occurring any given year. The National Oceanic and Atmospheric Administration (NOAA) has published

isopluvial charts showing rainfall depths for a range of recurrence intervals in certain geographic areas. Table 3-2 presents the rainfall depths for the City of Grants Pass obtained from the NOAA isopluvial charts.

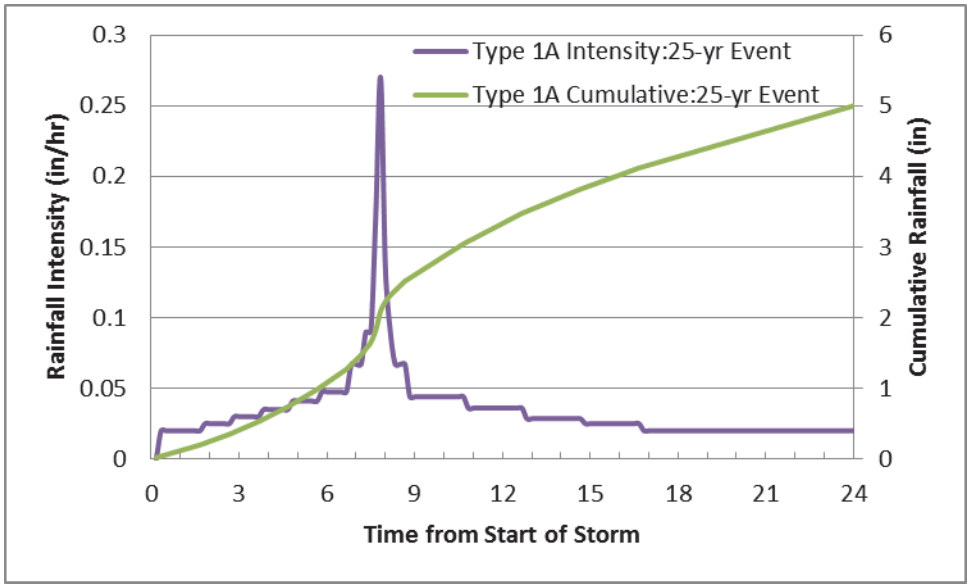
Table 3-2: 24-hour Storm Depths

Storm Event	Precipitation (in)*
2-year	3.0
5-year	3.7
10-year	4.1
25-year	5.0
50-year	5.5
100-year	5.9

*Source: NOAA Atlas 2, Volume X

Another parameter of a design storm is how the given amount of precipitation is distributed over the duration of the storm (temporal distribution). A hyetograph illustrates the typical temporal distribution of a storm. The hyetograph shape is theoretical and is based on historical data collection and extrapolation. The Natural Resource Conservation Service (NRCS) has developed region-specific hyetographs for the State of Oregon. For Grants Pass, the NRCS recommends the use of a Type 1A distribution. The 25-year storm hyetograph is illustrated in Chart 3-1.

Chart 3-1: Type 1A 25-year, 24-hour Hyetograph



Selection of a design storm is a matter that balances level of service with economic feasibility. Grants Pass does not currently have design standards for conveyance or detention facilities. The 25-year storm event is recommended as the design storm for conveyance (more specifically, the stormwater system should be capable of carrying the runoff from the contributing area for the 25-year storm event without flooding). Detention facilities should be

designed to hold the 50-year storm event, with overflows capable of safely conveying the 100-year storm event.

For detention facilities, the post-development runoff from the 50-year storm cannot exceed the pre-development runoff from the 50-year storm. In addition to the 50-year storm, the detention facility should serve the same function for limiting post-development runoff from smaller storm events (i.e. 25, 10, 5 & 2 year). This recommendation is typical of what many other communities in Oregon have established. Pre-development conditions should be defined as ideal hydrologic conditions prior to any manmade development (i.e. prairies and grasslands).

New detention facilities should not be located in a mapped floodway for the 100-year event as delineated by FEMA. Facilities in the 100-year floodplain need careful review to ensure they are designed to function during a 100-year flood event. The 100-year storm event for a stormwater basin does not necessarily coincide with the 100-year flood event for a given floodplain. The 100-year floodplain is influenced by many factors from a much broader river basin area.

The 2007 master plan recommended a policy that the 2-year post-development runoff volume should not exceed ½ the pre-development runoff volume for new developments. This policy is intended to improve stormwater quality and mitigate flooding from smaller storm events. However, it is important to recognize that any amount of runoff could be problematic to the receiving waters depending on pollutant type and concentration. The volume of flow is not necessarily directly correlated to the resulting stormwater quality. Regardless, policies like this are common because direct stormwater quality monitoring and treatment is not generally practiced.

3.3.2 Pipe Parameters

There are three parameters that are generally established for system analysis and design: pipe minimum roughness, minimum size, and minimum slope.

A roughness value (Manning's n) is typically established in city codes to set a minimum value allowed for design calculations based on PVC pipe. It is recommended that Grants Pass adopt 0.013 to be used as the Manning's n value for PVC pipes. Though manufacturers often claim lower Manning's n values based on laboratory testing (which would imply greater conveyance capacity, potentially alleviating more flooding), a more conservative n value will add a factor of safety and account for flow variations that occur in the field.

The minimum size for storm pipes should be 12 inches in diameter, in order to pass stormwater and unexpected debris through the system without clogging or surcharging.

The 10 States Standards, generally accepted in the design industry when designating minimum pipe slopes, are recommended for Grants Pass. These standards account for a minimum velocity of 2 feet per second when the pipe is flowing full, assume a Manning's n pipe roughness of 0.013. The following table provides minimum slopes for pipe sizes under these conditions. The minimum slopes from Grants Pass Sanitary Sewer Standard Specifications are also provided in Table 3-3 for reference. Though flatter slopes are allowed in 10 States Standards for pipelines 24 inches and larger, these are difficult to construct, and so a minimum

slope of 0.12% is recommended below. A maximum velocity of 10 feet per second is recommended to reduce premature wear on pipe joints and manhole sections caused by high system velocities.

Table 3-3: Minimum Pipe Slopes

Nominal Pipe Size (inches)	Minimum Slope - 10 States Standards (Feet per 100 Feet)	Minimum Slope –City Sanitary Sewer Standard Specifications (Feet per 100 Feet)
12	0.22	0.22
14	0.17	N/A
15	0.15	0.16
16	0.14	0.16
18	0.12	0.12
21+ and larger	0.10	0.12

Pipes in the model were assumed to be clean and free of debris. While it is not likely that pipes are completely clean, this criteria prevents a recommendation for a costly capital improvement in areas of flooding caused by a clogged pipe that could be mitigated by simply cleaning the pipe.

3.3.3 Infiltration Policies

Constructed infiltration systems are not needed for conveyance in Grants Pass because there is a sufficient amount of volume available in the existing creeks in Grants Pass to pass the 25-year event. Future water quality regulations may, however, require infiltration. DEQ maintains strict regulations for underground injection systems, which are avoided if infiltration is not allowed. Soil conditions in Grants Pass can vary greatly, making it difficult to establish a blanket standard for infiltration facilities. Keller Associates recommends the City's standards allow for infiltration facilities on a case-by-case basis with supporting geotechnical data and conformance to DEQ's regulations.

3.3.4 Roof Drains

Roof drains should drain to the yard to slow the arrival of runoff to the stormwater system, potentially reducing peak flows. There are differing opinions throughout Oregon regarding this policy. The fertilizer, pesticide, and animal droppings from lawn runoff can lead to water quality concerns downstream. However, since most events will infiltrate and stay onsite, Keller Associates recommends a policy of draining to the yards.

4.0 MODEL METHODOLOGY

A stormwater model correlates interactions of natural events with natural and manmade systems. Because there are countless variables with broad ranges of reasonable values in each system, a well-coordinated and strategic data collection effort is required, along with practical assumptions and good judgment for data that cannot be feasibly obtained. This section outlines the model construction process, beginning with data collection to how key assumptions were incorporated to construct the model of the Grants Pass existing stormwater system.

The stormwater model consists of two components: a hydrologic model and a hydraulic model. The hydrologic model consists of drainage basins, or geographic areas that drain to a specific point, and a temporal distribution of storm events (hyetograph). Input parameters such as area, surface slope, width, soil infiltration, and percent impervious surface define each of these minor basins. Input parameters determine how much rainfall is converted to runoff, and when the runoff reaches the outlet point. The hydraulic model then routes the hydrologic model's runoff through the storm drain network of open channels, detention ponds, and pipelines.

Each component of the stormwater model requires numerous input parameters to adequately simulate the actual rainfall events and the resulting effects on the storm drain network. The parameters and input assumptions are explained and summarized in this chapter.

XPSWMM is the software modeling package utilized for modeling the City's stormwater collection system. XPSWMM was used for the 2007 master planning efforts and remains an appropriate choice for continuing the modeling and planning efforts. Phases 2 and 5 of this project updated the four XPSWMM models from version 9.10 to version 15.0 (or XPSWMM 2014 as it is commonly referenced).

The area within the Grants Pass urban growth boundary was delineated into six major drainage basins. These six major basins were further divided into minor basins to incorporate into the model. Major basins are shown in Figure 4 in Appendix A. Minor drainage basins are shown in Figures 6A-6D.

There are four unique models that correspond to one or two of the major drainage basins. Many parameters were updated based on more detailed information collected since the 2007 model was developed. These included survey data from irrigation canals, flow monitoring data, operating scenarios for Grants Pass Irrigation District (GPID) facilities, and the Redwood Drainage Study and associated 2D storm drainage computer model developed for Josephine County. The links updated with more available information by this master plan can be found in Figure 7 of Appendix A.

4.1 KEY ASSUMPTIONS

Due to the nature and uncertainty of stormwater, hundreds of assumptions and "what if" scenarios go into the creation of a stormwater master plan. The goal is to capture a storm significant enough to simulate flooding in the majority of situations. It is entirely possible that an

actual 5-year storm event could flood the City, even though improvements are recommended for the textbook 25-year event.

4.1.1 Basins and Boundary Conditions

The following assumptions were made for basins and boundary conditions:

- For the purposes of this study, a 60 cfs GPID inflow (an estimate for the amount of upland stormwater flow that overtops the South Highline Canal in the Sand Creek model, and runs overland in the model) was split between two input locations. Each was input as a direct inflow Type 1A distribution with a peak flow of 30 cfs.
- All upland stormwater not draining to known storm and irrigation system components in Allen-Fruitdale and Skunk-Jones was assumed to drain directly to the creek, and was therefore not entered in the model.

4.1.2 Pipes, Ponds, and Channels

The following assumptions were made for pipes, ponds, and channels:

- All pipes are in good repair.
- All pipes are free of debris.
- All channels have been dredged on a regular schedule to maintain the sizes documented in the site surveys, videos, and photos.
- Natural channels and detention ponds have been mowed to remove excess vegetation, with only the plants intended to be used as water quality features remaining.
- It is assumed that the river and creeks have sufficient capacity to carry away all water discharged to them from the stormwater and canal network.

4.1.3 Flow Redirection and Connectivity

Previous XPSWMM versions often used a parameter called flow redirection to add flow from basins that did not contain a modeled line. The Grants Pass XPSWMM models have been updated to remove flow redirection. An alternative method of inputting flow locations was used. This method directs the flow from minor basins in which all lines are un-modeled to the location where the flow would actually enter the modeled network. As part of the model update process, every runoff node was checked to verify that the parameters were reasonable, and that each basin flows to the correct node.

4.2 SURVEYING ACTIVITIES

As a part of this project, the City Surveyor collected field information to better define the features to be modeled. The surveyor walked the entire length of the four major irrigation canals within the city limits and gathered typical cross-sections, channel bottom elevations at grade changes, and location, type, size, dimensions, and inverts of all canal spill points. Digital photography and video were recorded during this process. Datum accuracy was checked by taking survey shots at locations already existing in the XPSWMM model. The datum of the most recent survey and the XPSWMM model are the same.

The surveyor also gathered more detailed data on locations that were vague or contradictory in the City's existing stormwater system mapping. Discrepancies were found between model connectivity and pipe sizes compared to those shown in the City's records. These discrepancies were investigated and updated in the model.

During the calibration process, flow at several locations did not match between the modeled and the monitored flow. These areas were further investigated by the City Surveyor and Keller Associates' staff, and the model was updated to reflect observed conditions.

4.3 FLOW MONITORING

Temporary stormwater flow meters with data loggers were installed at strategic points in the stormwater system to observe runoff resulting from actual storm events. The intent of flow monitoring is to adjust the model parameters to reflect observed conditions for the same storm event. Locations of flow meters were selected to isolate basins and land use types, to better understand the interaction of irrigation canals with the City's storm system, and to further define the effects of wetlands, detention and retention facilities. Selected flow monitoring locations for the most recent round of flow monitoring are shown in Figure C.1 in Appendix C.

Flow monitoring was completed twice during this phase of the project. The first round occurred in February and March of 2013. Even though the flow meters were installed during a typically rainy period, unfortunately no significant storms were recorded.

The second round of flow monitoring was more successful than the first in capturing the necessary data for model calibration. It occurred in December 2013 and January 2014, and recorded one significant storm event. While more storms are typically used in the calibration process, it was determined that the data available would have to suffice, due to the time associated with further extending the flow monitoring process.

Both flow monitoring periods included 16 locations and used Hach Sigma 910 flow meters.

4.4 CALIBRATION

The XPSWMM model was calibrated to match field observed flows. Peak flows were targeted for calibration (as this reflects the design criteria of the stormwater facilities), but often the model matched much more than the peak flow. Pipes that were not circular were calibrated to water surface elevation. This provides a similar result to calibration based on flows. Chart 4-1 shows an example graph comparing flow monitoring data and modeled data.

Chart 4-1: Comparison of Modeled Flow to Flow Monitoring Results at Ballinger Drive & Greenwood Avenue

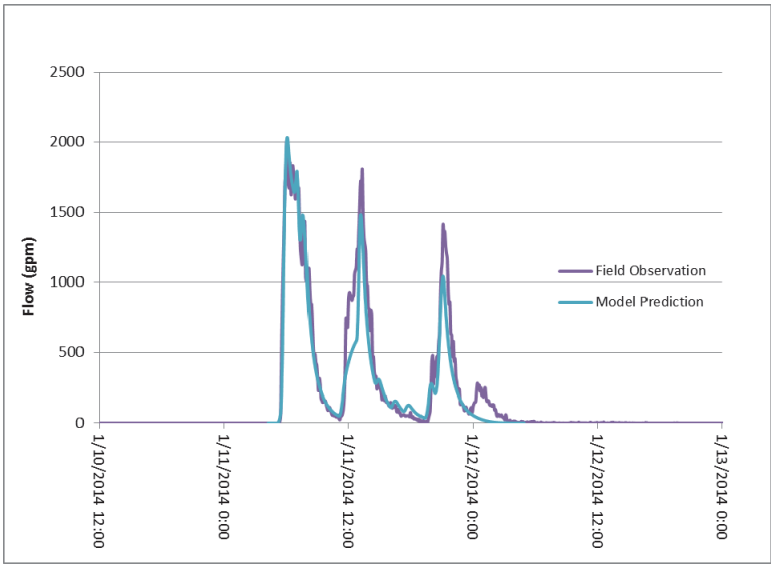


Table 4-1 compares peak flows from the flow monitoring data and the calibrated model. One of the monitored locations did not provide sufficient data. Out of the other 15 locations, all but one matched within 5% of peak flows, with the majority of the locations within 1.5%.

Table 4-1: Comparison of Modeled Flow to Flow Monitoring Results at Flow Monitoring Locations

Location	Monitored Peak	Recalibration Modeled Peak
1	7.34 in.	7.37 in.
2	2970 gpm	3011 gpm
3	3424 gpm	3396 gpm
4	6735 gpm	6731 gpm
5	5041 gpm	4826 gpm
6	2010 gpm	2033 gpm
7	1367 gpm	1416 gpm
8	5175 gpm	5223 gpm
9	insufficient data	N/A
10	3550 gpm	3546 gpm
11	2246 gpm	2220 gpm
12	1558 gpm	1564 gpm
13	4643 gpm	4661 gpm
14	6978 gpm	6777 gpm
15	12.81 in.	12.61 in.
16	1698 gpm	1665 gpm

As the stormwater model continually evolves as additional and improved information becomes available, the calibration accuracy will also become more refined. To calibrate flows, several modeling parameters were evaluated and adjusted including: minor basin width, slope, overland flow roughness, percent impervious ground cover, area, flow direction, soil infiltration capacity, open/closed status of gates, and pipe connectivity.

Width is one of the most versatile calibration tools. It is a number that changes the hydrograph, both in shape and time. The initial assumption is based on the flow length before channelized flow, but that can vary depending on many conditions. SWMM's published calibration methods call for changing width as the major driver for calibrating models. This is possible since width is not a physical quality in basins, but rather a theoretical calculated value.

Slope affects the time it takes for water to attenuate. It can only be used for fine-tuning changes to the model.

Percent impervious ground cover was reevaluated for each minor basin as a part of this phase. This is more than just a measure of how much impervious surface there is in an area; it determines how much of the area acts like an impervious surface (e.g. highly compacted soils). Similar land uses were assigned similar percent impervious within each model.

Infiltration parameters work in cooperation with percent impervious, and are not independent variables. Extra care was taken to balance these parameters to produce expected model flows. Infiltration affects the magnitude of peak and total flows. The Green-Ampt method was the primary infiltration method used.

Both overland flow ground roughness and pipe roughness are accounted for in the model. Ground roughness is used as a calibration parameter to change the timing of flows entering certain drainage features, and changes peak attenuation. Pipe and channel roughness were adjusted with the new data collected.

As part of this phase, system connectivity and minor basin boundaries were evaluated to determine if flow was being input into the correct locations in the model. Some discrepancies were found in the previous model. It appeared as if the minor basins in the 2007 model were drawn only around modeled pipes. For this model, all known pipes, ditches, and channels were included in the delineation of minor basins. In several places, there were fairly large changes to basin boundaries when the minor basin details were included. With the addition of more detail to the irrigation canals, it became possible to direct the flow from the surrounding basins to a more accurate place of entry into the model. Figures 5A-5D in Appendix A show the modeled lines in the system.

The gates (referred to as spills) from the irrigation canals are typically open to allow flow into the creeks and river. A few exceptions to this were discovered in the calibration process using the flow monitoring data. For example, two spill locations were closed when they were assumed to be open.

Stormwater models constantly improve as more information and flow monitoring results become available and are incorporated into the models. This master plan represents the first step towards having a detailed city-wide model. The amount of information available at this time provides a model detailed enough to evaluate regional areas of approximately 30 acres or larger. Each time the City or a developer performs a stormwater analysis on a smaller scale (less than 30 acres), the results of those evaluations should be incorporated into the city-wide stormwater model. Additional flow monitoring from small scale evaluations targeting smaller basins will improve the accuracy.

The stormwater model will continually evolve as additional and improved information becomes available. A good example of this is that for this phase of the SWMP, the accuracy of the model greatly increased by adding more detail to the canals in the system and calibrating to flow monitored locations.

4.5 IRRIGATION FACILITIES AND OPERATING SCENARIOS

The four major irrigation canals were added or further refined in the model based on information gathered from the survey. This refinement included cross-sections at grade-breaks and other major cross section transformations identified by the City surveyor. It also includes information about changes in materials.

In the summer months, the irrigation system runs water through the canals, thus, the irrigation spills to the drainage system are generally closed. This normally is a functional operation until a storm event occurs. In the event of a storm, the canals can overtop and flood low-lying areas rather than conveying drainage through the city.

In the winter months, when the weather is typically wetter, the irrigation canals are not conveying water to irrigation customers; thus all spills should be open, and the system functions as part of the storm drainage system. During the process of calibration and flow monitoring, it was discovered that two reportedly open spills were closed or otherwise obstructed. The lack of tracking for the process of opening and closing spills and valves can cause issues, resulting in additional potential flooding if all spills are not completely open as expected. Given the potential for damage to public and private property, a streamlined communication network and a clear delineation of responsibilities between the irrigation district and the City is recommended. This organizational effort is being addressed further in a separate Memorandum of Understanding and Agreement between the City and the Grants Pass Irrigation District.

The operating scenario chosen for evaluation was the winter operating scenario in which all irrigation spills were assumed to be open to allow drainage directly into the City's system.

4.6 COMPARISON WITH REDWOOD AVE. DRAINAGE STUDY

The Redwood Avenue Drainage Study used the 2D model produced for the County by the consulting firm Cardno WRG to evaluate existing stormwater drainage conditions, and proposed solutions. Table 4-2 compares results from the City's newly updated 1D model and the County's 2D model. A portion of a map presented in the County's SWMP that Keller Associates

annotated to compare results of the two models is included in Appendix D. In a 1D model, locations are evaluated as points at the ends of pipes, culverts, or channels. On the map in Appendix D, the black and white screenshot with red dots shows the location of City modeled lines in the selected area. The red dots represent the points of concern for the City model. In a 2D model, locations are evaluated as part of a grid. Flooding grid squares for the 2D model are shown in blue in the color screenshot on the map in Appendix D. The two models indicate flooding in similar areas, which further validates the 1D model.

4.7 COMPARISON WITH COUNTY 2 D MODEL

In addition to the Redwood Avenue section discussed earlier, the County's 2D model encompassed an area similar to the Sand Creek Basin allowing for a valid comparison. Four comparison locations modeled in both models are shown in Table 4-2 and Figure D.1 of Appendix D. The first three locations in the table were flow monitored locations, so they are the best calibrated locations in the 1D model. The fourth location was chosen to show an area of the City that is not covered by flow monitoring, and highlights the importance of flow monitoring in calibration.

Table 4-2: Comparison of 1D and 2D Model Locations

Location # on Figure D.1	City Model Link ID	County Model Link ID	City 1D Flow 25-year (cfs)	County 2D Flow 25-year (cfs)
1	SA-N140L*	6-DRNL-LR	28	27
2	SA-N089L*	SA-N089LR	15	25
3	SA-N070L	SA-N069LR	54	28
4	SA-N066L	SA-N066LR	97	971

*Calibrated model before redwood Avenue Improvements were incorporated

The three flow monitored locations came within a reasonable range of the County's 2D model (the results are not expected to be identical due to the nature of 1D vs. 2D models). The fourth location needs further investigation as part of a future phase of the stormwater master plan to determine the cause of the discrepancy. In the 2D model, the links are shown overtopping their banks and flooding the area, causing flow to reenter the system further downstream. The source of the extra water is unclear from the reference materials provided, but the amount appears to be excessive based on observed runoffs from similar basin areas. The discrepancy is likely due to improved information about pipe connectivity gained through the field observations in this phase. In the 1D model the pipes are not surcharging, and thus no water is lost. When this discrepancy was discovered, basin details were further evaluated to confirm the 1D model had been set up properly, and no errors were discovered.

5.0 EXISTING SYSTEM CONDITIONS

Field investigations were performed to assess conditions of existing facilities and determine details necessary to create the computer model. This chapter summarizes the existing hydraulic conditions and identifies existing deficiencies. Figures 8A through 8D in Appendix A show the existing system.

5.1 FIELD EVALUATIONS SUMMARY

During field investigations, physical conditions of detention basins, river outfalls, and irrigation canal spills were evaluated to determine condition and determine if any improvements are needed. Appendix E contains the rating system used for the field investigations and contains maps of the various assets that were evaluated. Field notes recorded for each facility have been provided to City staff as a separate document for reference.

5.2 MODEL EVALUATIONS

The computer model described in section 4 was used to evaluate the existing system conditions for flooding areas, bottlenecks, and undersized pipes. The results are presented in the following sections.

5.2.1 Flooding Areas and Alternative Analysis

The models were run at storm event return intervals of 2, 5, 10, 25, 50, and 100 years. The nodes that flood during each time frame are shown in Figures 9A through 9D of Appendix A. Each flooding node has been assigned to a geographic or hydraulically connected group. The alphabetic labels for the areas are solely to provide a unique identifier, and do not have any significance relative to priority of improvements. Each of the 48 areas is shown in Figures 10A through 10D in Appendix A and described briefly below, with each individual issue and possible alternatives to mitigate flooding. Some alternatives are presented as a concept only; once it was determined that an approach was not feasible or another alternative was thought to be better for the overall system, that alternative was not developed further or evaluated in the model.

The overall outcome of the proposed improvements is very dependent on all improvements working together, and an overall recommended system solution is presented in section 6. The stormwater network has been modeled with all of these improvements working together to meet the design criteria. These planning level solutions should be further refined (and in some cases additional evaluation of alternatives completed) as part of predesign. Any deviations from the current concept should be evaluated in the system-wide computer model to ensure improvements are consistent with the overall master plan.

In the flooding area summaries presented in this section, a brief description of the areas and problems are presented in the following format:

- **Title Bar:** Area identifier and general location
- **First line below title:** description of the area affected by the flooding, and the basin name.
- **Second line below title:**

- *First floods at:* This identifies the smallest storm event (e.g. 2-, 5-, 10-, 25-year) at which the area first begins flooding.
- *25-year flood time:* This is the predicted time the area would remain flooded if all of the flood water ponds at the location where flooding occurs. In reality, the time flooded may be greater or less, depending on overland flow patterns during flooding. This value provides a basis of comparison for the severity of the flooding.
- *25-year flood volume:* This is the predicted volume of floodwater resulting in the flooded area. Similar to the flood time, it is provided as a reference for comparing severity of flooding at different locations. Values are reported in cubic feet (cf).

- **Deficiencies:** Summary of issues
- **Potential solutions:** Alternatives to address identified issues

Area A: Pond Upstream of 7th Street and Outlook Avenue		
Potential flooded area: 7th Street and the field surrounding the pond		*Basin: Skunk Creek*
First floods at: 5-year	*25-year flood time: 55 min.*	*25-year flood volume: 12,845 cf*

Deficiencies:

1. This area is downstream of a pond with an outfall pipe crown above the top of pond. This does not allow for 1 ft. of freeboard in the pond. Currently, the water overtops the pond before the top of the outfall flows full. The field around the pond may flood.
2. Further downstream, pipes are undersized to carry design flows. 7th Street may flood.

Potential solutions:

1. Pond Solutions
   a. Construct a berm around pond to allow for 1 ft. freeboard above top of outfall pipe.
   b. Lower outfall pipe
2. Downstream pipes
   a. Upsizing and regrading pipes
   b. Adding a parallel pipe

Area B: 9th Street by High School to F Street

Potential flooded area: 7th Street and the field surrounding the pond		*Basin: Skunk Creek*
Smallest event flooding: 25-year	*25-year flood time: 56 min.*	*25-year flood volume: 33,378 cf*

Deficiencies:

1. There is a large portion of the Skunk Creek Basin that flows to the pipe downstream of this area, causing water to back up into this area. There is an existing 48-inch pipe that currently is not connected to the system, but runs nearly parallel to the problem area. This area floods Madrone Street for approximately 83 minutes during the 25-year storm event, (with potential impacts to the surrounding houses), and floods the canal between D Street and E Street near businesses for approximately 91 minutes.

2. While not contributing to the model's prediction of flooding in this area, there are some maintenance and cleaning needs noticed in the field (as seen above) that need to be addressed.

Potential solutions:

1. Upsize the entire line in this area from Madrone Street to the river.
2. Redirect flow from this area down the existing 48-inch line that is currently not being used to a new outfall at Skunk Creek. This effort should be coordinated with redirection of flows in Areas E, F, and I presented later.

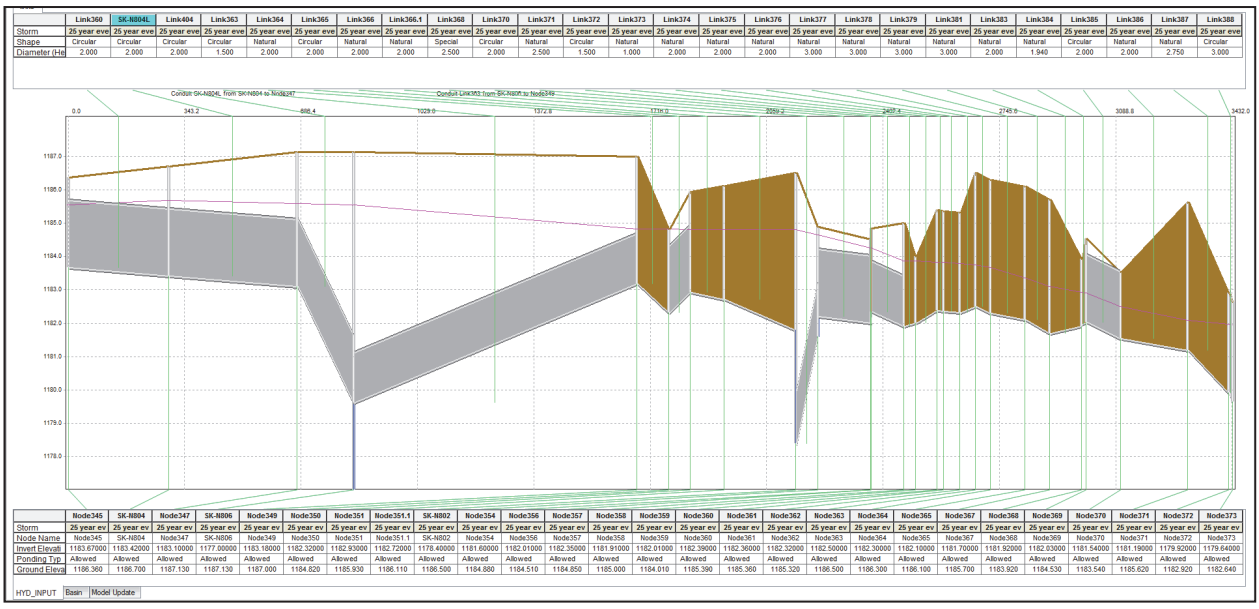
Area C: Canal North of Freeway near Beacon Drive

Potential flooded area: residential area and fields		*Basin: Skunk Creek*
First floods at: 5-year	*25-year flood time: 98 min.*	*25-year flood volume: 11,982 cf*

Deficiencies:

1. This area floods due to low spots in the channel walls, and an inconsistent channel slope with adverse grades as shown in the following profile. The channel meanders around yards, houses, and fields.
2. The irrigation spill, which crosses under I-5, is

also a potential flooding area. The county recently completed some improvements in this area, but it is unknown to the City what these improvements were. A survey could find that this pipe is now adequately sized.



Grey = piped segments; Brown = open channel segments; Brown line = ground surface or top of bank; Red line = hydraulic grade, or maximum water surface elevation

Potential solutions:

1. Channel solutions
   a. Create a uniform cross-section channel with a uniform slope that varies in depth with ground elevation.
   b. Pipe canal
2. Spillway solutions
   a. Do nothing; it is in the middle of a field and only floods in the 5+ year events
   b. Increase culvert diameter downstream of outfall

Area D: N Street and Rose Place

Potential flooded area: N Street and the surrounding residences		*Basin: Skunk Creek*
First floods at: 25-year	*25-year flood time: 4 min.*	*25-year flood volume: 2 cf*

Deficiencies:

This area floods in the model due to an undersized outlet. However, this area may have unmapped stormwater pipelines that are capable of conveying local runoff without flooding.

Potential solutions:

1. Survey the pipes in N Street and re-delineate the basins with more detail. Add the additional information to the

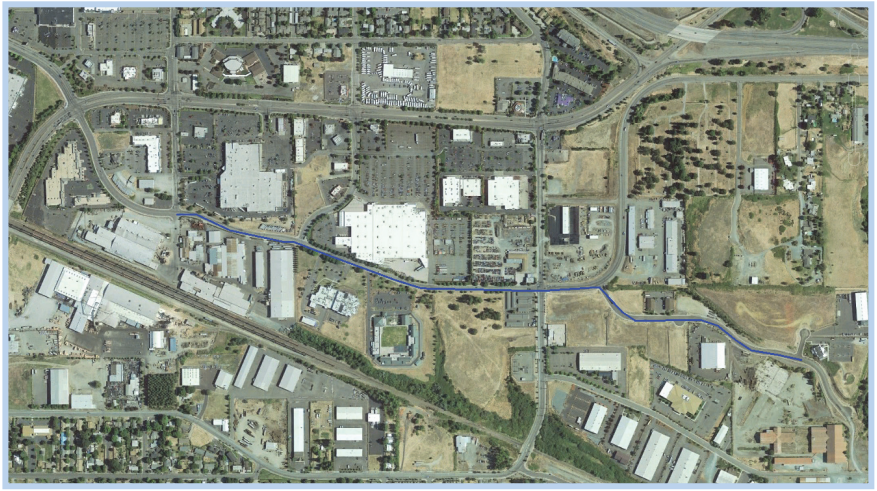
model. This may reveal that there is no flooding problem in this area.
2. Replace pipes downstream. This may be difficult since the outfall daylights at a cliff.
3. Create new spill of N Street pipes to irrigation siphon. This would require an adverse grade overflow, because the siphon is higher than the storm pipe.

Area E: M Street		
Potential flooded area: businesses and residences surrounding M Street		*Basin: Skunk Creek*
First floods at: 2-year	*25-year flood time: 305 min.*	*25-year flood volume: 36,974 cf*

Deficiencies:
The pipeline in M Street is undersized.

Potential solutions:
1. Upsize the entire line along M Street, and create a new outfall to the river
2. Construct an overflow to Rogue Drive that allows the surcharged pipe to flow in reverse. This should be done in coordination with fixing Areas B, F and I.

Area F: F Street and Industry Drive		
Potential flooded area: roads and adjacent businesses		*Basin: Skunk Creek/Jones Creek*
First floods at: 2-year	*25-year flood time: 408 min.*	*25-year flood volume: 287,225 cf*

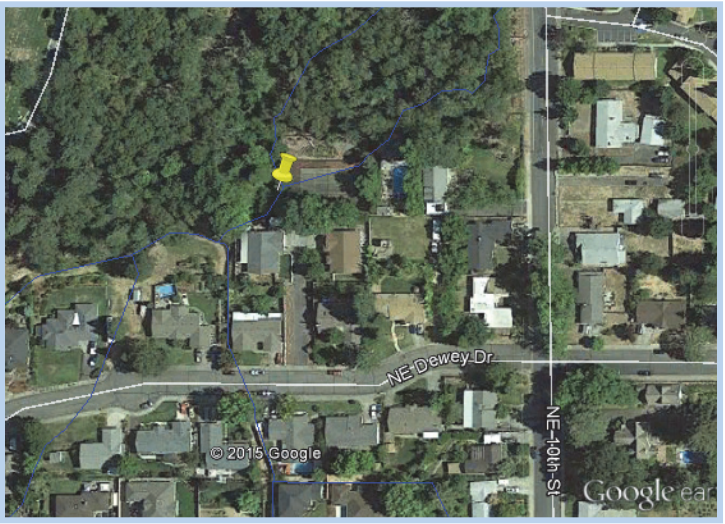


Deficiencies:
1. The pipelines in F Street/Industry Drive are undersized.
2. There is insufficient detention storage
3. Water backs up from downstream pipes, causing flooding along the entire line

Potential solutions:
1. Reroute flows along Rogue Drive, and Agness Avenue to River; create an overflow for the east end to Jones Creek; and construct a detention pond to slow flows from running offsite. This should be done in coordination with fixing Areas B, E and I.
2. Upsize lines all the way from upstream end of Industry Drive to the river. Detention will be needed.

Area G: Dewey Drive and 10th Street

Potential flooded area: field and surrounding residences		*Basin: Skunk Creek*
First floods at: 2-year	*25-year flood time: 108 min.*	*25-year flood volume: 2,223 cf*



Deficiencies:

The channel is undersized to carry the design flows.

Potential solutions:

1. Widen and deepen channel
2. Add localized detention

Area H: Hillcrest Drive

Potential flooded area: Hillcrest Drive, 9th Street and surrounding residences and businesses		*Basin: Skunk Creek*
First floods at: 2-year	*25-year flood time: 89 min.*	*25-year flood volume: 16,677 cf*

Deficiencies:

1. The pipe on Hillcrest Drive is undersized, causing a bottleneck.
2. The flow split on 9th and Hill crest sends too much flow down 9th Street.
3. The survey of this area was not able to be completed during field investigations, due to a large blackberry grove covering land in front of the pipe.

Potential solutions:

1. Upsize pipes down Hillcrest Drive, and reconfigure flow split to send more flow down Hillcrest Drive.
2. Increase capacity of 9th Street overflow and canal downstream.

Area I: D Street, Staples, Alley between Anderson Street and Baker Drive

Potential flooded area: D Street and surrounding residences and businesses, alley		*Basin: Skunk Creek*
First floods at: 10-year	*25-year flood time: 125 min.*	*25-year flood volume: 11,794 cf*

Deficiencies:

1. Water from downstream pipes backs up in this pipeline, due to much of the Skunk Creek basin draining to the same line.
2. Some of the pipes are undersized (some have smaller diameters than upstream pipelines) and have inadequate grades.
3. the main drain runs under the large building as shown

Potential solutions:

1. Upsize pipes and channels all the way to the river. This would include approximately 1950 feet of pipe and 2075 feet of open channel.
2. Locally upsize pipes (provide adequate cover). Redirect flows from Areas B, E, and F away from the outfall of this area as described in their respective sections. Pipeline rerouting may need to be considered instead of pipeline upsizing for a portion of the pipeline, if the pipeline goes under Staples as shown in some of the mapping.

Area J: Between Hefley Drive and Savage Street

Potential flooded area: residences		*Basin: Skunk Creek*
First floods at: 25-year	*25-year flood time: 16 min.*	*25-year flood volume: 474 cf*

Deficiencies:

Shallow pipes in this area flood.

Potential solutions:

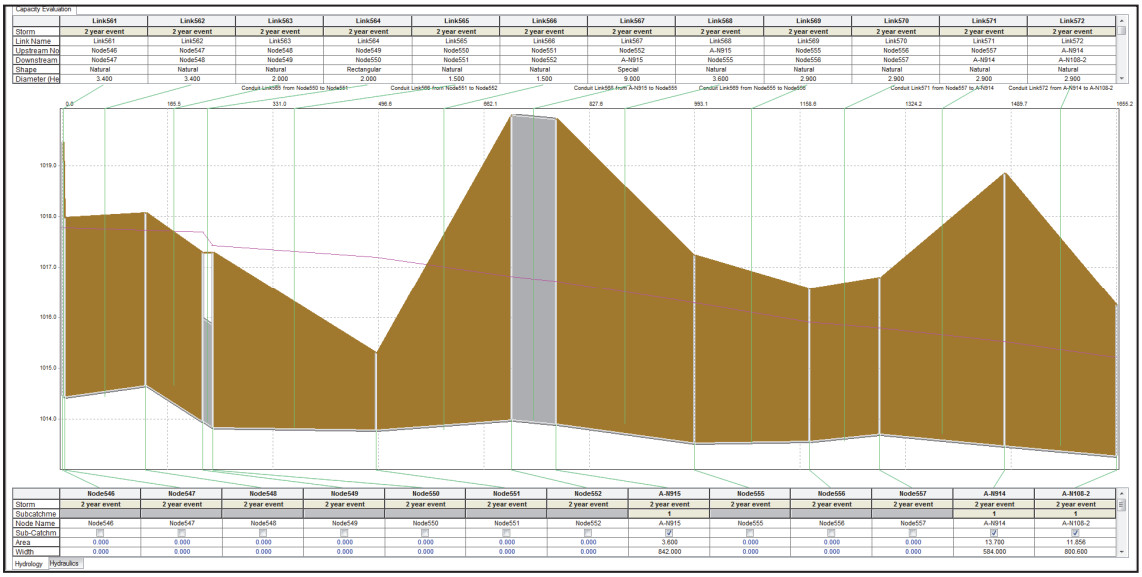
1. Further survey definition of this spill could decrease or increase the modelled flooding in this area.
2. Completing alternatives in other areas removes modeled flooding here.

Area K: South Highline Canal – Southern Flowing Portion near Allen Creek

Potential flooded area: Residences and businesses around canal		*Basin: Allen Creek*
First floods at: 2-year	*25-year flood time: 1408 min.*	*25-year flood volume: 329,330 cf*

Deficiencies:

The canal has many areas where the berms have eroded, or were never constructed as high as the surrounding area. There are adverse grades in the channel bottom, slowing the flow of water through the undersized canals.



Potential solutions:

All alternatives assume the eroded berms have been repaired.

1. Widen canal substantially to allow enough flow through
2. Construct a parallel pipe that will convey overflow from the canal
3. Replace the canal with a pipe

Area L: County Yard		
Potential flooded area: County yard and surrounding businesses		*Basin: Allen Creek*
First floods at: 2-year	*25-year flood time: 1752 min.*	*25-year flood volume: 6,303,146 cf*

Deficiencies:
The outlet pipe from the structure shown above is too small to pass design flows, and water backs up through the siphon into the ditch upstream where it overtops.

Potential solutions:
1. Upsize the outlet pipe. This will require connecting to the existing pipe further downstream than the existing intersection, due to cover requirements for the county's large trucks.
2. Bypass this structure and create a parallel pipe system.

Area M: Harbeck Road, Colorado Lane, Nebraska Avenue		
Potential flooded area: residences, a church, streets		*Basin: Allen Creek*
First floods at: 2-year	*25-year flood time: 102 min.*	*25-year flood volume: 52,248 cf*

Deficiencies:
The pipes are undersized to carry the design flows.

Potential solutions:
Upsize pipes to appropriate sizes as described in further detail in Section 6 and shown in Figure 11A of Appendix A.

Area N: South Highline Canal – Southern Flowing Portion near Fruitdale Creek- Southern Half

Potential flooded area: fields, residences, forest		*Basin: Fruitdale Creek*
First floods at: 10-year	*25-year flood time: 103 min.*	*25-year flood volume: 109,499 cf*

Deficiencies:

The canal receives upland flow and flow coming from areas upstream outside of the city limits that exceeds its capacity. This causes the canal to overtop.

Potential solutions:

1. Widen channel from City limits to Fruitdale Creek.
2. Create a new spill to river at the start of City limits to reroute flows originating from outside the City. This solution will also fix area X.

Area O: Parkdale Drive and Main Gravity Canal - Poplar Drive to Cloverlawn Drive

Potential flooded area: residences and businesses along canal and Parkdale Drive		*Basin: Allen Creek*
First floods at: 2-year	*25-year flood time: 166 min.*	*25-year flood volume: 163,789 cf*

Deficiencies:

1. The main gravity canal is undersized through this portion, causing water to overtop and flood surrounding areas.
2. Pipes down Parkdale Drive are undersized.

Potential solutions:

1. Create a new corridor for flow to exit canal to river down Parkdale Drive.
2. Add detention to the system and upsize pipe in Parkdale Drive.

Area P: Haviland Drive

Potential flooded area: Haviland Drive and surrounding residences		*Basin: Allen Creek*
First floods at: 25-year	*25-year flood time: 9 min.*	*25-year flood volume: 706 cf*

Deficiencies:
The pipes are undersized to carry the design flows.

Potential solutions:
Upsize pipes to appropriate sizes as described in further detail in Section 6 and shown in Figure 11A of Appendix A.

Area Q: Gaffney Way and Idle Court

Potential flooded area: Gaffney Way, Idle court and surrounding residences		*Basin: Allen Creek*
First floods at: 2-year	*25-year flood time: 143 min.*	*25-year flood volume: 41,330 cf*

Deficiencies:
The pipes are undersized to carry the design flows.

Potential solutions:
Upsize pipes to appropriate sizes as described in further detail in Section 6 and shown in Figure 11A of Appendix A.

Area R: Near Virginia Lane

Potential flooded area: Virginia Lane and surrounding residences		*Basin: Allen Creek*
First floods at: 10-year	*25-year flood time: 32 min.*	*25-year flood volume: 3,079 cf*

Deficiencies:
The pipes are undersized to carry the design flows.

Potential solutions:
Upsize pipes to appropriate sizes as described in further detail in Section 6 and shown in Figure 11A of Appendix A.

Area S: Harbeck Road and Southridge Way

Potential flooded area: residences. businesses, field, streets		*Basin: Allen Creek*
First floods at: 2-year	*25-year flood time: 318 min.*	*25-year flood volume: 41,470 cf*

Deficiencies:
The pipes are undersized to carry the design flows.

Potential solutions:
Upsize pipes to appropriate sizes as described further detail in Section 6 and shown in Figure 11A of Appendix A.

Area T: Northern Improvements to Allen Creek Basin

Potential flooded area: residences, businesses, park, streets , State highway		*Basin: Allen Creek*
First floods at: 2-year	*25-year flood time: 165 min.*	*25-year flood volume: 99,435 cf*

Deficiencies:

1. Many of the pipes are undersized to carry design flows.
2. The City reports that the sugar beet line may be blocked. Minor storm lines are connected to this line at several locations.
3. Water potentially floods the State highways 238, 199, and 99.

Potential solutions:
All improvements include adding detention, and rehabilitating the sugar beet line.

1. Upsize most of the pipes in this area, even those in highway ROW.
2. Upsize selected pipes and redirect flows to connect into the proposed alternative improvements in Area O.
3. Coordinate with State agencies to remove flooding on their highways.

Area U: West Park Street to River

Potential flooded area: residences around canal, West Park street		*Basin: Allen Creek*
First floods at: 25-year	*25-year flood time: 6 min.*	*25-year flood volume: 121 cf*

Deficiencies:
The canal is undersized to carry the design flows.

Potential solutions:
Upsize pipes to appropriate sizes as described in further detail in Section 6 and shown in Figure 11A of Appendix A.

Area V: Ramsey Avenue, Grandview Avenue, Williams Highway, Union Avenue, G I Lane Ringuette Street, Liberty Drive, Independence Drive, Harbeck Avenue

Potential flooded area: streets, hospital, businesses, fields		*Basin: Allen Creek*
First floods at: 2-year	*25-year flood time: 403 min.*	*25-year flood volume: 332,367 cf*

Deficiencies:
1. The canals and pipes in this area are undersized to carry the design flows.
2. The canal and pipe entering the canal need to be maintained.

Potential solutions:
The alternatives for this project include any number of choices for which pipes to upsize. Most of the pipes need to be upsized in any case. A connection between the canals is also part of this alternative. Flow splits should be adjusted to redirect flow as needed.

Area W: Meadow Glen

Potential flooded area: residences, field, Meadow Glen		*Basin: Allen Creek*
First floods at: 2-year	*25-year flood time: 127 min.*	*25-year flood volume: 9,479 cf*

Deficiencies:
The pipes are undersized to carry the design flows.

Potential solutions:
Upsize pipes to appropriate sizes as described further detail in Section 6 and shown in Figure 11A of Appendix A.

Area X: South Highline Canal – Southern Flowing Portion near Fruitdale Creek- Southern Half

Potential flooded area: forest, residences		*Basin: Fruitdale Creek*
First floods at: 25-year	*25-year flood time: 88 min.*	*25-year flood volume: 120,303 cf*

Deficiencies:
The canal receives more upland flow and flow coming from areas upstream outside of the city limits than its capacity. This causes the canal to overtop.

Potential solutions:
1. Widen channel from City limits to Fruitdale Creek
2. Create a new spill to the river at the start of City limits to reroute flows originating from outside the City. This solution will also fix area N.

Area Y: South Highline Canal – Towne Street to Gaffney Way		
Potential flooded area: residences, field		*Basin: Allen Creek*
First floods at: 5-year	*25-year flood time: 128 min. 2*	*5-year flood volume: 50,797 cf*

Deficiencies:

There are numerous flows entering the canal from upland areas within and outside the City limits. This makes the canal overtop.

Potential solutions:

1. Upsize canal
2. Create detention upstream to decrease flow attenuation in canal

Area Z: Streets near Golf Course		
Potential flooded area:		*Basin: Allen Creek*
First floods at: 2-year	*25-year flood time: 101 min.*	*25-year flood volume: 18,922 cf*

Deficiencies:

1. The pipes are undersized to carry the design flows.
2. Residents are blocking culverts with bricks, reportedly to keep the skunks out.

Potential solutions:

1. Upsize pipes to appropriate sizes.
2. Install grates on driveway culverts to keep animals out, and keep homeowners from plugging them with paving stones.

Area AA: 9th Street

Potential flooded area: 9th Street and surrounding businesses and residences		*Basin: Gilbert Creek*
First floods at: 5-year	*25-year flood time: 81 min.*	*25-year flood volume: 4,054 cf*

Deficiencies:
The pipes are undersized to carry the design flows.

Potential solutions:
Upsize pipes to appropriate sizes as described in further detail in Section 6 and shown in Figure 11B of Appendix A.

Area AB: 5th Street

Potential flooded area: 5th Street and surrounding businesses and residences		*Basin: Gilbert Creek*
First floods at: 2-year	*25-year flood time: 998 min.*	*25-year flood volume: 97,318 cf*

Deficiencies:
The pipes are undersized to carry the design flows.

Potential solutions:
Upsize pipes to appropriate sizes as described in further detail in Section 6 and shown in Figure 11B of Appendix A.

Area AC: G Street and Oak Street

Potential flooded area: streets and surrounding residences		*Basin: Gilbert Creek*
First floods at: 10-year	*25-year flood time: 32 min.*	*25-year flood volume: 673 cf*

Deficiencies:
The pipes are undersized to carry the design flows.

Potential solutions:
Upsize pipes to appropriate sizes as described further detail in Section 6 and shown in Figure 11B of Appendix A.

Area AD: Highland Heights Estates

Potential flooded area: streets and surrounding residences		*Basin: Gilbert Creek*
First floods at: 2-year	*25-year flood time: 950 min.*	*25-year flood volume: 221,010 cf*

Deficiencies:

1. A portion of this network consists of a canal constructed with a wall about 3 bricks tall on one side. This is insufficient to convey design flows.
2. The private channel and associated culverts in Highland Estates are too small to pass design flows.

Potential solutions:

1. Canal
   a. Replace brick channel with pipe
   b. Widen/deepen existing channel
2. Private channel
   a. Widen channel and upsize culverts
   b. Create a parallel pipe next to the canal

Area AE: Diamond Hardware

Potential flooded area: businesses, residences, streets		*Basin: Gilbert Creek*
First floods at: 2-year	*25-year flood time: 52 min.*	*25-year flood volume: 27,338 cf*

Deficiencies:

The canal receives upland flow and flow coming from areas upstream outside of the city limits that exceeds its capacity. This causes the canal to overtop.

Potential solutions:

1. Widen channel from City limits to Fruitdale Creek
2. Create a new spill to river at the start of City limits to reroute flows originating from outside the City. This solution will also fix area N.

Area AF: Tokay - Gilbert Creek spill to Pleasantview Drive

Potential flooded area: Canal and surrounding houses and school		*Basin: Gilbert Creek*
First floods at: 2-year	*25-year flood time: 121 min.*	*25-year flood volume: 18,113 cf*

Deficiencies:

1. The spill to Gilbert Creek is not large enough to pass the design flows to the creek, so water backs up and spills over the top of the control structure.
2. The gate on the spill to Valleyview Drive is much smaller than the receiving pipe, and too small to pass the design flows.

Potential solutions:

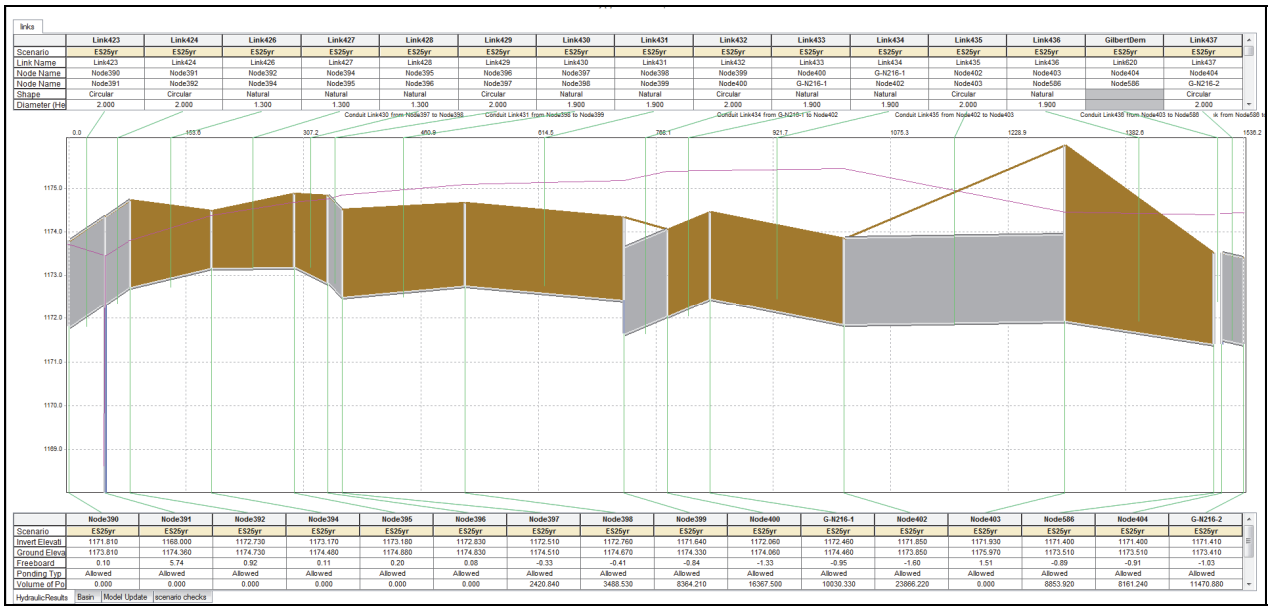
1. Expand the spill diameter to Gilbert Creek.
2. Expand the spill gate size to Valleyview Drive.
3. In addition, riprap should be added along Gilbert Creek to reduce erosion.

Area AG: Demoray Canal - Vine Street to Greenfield Drive

Potential flooded area: canal and surrounding fields, residences, and businesses		*Basin: Gilbert Creek*
First floods at: 2-year	*25-year flood time: 742 min.*	*25-year flood volume: 258,298 cf*

Deficiencies:

1. The canal receives upland flow and flow coming from areas upstream outside of the City limits that exceeds its capacity, causing the canal to overtop.
2. There are adverse grades in multiple different sections of the canal



3. The pipe at the downstream end of this section of canal is undersized.
4. The orifice for the pond on North Hill drive is too small to pass the design flows.

Potential solutions:

1. Widen channel from City limits to Gilbert Creek
2. Create a new spill to river at the start of City limits to reroute flows originating from outside the City. This solution will also fix area N.

Area AH: Demoray Canal – Regent Drive to Valleyview Drive

Potential flooded area: canal and surrounding houses *Basin: Gilbert Creek*

First floods at: 2-year *25-year flood time: 276 min.* *25-year flood volume: 12,077 cf*

Deficiencies:

The canal is rather shallow in this area, causing the canal to overtop into surrounding yards.

Potential solutions:

1. Expand channel capacity.
2. Create a new spill to the existing drainage ditch that crosses Shelly Circle.

Area AI: Demoray Canal- at Wrightwood Circle

Potential flooded area: canal and surrounding residences		*Basin: Gilbert Creek*
First floods at: 2-year	*25-year flood time: 1364 min.*	*25-year flood volume: 29,222 cf*

Deficiencies:
The canal is rather shallow in this area, causing the canal to overtop into surrounding yards.

Potential solutions:
1. Widen channel
2. Create a new spill through Highland Heights Estates.

Area AJ: Redwood Circle and Redwood Avenue

Potential flooded area: streets, businesses, nursing home		*Basin: Sand Creek*
First floods at: 2-year	*25-year flood time: 62 min.*	*25-year flood volume: 6,543 cf*

Deficiencies:
Flat pipes limit flow passing through

Potential solutions:
1. Upsize pipes
2. Regrade existing pipes

Area AK: South Main Canal

Potential flooded area: canal and surrounding businesses, homes, and fields		*Basin: Sand Creek*
First floods at: 2-year	*25-year flood time: 2,569 min.*	*25-year flood volume: 209,775 cf*

Deficiencies:
1. The canal receives more upland flow and flow coming from areas upstream outside of the city limits than its capacity, causing overtopping.
2. There are many adverse grades throughout the canal reach.

Potential solutions:
1. Widen and regrade channel
2. Pipe flows through existing canal alignment

3. Increase spills and redirect flow

Area AL: Dowell Road and Surrounding Branches		
Potential flooded area: Streets, canal, residences, businesses, park		*Basin: Sand Creek*
First floods at: 2-year	*25-year flood time: 2,389 min.*	*25-year flood volume: 1,247,866 cf*

Deficiencies:

1. Some sections of the canal are very shallow and undersized.
2. There is a pipe within the canal.
3. Pipes are undersized.

Potential solutions:

1. Expand all the pipes out to the river from the canal spill.
2. Add detention.
3. Permanently close the spill that was closed during flow monitoring, to prevent flows from entering the smaller pipe. Also partially close the one that was open.

Area AM: Kellenbeck Avenue and Redwood Avenue		
Potential flooded area: streets and surrounding residences and nursing home		*Basin: Sand Creek*
First floods at: 2-year	*25-year flood time: 89 min.*	*25-year flood volume: 15,242 cf*

Deficiencies:

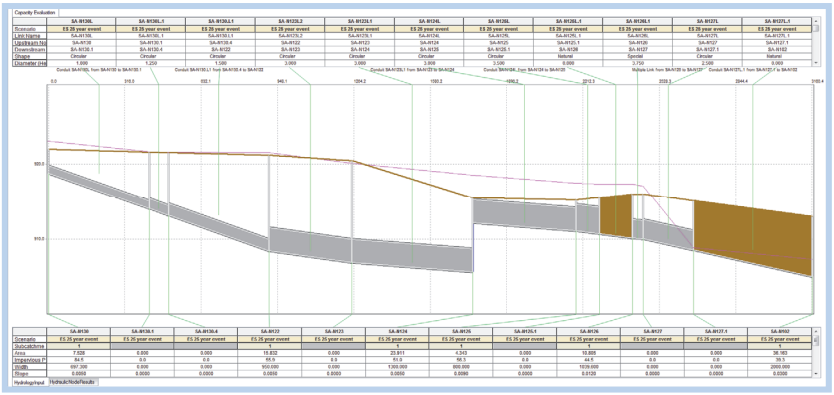
1. The pipes installed in the recent Redwood Avenue Improvements project were too small to pass the 25-year event.
2. Other utilities limited the size of the newly installed pipes.

Potential solutions:

1. Expand pipes and reroute other utilities.
2. Add a parallel pipe to increase capacity.

Area AN: Willow Lane

Potential flooded area: streets and surrounding residences		*Basin: Sand Creek*
First floods at: 2-year	*25-year flood time: 121 min.*	*25-year flood volume: 52,564 cf*



Deficiencies:

1. Undersized pipe
2. Downstream pipe exits manhole 6.5 feet higher than upstream inlet pipe. Since upstream system must surcharge to this depth before flow can pass through, it will eventually fill with sediment.

Potential solutions:

1. Regrade and upsize pipes

Area AO: Rainwood Lane and Sprinkle Way

Potential flooded area: streets and surrounding residences		*Basin: Sand Creek*
First floods at: 2-year	*25-year flood time: 89 min.*	*25-year flood volume: 5,876 cf*

Deficiencies:

1. Undersized pipe
2. Downstream pipe exits manhole 2.2 feet above inlet pipe, causing surcharging and sedimentation in upstream network.

Potential solutions:

1. Regrade and upsize pipes (Section 6 and Figure 11C of Appendix A).

Area AP: Summerfield Estates Ponds

Potential flooded area: Ponds, streets, and surrounding residences and fields		*Basin: Sand Creek*
First floods at: 2-year	*25-year flood time: 1,063 min.*	*25-year flood volume: 113,561 cf*

Deficiencies:

1. The ponds receive more upland flow and flow coming from areas upstream outside of the city limits than their capacity, causing the ponds to overtop.
2. The ponds were designed only for the neighborhood in which they reside and not for the external inflows.

Potential solutions:

1. Route external flows to bypass ponds.
2. Expand ponds.

Area AQ: Redwood Avenue		
Potential flooded area: residences		*Basin: Sand Creek*
First floods at: 25-year	*25-year flood time: 406 min.*	*25-year flood volume: 15,195 cf*

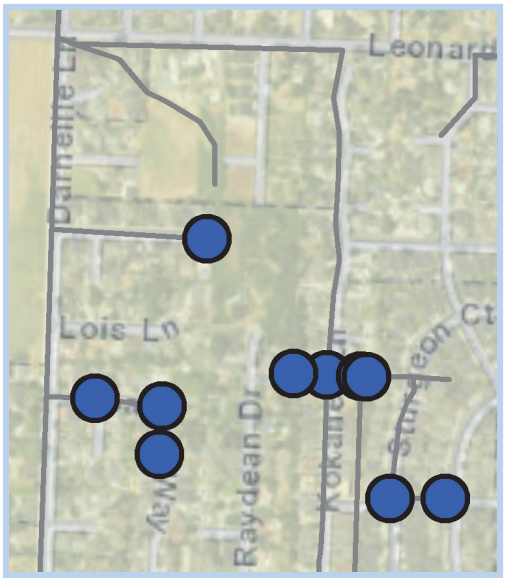
Deficiencies:

1. The pipes are not large enough to pass the 25 year flow.
2. Conflicts with other existing utilities limited the size of the newly installed pipes.
3. The wetlands upstream do not detain sufficient amounts of water, and are in need of maintenance.

Potential solutions:

1. Expand pipes and reroute other utilities.
2. Add a parallel pipe to increase capacity.
3. Expand wetland into a detention capacity.
4. The spill on the east side of Dowell Road that was closed during flow monitoring should remain closed during the winter drainage season. Also, partially close the one that was open (between Kokanee Lane and Yucca Drive).

Area AR: Areas Upstream of Darnelle Lane Bottle Neck		
Potential flooded area: streets and surrounding residences and fields		*Basin: Sand Creek*
First floods at: 2-year	*25-year flood time: 270 min.*	*25-year flood volume: 19,070 cf*



Deficiencies:

1. Undersized pipe

Potential solutions:

1. Increase pipe size

Area AS: Demoray Canal-West Side

Potential flooded area: forest and surrounding residences		*Basin: Gilbert Creek*
First floods at: 10-year	*25-year flood time: 389 min.*	*25-year flood volume: 59,388 cf*

Deficiencies:
The canal receives more upland flow and flow coming from areas upstream outside of the city limits than than its capacity, causing the flow to overtop the canal and flood the surrounding areas.

Potential solutions:
1. Widen channel
2. Expand the existing spill to Gilbert Creek upstream of the problem area, to divert flow.
3. Redirect flow upstream of this area.

Area AT: 6th Street

Potential flooded area: streets and surrounding businesses		*Basin: Gilbert Creek*
First floods at: 10-year	*25-year flood time: 46 min.*	*25-year flood volume: 2,174 cf*

Deficiencies:
The pipes are undersized to carry the design flows.

Potential solutions:
Upsize pipes to appropriate sizes

Area AU: MoonGlo Drive and Leonard Road

Potential flooded area: streets and surrounding residences and fields		*Basin: Sand Creek*
First floods at: 25-year	*25-year flood time: 15 min.*	*25-year flood volume: 1,014 cf*

Deficiencies:
The pipes are undersized to carry the design flows.

Potential solutions:
1. Upsize pipes to appropriate sizes
2. Connect to area AV and expand spill to river.

Area AV: Delsie Drive and Mesman Drive

Potential flooded area: streets and surrounding residences		*Basin: Sand Creek*
First floods at: 25-year	*25-year flood time: 9 min.*	*25-year flood volume: 870 cf*

Deficiencies:
The pipes are undersized to carry the design flows.

Potential solutions:
1. Upsize pipes to appropriate sizes
2. Expand spill to river.

6.0 CAPITAL IMPROVEMENT PLAN

6.1 CAPITAL IMPROVEMENT PROJECTS AND OPERATIONAL CHANGES

Evaluations were completed to determine the overall solution that reduces flooding for the design criteria. When an operational change could be used to control flows through spills, operational changes were selected as the best alternative to reduce costs. Adjustments to spill capacity were also high on the list of selected alternatives. Next, capital improvements in the form of pipes, channels, and detention areas were evaluated. Since the City has voiced concerns about the availability of land for detention, this was considered as the last alternative.

The recommendations presented in this report will continue to evolve with each phase of implementation, and the model should be reviewed in the early stages of predesign for each improvement to determine how the proposed project will have an effect on the rest of the system. One example would be fixing conveyance upstream which causes increased flooding downstream because downstream improvements have not yet been completed. Whenever possible, it is best to start with the most downstream improvements and work upstream.

The models created for this study were regionally calibrated to evaluate the overall functionality of the system and to determine the alignments to improve overall system drainage. Predesign for each project should include:

- An investigation of local boundary conditions including a reevaluation with the model.
- There are several adverse grades in the system, before any final design is completed, these should be verified. If the adverse grades do not actually exist, remodel the area to determine if still exists, or if the flooding has moved up- or downstream.
- All new pipe is assumed to have a roughness of concrete, if corrugated pipes are installed, the capacity needs to be matched to the modeled assumption.
- Parallel pipes could always be installed as an alternative to upsizing.
- 3 feet of cover was included in improvements with a few exceptions. Some pipe segments will not need to be upsized if less cover is provided. However special pipe materials and backfill materials are needed for cover less than 3 feet.
- Rectangular pipe was used in areas with little cover available and for links needing a large capacity. Other pipe shapes may be used if special backfill is used with sufficient structural capacity. Parallel circular or squash pipes could also replace a singular rectangular pipe if the City desires.
- Pipe bursting could be used in some locations to save money and minimize impacts to the existing ground cover, the cost estimates here assume open trench costs to provide a more conservative cost estimate.
- The cost estimates assume that all pipe will be replaced, some pipes only need to be regraded, so where possible, the pipe could be salvaged and reused to save money.

- The City should coordinate with the County and GPID to prevent flows upstream of the City from escaping the South Highline canal and overloading the stormwater network.

The following paragraphs list each improvement in more detail. A visual representation of these can be referenced in Figures 11A through 11D, and prioritization can be referenced in Figures 12A through 12D in Appendix A. The colors correspond to the colors shown in Figures 11A through11D in Appendix A for easy reference.

6.1.1 Method of Prioritization

Figures 12A through 12D in Appendix A show project prioritization for the capital improvements. The following prioritization criteria were used to determine the order of improvements.

Priority 1:

1A - reduces flooding from frequent flooding areas with high potential risk (generally residential 2-year storm)

1B - reduces flooding from highest risk areas that experiences flooding in a 2-year or 5-year event (generally areas of existing commercial development)

Priority 2:

2A - reduces flooding from residential areas during a 5-year event

2B - reduces flooding from commercial areas during a 10-year event

Priority 3:

3A - reduces flooding from residential 25 year storm

3B - reduces flooding from commercial 25-year storm

3C - reduces flooding in field/park from 5-year event

Priority 4: reduces all other flooding caused by the 25-year event

6.1.2 Allen-Fruitdale Recommended Improvements and Operational Changes

Project AF-1: Golf Course		
priority:1A		*cost: $371,000*
related problem area(s): Z	*prerequisites: none*	*basin: Allen*

This improvement consists of regrading and upsizing the pipe in Arroyo Drive to 27-inch and the pipes connecting Arroyo to the creek to 30-inch.

Project AF-2: South Highline Canal near Allen Creek		
priority:1A		*cost: $1,211,000*
related problem area(s): K	*prerequisites: none*	*basin: Allen*

This improvement consists of regrading and piping the canal with a 54-inch pipe between Wagon Wheel Drive and the creek. Catch basins should be added to collect flows currently accepted by channel. The concrete should be added to the bottom and sides of the channel under the bridge immediately upstream of this section to increase flow capacity.

Project AF-3: Harbeck Road, Nebraska Avenue		
priority:1A		*cost: $200,000*
related problem area(s): M	*prerequisites: none*	*basin: Allen*

This improvement consists of upsizing and regrading the pipe from Nebraska Avenue to the creek to 36-inch and upsizing the pipe in Nebraska Avenue from Princeton Place to the next manhole downstream.

Project AF-4: Pond Near Calvary Chapel off Harbeck Road		
priority:1A		*cost: $629,000*
related problem area(s): Y	*prerequisites: AF-7, AF-15,AF-16*	*basin: Allen*

This improvement consists of converting the existing slough upstream of the canal in the vicinity of Calvary Chapel to a detention pond, and add an outfall structure to control flow.

Project AF-5: Grandview Avenue and the Hospital		
priority:1A		*cost: $611,000*
related problem area(s): V	*prerequisites: none*	*basin: Allen*

This improvement consists of regrading the pipe that connects the manhole in Ringuette Street and Grandview Avenue to the open ditch to allow more flow through. The pipe downstream of the open ditch on Grandview Avenue should be upsized to 30-inch and regraded to connect in with the existing line on Ramsey Avenue. A new 24' canal spill should be constructed downstream of this connection through the hospital.

Project AF-6: West Park Street, Josephine County Yard, Tussing Park		
priority:1B		*cost: $407,000*
related problem area(s): L,U	*prerequisites: none*	*basin: Allen*

This improvement consists of connecting the siphon in the county yard in a continually descending 36-inch pipe, which will intersect the existing pipe at the bottom of the hill before the park. The outfall in Tussing Park should be upsized to 30-inch. The pipe along West Park Street should be upsized to 21-inch between Plummer Street and Short Street.

Project AF-7: Lower Parkdale Drive/Highway 199 Trunkline		
priority:1A		*cost: $1,590,000*
related problem area(s): O	*prerequisites: none*	*basin: Allen*

This improvement consists of creating a 54-inch trunkline from Fruitdale Drive to Golden Park Drive along Parkdale Drive, and an 83-inch by 53-inch trunkline from Golden Park drive to the open channel. The open channel should be regraded to match in with the proposed pipes.

Project AF-8: Haviland Drive and Grandview Avenue		
priority:3A		*cost: $3,000*
related problem area(s): P	*prerequisites: AF-7, AF-15*	*basin: Fruitdale*

This improvement consists of widening the channel on Haviland Drive and tributary to the east to a 3-foot bottom. The canal wall in that area, just north of Grandview Avenue needs to be raised to maintain sufficient freeboard.

Project AF-9: Spill North of Harpazo Lane		
priority: 4		*cost: $280,000*
related problem area(s): N,X	*corequisites: AF-10*	*basin: Fruitdale*

This improvement consists of creating a new 36-inch canal spill and pipe to creek north of the houses on Harpazo Lane.

Project AF-10: Canal spill East of UGB		
priority: 3A		*cost: $306,000*
related problem area(s): N,X	*corequisites: AF-9*	*basin: Allen*

This improvement consists of a new 30-inch canal spill and pipe to river just outside the UGB to prevent flows from outside the City entering the system and causing problems.

Project AF-11: Sugar Beet Line, East Park Street		
priority:1A		*cost: $1,330,000*
related problem area(s): T	*prerequisites: AF-17*	*basin: Allen*

This improvement consists of rehabilitating the old sugar beet line, since it has an unknown number of connections, and regrading and upsizing the line in East Park Street to 21-inch.

Project AF-12: Sunset Way and Tributary Pipes		
priority: 1A		*cost: $2,226,000*
related problem area(s): O,T	*prerequisites: AF-7*	*basin: Allen*

This improvement consists of changing the direction of flow along Sunset Way to the East by adding a flow diversion structure at Maple Lane and upsizing and regrading the pipe from Maple Lane to Playford Lane to 36-inch; from Playford Lane to where the Tobin Lane line connects in to Sunset Way to 42-inch; and adding a 48-inch line connecting where the Tobin Lane line connects in to Sunset Way until Parkdale Drive. In addition, the line from Tobin Court to Sunset Way should be upsized to 18-inch and regraded. The line in Playford Lane should be upsized to 15-inch from the southern end to the railroad tracks, and 24-inch from the railroad tracks to Sunset Way.

Project AF-13: Harbeck Road and Southridge Way		
priority: 1A		*cost: $1,082,000*
related problem area(s): S,V	*prerequisites: AF-5*	*basin: Allen*

This improvement regrades and upsizes the pipes along Harbeck Road shown in the following table, and Southridge Way is regraded and upsized to 21-inch. The concrete plug currently at the corner of Grandview Avenue and Harbeck Road should be removed to allow flow to the north. The pipe flowing west from that intersection needs to be regraded.

From	To	Size
Grandview Avenue	Southridge Way	24-inch
Southridge Way	North of Hilltop Drive	30-inch
North of Hilltop Drive	South Main Canal	33-inch

Project AF-14: Highway 238		
priority: 1A		*cost: $661,000*
related problem area(s): V	*prerequisites: AF-5,AF-13*	*basin: Allen*

This improvement consists of upsizing the pipe along Highway 238 to 15-inch from Liberty Drive to Grandview Avenue., and upsizing the line off highway 238 that runs from Harbeck Village to Subway to 15-inch, and from subway to the highway to 18-inch.

Project AF-15: Main Gravity Canal Spills and Central Parkdale Drive Trunkline		
priority:1A		*cost: $889,000*
related problem area(s): O	*prerequisites: AF-7*	*basin: Allen*

This improvement consists of upsizing and regrading to a 54-inch trunkline on Fruitdale Drive between Parkdale and Gaffney Way; constructing a canal spill, and 42-inch trunkline along Gaffney Way from the Main Gravity Canal to Fruitdale Drive; regrading the channel along Fruitdale Drive from Gardendale Lane to Cloverlawn Drive; adding a new canal spill on Drury Lane to connect to the 2014 improvements; and upsizing and regrading the line on Idle Court to 21-inch.

Project AF-16: Upper Parkdale Drive Trunkline and South Highland Canal Spill		
priority: 1A		*cost: $601,000*
related problem area(s): O,Q	*prerequisites: AF-7, AF15*	*basin: Allen*

This improvement consists of constructing a new canal spill on the South Highland Canal including a new 21-inch pipe from the canal to the location of the existing pipe on Gaffney Way, just north of Jeffery Court, then upsizing and regrading the pipe on Gaffney Way from just north of Jeffery Court to Grandview Avenue to 30-inch, and then upsizing and regrading From Grandview Avenue to underneath the main gravity canal to connect into the next segment of the trunkline.

Project AF-17: Highways 238/199/99 Intersection Detention		
priority: 1A		*cost: $959,000*
related problem area(s): T	*prerequisites: AF-11*	*basin: Allen*

This improvement consists of constructing two detention facilities: one 0.77 acre--foot facility on the southeast corner of Highway 99 and Highway 199, and one 5.24 acre--foot facility on the southwest corner of Highway 199 and Highway 238.

Project AF-18: Union Avenue		
priority: 1A		*cost: $646,000*
related problem area(s): V	*prerequisites: none*	*basin: Allen*

This improvement consists of upsizing the pipe along Union Avenue from the beginning of the line to the Eastern edge of the hospital buildings to 21-inch and regrading the farthest east segment.

Project AF-19: Meadow Glen		
priority:1A		*cost: $236,000*
related problem area(s): W	*prerequisites: AF-5*	*basin: Allen*

This improvement consists of upsizing the pipes from Meadow Glen and Lark Ellen Way to the Main Gravity Canal to 21-inch.

Project AF-20: Liberty Drive		
priority:1A		*cost: $473.000*
related problem area(s): V	*prerequisites: AF-5, AF-13*	*basin: Allen*

This improvement consists of regrading and upsizing pipes on Liberty Drive and the connection to Grandview Avenue to 27-inch.

6.1.3 Gilbert Recommended Improvements and Operational Changes

Project G-1: 5th Street, 6th Street		
priority:1A		*cost: $1,656,000*
related problem area(s): AB, AT	*prerequisites: none*	*basin: Gilbert*

This improvement upsizes the pipes along 5th Street shown in the following table, and upsizing the outfall on 6th Street to 18-inch.

From	*To*	*Size*
South of G Street	H Street	18-inch
H Street	South of J Street	24-inch
South of J Street	South of L Street	27-inch
South of L Street	M Street	30-inch
M Street	River	36-inch

Project G-2: 9th Street		
priority:2A		*cost: $457,000*
related problem area(s): AA	*prerequisites: none*	*basin: Gilbert*

This improvement consists of upsizing the line down 9th Street from I Street to L Street to 18-inch and from L Street to M Street to 21-inch.

Project G-3: G Street, I Street, Alder Street, L Street		
priority:1A		*cost: $795,000*
related problem area(s): AC	*prerequisites: none*	*basin: Gilbert*

This improvement consists of upsizing the most upstream pipe in the model on G Street to 15-inch, regrading the pipe on I Street, upsizing to a 2-foot by 2-foot box pipe and regrading along Alder from I Street to K Street, and upsizing and regrading the pipe on L Street to 30-inch.

Project G-4: Demoray Canal Spills- Southwest		
priority:1A		*cost: $127,000*
related problem area(s): AF, AH	*prerequisites: none*	*basin: Gilbert*

This improvement consists of several related parts. The first is to open the Copeland spill in winter. The second is to adjust the spill on Valley View Drive and Highland Ave so that the flow is directed east to Gilbert Creek. The channel upstream of Valley View Drive should be expanded to a 6-foot bottom, and regraded. The channel berms should be restored to an elevation that maintains adequate freeboard in the canal. The spill to Gilbert Creek near Buddy Lane needs to be expanded.

Project G-5: Demoray Canal Spills- Central West		
priority:1A		*cost: $29,000*
related problem area(s): AH	*prerequisites:G-4*	*basin: Gilbert*

This improvement consists of installing a new 12-inch spill to the existing large ravine. The downstream siphon should be closed off in winter to avoid the entry of debris from carried by runoff.

Project G-6: Hilcrest Drive, 6th Street, 7th Street		
priority:1A		*cost: $1,664,000*
related problem area(s): AE	*prerequisites: none*	*basin: Gilbert*

This improvement consists of upsizing and regrading the line along Hilcrest from 6th Street to Hawthorne Ave, upsizing and regrading the 6th Street crossing to 42-inch, upsizing and regrading the line north along 7th Street to 27-inch, upsizing the segment just downstream of the 'Y' on 7th Street to 21-inch, and adjusting the pond outfall behind the trailer park by adding an additional 24-inch outlet pipe.

Project G-7: Demoray Spill-South East		
priority:1A		*cost: $106,000*
related problem area(s): AG	*prerequisites: none*	*basin: Gilbert*

This project consists of improvements to the spill northeast of Greenfield Road on the Demoray Canal. The pipe and channel immediately downstream of the spill need to be regraded to match in with the next pipe segment which should be upsized to a 2-foot by 3-foot. regraded rectangular pipe. The segment of the line that faces flows west needs to be upsized to a 2-foot bottom natural channel and regraded.

Project G-8: Demoray Canal Spills- North Central		
priority:1A		*cost: $810,000*
related problem area(s): AD, AG	*corequisites: G-10*	*basin: Gilbert*

This improvement consists of expanding and regrading the section of the canal shown in the figures, but north of Scenic Drive to the Gilbert Creek Spill to 30-inch, modifying the spill, and continuing the 30-inch pipe south which will take the place of the existing small irrigation detention and shallow brick channel until it intersects the channel from the trailer park. South of the trailer park, the channel should be widened to an 8-foot bottom and a 12-foot top, regraded, and lined with concrete. The culvert sizes are unknown at this time, but should be evaluated to see if they have sufficient capacity. The cost estimates include a 54-inch culvert.

Project G-9: Demoray Canal Spills- Northwest		
priority:1A		*cost: $460,000*
related problem area(s): AD,AI	*prerequisites: G-8*	*basin: Gilbert*

This improvement raises the channel bank elevations on the Demoray canal between the pedestrian entrance to Highland Heights Estates and the southern portion of Wightwood Circle. A new 24-inch pipe should be installed parallel to the existing channel and culverts through highland heights Estates. The most downstream section of channel in Highland Heights Estates should be regraded and the bank should be raised to get sufficient freeboard. The highland avenue crossing at approximately 2555 Highland Avenue should be upsized to a 1-foot by 1-foot box pipe. The pipe segments on Highland Avenue, upstream and downstream of 2555

Highland Avenue should be upsized to 24-inch. The section from approximately Creekside Circle to the open ditch to the south should be upsized to 36-inch.

Project G-10: Demoray Canal Spills- Northeast		
priority:1A		*cost: $438,000*
related problem area(s): AG	*corequisites: G-8*	*basin: Gilbert*

This improvement consists of expanding the East Gilbert Creek spill to a 25-foot wide opening, and regrading and increasing the channel upstream to 8 to 12-foot bottom, and raise bank elevations to get sufficient freeboard.

6.1.4 Sand Recommended Improvements and Operational Changes

Project S-1: Trunkline from South Main Canal to River along Dowell Road		
priority:1A		*cost: $3,412,000*
related problem area(s): V	*prerequisites:*	*basin: Sand*

This improvement creates a trunkline from the South Main Canal to the River along Dowell Road. Currently there is a canal spill on either side of Dowell Road, draining to different lines. The spill on the East side should be closed for the winter as the pipes downstream are too small to handle the large flows entering. The spill on the West side of Dowell Road should be expanded to 48-inch. The pipes should be expanded to 48-inch from the spill until Redwood Avenue. From Redwood Avenue to the northern end of the trailer park, the pipe should be upsized to 60-inch. The pipe needs to maintain sufficient slope and cover throughout the line, so the entire line was regraded. The channel that connects the pipe to the river needs to be regraded to connect in with the pipe.

Project S-2: Flow-split Kellenback Avenue to Dowell Road		
priority: 1A		*cost: $691,000*
related problem area(s): AL, AM	*prerequisites: S-2, S-6, S-7, S-8*	*basin: Sand*

The pipe segment just north of Shane Way needs to be upsized to 18-inch. The pipes in Sun Glo Drive need to be upsized to 21-inch, and the pipe in Redwood Avenue needs to be upsized to 30-inch. To minimize improvements, a flow split was created at the corner of Kellenback Avenue and Shane Way. This redirects flow upstream (south) of Kellenback Avenue along Shane Way to Claudia Way to Mendi Way to eventually join in with Sun Glo Drive improvements. There are existing un modeled pipes along some of these lines. These pipes should be analyzed further to determine if they should connect to these improvements, or if new catch basins and associated piping should be installed.

Project S-3: Expansion of South Main Canal		
priority: 1A		*cost: $583,000*
related problem area(s): AK	*prerequisites: S-1*	*basin: Sand*

This improvement consists of expanding the channel and raising the channel berms to meet the design criteria with acceptable freeboard. The extents of this project are the canal from just west of the pond near Schutzwohl Lane until Dowell Road where it crosses Redwood Highway. In addition to channel expansion, an identical rectangular box pipe should be installed in parallel with the existing box, in the middle of a field in the middle of the improvement. The farthest west segment of the improvement should be transitioned into a 3-foot by 6-foot rectangular pipe.

Project S-4: Redwood Circle to River		
priority: 1B		*cost: $650,000*
related problem area(s): AJ	*prerequisites: none*	*basin: Sand*

Upsize pipes in Redwood Circle to 24-inch. Upsize pipe east-west pipe segment partially on Molly Lane to 27-inchand regrade to get sufficient cover and capacity. Regrade the pipe downstream of Molly Lane. If it isn't possible to reuse the existing pipe at a different slope, a circular or rectangular pipe with the same capacity as the existing pipe can be used to reduce costs of purchasing a new arch pipe. The cost includes purchase of a new arch pipe. This pipe needs special backfill under the gravel road since it cannot get sufficient cover without replacing more pipes.

Project S-5: Mesman Drive to River		
priority:3A		*cost: $240,000*
related problem area(s): AV	*prerequisites:*	*basin: Sand*

This improvement consists of upsizing the pipe from the northern end of Mesman Drive to the river outfall to 36-inch.

Project S-6: Leonard Road to Ditch		
priority:3A		*cost: $926,000*
related problem area(s): AN,AU	*prerequisites: none*	*basin: Sand*

This improvement expands capacity for problem area AU, and also matches in, and/or prepares for other improvements. The pipes south of Leonard Road should be upsized to 27-inch. The pipes crossing Leonard should now be three parallel 36-inch pipes. The channel section north of Leonard to the river should be regraded to match new upstream pipes, and the proposed elevation of pipes in S-7.

Project S-7: Willow Lane to Ditch		
priority:1A		*cost: $975,000*
related problem area(s): AN	*prerequisites: S-6*	*basin: Sand*

This project consists of replacing the pipeline from the manhole south of Blue Spruce Lane along Willow Lane until the last pipe segment. The last pipe segment should be upsized to two 48-inch pipes. The entire line should be regraded, including the channel downstream to tie into the new pipes, as well as project S-6.

Project S-8: Willow Court, Estates Lane		
priority:1A		*cost: $696,000*
related problem area(s): AM, AN	*prerequisites: S-6, S-7*	*basin: Sand*

This improvement consists of upsizing the most upstream segment on Willow Court to 24-inch, and the rest of Willow Court to 27-inch. Estates Lane should be upsized to 30-inch. The upstream end of the project consists of a new flow diversion to reduce flow to the east, and prevent the brand new pipes along Redwood Avenue from being replaced.

Project S-9: George Tweed Boulevard and Spurs		
priority:3A		*cost: $464,000*
related problem area(s): AQ	*prerequisites: S-10, S-11, S-16*	*basin: Sand*

This improvement increases the pipe size on George Tweed Boulevard to 18-inch north of Redwood Avenue, for two pipe segments, and regrading. The section of George Tweed Boulevard between Eastwood Lane and the improvements completed in 2014 should be upsized to 21-inch. A special backfill will be needed to match into the newly constructed project, since it does not have 3 feet of cover. Along Eastwood Lane, the pipes need to be regraded and the one immediately adjacent to George Tweed Boulevard needs to be upsized to 21-inch.

Project S-10: Kokanee Lane, Leonard Road		
priority:1A		*cost: $1,613,000*
related problem area(s): AQ, AR	*prerequisites: S-16*	*basin: Sand*

This improvement begins at Kokanee Lane and Redwood Avenue with a new flow split diverting some flows north along Kokanee Lane in an 18-inch line up to the second existing manhole. The next segment should be upsized to 24-inch, followed by a 30-inch for the next segment, and a 36-inch for the segment up to Leonard Road. Leonard Road should be increase to 36-inch to the west side of Darnelle Lane, where it is upsized to 42-inch to cross the street and join in with the existing line to the north.

Project S-11: Pond South of Redwood Highway		
priority:3A		*cost: $72,000*
related problem area(s): AQ	*prerequisites: S-16*	*basin: Sand*

This improvement upsizes the pipe crossing Darnelle Lane, north of Redwood Avenue, to 42-inch. This line was replaced in 2014, but it is still undersized to meet the design criteria.

Project S-12: Rainwood Lane to Leonard Road		
priority:1A		*cost: $141,000*
related problem area(s): AO	*prerequisites: none*	*basin: Sand*

This improvement consists of upsizing and regrading the pipe from Rainwood Lane to Leonard Road to 24-inch.

Project S-13: ODOT Pond South of Redwood Highway		
priority:1A		*cost: $1,353,000*
related problem area(s): AK	*prerequisites: S-1*	*basin: Sand*

This improvement consists of modifying the outlet structure of the ODOT pond south of Redwood Highway to direct flow east, toward the proposed new canal spill through a 42-inch pipe.

Project S-14: New Flow Diversion to Sand Creek at Redwood Hwy		
priority:1A		*cost: $167,554*
related problem area(s): AP	*prerequisites: none*	*basin: Sand*

This improvement redirects upland flow directly to the Sand Creek. The Summerfield Estates neighborhood ponds were only designed to hold the flow from that neighborhood, but they currently take on large flows from the upland areas. In order to reduce flooding in this area it is recommended the increase the outlet size of the pond south of the Redwood Highway to 18-

inch, tie in with the existing catch basin on the south side of the highway, and divert the flows through an open channel to the creek. The highway crossing should be blocked off to avoid overloading the Summerfield Estates ponds.

Project S-15: Yellowtail Lane to Mary Lynn Lane		
priority:1A		*cost: $392,000*
related problem area(s): AR	*prerequisites: S-10, S-16*	*basin: Sand*

This project regrades and upsizes the pipe in Yellowtail Lane to 18-inch, the pipe on Sturgeon Court to 24-inch, and upsizes the pipe connecting Sturgeon Court to the pond to 24-inch. The pipe connecting Mary Lynn Lane to Kokanee Lane should be upsized to 24-inch and regraded.

Project S-16: Darnelle Lane		
priority:1A		*cost: $1,138,000*
related problem area(s): AQ, AR	*prerequisites: none*	*basin: Sand*

This improvement upsizes and regrades the pipe on Darnell Lane, from one manhole south of Coffman Lane to South River Road, to two parallel 42-inch pipes.

6.1.5 Skunk-Jones Recommended Improvements and Operational Changes

Project SJ-1: F Street		
priority:1B		*cost: $1,829,000*
related problem area(s): E,F	*prerequisites: SJ-3, SJ-11, SJ-13*	*basin: Skunk*

This improvement consists of upsizing the two pipe segments behind Walmart along F Street to 33-inch and regrading. The next segment downstream should be replaced with a smooth pipe and regraded. The remaining pipes up to Beacon Drive should be upsized to 42-inch and regraded. Continuing south on Beacon, the next segment should be upsized to 42-inch, and the next segment should be regraded to match other proposed improvements. The line continuing west beside the railroad tracks should be converted to an overflow pipe, with a new diversion structure that will send the majority of the flows south through other proposed improvements.

Another portion of this improvement is a new flow division structure and 24-inch spill pipe along Agness Avenue from F Street to the existing line. A new 24-inch overflow pipe should be installed on the eastern end of F, connecting the end of the upstream end of the line to the creek.

Project SJ-2: D Street		
priority:2B		*cost: $2,181,000*
related problem area(s): I	*prerequisites: SJ-1, SJ-3, SJ-13*	*basin: Skunk*

The pipe from Royal Drive to Sovereign Avenue along D Street should be upsized to 18-inch and regraded. The segment from Sovereign Avenue to Beacon Drive should be upsized to 21-inch. The pipe from Beacon Drive to the line coming in from the north west of 12th Street should be upsized to 30-inch. The line connecting D Street and F Street should be upsized to a 60-inch by 38-inch squash pipe. The line northeast of D Street and Anderson Street should be upsized to 24-inch and regraded. The line northwest of D Street and Anderson Street should be upsized to 18-inch and regraded. The line between these two lines should be upsized to 30-inch and regraded. The pipe immediately downstream of D Street should be upsized to 30-inch and

regraded. The next two segments of pipe should be regraded. The last segment that connect in with the new squash pipe should be upsized to 36-inch and regraded.

Project SJ-3: A Street - East		
priority:3B		*cost: $526,000*
related problem area(s): E,F,I	*prerequisites: S-13*	*basin: Skunk & Jones*

This improvement consists of a new 15-inch pipe and flow split at the existing pipe near 10th Street and A Street leading to the new flow split near 9th Street and A Street.

Project SJ-4: Madrone Street		
priority:3B		*cost: $631,000*
related problem area(s): B	*prerequisites: SJ-1, SJ-13*	*basin: Skunk*

This improvement connects the canal to the existing 48-inch under-utilized line in 9th Street through a flow diversion structure and a 2-foot by 3-foot box pipe.

Project SJ-5: Tokay Canal from Savage Street to Dewey Drive		
priority:3A		*cost: $236,000*
related problem area(s): J	*prerequisites: none*	*basin: Skunk*

This improvement consists of adding a channel parallel to the existing pipes from the incoming channel to the Northeast to Savage Street to change flow direction and allow the spill at Savage to be better utilized. The segment going east-west out of 10th Street needs to be regraded.

Project SJ-6: Dewey Drive to 6th Street		
priority:3C		*cost: $795,000*
related problem area(s): A	*prerequisites: none*	*basin: Skunk*

This improvement consists of increasing the channel size between the ponds that are south of Dewey Drive, installing a new outfall structure and regrading and replacing pipes downstream to 7th Street with smooth pipes. The pipe crossing 7th Street should be upsized to a single 30-inch line. The pipes and channel in between 6th and 7th Street should be regraded to match in with improvements.

Project SJ-7: Demoray Canal		
priority:2A		*cost: $61,000*
related problem area(s): C	*prerequisites: none*	*basin: Skunk*

This improvement consists of expanding the channel cross section and creating a uniform slope in the areas shown on Figure 11D west of Beacon Drive. It also regrades part of the channel downstream of the expanded section, and expands the spill capacity by regrading the first two channel sections and increasing the first culvert size to 21-inch.

Project SJ-8: Spill Northwest of I-5 and Hilcrest Drive to 7th Street		
priority:1B		*cost: $386,000*
related problem area(s): H	*prerequisites: SJ-7*	*basin: Skunk*

This project consists of surveying the spill northwest of I-5 and Hilcrest Drive all the way to Hilcrest Drive. During field investigations the spill was completely inundated with blackberries, so it could not be accessed, so the best available records were used to determine what was

there. After a survey, the model should be reassessed to determine what, if any, changes would improve spill.

The pipe downstream crossing Hilcrest Drive should be upsized to a 21-inch pipe and regraded. The next segment down hillcrest Drive to the west, should be upsize to 21-inch, followed by two segments continuing west, then North, should be upsized to 27-inch.

Project SJ-9: Rose Lane to River		
priority:3A		*cost: $212,000*
related problem area(s): D	*prerequisites: none*	*basin: Skunk*

This improvement consists of upsizing all modeled lines in this street to the river to 21-inch.

Project SJ-10: Channel Northwest of Dewey Drive and 10th Street		
priority:1A		*cost: $3,000*
related problem area(s): G	*prerequisites: none*	*basin: Skunk*

The channel northwest of Dewey Drive and 10th Street, needs to be upsized and regraded.

Project SJ-11: Rogue Drive Trunkline		
priority:1B		*cost: $2,938,000*
related problem area(s): E,F	*prerequisites: SJ-3,SJ-13*	*basin: Skunk*

This improvement consists of a new pipe and flow diversion structure from F Street, encouraging the flow to continue down a new 48-inch pipe crossing under the rail yard and connects to the existing line on M Street with another flow diversion structure diverting flow to the south. The flow continues down to connect to Rogue Drive through a new 48-inch pipe. The pipe along Rogue Drive needs to be upsized to 54-inch until the outfall segment. The outfall segment can be 48-inch due to the steep slope.

Project SJ-12: M Street		
priority:1B		*cost: $759,000*
related problem area(s): E	*prerequisites: SJ-1, SJ-3, SJ-11, SJ-13*	*basin: Skunk*

This improvement consists of upsizing the two pipe segments starting east from M Street and Highway 199, including the highway crossing to 30-inch. The pipe segment on M Street immediately west of Milbank Street needs to be upsized to 24-inch.

Project SJ-13: A Street-West		
priority:1B		*cost: $1,126,000*
related problem area(s): B,E,F,I	*prerequisites: none*	*basin: Skunk*

This improvement creates a flow split near 9th Street and A Street that diverts flows through a new 3-foot by 5-foot box pipe to the creek.

6.2 COSTS

A summary of the recommended improvements organized by priority is presented in the following table. The costs presented in Table 6-1 represent all the respective priority improvements regardless of jurisdiction.

Table 6-1: Priority 1A Improvements

ID#	Priority	Item	Total Estimated Cost (2015)
Priority 1A Improvements (0-15 years)			
Allen Fruitdale			
AF-1	1A	Golf Course	$ 371,000
AF-2	1A	South Highline Canal near Allen Creek	$ 1,211,000
AF-3	1A	Harbeck Road, Nebraska Avenue	$ 200,000
AF-4	1A	Pond Near Calvary Chapel off Harbeck Road	$ 629,000
AF-5	1A	Grandview Avenue and the Hospital	$ 611,000
AF-7	1A	Lower Parkdale Drive/Highway 199 Trunkline	$ 1,590,000
AF-11	1A	Sugar Beet Line, East Park Street	$ 1,330,000
AF-12	1A	Sunset Way and Tributary Pipes	$ 2,226,000
AF-13	1A	Harbeck Road and Southridge Way	$ 1,082,000
AF-14	1A	Highway 238	$ 661,000
AF-15	1A	Main Gravity Canal Spills and Central Parkdale Drive Trunkline	$ 889,000
AF-16	1A	Upper Parkdale Drive Trunkline and South Highland Canal Spill	$ 601,000
AF-17	1A	Highways 238/199/99 Intersection Detention	$ 959,000
AF-18	1A	Union Avenue	$ 646,000
AF-19	1A	Meadow Glen	$ 236,000
AF-20	1A	Liberty Drive	$ 473,000
Gilbert			
G-1	1A	5th Street, 6th Street	$ 1,656,000
G-3	1A	G Street, I Street, Alder Street, L Street	$ 795,000
G-4	1A	Demoray Canal Spills- Southwest	$ 127,000
G-5	1A	Demoray Canal Spills- Central West	$ 29,000
G-6	1A	Hilcrest Drive, 6th Street, 7th Street	$ 1,664,000
G-7	1A	Demoray Spill-South East	$ 106,000
G-8	1A	Demoray Canal Spills- North Central	$ 810,000
G-9	1A	Demoray Canal Spills- Northwest	$ 460,000
G-10	1A	Demoray Canal Spills- Northeast	$ 438,000
Sand			
S-1	1A	Trunkline from South Main Canal to River along Dowell Road	$ 3,412,000
S-2	1A	Flow-split Kellenback Avenue to Dowell Road	$ 691,000
S-3	1A	Expansion of South Main Canal	$ 583,000
S-6	1A	Leonard Road to Ditch	$ 926,000
S-7	1A	Willow Lane to Ditch	$ 975,000
S-8	1A	Willow Court, Estates Lane	$ 696,000
S-10	1A	Kokanee Lane, Leonard Road	$ 1,613,000
S-12	1A	Rainwood Lane to Leonard Road	$ 141,000
S-13	1A	ODOT Pond South of Redwood Highway	$ 1,353,000
S-14	1A	New Flow Diversion to Sand Creek at I-5	$ 168,000
S-15	1A	Yellowtail Lane to Mary Lynn Lane	$ 392,000
S-16	1A	Darnelle Lane	$ 1,138,000
Skunk Jones			
SJ-10	1A	Channel Northwest of Dewey Drive and 10th Street	$ 3,000
		Total Priority 1A Improvements	**$ 31,891,000**

Table 6-2: Priority 1B, 2A, & 2B Improvements

ID#	Priority	Item	Total Estimated Cost (2015)
Priority 1B Improvements (15-20 years)			
Allen Fruitdale			
AF-6	1B	West Park Street, Josephine County Yard, Tussing Park	$ 407,000
Sand			
S-4	1B	Redwood Circle to River	$ 650,000
Skunk Jones			
SJ-1	1B	F Street	$ 1,829,000
SJ-8	1B	Spill Northwest of I-5 and Hilcrest Drive to 7th Street	$ 386,000
SJ-11	1B	Rogue Drive Trunkline	$ 2,938,000
SJ-12	1B	M Street	$ 759,000
SJ-13	1B	A Street-West	$ 1,126,000
		Total Priority 1B Improvements	**$ 8,095,000**
Priority 2A Improvements (20-25 years)			
Gilbert			
G-2	2A	9th Street	$ 457,000
Skunk Jones			
SJ-7	2A	Demoray Canal	$ 61,000
		Total Priority 2A Improvements	**$ 518,000**
Priority 2B Improvements (20-25 years)			
Skunk Jones			
SJ-2	2B	D Street	$ 2,181,000
		Total Priority 2B Improvements	**$ 2,181,000**

Table 6-3: Priority 3A, 3B, 3C, & 4 Improvements

ID#	Priority	Item	Total Estimated Cost (2015)
Priority 3A Improvements (25-30 years)			
Allen Fruitdale			
AF-8	3A	Haviland Drive and Grandview Avenue	$ 3,000
AF-10	3A	Canal spill East of UGB	$ 306,000
Sand			
S-5	3A	Mesman Drive to River	$ 240,000
S-9	3A	George Tweed Boulevard and Spurs	$ 464,000
S-11	3A	Pond South of Redwood Highway	$ 72,000
Skunk Jones			
SJ-5	3A	Tokay Canal from Savage Street to Dewey Drive	$ 236,000
SJ-9	3A	Rose Lane to River	$ 212,000
		Total Priority 3A Improvements	**$ 1,533,000**
Priority 3B Improvements (25-30 years)			
Skunk Jones			
SJ-3	3B	A Street - East	$ 526,000
SJ-4	3B	Madrone Street	$ 631,000
		Total Priority 3B Improvements	**$ 1,157,000**
Priority 3C Improvements (25-30 years)			
Skunk Jones			
SJ-6	3C	Dewey Drive to 6th Street	$ 795,000
		Total Priority 3C Improvements	**$ 795,000**
Priority 4 Improvements (30-35years)			
Allen Fruitdale			
AF-9	4	Spill North of Harpazo Lane	$ 280,000
		Total Priority 4 Improvements	**$ 280,000**
		TOTAL STORMWATER IMPROVEMENTS COSTS (rounded)	**$ 46,450,000**

* All costs in 2015 Dollars. Costs include contractor overhead and profit (OH&P; 15%), contingency (30%), engineering and construction management services (CMS; 20%), and legal, administrative, and permitting services (2%).

** Costs assume open cut construction. Alternative technologies (i.e. pipe bursting) should be explored during pre-design phase.

The cost estimate herein is concept level information only based on our perception of current conditions at the project location and its accuracy is subject to significant variation depending upon project definition and other factors. This estimate reflects our opinion of probable costs at this time and is subject to change as the project design matures. This cost opinion is in 2015 dollars and does not include escalation to time of actual construction. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids, or actual construction costs will not vary from the cost presented herein.

6.3 COORDINATION WITH OTHER JURISDICTIONS, ONE SYSTEM

The recommendations presented above were created as if the system was owned and operated by one single owner. This methodology provides the best overall recommendation with the system needs in mind, without regards to ownership or other political factors. Several owners including the City of Grants Pass, Josephine County, Grants Pass Irrigation District, and homeowner's associations own the stormwater infrastructure within the UGB. Coordination and cost sharing will be required among the parties to minimize potential flooding in the study area.

7.0 MAINTENANCE, REPLACEMENT, AND STAFFING

7.1 BACKGROUND

The Grants Pass storm water system within the urban growth boundary comprises about 138 miles of storm sewer, 5300 catch basins and curb inlets, 120 cleanouts, 35 piped river outfalls, 2241 manholes, and an unspecified number of other storm water structures. The system also includes 41 miles of irrigation pipes and canals (the canals are considered in storm water analyses since they also intercept and convey storm water runoff).

Though Grants Pass does not currently have a separate storm water utility, various City departments perform or oversee numerous activities related to storm water control and related water quality issues. The City requires installation of water quality structures in commercial developments, plus erosion and sedimentation control plans for all developments, and monitors contractor work for post-construction erosion. City staff are involved in monitoring activities within riparian areas, providing pet waste stations at parks and dog parks, and installation of bio-swales on City street improvement projects. The City is also responsible for storm water system maintenance and repairs, and specific actions required by the Rogue Basin TMDL Implementation Plan.

The City of Grants Pass requested Keller Associates' technical support to develop an annual budget for their storm water system that would provide for 1) system maintenance, 2) pipeline replacement, and 3) meeting NPDES MS4 Phase II permitting requirements. This section presents a summary of recommended vs. current storm water activities, and the associated budget implications.

7.2 SYSTEM MAINTENANCE

One of the responsibilities of the Streets and Drainage Division of the Grants Pass Public Works Department is maintenance of the storm water infrastructure within the City limits. This includes storm water facilities in City streets plus county roads and state highways that run through town, 20 detention structures throughout the city, and six water quality structures at Grandview, Tussing Park, Estates Lane, 7th Street, Grace Gardens, and 8th Street. Storm water and maintenance issues with the canals and I-5 are the jurisdiction of the Grants Pass Irrigation District and the Oregon Department of Transportation, respectively.

Storm water-related maintenance activities involve cleaning of pipelines and catch basins, maintenance of detention and water quality structures, and street sweeping.

7.2.1 Pipelines

When pipeline maintenance is needed, the Streets Division borrows a sewer cleaning truck from the City's wastewater program; however, there is currently no regularly scheduled maintenance or inspection of the storm sewer pipelines.

It is important to provide regular CCTV inspection to determine pipeline conditions, and repair the pipelines as needed. Sediment build-up in the pipelines reduces their capacity and

increases the potential for flooding; it also results in higher pollutant concentrations flushed out during large storm events. Other problems that could reduce the conveyance capacity of the storm water lines are broken or cracked pipelines, offset joints, root intrusion, and other blockage. A regular cleaning and CCTV program for the storm water pipelines will enable the City to identify and prioritize the pipelines in need of maintenance.

It is recommended that all the storm water pipelines be cleaned every 3 years, or more regularly if CCTV records justify a higher cleaning frequency (e.g. annual cleaning is recommended for lines with significant root intrusion). The recommended frequency for CCTV inspection is every 5-10 years, depending on the condition of the pipelines.

7.2.2 Catch Basins

The City crew is currently cleaning 1/3 of the catch basins each year. Cleaning is done by hand, except where the basins are too deep for hand cleaning or where lines are plugged. In those situations, arrangements must be made to use the sewer cleaning truck to vacuum out the basins or jet the pipelines.

At a minimum, catch basins need to be cleaned when sediment or debris blocks more than 1/3 of the pipe. An EPA study titled *Evaluation of Catch Basin Performance for Urban Stormwater Pollution Control* (Aronson et al, 1983, EPA-600/2-83-043) recommends that all catch basins be cleaned at least annually; annual cleaning may be required by the NPDES permit. A catch basin's effectiveness increases with more frequent cleanings.

Catch basin cleaning can be coordinated with line cleaning and CCTV inspection. If lines are cleaned and inspected every three years, approximately 1/3 of the lines and catch basins will be cleaned yearly. This leaves 2/3 of the catch basins to be cleaned independent of the storm lines.

7.2.3 Detention Facilities, Open Channels and Water Quality Structures

Wetlands and detention areas in the Grants Pass storm water system are, for the most part, left to grow in a natural state. The City does attempt to remove invasives (such as blackberries), and in some locations, attempts to maintain a 5- to 10-foot buffer between the wetland and private property. The City contracts with the County to have their corrections crew complete some of the blackberry clearing along ditches, wetlands and detention areas.

Water quality structures are cleaned using the sewer cleaning (vac) truck to remove sediment. There are no filters to replace. The Grandview water quality structure, on line for 10 years, has required little effort to maintain since its location does not collect much debris. It has been cleaned a couple of times. The other water quality structures, installed later in 2012, will be placed on a 6-month cleaning schedule that will be adjusted as warranted by the accumulation of debris.

Grates on inlet and outlet pipes (where applicable) should be cleaned regularly, and the control structures should be inspected and cleaned as well. The areas around the detention facilities should be sprayed for weeds. The timing and type of spray used for this should be such that it

does not impair water quality or damage vegetation used for sediment filtering. Open detention facilities should be cleared of any trash or debris on a regular basis. The facility should be dredged before sediment accumulation exceeds the elevation of the outfall pipe, interfering with proper functioning of the detention facility. Similar maintenance should be performed on and around biofiltration swales and open channels.

7.2.4 Street Sweeping

In Grants Pass, the street sweeping is performed by an outside contractor. Street sweeping is an important part of the storm water operation and maintenance procedures in pollution prevention and control. The sweeping frequency varies by location, as shown in Table 7-1:

Table 7-1: Sweeping Frequency

Location	*Street Sweeping Frequency*
Downtown	Every week
Industrial / Commercial Areas	Every other week
Arterial Streets	Every other week
Residential Areas	Oct-Jan: once a month; Feb-Sept: every other month

7.2.5 Costs

The Streets and Drainage Division has 7 full-time employees (FTE) for maintenance of streets and drainage (storm water) facilities. City staff estimate that the time spent on storm water work accounts for an equivalent of 1 to 1.4 FTE. The City anticipates this will increase to 2 FTE when the old sewer cleaning truck is transferred to the storm water staff. The current budget for in-house storm water system maintenance and repairs is $40,500, with an additional $158,000 budgeted for the street sweeping contract. As previously discussed, this budget does not include regular pipeline cleaning and inspection, and covers annual cleaning of just 1/3 of the catch basins.

Pipeline and Catch Basin Cleaning: The cost of pipeline cleaning and inspection depends on whether the work is contracted out or performed by City staff. Based on a 3-year pipeline cleaning and a 6-year video inspection cycle, approximately 46 miles of pipeline would need to be cleaned annually and half of that would also be video inspected. Typical contracted cleaning and inspection costs, assuming the lines are regularly maintained, are about $1.90/ft ($0.80/ft for cleaning only); poorly maintained lines can cost up to $5/ft. Estimated annual costs for contract cleaning and CCTV inspection for Grants Pass would be about $327,000.

Performing the pipeline cleaning and inspection work in-house would require an estimated 260 man-days per year, based on a 2-man crew with an estimated production of 2,800 feet per day for cleaning and 1,400 feet per day for CCTV. At an estimated cost of about $336 per working day per FTE, the estimated annual pipeline cleaning and inspection cost would be about $88,000.

It is also recommended that the cleaning truck be used to clean the catch basins wherever possible. Based on an estimated cleaning rate of 40 catch basins per day, it would take 265

man-days for a 2-man crew to clean all 5300 catch basins/curb inlets. This represents a cost of about $89,000.

Based on the above time estimates and 250 annual working days, the cleaning truck required for this work would be in use over 100% of the time. Thus, borrowing the sewer cleaning truck to clean the storm sewer system would not be practical. According to a recent survey of suppliers, new fully equipped vactor/CCTV trucks cost approximately $300,000. The annualized capital cost of a vactor truck/CCTV truck, based on a 15-year equipment life and 5% interest rate, would be about $29,000 per year. Thus, the total annual cost for in-house cleaning and TV inspection of pipelines (3-year and 6-year cycle, respectively) and catch basins (annual) is estimated at $235,000. This approach is not only less costly than contracting the work out, but would give the City the ability to respond more quickly to debris blockages that may cause flooding or ponding during storm events.

Detention Facilities, Water Quality Structures and Street Sweeping: It is assumed that the City will continue current practices for maintenance of detention facilities and water quality structures. It is also assumed that the City will continue to utilize an outside contractor to provide the current level of service for street sweeping.

Staffing (based on 1500 annual productive hours per FTE): Providing the described level of pipeline cleaning and inspection in-house would require 1.39 FTE, and cleaning the catch basins annually would require 1.41 FTE. Assuming that 0.4 FTE is currently utilized for cleaning 1/3 of the catch basins each year, adding pipeline inspection/cleaning and increasing the frequency of catch basin cleaning would require an additional 2.40 FTE.

7.3 PIPELINE REPLACEMENT

In addition to regular maintenance, Keller Associates recommends establishing an annual pipeline replacement program. Storm water infrastructure replacement/rehabilitation needs will increase as the storm water system ages. A replacement program is typically based on the amount of storm water infrastructure and its estimated useful life. Assuming an average 75-year remaining useful life for the pipelines, the replacement program should target 1.3% of the system each year. For the entire Grants Pass system, this would amount to 9,700 feet of pipe, 106 catch basins, and 45 manholes. At an estimated average pipe replacement cost of $200/ft, and costs of $2,300 and $7,000, respectively, for replacement of catch basins and manholes, the annual replacement budget would total approximately $2.5 million.

The City is not necessarily responsible for 100% of this replacement cost, since parts of the Grants Pass storm water system lie within county roads, state highways, or are used by GPID for irrigation distribution. Efforts should be made to coordinate with these entities for cost-sharing. It should also be noted that any portions of the storm water infrastructure to be replaced under a capital improvement program can be excluded from the annual replacement program. It is recommended that the replacement program be phased in over a period of 5-10 years, and adjusted as needed based on future inspection efforts.

7.4 NPDES MS4 PHASE II PERMITTING REQUIREMENTS

The City received a letter from DEQ in the spring of 2015 indicating that DEQ would be done with the NPDES MS4 Phase II permit writing approximately in the next year. The implementation of the requirements is anticipated to be phased in over a five-year period. Six minimum control measures will be required to meet the NPDES MS4 Phase II permit requirements are:

1. Public education program
2. Public participation
3. Illicit discharge detection and elimination
4. Construction site stormwater runoff control
5. Post-construction stormwater management in new development and redevelopment
6. Pollution prevention in municipal operations

The City currently contracts with RVCOG to accomplish activities required by the Rogue Basin TMDL Implementation Plan, including community outreach and education, preparation of an annual report, and restoration of planting areas. These activities, particularly community education, may at least partly satisfy some of the minimum control measures required as part of an MS4 Phase II permit. Ongoing City programs and policies may be sufficient to address other requirements such as construction and post-construction storm water management. However, additional activities will be needed to satisfy all required control measures, including illicit discharge detection/elimination and pollution prevention in municipal operations, which involves the following:

- Structural and non-structural best management practices (BMPs) that the permittee or another entity will implement for each of the stormwater minimum control measures
- Measurable goals for each of the BMPs including milestones and the frequency of the action
- Rationale for how and why the permittee selected each of the BMPs and measurable goals for the permittee's Stormwater Management Program
- A timetable for completing each of these actions

It is estimated that an additional 0.25 FTE will be needed for activities related to the NPDES MS4 Phase II permit requirements. It should be noted that the NPDES MS4 Phase II permiting process will require a certain amount of operation and maintenance. The additional FTE mentioned in this paragraph is just for the administration side of the permit requirements mentioned in this section.

7.5 SUMMARY

It is recommended that the City of Grants Pass budget for an additional 2.65 FTE plus a new fully equipped inspection and cleaning truck as well as a CCTV truck, and begin to establish an annual replacement program. The recommended annual budget for the upcoming budget cycle is summarized in the table below. (The budgeted cost for each new employee is based on an estimated total of $70,200 for salary plus benefits.)

Table 7-2: O&M/Replacement Staffing Summary

Budget Item	*Currently Budgeted*	*Recommended*
Street sweeping	$ 158,000	$ 158,000
Cleaning and CCTV (2.4 add'l FTE)	-	177,000
Equipment (CCTV & vac truck)	-	58,000
Equipment fuel and maintenance	-	4,000
Storm system repairs	$25,500	50,000
Permitting (RVCOG, 0.25 add'l FTE)	$15,000	33,000
Replacement program	-	$2,500,000*
TOTAL	$ 198,500	$ 2,980,000

* Amount to be determined following inspection of existing facilities, and adjusted on an annual basis as needed

Appendix A
Figures

GRANTS PASS
WHERE THE ROGUE RIVER RUNS
OREGON

KELLER associates

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 1 Land Use and Study Area.mxd drawn by:NCJ

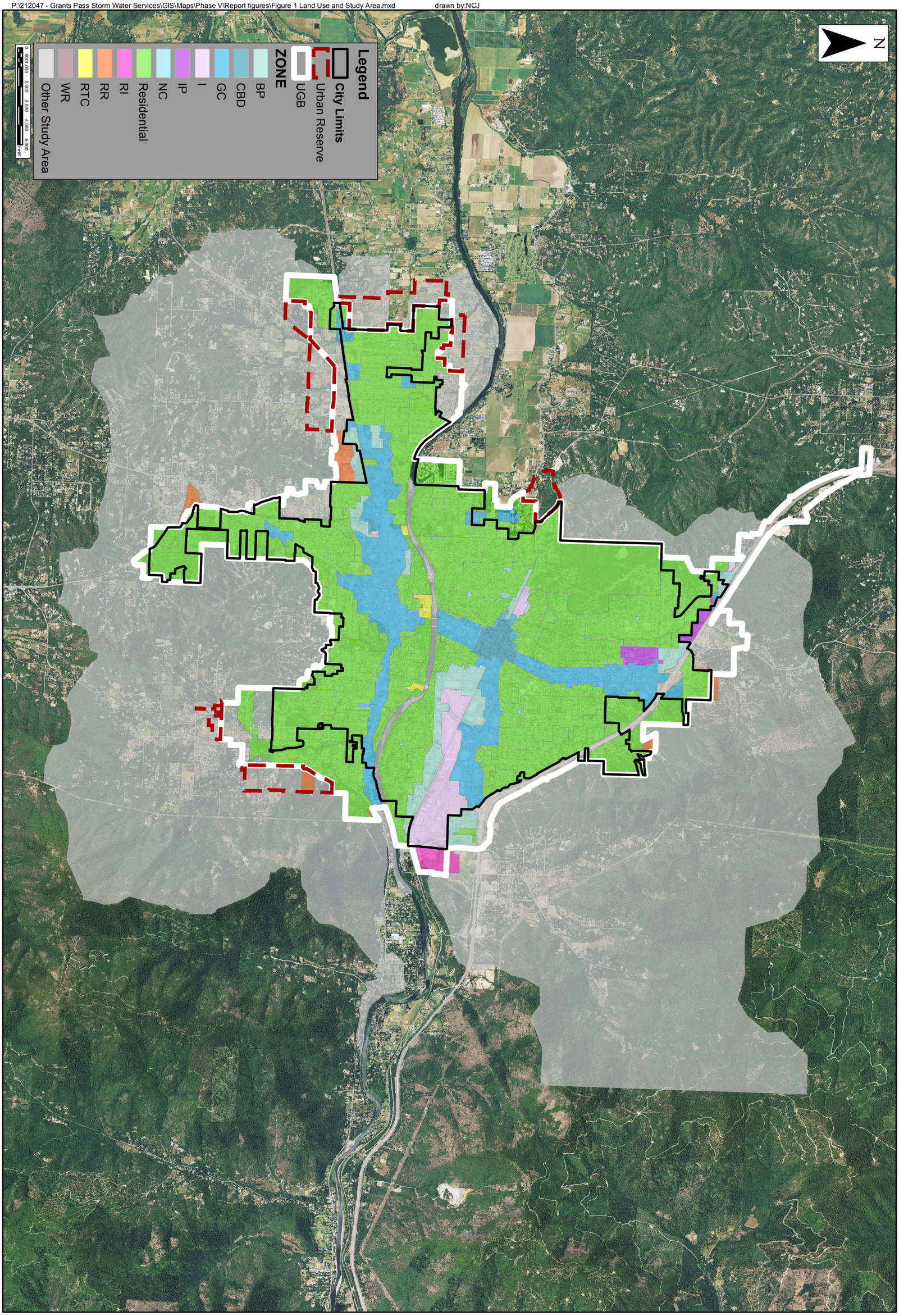


Figure:	Title:		Prepared for:		
1	LAND USE AND STUDY AREA	STORMWATER MASTER PLAN	CITY OF GRANTS PASS, OREGON	GRANTS PASS OREGON	KELLER associates

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 2 Soils.mxd drawn by:NCJ

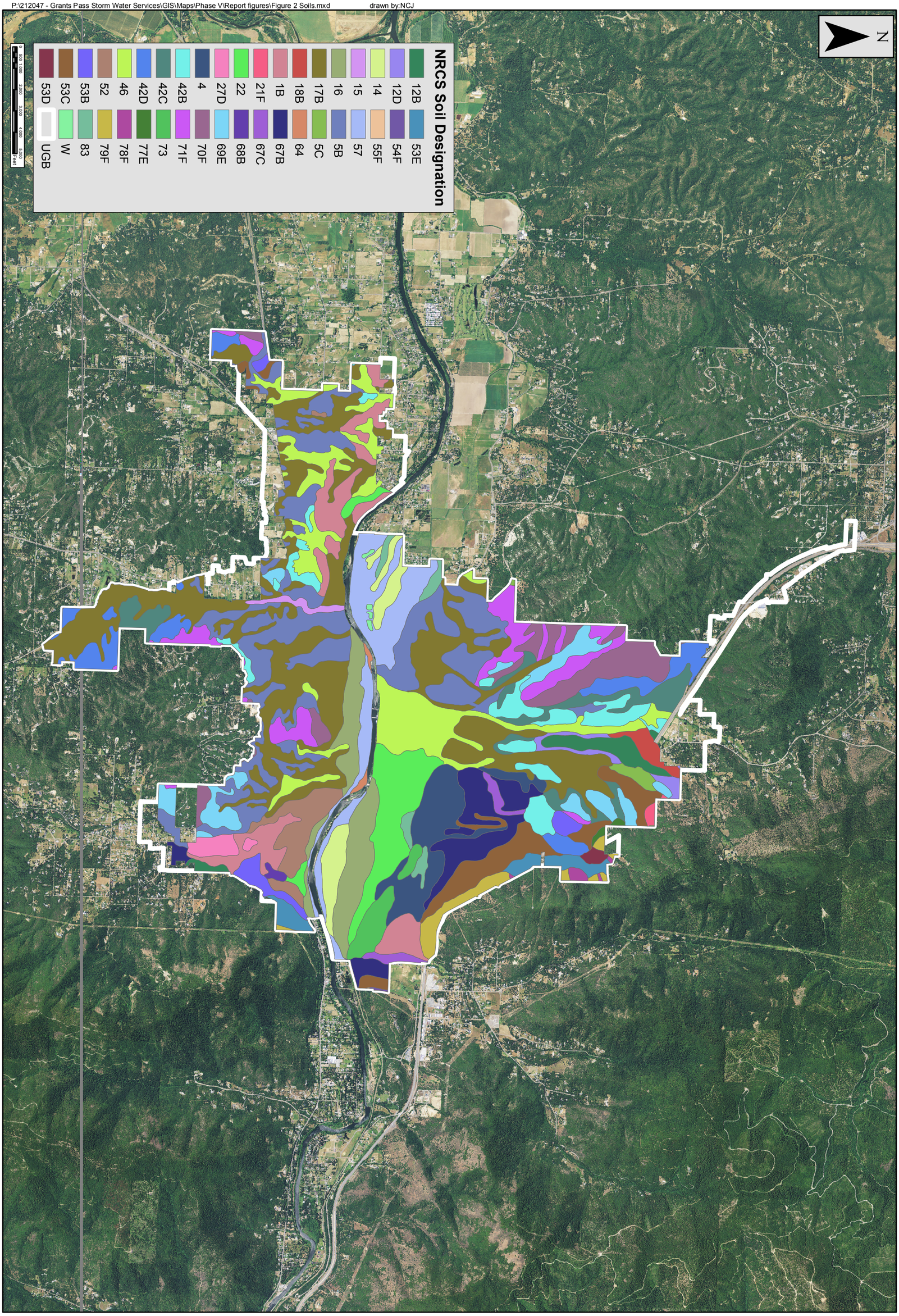


Figure:	Title:		Prepared for:		
2	SOILS	STORMWATER MASTER PLAN	CITY OF GRANTS PASS, OREGON	GRANTS PASS WHERE THE ROGUE RIVER RUNS OREGON	KELLER associates

N

Legend

Elevation (ft.)

- 1600-1800
- 1400-1599
- 1200-1399
- 1000-1199
- 860-999
- 100-year flood plain
- 500-year flood plain
- City Limits
- UGB

0 500 1,000 2,000 3,000 4,000 5,000 Feet

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GRANTS PASS WHERE THE ROGUE RIVER RUNS

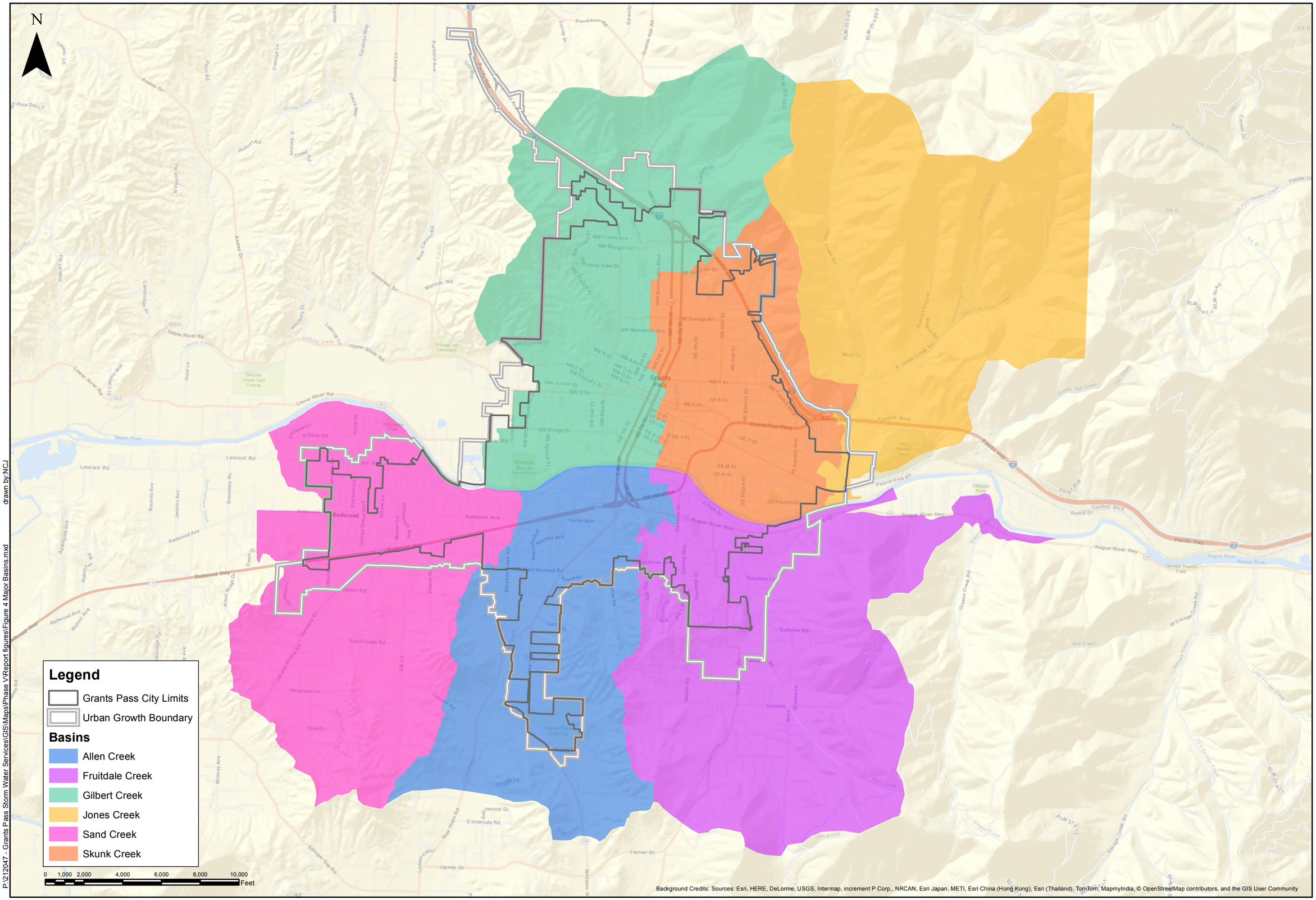
Prepared for:

CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title: TOPOGRAPHY AND FLOOD PLAIN

Figure: 3



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P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 4 Major Basins.mxd

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GRANTS PASS WHERE THE ROGUE RIVER RUNS

Prepared for:

CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title: MAJOR BASINS

Figure: 4

N

Legend

- Irrigation Spills
- Outfall
- Modeled Storage Facility
- 8" and Smaller Pipe
- 10" - 12" Pipe
- 24"- 28" Pipe
- 14" - 21" Pipe
- 30" - 36" Pipe
- 42" and Larger Pipe
- Allen Fruitdale Channels
- Special Pipes

0 250 500 1,000 1,500 2,000 2,500 Feet

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P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 7A Allen-Fruitdale Modeled Lines.mxd

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GRANTS PASS — WHERE THE ROGUE RIVER RUNS

Prepared for:

CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title: ALLEN-FRUITDALE MODELED LINES

Figure: 5A

N

Legend

- Irrigation Spills
- Outfall
- Modeled Storage Facility

Gilbert Modeled Links

- 8" and Smaller Pipe
- 10" - 12" Pipe
- 24" - 28" Pipe
- 14" - 21" Pipe
- 30" - 36" Pipe
- 42" and Larger Pipe
- Special Pipes
- Gilbert Channels

0 500 1,000 2,000 3,000 Feet

Background Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User

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P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 7B Gilbert Modeled Lines.mxd

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GRANTS PASS — WHERE THE ROGUE RIVER RUNS

Prepared for:

CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title: GILBERT MODELED LINES

Figure: 5B

N

Legend

- Irrigation Spills
- Modeled Storage Facility

Sand Modeled Links

- 8" and Smaller Pipe
- 10" - 12" Pipe
- 24" - 28" Pipe
- 14" - 21" Pipe
- 30" - 36" Pipe
- 42" and Larger Pipe
- Special pipes
- Sand Channels

0 500 1,000 2,000 3,000 Feet

Background Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 7C Sand Modeled Lines.mxd drawn by:NCJ

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GRANTS PASS WHERE THE ROGUE RIVER RUNS

Prepared for:

CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title: SAND MODELED LINES

Figure: 5C

N

Legend

- Irrigation Spills
- Outfall
- Modeled Storage Facility

Skunk-Jones Modeled Links

- 8" and Smaller Pipe
- 10" - 12" Pipe
- 24" - 28" Pipe
- 14" - 21" Pipe
- 30"- 36" Pipe
- 42" and Larger Pipe
- Special Pipes
- Skunk-Jones Channels

0 500 1,000 2,000 3,000 Feet

Background Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User

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GRANTS PASS WHERE THE ROGUE RIVER RUNS

Prepared for:
CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title:
SKUNK-JONES MODELED LINES

Figure:
5D

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 5A Basin Updates-Allen-Fruitdale-final.mxd drawn by:NCJ

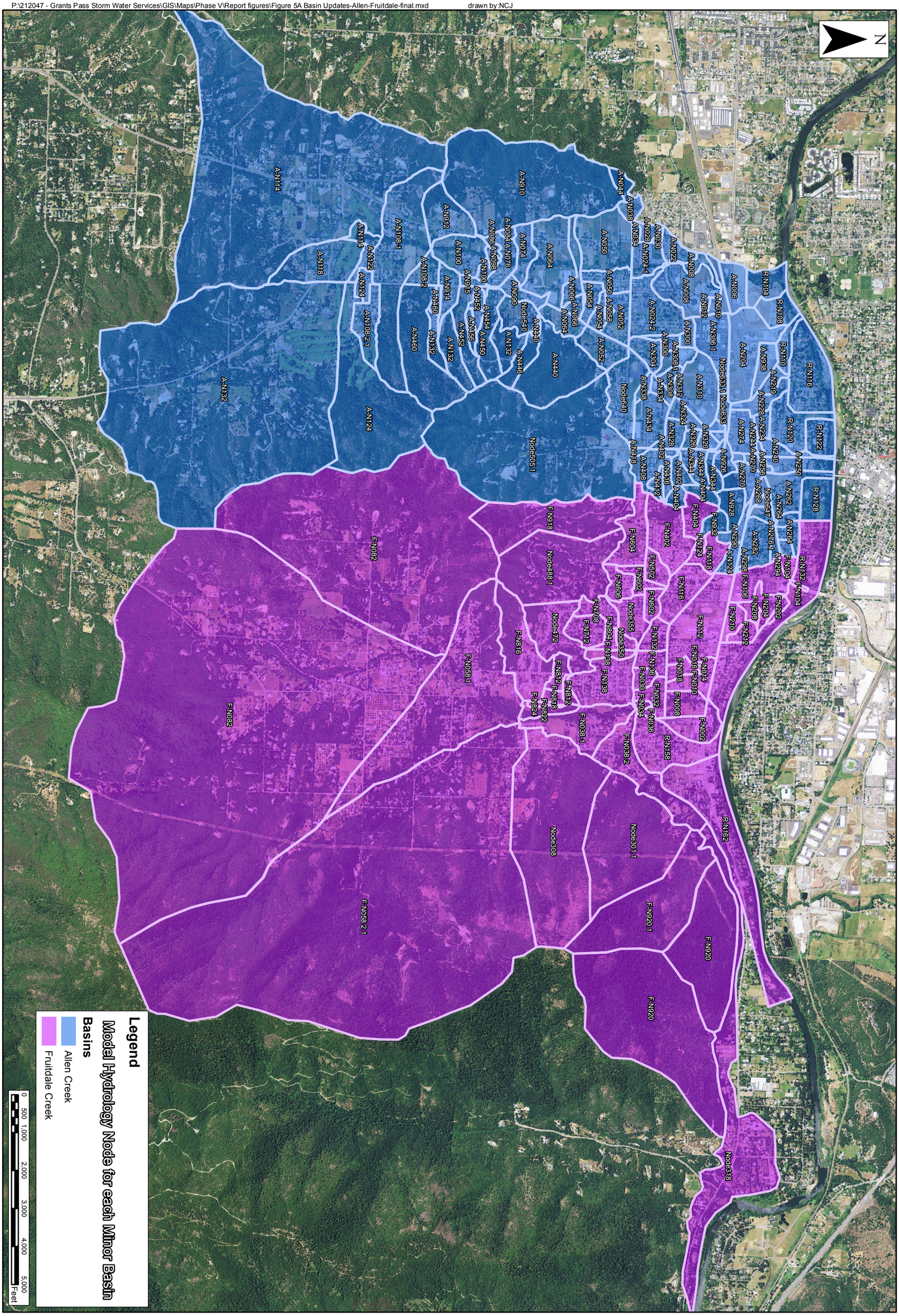
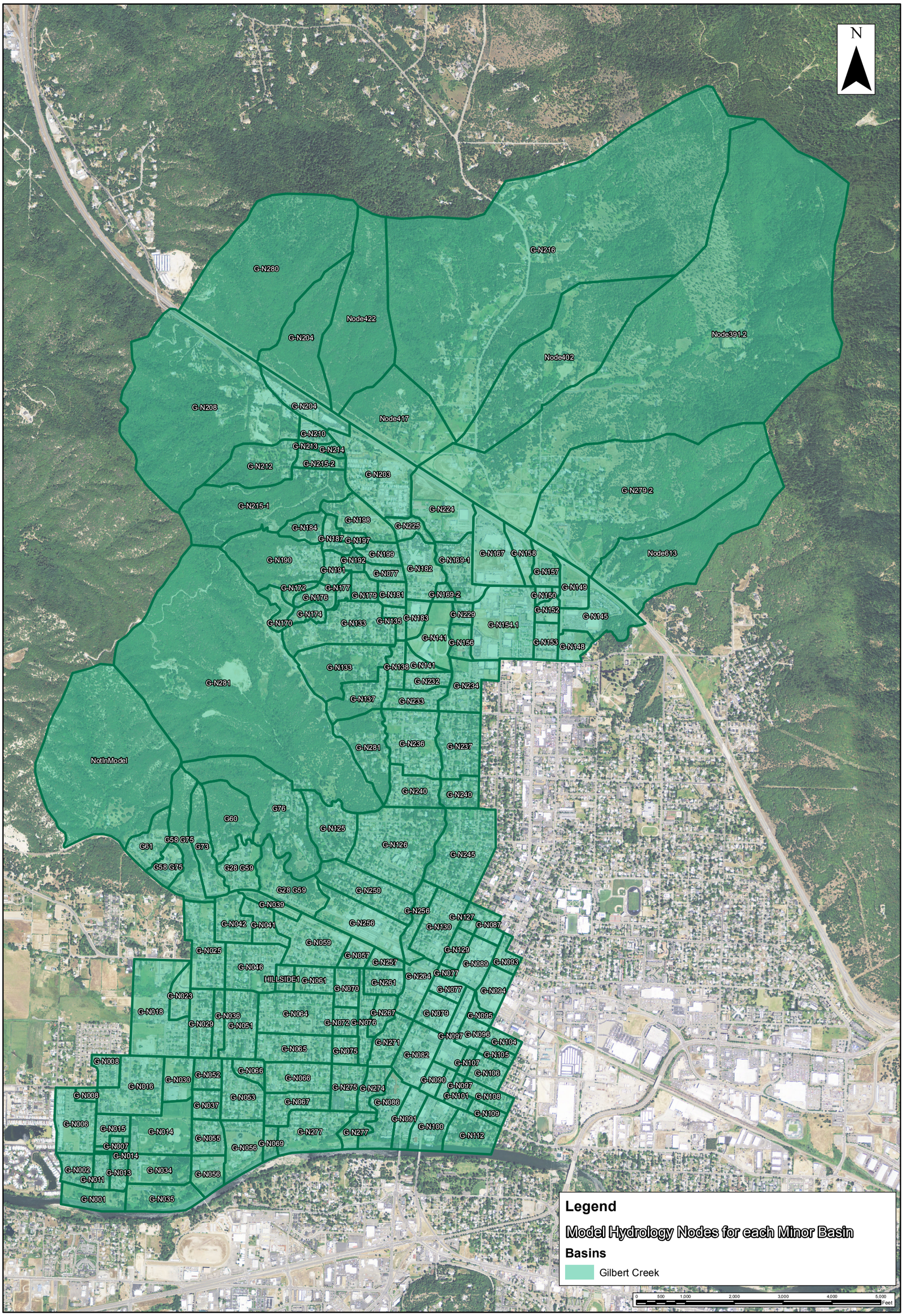


Figure:	Title:		Prepared for:		
6A	MINOR BASINS ALLEN-FRUITDALE	STORMWATER MASTER PLAN	CITY OF GRANTS PASS, OREGON	GRANTS PASS NEVER THE ROGUE RIVER RUNS OREGON	KELLER associates



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P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase VI\Report figures\Figure 5B Basin Updates-Gilbert-final.mxd

Figure:	Title:		Prepared for:		
6B	MINOR BASINS GILBERT	STORMWATER MASTER PLAN	CITY OF GRANTS PASS, OREGON	GRANTS PASS WHERE THE ROGUE RIVER RUNS OREGON	KELLER associates

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 5C Basin final-Sand.mxd drawn by:NCJ

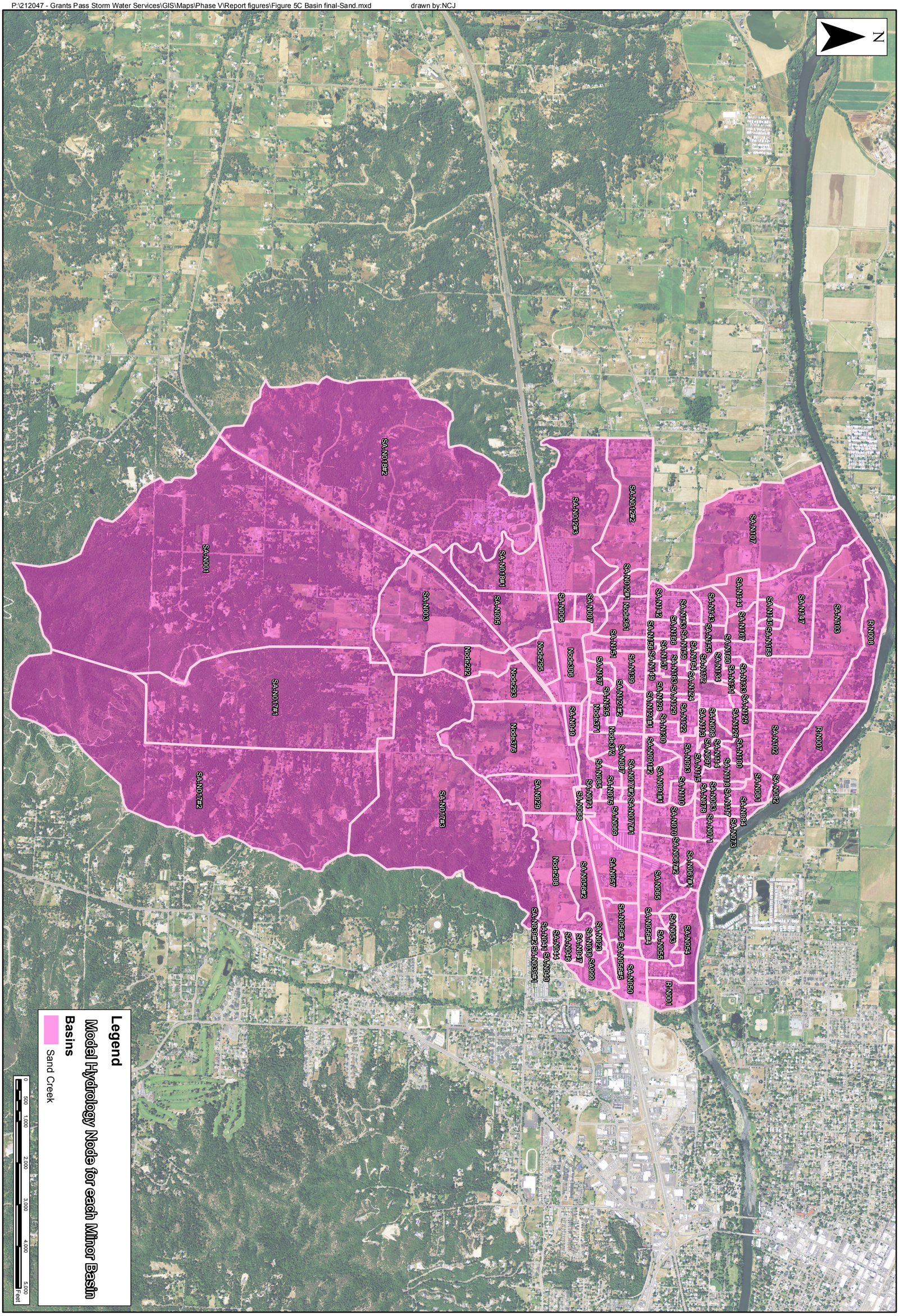


Figure:	Title:		Prepared for:		
6C	MINOR BASINS SAND	STORMWATER MASTER PLAN	CITY OF GRANTS PASS, OREGON	GRANTS PASS OREGON	KELLER associates

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 5D Basin Updates-Skunk-Jones-final.mxd drawn by:NCJ

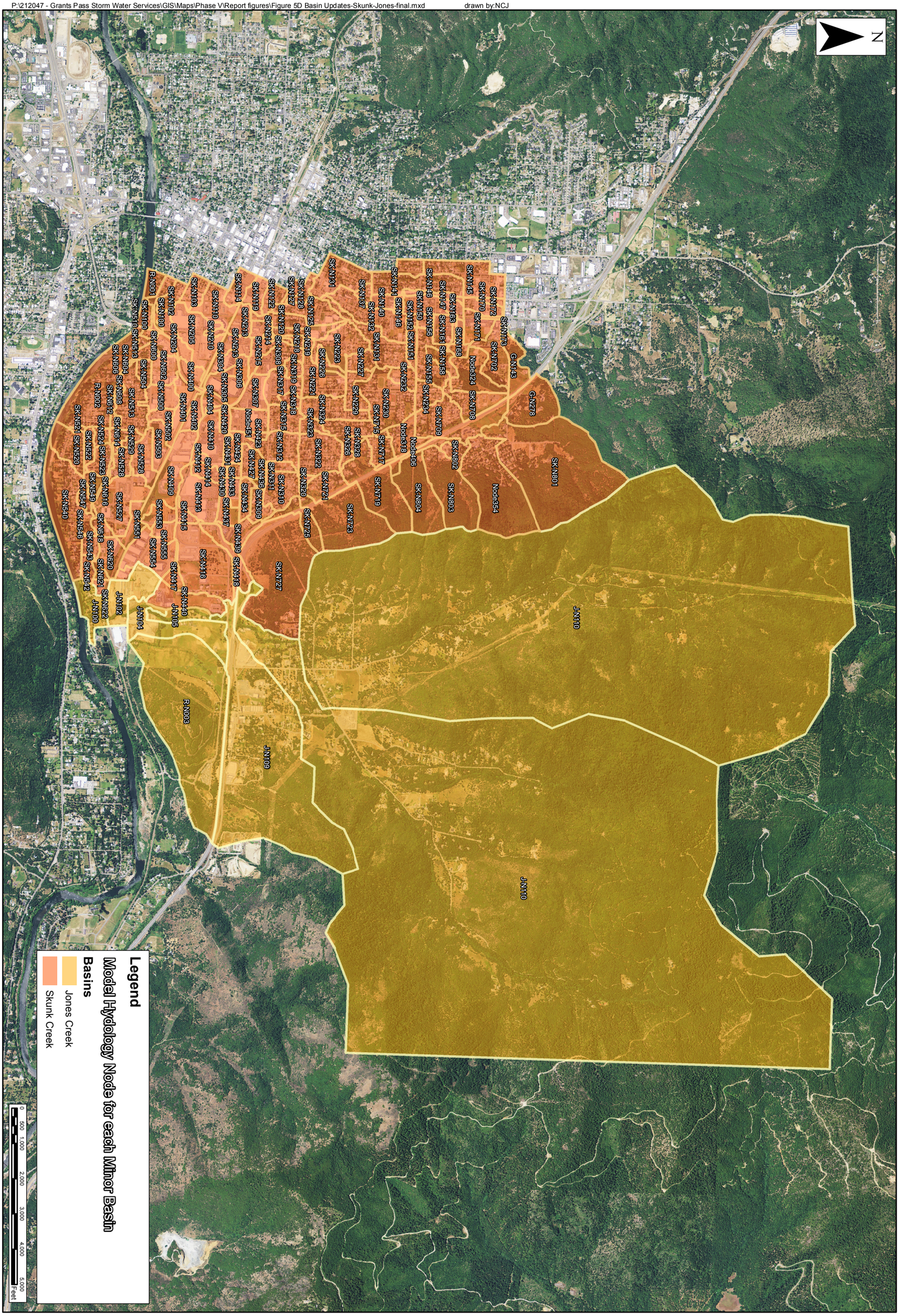
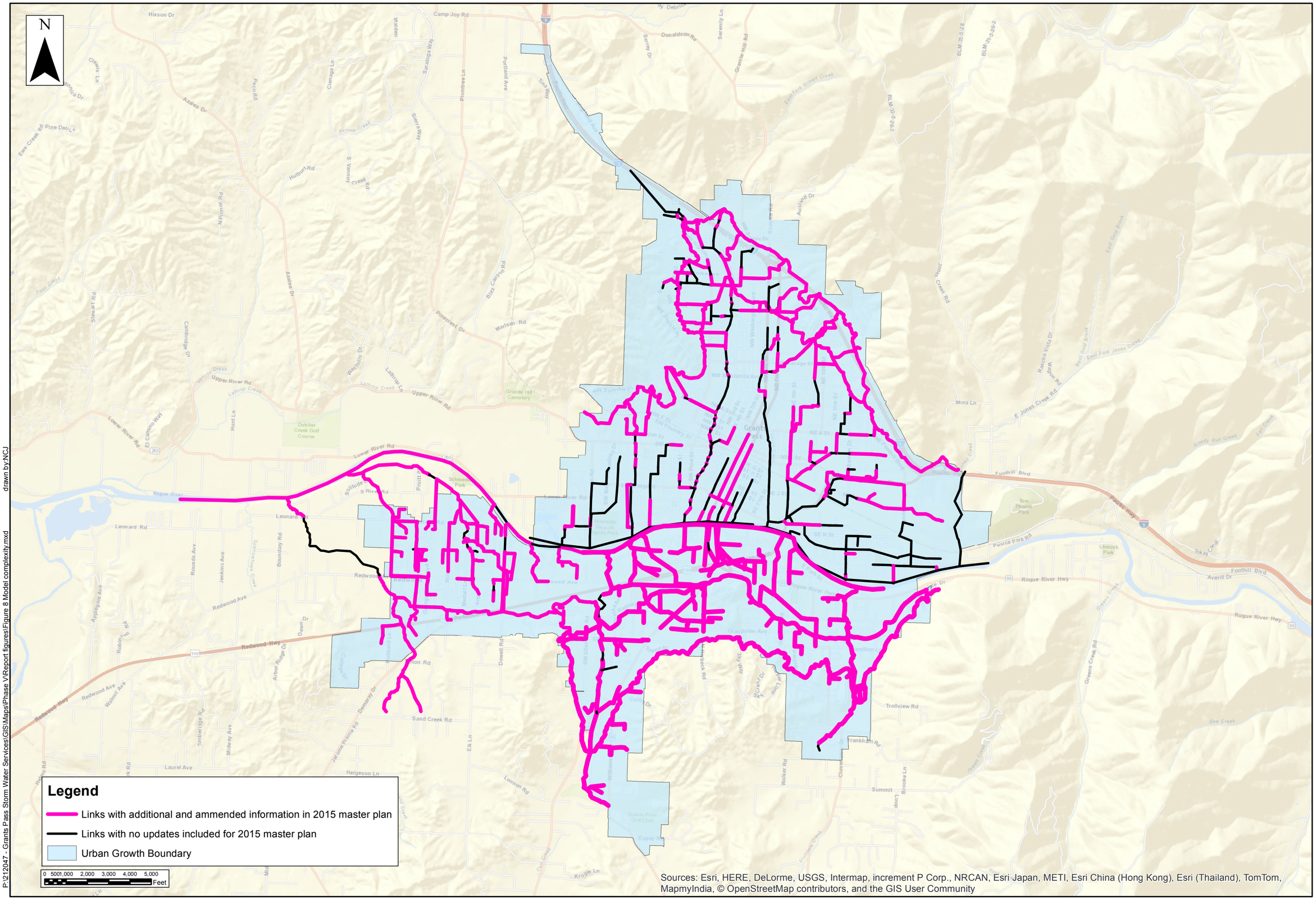


Figure:	Title:		Prepared for:		
6D	MINOR BASINS SKUNK-JONES	STORMWATER MASTER PLAN	CITY OF GRANTS PASS, OREGON	GRANTS PASS OREGON	KELLER associates



drawn by:NCJ

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 8 Model complexity.mxd

KELLER associates

GRANTS PASS WHERE THE ROGUE RIVER RUNS

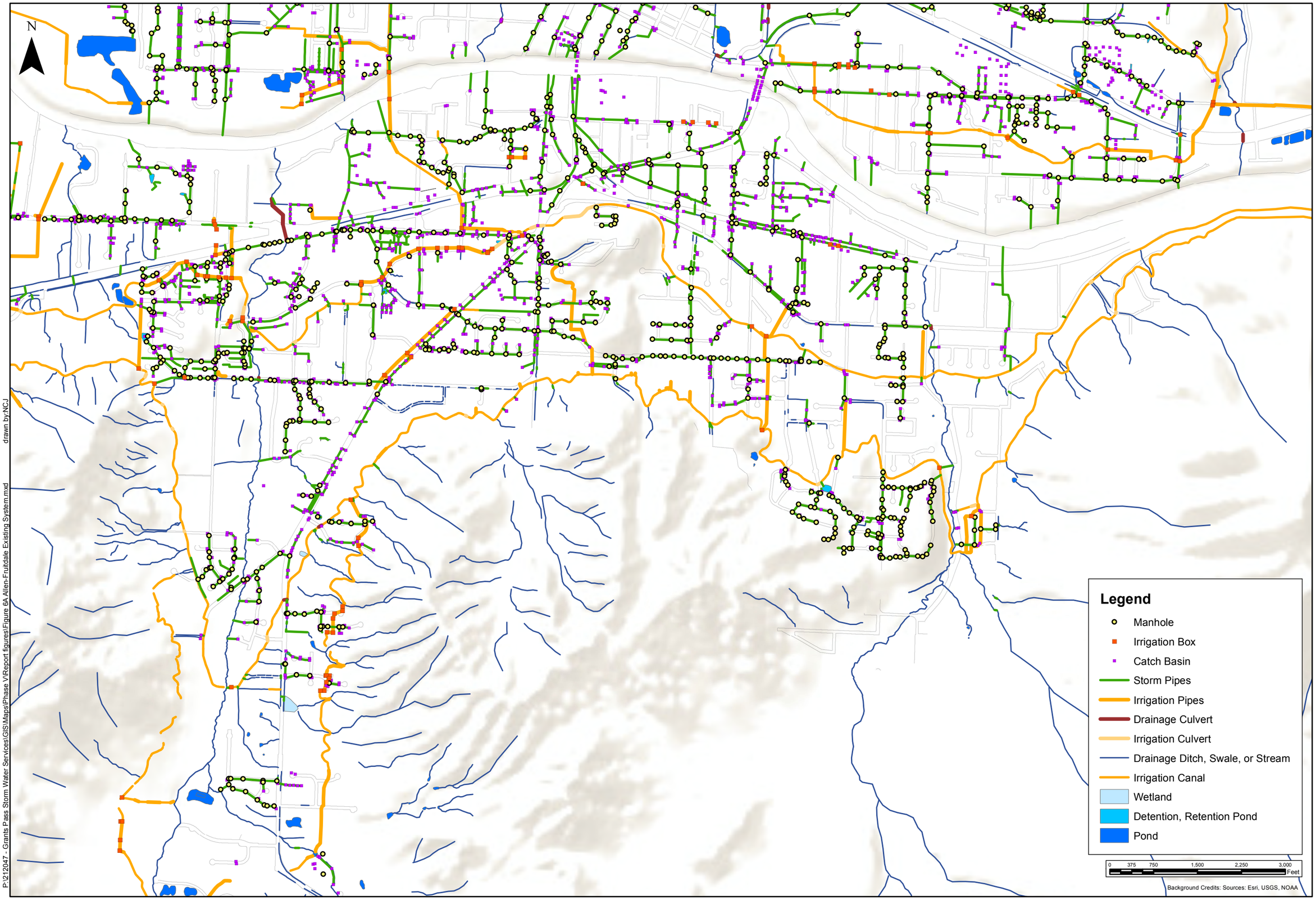
Prepared for:

CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title: COMPARISON OF 2007 AND 2015 MODEL

Figure: 7



drawn by:NCJ

P:\12047 - Grants Pass Storm Water Services\GIS\Maps\Phase VI\Report figures\Figure 8A Allen-Fruitdale Existing System.mxd

KELLER associates

GRANTS PASS
WHERE THE ROGUE RIVER RUNS

Prepared for:

CITY OF
GRANTS PASS, OREGON

STORMWATER
MASTER PLAN

Title:
ALLEN-FRUITDALE
EXISTING SYSTEM

Figure:
8A

N

Legend

- Manhole
- Irrigation Box
- Catch Basin
- Storm Pipes
- Irrigation Pipes
- Drainage Culvert
- Irrigation Culvert
- Drainage Ditch, Swale, or Stream
- Irrigation Canal
- Wetland
- Detention, Retention Pond
- Pond

0 375 750 1,500 2,250 3,000 Feet

Background Credits: Sources: Esri, USGS, NOAA

drawn by:NCJ

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 6B Gilbert, Skunk, Jones Existing System.mxd

KELLER associates

GRANTS PASS OREGON — WHERE THE ROGUE RIVER RUNS

Prepared for:

CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title: GILBERT, SKUNK, JONES EXISTING SYSTEM

Figure: 8B

Legend

- Manhole
- Irrigation Box
- Catch Basin
- Storm Pipes
- Irrigation Pipes
- Drainage Culvert
- Irrigation Culvert
- Drainage Ditch, Swale, or Stream
- Irrigation Canal
- Wetland
- Detention, Retention Pond
- Pond

N

0 375 750 1,500 2,250 3,000 Feet

Background Credits: Sources: Esri, USGS, NOAA

drawn by:NCJ

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase VI\Report figures\Figure 8C Sand Existing System.mxd

KELLER associates

GRANTS PASS WHERE THE ROGUE RIVER RUNS

Prepared for:

CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title:

SAND EXISTING SYTEM

Figure:

8C

N

Legend

First floods at

- 2-yr event
- 5-yr event
- 10-yr event
- 25-yr event
- 50-yr event
- 100-yr event
- no flooding
- Links

0 375 750 1,500 2,250 3,000 Feet

Background Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 9A Allen-Fruitdale Flooding Nodes.mxd drawn by:NCJ

KELLER associates

GRANTS PASS WHERE THE ROGUE RIVER RUNS

Prepared for:

CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title: FLOODING NODES ALLEN-FRUITDALE

Figure: 9A

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 9B Flooding Nodes - Gilbert.mxd drawn by:NCJ

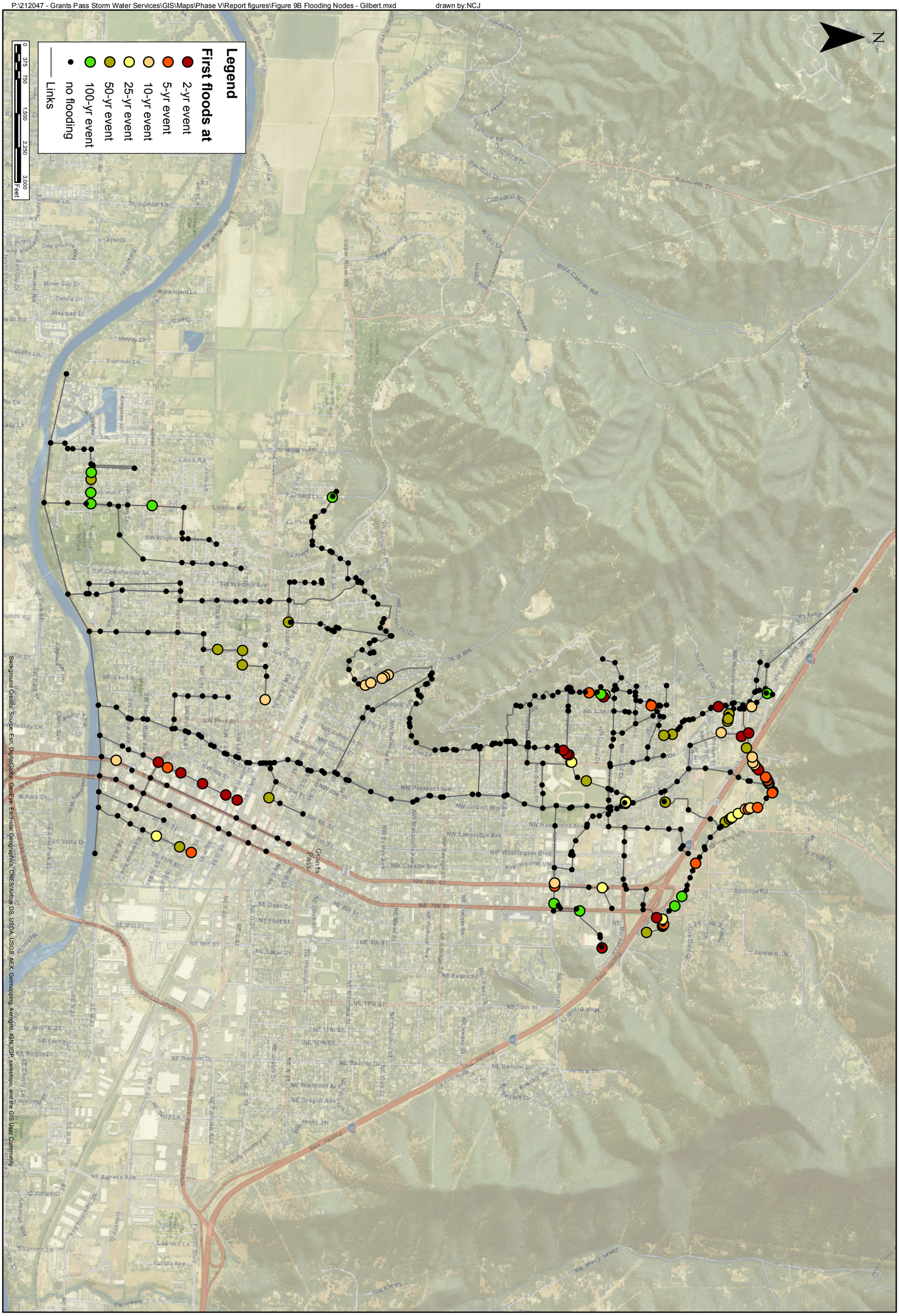
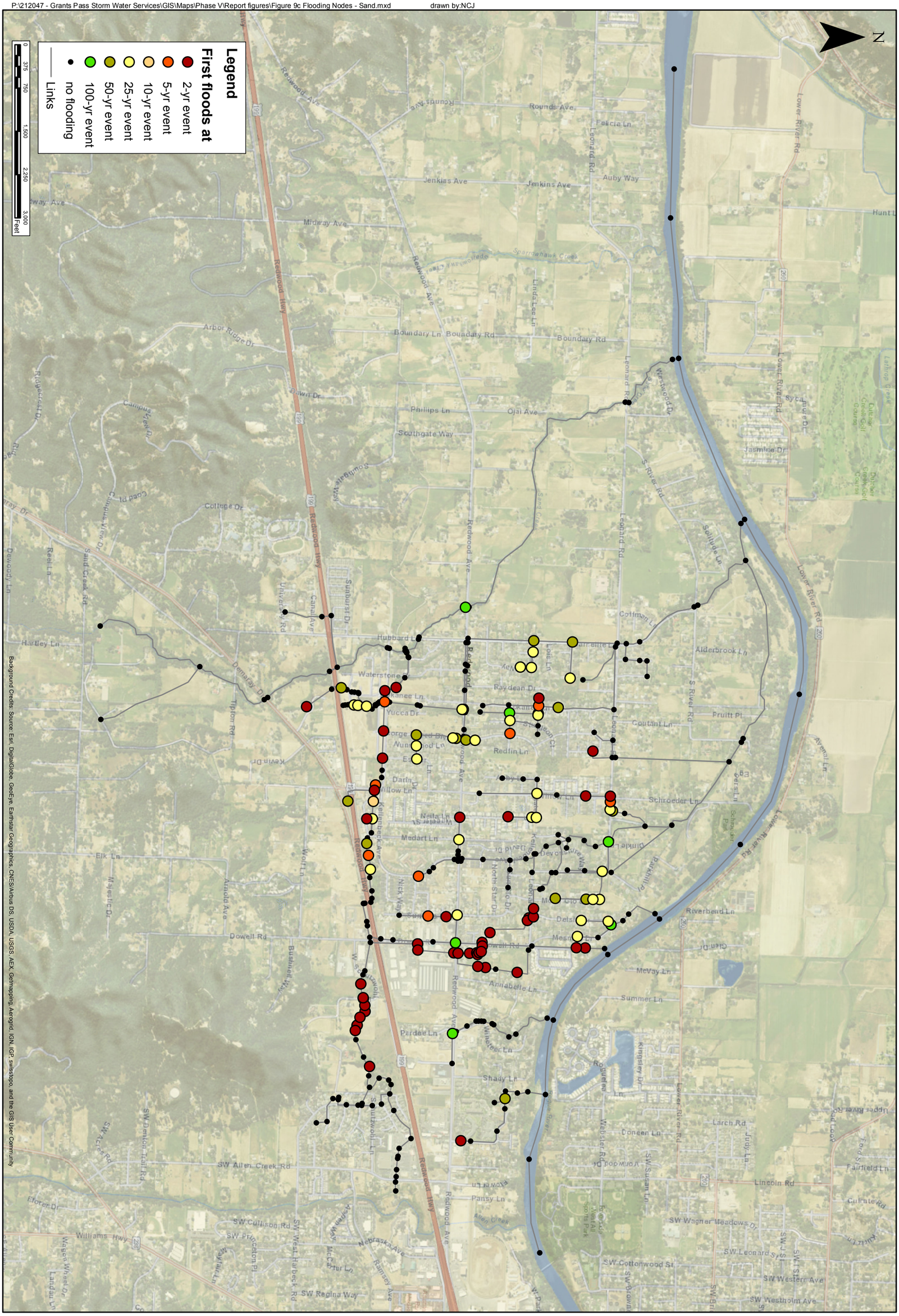


Figure:	Title:		Prepared for:		
9B	**FLOODING NODES GILBERT**	**STORMWATER MASTER PLAN**	**CITY OF GRANTS PASS, OREGON**	GRANTS PASS OREGON NEVER THE ROGUE RIVER RUNS	KELLER associates

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 9c Flooding Nodes - Sand.mxd drawn by:NCJ



Background Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure:	Title:		Prepared for:		
9C	FLOODING NODES SAND	STORMWATER MASTER PLAN	CITY OF GRANTS PASS, OREGON	GRANTS PASS NEVER THE ROGUE RIVER RUNS OREGON	KELLER associates

N

Legend

First floods at

- 2-yr event
- 5-yr event
- 10-yr event
- 25-yr event
- 50-yr event
- 100-yr event
- no flooding
- Links

0 375 750 1,500 2,250 3,000 Feet

Background Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 9d Flooding Nodes - skunk jones.mxd drawn by:NCJ

KELLER associates

GRANTS PASS WHERE THE ROGUE RIVER RUNS

Prepared for:

CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title: FLOODING NODES SKUNK-JONES

Figure: 9D

N

Legend

Problem Area

- K
- L
- M
- N
- O
- P
- Q
- R
- S
- T
- U
- V
- W
- X
- Y
- Z

Links

0 375 750 1,500 2,250 3,000 Feet

Background Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

drawn by:NCJ

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase VI\Report figures\Figure 10A Problem Areas-Allen Fruitdale.mxd

KELLER associates

GRANTS PASS WHERE THE ROGUE RIVER RUNS

Prepared for:

CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title:

PROBLEM AREAS ALLEN-FRUITDALE

Figure:

10A

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 10B Problem Areas - Gilbert.mxd drawn by:NCJ

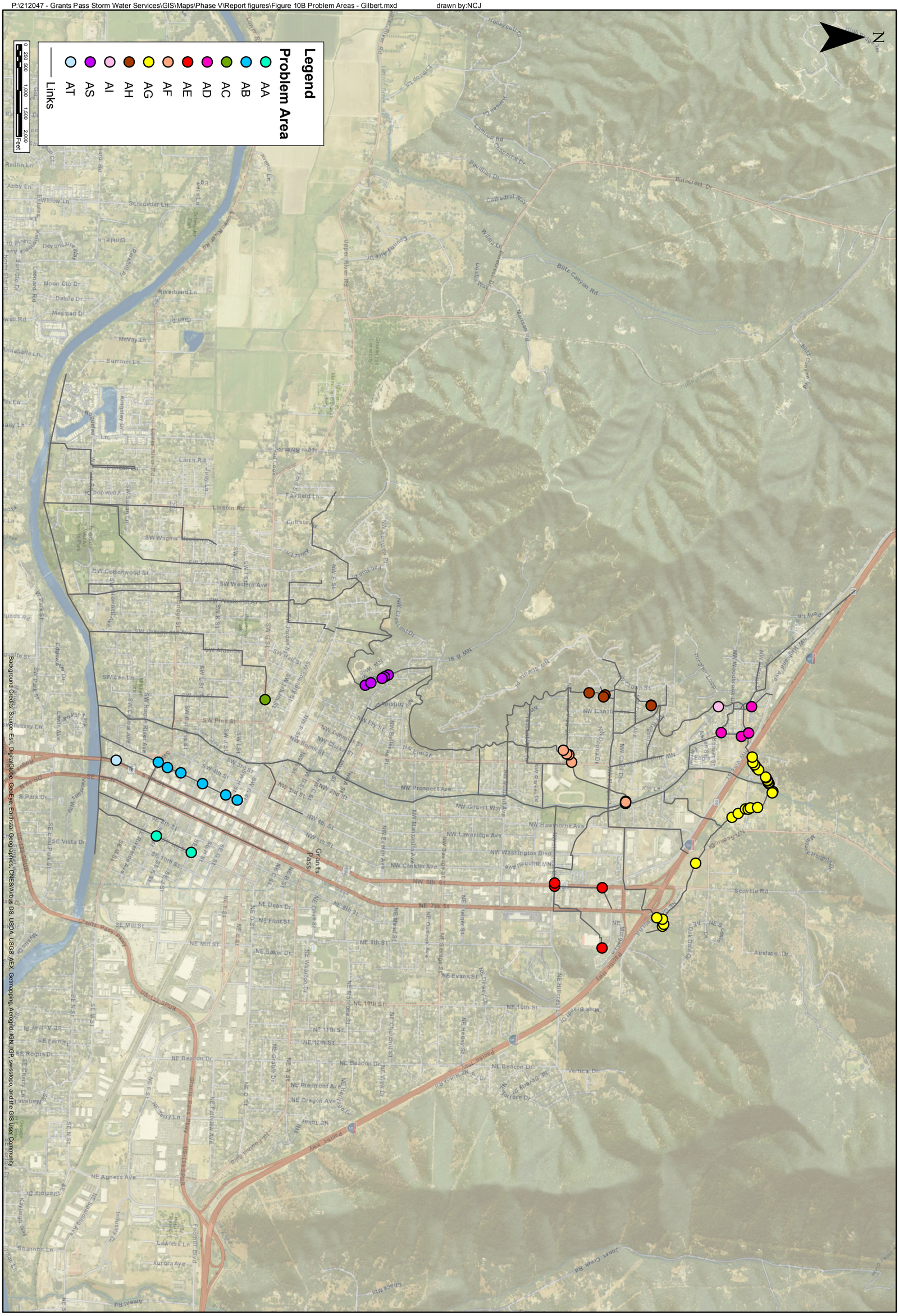
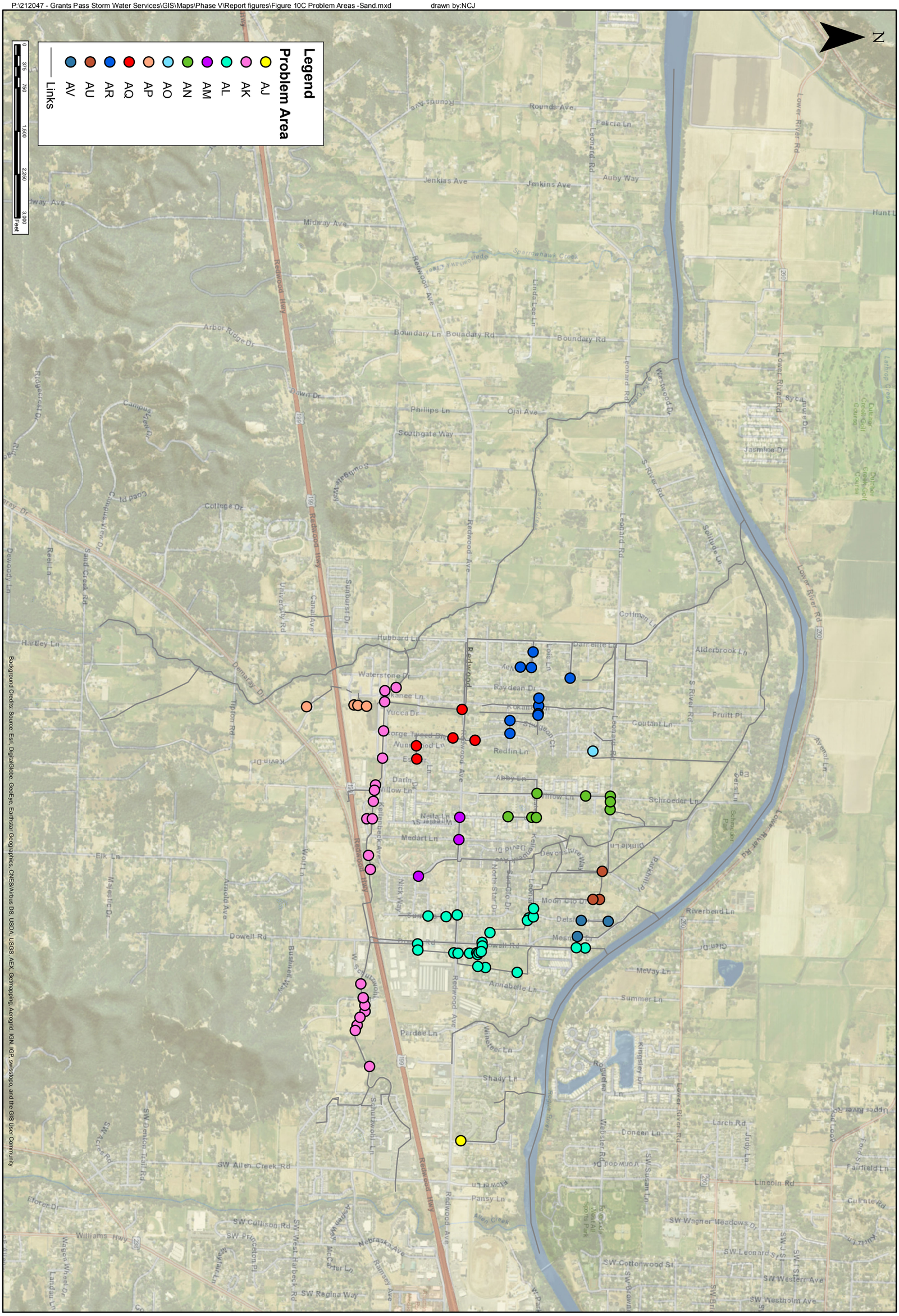


Figure:	Title:		Prepared for:		
10B	PROBLEM AREAS GILBERT	STORMWATER MASTER PLAN	CITY OF GRANTS PASS, OREGON	GRANTS PASS OREGON	KELLER associates

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 10C Problem Areas -Sand.mxd drawn by:NCJ



Background Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure:	Title:		Prepared for:		
10C	PROBLEM AREAS SAND	STORMWATER MASTER PLAN	CITY OF GRANTS PASS, OREGON	GRANTS PASS NEVER THE ROGUE RIVER RUNS OREGON	KELLER associates

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 10D Problem Areas - skunk jones.mxd drawn by:NCJ

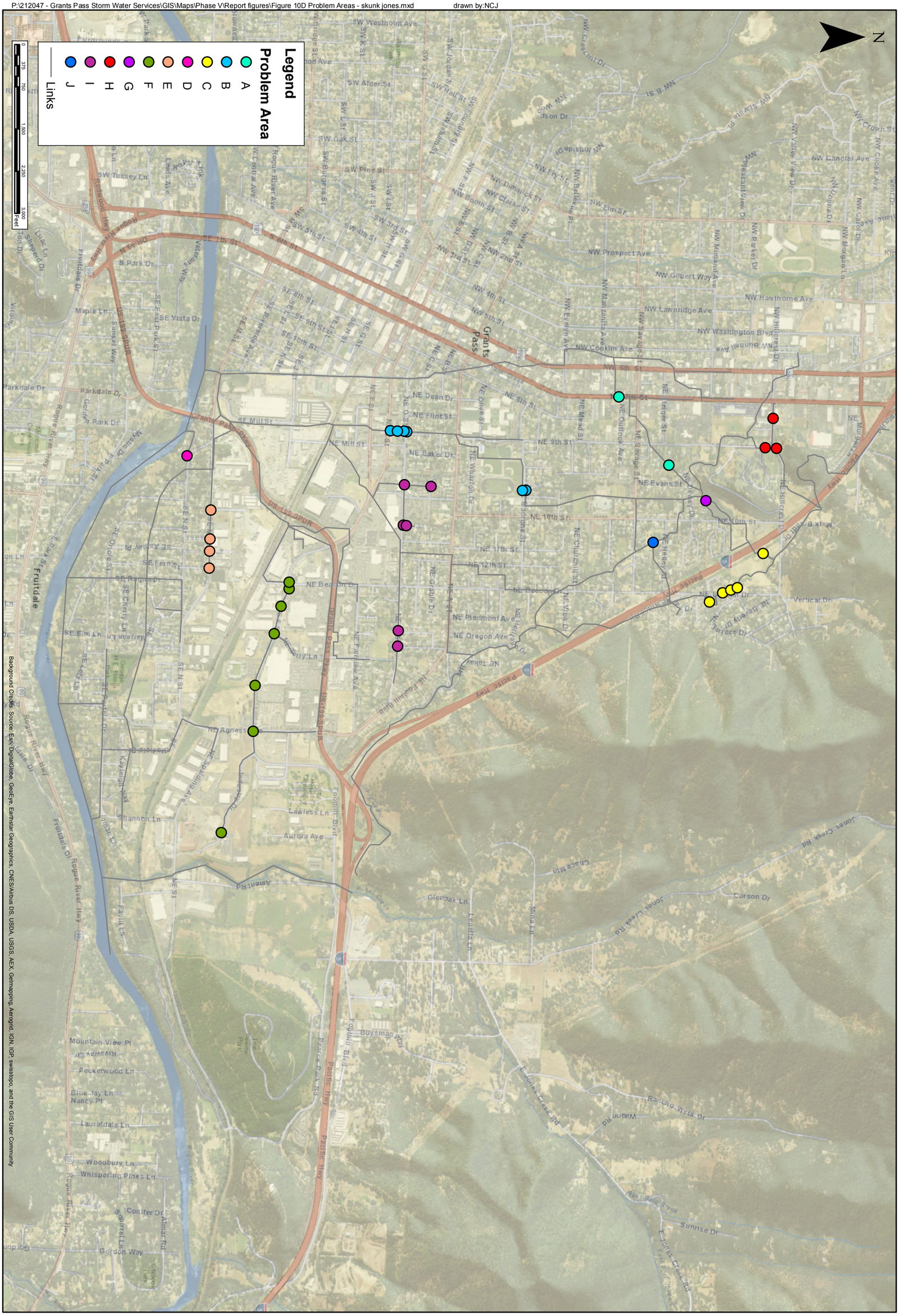


Figure:	Title:		Prepared for:		
10D	PROBLEM AREAS SKUNK-JONES	STORMWATER MASTER PLAN	CITY OF GRANTS PASS, OREGON	GRANTS PASS NEVER THE ROGUE RIVER RUNS OREGON	KELLER associates

N

upsize to 21", regrade
upsize to 42", regrade
upsize to 36", regrade
upsize to 24", regrade
Rehabilitate sugar beet line
upsize to 18", regrade
upsize to 48", regrade
new 48" pipe and flow diversion
new 0.77 acre-ft detention pond
new 5.24 acre-ft. detention pond
regrade channel
upsize to 83"x53"squash pipe, regrade
upsize to 30"
upsize to 21"
upsize to 83"x53" squash pipe, regrade
upsize to 83"x53" squash pipe, regrade
connect siphon to intersect existing pipe with new 36" pipe, farther downstream
upsize to 83"x53" squash pipe, regrade
upsize to 21", regrade
upsize to 15", regrade
upsize to 36", regrade
convert channel to 33" pipe, regrade
upsize to 54", regrade
New 30" spill to river
new 24" canal spill
upsize to 21"
upsize to 21"
new 21" canal spill, special backfill needed
upsize to 54", regrade
intercept exiting pipe, regrade
upsize to 33", regrade
upsize to 54", regrade
upsize to 30", regrade
upsize to 18"
upsize to 15"
upsize to 54", regrade
upsize to 18"
upsize to 30", regrade
upsize to 30", regrade
upsize to 15"
upsize to 21", regrade
new 42" pipe
regrade channel
upsize to 30", regrade
upsize to 21", regrade
regrade pipe
new 15" canal spill
new spill
upsize to 21"
upsize to 15"
replace with 36" pipe under channel
upsize to 21"
upsize to 15"
upsize to 30", regrade
regrade pipe
new 21" canal spill
upsize to 27", regrade
upsize to 24", regrade
upsize to 27", regrade
remove concrete plug and upsize to 24", regrade
raise channel wall
upsize to 36", regrade
upsize to 24"
convert existing slough to a 13 acre-ft. detention pond with outfall structure
New 36" canal spill to Fruitdale Creek
widen channel to 3 ft. bottom, regrade
widen channel to 3 ft. bottom, regrade
install concrete bottom and sides
pipe channel, with 54", regrade
pipe channel, with 54", regrade, add catch basins
pipe channel, with 54", regrade
pipe channel, with 54", regrade
pipe channel, with 54", regrade
pipe channel, with 54", regrade
pipe channel, with 54", regrade
upsize to 30", regrade
upsize to 27", regrade
upsize to 30", regrade

Legend

- Nodes

Project

- AF-1
- AF-2
- AF-3
- AF-4
- AF-5
- AF-6
- AF-7
- AF-8
- AF-9
- AF-10
- AF-11
- AF-12
- AF-13
- AF-14
- AF-15
- AF-16
- AF-17
- AF-18
- AF-19
- AF-20
- No Change

0 500 1,000 2,000 Feet

Note: All new pipes are assumed to be smooth concrete. Other pipe types should only be used if analysis shows that design criteria conditions are still met for all areas of the City, or if size is sufficiently larger to carry the same flow as the sizes shown.

Background Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, Mapmyindia, © OpenStreetMap contributors, and the GIS User Community

drawn by:NCJ

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase VI\Report figures\Figure 11A-CIP-Allen Fruitdale.mxd

KELLER associates

GRANTS PASS WHERE THE ROGUE RIVER RUNS

Prepared for:

CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title:

CIP ALLEN-FRUITDALE

Figure:

11A

N

upsize to 30", regrade
upsize to 30", regrade
upsize to 30", regrade
change spill
regrade, raise downstream channel bank
upsize to 24"
upsize to 1ft.x1ft. Box pipe
upsize to 24"
upsize to 36"
new 24" pipe parallel to channel/pipe
raise channel bank between callouts
raise channel bank between callouts
new 12" spill to natural ditch, close off siphon to avoid debris
6 ft. bottom natural channel, regrade
6 ft. bottom natural channel, regrade, raise downstream channel banks
raise upstream channel banks
flow redirected
open Copeland spill
upsize to 30", regrade
upsize to 30", regrade
regrade channel
expand spill to 25ft. wide
replace with 8 ft. bottom concrete channel, increase channel bankelevation upstream, regrade
replace with 12ft. bottom concrete channel, increase channel bank elevation upstream, regrade
increase downstream channel bank elev.
upsize to 30", regrade
bypass weir with new pipes
replace brick channel with 30" pipe, regrade
widen channel to a 8 ft. bottom, 12 ft. top regrade, line with concrete
adjust spill
adjust spill
regrade pipe
regrade channel
upsize to 2 ft. by 3 ft. rectangular pipe, regrade
2 ft. bottom natural channel, regrade
upsize to 21"
Adjust pond outfall structure by adding an additional 24" pipe
upsize to 27", regrade
upsize to 48"
upsize to 48", regrade
upsize to 33", regrade
upsize to 42", regrade
upsize to a 2 ft. x 2 ft box pipe, regrade
upsize to 30", regrade
regrade pipe
upsize to 15"
upsize to 18"
upsize to 24"
upsize to 27"
upsize to 18"
upsize to 30"
upsize to 30"
upsize to 18"
upsize to 36"
upsize to 21"
upsize to 36"
upsize to 36"
upsize to 21"
upsize to 36"
upsize to 18"

Legend

- Nodes

Project

- No Change
- G-1
- G-2
- G-3
- G-4
- G-5
- G-6
- G-7
- G-8
- G-9
- G-10

0 395 790 1,580 2,370 3,160 Feet

Note: All new pipes are assumed to be smooth concrete. Other pipe types should only be used if analysis shows that design criteria conditions are still met for all areas of the City, or if size is sufficiently larger to carry the same flow as the sizes shown.

Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

drawn by:NCJ

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KELLER associates

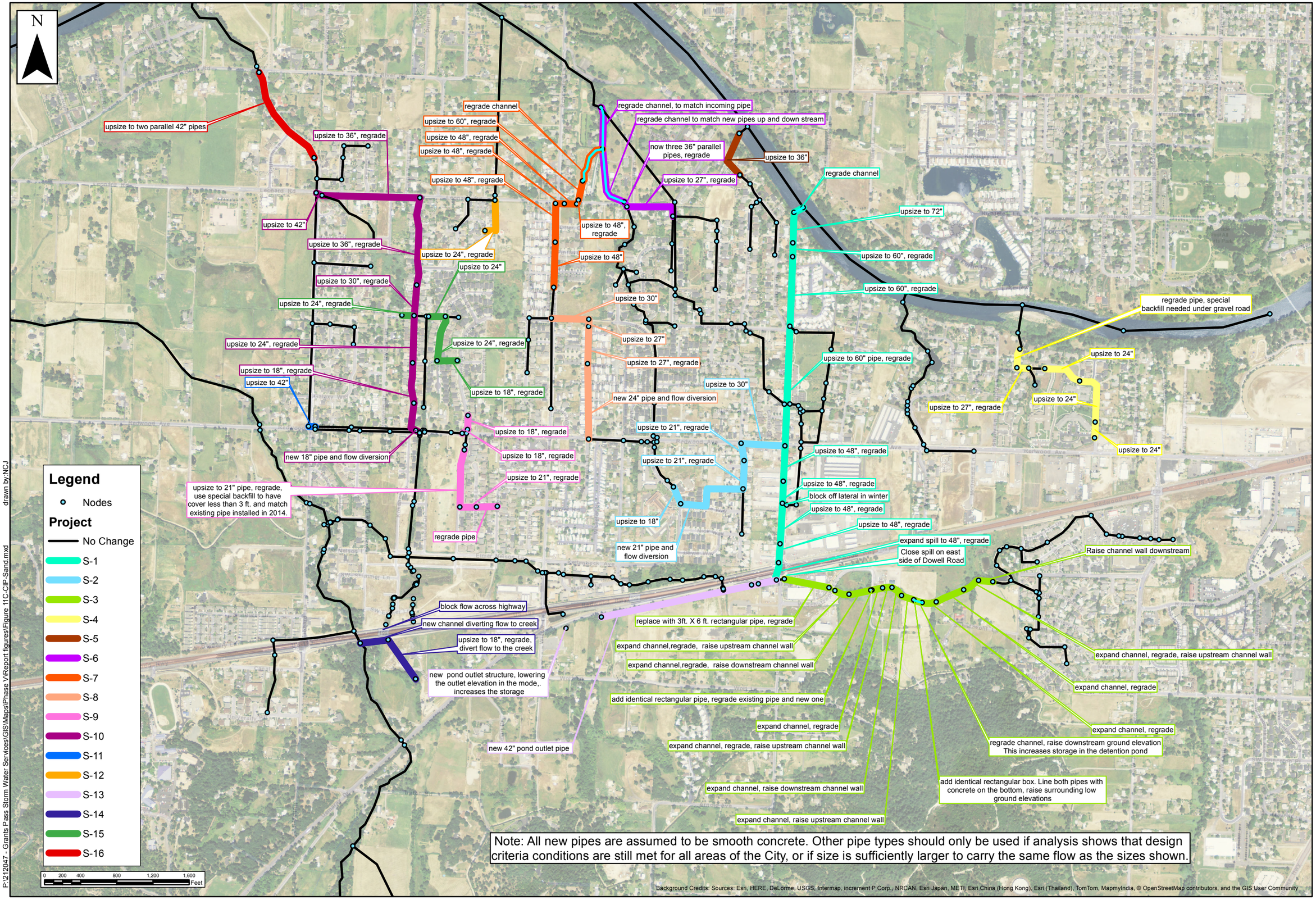
GRANTS PASS WHERE THE ROGUE RIVER RUNS

Prepared for:
CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title:
CIP GILBERT

Figure:
11B



KELLER associates

GRANTS PASS
WHERE THE ROGUE RIVER RUNS

Prepared for:
CITY OF
GRANTS PASS, OREGON

STORMWATER
MASTER PLAN

Title:
CIP
SAND

Figure:
11C

N

survey, reassess, then potentially adjust spill diversion structure, and downstream piping and channels until Hilcrest

adjust spill diversion structure
upsize to 21", regrade
upsize to 21"
upsize to 27"
upsize to 27"
regrade channel
regrade channel
upsize to 21", regrade
regrade pipe
regrade channnel
raise upstream channel berms
construct uniform channel with 10 ft. base between callouts, regrade, and repair channel berms to obtain freeboard
construct uniform channel with 10 ft. base between callouts, regrade, and repair channel berms to obtain freeboard
construct uniform channel with 8 ft. base between callouts, regrade
construct uniform channel with 8 ft. base between callouts, regrade
widen, deepen, regrade channel
new 5ft base 9 ft top channel parallel to existing pipes
regrade pipe
expand channel to a 4 ft. base, regrade
new pond outlet structure
regrade pipe
replace and regrade
regrade pipe
regrade channel
regrade channel
regrade pipe
regrade pipe
upsize to a single 30" pipe, regrade
new 2ft x 3 ft. rectangular pipe and flow split
new 3ftx5ft. rectanglular pipe and redirect all flow west
split existing pipe
new 15" pipe and flow diversion
upsize to 30", regrade
upsize to 18" regrade
upsize to 30", regrade
regrade pipe
upsize to 24", regrade
upsize to 21"
upsize to 18" and regrade
upsize to 18" regrade
upsize to 30"
upsize to 30"
regrade pipe
upsize to 36", regrade
upsize to 60"x38" squash pipe
upsize to 42", regrade
block flow through pipe
upsize to 42", regrade
upsize to 42", regrade
regrade and replace
upsize to 33"
Install new flow division structure and a 24" pipe
regrade
new 48" pipe and flow diversion structure
upsize to 24"
upsize to 33"
new 24" pipe
new 48" pipe and flow diversion structure
upsize to 30"
upsize to 21"
upsize to 21"
upsize to 54", regrade
upsize to 54" and regrade
upsize to 21"
upsize to 54", regrade
upsize to 54", regrade
upsize to 48"

Legend

- Nodes

Project

- No Change
- SJ-1
- SJ-2
- SJ-3
- SJ-4
- SJ-5
- SJ-6
- SJ-7
- SJ-8
- SJ-9
- SJ-10
- SJ-11
- SJ-12
- SJ-13
- Skunk-Jones Proposed Links

0 375 750 1,500 2,250 3,000 Feet

Note: All new pipes are assumed to be smooth concrete. Other pipe types should only be used if analysis shows that design criteria conditions are still met for all areas of the City, or if size is sufficiently larger to carry the same flow as the sizes shown.

Background Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

drawn by:NCJ

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KELLER associates

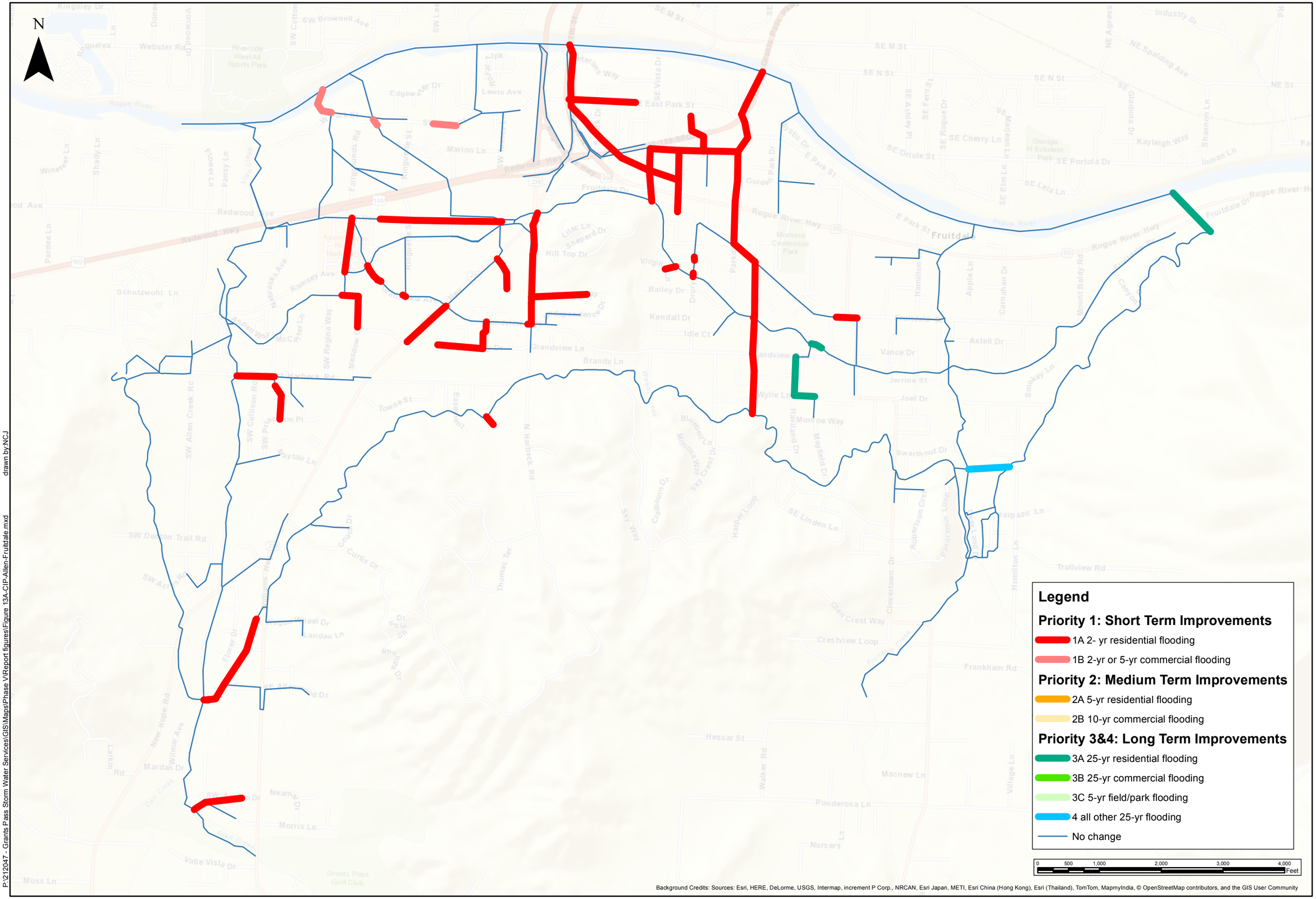
GRANTS PASS WHERE THE ROGUE RIVER RUNS

Prepared for:
CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title:
CIP SKUNK-JONES

Figure:
11D



P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure 13A-CIP-Allen-Fruitdale.mxd drawn by:NCJ

KELLER associates

GRANTS PASS WHERE THE ROGUE RIVER RUNS

Prepared for:

CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title: CIP PRIORITIZATION ALLEN-FRUITDALE

Figure: 12A

N

Legend

Priority 1: Short Term Improvements

- 1A 2- yr residential flooding
- 1B 2-yr or 5-yr commercial flooding

Priority 2: Medium Term Improvements

- 2A 5-yr residential flooding
- 2B 10-yr commercial flooding

Priority 3&4: Long Term Improvements

- 3A 25-yr residential flooding
- 3B 25-yr commercial flooding
- 3C 5-yr field/park flooding
- 4 all other 25-yr flooding
- No change

0 500 1,000 2,000 3,000 4,000 5,000 Feet

Background Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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KELLER associates

GRANTS PASS — WHERE THE ROGUE RIVER RUNS

Prepared for:
CITY OF
GRANTS PASS, OREGON

STORMWATER
MASTER PLAN

Title:
CIP
PRIORITIZATION
GILBERT

Figure:
12B

N

Legend

Priority 1: Short Term Improvements

- 1A 2- yr residential flooding
- 1B 2-yr or 5-yr commercial flooding

Priority 2: Medium Term Improvements

- 2A 5-yr residential flooding
- 2B 10-yr commercial flooding

Priority 3&4: Long Term Improvements

- 3A 25-yr residential flooding
- 3B 25-yr commercial flooding
- 3C 5-yr field/park flooding
- 4 all other 25-yr flooding
- No change

0 400 800 1,600 2,400 3,200 4,000 Feet

Background Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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KELLER associates

GRANTS PASS — WHERE THE ROGUE RIVER RUNS

Prepared for:

CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title: CIP PRIORITIZATION SAND

Figure: 12C

N

Legend

Priority 1: Short Term Improvements

- 1A 2- yr residential flooding
- 1B 2-yr or 5-yr commercial flooding

Priority 2: Medium Term Improvements

- 2A 5-yr residential flooding
- 2B 10-yr commercial flooding

Priority 3&4: Long Term Improvements

- 3A 25-yr residential flooding
- 3B 25-yr commercial flooding
- 3C 5-yr field/park flooding
- 4 all other 25-yr flooding
- No change

0 500 1,000 2,000 3,000 4,000 Feet

Background Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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KELLER associates

GRANTS PASS — WHERE THE ROGUE RIVER RUNS

Prepared for:

CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title: CIP PRIORITIZATION SKUNK-JONES

Figure: 12D

Appendix B
Model Data & Results

GRANTS PASS
WHERE THE ROGUE RIVER RUNS
OREGON

KELLER associates

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
A-N124	1042.053	1047.953	-1.17	91	12884
A-N122	1036.899	1040.499	-0.7	101	6037
A-N120	1036.47	1042.188	4.21	0	0
A-N126	1048.869	1054.669	5.8	0	0
A-N456	1064.811	1070.611	4.98	0	0
A-N454	1060.236	1066.736	5.76	0	0
A-N452	1018.818	1024.418	1.11	0	0
A-N450	1014.593	1020.554	1.32	0	0
A-N084	993.619	1004.019	8.31	0	0
A-N082	992.132	1000.432	5.51	0	0
A-N078	992.564	995.564	2.67	0	0
A-N076	968.44	992.85	19.57	0	0
A-N096	999.941	1002.941	3	0	0
A-N092	997.495	1001.995	4.42	0	0
A-N090	996.266	1000.266	2.69	0	0
A-N088	983.877	997.039	8.57	0	0
A-N446	1054.71	1067.68	12.37	0	0
A-N444	1022.73	1030	6.95	0	0
A-N442	1019	1022	0.74	0	0
A-N440	1016	1020.8	1.13	0	0
A-N066	973.548	975.048	0.1	0	0
A-N064	953.893	970.693	9.51	0	0
A-N054	956.24	965.44	-0.56	39	4164
A-N052	951.699	956.75	-2.13	102	42794
A-N056	953.57	959.32	0.23	0	0
A-N058	962.78	968.58	5.45	0	0
A-N050	941.906	956.606	9.42	0	0
Node37	1006.742	1009.742	3	0	0
A-N042	981.591	988.891	7.3	0	0
A-N040	975.276	982.426	6.36	0	0
A-N038	972.551	982.651	6.54	0	0
A-N036	970.866	979.066	7.27	0	0
A-N032	962.279	968.729	4.42	0	0
A-N028	962.279	968.817	5.06	0	0
A-N026	934.628	950.27	10.12	0	0
A-N030	962.716	969.266	5.49	0	0
A-N034	963.421	969.221	3.79	0	0
A-N012	937.302	940.702	2.9	0	0
A-N010	925.275	940.675	14.7	0	0
A-N008	914.309	943	25.69	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
A-N308	953.73	957.23	1.57	0	0
A-N314	960.32	967.62	0.96	0	0
A-N312	954.018	960.42	3.54	0	0
A-N310	943.87	949.774	-0.88	280	26370
Node40	943.85	951.61	6.51	0	0
A-N338	971.324	975.224	-0.16	27	972
A-N434	985.6	989.4	-1.73	180	27310
A-N334	963.52	968.87	0.27	0	0
A-N332	957.376	961.126	2.73	0	0
A-N324	952.695	958.45	4.16	0	0
A-N323	949.426	958.009	6.41	0	0
A-N322	948.559	957.84	6.38	0	0
A-N320	947.32	951.65	0.65	0	0
Node673	968.304	971.304	3	0	0
A-N342	952.229	956.529	3.79	0	0
A-N340	947.66	951.836	0.83	0	0
A-N326	958.4	963.56	-1.02	281	10408
A-N328	962.258	967.458	-0.73	148	6298
A-N408	978.539	984.44	-0.05	6	298
A-N410	981.379	992.279	4.48	0	0
A-N414	983.171	989.546	1.29	0	0
A-N416	1014.675	1023.225	8.11	0	0
A-N402	973.654	976.654	-1.68	318	25181
A-N400	973	976.016	-0.83	280	7633
A-N404	1001.242	1007.692	-0.92	84	8656
A-N418	995.114	998.014	2.56	0	0
A-N206	939.83	942.83	3	0	0
A-N210	938.111	941.111	3	0	0
A-N212	937.193	940.993	3.8	0	0
A-N208	933.213	936.213	3	0	0
A-N204	926.945	929.945	1.58	0	0
A-N216	895.011	902.361	-3.82	1752	259982
A-N218	904.398	913.898	7.32	0	0
A-N219	919.436	925.036	4.9	0	0
A-N228	911.848	919.098	-0.03	6	121
A-N226	909.414	915.364	4.31	0	0
A-N224	907.27	914.67	5.98	0	0
A-N222	903.09	911.65	7.45	0	0
A-N230	909.305	916.055	5.73	0	0
A-N234	929.844	936.644	6.18	0	0
A-N232	913.773	916.773	3	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
A-N244	935.881	941.281	4.97	0	0
A-N242	910.479	915.879	5.1	0	0
A-N240	894	910	15.12	0	0
A-N252	907.658	914.679	6.63	0	0
A-N250	894	910	15	0	0
A-N254	917.221	921.321	3.39	0	0
A-N256	929.122	932.122	2.39	0	0
A-N260	894	910	14.38	0	0
A-N262	904.27	919.87	12.86	0	0
A-N264	919.92	924.02	-0.77	58	6614
A-N266	908.04	916.9	-0.47	25	3453
A-N268	909.043	925.368	6.13	0	0
A-N274	926.716	930.307	-1.42	122	18386
A-N270	922.662	936.807	-1.49	137	20303
A-N280	909.538	927.583	8.34	0	0
A-N276	912.379	922.73	1.44	0	0
A-N278	914.973	924.373	3.09	0	0
A-N282	913.69	926.04	-0.22	14	1416
A-N284	913.663	920.363	-1.41	142	18001
A-N286	915.886	926.536	0.23	0	0
A-N292	917.864	926.771	0.85	0	0
A-N296	918.204	925.88	-0.03	10	170
A-N298	919.383	924.383	-0.77	94	6612
A-N288	920.014	928.414	-1.02	85	10279
A-N290	935.741	938.741	-0.52	55	3928
A-N294	919.298	923.378	-1.04	165	10272
F-N102	902.039	909	6.06	0	0
F-N104	915.907	924	5.51	0	0
F-N106	916.4	930	10.92	0	0
F-N108	919.187	925.987	0.02	0	0
F-N110	920.089	926.889	-1.26	80	14673
F-N112	921.238	929.838	-0.2	39	1309
F-N114	923.55	929.9	-0.83	56	7290
F-N116	924.45	933.9	2.6	0	0
F-N120	929.55	934.17	2.85	0	0
F-N124	946.4	952.46	5.77	0	0
F-N130	925.32	935.02	3.16	0	0
F-N132	936.43	938.53	1.22	0	0
F-N136	940.486	943.49	1.8	0	0
F-N030	941.351	946.651	1.49	0	0
F-N028	940.577	946.18	4.55	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
F-N026	936.827	944.08	6.31	0	0
F-N024	928.955	945.768	11.79	0	0
F-N008	915.729	932.829	10.9	0	0
F-N010	931.198	935.348	2.61	0	0
F-N012	932.591	939.291	5.59	0	0
F-N016	937.249	940.249	2.79	0	0
F-N014	933.714	939.014	2.3	0	0
F-N018	937.185	940.185	2.13	0	0
F-N210	926.1	929.2	0.44	0	0
F-N212	927.228	930.228	1.24	0	0
F-N208	925.25	930.48	2.4	0	0
F-N204	917.4	925.34	6.19	0	0
F-N202	915.32	919.162	3	0	0
F-N206	925	929.5	2.43	0	0
Node41	949.43	956.43	7	0	0
F-N804	972.86	977.51	4.11	0	0
F-N036	943.41	946.41	1.61	0	0
F-N034	938.718	948.82	4.11	0	0
F-N712	985.201	987.301	0.94	0	0
F-N710	976.684	978.684	0.22	0	0
F-N708	972.266	974.066	-0.07	9	706
F-N706	955.778	961.478	3.49	0	0
F-N704	954.364	959.664	3.19	0	0
F-N606	968.276	974.476	-0.13	13	716
F-N604	962.541	966.791	-2.08	143	40615
F-N602	950.54	957.14	2.58	0	0
F-N506	959.4	964.4	5	0	0
F-N502	949.72	953.93	-0.39	59	4069
F-N404	956.069	958.269	-0.43	32	3079
F-N402	949.24	953.866	-0.01	7	263
A-N300	943.84	951.54	2.85	0	0
A-N302	947.495	952.445	0	0	0
A-N304	952.354	958.604	-0.97	127	9479
A-N432	978.93	989.451	5.86	0	0
A-N430	980.305	990.155	6.56	0	0
F-N812	1025.96	1032.262	3.84	0	0
F-N814	1033.855	1042.31	1.81	0	0
F-N818	1060.04	1065.34	4.69	0	0
F-N824	1104.04	1108.54	4.24	0	0
F-N822	1028.061	1031.861	3	0	0
A-N464	1082.414	1086.414	4	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
A-N462	1065.192	1070.592	5.4	0	0
A-N460	1041.995	1045.595	1.83	0	0
F-N134	937.83	940.83	2.15	0	0
F-N504	951.48	956.6	2.28	0	0
F-N118	925.65	934.03	2.7	0	0
A-N412	1004.723	1007.723	2.67	0	0
A-N336	966.984	969.984	-0.02	10	32
A-N330	954.521	959.174	3.7	0	0
A-N272	936.686	939.686	2.54	0	0
F-N816	1045.858	1048.858	1.35	0	0
A-N406	975.845	978.845	0.51	0	0
A-N080	987.265	997.465	3.05	0	0
A-N094	1001.268	1004.268	3	0	0
F-N056	1023	1045.53	18.76	0	0
F-N054	1003.28	1029.84	22.86	0	0
F-N052	994.27	1029.52	31.74	0	0
F-N050	983.328	1018.54	32.48	0	0
F-N048	971.211	1013.233	36.9	0	0
F-N046	965.729	1007.74	37.15	0	0
F-N044	963.3	998.78	30	0	0
F-N006	902.895	932.401	21.68	0	0
F-N004	898.842	933.65	27.57	0	0
F-N002	895.429	933.75	34.79	0	0
F-N022	922.063	943.5	15.04	0	0
F-N020	918.563	939.97	17.01	0	0
F-N032	938.085	948.19	4.33	0	0
F-N042	963.017	980.32	14.39	0	0
F-N040	951.897	995.9	39.42	0	0
F-N038-1	948.03	992.03	39.93	0	0
F-N068	1061.009	1072.62	9.23	0	0
F-N066	1045.937	1057.55	8.52	0	0
F-N064	1041.219	1062.13	16.98	0	0
F-N062	1031.956	1055.239	20.07	0	0
F-N060	1027.121	1050.33	19.58	0	0
F-N058.1	1025.22	1044.48	16.1	0	0
F-N070	1061.098	1071.098	7.18	0	0
F-N072	1067.99	1078.265	6.87	0	0
F-N082	1083.49	1099.927	12.44	0	0
F-N080	1079.928	1096.34	12.19	0	0
F-N078	1071.868	1086.987	10.27	0	0
F-N076	1068.832	1083.94	10.59	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
F-N074	1068.265	1082.78	10.84	0	0
A-N004	885.455	933.823	43.09	0	0
A-N006	891.205	938.11	39.48	0	0
A-N014	916.782	943.59	21.08	0	0
A-N016	919.799	946.613	20.92	0	0
A-N018	926.724	943.375	12.35	0	0
A-N020	931.205	947.856	11.46	0	0
Node39	933.343	950	12.77	0	0
A-N024-1	934.15	946.55	8.09	0	0
A-N046	938.525	950.125	6.22	0	0
A-N048	941.778	953.614	6.67	0	0
A-N060	947.524	962.227	9.72	0	0
A-N062	951.761	968.57	12.36	0	0
A-N068	959.353	979.26	15.66	0	0
A-N070	960.182	980.082	12.54	0	0
A-N074	965.433	986.04	14.22	0	0
A-N086	972.602	999.712	21.24	0	0
A-N098	984.039	999.5	10.86	0	0
A-N100	988.359	1004.27	10.49	0	0
A-N102	988.651	1004.76	8.1	0	0
A-N104	992.898	1013.41	15.55	0	0
A-N108-1	997.304	1017.01	14.8	0	0
A-N110	1004.323	1021.63	13.43	0	0
A-N112	1007.499	1033.51	19.52	0	0
A-N114	1008.263	1034.305	18.35	0	0
A-N116	1020.166	1037.926	15.07	0	0
A-N128	1033.35	1047.36	11.43	0	0
A-N130	1048.296	1057.2	7.04	0	0
A-N132	1054.274	1063.25	5.19	0	0
R-N112	878.203	912.91	30.55	0	0
R-N110	877.042	906.15	24.16	0	0
R-N108	875.963	938.483	56.67	0	0
R-N106	875.765	938.27	56.62	0	0
R-N104	875.401	932.241	50.73	0	0
R-N102	875.184	931.39	50.06	0	0
R-N100	875.367	929.67	48.51	0	0
R-N130	886.359	923.26	33.23	0	0
R-N128	886.231	922.44	32.91	0	0
R-N126	885.776	924.12	35.42	0	0
R-N124	884.955	923.26	35.46	0	0
R-N122	882.351	919.286	32.64	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
R-N120	882.013	918.92	32.63	0	0
R-N118	882.081	913.19	28	0	0
R-N116	879.76	910.47	26.07	0	0
R-N114	877.989	912.709	29.54	0	0
R-N148	892.716	931.847	35.68	0	0
R-N146	892.27	931.58	36.89	0	0
R-N144	888.909	928.21	34.33	0	0
R-N142	888.098	927.149	34.47	0	0
R-N140	887.801	927.433	35.12	0	0
R-N138	886.832	925.64	34.14	0	0
R-N136	886.876	927.185	36.14	0	0
R-N134	886.069	926.37	35.59	0	0
R-N132	886.47	926.58	36.09	0	0
R-N162	895.675	935.746	35.59	0	0
R-N160	895.593	935.6	35.71	0	0
R-N158	895.429	933.15	33.77	0	0
R-N156	894.695	931.93	33.55	0	0
R-N154	894.436	932.04	34.37	0	0
R-N152	893.701	931.31	34.27	0	0
A-N118	1024.764	1042.498	14.38	0	0
A-N106	992.632	1013.14	12.94	0	0
A-N072	966.56	986.139	16.54	0	0
A-N044	1008.27	1013.41	3.41	0	0
A-N912	1012.58	1016.08	2.61	0	0
A-N914	1013.48	1018.85	2.72	0	0
F-N918	1020.64	1024.9	0.59	0	0
F-N920	1033.99	1037.59	-0.62	57	9840
A-N924	942.94	951.54	6.28	0	0
A-N926	946.46	952.16	1.15	0	0
A-N928	948.21	952.93	0.13	0	0
F-N932	949.24	958.55	5.07	0	0
A-N936	943.9	947.4	-0.05	5	3116
A-N938	942.5	946.5	-0.99	194	1589424
A-N915	1013.91	1019.91	2.37	0	0
A-N436	972.602	983	4.12	0	0
A-N438	972.2	978.5	3.16	0	0
A-N458	1035.025	1036.525	0.13	0	0
F-N920.1	1033.41	1036.39	-1.18	88	19207
F-N920.2	1033.7	1037.3	-0.47	56	9570
F-N920.1.1	1033.17	1037.39	0.13	0	0
F-N920.1.2	1033.45	1036.35	-0.9	78	12380

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
F-N920.1.3	1033.46	1036.7	-0.84	76	11421
Node298	1032.76	1036.36	-0.89	78	10684
Node299	1032.77	1038.77	1.61	0	0
Node300	1032.76	1038.77	1.75	0	0
Node301	1031.79	1035.82	-1.08	87	14926
Node302	1031.27	1034.71	-0.98	94	12325
Node301.1	1031.21	1035.12	-0.67	79	20677
Node301.2	1031.78	1035.81	-1.02	85	32275
Node306	1030.57	1033.86	-1.1	103	21408
Node302.1	1031.12	1034.53	-1.05	97	20039
Node308	1030.84	1034.19	-0.55	80	6451
Node309	1030.42	1033.81	-0.73	91	9290
Node311	1029.77	1033.5	-0.63	88	7698
Node312	1029.48	1033.23	-0.48	82	4346
Node311.1	1029.57	1033.31	-0.68	92	7265
Node314	1026.9	1034.57	1.84	0	0
Node312.1	1029.53	1033.23	0.01	0	0
Node316	952.35	962.35	6.16	0	0
Node317	950.56	960.56	4.4	0	0
Node318	953.49	958.49	2.26	0	0
Node319	954.68	959.68	3.52	0	0
Node320	953.17	958.17	2.58	0	0
Node321	953.076	958.076	2.52	0	0
Node322	953.34	960.238	4.74	0	0
Node323	953.34	960.238	4.74	0	0
Node325	952.53	956.89	1.81	0	0
Node326	952.44	956.8	1.81	0	0
Node327	952.44	957.14	2.15	0	0
Node329	952.39	957.09	2.23	0	0
Node331	952.03	957.58	3.3	0	0
Node332	952.388	956.75	1.9	0	0
Node333	951.91	958.57	4.46	0	0
Node331.1	951.979	958.78	4.57	0	0
Node335	951.46	956.82	3.39	0	0
Node336	951.27	958.5	5.38	0	0
F-N038-2	950.83	960.83	7.88	0	0
Node336.2.	950.3	958.7	6.52	0	0
Node340	951.62	960.02	6.45	0	0
Node341	951.62	957.48	3.72	0	0
Node342	951.88	957.28	3.23	0	0
Node343	951.8	956.655	2.45	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
Node344	951.19	959.59	6.08	0	0
Node345	950.37	959.46	6.57	0	0
Node347	951.52	956.13	1.61	0	0
Node348	951.72	957.5	2.9	0	0
F-N138	951.46	958.36	3.53	0	0
Node350	951.43	958.36	3.54	0	0
Node351	951.32	955.32	0.5	0	0
Node352	951.1	955.1	0.28	0	0
Node353	951.25	956.26	1.44	0	0
Node354	951.21	954.47	-0.35	32	2586
Node355	951.31	955.41	0.59	0	0
Node356	951.19	955.29	0.56	0	0
Node357	950.96	954.64	-0.04	13	431
Node358	950.93	954.61	-0.06	15	682
Node359	950.77	954.11	-0.51	57	6264
Node360	950.62	957.22	2.66	0	0
Node362	949.99	954.19	-0.02	10	145
Node363	949.56	952.97	-1.22	166	15654
Node364	949.78	953.44	-0.63	94	7289
Node365	949.66	952.92	-1.06	153	18396
Node366	949.68	955.38	1.44	0	0
Node367	949.49	955.49	1.59	0	0
Node368	949.19	953.21	-0.67	110	7747
Node369	949.33	953.74	-0.12	37	1364
Node370	949.2	953.51	-0.21	55	2289
Node371	949.21	954.91	1.26	0	0
Node372	949.15	954.15	0.57	0	0
Node373	948.94	952.72	-0.64	128	7188
Node374	948.8	952.5	-0.7	133	7987
Node375	948.81	952.55	-0.57	120	5625
Node376	948.39	952.47	-0.58	120	6348
Node375.1	948.648	952.59	-0.49	110	4675
Node378	948.78	952.64	-0.38	97	4001
Node379	948.4	952.14	-0.83	139	8539
Node378.1	948.5	952.77	-0.22	72	1903
Node381	948.44	951.81	-1.13	158	13796
Node382	948.29	951.89	-1.03	151	11722
Node383	948.64	952.68	-0.22	72	1553
Node384	947.46	953.16	0.86	0	0
Node385	947.14	952.84	1.11	0	0
Node384.1	947.26	952.96	1.12	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
Node387	946.76	952.46	1.41	0	0
Node388	946.13	951.83	0.92	0	0
Node389	945.58	951.75	0.92	0	0
Node390	944.55	950.25	-0.5	105	4059
Node391	944.3	950	-0.53	111	4545
Node392	944.02	949.72	-0.75	131	7542
Node393	947	952.1	1.19	0	0
A-N320.1	946.88	951.98	1.06	0	0
Node395	946.5	952.14	1.23	0	0
Node396	946.1	952.46	1.34	0	0
Node397	945.2	951.15	-0.04	2	434
Node398	945.1	949.66	-1.12	285	92686
Node399	943.1	949.94	-0.83	245	37526
A-N306	943.4	950.31	-0.18	39	2098
Node401	943.2	951.38	1.19	0	0
Node402	943.2	950.53	1.14	0	0
Node403	943.2	947.7	-1.18	403	59720
Node404	946.14	950.54	1.67	0	0
Node405	945.25	949.71	0.95	0	0
Node409	945.64	950.48	1.88	0	0
Node410	944.64	949.66	1.48	0	0
Node411	944.5	948.1	0.33	0	0
Node412	944.46	948.96	1.79	0	0
Node413	944.44	948.94	1.84	0	0
Node414	944.08	947.2	0.65	0	0
Node415	944.13	947.23	0.74	0	0
Node416	943.83	946.93	0.6	0	0
Node417	944.01	947.71	1.53	0	0
Node418	943.96	947.66	1.52	0	0
Node419	944.08	947.18	2.41	0	0
Node418.1	938.08	947.21	7.14	0	0
Node418.2	944.06	947.26	1.73	0	0
A-N024-2	943.74	949.74	4.38	0	0
Node423	943.32	949.32	4.03	0	0
A-N022	942.85	949.15	3.86	0	0
Node425	943.13	947.96	2.73	0	0
Node426	943.43	948.23	3.2	0	0
Node427	942.93	946.1	1.98	0	0
Node428	942.65	948.09	4.27	0	0
Node429	1028.16	1038.66	5.95	0	0
Node430	1028.98	1047.58	14.97	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
F-N058.2	1028.39	1034.78	2.18	0	0
Node434	1028.87	1047.17	14.56	0	0
Node435	1031.02	1047.52	14.91	0	0
Node440	1028.23	1032.5	2.66	0	0
Node441	1028.67	1032.5	2.92	0	0
Node442	1027.37	1031.17	2.11	0	0
Node441.1	1027.55	1031.35	2.26	0	0
Node441.2	1027.9	1030.9	1.79	0	0
Node441.3	1028.42	1032.22	3.03	0	0
Node448	1027.2	1030.4	2.52	0	0
Node449	1027.2	1030.4	1.95	0	0
Node450	1026.99	1030.19	1.74	0	0
Node451	1026.85	1030.3	1.85	0	0
Node452	1026.41	1030.15	1.7	0	0
Node453	1026.42	1029.52	1.08	0	0
Node454	1026.411	1029.511	1.07	0	0
Node455	1026.26	1029.87	1.43	0	0
Node456	1025.88	1029.48	1.04	0	0
Node457	1025.999	1032	3.58	0	0
Node458	1026.035	1030	1.59	0	0
Node459	1026.053	1030.053	1.65	0	0
Node460	1025.26	1029.26	1.73	0	0
Node461	1024.78	1029.78	2.74	0	0
Node462	1024.63	1029.63	2.6	0	0
Node463	1024.43	1029.43	2.48	0	0
Node464	1024.53	1029.53	2.63	0	0
Node465	1024.09	1029.09	2.23	0	0
Node466	1023.68	1028.68	1.91	0	0
Node467	1023.68	1028.68	1.91	0	0
Node468	1023.46	1027.46	0.77	0	0
Node469	1023.05	1027.05	0.41	0	0
Node470	1023.3	1027.3	0.74	0	0
Node471	1022.8	1027.4	1.1	0	0
Node472	1022.66	1029.04	2.76	0	0
Node473	1022.62	1028.62	2.5	0	0
Node473.1	1022.24	1028.24	2.54	0	0
Node473.2	1022.71	1028.71	2.77	0	0
Node473.3	1022.29	1028.29	2.22	0	0
Node478	1022.57	1028.57	3.1	0	0
Node479	1021.87	1027.87	2.53	0	0
Node480	1021.67	1027.67	2.49	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
Node481	1021.668	1027.668	2.5	0	0
Node482	1021.643	1025.143	0	6	34
Node483	1021.641	1026.541	1.4	0	0
Node484	1021.61	1026.58	1.52	0	0
Node485	1021.57	1026.57	1.59	0	0
Node486	1021.63	1027.1	2.14	0	0
Node487	1020.2	1025.1	0.39	0	0
Node488	1020.65	1025.55	0.85	0	0
Node489	1020.54	1024.94	0.36	0	0
Node490	1020.87	1025.14	0.79	0	0
Node488.1	1020.44	1024.91	0.26	0	0
Node493	1019.81	1023.98	-0.1	47	942
F-N918.1	1020.2	1024.41	0.3	0	0
F-N918.2	1020.28	1024.49	0.38	0	0
Node496	1019.86	1023.43	-0.49	102	4403
Node493.1	1019.67	1023.17	-0.77	128	9708
Node493.2	1019.82	1023.48	-0.55	108	7127
Node499	1020.01	1023.72	-0.16	60	1593
Node500	1019.76	1023.45	-0.32	84	3991
Node501	1019.28	1023.25	-0.44	97	5305
Node502	1019.96	1023.46	-0.17	65	1452
Node503	1020.01	1023.61	0.05	0	0
Node504	1019.16	1023.16	-0.21	76	1863
Node505	1019.2	1023.2	-0.13	64	1594
A-N308.1	945.02	952.2	0.8	0	0
A-N308.2	947.9	953.43	-1.06	197	11170
A-N308.3	948.65	953.86	-1.55	203	27487
A-N326.1	955.47	960.94	-0.54	320	4179
F-N818.1	1044.14	1051.35	6.74	0	0
F-N028.1	938.69	945.12	5.5	0	0
F-N136.1	938.45	941.45	2.27	0	0
F-N134.1	937.37	940.07	1.53	0	0
Node514	1018.64	1022.66	0.1	0	0
Node515	1018.609	1022.609	0.1	0	0
Node516	1018.9	1021.9	-0.6	125	4978
Node517	1018.89	1021.89	-0.6	125	5043
Node518	1018.87	1022.87	0.39	0	0
Node519	1018.797	1022.8	0.49	0	0
Node520	1018.47	1023.47	1.24	0	0
Node519.1	1018.55	1023.3	1	0	0
A-N916	1018.69	1022.69	0.96	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
Node524	1018.33	1021.2	-0.29	94	2781
Node525	1017.77	1021.25	-0.25	89	2147
Node526	1018.23	1021.03	-0.37	103	3531
Node527	1018.23	1021.03	-0.23	81	2082
Node528	1018.17	1021.97	0.91	0	0
Node529	1017.85	1020.65	0.09	0	0
Node530	1016.98	1019.78	-0.8	184	8016
Node531	1016.97	1019.77	-0.79	184	8173
Node532	1016.8	1019.99	-0.24	109	2281
Node531.1	1016.87	1019.9	-0.57	152	5840
Node534	1016.69	1019.77	-0.29	124	2650
Node535	1016.97	1019.77	-0.28	121	2316
Node536	1016.78	1019.65	-0.25	119	2183
Node537	1016.1	1019.06	-0.8	205	10338
Node536.1	1016.48	1019.39	-0.49	161	4360
Node539	1015.75	1019.21	-0.37	155	4962
Node540	1014.6	1018.44	-0.98	239	15584
Node541	1015.042	1018.542	-0.82	227	8985
Node540.1	1014.986	1018.49	-0.89	231	10945
Node543	1015.08	1018.13	-1.23	264	17997
Node544	1014.56	1017.88	-1.44	287	23626
Node545	1014.9	1018.37	-0.91	235	11505
Node546	1014.46	1019.46	0.26	0	0
Node547	1014.45	1017.98	-1.22	264	14936
Node548	1014.67	1018.07	-1.1	252	13708
Node549	1013.96	1017.29	-1.85	346	33033
Node550	1013.84	1017.29	-1.14	308	14509
Node551	1013.8	1015.3	-2.84	1408	102844
Node552	1013.99	1019.99	2.36	0	0
Node555	1013.54	1017.23	0.26	0	0
Node556	1013.58	1016.57	0.04	0	0
Node557	1013.71	1016.79	0.38	0	0
A-N108-2	1013.28	1016.24	0.37	0	0
Node559	1012.63	1016.01	2.08	0	0
Node560	1012.14	1016.14	2.36	0	0
Node561	1012.38	1015.55	1.77	0	0
Node562	1012.52	1015.42	1.99	0	0
Node563	1012.775	1015.68	2.25	0	0
Node564	1012.65	1015.55	2.12	0	0
Node565	1013.04	1015.91	2.48	0	0
Node566	1012.91	1016.89	3.47	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
Node567	1012.07	1015.91	2.49	0	0
Node568	1012.45	1016.25	2.84	0	0
Node569	1012.85	1015.98	2.57	0	0
Node570	1012.54	1015.81	2.41	0	0
Node571	1012.66	1015.62	2.22	0	0
Node572	1012.67	1015.57	2.14	0	0
Node573	1012.34	1015.84	2.37	0	0
Node574	1011.93	1015.06	2.15	0	0
Node575	1011.91	1014.7	1.96	0	0
Node576	1011.12	1015.95	3.3	0	0
Node577	1011.2	1016.03	3.41	0	0
Node578	1011.64	1014.44	1.85	0	0
Node579	1011.54	1014.94	2.4	0	0
Node580	1010.99	1015.99	4.06	0	0
Node581	1010.925	1015.925	4	0	0
Node582	1010.113	1015.113	3.8	0	0
Node583	1010.041	1015.041	3.75	0	0
Node584	1009.36	1014.86	3.63	0	0
Node585	1009.37	1013.28	2.23	0	0
Node586	1008.986	1012.89	1.89	0	0
Node587	1008.77	1013.42	2.52	0	0
Node588	1008.84	1012.79	1.81	0	0
Node588.1	1008.79	1013.79	2.87	0	0
Node588.2	1008.8	1013.8	2.87	0	0
Node591	1009	1013.26	2.48	0	0
Node587.1	1008.94	1013.3	2.48	0	0
Node587.2	1008.93	1013.3	2.48	0	0
Node594	1009.05	1014.05	3.48	0	0
Node595	1008.82	1013.63	3.26	0	0
Node594.1	1009.04	1014.03	3.47	0	0
Node594.2	1008.89	1013.76	3.38	0	0
A-N910	1008.24	1012.86	2.51	0	0
Node595.1	1008.3	1014.3	3.95	0	0
Node595.2	1008.32	1014.32	3.97	0	0
Node595.3	1008.64	1014.64	4.28	0	0
Node595.4	1008.66	1014.66	4.3	0	0
Node603	1008.22	1012.53	3.86	0	0
Node769	1008.61	1013.41	3.9	0	0
A-N306.1	932.61	948.02	13.61	0	0
A-N224.1	905.81	913.62	5.68	0	0
Node607	922.66	936.81	13.01	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
A-N276.1	909.538	927.58	6.29	0	0
A-N282.1	913.46	926.13	3.33	0	0
Node610	950.37	956.15	3.3	0	0
F-N132.1	932.93	937.42	3.33	0	0
A-N026.1	934.29	947.66	8.34	0	0
Node615	1028.67	1032.47	2.66	0	0
F-N054.1	998.47	1029.67	27.12	0	0
A-N266.1	906.38	918.21	9.57	0	0
Node607.1	914.79	927.82	12.16	0	0
Node621	1051.7	1057.78	5.63	0	0
Node622	1043.13	1049.64	6.22	0	0
Node623	1017.5	1021	1.32	0	0
Node392.1	943.91	947.57	0	0	0
Node625	941.6	946.77	-0.94	332	2382345
Node626	935.6	946.77	-0.47	276	1136533
Node627	935.599	946.77	-0.52	307	904849
Node628	935.6	945.5	-0.38	19	9796
Node629	941.2	945.5	-0.43	17	17099
Node630	941.1	945.5	2.16	0	0
A-N344	968.3	971.3	1.53	0	0
Node631.1	954.77	956.77	0.66	0	0
Node633	947.32	951.65	-0.89	123	8278
Node633.1	938.68	949.52	9.5	0	0
A-N306.1.1	919.57	944.44	23.08	0	0
A-N054.1	952.64	958.56	-0.63	78	5290
A-N058.1	955.72	961.48	2.38	0	0
Node640	966.25	972	4.26	0	0
Node633.3	935.29	948.68	12.42	0	0
Node633.2	943.76	950.77	6.24	0	0
Node505.1	1018.81	1022.82	-0.18	72	2764
F-N206.1	921.8	925	2.61	0	0
F-N210.1	925.5	931	2.64	0	0
Node647	911.8	920.8	8.63	0	0
Node649	1037	1042	2.51	0	0
Node650	1036.5	1042	3.14	0	0
Node651	912.595	922.4	9.8	0	0
A-N438.1	967.2	974.1	2.36	0	0
A-N438.2	969.5	977.3	3.5	0	0
A-N408.1	972.78	980.88	1.23	0	0
A-N408.2	973.55	982.3	-0.16	10	954
A-N408.3	974.75	985	1.05	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Allen-Fruitdale hydraulic nodes					
A-N314.1	956.6	964.4	1.03	0	0
A-N108-2.1	1013.01	1016.15	0.41	0	0
F-N120.1	928	932.83	1.5	0	0
F-N120.2	928.75	933.26	1.93	0	0
Node661	941.9	948.1	5.92	0	0
Node662	940.62	947.09	6.18	0	0
Node663	935.5	942.37	6.55	0	0
Node664	934.4	941.2	6.48	0	0
Node665	930.2	934.05	2.73	0	0
F-N058.2.1	1028.31	1033.64	1	0	0
Node314.1	1009.04	1020	8.93	0	0
Node314.2	1030	1034.5	2.08	0	0
Node314.3	1004.385	1015	9.47	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Gilbert hydraulic nodes					
G-N002	894.169	904.322	8.2	0	0
G-N003	894.3	904.85	8.57	0	0
G-N004	894.435	904.74	8.33	0	0
G-N005	894.678	903.839	7.16	0	0
G-N006	894.837	902.44	5.58	0	0
G-N007	895.9	901.2	3.05	0	0
G-N034	895	907.901	10.14	0	0
G-N014	896.038	901.938	1.38	0	0
G-N013	897.264	901.914	1.14	0	0
G-N012	898.45	901.654	0.83	0	0
G-N011	899.068	901.918	1.07	0	0
G-N015	896.75	904.711	3.55	0	0
G-N016	897.519	906.119	4.49	0	0
G-N032	896.512	905.362	4.45	0	0
G-N031	898.514	905.114	3.91	0	0
G-N017	898.419	904.756	2.32	0	0
G-N018	899.837	905.337	2.72	0	0
G-N030	900.322	906.872	4.95	0	0
G-N029	904.14	915.876	10.54	0	0
G-N028	905.21	913.142	6.87	0	0
G-N026	908.369	916.977	7.57	0	0
G-N020	902.488	907.588	4.52	0	0
G-N022	906.399	911.799	4.87	0	0
G-N023	906.188	912.428	5.36	0	0
G-N027	907.093	915.293	7.18	0	0
G-N038	896.803	908.953	10.25	0	0
G-N054	897.559	910.176	10.26	0	0
G-N053	899.651	907.551	5.05	0	0
G-N052	904.675	912.875	5.94	0	0
G-N051	905.65	914.862	6.7	0	0
G-N050	906.705	915.305	6.53	0	0
G-N049	909.32	917.607	6.39	0	0
G-N048	910.96	918.285	5.37	0	0
G-N047	913.059	920.337	5.06	0	0
G-N045	917.309	926.831	7.06	0	0
G-N044	918.96	929.572	8.03	0	0
G-N043	919.311	929.561	7.65	0	0
G-N042	935.85	939.05	1.86	0	0
G-N041	938.839	941.34	0.33	0	0
G-N040	961.186	964.29	2.29	0	0
G-N068	895.688	909.438	11.96	0	0
G-N067	900.651	910.157	7.82	0	0
G-N066	910.377	916.377	4.46	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Gilbert hydraulic nodes					
G-N065	913.409	918.685	3.02	0	0
G-N064	916.342	921.972	2.99	0	0
G-N063	918.529	923.529	1.94	0	0
G-N062	920	924.537	0.61	0	0
G-N061	924.95	928.6	0.3	0	0
G-N060	925.584	930.664	0.81	0	0
G-N075	915.71	924.008	2.83	0	0
G-N074	918.731	922.561	1.32	0	0
G-N073	918.798	924.378	2.99	0	0
G-N072	921.336	926.796	4.31	0	0
G-N071	923.89	929.427	4.74	0	0
G-N070	926.546	931.876	4.53	0	0
G-N091	913.617	921.867	-0.35	46.1	2173.76
G-N084	913.776	920.075	2.13	0	0
G-N083	915.564	921.914	0.32	0	0
G-N099	912.275	921.011	7.08	0	0
G-N098	914.174	921.774	5.95	0	0
G-N097	915.72	923.22	4.23	0	0
G-N090	916.906	924.56	4.29	0	0
G-N082	917.772	923.972	-1.46	164.3	19442.86
G-N081	918.859	926.507	-0.25	142.9	1645.86
G-N080	920.337	928.687	-0.54	266.9	4194.46
G-N079	923.19	932.045	-2.25	998.3	49694.78
G-N089	928.769	937.47	7.18	0	0
G-N077	927.7	936.289	-1.21	498.3	13749.3
G-N088	932.87	939.72	6.04	0	0
G-N087	939.27	946.37	6.08	0	0
G-N093	935.41	941.46	5.06	0	0
G-N094	927.828	935.93	6	0	0
G-N095	926.809	934.559	5.9	0	0
G-N096	922.398	931	5.3	0	0
G-N101	913.958	924.807	7.75	0	0
G-N102	913.283	923.246	7.26	0	0
G-N110	908	921.595	12.42	0	0
G-N109	916	924.151	7.07	0	0
G-N106	921.387	927.087	-0.03	20.2	150.97
G-N105	923.537	930.187	0.07	0	0
G-N104	924.832	930.532	-0.51	80.9	3902.54
G-N107	922.726	928.126	4.82	0	0
G-N127	948.471	950.971	2.14	0	0
G-N128	940.94	943.939	2.62	0	0
G-N129	937.89	941.39	0.68	0	0
G-N130	934.785	943.185	2.87	0	0
G-N131	933.549	943.964	5.96	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Gilbert hydraulic nodes					
G-N124	987.869	994.319	4.72	0	0
G-N138	1044.04	1051.54	5.14	0	0
G-N136	1040.5	1052.28	10.82	0	0
G-N140	1019.2	1029.57	8.54	0	0
G-N135	1055.51	1066.41	6.29	0	0
G-N144B	1073.5	1080.09	3.36	0	0
G-N148	1070.28	1076.31	1.35	0	0
G-N153	1063.83	1070.83	-1.51	51.7	20360.72
G-N154	1063	1069.66	-0.77	44.5	6805.14
G-N155	1046	1054.11	6.44	0	0
G-N145	1097.15	1102.75	4.06	0	0
G-N146	1092.86	1097.86	5	0	0
G-N147	1078	1084.14	6.14	0	0
G-N149	1123.59	1131.04	6.24	0	0
G-N150	1099	1106.53	1.36	0	0
G-N152	1091.93	1096.68	3.48	0	0
G-N158	1099.78	1109.98	7.87	0	0
G-N159	1096.23	1106.36	8.55	0	0
G-N167	1089.02	1097.57	7.06	0	0
G-N168	1077.23	1086.54	7.82	0	0
G-N166	1106.06	1113.86	7.36	0	0
G-N165	1121.64	1125.39	3.32	0	0
G-N164	1133.53	1139.63	5.7	0	0
G-N163	1144	1154.15	9.52	0	0
G-N199	1103.4	1109.4	5.38	0	0
G-N200	1095.29	1099.89	3.89	0	0
G-N181	1080.59	1090.79	5.02	0	0
G-N180	1097.72	1104.83	5.77	0	0
G-N179	1104.9	1109.8	3.65	0	0
G-N178	1110.02	1114.67	3.41	0	0
G-N195	1113.73	1118.93	4.32	0	0
G-N177	1130.23	1134.72	3.52	0	0
G-N194	1137.39	1142.96	5.05	0	0
G-N191	1138.74	1144.87	4.34	0	0
G-N176	1141.17	1149.42	7.64	0	0
G-N173	1169.01	1176.54	7.2	0	0
G-N172	1193.08	1199.88	6.48	0	0
G-N171	1246.27	1253.12	6.63	0	0
G-N170	1284.4	1291.3	6.67	0	0
G-N175	1158.84	1163.84	4.71	0	0
G-N174	1183.15	1188.18	4.75	0	0
G-N190	1168.27	1174.97	5.9	0	0
G-N254	938	953	10.68	0	0
G-N226	1072	1087	12.58	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Gilbert hydraulic nodes					
G-N230	1034	1060	22.84	0	0
G-N231	1033.5	1055	19.42	0	0
G-N001	874.87	935	54.44	0	0
G-N035	876.45	940	58.65	0	0
G-N056	878.95	945	61.39	0	0
G-N069	880.08	930	45.14	0	0
G-N057	937.886	942.286	-0.11	32.1	673.43
G-N086	882.94	930	42.91	0	0
G-N092	883.43	930	42.6	0	0
G-N100	883.92	930	42.31	0	0
G-N103	884.37	930	41.89	0	0
G-N112	884.82	930	41.45	0	0
G-N132	932	946	8.77	0	0
G-N245	949	975	19.71	0	0
G-N126	948	963	9.84	0	0
G-N234	997	1020	19.76	0	0
G-N141	1016	1040	19.41	0	0
G-N156	1022	1055	28.7	0	0
G-N169-2	1048	1071	17.06	0	0
G-N151	1098.54	1104.24	-0.03	5.8	172.08
G-N008	902.5	904.25	1.05	0	0
G-N036	905	915.068	6.76	0	0
G-N033	895.9	903.614	3.3	0	0
G-N037	900.33	908.98	3.24	0	0
G-N037B	897.786	907.086	6.24	0	0
G-N059	931.612	935.862	2.83	0	0
G-N217	1150	1165	13.41	0	0
G-N218	1147	1162	12.68	0	0
G-N219	1140	1163	20.16	0	0
G-N220	1138	1163	22.84	0	0
G-N221	1115	1130	12.33	0	0
G-N203	1108	1123	12.55	0	0
G-N223	1100	1125	21.93	0	0
G-N224	1085.9	1115	25.34	0	0
G-N225	1085.9	1110	20.99	0	0
G-N228	1057	1072	14.04	0	0
G-N229	1042.5	1065.5	18.86	0	0
G-N232	1010	1025	10.24	0	0
G-N233	1002	1017	12.58	0	0
G-N235	990	1015	20.27	0	0
G-N236	981	999	16.06	0	0
G-N237	976	1000	19.46	0	0
G-N240	967	982	12.18	0	0
G-N241	965	980	11.81	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Gilbert hydraulic nodes					
G-N242	960	975	10.16	0	0
G-N243	955	985	24.19	0	0
G-N244	952	980	24.3	0	0
G-N246	948	975	21.44	0	0
G-N247	945	960	10.57	0	0
G-N248	944.5	959.5	10.53	0	0
G-N249	943	958	10.29	0	0
G-N250	942	957	9.72	0	0
G-N251	940	955	8.5	0	0
G-N252	940	955	8.9	0	0
G-N253	938	953	8.88	0	0
G-N255	936	951	12.48	0	0
G-N256	934	949	10.68	0	0
G-N257	932	948	10.64	0	0
G-N258	932	947.5	10.42	0	0
G-N259	929	944	9.34	0	0
G-N260	928	943.5	8.95	0	0
G-N261	927	943	9.46	0	0
G-N263	925.5	941	9.79	0	0
G-N264	925.5	941	10.05	0	0
G-N265	924	939	9.7	0	0
G-N266	924	939	10.12	0	0
G-N267	921	936	8.55	0	0
G-N268	921	936	8.99	0	0
G-N269	919	934	9.74	0	0
G-N270	918	933	9.15	0	0
G-N076	914.5	929.5	8.38	0	0
G-N271	916	931	9.69	0	0
G-N272	910	927	12.52	0	0
G-N273	910	925	11.08	0	0
G-N274	904	919	12.59	0	0
G-N275	901	925	19.4	0	0
G-N276	891	920	22.61	0	0
G-N277	882.04	930	43.6	0	0
G-N125	984.3	989.3	4.12	0	0
G-N216	1167	1175.161	5.57	0	0
G-N238	975	1000	20.87	0	0
G-N239	975	990	11.07	0	0
G-N262	927	943	9.72	0	0
G-N202	1133	1148	13.83	0	0
G-N201	1142	1146	0.73	0	0
Node 42	1115.09	1119.29	4.2	0	0
Node43	1120.9	1126.25	5.11	0	0
G-N197	1168.8	1174.7	5.54	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Gilbert hydraulic nodes					
G-N185	1178.95	1186	6.72	0	0
G-N186	1164.59	1179.6	14.91	0	0
G-N187	1154	1169	14.49	0	0
G-N188	1146	1164	17.83	0	0
G-N192	1121.28	1135.48	10.99	0	0
G-N139	1022.83	1035.13	11.15	0	0
G-N019	902.266	907.166	4.35	0	0
G-N183	1059.32	1064.62	4.06	0	0
G-N025	909.977	920.327	9.3	0	0
Node44	1063	1068.5	4.51	0	0
G-N134	1060	1065.58	4.69	0	0
G-N157	1108.66	1116.51	5.82	0	0
G-N161	1154	1162	7.57	0	0
G-N162	1145	1152	6.47	0	0
G-N193	1138.14	1144.98	6.08	0	0
G-N212	1207.37	1213.67	5.78	0	0
G-N213	1191.54	1198.24	5.87	0	0
G-N210	1188	1206	14.75	0	0
G-N208	1210	1225	13.73	0	0
G-N209	1195	1210	14.01	0	0
G-N210B	1188	1204.5	14.05	0	0
G-N214	1182	1197	13.99	0	0
G-N021	904.609	908.009	3.06	0	0
G-N055	895.963	908.804	11.01	0	0
G-N046	914.009	922.159	5.93	0	0
G-N039	962.68	967.68	3.48	0	0
G-N058	933.618	937.278	3.07	0	0
G-N108	919.308	926.508	2.27	0	0
G-N085	913.269	919.569	3.36	0	0
G-N078	926.202	935.202	-0.9	579.1	8590.86
G-N123	991.107	997.357	4.84	0	0
Node42	1080.11	1089.11	7.4	0	0
G-N184	1194.1	1202.15	7.7	0	0
Node36	1158.43	1165.68	4.93	0	0
G-N207	1175.22	1180.92	-1.65	102.6	24457.77
G-N205	1196.66	1201.16	3.46	0	0
G-N206	1184.75	1189.75	3.42	0	0
G-N204	1203.55	1208.05	3.36	0	0
G-N227	1072	1095	19.96	0	0
G-N137	1064.14	1071.34	6.71	0	0
G-N211	1188	1203	13.52	0	0
N299	886	930	40.21	0	0
N300	873	930	50	0	0
G-N283	1193.43	1200.44	5.52	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Gilbert hydraulic nodes					
G-N280	1345	1350	4.55	0	0
G-N281	1062	1069	5.6	0	0
Node330	1176.42	1178.42	0.03	0	0
Node331	1176.26	1178.26	-0.1	13.1	709.95
Node332	1176.39	1178.39	0.04	0	0
G-N279-2	1174.93	1177.93	-0.42	29	2959.26
Node334	1172.81	1177.81	4.04	0	0
Node335	1175.89	1178.14	-0.09	15.1	614.89
Node336	1175.92	1178.23	0.31	0	0
Node337	1175.9	1178.2	0.3	0	0
Node336.1	1175.81	1178.11	0.21	0	0
Node336.2	1175.82	1178.12	0.2	0	0
Node340	1174.44	1178.44	1.35	0	0
Node337.1	1175.16	1182.58	4.85	0	0
Node346	1174.21	1177.21	0.18	0	0
Node347	1174.17	1176.17	0.12	0	0
Node348	1173.61	1175.61	-0.15	45.7	1050.74
Node349	1174.04	1178.24	2.74	0	0
Node350	1173.32	1176.32	1.27	0	0
Node351	1172.619	1175.619	0.93	0	0
Node349.1	1173.48	1177.96	2.82	0	0
Node354	1069.3	1071.45	1.31	0	0
Node317.1	1069.32	1072.36	2.22	0	0
Node317.2	1069.34	1073.07	2.95	0	0
Node317.3	1069.45	1075.15	4.94	0	0
Node359	1066.82	1072.12	1.98	0	0
Node360	1065.53	1070.58	0.41	0	0
Node359.1	1066.31	1071.35	1.2	0	0
Node362	1068.88	1070.58	0.41	0	0
Node363	1068.78	1071.15	0.97	0	0
Node364	1068.9	1071.15	0.97	0	0
Node365	1067.45	1070.65	0.42	0	0
Node366	1068.01	1071.76	1.5	0	0
Node367	1068.63	1071.63	1.32	0	0
G-N169-1	1067.94	1070.94	0.62	0	0
Node367.1	1068.24	1071.24	0.92	0	0
Node370	1066.72	1070.22	-0.1	25.5	605.65
Node371	1067.38	1069.38	1	0	0
Node372	1066.59	1068.59	0.69	0	0
Node370.1	1067.46	1069.58	1.13	0	0
G-N182	1067.69	1070.15	-0.18	33.2	1344.76
Node370.3	1067.3	1070.18	-0.15	31.4	1046.3
G-N226.1	1063	1078.7	12.12	0	0
Node377	1066.76	1067.95	0.09	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Gilbert hydraulic nodes					
Node378	1066.36	1068.36	0.51	0	0
Node379	1066.21	1068.21	0.37	0	0
Node380	1065.83	1067.83	-0.01	10	55.01
Node381	1065.36	1067.32	-0.51	93	4004.96
Node382	1065.66	1067.36	-0.5	90.7	4023.69
G-N133	1065.58	1068.58	0.7	0	0
Node384	1161.26	1164.66	1.98	0	0
Node384.1	1114.37	1117.77	3.07	0	0
Node388	1113.67	1117.07	3.04	0	0
Node384.2	1123.37	1126.85	2.97	0	0
Node390	1171.81	1173.81	0.13	0	0
Node391	1168	1174.36	5.81	0	0
Node392	1172.73	1174.73	0.89	0	0
Node394	1173.17	1174.48	0.08	0	0
Node395	1173.18	1174.88	0.17	0	0
Node396	1172.83	1174.83	0.04	0	0
Node397	1172.51	1174.51	-0.38	248.8	2849.11
Node398	1172.76	1174.67	-0.47	254.6	4052.61
Node399	1171.64	1174.33	-0.9	375.2	9207.37
Node400	1172.06	1174.06	-1.41	472.2	18180.96
G-N216-1	1172.46	1174.46	-1.03	350.6	11324.27
Node402	1171.85	1173.85	-1.68	553.2	26252.83
Node403	1171.93	1175.97	1.47	0	0
Node404	1171.4	1173.51	-0.96	595.4	8897.45
G-N216-2	1171.41	1173.41	-1.09	615.2	12484.82
Node406	1171.66	1173.66	-0.84	571.6	8632.72
Node407	1171.86	1173.86	-0.64	517	5485.84
Node408	1171.73	1173.73	-0.77	555.7	7050.62
Node409	1171.7	1173.7	-0.81	564.6	7602.76
Node410	1171.57	1173.57	-0.94	593.1	9440.79
Node411	1171.55	1173.55	-0.96	597.4	10826.56
Node412	1170.17	1173.17	-1.37	650.1	18042.98
Node411.1	1170.48	1172.48	-2.03	741.7	40971.86
Node415	1170.89	1173.89	-0.65	529.6	5787.14
Node416	1170.91	1173.91	-0.81	538	8216.3
Node417	1171.06	1173.96	-0.76	524.8	7602.52
Node418	1169.98	1174.98	0.3	0	0
Node419	1169.92	1171.92	1.76	0	0
Node420	1163.4	1172.41	7.25	0	0
Node421	1164	1171.498	6.32	0	0
Node422	1163.395	1165.07	-0.79	421.4	60733.6
Node423	1168.92	1172.45	2.1	0	0
Node424	1169.14	1171.64	1.45	0	0
G-N215-2	1168.96	1171.46	2.01	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Gilbert hydraulic nodes					
Node426	1168.56	1170.56	1.06	0	0
Node427	1168.36	1170.36	0.84	0	0
Node428	1167.95	1169.95	0.4	0	0
Node429	1168.08	1170.16	0.64	0	0
Node428.1	1168.06	1168.56	-0.96	1363.5	29221.56
Node431	1168.57	1170.57	1.03	0	0
G-N215-1	1168.24	1170.74	1.14	0	0
Node433	1167.45	1169.95	0.39	0	0
Node434	1165.9	1171.75	2.43	0	0
Node435	1165.88	1169.96	0.72	0	0
Node436	1165.74	1170.89	1.66	0	0
Node437	1163.85	1174.66	5.47	0	0
Node438	1163.67	1179.75	10.59	0	0
Node439	1163.21	1182.7	13.6	0	0
Node440	1163.23	1180.41	11.35	0	0
Node441	1163.14	1180.41	11.41	0	0
Node442	1162.83	1169.16	0.19	0	0
G-N198	1166.76	1169.35	0.38	0	0
Node444	1166.19	1169.11	0.15	0	0
Node445	1166.43	1170.03	1.83	0	0
Node446	1163.79	1170.03	2.42	0	0
Node447	1164.99	1169.99	2.39	0	0
Node448	1157.36	1169.99	2.4	0	0
Node449	1157.28	1169.99	2.49	0	0
Node450	1164.62	1169.99	2.5	0	0
Node451	1160.769	1167.499	0.53	0	0
Node452	1159.972	1167.99	1.32	0	0
Node453	1159.37	1169.49	3.05	0	0
Node454	1162.74	1170.44	4.06	0	0
Node455	1161.096	1167.496	0.4	0	0
Node456	1161.69	1166.9	-0.25	171.1	1893.63
Node457	1162.488	1170.44	4.15	0	0
Node458	1161.14	1168.84	2.76	0	0
Node459	1161.16	1167.36	1.31	0	0
Node460	1161.55	1165.75	-0.15	150.7	1008.92
Node461	1161.13	1165.13	-0.74	275.9	6502.56
Node462	1161.13	1169.6	3.77	0	0
Node463	1162.67	1165.97	0.14	0	0
Node464	1163.32	1167.32	2.25	0	0
Node465	1163.35	1165.44	0.38	0	0
Node466	1163.17	1164.91	-0.15	180.2	1011.18
Node467	1162.91	1164.98	0.15	0	0
Node468	1162.89	1164.61	1.15	0	0
Node469	1162.1	1163.77	0.86	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Gilbert hydraulic nodes					
Node470	1161.74	1164.53	1.92	0	0
Node471	1159.74	1164.54	1.78	0	0
Node472	1160.94	1164.44	1.7	0	0
Node473	1161.84	1163.84	1.29	0	0
Node474	1161.76	1163.92	1.38	0	0
Node475	1161.12	1162.42	0.54	0	0
Node476	1161.28	1162.65	0.87	0	0
Node477	1160.36	1162.12	0.82	0	0
Node478	1160.8	1162.1	0.89	0	0
Node479	1159.63	1160.93	0.95	0	0
Node480	1160.37	1161.67	1.3	0	0
Node481	1159.77	1161.07	1.3	0	0
Node482	1159.9	1161.2	1.3	0	0
G-N007.1	895.67	901.47	3.67	0	0
G-N007.2	895.78	901.34	3.3	0	0
G-N087.1	937.16	944.17	6.05	0	0
G-N093.1	931.72	938.77	6.14	0	0
G-N089.1	919.06	926.9	6.17	0	0
G-N096.1	919.09	927.2	6.01	0	0
Node490	915.06	924.56	2.3	0	0
G-N147.1	1074.51	1080.6	5.64	0	0
G-N154.1	1058.4	1065.45	3.83	0	0
G-N182.1	1066.09	1072.6	5.07	0	0
G-N190.1	1152.45	1158.84	5.02	0	0
Node495	1065.4	1067.1	-0.78	121	7032.42
Node496	1065.06	1066.06	0.12	0	0
Node497	1064.967	1065.967	0.16	0	0
Node498	1064.79	1066.79	1.2	0	0
Node499	1064.34	1066.34	0.82	0	0
Node500	1064.22	1066.3	1.52	0	0
Node501	1064.63	1066.3	1.46	0	0
Node503	1063.89	1065.89	1.45	0	0
Node504	1063.902	1065.902	1.47	0	0
Node505	1063.912	1065.412	1	0	0
Node506	1063.937	1065.437	1.1	0	0
Node507	1063.948	1065.948	1.62	0	0
Node508	1063.96	1065.96	1.64	0	0
Node509	1063.91	1065.41	1.12	0	0
Node510	1063.64	1065.14	1.05	0	0
Node511	1063.41	1067.41	3.33	0	0
Node512	1063.44	1065.44	1.36	0	0
Node513	1063.77	1066.77	2.77	0	0
Node514	1063.11	1065.31	2	0	0
Node515	1062.13	1065.13	2.77	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Gilbert hydraulic nodes					
Node516	1061.58	1064.58	2.47	0	0
Node517	1061.61	1063.11	1.3	0	0
Node516.1	1061.6	1063.1	1.25	0	0
Node516.2	1061.6	1064.1	2.06	0	0
Node520	1060.73	1063.73	2.13	0	0
Node517.1	1061.4	1063.4	1.67	0	0
Node522	1060.63	1063.63	2.04	0	0
Node523	1061.33	1064.33	2.76	0	0
Node524	1060.77	1063.47	2.06	0	0
Node525	1060.29	1062.49	1.08	0	0
Node524.1	1060.67	1063.63	2.22	0	0
Node527	1059.92	1062.34	0.93	0	0
Node528	1059.93	1062.88	1.47	0	0
Node527.1	1059.93	1062.61	1.2	0	0
Node527.2	1059.93	1062.56	1.15	0	0
Node531	1059.31	1062.21	0.8	0	0
Node532	1040.69	1062.68	1.27	0	0
Node533	1057.34	1060.34	-0.94	356.3	9670.2
Node531.1	1059.22	1062.12	0.71	0	0
Node535	1057.314	1060.314	-0.97	361.6	10055.54
Node536	1057.3	1060.3	-0.98	363.8	11067.61
Node537	1057.08	1060.08	-1.2	388.8	14590.39
Node536.1	1057.15	1060.15	-1.13	383.9	14004.27
Node539	1061.46	1067.46	6	0	0
G-N207.1	1163.99	1169.74	2	0	0
Node541	1059.176	1063.176	4	0	0
Node542	1054.75	1058.57	3.82	0	0
Node543	1054.18	1057.08	2.9	0	0
Node544	1053.81	1055.91	1.95	0	0
Node545	1054.02	1055.98	1.83	0	0
Node544.1	1053.94	1055.95	1.86	0	0
Node544.2	1053.93	1055.95	1.95	0	0
Node544.3	1053.89	1055.94	1.98	0	0
Node551	1052.32	1054.87	1.71	0	0
Node545.1	1052.74	1055.14	1.98	0	0
G76	1053.69	1055.76	1.59	0	0
Node545.3	1053.76	1055.8	1.66	0	0
Node555	1052.86	1054.68	1.52	0	0
Node556	1052.83	1054.63	1.48	0	0
Node551.1	1052.61	1054.51	1.35	0	0
G60	1051.38	1054.38	2.15	0	0
Node559	1051.5	1054.5	2.8	0	0
Node556.1	1051.72	1054.2	1.96	0	0
Node556.2	1052	1054.05	1.72	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Gilbert hydraulic nodes					
Node562	1050.5	1053.5	3	0	0
Node559.1	1025.93	1027.43	1.13	0	0
Node564	1030.67	1036.62	5.95	0	0
Node565	1030.67	1063.62	32.95	0	0
Node566	1004.44	1009.44	5	0	0
Node567	995.58	1000.28	4.7	0	0
Node568	989.79	994.59	4.8	0	0
Node569	986.67	992.67	6	0	0
G58 G75	949.19	951.19	1.51	0	0
Node571	946.4	948.4	0.91	0	0
Node572	945.9	948.4	1.28	0	0
Node573	945.61	947.62	0.77	0	0
node5769	944.97	947.22	0.87	0	0
G61	944.97	947.22	0.89	0	0
Node576	942.11	944.21	0.39	0	0
Node577	941.45	943.55	1.03	0	0
Node578	941.47	943.27	1.12	0	0
Node580	1112.14	1117.34	4.32	0	0
Node334.1	1130.12	1133.12	2	0	0
Node334.2	1144.29	1147.29	1.95	0	0
Node334.3	1149.82	1153.32	2.55	0	0
Node334.4	1163.44	1166.94	2.67	0	0
Node585	1165.884	1170.884	-1.35	95.8	20465.46
Node586	1171.4	1173.51	-0.94	589.3	9588.48
G-N214.1	1170.65	1182.92	5.34	0	0
Node512.1	1063.68	1066.4	2.34	0	0
G-N234.1	991.28	1015.92	20.79	0	0
G73	1024.49	1025.99	1.24	0	0
Node565.1	1007.21	1015.15	7.94	0	0
Node565.2	1019.49	1040.51	21.02	0	0
Node450.1	1163.248	1166.924	-0.25	172.3	1660.95
Node596	968.53	978.03	8.65	0	0
Node596.1	966.49	974.41	7.39	0	0
Node598	969.44	978.03	4.49	0	0
G28 G59	975.57	978.03	1.75	0	0
Node422.1	1158.28	1163.14	-2.68	950.3	132175.94
Node603	1095	1102.67	0.41	0	0
Node604	1095	1102.67	5.51	0	0
Node605	936.85	939.95	2.75	0	0
Node606	939.8	946.42	6.62	0	0
Node607	961.5	969.53	8.03	0	0
Node608	971.65	977.05	5.4	0	0
Node609	980	987.88	7.88	0	0
Node610	982	984.96	2.96	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Gilbert hydraulic nodes					
Node391.1	1153.64	1160.25	4.05	0	0
Node613	1145	1149	0	39.5	0
G-N040.1	940.19	942.72	1.42	0	0
HILLSIDE1	0	0	0	0	0
Node616	1163.395	1165.07	0	616	0
Node391..1	1132.44	1137.94	4.75	0	0
Node391.2	1167.78	1174.14	5.59	0	0
G-N168.1	1065.17	1078.77	12.12	0	0
G-N159.1	1093.5	1101.96	7.09	0	0
Node36.1	1142.67	1145.68	-0.45	25.1	3642.9
Node36.2	1149.31	1152.06	0.36	0	0
Node36.3	1149.75	1152.5	0.22	0	0
Node36.4	1150.5	1153.25	0.31	0	0
Node636	1153.516	1156.27	0.18	0	0
Node637	1153.027	1155.78	0.35	0	0
Node638	1150.889	1153.639	0.18	0	0
Node613.1	1121.08	1131	9.13	0	0
Node613.2	1121.75	1130	7.21	0	0
Node613.3	1145	1147.66	2.07	0	0
G-N207.1.1	1162.63	1168.8	2.24	0	0
Node545.2	1052.05	1054.45	2.11	0	0
Node644	1059.6	1066.4	6.8	0	0
Node532.1	1042.46	1062.43	1.02	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Sand hydraulic nodes					
SA-N009	930	938.84	2.84	0	0
SA-N066	909	933.69	23.72	0	0
SA-N070	915	918	0.58	0	0
SA-N122	908.48	921.2	-0.02	1.7	55.93
SA-N144	900.68	908.58	4.7	0	0
SA-N132	910.69	917.4	2.65	0	0
SA-N131	913.72	918.77	2.33	0	0
SA-N134	914.42	919.42	-0.9	88.8	5878.82
SA-N145	899	906	4.38	0	0
SA-N007	931	940	2.74	0	0
SA-N003	949	959.79	3.78	0	0
SA-N011	928	937	4.3	0	0
SA-N013	923	930	2.1	0	0
SA-N029	937.72	943.32	1.49	0	0
SA-N014	883	891	1.8	0	0
SA-N069	916.9	927.34	0.76	0	0
SA-N057	923.82	927	0.71	0	0
SA-N005	940	954	10.19	0	0
SA-N080	900.36	910.57	1.1	0	0
SA-N102	905.04	913	5.39	0	0
SA-N140	918.87	928.23	2.86	0	0
SA-N159	915.46	918.96	-1.04	269.6	7872.12
SA-N025	938.16	943.86	0.47	0	0
SA-N147	890	897	4.69	0	0
SA-N104	889	897	1.73	0	0
SA-N068	930.13	934.65	3.97	0	0
SA-N072	911.5	915	-1.01	229.8	7898.42
SA-N084	902.63	909.96	-0.23	9	671.01
SA-N168	905.35	911.65	5.12	0	0
SA-N169	901.25	908.55	6.36	0	0
SA-N137	926.05	931.95	0.42	0	0
SA-N136	927.5	931.7	-0.09	7	246.71
SA-N121	916.54	925.68	2.76	0	0
SA-N146	893.91	902.89	5.78	0	0
SA-N133	909.1	915.5	2.3	0	0
SA-N135	928.81	933.08	-0.01	2.8	12.47
SA-N138	922.06	926.24	0.09	0	0
SA-N113	912.58	920.22	6.08	0	0
SA-N139	921.75	927.92	1.85	0	0
SA-N160	910.64	917.56	4.75	0	0
SA-N128	918.28	924.48	3.35	0	0
SA-N129	916.05	923.05	1.86	0	0
SA-N130	918.77	921.97	-0.99	120.9	6760.49

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Sand hydraulic nodes					
SA-N124	905.67	915.5	-1.67	120.5	29530.97
SA-N123	906.93	920.44	1.1	0	0
SA-N083	906.54	912.8	-0.08	7.1	149.75
SA-N078	905.49	911.74	-0.03	3.6	49.18
SA-N079	904.87	913.06	2.53	0	0
SA-N081	899.76	910.58	1.77	0	0
SA-N115	914.19	917.64	0.21	0	0
SA-N117	910.52	915.27	-0.25	14.7	674.16
SA-N116	911.92	915.43	-0.11	10.3	259.45
SA-N118	909.57	915.35	-0.02	4.7	80.71
SA-N119	912.82	918.75	2.36	0	0
SA-N120	911.35	917.22	1.69	0	0
SA-N100	908	912.6	0.72	0	0
SA-N101	907.57	912.6	3.2	0	0
SA-N090	918.02	926.69	6.74	0	0
SA-N085	923.47	929.15	-1	88.6	7532.33
SA-N091	916.09	921.32	2.42	0	0
SA-N093	915.18	922.15	4.55	0	0
SA-N095	914.49	921	4.81	0	0
SA-N096	912.98	921	5.52	0	0
SA-N097	911.24	920	5.94	0	0
SA-N098	910.45	920	6.33	0	0
SA-N099	910.06	916	3.72	0	0
SA-N110	916.42	920.17	1.05	0	0
SA-N111	916.32	920.15	1.14	0	0
SA-N112	916.46	921.15	3.84	0	0
SA-N074	927.39	932.52	2.63	0	0
SA-N075	924.51	928.01	-0.47	46.8	1666.72
SA-N076	922.22	925.9	-1.2	91	10857.41
SA-N077	920.18	926.67	-0.31	43.6	958.06
SA-N056	926.95	928.66	0.45	0	0
SA-N058	921.12	930.52	5.71	0	0
SA-N059	920.95	930.35	6.32	0	0
SA-N060	920.7	925.4	2.18	0	0
SA-N061	920.4	925.1	1.92	0	0
SA-N062	918.02	923.57	2.54	0	0
SA-N063	917.54	923.09	2.34	0	0
SA-N064	917.44	921.44	1.23	0	0
SA-N065	916.14	926.14	8.39	0	0
SA-N050	930.26	935.47	-0.94	61.9	6543.1
SA-N051	923.57	931.53	3.19	0	0
SA-N053	923.56	926.56	2.2	0	0
SA-N052	923.56	928.1	0.06	0	0
SA-N055	927.16	933.91	5.03	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Sand hydraulic nodes					
SA-N033	936.22	940.22	-0.59	123.8	2791.87
SA-N049	936.96	941	-2.32	2568.7	120462.04
SA-N031	936.6	940.99	0.03	0	0
SA-N032	936.41	940.75	-0.14	68.2	423.57
SA-N034	933.1	939.6	-0.99	156.9	7512.97
SA-N027	936.23	944.26	2.38	0	0
SA-N022	939.4	947.13	2.39	0	0
SA-N023	938.31	944.91	0.92	0	0
SA-N038	945.53	951.23	4.89	0	0
SA-N047	950.06	953.69	2.8	0	0
SA-N048	947.89	951.83	3.58	0	0
SA-N040	968.14	974.38	5.46	0	0
SA-N042	957.9	963.9	5.52	0	0
SA-N043	953.42	959.06	2.53	0	0
SA-N041	959.81	964.79	4.4	0	0
SA-N044	951.87	955.72	2.85	0	0
SA-N045	947.76	952.51	3.94	0	0
SA-N149	924.05	926.3	-0.02	4.2	26.58
SA-N150	922.16	927	0.9	0	0
SA-N141	914.82	930	6.53	0	0
SA-N142	910.57	920.32	1.65	0	0
SA-N154	913.8	918.55	-0.23	8	717.81
SA-N125	911.1	915.2	-1.15	115.5	10056.36
SA-N126	910.16	916	-0.24	75.1	1284.47
SA-N114	911.6	917.38	1.51	0	0
SA-N018	958.38	967.57	8.1	0	0
SA-N019	952.46	961.65	2.59	0	0
SA-N020	949.05	953.05	2.75	0	0
SA-N006	938	954	10.46	0	0
SA-N153	916.28	919.38	-0.01	1	17.7
SA-N155	909.02	916.77	0.18	0	0.3
SA-N143	906.21	914.46	0.8	0	0
SA-N152	924	926.7	-0.97	406.4	14674.45
SA-N151	927.8	931.6	3.35	0	0
SA-N028	936.8	942.44	0.58	0	0
SA-N030	937.55	943.8	2.26	0	0
SA-N026	938.04	944.64	1.41	0	0
SA-N010	929	937	3.26	0	0
SA-N008	931	940	3.49	0	0
SA-N012	923	930	0.23	0	0
SA-N015	883	899	10.89	0	0
SA-N148	889.9	897.5	5.89	0	0
SA-N105	888	897	6.34	0	0
SA-N106	869.82	879.19	6.01	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Sand hydraulic nodes					
SA-N127	910.06	916	0.1	0	0
SA-N046	946	951.89	4.7	0	0
SA-N086	920.68	927.23	3.76	0	0
SA-N087	920.64	927.12	4.36	0	0
SA-N088	919.49	926.47	5.63	0	0
SA-N094	915	922.6	5.7	0	0
SA-N103	891.49	897	1.44	0	0
SA-N161	901.05	909.73	5.59	0	0
SA-N024	940.04	945.11	1.32	0	0
SA-N004	948.5	959.5	3.95	0	0
SA-N092	915.8	919.5	1.46	0	0
SA-N071	912	915	-1.96	264	60868.02
SA-N039	974.39	977.89	3.07	0	0
SA-N016	859.16	875.16	9.08	0	0
SA-N002	958.88	976.93	13.98	0	0
SA-N001	982	1000.05	13.94	0	0
SA-N017	1003.4	1005.1	0.2	0	0
SA-N021	942.4	955.14	8.25	0	0
SA-N054	890.1	893.1	2.56	0	0
SA-N067	873.73	898.42	21.04	0	0
SA-N082	893	900	6.79	0	0
SA-N073	910.18	914	3.68	0	0
SA-N167	912.96	916	2.63	0	0
SA-N107	862.13	868.13	1.11	0	0
SA-N109	921.32	926.86	1.97	0	0
SA-N108	921.75	927.1	1.14	0	0
R-N001	876.71	933.04	51.66	0	0
R-N011	859.1	885.73	20.33	0	0
R-N012	858.69	874.22	9.22	0	0
R-N002	875.37	933.95	53.97	0	0
R-N003	873.58	932.16	53.84	0	0
R-N004	873.6	923.75	46.38	0	0
R-N005	871.17	916.52	40.58	0	0
R-N006	871.19	913.94	38.73	0	0
R-N007	867.81	903.57	31.3	0	0
R-N008	865.73	901.49	31.19	0	0
R-N009	861.87	885.87	18.86	0	0
R-N010	858.89	885.52	19.5	0	0
SA-N133A	911.23	915.5	3.52	0	0
SA-N166	917	919.35	-0.91	263.1	5964.42
SA-N158	916.1	919.66	-0.55	203.7	2087.81
SA-N172	915	920	-0.22	0	0
SA-N171	915.48	922	1.44	0	0
SA-N170	917.94	924.4	3.14	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Sand hydraulic nodes					
SA-N162	919.56	922.56	2.11	0	0
SA-N157	918.48	921.71	1.28	0	0
SA-N156	919	924.78	4.24	0	0
SA-N164	917.28	921.66	0	2.7	4.64
SA-N163	919.36	922.75	-0.57	61.4	2347.44
Node193	938.7	954.93	8.09	0	0
Node194	941.8	951.81	5.04	0	0
Node195	938.4	950.73	4.05	0	0
Node196	940.5	950.78	4.14	0	0
Node197	940.4	950.67	4.1	0	0
SA999	939.8	948	1.59	0	0
Node199	940.18	944.54	0.59	0	0
SA-N023.1	939.54	944.67	0.7	0	0
Node202	939.97	944.27	0.38	0	0
Node203	939.34	942.34	-1.17	2171.4	10876.58
Node204	939.34	942.34	-1.16	2170.2	11155.38
Node205	939.33	944.1	0.39	0	0
Node206	939.62	943.08	-0.6	2144.6	5044.53
Node207	939.22	943.87	0.23	0	0
Node208	939	943.58	0.01	0	0
Node208.1	939.22	943.52	0	1989.8	0
Node212	938.89	942.65	-0.81	2135.8	6756.48
Node204.1	939.09	943.39	-0.09	2016.4	477.6
Node214	938.89	943.19	-0.25	2061.4	992.25
Node212.1	938.89	943.19	-0.26	2064.2	1376.93
Node216	938.89	943.19	-0.23	2057.8	1006.16
Node217	938.79	942.2	-1.2	2163.3	15261.54
Node218	937.81	943.51	1.66	0	0
Node219	937.62	943.32	1.48	0	0
Node220	937.72	942.32	0.49	0	0
Node221	937.84	942.44	0.61	0	0
Node222	937.44	942.84	1.33	0	0
Node223	937.13	941.63	0.13	0	0
Node224	936.64	941.62	0.12	0	0
Node225	936.76	940.85	-0.64	201.7	4509.91
Node224.1	936.68	941.37	-0.12	90.9	829.02
Node227	934.6	941.92	0.99	0	0
Node228	935.1	942.65	1.7	0	0
Node229	933.6	941.341	0.6	0	0
Node230	935.2	939.21	-1.49	223.5	20066.61
Node231	935.67	941.17	0.47	0	0
Node232	935.62	941.12	0.53	0	0
Node233	932.03	940.6	0.32	0	0
Node234	931.24	940.89	0.82	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Sand hydraulic nodes					
Node235	929.91	938	-1.71	452.4	45.95
Node236	929.29	936.31	-2.62	2267.4	102.09
Node237	928.69	937.61	-0.51	165.6	13.4
Node238	928.46	935.52	-2.33	2313.3	56.34
Node239	928.22	936.93	-0.64	332.4	14.03
Node240	927.95	937.89	0.62	0	0
Node241	933	939.62	2.83	0	0
Node242	934.41	938.41	4	0	0
Node243	934.15	938.41	4.26	0	0
Node244	934.2	939.62	2.96	0	0
Node245	934.32	938.32	1.84	0	0
SA-N050.1	925.93	932.92	3.36	0	0
SA-N050.2	929.29	934.9	1.44	0	0
SA-N053.1	905.69	908.69	2.15	0	0
SA-N058.1	921.03	930.43	6.3	0	0
SA-N068.1	921.63	929.95	2.67	0	0
SA-N068.2	924.57	931.58	3.28	0	0
SA-N084.1	901.16	910.35	0.77	0	0
SA-N080.1	900.01	910.58	1.63	0	0
SA-N115.1	912.32	915.82	0.26	0	0
SA-N085.1	923.26	928.11	3.09	0	0
SA-N085.2	923.33	928.45	2.61	0	0
SA-N090.1	917.14	923.63	4.42	0	0
SA-N130.1	914.05	921.62	-0.01	1.4	13.77
SA-N130.4	913.15	921.55	0.21	1.1	3.65
SA-N128.1	916.93	923.61	2.48	0	0
SA-N125.1	910.71	915.54	-0.7	103.5	4858.01
SA-N127.1	908.56	915.1	5.64	0	0
SA-N162.1	917.67	920.9	0.86	0	0
SA-N140.1	916.52	929.1	4.79	0	0
SA-N159.1	914.2	918.59	0.7	0	0
SA-N153.1	915.24	919.03	-0.05	3.4	57.48
SA-N168.1	902.77	909.7	6.29	0	0
SA-N168.2	903.58	910.31	5.99	0	0
Node269	934.32	938.32	2.6	0	0
Node270	934.32	938.32	4	0	0
SA-N028.1	933.5	938.56	4.81	0	0
Node273	928.4788	932.5	3.33	0	0
Node281	942.65	948.09	1.19	0	0
Node282	927.7	934.03	-2.04	2369.1	68143.45
SA-N139.1	921.49	928.2	2.68	0	0
SA-N152.1	919.8	925.65	0.06	0	0
Node273.2	927	931.6	2.94	0	0
Node292	957	961	0	1063.3	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Sand hydraulic nodes					
Node293	932.3	956.3	20.41	0	0
Node294	930.5829	937.61	5.67	0	0
Node295	939.15	951.4	7.48	0	0
Node297	937.8	940.4	2.6	0	0
Node298	937.6	941	0.04	0	0
Node299	936.7	941	0.05	0	0
Node300	936.4	941	2.95	0	0
Node301	935.6	938.6	0.6	0	0
Node302	934.8	938.6	0.61	0	0
Node303	934.3	938.77	0.78	0	0
Node304	933.7	937.3	0	17.1	0
Node305	933.7	937.3	0	17.1	0
Node306	933.17	937.3	0	17.3	0
Node307	933.17	937.86	1.36	0	0
Node309	930.6	932.27	-0.37	1597.1	1826.47
Node310	925	930.67	-1.85	2318.7	49357.72
Node311	925	929.17	-2.41	2377.1	145489.52
Node312	927.2	928.87	-2.7	2388.8	262152
Node313	927.3	928.97	-0.28	1361.6	907.65
Node314	927.7	928.7	-0.53	1915.6	2330.42
Node317	927.17	928.84	-0.41	1741.3	1525.01
Node311.1	915.44	918.5	0.41	0	0
Node311.2	918.51	921.92	-1.7	2328.3	35316.02
Node311.3	920.47	924.11	0.48	0	0
Node311.4	921.38	925.13	-1.34	2248.7	16089.75
Node311a	922.07	925.9	-3.01	2384.7	484792.42
Node323	921.2	926.27	-1.42	2380.3	19237.05
Node317.1	924.78	926.45	-1.24	2351.4	13153.37
Node317.2	926	927.67	-1.44	2370.9	20924.44
Node317.3	922.74	928.41	-0.7	2186.1	4219.35
Node317.4	922.87	928.54	-0.65	2129.3	3252.57
Node317a	927.08	928.75	-0.44	1805.5	1748.63
Node329	918	926.27	-1.41	2379.8	18462.64
Node330	918.92	926.27	-1.36	2376	16689.03
Node330.1	920.075	921.75	0.81	0	0
Node330.2	920.318	921.988	1.04	0	0
Node330.7	917.04	921.43	3.74	0	0
Node338	910.679	913.96	2.79	0	0
SA-N102.1	901.87	909.26	4.81	0	0
Node341	934.3	938.77	1.4	0	0
Node342	934.8	938.6	0.71	0	0
Node343	934.8	938.6	0.71	0	0
Node344	931.7	936.9	1.2	0	0
Node345	931.7	936.9	1.2	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Sand hydraulic nodes					
Node346	931.7	936.9	3.72	0	0
Node347	932.33	936.9	3.69	0	0
Node330.3	917.54	921.48	2.89	0	0
Node349	937.8	940.4	2.6	0	0
Node350	937.8	940.4	2.6	0	0
Node351	935.8	940.75	3.45	0	0
Node352	931.4619	936.77	3.96	0	0
SA-N152.2	918.21	928.22	2.74	0	0
Node356	921.65	927.81	1.81	0	0
Node358	933.17	937.86	0.74	0	0
Node359	933.17	937.86	0.74	0	0
Node376	939.5	943.7	0.3	0	0
SA-N140.2	915.38	930.12	6.23	0	0
Node366	921.23	928.04	2.49	0	0
Node356.2	921.53	927.42	1.56	0	0
SA-N137.1	922.21	926.08	-0.09	4.4	234.86
Node365	922.2	928.05	2.52	0	0
Node363	916.75	929.42	4.97	0	0
Node362	916.41	930.01	5.66	0	0
Node361	915.55	931.14	7.12	0	0
Node364	917.41	928.82	3.9	0	0
Node371	924.73	927.79	-1.05	61.7	7709.57
Node372	922.6	928.22	-0.01	1.9	18.42
SA-N085.5	920.74	927.67	3.97	0	0
Node387	918.9	927.84	2.31	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Skunk-Jones hydraulic nodes					
SK-N548	930.3	Allowed	3.84	0	0
SK-N547	929.599	Allowed	6.79	0	0
SK-N546	933.5	Allowed	7.15	0	0
SK-N545	937	Allowed	4.8	0	0
SK-N544	929.15	Allowed	11.45	0	0
SK-N543	927.2	Allowed	12.73	0	0
SK-N542	918.75	Allowed	14.22	0	0
SK-N551	933	Allowed	9.29	0	0
SK-N550	931.299	Allowed	13.25	0	0
SK-N418	966.04	Allowed	5.34	0	0
SK-N416	957.55	Allowed	-1.34	60.6	14416.66
SK-N415	946.239	Allowed	-2.44	218.3	57603.1
SK-N413	935.44	Allowed	-1.98	246.9	31613.1
SK-N412	931.96	Allowed	-3.18	407.9	127341.36
SK-N411	930.719	Allowed	-1.77	357.2	25683.08
SK-N410	929.76	Allowed	-1.17	207.1	11219.27
SK-N419	972.699	Allowed	7.4	0	0
SK-N414	950.44	Allowed	5.84	0	0
SK-N432	953.299	Allowed	5.43	0	0
SK-N430	951.919	Allowed	4.79	0	0
SK-N429	949.59	Allowed	4.91	0	0
SK-N428	947.38	Allowed	5.04	0	0
SK-N425	945.2	Allowed	5.39	0	0
SK-N422	940.34	Allowed	6.84	0	0
SK-N421	938.739	Allowed	6.24	0	0
SK-N420	936	Allowed	9.59	0	0
SK-N409	929.48	Allowed	0.89	0	0
SK-N408	929.419	Allowed	0.91	0	0
SK-N503	928.9	Allowed	-0.34	97	2187.82
SK-N502	928	Allowed	-1.07	260.8	9832.06
SK-N501	927.349	Allowed	-1.1	282.3	10368.81
SK-N528	929	Allowed	5.36	0	0
SK-N529	927.7	Allowed	4.37	0	0
SK-N525	927.5	Allowed	6.15	0	0
SK-N522	919.7	Allowed	7.9	0	0
SK-N521	911.789	Allowed	3.1	0	0
SK-N423	945.4	Allowed	6.19	0	0
SK-N424	940.7	Allowed	9.94	0	0
SK-N427	949.15	Allowed	2.47	0	0
SK-N310	981.88	Allowed	-0.54	75.2	3842.16
SK-N311	973.099	Allowed	-0.25	80.3	1587.03
SK-N312	948.78	Allowed	2.3	0	0
SK-N313	946.799	Allowed	3.83	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Skunk-Jones hydraulic nodes					
SK-N314	942.88	Allowed	4.79	0	0
SK-N315	940.979	Allowed	1.05	0	0
SK-N320	1028.4	Allowed	11.38	0	0
SK-N321	1013.5	Allowed	6.25	0	0
SK-N322	971.4	Allowed	3.98	0	0
SK-N323	957.6	Allowed	8.69	0	0
SK-N324	955.3	Allowed	9.53	0	0
SK-N326	976.75	Allowed	5.19	0	0
SK-N325	982.18	Allowed	8.22	0	0
SK-N329	1061.34	Allowed	7.8	0	0
SK-N328	1029.25	Allowed	7.16	0	0
SK-N330	1006.25	Allowed	3.66	0	0
SK-N327	997.83	Allowed	3.33	0	0
SK-N234	1031.51	Allowed	4.07	0	0
SK-N235	1039.56	Allowed	8.42	0	0
SK-N236	1062.92	Allowed	10.63	0	0
SK-N166	1029.25	Allowed	4.03	0	0
SK-N161	1018.26	Allowed	5.09	0	0
SK-N156	1006.07	Allowed	4.2	0	0
SK-N152	1000	Allowed	-1.26	55.2	12845.16
SK-N173	1045.56	Allowed	4.51	0	0
SK-N171	1034.85	Allowed	3.04	0	0
SK-N169	1031.79	Allowed	2.61	0	0
SK-N167	1030.25	Allowed	3.51	0	0
SK-N168	1033	Allowed	5	0	0
SK-N436	964.159	Allowed	8.99	0	0
SK-N435	961.859	Allowed	5.38	0	0
SK-N434	960.38	Allowed	5.06	0	0
SK-N433	957.3	Allowed	2.27	0	0
SK-N500	926	Allowed	-1.32	304.5	14585.7
SK-N401	926.32	Allowed	5.58	0	0
SK-N400	925.56	Allowed	3.41	0	0
SK-N513	919.9	Allowed	-0.01	4.2	1.63
SK-N511	916.9	Allowed	7.35	0	0
SK-N307	931.5	Allowed	3.39	0	0
SK-N306	927.299	Allowed	0.82	0	0
SK-N300	926.2	Allowed	1.08	0	0
SK-N317	935.58	Allowed	-0.38	38.6	2515
SK-N308	931.72	Allowed	3.35	0	0
SK-N318	938.8	Allowed	2.98	0	0
SK-N316	938.146	Allowed	-0.26	121.3	1566.22
SK-N303	926.7	Allowed	1.21	0	0
SK-N304	926.8	Allowed	1.19	0	0
SK-N302	926.4	Allowed	1.21	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Skunk-Jones hydraulic nodes					
SK-N301	926.3	Allowed	1.08	0	0
SK-N305	927.1	Allowed	5.19	0	0
SK-N213	926	Allowed	1.1	0	0
SK-N212	925.93	Allowed	3.4	0	0
SK-N211	925.6	Allowed	1.99	0	0
SK-N208	925.13	Allowed	2.76	0	0
SK-N207	925.02	Allowed	3.22	0	0
SK-N206	924.88	Allowed	3.31	0	0
SK-N205	924.81	Allowed	3.61	0	0
SK-N204	924.5	Allowed	2.76	0	0
SK-N600	926.7	Allowed	1.02	0	0
SK-N214	930.83	Allowed	1.21	0	0
SK-N228	972.7	Allowed	4	0	0
SK-N229	968.5	Allowed	-0.8	32.1	6357.09
SK-N164	1015.45	Allowed	5.53	0	0
SK-N162	1013.2	Allowed	3.73	0	0
SK-N157	999	Allowed	3.98	0	0
SK-N227	968.25	Allowed	-0.43	27.4	2856.21
SK-N226	953.88	Allowed	1.24	0	0
SK-N225	951.96	Allowed	2.88	0	0
SK-N224	951	Allowed	1.88	0	0
SK-N403	927	Allowed	2.19	0	0
SK-N431	953.78	Allowed	3.32	0	0
SK-N221	945.5	Allowed	2.67	0	0
SK-N222	949	Allowed	2.76	0	0
SK-N231	982	Allowed	2.28	0	0
SK-N232	1004.5	Allowed	3.85	0	0
SK-N233	1008.98	Allowed	5.95	0	0
SK-N220	937	Allowed	1.41	0	0
SK-N223	947.75	Allowed	3.72	0	0
SK-N219	934.5	Allowed	-0.96	53.8	9128.37
SK-N218	934.399	Allowed	-0.26	32.8	1729.38
SK-N215	931.46	Allowed	3	0	0
SK-N165	1020.25	Allowed	3.9	0	0
SK-N163	1016.7	Allowed	4.32	0	0
SK-N160	1007.785	Allowed	8.61	0	0
SK-N159	1006	Allowed	7.15	0	0
SK-N170	1031.81	Allowed	2.92	0	0
SK-N172	1042.97	Allowed	4.07	0	0
SK-N147	987	Allowed	2.52	0	0
SK-N146	983.799	Allowed	1.85	0	0
SK-N145	980	Allowed	2.79	0	0
SK-N144	975.5	Allowed	3.74	0	0
SK-N143	973	Allowed	2.81	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Skunk-Jones hydraulic nodes					
SK-N142	971.87	Allowed	2.12	0	0
SK-N141	967.2	Allowed	5.34	0	0
SK-N140	966.96	Allowed	4.95	0	0
SK-N139	961.53	Allowed	2.85	0	0
SK-N138	960.45	Allowed	3.15	0	0
SK-N137	959.47	Allowed	2.47	0	0
SK-N136	958.36	Allowed	2.46	0	0
SK-N135	955.54	Allowed	1.65	0	0
SK-N130	941.66	Allowed	2.89	0	0
SK-N129	940.77	Allowed	2.59	0	0
SK-N128	939.72	Allowed	2.57	0	0
SK-N127	938.59	Allowed	2.67	0	0
SK-N126	937.81	Allowed	2.6	0	0
SK-N125	937.26	Allowed	3.4	0	0
SK-N124	936.47	Allowed	3.22	0	0
SK-N123	935.24	Allowed	3.24	0	0
SK-N122	934.71	Allowed	2.93	0	0
SK-N121	933.55	Allowed	2.3	0	0
SK-N120	932.34	Allowed	3.39	0	0
SK-N119	930.78	Allowed	2.47	0	0
SK-N118	929.91	Allowed	2.71	0	0
SK-N117	929.25	Allowed	3.64	0	0
SK-N116	928.44	Allowed	3.27	0	0
SK-N115	927.47	Allowed	4.04	0	0
SK-N114	927.03	Allowed	3.24	0	0
J-N110	1025	Allowed	37.07	0	0
J-N109	1011	Allowed	50.27	0	0
J-N108	997	Allowed	41.85	0	0
J-N107	983	Allowed	47.14	0	0
J-N106	966	Allowed	51.96	0	0
J-N105	951	Allowed	51.37	0	0
J-N104	939	Allowed	24.53	0	0
J-N103	939	Allowed	17.74	0	0
J-N102	924	Allowed	23.43	0	0
J-N101	917	Allowed	29.46	0	0
J-N100	900.5	Allowed	39.42	0	0
SK-N440	965	Allowed	-1.52	243	19348.27
SK-N113	925.28	Allowed	4.42	0	0
SK-N112	924.87	Allowed	4.67	0	0
SK-N111	923.13	Allowed	5.94	0	0
SK-N110	922.67	Allowed	6.45	0	0
SK-N109	922.03	Allowed	7.16	0	0
SK-N108	921.75	Allowed	7.55	0	0
SK-N102	918	Allowed	9.79	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Skunk-Jones hydraulic nodes					
SK-N101	916	Allowed	11.58	0	0
SK-N201	920	Allowed	8.33	0	0
SK-N202	921.5	Allowed	8.04	0	0
SK-N203	923	Allowed	6.59	0	0
SK-N150	991	Allowed	4.93	0	0
SK-N149	996.02	Allowed	4.02	0	0
SK-N148	997.52	Allowed	3.35	0	0
SK-N134	953.1	Allowed	2.63	0	0
SK-N133	953	Allowed	2.73	0	0
SK-N132	950.58	Allowed	1.68	0	0
SK-N131	949.39	Allowed	2.82	0	0
SK-N107	920.75	Allowed	7.96	0	0
SK-N104	918.34	Allowed	9.23	0	0
SK-N622	944	Allowed	3.16	0	0
SK-N621	943.5	Allowed	3.02	0	0
SK-N619	943	Allowed	2.82	0	0
SK-N620	943	Allowed	2.75	0	0
SK-N618	941	Allowed	2.4	0	0
SK-N617	941	Allowed	2.44	0	0
SK-N616	938	Allowed	2.71	0	0
SK-N615	938	Allowed	2.79	0	0
SK-N614	933	Allowed	1.71	0	0
SK-N613	933	Allowed	1.73	0	0
SK-N612	933	Allowed	1.99	0	0
SK-N611	933	Allowed	2.01	0	0
SK-N610	933	Allowed	2.27	0	0
SK-N609	933	Allowed	2.3	0	0
SK-N608	932	Allowed	1.89	0	0
SK-N607	932	Allowed	1.9	0	0
SK-N606	932	Allowed	2.08	0	0
SK-N605	932	Allowed	2.1	0	0
SK-N604	932	Allowed	2.57	0	0
SK-N603	932	Allowed	2.63	0	0
SK-N602	930.5	Allowed	2.25	0	0
SK-N601	929	Allowed	2.35	0	0
SK-N512	917.5	Allowed	4.84	0	0
SK-N524	923.299	Allowed	5.9	0	0
SK-N549	934	Allowed	2.38	0	0
SK-N158	1028	Allowed	2.27	0	0
SK-N155	1014.08	Allowed	1.04	0	0
SK-N154	1011.433	Allowed	2.89	0	0
SK-N541	900	Allowed	34.89	0	0
SK-N540	899.5	Allowed	35.91	0	0
SK-N520	895	Allowed	35.59	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Skunk-Jones hydraulic nodes					
SK-N510	887.5	Allowed	37.6	0	0
SK-N153	1008.737	Allowed	1.91	0	0
SK-N151	1003.342	Allowed	2.17	0	0
SK-N704	1072.32	Allowed	2.63	0	0
SK-N703	1072.388	Allowed	1.92	0	0
SK-N702	1070.873	Allowed	1.44	0	0
SK-N701	1070.82	Allowed	3.03	0	0
SK-N706	1073.12	Allowed	2.48	0	0
SK-N707	1073.02	Allowed	2.64	0	0
SK-N708	1073.5	Allowed	5.51	0	0
SK-N709	1074.72	Allowed	5.35	0	0
SK-N712	1074.7	Allowed	7.87	0	0
SK-N713	1075.45	Allowed	2.12	0	0
SK-N714	1076.53	Allowed	1.42	0	0
SK-N716	1075.38	Allowed	2.32	0	0
SK-N715	1074.41	Allowed	7.33	0	0
SK-N718	1069.64	Allowed	11.02	0	0
SK-N710	1076.55	Allowed	4.86	0	0
SK-N711	1075.6	Allowed	0.29	0	0
SK-N717	1065.9	Allowed	12.65	0	0
SK-N719	1065.9	Allowed	13.22	0	0
SK-N720	1076.45	Allowed	5.69	0	0
SK-N721	1076.36	Allowed	3.09	0	0
SK-N722	1076.95	Allowed	5.48	0	0
SK-N723	1077.38	Allowed	4.75	0	0
SK-N724	1078.63	Allowed	3.76	0	0
SK-N725	1078.74	Allowed	2.2	0	0
SK-N726	1077.62	Allowed	1.78	0	0
SK-N727.1	1078.2	Allowed	2.33	0	0
SK-N216	933.4	Allowed	0.77	0	0
SK-N210	925.46	Allowed	1.52	0	0
SK-N209	925.19	Allowed	2.75	0	0
SK-N437	955	Allowed	6.6	0	0
SK-N230	975.099	Allowed	2.35	0	0
SK-N527	931.9	Allowed	5.91	0	0
SK-N526	934.25	Allowed	3.51	0	0
SK-N523	927.55	Allowed	4.92	0	0
SK-N309	1002.05	Allowed	3.68	0	0
SK-N319	940	Allowed	-0.04	15.1	155.13
SK-N103	918	Allowed	9.31	0	0
SK-N106	919.4	Allowed	7.1	0	0
SK-N105	919.16	Allowed	7.21	0	0
SK-N217	933.6	Allowed	-0.92	56	8391.9
SK-N402	927	Allowed	4.69	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Skunk-Jones hydraulic nodes					
SK-N439	969.46	Allowed	6.17	0	0
SK-N100	887	Allowed	38.41	0	0
SK-N417	960	Allowed	5.14	0	0
SK-N554	957.5	Allowed	4.25	0	0
SK-N555	944.9	Allowed	12.46	0	0
SK-N553	936.75	Allowed	6.27	0	0
SK-N552	934.4	Allowed	8.36	0	0
SK-N438	964.44	Allowed	4.1	0	0
SK-N407	932.5	Allowed	3.19	0	0
SK-N405	932.4	Allowed	4.69	0	0
SK-N406	932.099	Allowed	4.2	0	0
SK-N404	930.5	Allowed	4.7	0	0
SK-N200	918	Allowed	9.97	0	0
SK-N804	1183.42	Allowed	1.4	0	0
SK-N803	1183	Allowed	3.6	0	0
SK-N801	1180.47	Allowed	1.63	0	0
SK-N705	1074.12	Allowed	2.23	0	0
SK-N806	1177	Allowed	1.98	0	0
SK-N805	1178	Allowed	3.13	0	0
SK-N802	1178.4	Allowed	1.07	0	0
R-N001	885	Allowed	36.95	0	0
R-N002	893	Allowed	37.07	0	0
R-N003	902	Allowed	43.54	0	0
SK-N504	924.5	Allowed	3.47	0	0
SK-N402.1	926.81	Allowed	5.21	0	0
SK-N317.1	933.65	Allowed	3.23	0	0
SK-N158.1	1047	None	1.01	0	0
SK-N727	1081.42	Allowed	2.7	0	0
Node296	1080.29	Allowed	2.28	0	0
Node297	1079.64	Allowed	2.61	0	0
Node298	1079.97	Allowed	2.55	0	0
Node299	1079.12	Allowed	3.07	0	0
Node300	1078.73	Allowed	2.72	0	0
Node301	1077.76	Allowed	1.92	0	0
Node303	1077.43	Allowed	1.75	0	0
Node304	1077.13	Allowed	2.3	0	0
Node305	1077.19	Allowed	2.28	0	0
Node306	1075.81	Allowed	2.41	0	0
Node307	1076.2	Allowed	2.91	0	0
Node307.1	1076.34	Allowed	3.07	0	0
Node309	1076.47	Allowed	1.91	0	0
Node310	1076.47	Allowed	1.91	0	0
Node311	1076.42	Allowed	1.9	0	0
Node312	1076.08	Allowed	2.59	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Skunk-Jones hydraulic nodes					
Node313	1075.88	Allowed	1.64	0	0
Node312.1	1075.96	Allowed	1.79	0	0
Node312.2	1076.06	Allowed	2.68	0	0
Node317	1076.3	Allowed	1.26	0	0
Node318	1076.29	Allowed	1.27	0	0
Node319	1076.13	Allowed	0.66	0	0
Node320	1076.01	Allowed	-0.08	16.3	474.07
SK-N710.1	1075.56	Allowed	5.32	0	0
Node322	1070.92	Allowed	3.6	0	0
Node323	1072.92	Allowed	1.72	0	0
Node324	1072.81	Allowed	1.53	0	0
Node325	1072.95	Allowed	3.43	0	0
Node326	1073.14	Allowed	1.45	0	0
Node325.1	1073.04	Allowed	2.41	0	0
Node328	1073.11	Allowed	2.32	0	0
Node329	1072.47	Allowed	1.27	0	0
Node330	1071	Allowed	0.44	0	0
Node331	1072.47	Allowed	1.28	0	0
Node334	1069.6	Allowed	4.72	0	0
SK-N701.1	1069.74	Allowed	4.53	0	0
SK-N701.2	1070.09	Allowed	4.07	0	0
SK-N701.3	1070.19	Allowed	4	0	0
Node338	1183.24	Allowed	5.57	0	0
Node339	1184.42	Allowed	2.89	0	0
Node340	1184.65	Allowed	2.05	0	0
Node341	1184.48	Allowed	1.93	0	0
Node342	1183.84	Allowed	1.65	0	0
Node343	1179	Allowed	2.7	0	0
Node344	1179.33	Allowed	1.12	0	0
Node345	1183.67	Allowed	1.17	0	0
Node347	1183.1	Allowed	1.94	0	0
Node349	1183.18	Allowed	1.59	0	0
Node350	1182.32	Allowed	-0.59	98.3	4674.37
Node351	1182.93	Allowed	0.5	0	0
Node351.1	1182.72	Allowed	0.68	0	0
Node354	1181.6	Allowed	-0.53	95.2	3585.66
Node356	1182.01	Allowed	-0.18	84.2	1082.27
Node357	1182.35	Allowed	0.16	0	0
Node358	1181.91	Allowed	0.94	0	0
Node359	1182.01	Allowed	-0.03	61.5	229.26
Node360	1182.39	Allowed	1.38	0	0
Node361	1182.36	Allowed	1.36	0	0
Node362	1182.32	Allowed	1.36	0	0
Node363	1182.5	Allowed	2.58	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Skunk-Jones hydraulic nodes					
Node364	1182.3	Allowed	2.45	0	0
Node365	1182.1	Allowed	2.58	0	0
Node367	1181.7	Allowed	2.45	0	0
Node368	1181.92	Allowed	0.86	0	0
Node369	1182.03	Allowed	1.48	0	0
Node370	1181.54	Allowed	0.92	0	0
Node371	1181.19	Allowed	3.45	0	0
Node372	1179.92	Allowed	1.34	0	0
Node373	1179.64	Allowed	1.06	0	0
Node374	1180.77	Allowed	2.03	0	0
Node375	1180.81	Allowed	2.26	0	0
Node376	1180.64	Allowed	1.21	0	0
Node379	1180.63	Allowed	1.95	0	0
Node380	1179.72	Allowed	2.09	0	0
Node381	1180.8	Allowed	1.42	0	0
Node382	1179.86	Allowed	2.24	0	0
Node383	1179.86	Allowed	2.26	0	0
Node384	1180.18	Allowed	2.59	0	0
Node385	1179.34	Allowed	2.43	0	0
Node386	1179.5	Allowed	2.59	0	0
G-N278	1178.84	Allowed	1.63	0	0
SK-N500.1	925.35	Allowed	2.01	0	0
SK-N415.1	939.85	Allowed	0.06	0	0
SK-N414.1	942.94	Allowed	4.52	0	0
SK-N439.1	966.73	Allowed	5.04	0	0
SK-N418.1	962.91	Allowed	3.84	0	0
SK-N419.1	969.37	Allowed	7.08	0	0
SK-N309.1	992.33	Allowed	3.66	0	0
SK-N324.1	945.85	Allowed	7.22	0	0
SK-N324.2	953.38	Allowed	9.33	0	0
SK-N321.1	997.83	Allowed	5.59	0	0
SK-N227.1	959.418	Allowed	3.65	0	0
SK-N167.1	1025.71	Allowed	3.79	0	0
SK-N157.1	997.47	Allowed	3.96	0	0
Node401	1076.97	Allowed	11.41	0	0
Node331.1	1072.36	Allowed	1.19	0	0
Node387.1	1090.2	Allowed	0.03	0	0
G-N143	1077.34	Allowed	-0.97	89.1	8752.82
Node406	1177	Allowed	7.36	0	0
Node406.1	1153.34	Allowed	6.15	0	0
Node406.2	1165.09	Allowed	6.6	0	0
Node406.3	1132.61	Allowed	4.7	0	0
SK-N805.1	1162.1	Allowed	-0.36	17	2410.91
SK-N805.4	1159.1	Allowed	2.33	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Skunk-Jones hydraulic nodes					
SK-N805.2	1154	Allowed	2	0	0
SK-N805.3	1150.4	Allowed	2.13	0	0
Node414	1136.9	Allowed	1.88	0	0
Node414.1	1135.9	Allowed	1.78	0	0
Node414.2	1136.18	Allowed	2	0	0
Node418	1136.1	Allowed	2	0	0
Node414.6	1125.2	Allowed	2.32	0	0
Node414.4	1121.2	Allowed	1.91	0	0
Node414.5	1118.3	Allowed	2.4	0	0
Node422	1113.82	Allowed	2.25	0	0
Node422.1	1110.18	Allowed	1.9	0	0
Node422.2	1081.98	Allowed	-0.34	108.1	2222.99
Node425	1134.8	Allowed	2.28	0	0
Node426	1111	Allowed	1.66	0	0
Node427	1111.4	Allowed	2.18	0	0
Node428	1106.4	Allowed	1.43	0	0
Node427.1	1109.83	Allowed	1.94	0	0
Node425.1	1125.2	Allowed	2.11	0	0
Node387.2	1091.2	Allowed	1.49	0	0
Node387.3	1099	Allowed	-0.15	12.9	856.57
Node387.4	1086.3	Allowed	-0.83	55	7067.24
Node387.3.	1083.8	Allowed	0.86	0	0
SK-N307.1	930.572	Allowed	2.73	0	0
SK-N318.1	938.32	Allowed	-0.34	124.7	2128.71
SK-N317.2	935.13	Allowed	2.61	0	0
SK-N218.1	934	Allowed	-0.58	47.3	4915.05
Node440	1069.45	Allowed	4.55	0	0
Node441	956.52	Allowed	2.91	0	0
Node442	956.37	Allowed	3.54	0	0
Node443	956.05	Allowed	4.31	0	0
Node444	954.97	Allowed	4.18	0	0
Node445	953.95	Allowed	3.79	0	0
Node446	952.45	Allowed	3.19	0	0
Node447	950.9	Allowed	2.07	0	0
Node448	944	Allowed	2.63	0	0
Node449	938.4	Allowed	1.08	0	0
Node450	937.8	Allowed	1.84	0	0
Node451	937.2	Allowed	6.45	0	0
Node452	937.2	Allowed	8.6	0	0
Node453	935.8	Allowed	1.33	0	0
Node455	933.8	Allowed	2.16	0	0
Node456	934.2	Allowed	1.81	0	0
G-Node319	1176.2	Allowed	5.38	0	0
G-Node320	1176.2	Allowed	5.34	0	0

Node Name	Invert Elevation (ft.)	Gound Elevation (ft.)	Freeboard (ft.)	Flood Duration (min.)	Flooded Volume (cf.)
Skunk-Jones hydraulic nodes					
GNode320.2	1178.77	Allowed	3.36	0	0
GNode320.1	1178.44	Allowed	3.26	0	0
G-Node322	1177.61	Allowed	3	0	0
G-Node325	1177.89	Allowed	3	0	0
G-Node326	1178.08	Allowed	2.5	0	0
GNode326.1	1175.82	Allowed	4.38	0	0
G-Node327	1174.66	Allowed	5.34	0	0
G-N279-1	1177.21	Allowed	2.69	0	0
Node468	1176.42	Allowed	2	0	0
G-N144	1074.55	Allowed	4.03	0	0
G-N144B	1073.5	Allowed	5.35	0	0
Node471	1062.985	Sealed	10.59	0	0
SK-N717.1	1065.34	Sealed	12.13	0	0
Node473	959.6	Allowed	5	0	0
Node474	957.2	Allowed	5	0	0
Node475	953.6	Allowed	5	0	0
Node476	950.7	Allowed	5	0	0
Node477	948.25	Allowed	4.21	0	0
Node478	951.5	Allowed	5	0	0
Node479	962.3	Allowed	5	0	0
Node480	950.3	Allowed	5	0	0
SK-N158.2	1043.5	None	0	36.1	0
Node324.1	1051	Allowed	2.67	0	0

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Skunk-Jones hydrologic nodes					
SK-N547	1	0.006	28.3%	5.413	161.5
SK-N546	1	0.010	22.9%	4.366	89.4
SK-N545	1	0.010	29.%	0.756	38.4
SK-N543	1	0.005	29.3%	6.628	151.6
SK-N542	1	0.009	22.%	6.192	142
SK-N551	1	0.012	21.8%	10.869	165.9
SK-N418	1	0.037	73.%	17.806	234.96
SK-N416	1	0.030	39.2%	61.808	654.96
SK-N415	1	0.014	67.3%	5.251	145.84
SK-N413	1	0.014	64.1%	30.427	440.4
SK-N412	1	0.034	63.%	3.317	83.36
SK-N410	1	0.017	63.5%	22.483	246.48
SK-N414	1	0.017	44.3%	7.467	276.24
SK-N430	1	0.009	53.8%	1.495	51.36
SK-N425	1	0.009	73.5%	2.273	50.16
SK-N420	1	0.008	69.9%	5.238	121.44
SK-N409	1	0.012	44.5%	35.819	227.2
SK-N503	1	0.003	68.9%	13.792	156.88
SK-N502	1	0.004	69.8%	6.583	115.28
SK-N528	1	0.004	44.5%	10.544	161.6
SK-N528	2	0.004	72.6%	17.301	467.49
SK-N529	1	0.006	24.2%	3.984	134.8
SK-N525	1	0.004	26.3%	1.478	64.5
SK-N522	1	0.007	25.8%	6.836	123
SK-N521	1	0.020	23.1%	1.236	49.9
SK-N423	1	0.009	41.%	3.113	95.6
SK-N424	1	0.012	54.5%	10.409	204.5
SK-N427	1	0.022	24.6%	13.21	189.9
SK-N310	1	0.043	23.8%	21.147	236.7
SK-N311	1	0.052	24.3%	5.172	115.75
SK-N312	1	0.044	21.5%	20.994	276.2
SK-N315	1	0.019	29.4%	15.447	237.4
SK-N320	1	0.060	25.9%	2.881	110.5
SK-N322	1	0.041	22.5%	30.946	278.1
SK-N323	1	0.032	22.1%	6.141	126.05
SK-N324	1	0.033	23.%	22.42	221.15
SK-N326	1	0.045	22.5%	20.355	214.85
SK-N328	1	0.087	21.2%	2.93	158.5
SK-N234	1	0.038	23.%	11.377	273.28
SK-N166	1	0.037	81.1%	1.907	152.9
SK-N161	1	0.041	69.9%	10.427	290.3
SK-N156	1	0.025	73.8%	4.422	229.5
SK-N152	1	0.025	75.9%	2.135	104

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Skunk-Jones hydrologic nodes					
SK-N173	1	0.041	89.9%	2.023	164.5
SK-N171	1	0.029	54.1%	13.678	384.3
SK-N168	1	0.044	42.4%	7.681	270.45
SK-N436	1	0.040	10.%	2.086	83.4
SK-N434	1	0.039	42.5%	9.02	226.8
SK-N433	1	0.018	40.5%	7.4	172.4
SK-N500	1	0.006	66.4%	14.41	205.2
SK-N401	1	0.003	66.3%	16.774	136.08
SK-N400	1	0.013	72.%	8.861	119.36
SK-N513	1	0.010	23.7%	4.145	196.2
SK-N513	2	0.003	47.7%	29.504	579.382
SK-N511	1	0.009	24.4%	2.528	104
SK-N307	1	0.008	62.2%	15.017	261.68
SK-N306	1	0.007	38.7%	7.906	13.4
SK-N317	1	0.024	52.5%	17.516	230.8
SK-N308	1	0.011	42.3%	15.906	132.72
SK-N318	1	0.031	38.6%	4.973	118.96
SK-N304	1	0.009	69.4%	8.844	196.96
SK-N305	1	0.011	46.3%	15.939	182.96
SK-N213	1	0.007	63.7%	10.846	179.44
SK-N213	2	0.004	81.8%	10.613	303.526
SK-N205	1	0.003	56.%	35.673	270.48
SK-N204	1	0.008	33.5%	11.646	155.2
SK-N600	1	0.011	65.8%	6.955	143.36
SK-N214	1	0.004	78.7%	6.051	115.28
SK-N229	1	0.026	28.%	13.76	206.08
SK-N227	1	0.035	27.%	9.775	214.48
SK-N226	1	0.014	37.%	5.997	131.6
SK-N431	1	0.016	18.9%	3.477	128.8
SK-N221	1	0.017	37.%	26.285	281.4
SK-N232	1	0.044	30.%	8.532	231.28
SK-N223	1	0.028	43.%	27.528	197.68
SK-N219	1	0.015	37.%	11.943	135.016
SK-N218	1	0.013	38.%	3.213	105
SK-N215	1	0.004	57.4%	9.725	36.96
SK-N163	1	0.018	79.8%	5.839	225
SK-N170	1	0.034	81.1%	8.952	260.6
SK-N172	1	0.026	85.4%	3.07	159.05
SK-N147	1	0.025	79.2%	5.872	50
SK-N146	1	0.022	55.5%	21.937	210
SK-N146	2	0.015	78.7%	2.806	220.741
SK-N145	1	0.022	58.9%	35.279	235
SK-N141	1	0.016	64.9%	17.595	200
SK-N140	1	0.023	76.7%	6.78	171.8

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Skunk-Jones hydrologic nodes					
SK-N137	1	0.019	51.7%	4.107	163.36
SK-N128	1	0.008	63.5%	6.482	133.92
SK-N127	1	0.008	65.5%	3.573	103.12
SK-N125	1	0.014	55.2%	21.159	257.6
SK-N122	1	0.008	60.3%	9.033	255.52
SK-N120	1	0.007	51.%	11.597	173.68
SK-N119	1	0.007	59.2%	10.834	257.12
SK-N114	1	0.005	46.6%	11.987	170.6
J-N110	1	0.122	3.1%	2053.244	2550.9
J-N110	2	0.117	3.1%	2674.171	5756.601
J-N109	1	0.093	25.1%	318.784	639.6
J-N105	1	0.023	29.5%	13.246	137.2
J-N104	1	0.039	14.8%	45.616	282.9
J-N102	1	0.027	49.9%	32.721	294.3
J-N100	1	0.044	22.8%	22.133	467
SK-N440	1	0.008	65.6%	25.098	297.52
SK-N110	1	0.006	35.4%	20.344	329.2
SK-N102	1	0.009	25.9%	8.889	143.8
SK-N203	1	0.013	41.%	2.536	116.8
SK-N150	1	0.020	76.4%	13.8	129.95
SK-N132	1	0.022	57.6%	32.341	309.44
SK-N131	1	0.023	43.3%	28.617	228.56
SK-N131	2	0.035	27.%	27.59	306.4
SK-N622	1	0.007	43.7%	4.003	122.5
SK-N621	1	0.013	5.6%	6.905	66.25
SK-N620	1	0.014	41.%	15.031	240.8
SK-N618	1	0.002	32.1%	5.539	139.3
SK-N617	1	0.005	31.8%	0.903	40.7
SK-N616	1	0.006	46.8%	1.506	33.4
SK-N614	1	0.006	24.8%	5.331	205.4
SK-N612	1	0.006	27.5%	1.328	54.2
SK-N610	1	0.006	27.5%	0.792	54.2
SK-N608	1	0.006	4.1%	1.987	75.9
SK-N606	1	0.005	26.%	0.44	27.5
SK-N604	1	0.006	27.%	0.51	26.95
SK-N602	1	0.007	63.7%	13.83	422.24
SK-N601	1	0.004	61.3%	1.268	42.4
SK-N524	1	0.007	23.7%	4.866	128.2
SK-N549	1	0.011	43.1%	6.669	235.8
SK-N158	1	0.035	28.8%	8.605	200
SK-N155	1	0.029	49.9%	22.14	331.95
SK-N540	1	0.008	24.6%	59.587	326.2
SK-N520	1	0.023	21.9%	21.656	503.4
SK-N510	1	0.116	51.4%	1.7	104.4

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Skunk-Jones hydrologic nodes					
SK-N151	1	0.019	58.%	7.667	214.75
SK-N702	1	0.068	31.3%	24.26	1037.2
SK-N708	1	0.034	34.%	20.054	231.28
SK-N709	1	0.030	32.%	45.626	340.48
SK-N715	1	0.029	37.%	1.249	218
SK-N717	1	0.127	25.%	11.291	487.5
SK-N719	1	0.297	8.8%	54.462	695.9
SK-N721	1	0.198	35.1%	16.826	157.2
SK-N723	1	0.330	3.%	66.645	509.7
SK-N725	1	0.260	24.1%	16.696	222.8
SK-N210	1	0.011	70.3%	2.395	65.4
SK-N437	1	0.020	34.8%	10.341	105.92
SK-N230	1	0.038	27.%	42.684	365.68
SK-N527	1	0.004	34.2%	37.749	427
SK-N526	1	0.016	43.%	0.834	81.2
SK-N523	1	0.006	27.4%	10.441	180.9
SK-N309	1	0.031	25.6%	9.963	154.75
SK-N319	1	0.048	51.2%	5.28	218.4
SK-N103	1	0.003	28.6%	11.031	194.4
SK-N217	1	0.011	37.4%	2.373	63.28
SK-N402	1	0.004	59.9%	8.808	125.68
SK-N439	1	0.082	58.2%	13.249	179.76
SK-N100	1	0.031	32.8%	7.514	135.2
SK-N100	2	0.041	29.6%	6.014	245.242
SK-N417	1	0.038	63.7%	7.01	138.56
SK-N554	1	0.017	24.5%	30.829	214.4
SK-N555	1	0.007	33.2%	7.629	156.96
SK-N553	1	0.027	21.7%	9.788	164.48
SK-N407	1	0.005	7.8%	1.373	50
SK-N404	1	0.009	31.%	5.971	153.44
SK-N200	1	0.016	27.2%	2.338	59.05
SK-N804	1	0.344	13.%	44.976	805
SK-N803	1	0.367	5.%	51.492	698
SK-N801	1	0.226	13.3%	167.603	2267.2
SK-N802	1	0.121	17.6%	7.99	302.5
R-N001	1	0.044	26.2%	7.711	180.9
R-N002	1	0.011	23.%	64.485	329
R-N003	1	0.075	33.%	217.115	687.2
SK-N504	1	0.004	46.9%	6.41	126.4
SK-N727	1	0.220	9.3%	120.313	463.2
Node318	1	0.050	37.%	18.886	382.5
Node324	1	0.026	24.8%	27.336	405.8
Node354	1	0.226	13.3%	82.867	2267.2
G-N278	1	0.190	33.8%	35.978	1661.98

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Skunk-Jones hydrologic nodes					
G-N143	1	0.080	36.8%	16.755	1419.18
Node406	1	0.076	35.%	8.068	194
Node451	1	0.008	62.2%	15.976	261.68

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Skunk-Jones hydrologic nodes					
G-N002	1	0.003	24.8%	9.983	280.543
G-N006	1	0.003	31.%	22.583	380.375
G-N007	1	0.004	32.%	2.772	138.278
G-N034	1	0.007	16.3%	17.877	347.293
G-N014	1	0.004	49.6%	1.676	87.525
G-N013	1	0.005	33.7%	6.253	259.641
G-N011	1	0.005	27.8%	5.83	241.417
G-N015	1	0.005	24.9%	8.659	294.134
G-N016	1	0.001	25.5%	30.364	494.675
G-N018	1	0.010	31.1%	44.735	622.158
G-N030	1	0.006	21.6%	12.507	288.949
G-N029	1	0.005	39.2%	15.518	335.223
G-N023	1	0.008	14.%	8.836	205.054
G-N053	1	0.010	32.6%	19.057	427.669
G-N052	1	0.010	35.6%	8.634	264.699
G-N051	1	0.004	35.3%	22.2	412.828
G-N042	1	0.040	37.7%	15.454	171.36
G-N041	1	0.020	67.6%	11.475	127.466
G-N067	1	0.007	51.3%	14.79	318.572
G-N066	1	0.004	33.6%	19.361	307.87
G-N065	1	0.005	34.1%	20.507	330.565
G-N064	1	0.007	37.3%	30.361	508.47
G-N061	1	0.010	33.5%	10.227	435.795
G-N075	1	0.006	42.7%	7.016	210.358
G-N072	1	0.006	43.%	6.925	227.851
G-N070	1	0.010	44.3%	9.407	301.504
G-N091	1	0.004	82.9%	10.992	573.53
G-N097	1	0.020	85.%	3.141	271.605
G-N090	1	0.002	92.%	5.418	534.69
G-N082	1	0.017	85.%	19.38	828.63
G-N079	1	0.016	87.%	11.111	1078.98
G-N089	1	0.021	95.%	13.182	680.07
G-N077	1	0.020	88.7%	6.057	602.58
G-N087	1	0.023	84.4%	8.507	487.875
G-N093	1	0.029	90.%	5.945	469.41
G-N094	1	0.017	95.%	10.714	705.39
G-N095	1	0.029	97.%	3.676	406.875
G-N096	1	0.022	92.%	6.957	680.775
G-N101	1	0.017	85.%	5.39	547.62
G-N109	1	0.008	60.9%	5.251	262.51
G-N106	1	0.006	75.%	9.223	100
G-N105	1	0.004	80.%	4.696	50

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Skunk-Jones hydrologic nodes					
G-N104	1	0.005	72.2%	5.093	388.97
G-N107	1	0.019	85.%	2.877	289.725
G-N127	1	0.006	44.3%	2.391	160.217
G-N129	1	0.010	51.5%	6.774	233.308
G-N130	1	0.010	48.3%	23.171	513.553
G-N138	1	0.010	32.4%	7.464	235.969
G-N135	1	0.030	37.%	4.761	207.953
G-N148	1	0.070	85.7%	8.488	725.5
G-N153	1	0.030	97.1%	8.656	1000
G-N145	1	0.040	81.7%	25.54	751.14
G-N149	1	0.030	85.7%	12.15	1050.7
G-N150	1	0.020	97.%	2.483	352.26
G-N152	1	0.030	88.7%	5.903	493.9
G-N158	1	0.030	86.%	9.116	279.88
G-N167	1	0.040	71.7%	28.102	786.85
G-N199	1	0.050	33.4%	7.928	357.91
G-N200	1	0.040	33.4%	6.057	233.759
G-N181	1	0.030	35.1%	6.648	354.076
G-N179	1	0.030	34.2%	6.749	302.821
G-N177	1	0.020	39.5%	3.418	205.896
G-N191	1	0.030	34.8%	6.567	298.002
G-N176	1	0.140	32.8%	6.858	209.083
G-N172	1	0.180	24.8%	3.573	282.192
G-N170	1	0.080	16.4%	7.292	299.744
G-N174	1	0.150	26.1%	5.794	252.212
G-N190	1	0.180	16.%	42.331	497.233
G-N001	1	0.010	53.4%	13.144	255.799
G-N035	1	0.020	23.4%	18.692	315.41
G-N056	1	0.020	28.%	11.32	248.931
G-N069	1	0.020	40.9%	4.639	197.974
G-N057	1	0.010	58.5%	7.204	241.026
G-N086	1	0.006	73.%	18.709	547.51
G-N100	1	0.005	78.1%	16.867	729.35
G-N112	1	0.030	53.%	17.885	977.12
G-N245	1	0.010	32.8%	44.297	446.046
G-N126	1	0.030	34.5%	57.833	665.584
G-N234	1	0.020	32.%	20.81	282.515
G-N141	1	0.020	52.4%	18.787	374.221
G-N156	1	0.030	60.5%	7.115	210.579
G-N169-2	1	0.010	35.9%	3.13	232.815
G-N008	1	0.004	22.%	2.801	200.218
G-N036	1	0.006	30.%	7.269	171.122
G-N037	1	0.002	37.5%	8.259	333.75

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Skunk-Jones hydrologic nodes					
G-N059	1	0.020	35.7%	27.583	434.222
G-N203	1	0.020	55.2%	44.304	546.839
G-N224	1	0.030	56.6%	31.018	494.122
G-N225	1	0.020	53.4%	7.125	196.214
G-N229	1	0.030	23.6%	4.337	209.262
G-N232	1	0.020	35.4%	7.692	235.144
G-N233	1	0.040	30.3%	11.669	285.039
G-N236	1	0.030	28.9%	31.778	430.746
G-N237	1	0.020	34.1%	25.773	388.612
G-N240	1	0.020	35.%	11.38	266.773
G-N250	1	0.050	49.3%	28.158	383.92
G-N256	1	0.030	46.9%	29.909	517.285
G-N257	1	0.010	59.6%	5.187	247.962
G-N261	1	0.007	46.9%	9.833	282.251
G-N264	1	0.006	53.%	14.416	259.769
G-N267	1	0.009	37.4%	7.603	229.432
G-N076	1	0.007	43.6%	10.195	220.524
G-N271	1	0.006	44.7%	12.969	266.169
G-N274	1	0.010	43.3%	8.967	244.477
G-N275	1	0.006	41.4%	13.782	211.599
G-N277	1	0.020	32.6%	25.171	472.685
G-N125	1	0.020	24.8%	25.098	425.051
G-N216	1	0.190	8.9%	527.118	2965.96
G-N197	1	0.080	26.1%	3.278	213.172
G-N187	1	0.080	29.4%	7.004	225.692
G-N192	1	0.040	30.%	3.74	225.82
G-N183	1	0.020	60.7%	7.106	266.977
G-N025	1	0.020	35.7%	27.169	435.285
G-N157	1	0.040	84.8%	9.738	559.32
G-N212	1	0.150	15.2%	28.854	356.405
G-N213	1	0.030	30.5%	1.252	100.504
G-N210	1	0.020	48.9%	5.925	242.327
G-N208	1	0.110	17.8%	199.733	1506.9
G-N214	1	0.040	29.5%	2.814	173.604
G-N055	1	0.003	38.2%	11.202	326.128
G-N046	1	0.010	32.8%	24.819	515.823
G-N039	1	0.020	43.3%	6.015	121.678
G-N108	1	0.003	65.2%	8.21	352.8
G-N184	1	0.100	14.2%	9.891	222.462
G-N204	1	0.060	67.8%	17.796	276.403
G-N137	1	0.190	18.3%	17.538	468.461
G-N280	1	0.220	7.6%	159.03	2051.12
G-N281	1	0.070	10.7%	27.605	283.203

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Skunk-Jones hydrologic nodes					
G-N279-2	1	0.240	18.2%	191.889	1396.48
G-N169-1	1	0.040	35.1%	19.362	467.687
G-N182	1	0.020	37.6%	20.756	391.935
G-N133	1	0.150	13.9%	36.942	579.165
Node402	1	0.190	8.9%	122.173	2965.96
Node417	1	0.190	8.9%	59.258	2521.066
Node422	1	0.190	8.9%	90.475	2521.066
G-N215-2	1	0.040	36.%	7.803	246.072
G-N215-1	1	0.160	11.3%	72.495	605.081
G-N198	1	0.080	14.3%	18.898	288.55
G-N154.1	1	0.010	86.5%	42.437	1200
G76	1	0.086	5.%	64.47	212.5
G60	1	0.133	5.%	27.859	198.263
G58 G75	1	0.130	12.%	26.702	588.625
G61	1	0.150	25.%	14.523	1168.75
G73	1	0.134	10.%	19.76	318.75
G28 G59	1	0.044	20.%	25.545	350.965
Node613	1	0.250	25.%	96.328	1780.84
HILLSIDE1	1	0.010	33.5%	4.679	512.7
Node391.2	1	0.200	10.6%	574.411	3093.87
G-N014	2	0.003	53.4%	27.675	1117.266
G-N066	2	0.004	21.2%	6.309	382.755
G-N097	2	0.006	95.%	12.832	412.245
G-N077	2	0.006	87.%	2.043	407.64
G-N056	2	0.010	40.1%	19.758	285.719
G-N141	2	0.130	55.3%	4.94	31.612
G-N008	2	0.004	41.3%	7.578	253.19
G-N240	2	0.040	56.3%	17.024	262.514
G-N256	2	0.009	68.3%	11.06	349.869
G-N277	2	0.020	48.3%	7.832	253.742
G-N204	2	0.190	8.9%	53.249	2521.066
G-N281	2	0.120	7.5%	324.528	1611.396
G-N133	2	0.180	43.4%	34.974	279.055
G58 G75	2	0.110	35.%	9.142	211.438
G28 G59	2	0.038	20.%	15.62	217.711

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Skunk-Jones hydrologic nodes					
SA-N070	1	0.006	50.3%	23.111	1200
SA-N122	1	0.005	55.9%	15.832	950
SA-N144	1	0.010	39.9%	17.262	1500
SA-N131	1	0.013	58.7%	2.594	362.7
SA-N134	1	0.005	65.8%	10.395	400
SA-N145	1	0.007	69.4%	5.984	800
SA-N007	1	0.005	53.2%	12.169	558.8
SA-N003	1	0.014	37.7%	115.224	3309.9
SA-N069	1	0.006	85.8%	27.679	636.225
SA-N057	1	0.006	62.3%	36.638	1100
SA-N005	1	0.021	41.%	57.499	2094.7
SA-N102	1	0.030	39.3%	36.163	2000
SA-N159	1	0.006	67.5%	5.238	750
SA-N147	1	0.010	46.7%	84.366	2500
SA-N068	1	0.010	98.9%	1.438	145.484
SA-N084	1	0.004	53.2%	4.319	350
SA-N168	1	0.009	63.4%	2.841	380
SA-N137	1	0.010	58.5%	6.304	700
SA-N121	1	0.004	48.2%	3.516	1180
SA-N133	1	0.011	43.9%	7.881	1400
SA-N135	1	0.012	60.9%	4.163	550
SA-N113	1	0.004	54.9%	1.985	600
SA-N139	1	0.007	35.6%	19.046	1100
SA-N160	1	0.004	50.%	12.901	1600
SA-N128	1	0.005	64.%	2.47	450
SA-N129	1	0.006	72.9%	1.982	250.7
SA-N130	1	0.005	84.5%	7.528	697.3
SA-N124	1	0.005	51.%	23.911	1300
SA-N083	1	0.016	52.5%	6.243	305.8
SA-N078	1	0.015	54.4%	6.188	1000
SA-N081	1	0.007	50.%	14.31	700
SA-N115	1	0.018	54.1%	1.925	300
SA-N117	1	0.006	60.7%	3.056	550
SA-N118	1	0.008	44.7%	10.75	1200
SA-N119	1	0.019	52.4%	1.704	300
SA-N100	1	0.013	44.8%	8.44	800
SA-N085	1	0.011	71.%	19.794	393.8
SA-N091	1	0.005	52.%	16.755	1500
SA-N093	1	0.007	50.2%	16.485	1500
SA-N097	1	0.017	49.%	2.546	400
SA-N098	1	0.009	43.3%	8.617	1500
SA-N110	1	0.009	56.7%	7.386	1300

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Skunk-Jones hydrologic nodes					
SA-N074	1	0.013	63.4%	3.729	382.371
SA-N075	1	0.009	70.3%	3.888	298.691
SA-N077	1	0.005	69.6%	3.729	272.198
SA-N056	1	0.011	46.9%	18.555	1000
SA-N065	1	0.007	62.4%	27.516	778
SA-N050	1	0.015	58.%	17.858	391
SA-N053	1	0.010	48.%	2.233	1500
SA-N055	1	0.011	57.4%	13.155	1500
SA-N049	1	0.006	87.8%	7.61	431.4
SA-N023	1	0.006	69.3%	1.874	120.989
SA-N038	1	0.013	68.5%	3.194	197.547
SA-N047	1	0.041	73.1%	2.961	122.261
SA-N040	1	0.100	61.5%	1.881	192.353
SA-N041	1	0.027	64.%	3.17	247.28
SA-N044	1	0.086	64.1%	3.438	242.296
SA-N149	1	0.005	54.4%	2.19	850
SA-N142	1	0.006	62.9%	20.648	800
SA-N125	1	0.009	56.3%	4.343	800
SA-N126	1	0.012	44.5%	10.805	1039.6
SA-N114	1	0.017	53.%	4.627	800
SA-N018	1	0.020	55.7%	49.005	1000
SA-N006	1	0.005	54.2%	9.199	1829.9
SA-N153	1	0.016	52.%	1.755	353.34
SA-N155	1	0.007	39.%	4.913	1500
SA-N143	1	0.005	55.%	12.999	570.7
SA-N151	1	0.008	23.6%	12.39	700
SA-N012	1	0.010	42.2%	13.498	785.7
SA-N046	1	0.048	64.%	6.091	348.333
SA-N087	1	0.009	28.4%	10.08	589.5
SA-N103	1	0.030	44.6%	131.195	2500
SA-N071	1	0.008	62.7%	10.448	350
SA-N039	1	0.044	54.5%	1.83	123.322
SA-N001	1	0.062	29.5%	732.317	4498.9
SA-N017	1	0.043	28.6%	299.684	3058.9
SA-N054	1	0.007	55.1%	32.979	1200
SA-N067	1	0.061	39.%	7.983	500
SA-N082	1	0.067	27.9%	2.599	338.5
SA-N073	1	0.007	47.8%	2.441	1000
SA-N167	1	0.007	39.%	12.211	2000
SA-N107	1	0.014	40.9%	149.687	2500.5
R-N001	1	0.007	51.1%	17.553	851.1
R-N007	1	0.010	14.%	44.823	1003.1
R-N008	1	0.010	23.4%	41.978	1113.8

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Skunk-Jones hydrologic nodes					
SA-N166	1	0.005	62.%	12.872	538.2
SA-N172	1	0.014	47.8%	1.541	1500
SA-N170	1	0.010	50.3%	1.34	500
SA-N162	1	0.019	51.7%	1.265	252.5
SA-N157	1	0.011	56.4%	4.253	700
SA-N156	1	0.015	52.2%	1.708	381.34
SA-N164	1	0.011	58.4%	2.559	400
SA-N163	1	0.005	64.5%	5.796	234.3
SA999	1	0.036	98.%	14.263	2196.038
Node208	1	0.022	42.1%	66.225	923.694
Node295	1	0.021	62.%	18.869	1100
Node306	1	0.005	45.2%	34.788	1138.4
Node376	1	0.015	54.8%	110.11	1693.5
Node361	1	0.007	47.%	21.922	1500
Node371	1	0.006	55.%	14.446	1134.6
Node372	1	0.006	55.%	14.044	1134.6
SA-N029	2	0.015	54.8%	37.952	1693.5
SA-N121	2	0.006	62.4%	18.203	1134.6
SA-N091	2	0.005	48.3%	8.227	1600
SA-N077	2	0.009	43.8%	5.683	312.545
SA-N056	2	0.003	60.5%	35.163	1500
SA-N018	2	0.001	29.%	436.784	500
SA-N012	2	0.005	42.9%	77.635	1470.5
SA-N039	2	0.027	53.%	1.351	623.501
SA-N017	2	0.064	15.%	450.477	4247.3
SA-N067	2	0.022	58.5%	23.795	1800
Node292	2	0.014	38.7%	30.404	1197.4
Node293	2	0.002	49.8%	30.622	1193.5
SA-N056	3	0.010	49.3%	1.813	700
SA-N012	3	0.085	55.%	130.149	1470.5
SA-N017	3	0.064	15.%	319.644	4247.3
SA-N056	4	0.011	59.9%	7.519	1000.7
SA-N056	5	0.015	64.4%	4.585	450

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Allen-Fruitdale hydrologic nodes					
F-N016	1	0.013	57.%	0.38	128
A-N314	1	0.011	67.%	0.651	488
F-N014	1	0.014	11.5%	0.824	234
A-N058	1	0.018	55.%	1.001	232
A-N244	1	0.011	95.%	1.211	238
A-N342	1	0.099	100.%	1.242	884
Node647	1	0.040	75.%	1.246	1143
A-N030	1	0.124	69.%	1.492	254
A-N298	1	0.021	94.4%	1.586	1232
A-N402	1	0.034	88.%	1.638	600
A-N272	1	0.035	97.3%	1.667	844
A-N440	1	0.101	69.3%	1.692	200.6
A-N418	1	0.063	38.%	1.791	600
F-N036	1	0.030	80.2%	1.86	378
F-N124	1	0.022	37.4%	1.98	117.5
A-N012	1	0.023	100.%	2.1	354
F-N034	1	0.038	59.%	2.144	412
A-N312	1	0.017	39.%	2.156	600
F-N824	1	0.110	69.7%	2.159	178
A-N034	1	0.032	74.5%	2.19	406
A-N416	1	0.205	83.%	2.193	600
A-N256	1	0.019	95.%	2.242	308
A-N084	1	0.029	75.7%	2.312	536
Node633.1	1	0.007	89.%	2.636	1100
A-N086	1	0.022	81.9%	2.818	254
A-N098	1	0.032	57.8%	2.849	412
F-N202	1	0.016	49.7%	3.079	92.5
A-N454	1	0.130	70.4%	3.148	432
A-N294	1	0.020	78.%	3.286	1542
A-N915	1	0.064	54.7%	3.586	842
A-N264	1	0.040	75.%	4.045	510
A-N338	1	0.022	71.%	4.107	600
A-N412	1	0.117	38.%	4.452	600
F-N818	1	0.031	66.3%	4.479	598
A-N326	1	0.024	76.%	4.517	400
A-N308	1	0.023	37.%	4.552	532
Node350	1	0.047	72.%	4.588	886
F-N208	1	0.008	51.8%	4.601	155
A-N456	1	0.159	66.9%	4.663	328
A-N268	1	0.040	75.%	4.71	1143
A-N066	1	0.026	59.9%	4.876	325.9
F-N104	1	0.005	85.6%	5.024	334.2

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Allen-Fruitdale hydrologic nodes					
F-N804	1	0.059	73.%	5.151	1248
A-N334	1	0.011	93.%	5.257	600
A-N028	1	0.091	65.7%	5.289	658
A-N404	1	0.059	84.%	5.32	632
A-N300	1	0.015	67.8%	5.627	503
A-N234	1	0.011	88.6%	5.809	680
A-N122	1	0.081	78.%	6.199	546
Node633	1	0.005	89.%	6.213	1200
A-N219	1	0.030	82.3%	6.231	884
A-N044	1	0.224	9.1%	6.45	586
F-N138	1	0.052	41.%	6.625	820
F-N030	1	0.015	60.8%	6.72	860
A-N054	1	0.029	64.8%	6.825	652
A-N344	1	0.390	56.%	6.858	700
A-N038	1	0.053	50.9%	6.887	1008
F-N212	1	0.004	50.%	7.016	190.5
F-N018	1	0.006	61.%	7.077	584
A-N124	1	0.085	78.%	7.161	813
A-N288	1	0.021	94.4%	7.161	1232
A-N008	1	0.031	45.4%	7.275	480.4
A-N290	1	0.040	93.5%	7.43	856
A-N320	1	0.022	100.%	7.591	600
A-N926	1	0.131	83.%	7.749	994
F-N932	1	0.238	46.%	7.855	1200
A-N324	1	0.011	68.%	8.885	600
A-N010	1	0.040	95.%	8.952	776
F-N812	1	0.110	54.9%	8.967	952.4
F-N822	1	0.110	25.%	8.978	458
A-N240	1	0.030	98.%	9.039	400
F-N602	1	0.035	73.%	9.184	1254.4
F-N210	1	0.004	90.9%	9.348	188.5
A-N308.1	1	0.190	38.%	10.082	600
A-N090	1	0.017	90.5%	10.091	702
F-N502	1	0.027	61.%	10.2	1240
R-N110	1	0.053	71.3%	10.253	688
F-N136	1	0.014	32.4%	10.326	224
A-N276.1	1	0.040	75.%	10.375	1143
F-N204	1	0.009	28.8%	10.403	240
A-N328	1	0.027	32.%	10.699	600
A-N022	1	0.099	42.5%	10.894	948
F-N132	1	0.016	28.8%	11.529	208.5
A-N108-2	1	0.050	23.9%	11.833	800.6
F-N032	1	0.016	53.9%	12.13	886

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Allen-Fruitdale hydrologic nodes					
A-N228	1	0.027	73.5%	12.147	1136
A-N938	1	0.003	77.2%	12.203	900
F-N708	1	0.048	74.%	12.288	1200
A-N304	1	0.020	52.2%	12.369	1200
F-N606	1	0.044	83.%	12.516	898
A-N928	1	0.224	32.%	13.066	1244
A-N446	1	0.181	11.4%	13.497	349
A-N914	1	0.067	52.2%	13.685	584
A-N270	1	0.113	78.%	14.07	1100
F-N010	1	0.010	44.6%	14.546	1128
F-N118	1	0.013	33.4%	14.559	211
A-N074	1	0.039	71.7%	14.844	862
A-N250	1	0.031	83.%	15.073	390
A-N076	1	0.047	71.1%	15.315	1200
F-N404	1	0.188	49.%	15.474	1200
A-N024-1	1	0.026	68.3%	15.568	890.4
R-N108	1	0.054	44.7%	15.993	767
F-N008	1	0.025	41.4%	16.293	601
A-N006	1	0.010	64.%	16.663	1200
R-N122	1	0.040	86.%	16.855	1200
F-N712	1	0.038	74.%	16.935	1200
A-N274	1	0.020	98.5%	18.013	1590
Node540	1	0.138	28.4%	18.211	7640.5
A-N052	1	0.022	52.2%	18.329	1081.8
A-N408	1	0.088	65.%	18.66	600
Node355	1	0.050	59.%	18.776	1200
R-N104	1	0.066	32.6%	19.762	1200
A-N282	1	0.023	75.%	20.973	1362
F-N002	1	0.029	54.7%	20.976	114
R-N128	1	0.039	50.8%	21.329	932
A-N452	1	0.117	14.4%	21.679	1183.6
A-N108-2.1	1	0.085	78.%	22.56	813
A-N450	1	0.138	28.4%	24.927	7640.5
A-N262	1	0.017	78.%	24.964	1200
A-N434	1	0.026	83.%	25.357	636
F-N106	1	0.006	58.9%	26.038	591
A-N306.1	1	0.009	86.%	26.824	1135
A-N100	1	0.019	30.8%	27.345	764.3
F-N116	1	0.013	30.5%	27.482	364
R-N120	1	0.027	73.5%	28.326	1136
F-N604	1	0.067	65.%	29.159	1200
A-N912	1	0.129	27.8%	31.227	1134
A-N310	1	0.013	85.5%	34.489	1057

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Allen-Fruitdale hydrologic nodes					
Node640	1	0.025	40.3%	37.019	1200
F-N402	1	0.040	67.%	38.611	1200
A-N024-2	1	0.014	51.6%	40.275	1200
Node472	1	0.100	28.8%	44.36	2345
F-N038-1	1	0.023	37.5%	46.221	614.2
A-N118	1	0.072	26.7%	46.656	687.8
R-N158	1	0.026	67.9%	46.991	1200
A-N204	1	0.014	85.%	47.884	1200
A-N050	1	0.020	29.8%	47.92	1200
R-N116	1	0.027	54.1%	51.14	1670
A-N064	1	0.027	52.9%	51.415	1200
F-N038-2	1	0.310	34.6%	53.434	1200
F-N816	1	0.111	37.6%	55.39	1200
F-N112	1	0.004	35.7%	60.708	417.5
A-N460	1	0.081	6.8%	71.354	1200
R-N132	1	0.049	56.8%	81.021	4275
F-N918	1	0.100	28.8%	86.204	2345
R-N162	1	0.039	53.4%	99.162	1200
Node488.1	1	0.100	28.8%	110.725	2345
A-N108-1	1	0.126	26.4%	113.969	1412
F-N920.1	1	0.123	10.1%	122.776	5779.1
Node301.1	1	0.123	10.1%	145.014	5779.1
Node318	1	0.254	4.3%	152.841	1398
A-N910	1	0.081	13.7%	202.496	1294
F-N058.1	1	0.072	30.5%	227.26	1601.9
Node308	1	0.123	10.1%	234.014	5779.1
F-N920	1	0.123	2.%	238.233	5779.1
Node505.1	1	0.004	24.1%	310.439	2147
F-N082	1	0.042	17.4%	535.137	5115
A-N114	1	0.063	22.%	603.044	3466.6
A-N132	1	0.087	21.4%	706.438	3976
F-N058.2.1	1	0.123	10.1%	1177.043	5779.1
A-N450	2	0.079	61.9%	0.773	409.6
F-N104	2	0.006	83.7%	0.97	86
Node633	2	0.022	90.%	1.847	600
A-N460	2	0.059	79.8%	3.308	381
A-N270	2	0.113	78.%	3.573	1100
A-N100	2	0.026	60.3%	3.677	212.1
A-N452	2	0.075	72.3%	3.838	499.6
F-N812	2	0.076	60.7%	3.953	337.6
A-N300	2	0.004	61.3%	5.531	972.6
A-N344	2	0.160	86.%	5.787	800
A-N404	2	0.116	79.%	6.469	458.8

Name	Subcatchment	Slope	Impervious Percentage %	Area (acres)	Width (ft)
Allen-Fruitdale hydrologic nodes					
A-N264	2	0.020	78.%	7.383	1542
A-N114	2	0.026	16.3%	7.642	504
A-N402	2	0.079	83.%	7.669	800
F-N602	2	0.023	66.%	7.863	1200
A-N054	2	0.029	64.8%	9.347	652
A-N064	2	0.017	50.6%	13.567	941.4
A-N066	2	0.060	26.9%	13.568	1074.8
A-N050	2	0.03	56.8%	14.305	436.4
A-N052	2	0.039	39.8%	20.114	1105.4
A-N132	2	0.117	14.4%	20.84	1183.6
A-N008	2	0.016	55.4%	36.082	1200
F-N138	2	0.028	71.%	41.684	1200
A-N440	2	0.125	12.3%	66.788	1085.9
F-N920	2	0.123	2.%	111.559	5779.1
A-N124	2	0.081	8.6%	148.035	546
F-N082	2	0.177	16.%	1385.835	3991.4
A-N344	3	0.099	76.%	6.873	600
A-N132	3	0.113	39.6%	9.641	536
A-N132		0	.%		

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Allen-Fruitdale Links																			
A-N124L	A-N124	A-N122	Circular	1.75	0	0	1	0	0	0	0.75	1042.053	1036.899	1047.953	1040.499	688.29	0.013	13.71	17.268
A-N122L	A-N122	A-N120	Circular	1.75	0	0	1	0	0	0	-0.04	1036.899	1036.97	1040.499	1042.188	161.819	0.013	3.32	20.508
A-N120L	A-N120	A-N118	Circular	1.75	0	0	1	0	0	0	1.55	1036.47	1035.598	1042.188	1042.498	56.187	0.013	19.74	20.509
A-N126L	A-N126	A-N122	Circular	1	0	0	1	0	0	0	2.09	1048.869	1036.899	1054.669	1040.499	573.926	0.013	5.15	0
A-N456L	A-N456	A-N454	Circular	1.25	0	0	1	0	0	0	1.87	1064.811	1060.236	1070.611	1066.736	244.225	0.013	8.84	6.476
A-N454L	A-N454	A-N452	Circular	1.25	0	0	1	0	0	0	6.88	1060.236	1018.818	1066.736	1024.418	602.27	0.013	16.94	11.182
A-N452L	A-N452	A-N450	Circular	2	0	0	1	0	0	0	0.53	1018.818	1017.554	1024.418	1020.554	239.573	0.013	16.43	29.16
Link560	A-N450	Node546	Rectangular	5	0	0	1	0	0	9	0.24	1014.593	1014.46	1020.554	1019.46	56	0.022	203.24	123.432
A-N084L	A-N084	A-N082	Circular	1.25	0	0	1	0	0	0	0.54	993.619	992.132	1004.019	1000.432	276.36	0.013	4.74	3.468
A-N082L	A-N082	A-N080	Circular	1.25	0	0	1	0	0	0	2.7	992.132	987.265	1000.432	997.465	180.545	0.013	10.61	3.458
A-N078L	A-N078	A-N076	Circular	1.25	0	0	1	0	0	0	12.64	992.564	968.884	995.564	992.85	187.406	0.013	22.96	3.446
A-N076L	A-N076	A-N074	Natural	0	0	NS_A-N076L	1	0	0	0	0.61	968.44	965.433	992.85	986.04	494.3	0.04	469.94	694.976
A-N096L	A-N096	A-N094	Circular	1.25	0	0	1	0	0	0	-0.97	999.941	1001.268	1002.941	1004.268	136.732	0.013	6.36	0
A-N092L	A-N092	A-N090	Circular	2	0	0	1	0	0	0	0.76	997.495	996.266	1001.995	1000.266	161.454	0.013	19.74	0.056
A-N090L	A-N090	A-N088	Circular	2	0	0	1	0	0	0	0.64	996.266	991.312	1000.266	997.039	768.298	0.013	18.17	13.702
A-N088L	A-N088	A-N086	Rectangular	10	0	0	1	0	0	10	0.5	983.877	983.708	997.039	999.712	33.816	0.013	1488.51	681.766
Link644	A-N446	Node621	Circular	2	0	0	1	0	0	0	1.26	1054.71	1051.7	1067.68	1057.78	238	0.013	25.44	4.323
A-N444L	A-N444	A-N442	Circular	2	0	0	1	0	0	0	10.92	1022.73	1020	1030	1022	25	0.013	74.76	4.217
647.2	A-N442	Node623	0	0	0	0	0	0	0	0	0	0	0	1022	1021	0	0	0	0.79
647.1	A-N442	Node623	0	0	0	0	0	0	0	0	0	0	0	1022	1021	0	0	6.3	5.144
Link552	A-N440	Node539	Natural	2.8	0	6bot12top2.8deepConc	1	0	0	0	0.11	1016	1015.75	1020.8	1019.21	234	0.017	105.5	117.091
A-N066L	A-N066	A-N064	Trapezoidal	1.5	0	0	1	1.5	1.5	0	2.2	973.548	957.635	975.048	970.693	723.343	0.03	18.08	15.291
A-N064L	A-N064	A-N062	Natural	0	0	NS_A-N064L	1	0	0	0	0.43	953.893	951.761	970.693	968.57	500	0.04	10891.8	747.742
A-N054L	A-N054	A-N054.1	Circular	1.5	0	0	1	0	0	0	0.63	956.24	952.64	965.44	958.56	572.6	0.013	8.33	12.568
A-N052L	A-N052	A-N050	Circular	2	0	0	1	0	0	0	1.62	951.699	941.906	956.75	956.606	606.065	0.013	28.76	33.062
A-N056L	A-N056	A-N052	Circular	2.67	0	0	1	0	0	0	0.69	953.574	951.699	959.32	956.75	271.908	0.013	40.59	26.825
A-N058L	A-N058	A-N058.1	Circular	1	0	0	1	0	0	0	1.68	962.78	955.72	968.58	961.48	420.06	0.013	4.62	1.149
A-N050L	A-N050	A-N048	Rectangular	10	0	0	1	0	0	10	0.27	941.906	941.778	956.606	953.614	47.491	0.013	1093.12	794.388
A-N044L	Node37	A-N042	Circular	1	0	0	1	0	0	0	9.16	1006.742	981.591	1009.742	988.891	274.692	0.013	10.78	0
A-N042L	A-N042	A-N040	Circular	1	0	0	1	0	0	0	2.82	981.591	975.276	988.891	982.426	223.807	0.013	5.98	0
A-N040L	A-N040	A-N038	Circular	1.25	0	0	1	0	0	0	0.59	975.276	972.551	982.426	982.651	458.787	0.013	4.98	0.972
A-N038L	A-N038	A-N036	Circular	1.25	0	0	1	0	0	0	0.57	972.551	970.866	982.651	979.066	294.83	0.013	4.88	7.811
A-N036L	A-N036	A-N032	Circular	1.25	0	0	1	0	0	0	1.71	970.866	963.529	979.066	968.729	428.674	0.013	8.45	7.558
A-N032L	A-N032	A-N028	Circular	2.5	0	0	1	0	0	0	0	962.279	962.279	968.729	968.817	32.937	0.013	1.3	46.233
A-N028L	A-N028	A-N026	Circular	2.5	0	0	1	0	0	0	4.25	962.279	934.628	968.817	950.27	651.347	0.013	84.51	55.152
A-N026L	A-N026	A-N026.1	Natural	0	0	NS_A-N026L	1	0	0	0	0.17	934.63	934.29	950.27	947.66	194.8	0.014	2841.74	833.626
A-N030L	A-N030	A-N028	Circular	2.5	0	0	1	0	0	0	0.2	962.716	962.279	969.266	968.817	219.905	0.013	18.28	2.034
A-N034L	A-N034	A-N032	Circular	2.5	0	0	1	0	0	0	0.96	963.421	962.279	969.221	968.729	119.452	0.013	40.11	38.745
A-N012L	A-N012	A-N010	Circular	1	0	0	1	0	0	0	3.44	937.302	925.275	940.702	940.675	349.414	0.013	6.61	3.346
A-N010L	A-N010	A-N008	Circular	4	0	0	1	0	0	0	3.16	925.275	914.309	940.675	943	346.967	0.013	255.37	17.145
Box#1	A-N008	A-N006	Rectangular	6	0	0	1	0	0	7	2.2	914.309	897.736	943	938.11	753.335	0.013	980.35	484.507

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Allen-Fruitdale Links																			
Box#2	A-N008	A-N006	Rectangular	6	0	0	1	0	0	7	2.2	914.309	897.736	943	938.11	753.335	0.013	980.35	484.507
A-N308L	A-N308	A-N308.3	Trapezoidal	3.5	0	0	1	1.25	1.25	6	0.82	953.73	950.36	957.23	953.86	412.68	0.04	200.58	43.356
A-N314L	A-N314	A-N314.1	Circular	2.25	0	0	1	0	0	0	1.93	960.32	956.6	967.62	964.4	192.28	0.013	43.08	40.945
A-N312L	A-N312	A-N310	Circular	1	0	0	1	0	0	0	0.8	954.518	946.774	960.42	949.774	962.929	0.013	3.2	3.215
Link520	A-N312	A-N308	Circular	2.25	0	0	1	0	0	0	0.04	954.018	954	960.42	957.23	47	0.013	6.06	40.417
Link410	A-N310	A-N306	Circular	4	0	0	1	0	0	0	0.08	943.87	943.4	949.774	950.31	565	0.013	41.43	52.496
Link625	Node40	A-N306.1	Circular	3	0	0	1	0	0	0	1.3	943.85	932.61	951.61	948.02	864.68	0.013	76.05	27.596
A-N338L	A-N338	A-N336	Circular	1	0	0	1	0	0	0	0.68	971.324	966.984	975.224	969.984	634.714	0.013	2.95	3.79
A-N434L	A-N434	A-N432	Circular	1.5	0	0	1	0	0	0	0.91	985.6	978.93	989.4	989.451	734.321	0.013	10.01	10.811
A-N334L	A-N334	A-N332	Circular	1.25	0	0	1	0	0	0	1.17	965.271	957.376	968.87	961.126	676.407	0.013	6.98	8.011
A-N438L.1	A-N334	A-N314	Circular	2.25	0	0	1	1.5	1.5	0	0	963.52	963.52	968.87	967.62	118	0.013	0.98	39.934
A-N332L	A-N332	A-N330	Circular	1.5	0	0	1	0	0	0	0.95	957.376	954.521	961.126	959.174	301.85	0.013	10.22	8.03
A-N324L	A-N324	A-N323	Circular	1.75	0	0	1	0	0	0	2	952.695	949.426	958.45	958.009	163.443	0.013	22.41	20.939
A-N323L	A-N323	A-N322	Circular	2.5	0	0	1	0	0	0	1	949.426	948.559	958.009	957.84	86.718	0.013	41.01	20.804
A-N322L	A-N322	A-N320	Circular	2.5	0	0	1	0	0	0	0.39	948.56	947.52	957.84	951.65	265.74	0.013	25.66	20.669
Link401	A-N320	A-N320.1	Rectangular	4	0	0	1	0	0	6	0.13	947.32	946.88	951.65	951.98	341	0.024	60.28	39.557
A-N344L	Node673	A-N342	Circular	1	0	0	1	0	0	0	3.59	968.304	952.229	971.304	956.529	448.141	0.013	6.75	0
A-N342L	A-N342	A-N340	Circular	1	0	0	1	0	0	0	2.37	952.229	947.66	956.529	951.836	192.8	0.013	5.48	2.018
A-N340L	A-N340	A-N320	Rectangular	4	0	0	1	1	1	6	0.14	947.66	947.322	951.836	951.65	239.83	0.013	116.3	-28.136
A-N326L	A-N326	A-N326.1	Circular	0.833	0	0	1	0	0	0	2.07	958.4	955.47	963.56	960.94	141.43	0.013	3.15	3.493
A-N328L	A-N328	A-N326	Circular	0.833	0	0	1	0	0	0	1.5	962.258	958.405	967.458	963.56	256.841	0.013	2.68	2.738
A-N408L	A-N408	A-N406	Circular	1.25	0	0	1	0	0	0	0.85	978.539	975.845	984.44	978.845	315.182	0.013	0	0
Link657	A-N408	A-N408.3	Circular	2.25	0	0	1	0	0	0	2.52	978.539	977	984.44	985	61.07	0.013	49.16	30.194
A-N410L	A-N410	A-N408	Circular	1.25	0	0	1	0	0	0	1.21	981.379	978.539	992.279	984.44	235.569	0.013	7.09	7.835
A-N414L	A-N414	A-N410	Circular	1.25	0	0	1	0	0	0	1.02	983.171	981.379	989.546	992.279	175.515	0.013	6.53	3.349
A-N416L	A-N416	A-N414	Circular	1	0	0	1	0	0	0	5.76	1014.675	983.171	1023.225	989.546	546.587	0.013	8.55	3.398
A-N402L	A-N402	A-N400	Circular	1.25	0	0	1	0	0	0	0.62	973.654	973	976.654	976.016	106.283	0.013	5.07	8.468
A-N400L	A-N400	A-N344	Circular	1.25	0	0	1	0	0	0	0.73	973	968.304	976.016	971.3	643.73	0.013	5.52	7.078
A-N404L	A-N404	A-N402	Circular	1	0	0	1	0	0	0	3.08	1001.242	973.654	1007.692	976.654	896.171	0.013	6.25	6.799
A-N418L	A-N418	A-N408	Circular	1.5	0	0	1	0	0	0	3.59	995.114	978.539	998.014	984.44	461.477	0.013	19.91	2.291
A-N206L	A-N206	A-N204	Circular	3	0	0	1	0	0	0	1.09	939.83	926.945	942.83	929.945	1180.361	0.013	69.69	0
A-N210L	A-N210	A-N208	Circular	1.25	0	0	1	0	0	0	0.63	938.111	933.213	941.111	936.213	771.657	0.013	5.15	0
A-N212L	A-N212	A-N208	Circular	1.25	0	0	1	0	0	0	0.51	937.193	933.213	940.993	936.213	776.304	0.013	4.63	0
A-N208L	A-N208	A-N204	Circular	1.25	0	0	1	0	0	0	1.28	933.213	926.945	936.213	929.945	489.778	0.013	7.31	0
A-N204L	A-N204	A-N216	Circular	2.5	0	0	1	0	0	0	5.31	926.945	895.011	929.945	902.361	601.71	0.013	94.49	52.408
A-N216L	A-N216	R-N110	Circular	1	0	0	1	0	0	0	2.66	895.011	878.361	902.361	906.15	625.193	0.013	5.81	7.571
A-N218L	A-N218	A-N216	Circular	2	0	0	1	0	0	0	1.21	904.398	895.011	913.898	902.361	774.471	0.013	24.91	9.249
A-N219L	A-N219	A-N218	Circular	1.5	0	0	1	0	0	0	4	919.436	904.398	925.036	913.898	376.322	0.013	21	9.369
A-N228L	A-N228	A-N226	Circular	1.5	0	0	1	0	0	0	0.66	911.848	909.414	919.098	915.364	370.981	0.013	8.51	15.906
A-N226L	A-N226	A-N224	Circular	2	0	0	1	0	0	0	0.5	909.414	907.271	915.364	914.67	428.51	0.013	16	15.885
A-N224L	A-N224	A-N224.1	Circular	3	0	0	1	0	0	0	0.99	907.27	905.81	914.67	913.62	147.52	0.013	66.35	24.021
A-N222L	A-N222	R-N120	Circular	2	0	0	1	0	0	0	3.1	903.094	882.013	911.65	918.92	680.692	0.013	39.81	23.684

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Allen-Fruitdale Links																			
A-N230L	A-N230	A-N224	Circular	2	0	0	1	0	0	0	0.53	909.305	907.271	916.055	914.67	383.017	0.013	16.49	8.451
A-N234L	A-N234	A-N230	Circular	2	0	0	1	0	0	0	3.29	929.844	909.305	936.644	916.055	623.788	0.013	41.05	8.574
A-N232L	A-N232	A-N230	Circular	1.5	0	0	1	0	0	0	1.63	913.773	909.305	916.773	916.055	274.632	0.013	13.4	0
A-N244L	A-N244	A-N242	Circular	1.25	0	0	1	0	0	0	1.88	935.881	910.479	941.281	915.879	1351.883	0.013	8.85	1.847
A-N242L	A-N242	A-N240	Circular	1.5	0	0	1	0	0	0	4.09	910.479	894	915.879	910	402.739	0.013	21.25	1.831
A-N240L	A-N240	R-N124	Circular	1.5	0	0	1	0	0	0	4.76	894	885.981	910	923.26	168.395	0.013	22.92	14.78
A-N252L	A-N252	A-N250	Circular	2.5	0	0	1	0	0	0	2.41	907.658	894	914.679	910	566.111	0.013	63.71	3.403
A-N250L	A-N250	R-N124	Circular	2	0	0	1	0	0	0	3.87	894	885.981	910	923.26	207.225	0.013	44.5	22.283
A-N254L	A-N254	A-N252	Circular	1	0	0	1	0	0	0	2	917.221	907.658	921.321	914.679	478.166	0.013	5.04	3.441
A-N256L	A-N256	A-N254	Circular	1	0	0	1	0	0	0	2	929.122	917.221	932.122	921.321	594.656	0.013	5.04	3.476
A-N260L	A-N260	R-N126	Circular	3.5	0	0	1	0	0	0	4.96	894	886.318	910	924.12	154.941	0.013	224.02	98.025
A-N262L	A-N262	A-N260	Circular	3.5	0	0	1	0	0	0	1.43	904.272	894	919.87	910	717.484	0.013	120.38	98.11
A-N264L	A-N264	A-N262	Circular	1.25	0	0	1	0	0	0	1.45	919.92	904.272	924.02	919.87	1077.758	0.013	7.78	8.519
A-N266L	A-N266	A-N266.1	Circular	2	0	0	1	0	0	0	0.69	908.04	906.38	916.9	918.21	239.98	0.013	18.82	44.356
A-N268L	A-N268	A-N266	Circular	2	0	0	1	0	0	0	0.25	909.043	908.04	925.368	916.9	401.244	0.013	11.31	16.101
A-N274L	A-N274	Node607	Circular	1.5	0	0	1	0	0	0	0.5	926.716	922.662	930.307	936.81	810.813	0.013	7.43	10.481
A-N270L	A-N270	A-N268	Circular	1	0	0	1	0	0	0	2	922.662	915.315	936.807	925.368	367.349	0.013	5.04	9.316
A-N280L	A-N280	A-N268	Circular	2	0	0	1	0	0	0	0.25	909.538	909.043	927.583	925.368	198.045	0.013	11.31	-0.604
A-N276L	A-N276	A-N276.1	Circular	1.5	0	0	1	0	0	0	1.08	912.38	909.538	922.73	927.58	263.79	0.013	10.9	-2.181
A-N278L	A-N278	A-N276	Circular	1.5	0	0	1	0	0	0	0.55	914.973	912.379	924.373	922.73	475.803	0.013	7.76	-2.052
A-N282L	A-N282	A-N282.1	Circular	1.25	0	0	1	0	0	0	0.5	913.69	913.46	926.04	926.13	46	0.013	4.57	20.547
A-N284L	A-N284	A-N282	Circular	1.25	0	0	1	0	0	0	-0.01	913.663	913.69	920.363	926.04	381.893	0.013	0.54	-7.827
A-N286L	A-N286	A-N282	Circular	2	0	0	1	0	0	0	0.47	915.886	913.69	926.536	926.04	466.053	0.013	15.53	14.229
A-N292L	A-N292	A-N286	Circular	1.75	0	0	1	0	0	0	0.5	917.864	915.886	926.771	926.536	395.697	0.013	11.2	6.842
A-N296L	A-N296	A-N292	Circular	1.75	0	0	1	0	0	0	0.5	918.204	917.864	925.88	926.771	67.946	0.013	11.21	4.626
A-N298L	A-N298	A-N296	Circular	1.25	0	0	1	0	0	0	0.21	919.383	918.204	924.383	925.88	568.741	0.013	2.94	4.605
A-N288L	A-N288	A-N286	Circular	1.5	0	0	1	0	0	0	0.66	920.014	915.886	928.414	926.536	625.435	0.013	8.53	10.317
A-N290L	A-N290	A-N288	Circular	1	0	0	1	0	0	0	4.2	935.741	920.014	938.741	928.414	374.306	0.013	7.3	5.994
A-N294L	A-N294	A-N292	Circular	1	0	0	1	0	0	0	0.2	919.298	917.864	923.378	926.771	714.166	0.013	1.6	3.068
F-N102L	F-N102	R-N138	Natural	3.5	0	10bot16top3.5deepNat	1	0	0	0	2.97	902.039	887.471	909	925.64	491.019	0.04	517.17	52.382
F-N104L	F-N104	F-N102	Circular	3	0	0	1	0	0	0	3.31	915.907	902.039	924	909	418.785	0.024	65.74	52.202
F-N106L	F-N106	F-N104	Circular	3	0	0	1	0	0	0	0.36	916.4	915.907	930	924	136.503	0.013	40.08	45.348
F-N108L	F-N108	F-N106	Circular	2	0	0	1	0	0	0	0.57	919.187	916.4	925.987	930	488.274	0.013	17.09	28.309
F-N110L	F-N110	F-N108	Circular	2.5	0	0	1	0	0	0	0.19	920.089	919.187	926.889	925.987	468.701	0.013	17.99	28.308
F-N112L	F-N112	F-N110	Circular	2.5	0	0	1	0	0	0	0.34	921.238	920.089	929.838	926.889	336.832	0.013	23.96	34.871
F-N114L	F-N114	F-N112	Circular	2.5	0	0	1	0	0	0	0.52	923.55	921.238	929.9	929.838	443.491	0.013	29.62	16.863
F-N116L	F-N116	F-N114	Circular	2.5	0	0	1	0	0	0	0.37	924.45	923.55	933.9	929.9	241.981	0.013	25.01	27.015
F-N120L	F-N120	F-N120.2	Circular	2	0	0	1	1.5	1.5	0	0.44	929.55	928.85	934.17	933.26	159	0.013	15.01	-2.25
Link687	F-N124	Node661	Circular	1.25	0	0	1	0	0	0	2.37	946.4	942	952.46	948.1	186	0.013	9.94	1.173
F-N130L	F-N130	F-N116	Circular	2	0	0	1	0	0	0	0.19	925.323	924.45	935.02	933.9	457.009	0.013	9.89	8.367
F-N132L	F-N132	F-N132.1	Circular	2	0	0	1	0	0	0	0.88	936.43	932.93	938.53	937.42	400	0.013	21.16	8.394
F-N136L	F-N136	F-N136.1	Trapezoidal	1.5	0	0	1	1.5	1.5	0	0.6	940.49	938.45	943.49	941.45	340.83	0.03	9.43	4.258

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Allen-Fruitdale Links																			
F-N030L	F-N030	F-N028	Circular	1.25	0	0	1	0	0	0	0.3	941.351	940.577	946.651	946.18	260.934	0.013	3.52	7.605
F-N028L	F-N028	F-N028.1	Circular	1.75	0	0	1	0	0	0	0.55	940.58	938.69	946.18	945.12	346.02	0.013	11.71	7.472
F-N026L	F-N026	F-N024	Circular	2	0	0	1	0	0	0	0.5	936.827	936.343	944.08	945.768	96.723	0.013	16	7.256
F-N024L	F-N024	F-N022	Natural	0	0	NS_F-N024L	1	0	0	0	1.38	928.955	922.063	945.768	943.5	500	0	19068.39	929.595
F-N008L	F-N008	F-N006	Circular	8.5	0	0	1	0	0	0	1	915.729	914.779	932.829	932.401	94.991	0.013	1072.17	945.6
F-N010L	F-N010	F-N008	Circular	1.5	0	0	1	0	0	0	4.26	931.198	915.729	935.348	932.829	362.713	0.013	21.69	20.064
F-N012L	F-N012	F-N010	Circular	1.5	0	0	1	0	0	0	0.94	932.591	931.198	939.291	935.348	148.843	0.013	10.16	8.218
F-N016L	F-N016	F-N014	Circular	1.5	0	0	1	0	0	0	1.36	937.249	933.714	940.249	939.014	260.547	0.013	12.24	0.522
F-N014L	F-N014	F-N012	Circular	1.5	0	0	1	0	0	0	0.25	933.714	932.591	939.014	939.291	444.876	0.013	5.28	8.556
F-N018L	F-N018	F-N014	Circular	1.5	0	0	1	0	0	0	2.8	937.185	933.714	940.185	939.014	124.129	0.013	17.57	7.388
F-N210L	F-N210	F-N210.1	Circular	2	0	0	1	0	0	0	0.2	926.1	925.5	929.2	931	300.2	0.013	10.11	8.349
F-N212L	F-N212	F-N208	Circular	1.5	0	0	1	0	0	0	0.17	927.228	926.229	930.228	930.48	582.461	0.013	4.35	4.349
F-N208L	F-N208	F-N206	Circular	2	0	0	1	0	0	0	0.12	925.25	925	930.48	929.5	210.216	0.013	7.8	15.932
F-N204L	F-N204	F-N202	Circular	2	0	0	1	0	0	0	0.82	917.4	915.32	925.34	919.162	255.072	0.013	20.43	20.062
F-N202L	F-N202	R-N142	Circular	2	0	0	1	0	0	0	7.01	915.32	892.156	919.162	927.149	330.61	0.013	59.88	22.196
F-N206L	F-N206	F-N206.1	Trapezoidal	1	0	0	1	0.75	0.75	1.5	0.71	925	921.8	929.5	925	449.46	0.04	4.81	15.844
F-N138L	Node41	F-N136	Natural	0.5	0	35ft.Street	1	0	0	0	1.19	949.43	940.486	956.43	943.49	754.102	0.013	109.43	0
F-N804L	F-N804	Node350	Circular	2	0	0	1	0	0	0	4.48	972.86	951.57	977.51	958.36	475.111	0.013	47.89	7.652
F-N036L	F-N036	F-N034	Circular	1	0	0	1	0	0	0	2.52	943.41	939.746	946.41	948.82	145.569	0.013	5.65	2.713
F-N034L	F-N034	F-N032	Natural	0	0	NS_F-N034L	1	0	0	0	0.18	938.718	938.085	948.82	948.19	354.6	0	7362.35	924.106
F-N712L	F-N712	F-N710	Circular	2	0	0	1	0	0	0	2.5	985.201	976.684	987.301	978.684	340.568	0.013	35.78	22.659
F-N710L	F-N710	F-N708	Trapezoidal	1.5	0	0	1	1.5	1.5	0	1.33	976.684	972.266	978.684	974.066	331.732	0.03	14.07	22.357
F-N708L	F-N708	F-N706	Trapezoidal	1.5	0	0	1	1.5	1.5	0	2.63	972.266	955.778	974.066	961.478	626.532	0.03	19.78	37.561
F-N706L	F-N706	F-N704	Circular	2.5	0	0	1	1.5	1.5	0	0.7	955.778	954.364	961.478	959.664	202.653	0.013	34.26	36.808
F-N704L	F-N704	Node355	Circular	2.5	0	0	1	1.5	1.5	0	1.37	954.364	951.31	959.664	955.41	223.508	0.013	47.95	36.42
F-N606L	F-N606	F-N604	Circular	1.5	0	0	1	0	0	0	1.86	968.276	962.541	974.476	966.791	308.281	0.013	14.33	15.7
F-N604L	F-N604	F-N602	Circular	1.5	0	0	1	0	0	0	1.85	962.541	951.708	966.791	957.14	586.242	0.013	14.28	16.885
F-N602L	F-N602	F-N502	Natural	4.2	0	6bot12top4.2deep	1	1	1	8	0.26	950.54	949.72	957.14	953.93	321	0.04	124.23	74.81
F-N506L	F-N506	F-N504	Circular	1.5	0	0	1	0	0	0	1.94	959.4	951.48	964.4	956.6	409.079	0.013	14.62	0
Link366	F-N502	Node362	Natural	4.2	0	6bot12top4.2deep	1	0	0	0	-0.14	949.72	949.99	953.93	954.19	192	0.04	92.18	78.137
F-N404L	F-N404	F-N402	Circular	1.25	0	0	1	0	0	0	3.84	956.069	949.24	958.269	953.866	177.925	0.013	12.66	11.145
Link374	F-N402	Node369	Natural	3.2	0	10bot22top3.2deepNat	1	0	0	0	-0.15	949.24	949.33	953.866	953.74	59	0.04	124.5	91.033
Link416	A-N300	Node409	Natural	4.4	0	7bot13top4.4deepNat	1	0	0	0	-0.97	943.84	945.64	951.54	950.48	186	0.04	295.63	61.123
A-N302L	A-N302	A-N300	Circular	1	0	0	1	0	0	0	1.4	947.495	943.84	952.445	951.54	261.711	0.013	4.21	4.374
A-N304L	A-N304	A-N302	Circular	1	0	0	1	0	0	0	0.96	952.354	947.495	958.604	952.445	506.408	0.013	3.49	4.374
A-N432L	A-N432	A-N436	Circular	1.5	0	0	1	0	0	0	0.21	978.93	978.03	989.451	983	419.115	0.013	4.87	10.811
A-N430L	A-N430	A-N432	Circular	1.5	0	0	1	0	0	0	0.3	980.305	978.93	990.155	989.451	463.538	0.013	5.72	1.054
Link468	F-N812	Node457	Rectangular	6	0	0	1	0	0	15	-0.1	1025.96	1025.999	1032.262	1032	38	0.022	323.7	42.923
F-N814L	F-N814	F-N812	Circular	2	0	0	1	0	0	0	2.41	1033.855	1026.68	1042.31	1032.262	297.273	0.013	35.15	45.453
F-N818L	F-N818	F-N818.1	Circular	1.25	0	0	1	0	0	0	5.5	1060.04	1044.14	1065.34	1051.35	289.28	0.013	15.14	6.253
F-N824L	F-N824	F-N822	Circular	1	0	0	1	0	0	0	34.29	1104.04	1028.061	1108.54	1031.861	221.566	0.013	20.86	3.129
Link457	F-N822	Node448	Natural	3.2	0	8bot18top3.2deepRock	1	0	0	0	0.71	1028.061	1027.2	1031.861	1030.4	122	0.045	188.85	15.301

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Allen-Fruitdale Links																			
A-N464L	A-N464	A-N462	Circular	1	0	0	1	0	0	0	5.2	1082.414	1065.192	1086.414	1070.592	331.079	0.013	8.13	0
A-N462L	A-N462	A-N460	Circular	1	0	0	1	0	0	0	5.65	1065.192	1041.995	1070.592	1045.595	410.303	0.013	8.47	0
A-N460L	A-N460	A-N458	Circular	1	0	0	1	0	0	0	6.71	1041.995	1035.025	1045.595	1036.525	103.926	0.013	9.23	11.498
Link674	A-N460	Node649	Trapezoidal	1.5	0	0	1	1	1	1	1.53	1041.995	1037	1045.595	1042	325.96	0.04	13.79	19.589
F-N134L	F-N134	F-N134.1	Circular	1.75	0	0	1	1.5	1.5	0	0.54	937.83	937.37	940.83	940.07	85.43	0.013	11.63	4.233
F-N504L	F-N504	F-N502	Circular	1.5	0	0	1	0	0	0	1.2	951.48	949.72	956.6	953.93	146.514	0.013	11.51	-0.087
F-N118L	F-N118	F-N116	Circular	2	0	0	1	0	0	0	0.52	925.65	925.45	934.03	933.9	38.708	0.013	16.26	8.112
A-N412L	A-N412	A-N410	Circular	1.75	0	0	1	0	0	0	13.27	1004.723	981.379	1007.723	992.279	175.968	0.013	57.71	4.536
A-N336L	A-N336	A-N334	Circular	1	0	0	1	0	0	0	0.9	966.984	965.271	969.984	968.87	190.273	0.013	3.38	4.043
A-N330L	A-N330	A-N324	Circular	1.75	0	0	1	0	0	0	1	954.521	952.695	959.174	958.45	182.632	0.013	15.84	7.958
A-N272L	A-N272	Node607	Circular	1.25	0	0	1	0	0	0	2.19	936.686	922.662	939.686	936.81	640.895	0.013	9.56	2.709
F-N816L	F-N816	F-N814	Circular	2	0	0	1	0	0	0	5.44	1045.858	1033.855	1048.858	1042.31	220.47	0.013	52.78	39.446
A-N406L	A-N406	A-N402	Circular	1.25	0	0	1	0	0	0	1.8	975.845	973.654	978.845	976.654	121.455	0.013	8.68	-0.32
A-N080L	A-N080	A-N078	Circular	1.25	0	0	1	0	0	0	-1.85	987.265	992.564	997.465	995.564	286.834	0.013	8.78	3.45
A-N094L	A-N094	A-N092	Circular	1.5	0	0	1	0	0	0	0.57	1001.268	997.495	1004.268	1001.995	658.748	0.013	7.95	0
F-N056L	F-N056	F-N054	Natural	0	0	NS_F-N056L	1	0	0	0	3.94	1023	1003.281	1045.53	1029.84	500	0.04	63955.64	731.545
video714	F-N056	Node440	0	0	0	0	0	0	0	0	0	0	0	1045.53	1032.5	0	0	0	-178.249
F-N054L	F-N054	F-N054.1	Natural	0	0	NS_F-N054L	1	0	0	0	1.8	1003.28	998.47	1029.84	1029.67	267	0	168300.33	731.822
F-N052L	F-N052	F-N050	Natural	0	0	NS_F-N052L	1	0	0	0	2.19	994.273	983.328	1029.52	1018.54	500	0	471888.63	846.014
F-N050L	F-N050	F-N048	Natural	0	0	NS_F-N050L	1	0	0	0	2.42	983.328	971.211	1018.54	1013.233	500	0	456311.35	865.845
F-N048L	F-N048	F-N046	Natural	0	0	NS_F-N048L	1	0	0	0	1.1	971.211	965.729	1013.233	1007.74	500	0	491528.65	861.467
F-N046L	F-N046	F-N044	Natural	0	0	NS_F-N046L	1	0	0	0	0.95	965.729	963.3	1007.74	998.78	254.9	0.04	235030.78	855.963
F-N044L	F-N044	F-N042	Rectangular	4.5	0	0	1	0	0	8	0.3	963.3	963.017	998.78	980.32	94.196	0.013	287.63	851.68
F-N006L	F-N006	F-N004	Natural	0	0	NS_F-N006L	1	0	0	0	1.16	902.895	898.842	932.401	933.65	350	0	15697.97	945.382
F-N004L	F-N004	F-N002	Natural	0	0	NS_F-N004L	1	0	0	0	0.82	898.842	895.429	933.65	933.75	416.1	0	22341.99	944.016
F-N002L	F-N002	R-N156	Natural	0	0	NS_F-N002L	1	0	0	0	0.29	895.429	894.695	933.75	931.93	251.4	0	252022.21	2009.097
F-N022L	F-N022	F-N020	Natural	0	0	NS_F-N022L	1	0	0	0	0.7	922.063	918.563	943.5	939.97	500	0	31811.49	929.038
F-N020L	F-N020	F-N008	Natural	0	0	NS_F-N020L	1	0	0	0	1.92	918.563	915.729	939.97	932.829	147.8	0	18400.56	929.171
F-N032L	F-N032	F-N024	Rectangular	5	0	0	1	0	0	8	1	938.085	937.494	948.19	945.768	59.125	0.013	609.21	927.289
F-N042L	F-N042	F-N040	Natural	0	0	NS_F-N042L	1	0	0	0	4.45	963.017	951.897	980.32	995.9	250	0.04	88167.66	851.854
F-N040L	F-N040	F-N038-1	Natural	0	0	NS_F-N040L	1	0	0	0	1.52	951.897	948.03	995.9	992.03	254.5	0.04	574024.07	849.878
F-N038L	F-N038-1	F-N034	Natural	0	0	NS_F-N038L	1	0	0	0	1.92	948.03	938.718	992.03	948.82	484.9	0.04	7607.91	934.178
F-N068L	F-N068	F-N066	Natural	0	0	NS_F-N068L	1	0	0	0	3.77	1061.009	1045.937	1072.62	1057.55	400	0.04	47304.58	487.707
F-N066L	F-N066	F-N064	Natural	0	0	NS_F-N066L	1	0	0	0	1.18	1045.937	1041.219	1057.55	1062.13	400	0	5802.75	488.815
F-N064L	F-N064	F-N062	Natural	0	0	NS_F-N064L	1	0	0	0	2.32	1041.219	1031.956	1062.13	1055.239	400	0	189278.27	484.9
F-N062L	F-N062	F-N060	Natural	0	0	NS_F-N062L	1	0	0	0	1.21	1031.956	1027.121	1055.239	1050.33	400	0	88368.86	482.759
F-N060L	F-N060	F-N058.1	Natural	0	0	NS_F-N060L	1	0	0	0	2.69	1027.121	1025.22	1050.33	1044.48	70.6	0.4	38311.78	484.557
F-N058L	F-N058.1	F-N056	Rectangular	5.5	0	0	1	0	0	10	1	1025.22	1024.919	1044.48	1045.53	30.169	0.013	920.33	568.975
F-N070L	F-N070	F-N068	Rectangular	5.5	0	0	1	0	0	10	0.2	1061.098	1061.009	1071.098	1072.62	44.249	0.013	413.22	486.242
F-N072L	F-N072	F-N070	Natural	0	0	NS_F-N072L	1	0	0	0	1.94	1067.99	1061.098	1078.265	1071.098	354.5	0.04	10174.7	485.193
F-N082L	F-N082	F-N080	Natural	0	0	NS_F-N082L	1	0	0	0	0.89	1083.49	1079.928	1099.927	1096.34	400	0.014	22370.43	511.646
F-N080L	F-N080	F-N078	Natural	0	0	NS_F-N080L	1	0	0	0	2.02	1079.928	1071.868	1096.34	1086.987	400	0.014	38163.14	494.893

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Allen-Fruitdale Links																			
F-N078L	F-N078	F-N076	Natural	0	0	NS_F-N078L	1	0	0	0	0.76	1071.868	1068.832	1086.987	1083.94	400	0	34757.95	495.702
F-N076L	F-N076	F-N074	Natural	0	0	NS_F-N076L	1	0	0	0	0.3	1068.832	1068.265	1083.94	1082.78	187	0	20751	489.003
F-N074L	F-N074	F-N072	Rectangular	10	0	0	1	0	0	5.5	1.3	1068.265	1067.99	1082.78	1078.265	21.158	0.013	1050.43	485.252
A-N004L	A-N004	R-N104	Natural	0	0	NS_A-N004L	1	0	0	0	1.2	885.455	875.401	933.823	932.241	836.3	0.04	120776.05	974.141
A-N006L	A-N006	A-N004	Natural	0	0	NS_A-N006L	1	0	0	0	1.19	891.205	885.455	938.11	933.823	485	0.014	111964.19	975.867
A-N014L	A-N014	A-N008	Natural	0	0	NS_A-N014L	1	0	0	0	0.44	916.782	914.309	943.59	943	563.3	0.014	65065.34	901.931
A-N016L	A-N016	A-N014	Natural	0	0	NS_A-N016L	1	0	0	0	0.61	919.799	916.782	946.613	943.59	494.4	0.04	66571.54	901.501
A-N018L	A-N018	A-N016	Natural	0	0	NS_A-N018L	1	0	0	0	1.38	926.724	919.799	943.375	946.613	501.9	0.04	45406.2	906.871
A-N020L	A-N020	A-N018	Natural	0	0	NS_A-N020L	1	0	0	0	0.9	931.205	926.724	947.856	943.375	497.8	0.04	20970.64	910.814
A-N022L	Node39	A-N020	Rectangular	10	0	0	1	0	0	10	3.5	933.343	931.205	950	947.856	61.075	0.013	3939.5	911.427
A-N024L	A-N024-1	Node39	Natural	0	0	NS_A-N024L	1	0	0	0	1	934.153	933.343	946.55	950	81	0.014	8121.08	911.376
A-N046L	A-N046	A-N026	Natural	0	0	NS_A-N046L	1	0	0	0	1.14	938.525	934.628	950.125	950.27	341.4	0.014	6405.85	791.205
A-N048L	A-N048	A-N046	Natural	0	0	NS_A-N048L	1	0	0	0	0.95	941.778	938.525	953.614	950.125	342.1	0.04	3759.74	793.679
A-N060L	A-N060	A-N050	Natural	0	0	NS_A-N060L	1	0	0	0	0.95	947.524	941.906	962.227	956.606	588.6	0.04	30578.99	743.253
A-N062L	A-N062	A-N060	Natural	0	0	NS_A-N062L	1	0	0	0	0.86	951.761	947.524	968.57	962.227	492.6	0.04	7824.84	746.856
A-N068L	A-N068	A-N064	Natural	0	0	NS_A-N068L	1	0	0	0	1.9	959.353	953.893	979.26	970.693	287.5	0.04	5867.92	702.145
A-N070L	A-N070	A-N068	Natural	0	0	NS_A-N070L	1	0	0	0	0.16	960.182	959.353	980.082	979.26	503	0.04	4448.53	704.532
A-N074L	A-N074	A-N072	Natural	0	0	NS_A-N074L	1	0	0	0	-0.5	965.433	966.56	986.04	986.139	226.1	0.014	8564.9	706.64
A-N086L	A-N086	A-N076	Natural	0	0	NS_A-N086L	1	0	0	0	1.1	972.602	968.44	999.712	992.85	376.9	0.04	22168.92	683.678
A-N098L	A-N098	A-N088	Rectangular	10	0	0	1	0	0	10	0.5	984.039	983.877	999.5	997.039	32.345	0.013	1490.13	671.949
A-N100L	A-N100	A-N098	Natural	0	0	NS_A-N100L	1	0	0	0	1.03	988.359	984.039	1004.27	999.5	419.7	0.014	1539.55	670.257
A-N102L	A-N102	A-N100	Natural	0	0	NS_A-N102L	1	0	0	0	0.06	988.651	988.359	1004.76	1004.27	498.2	0.014	1476.9	654.353
A-N104L	A-N104	A-N102	Natural	0	0	NS_A-N104L	1	0	0	0	0.86	992.898	988.651	1013.41	1004.76	495.7	0.014	9551.55	661.14
A-N108L	A-N108-1	A-N106	Natural	0	0	NS_A-N108L	1	0	0	0	1.95	997.304	992.632	1017.01	1013.14	240.1	0.04	16304.83	666.699
A-N110L	A-N110	A-N108-1	Natural	0	0	NS_A-N110L	1	0	0	0	1.45	1004.323	997.304	1021.63	1017.01	482.7	0	10184.11	486.725
A-N112L	A-N112	A-N110	Natural	0	0	NS_A-N112L	1	0	0	0	0.66	1007.499	1004.323	1033.51	1021.63	482	0.014	5752.5	488.087
A-N114L	A-N114	A-N112	Natural	0	0	NS_A-N114L	1	0	0	0	0.15	1008.263	1007.499	1034.305	1033.51	498.6	0.014	7817.12	487.493
A-N116L	A-N116	A-N114	Natural	0	0	NS_A-N116L	1	0	0	0	3.69	1020.166	1008.263	1037.926	1034.305	322.4	0	16672.79	302.249
A-N128L	A-N128	A-N118	Natural	0	0	NS_A-N128L	1	0	0	0	2.35	1033.35	1024.764	1047.36	1042.498	365.6	0	25601.4	265.858
A-N130L	A-N130	A-N128	Natural	0	0	NS_A-N130L	1	0	0	0	2.97	1048.296	1033.35	1057.2	1047.36	503.4	0	2409.42	267.36
A-N132L	A-N132	A-N130	Natural	0	0	NS_A-N132L	1	0	0	0	1.2	1054.274	1048.296	1063.25	1057.2	500.1	0	2775.94	280.346
R-N112L	R-N112	R-N110	Natural	0	0	NS_R-N112L	1	0	0	0	0.23	878.203	877.042	912.91	906.15	500	0	118059.74	2067.074
R-N110L	R-N110	R-N108	Natural	0	0	NS_R-N110L	1	0	0	0	0.22	877.042	875.963	906.15	938.483	500	0	108450.88	2076.868
R-N108L	R-N108	R-N106	Natural	0	0	NS_R-N108L	1	0	0	0	0.04	875.963	875.765	938.483	938.27	500	0	266588	2081.891
R-N106L	R-N106	R-N104	Natural	0	0	NS_R-N106L	1	0	0	0	0.07	875.765	875.401	938.27	932.241	500	0	148128.17	2093.091
R-N104L	R-N104	R-N102	Natural	0	0	NS_R-N104L	1	0	0	0	0.04	875.401	875.184	932.241	931.39	500	0.04	210221.07	2634.084
R-N102L	R-N102	R-N100	Natural	0	0	NS_R-N102L	1	0	0	0	-0.04	875.184	875.367	931.39	929.67	440.42	0.04	208192.26	2633.657
R-N130L	R-N130	R-N128	Natural	0	0	NS_R-N130L	1	0	0	0	0.03	886.359	886.231	923.26	922.44	500	0	63990.5	1949.006
R-N128L	R-N128	R-N126	Natural	0	0	NS_R-N128L	1	0	0	0	0.09	886.231	885.776	922.44	924.12	500	0	111503.27	1952.686
R-N126L	R-N126	R-N124	Natural	0	0	NS_R-N126L	1	0	0	0	0.16	885.776	884.955	924.12	923.26	500	0	194264.21	2004.758
R-N124L	R-N124	R-N122	Natural	0	0	NS_R-N124L	1	0	0	0	0.52	884.955	882.351	923.26	919.286	500	0	283144.8	2008.902
R-N122L	R-N122	R-N120	Natural	0	0	NS_R-N122L	1	0	0	0	0.07	882.351	882.013	919.286	918.92	500	0	124494.83	2006.845

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Allen-Fruitdale Links																			
R-N120L	R-N120	R-N118	Natural	0	0	NS_R-N120L	1	0	0	0	-0.01	882.013	882.081	918.92	913.19	500	0	40838.45	2014.159
R-N118L	R-N118	R-N116	Natural	0	0	NS_R-N118L	1	0	0	0	0.46	882.081	879.76	913.19	910.47	500	0	281940.99	2009.149
R-N116L	R-N116	R-N114	Natural	0	0	NS_R-N116L	1	0	0	0	0.35	879.76	877.989	910.47	912.709	500	0	227637.73	2013.748
R-N114L	R-N114	R-N112	Natural	0	0	NS_R-N114L	1	0	0	0	-0.03	877.989	878.203	912.709	912.91	654.1	0.014	73974.16	2011.649
R-N148L	R-N148	R-N146	Natural	0	0	NS_R-N148L	1	0	0	0	0.09	892.716	892.27	931.847	931.58	500	0	179943.52	1965.37
R-N146L	R-N146	R-N144	Natural	0	0	NS_R-N146L	1	0	0	0	0.67	892.27	888.909	931.58	928.21	500	0	570300.07	1957.444
R-N144L	R-N144	R-N142	Natural	0	0	NS_R-N144L	1	0	0	0	0.16	888.909	888.098	928.21	927.149	500	0	182289.52	1947.72
R-N142L	R-N142	R-N140	Natural	0	0	NS_R-N142L	1	0	0	0	0.06	888.098	887.801	927.149	927.433	500	0	168741.43	1940.093
R-N140L	R-N140	R-N138	Natural	0	0	NS_R-N140L	1	0	0	0	0.19	887.801	886.832	927.433	925.64	500	0	288848.43	1928.001
R-N138L	R-N138	R-N136	Natural	0	0	NS_R-N138L	1	0	0	0	-0.01	886.832	886.876	925.64	927.185	500	0	32713.14	1956.121
R-N136L	R-N136	R-N134	Natural	0	0	NS_R-N136L	1	0	0	0	0.16	886.876	886.069	927.185	926.37	500	0	153422.39	1945.224
R-N134L	R-N134	R-N132	Natural	0	0	NS_R-N134L	1	0	0	0	-0.08	886.069	886.47	926.37	926.58	500	0	116152.27	1936.888
R-N132L	R-N132	R-N130	Natural	0	0	NS_R-N132L	1	0	0	0	0.02	886.47	886.359	926.58	923.26	677.9	0	46171.06	1953.472
R-N162L	R-N162	R-N160	Natural	0	0	NS_R-N162L	1	0	0	0	0.02	895.675	895.593	935.746	935.6	500	0.014	80647.53	1073.919
R-N160L	R-N160	R-N158	Natural	0	0	NS_R-N160L	1	0	0	0	0.03	895.593	895.429	935.6	933.15	500	0.014	77903.04	1060.127
R-N158L	R-N158	F-N002	Natural	0	0	NS_R-N160L	1	0	0	0	0	895.429	895.429	933.15	933.75	248.4	0.014	13602.46	1089.314
R-N156L	R-N156	R-N154	Natural	0	0	NS_R-N156L	1	0	0	0	0.05	894.695	894.436	931.93	932.04	500	0	117042.23	1998.995
R-N154L	R-N154	R-N152	Natural	0	0	NS_R-N154L	1	0	0	0	0.15	894.436	893.701	932.04	931.31	500	0	204678.94	1983.962
R-N152L	R-N152	R-N148	Natural	0	0	NS_R-N152L	1	0	0	0	0.14	893.701	892.716	931.31	931.847	682.3	0	96162.71	1971.908
A-N118L	A-N118	A-N116	Natural	0	0	NS_A-N118L	1	0	0	0	1.48	1024.764	1020.166	1042.498	1037.926	311.3	0	16006.7	304.891
A-N106L	A-N106	A-N104	Natural	0	0	NS_A-N106L	1	0	0	0	-0.1	992.632	992.898	1013.14	1013.41	263.7	0.04	2376.83	663.472
A-N072L	A-N072	A-N070	Natural	0	0	NS_A-N072L	1	0	0	0	2.33	966.56	960.182	986.139	980.082	273.5	0.014	46727.07	707.542
Link620	A-N044	A-N034	Circular	2	0	0	1	0	0	0	3.73	1008.61	963.421	1013.41	969.221	1211.01	0.013	43.7	36.226
bakercheck	A-N044	Node769	0	0	0	0	0	0	0	0	0	0	0	1013.41	1013.41	0	0	0	9.12
Link589	A-N912	Node573	Rectangular	3.5	0	0	1	0	0	12	0.53	1012.58	1012.34	1016.08	1015.84	45	0.017	328.28	15.709
Link572	A-N914	A-N108-2	Natural	2.9	0	6bot12top2.9deepConc	1	0	0	0	0.11	1013.48	1013.28	1018.85	1016.24	175	0.017	114.95	115.204
504b	F-N918	F-N918.2	Circular	4	0	0	1	0	0	0	0.39	1020.64	1020.28	1024.9	1024.49	92	0.024	48.67	40.736
504a	F-N918	F-N918.2	Special	4.92	0	0	1	0	0	0	0.39	1020.64	1020.28	1024.9	1024.49	92	0.024	48.93	38.508
F-N920L	F-N920	F-N920.2	Natural	3.6	0	10bot20top3.6deepNat	1	1	1	8	0.04	1033.99	1033.7	1037.59	1037.3	657	0.04	75.95	133.784
Link433	A-N924	Node425	Rectangular	3	0	0	1	0	0	6.7	-0.1	942.94	943.13	951.54	947.96	182	0.017	58.13	22.477
A-N926L1	A-N926	A-N340	Rectangular	4	0	0	1	1	1	6	0.14	947.75	947.66	952.16	951.836	63.977	0.013	116.19	-26.813
Link396	A-N926	Node388	Natural	5.7	0	5bot10top5.7deepRck	1	0	0	0	0.58	946.46	946.13	952.16	951.83	57	0.014	175.7	79.952
Link391	A-N928	Node384	Rectangular	4	0	0	1	0	0	6	0.13	948.21	947.46	952.93	953.16	563	0.017	86.47	72.417
Link379	F-N932	Node373	Natural	3.7	0	8bot14top3.7deepRck	1	0	0	0	0.18	949.24	948.94	958.55	952.72	165	0.045	100.5	88.916
A-N936L	A-N936	A-N938	Natural	3.5	0	8bot16top3.5deepNat	1	1	1	8	0.17	943.9	942.5	947.4	946.5	809	0.017	202.9	135.104
Link649	A-N938	Node625	Trapezoidal	4	0	0	1	0	0	8	100	942.5	941.6	946.5	946.77	0.9	0.017	4440.24	1519.565
Link568	A-N915	Node555	Natural	3.6	0	Link 568	1	0	0	0	0.17	1013.91	1013.54	1019.91	1017.23	218	0.035	92.76	111.095
A-N436L	A-N436	A-N438	Circular	2.25	0	0	1	1.5	1.5	0	0.16	972.602	972.2	983	978.5	251.5	0.013	12.38	38.275
A-N438L	A-N438	A-N438.2	Circular	2.25	0	0	1	1.5	1.5	0	2.49	972.2	969.5	978.5	977.3	108.28	0.013	48.9	37.394
A-N458L	A-N458	A-N914	Trapezoidal	1.5	0	0	1	1.5	1.5	0	3.46	1035.025	1014.95	1036.525	1018.85	580.342	0.03	22.68	17.912
F-N920L.1	F-N920.1	F-N920.1.3	Natural	2.9	0	6bot12top2.9deepCnc	1	1	1	8	-0.06	1033.41	1033.46	1036.39	1036.7	83	0.017	83.45	165.263
F-N920L.2	F-N920.2	F-N920.1	Natural	2.9	0	6bot12top2.9deep	1	1	1	8	0.04	1033.7	1033.41	1037.3	1036.39	662	0.017	71.17	125.927

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Allen-Fruitdale Links																			
Link305	F-N920.1.1	Node298	Natural	3	0	8bot14top3deepgunite	1	0	0	0	0.55	1033.17	1032.76	1037.39	1036.36	74	0.022	263.53	146.872
F-N920L.12	F-N920.1.2	F-N920.1.1	Natural	2.9	0	6bot12top2.9deep	1	1	1	8	0.64	1033.45	1033.17	1036.35	1037.39	44	0.017	271.24	147.316
F-N920L.13	F-N920.1.3	F-N920.1.2	Natural	2.9	0	6bot12top2.9deep	1	1	1	8	0	1033.46	1033.45	1036.7	1036.35	551	0.017	14.49	158.039
Link306	Node298	Node299	Natural	3.6	0	10bot20top3.6deepNat	1	0	0	0	-0.01	1032.76	1032.77	1036.36	1038.77	165	0.04	28.14	139.564
Link307	Node299	Node300	Special	6	0	0	1	0	0	0	0.05	1032.77	1032.76	1038.77	1038.77	19	0.024	33.41	138.415
Link308	Node300	Node301	Natural	3.6	0	10bot20top3.6deepNat	1	0	0	0	0.39	1032.76	1031.79	1038.77	1035.82	247	0.04	226.55	136.725
Link309	Node301	Node301.2	Natural	3.5	0	6bot6wall3.5deep	1	0	0	0	0.02	1031.79	1031.78	1035.82	1035.81	42	0.04	24.54	128.658
Link312	Node302	Node302.1	Natural	3.3	0	5bot14top3.3deepGun	1	0	0	0	0.08	1031.27	1031.12	1034.71	1034.53	184	0.022	94.04	146.619
Link309.1	Node301.1	Node302	Natural	3.4	0	9bot17top3.4deepNat	1	0	0	0	-0.05	1031.21	1031.27	1035.12	1034.71	111	0.04	65.88	148.598
Link309.2	Node301.2	Node301.1	Natural	3.5	0	9bot17top3.5deepNat	1	0	0	0	0.03	1031.78	1031.21	1035.81	1035.12	2092	0.04	48.87	121.449
Link314	Node306	Node308	Natural	3.2	0	10bot17top3.2deepNat	1	0	0	0	-0.13	1030.57	1030.84	1033.86	1034.19	207	0.04	98.55	146.721
Link312.1	Node302.1	Node306	Natural	3.2	0	10bot17top3.2deepNat	1	0	0	0	0.08	1031.12	1030.57	1034.53	1033.86	701	0.04	76.43	145.371
Link315	Node308	Node309	Natural	3.3	0	10bot17top3.3deepRck	1	0	0	0	0.24	1030.84	1030.42	1034.19	1033.81	172	0.045	187.74	187.531
Link317	Node309	Node311	Natural	3.3	0	10bot17top3.3deepNat	1	0	0	0	0.28	1030.42	1029.77	1033.81	1033.5	229	0.04	152.32	186.811
Link318	Node311	Node311.1	Natural	3.3	0	10bot17top3.3deepRck	1	0	0	0	0.12	1029.77	1029.57	1033.5	1033.31	165	0.045	132.27	186.054
Link320	Node312	Node312.1	Natural	3.7	0	6bot14top3.7deepNat	1	0	0	0	-0.05	1029.48	1029.53	1033.23	1033.23	109	0.04	49.64	185.77
Link318.1	Node311.1	Node312	Natural	3.3	0	6bot14top3.7deepNat	1	0	0	0	0.12	1029.57	1029.48	1033.31	1033.23	74	0.04	65.12	185.76
Link438	Node314	Node429	Circular	6	0	0	1	0	0	0	-1.68	1026.9	1028.16	1034.57	1038.66	75	0.024	297.34	-32.759
Link699	Node314	Node314.2	Circular	3.5	0	0	1	0	0	0	0.7	1030.07	1030	1034.57	1034.5	10	0.013	84.18	156.075
Link320.1	Node312.1	Node314	Natural	3.7	0	6bot14top3.7deepNat	1	0	0	0	1.57	1029.53	1026.9	1033.23	1034.57	167	0.04	290.87	185.846
Link322	Node316	Node317	Natural	10	0	10bot25top10deepNat	1	0	0	0	0.39	952.35	950.56	962.35	960.56	460	0.04	1178.61	35.478
Link324	Node317	Node319	Natural	5	0	10bot18top5deepNat	1	0	0	0	-3.35	950.56	954.68	960.56	959.68	123	0.04	1002.39	34.666
Link323	Node318	Node316	Natural	5	0	10bot18top5deepNat	1	0	0	0	0.63	953.49	952.35	958.49	962.35	180	0.04	435.87	37.39
Link325	Node319	Node320	Natural	5	0	link325	1	0	0	0	0.84	954.68	953.17	959.68	958.17	180	0.04	497.37	34.38
Link326	Node320	Node321	Natural	5	0	12bot20top5deepNat	1	0	0	0	0.07	953.17	953.076	958.17	958.076	136	0.04	170.12	33.723
Link327	Node321	Node322	Natural	5	0	link325	1	0	0	0	-0.26	953.076	953.34	958.076	960.238	100	0.04	279.02	33.172
851.1	Node322	Node323	Rectangular	4	0	0	1	0	0	8	0	953.34	953.34	960.238	960.238	30	0.012	15.18	16.408
851.2	Node322	Node323	Rectangular	4	0	0	1	0	0	8	0	953.34	953.34	960.238	960.238	30	0.012	15.18	16.408
Link330	Node323	Node325	Natural	4	0	8bot24top4deepNat	1	0	0	0	0.09	953.34	952.53	960.238	956.89	896	0.04	130.7	30.768
Link331	Node325	Node326	Natural	4.3	0	Link 331	1	0	0	0	0.04	952.53	952.44	956.89	956.8	209	0.04	71	28.852
Link332	Node326	Node327	Rectangular	3.5	0	0	1	0	0	14	0	952.44	952.44	956.8	957.14	18	0.04	7.2	28.7
Link333	Node327	Node329	Natural	4.7	0	6bot16top4.7deepNat	1	0	0	0	0.02	952.44	952.39	957.14	957.09	206	0.04	56.88	28.581
Link337	Node329	Node332	Rectangular	4	0	0	1	0	0	12	0.02	952.39	952.388	957.09	956.75	9	0.04	34.83	28.469
Link338	Node331	Node331.1	Natural	5.5	0	10bot30top5.5deepnat	1	0	0	0	0.02	952.03	951.979	957.58	958.78	232	0.04	135.68	27.728
Link336	Node332	Node331	Natural	4.3	0	6bot14top4.3deepNW	1	0	0	0	0.06	952.388	952.03	956.75	957.58	563	0.045	64.6	28.243
Link340	Node333	Node335	Natural	5.3	0	6bot14top5.3deepNat	1	0	0	0	0.09	951.91	951.46	958.57	956.82	521	0.04	113.55	27.334
Link338.1	Node331.1	Node333	Natural	5	0	tirenewjersey	1	0	0	0	0.02	951.979	951.91	958.78	958.57	309	0.04	109.84	27.422
Link341	Node335	Node336	Natural	5.3	0	6bot14top5.3deepNat	1	0	0	0	0.11	951.46	951.27	956.82	958.5	171	0.04	128.79	27.424
Link342	Node336	F-N038-2	Natural	7.2	0	7bot14top7.2deepNat	1	0	0	0	0.32	951.27	950.83	958.5	960.83	136	0.04	352.78	27.503
Link342.1	F-N038-2	Node336.2.	Natural	8.4	0	5bot14top8.4deepNat	1	0	0	0	0.26	950.83	950.3	960.83	958.7	207	0.04	333.44	36.805
FruitMain	Node336.2.	F-N038-1	0	0	0	0	0	0	0	0	0	0	0	958.7	992.03	0	0	0	70.76
fruitblock	Node336.2.	Node610	0	0	0	0	0	0	0	0	0	0	0	958.7	956.15	0	0	0	-41.458

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Allen-Fruitdale Links																			
Link346	Node340	Node341	Special	6.3	0	0	1	0	0	0	0	951.62	951.62	960.02	957.48	56	0.024	4.61	-41.632
Link347	Node341	Node342	Natural	5.4	0	8bot30top5.4deepNat	1	0	0	0	-0.09	951.62	951.88	957.48	957.28	279	0.04	250.36	-41.897
Link348	Node342	Node343	Special	7.67	0	0	1	0	0	0	0.08	951.88	951.8	957.28	956.655	100	0.024	82.82	-42.642
Link351	Node343	Node347	Natural	4.3	0	Link351	1	0	0	0	0.1	951.8	951.52	956.655	956.13	267	0.04	99.32	-43.041
Link350	Node344	Node340	Natural	8.4	0	5bot14top8.4deepNat	1	0	0	0	-4.3	951.19	951.62	959.59	960.02	10	0.04	1366.48	-41.603
Link349	Node345	Node344	Natural	8.4	0	5bot14top8.4deepNat	1	0	0	0	-0.22	950.87	951.19	959.46	959.59	143	0.04	311.73	-41.511
Link352	Node347	Node348	Natural	4.6	0	Link 352	1	0	0	0	-0.17	951.52	951.72	956.13	957.5	117	0.04	160.25	-43.726
Link353	Node348	F-N138	Natural	3.7	0	Link 353	1	0	0	0	0.05	951.72	951.46	957.5	958.36	486	0.04	62.31	-45.443
Link354	F-N138	Node350	Rectangular	5.3	0	0	1	0	0	20	0.07	951.46	951.43	958.36	958.36	45	0.022	302.66	-7.592
Link355	Node350	Node351	Natural	4	0	link 355	1	0	0	0	0.07	951.43	951.32	958.36	955.32	154	0.034	69.92	17.193
Link356	Node351	Node352	Natural	4	0	link 356	1	0	0	0	0.07	951.32	951.1	955.32	955.1	300	0.022	125.62	14.922
Link357	Node352	Node353	Natural	3.99	0	link 357	1	0	0	0	-0.05	951.11	951.25	955.1	956.26	302	0.022	127.61	10.661
Link358	Node353	Node354	Natural	3.2	0	link358	1	0	0	0	0.05	951.25	951.21	956.26	954.47	77	0.04	56.35	7.428
Link359	Node354	Node355	Natural	3.2	0	link358	1	0	0	0	-0.09	951.21	951.31	954.47	955.41	116	0.04	72.59	7.322
Link360	Node355	Node356	Natural	4	0	link360	1	0	0	0	0.1	951.31	951.19	955.41	955.29	119	0.05	74.49	56.991
Link361	Node356	Node357	Natural	3.6	0	link361	1	0	0	0	0.12	951.19	950.96	955.29	954.64	200	0.04	94.9	55.393
Link362	Node357	Node358	Natural	3.6	0	6bot18top3.6deepGun	1	0	0	0	0.02	950.96	950.93	954.64	954.61	134	0.022	72.97	53.37
Link363	Node358	Node359	Natural	3.3	0	7bot15top3.3deepNat	1	0	0	0	0.06	950.93	950.77	954.61	954.11	259	0.04	54.78	50.857
Link364	Node359	Node360	Natural	3.3	0	7bot15top3.3deepNat	1	0	0	0	0.05	950.77	950.62	954.11	957.22	297	0.04	49.54	45.296
Link365	Node360	F-N602	Rectangular	4.8	0	0	1	0	0	18	0.23	950.62	950.54	957.22	957.14	35	0.04	234.97	44.333
Link367	Node362	Node363	Natural	3.4	0	8bot14top3.4deepNat	1	0	0	0	0.56	949.99	949.56	954.19	952.97	77	0.04	175.16	77.044
Link368	Node363	Node364	Natural	3.4	0	8bot14top3.4deepNat	1	0	0	0	-0.14	949.56	949.78	952.97	953.44	160	0.04	0.52	69.33
Link369	Node364	Node365	Natural	3.2	0	8bot14top3.2deepNat	1	0	0	0	0.04	949.78	949.66	953.44	952.92	315	0.04	41.84	65.866
Link370	Node365	Node366	Natural	3.2	0	10bot22top3.2deepNat	1	0	0	0	-0.01	949.66	949.68	952.92	955.38	330	0.04	24.82	62.152
Link371	Node366	Node367	Rectangular	3	0	0	1	0	0	12	0.76	949.68	949.49	955.38	955.49	25	0.04	131.66	62.566
Link372	Node367	Node368	Natural	3.2	0	10bot22top3.2deepNat	1	0	0	0	0.15	949.49	949.19	955.49	953.21	201	0.04	123.15	62.796
Link373	Node368	F-N402	Natural	3.2	0	10bot22top3.2deepNat	1	0	0	0	-0.09	949.19	949.24	953.21	953.866	58	0.04	93.59	63.207
Link375	Node369	Node370	Natural	4.3	0	8bot16top4.3deepNat	1	0	0	0	0.04	949.33	949.2	953.74	953.51	328	0.04	72.4	88.882
Link376	Node370	Node371	Natural	3.6	0	7bot15top3.6deepNat	1	0	0	0	-0.01	949.2	949.21	953.51	954.91	144	0.04	20.92	86.826
Link377	Node371	Node372	Circular	5	0	0	1	0	0	0	0.27	949.21	949.15	954.91	954.15	22	0.024	73.67	86.603
Link378	Node372	F-N932	Natural	3.6	0	7bot15top3.6deepNat	1	0	0	0	-0.04	949.15	949.24	954.15	958.55	202	0.04	52.99	86.377
Link380	Node373	Node374	Natural	2.8	0	6bot12top2.8deepRck	1	0	0	0	0.07	948.94	948.8	952.72	952.5	213	0.045	31.26	86.132
Link381	Node374	Node375	Natural	3.7	0	8bot14top3.7deepRck	1	0	0	0	-0.01	948.8	948.81	952.5	952.55	163	0.045	18.46	83.199
Link382	Node375	Node375.1	Natural	3.7	0	8bot14top3.7deepRck	1	0	0	0	0.2	948.81	948.648	952.55	952.59	80	0.045	106.06	81.27
Link384	Node376	Node378	Natural	3.8	0	10bot18top3.8deepNat	1	0	0	0	-0.27	948.39	948.78	952.47	952.64	147	0.04	187.55	77.251
Link382.1	Node375.1	Node376	Natural	3.9	0	10bot18top3.9deepNat	1	0	0	0	0.2	948.648	948.39	952.59	952.47	127	0.04	171.92	79.447
Link385	Node378	Node378.1	Natural	3.8	0	10bot18top3.8deepNat	1	0	0	0	0.17	948.78	948.5	952.64	952.77	160	0.04	152.32	75.443
Link387	Node379	Node381	Natural	3.3	0	8bot14top3.3deepNat	1	0	0	0	-0.05	948.4	948.44	952.14	951.81	84	0.04	48.95	71.928
Link385.1	Node378.1	Node379	Natural	3.3	0	8bot14top3.3deepNat	1	0	0	0	0.18	948.5	948.4	952.77	952.14	55	0.04	95.65	73.906
Link388	Node381	Node382	Natural	3.3	0	8bot14top3.3deepNat	1	0	0	0	0.2	948.44	948.29	951.81	951.89	76	0.04	99.66	70.549
Link389	Node382	Node383	Natural	3.3	0	8bot14top3.3deepNat	1	0	0	0	-0.5	948.29	948.64	951.89	952.68	70	0.04	158.62	70.883
Link390	Node383	A-N928	Rectangular	4	0	0	1	0	0	8	0.77	948.64	948.33	952.68	952.93	40	0.04	126.78	71.321

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Allen-Fruitdale Links																			
Link392	Node384	Node384.1	Natural	5.7	0	5bot10top5.7deepRck	1	0	0	0	0.08	947.46	947.26	953.16	952.96	254	0.05	64.79	72.51
Link394	Node385	Node387	Circular	4	0	0	1	0	0	0	0.17	947.14	946.76	952.84	952.46	230	0.013	58.39	83.555
Link392.1	Node384.1	Node385	Natural	5.7	0	8bot10top5.7deepNat	1	0	0	0	0.08	947.26	947.14	952.96	952.84	147	0.04	103.51	72.716
Link395	Node387	A-N926	Natural	5.7	0	10bot20top5.5deepNat	1	0	0	0	0.19	946.76	946.46	952.46	952.16	155	0.04	315.82	83.771
Link397	Node388	Node389	Special	5	0	0	1	0	0	0	1.9	946.13	945.58	951.83	951.75	29	0.014	184.65	79.693
Link398	Node389	Node390	Natural	5.7	0	5bot10top5.7deepRck	1	0	0	0	1.08	945.58	944.55	951.75	950.25	95	0.04	240.43	79.284
Link399	Node390	Node391	Special	5	0	0	1	0	0	0	0.89	944.55	944.3	950.25	950	28	0.024	73.9	75.483
Link400	Node391	Node392	Natural	5.7	0	5bot10top5.7deepRck	1	0	0	0	0.27	944.3	944.02	950	949.72	102	0.014	120.98	72.431
A-N926L	Node392	Node392.1	Special	4.25	0	0	1	1	1	8	0.01	944.02	943.91	949.72	947.57	1470.02	0.024	12.13	69.075
Link405	Node393	Node396	Special	5	0	0	1	0	0	0	0.12	947	946.36	952.1	952.46	546	0.013	49.44	-23.651
Link401.1	A-N320.1	Node393	Special	5	0	0	1	0	0	0	-0.12	946.88	947	951.98	952.1	97	0.013	50.79	19.409
Link403	A-N320.1	Node395	Special	5	0	0	1	0	0	0	0.39	946.88	946.5	951.98	952.14	97	0.013	90.38	-21.819
Link404	Node395	Node396	Special	5	0	0	1	0	0	0	0.03	946.5	946.36	952.14	952.46	546	0.013	23.12	-22.785
Link406	Node396	Node397	Rectangular	3	0	0	1	0	0	12.5	0	946.34	946.34	952.46	951.15	50	0.013	15.39	38.771
Link407	Node397	Node398	Circular	4	0	0	1	0	0	0	0.05	945.2	945.1	951.15	949.66	213	0.013	31.12	38.768
Link408	Node398	Node399	Rectangular	3	0	0	1	0	0	10	0	946.2	946.2	949.66	949.94	150	0.013	11.93	72.545
Link409	Node399	A-N310	Circular	4	0	0	1	0	0	0	-0.11	943.5	943.87	949.94	949.774	325	0.013	48.47	38.894
A-N310L	A-N306	Node401	Circular	4	0	0	1	1	1	8	0.03	943.4	943.2	950.31	951.38	642	0.013	25.35	58.07
Link411	Node401	Node402	Circular	4	0	0	1	0	0	0	0	943.2	943.2	951.38	950.53	49	0.013	4.54	58.086
Link412	Node402	Node403	Special	3.75	0	0	1	0	0	0	0	943.2	943.2	950.53	947.7	22	0.013	2.18	58.051
Link413	Node403	Node404	Natural	4.4	0	7bot13top4.4deepNat	1	0	0	0	-10.89	943.2	946.14	947.7	950.54	27	0.04	991.66	52.049
Link414	Node404	Node405	Natural	4.4	0	7bot13top4.4deepNat	1	0	0	0	0.8	946.14	945.25	950.54	949.71	111	0.04	269.09	52.06
Link415	Node405	A-N300	Natural	4.4	0	7bot13top4.4deepNat	1	0	0	0	0.81	945.25	943.84	949.71	951.54	174	0.04	270.52	52.101
Link417	Node409	Node410	Natural	4.4	0	7bot13top4.4deepNat	1	0	0	0	0.33	945.64	944.64	950.48	949.66	302	0.04	172.93	60.966
Link418	Node410	Node411	Natural	3.6	0	7bot13top3.6deepNat	1	0	0	0	0.03	944.64	944.5	949.66	948.1	473	0.04	38.91	60.753
Link419	Node411	Node412	Natural	3.6	0	7bot13top3.6deepNat	1	0	0	0	0.01	944.5	944.46	948.1	948.96	465	0.04	20.97	60.619
Link420	Node412	Node413	Rectangular	3	0	0	1	0	0	12	0.03	944.46	944.44	948.96	948.94	60	0.04	27.57	60.585
Link421	Node413	Node414	Natural	3.1	0	6bot14top3.1deepNat	1	0	0	0	0.15	944.44	944.08	948.94	947.2	236	0.04	69.55	60.571
Link422	Node414	Node415	Natural	3.1	0	6bot10top3.1deepConc	1	0	0	0	-0.07	944.08	944.13	947.2	947.23	68	0.017	88.71	60.566
Link423	Node415	Node416	Natural	3.1	0	6bot10top3.1deepConc	1	0	0	0	0.14	944.13	943.83	947.23	946.93	211	0.017	123.35	60.565
Link424	Node416	Node417	Natural	3.1	0	6bot10top3.1deepConc	1	0	0	0	-0.1	943.83	944.01	946.93	947.71	182	0.017	102.88	60.561
Link425	Node417	Node418	Rectangular	3	0	0	1	0	0	14	0.17	944.01	943.96	947.71	947.66	29	0.04	74.59	60.557
Link426	Node418	Node418.2	Natural	3.2	0	3bot14top3.2deepNat	1	0	0	0	-0.11	943.96	944.06	947.66	947.26	94	0.04	60.93	60.555
Link429	Node419	A-N024-2	Special	3	0	0	1	0	0	6	0.41	944.08	943.74	947.18	949.74	82	0.024	53.18	-19.398
Link426.1	Node418.1	Node419	Natural	3.1	0	6bot10top3.1deepConc	1	0	0	0	-0.14	944.07	944.08	947.21	947.18	7	0.017	123.64	-19.307
1449.1	Node418.1	A-N026.1	Circular	4	0	0	1	0	0	0	3.9	938.08	934.29	947.21	947.66	97.3	0.013	283.5	69.018
1449.2	Node418.1	A-N026.1	Circular	1.5	0	0	1	0	0	0	9.35	943.39	934.29	947.21	947.66	97.3	0.013	32.12	0
Link426.2	Node418.2	Node418.1	Natural	3.1	0	6bot10top3.1deepConc	1	0	0	0	-0.08	944.06	944.07	947.26	947.21	13	0.017	90.73	60.553
Link430	A-N024-2	Node423	Circular	6	0	0	1	0	0	0	0.42	943.74	943.32	949.74	949.32	99	0.024	149.42	12.269
Link431	Node423	A-N022	Rectangular	3	0	0	1	0	0	6.7	0.64	943.32	942.85	949.32	949.15	73	0.017	144.35	11.911
Link432	A-N022	A-N924	Special	6.4	0	0	1	0	0	0	-0.14	942.85	942.94	949.15	951.54	63	0.024	70.96	23.047
Link434	Node425	Node426	Natural	4.8	0	6bot16top4.8deepNat	1	0	0	0	-0.13	943.13	943.43	947.96	948.23	231	0.04	135.65	21.263

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Allen-Fruitdale Links																			
Link435	Node426	Node427	Natural	3.1	0	5bot11top3.1deepNat	1	0	0	0	0.2	943.43	942.93	948.23	946.1	253	0.04	61.05	21.117
Link436	Node427	Node428	Special	5	0	0	1	0	0	0	0.93	942.93	942.65	946.1	948.09	30	0.024	75.56	21.111
Link439	Node429	Node430	Circular	6	0	0	1	0	0	0	0.61	1031.02	1028.98	1038.66	1047.58	336	0.024	178.75	-18.133
Link443	Node429	F-N058.2	Circular	4	0	0	1	0	0	0	-0.03	1028.16	1028.39	1038.66	1034.78	898	0.024	12.45	21.201
Link444	Node430	Node434	Circular	6	0	0	1	0	0	0	0.46	1028.98	1028.87	1047.58	1047.17	24	0.024	155.3	-19.748
Link448	F-N058.2	F-N058.2.1	Natural	3	0	6bot12top3deepNat	1	0	0	0	0.05	1028.78	1028.72	1034.78	1033.64	118	0.04	34.26	-44.504
Link445	Node434	Node435	Circular	6	0	0	1	0	0	0	-43	1028.87	1031.02	1047.17	1047.52	5	0.024	1504.28	-19.929
Link440	Node435	F-N058.2	Circular	6	0	0	1	0	0	0	0.38	1031.02	1028.78	1047.52	1034.78	591	0.024	141.23	-22.135
Link637	Node440	Node615	Natural	3.8	0	5bot5top3.8deepConc	1	0	0	0	0	1028.67	1028.67	1032.5	1032.47	32	0.017	6.91	12.9
Link451	Node441	Node441.3	Natural	3.8	0	8bot18top3.8deepRock	1	0	0	0	0.19	1028.67	1028.42	1032.5	1032.22	132	0.045	127.35	11.698
Link452	Node442	F-N822	Natural	3.8	0	8bot18top3.8deepRock	1	0	0	0	-0.13	1027.37	1028.061	1031.17	1031.861	552	0.045	103.54	9.807
Link451.1	Node441.1	Node442	Natural	3.8	0	8bot18top3.8deepRock	1	0	0	0	0.19	1027.55	1027.37	1031.35	1031.17	96	0.045	126.72	9.661
Link451.2	Node441.2	Node441.1	Natural	3	0	8bot14top3deepGun	1	0	0	0	0.19	1027.9	1027.55	1030.9	1031.35	187	0.022	153.17	9.634
Link451.3	Node441.3	Node441.2	Natural	3	0	8bot14top3deepConc	1	0	0	0	0.18	1028.42	1027.9	1032.22	1030.9	282	0.017	196.75	11.22
Link458	Node448	F-N050	Circular	1.5	0	0	1	0	0	0	18.75	1027.2	983.328	1030.4	1018.54	234	0.013	45.48	18.945
panoramic	Node448	Node449	0	0	0	0	0	0	0	0	0	0	0	1030.4	1030.4	0	0	0	-4.394
Link460	Node449	Node450	Natural	3.2	0	12bot18top3.2deepRck	1	0	0	0	0.18	1027.2	1026.99	1030.4	1030.19	117	0.045	117.37	-4.055
Link461	Node450	Node451	Natural	3.1	0	6bot18top3.1deepGun	1	0	0	0	0.18	1026.99	1026.85	1030.19	1030.3	79	0.022	162.66	-5.113
Link462	Node451	Node452	Natural	3.1	0	6bot18top3.1deepGun	1	0	0	0	0.21	1026.85	1026.41	1030.3	1030.15	206	0.022	178.58	-6.738
Link463	Node452	Node453	Natural	3.1	0	6bot18top3.1deepGun	1	0	0	0	-0.01	1026.41	1026.42	1030.15	1029.52	130	0.022	33.89	-8.431
Link464	Node453	Node454	Rectangular	3.1	0	0	1	0	0	8	0.05	1026.42	1026.411	1029.52	1029.511	18	0.022	40.33	-9.476
Link465	Node454	Node455	Natural	3.1	0	6bot18top3.1deepGun	1	0	0	0	0.05	1026.411	1026.26	1029.511	1029.87	316	0.022	84.47	-12.365
Link466	Node455	Node456	Natural	3.6	0	6bot12top3.6deepRock	1	0	0	0	0.16	1026.26	1025.88	1029.87	1029.48	241	0.045	69.84	-16.622
Link467	Node456	F-N812	Natural	3.6	0	6bot12top3.6deepGun	1	0	0	0	-0.1	1025.88	1025.96	1029.48	1032.262	77	0.022	115.96	-18.487
Link469	Node457	Node458	Natural	3.6	0	6bot12top3.6deepGun	1	0	0	0	-0.1	1025.999	1026.035	1032	1030	35	0.022	115.38	42.355
Link470	Node458	Node459	Rectangular	3.6	0	0	1	0	0	9	-0.1	1026.035	1026.053	1030	1030.053	18	0.022	81.83	42.075
Link471	Node459	Node460	Natural	4	0	6bot12top4deepRck	1	0	0	0	0.25	1026.053	1025.26	1030.053	1029.26	323	0.045	101.14	41.03
Link472	Node460	Node461	Natural	4	0	6bot12top4deepRck	1	0	0	0	0.24	1025.26	1024.78	1029.26	1029.78	196	0.045	101.02	40.267
Link473	Node461	Node462	Natural	5	0	6bot16top5deepGun	1	0	0	0	0.24	1024.78	1024.63	1029.78	1029.63	63	0.022	354.14	39.454
Link474	Node462	Node463	Natural	5	0	6bot16top5deepGun	1	0	0	0	0.08	1024.63	1024.43	1029.63	1029.43	255	0.022	203.26	38.616
Link475	Node463	Node464	Natural	5	0	6bot16top5deepGun	1	0	0	0	-0.05	1024.43	1024.53	1029.43	1029.53	199	0.022	162.69	37.195
Link476	Node464	Node465	Natural	5	0	6bot16top5deepGun	1	0	0	0	0.21	1024.53	1024.09	1029.53	1029.09	208	0.022	333.8	35.986
Link477	Node465	Node466	Natural	5	0	6bot16top5deepNat	1	0	0	0	0.26	1024.09	1023.68	1029.09	1028.68	158	0.04	203.34	34.652
Link478	Node466	Node467	Rectangular	4	0	0	1	0	0	12	0	1023.68	1023.68	1028.68	1028.68	16	0.04	7.39	34.049
Link479	Node467	Node468	Natural	4	0	10bot13top4deepNat	1	0	0	0	0.06	1023.68	1023.46	1028.68	1027.46	383	0.04	73.85	32.959
Link480	Node468	Node469	Natural	4	0	10bot14top4deepRck	1	0	0	0	0.18	1023.46	1023.05	1027.46	1027.05	223	0.045	126.32	31.629
Link481	Node469	Node470	Special	4	0	0	1	0	0	0	-0.42	1023.05	1023.3	1027.05	1027.3	59	0.04	54.76	31.492
Link482	Node470	Node471	Natural	4	0	6bot12top4deepRck	1	0	0	0	0.09	1023.3	1022.8	1027.3	1027.4	560	0.045	60.99	31.518
Link483	Node471	Node472	Special	4.6	0	0	1	0	0	9.3	0.22	1022.8	1022.66	1027.4	1029.04	63	0.045	209.24	31.706
Link484	Node472	Node473	Natural	6	0	5bot10top6deepRck	1	0	0	0	0.47	1023.04	1022.62	1029.04	1028.62	90	0.045	186.99	44.118
Link485	Node473	Node473.3	Natural	6	0	6bot12top6deepRck	1	0	0	0	0.58	1022.62	1022.29	1028.62	1028.29	57	0.045	268.33	43.959
Link485.1	Node473.1	Node478	Natural	6	0	6bot12top6deepRck	1	0	0	0	-0.15	1022.24	1022.57	1028.24	1028.57	215	0.045	138.16	42.744

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Allen-Fruitdale Links																			
Link485.2	Node473.2	Node473.1	Natural	6	0	6bot12top6deepRck	1	0	0	0	0.22	1022.71	1022.24	1028.71	1028.24	216	0.045	164.5	43.172
Link485.3	Node473.3	Node473.2	Natural	6	0	6bot12top6deepRck	1	0	0	0	-0.26	1022.29	1022.71	1028.29	1028.71	162	0.045	179.56	43.676
Link489	Node478	Node479	Natural	4	0	8bot16top4deepRck	1	0	0	0	0.28	1022.57	1021.87	1028.57	1027.87	251	0.045	153.58	41.941
Link490	Node479	Node480	Natural	6	0	8bot16top6deepRck	1	0	0	0	0.05	1021.87	1021.67	1027.87	1027.67	414	0.045	113.74	40.951
Link491	Node480	Node481	Rectangular	4	0	0	1	0	0	10.5	0.01	1021.67	1021.668	1027.67	1027.668	18	0.045	18.71	40.573
Link492	Node481	Node482	Natural	3.5	0	7bot13top3.5deepGun	1	0	0	0	0.01	1021.668	1021.643	1027.668	1025.143	241	0.022	40.21	40.383
Link493	Node482	Node483	Rectangular	3.5	0	0	1	0	0	10	0.02	1021.643	1021.641	1025.143	1026.541	13	0.04	19.17	40.246
Link494	Node483	Node484	Natural	4.9	0	8bot14top4.9deepNat	1	0	0	0	0.01	1021.641	1021.61	1026.541	1026.58	230	0.04	45.8	40.118
Link495	Node484	Node485	Natural	4.9	0	8bot14top4.9deepNat	1	0	0	0	0.02	1021.61	1021.57	1026.58	1026.57	230	0.04	52.03	39.959
Link496	Node485	Node486	Rectangular	4.5	0	0	1	0	0	9	-0.16	1021.57	1021.63	1026.57	1027.1	38	0.04	78.34	39.87
Link497	Node486	Node487	Natural	4.9	0	8bot18top4.9deepRock	1	0	0	0	0.17	1021.63	1020.2	1027.1	1025.1	857	0.045	174.55	39.677
Link498	Node487	Node488	Natural	4.9	0	8bot18top4.9deepRock	1	0	0	0	-0.59	1020.2	1020.65	1025.1	1025.55	76	0.045	328.8	39.684
Link499	Node488	Node488.1	Natural	4.4	0	8bot18top4.4deepRock	1	0	0	0	0.06	1020.65	1020.44	1025.55	1024.91	325	0.045	92.7	40.316
Link500	Node489	Node490	Natural	4.2	0	8bot18top4.9Nat	1	0	0	0	-0.05	1020.54	1020.87	1024.94	1025.14	602	0.04	84.42	60.022
Link502	Node490	F-N918	Natural	4.2	0	8bot18top4.2deepGun	1	0	0	0	0.07	1020.87	1020.64	1025.14	1024.9	326	0.022	184.87	59.802
Link499.1	Node488.1	Node489	Natural	4.4	0	8bot18top4.4deepRock	1	0	0	0	-0.05	1020.44	1020.54	1024.91	1024.94	206	0.045	80.35	60.27
Link507	Node493	Node493.2	Natural	3.5	0	8bot18top3.5deepNat	1	0	0	0	-0.01	1019.81	1019.82	1023.98	1023.48	174	0.04	22.01	77.534
Link504.1	F-N918.1	Node493	Natural	3.5	0	8bot18top3.5deepNat	1	0	0	0	0.39	1020.2	1019.81	1024.41	1023.98	99	0.04	182.26	78.326
Link504.2	F-N918.2	F-N918.1	Natural	4.2	0	8bot18top4.2deepGun	1	0	0	0	0.42	1020.28	1020.2	1024.49	1024.41	19	0.022	451.63	78.582
Link510	Node496	Node499	Natural	3.5	0	8bot18top3.5deepDR	1	0	0	0	-0.2	1019.86	1020.01	1023.43	1023.72	76	0.05	103.21	73.662
Link507.1	Node493.1	Node496	Natural	3.5	0	8bot18top3.5deepNat	1	0	0	0	-0.35	1019.67	1019.86	1023.17	1023.43	54	0.04	172.25	74.04
Link507.2	Node493.2	Node493.1	Natural	3.5	0	8bot18top3.5deepNat	1	0	0	0	0.05	1019.82	1019.67	1023.48	1023.17	304	0.04	64.5	75.547
Link511	Node499	Node500	Natural	3.4	0	8bot18top3.4deepNat	1	0	0	0	0.09	1020.01	1019.76	1023.72	1023.45	270	0.04	84.51	73.436
Link512	Node500	Node501	Natural	3.4	0	8bot18top3.4deepNat	1	0	0	0	0.19	1019.76	1019.28	1023.45	1023.25	247	0.04	122.43	73.3
Link513	Node501	Node502	Natural	3.4	0	8bot18top3.4deepNat	1	0	0	0	-0.36	1019.28	1019.96	1023.25	1023.46	189	0.04	166.59	73.367
Link514	Node502	Node503	Rectangular	3.5	0	0	1	0	0	10	-0.16	1019.96	1020.01	1023.46	1023.61	32	0.04	61.1	73.61
Link515	Node503	Node504	Natural	3.6	0	8bot14top3.6deepNat	1	0	0	0	0.33	1020.01	1019.16	1023.61	1023.16	256	0.04	146.83	73.675
Link516	Node504	Node505	Rectangular	4	0	0	1	0	0	10.5	-0.12	1019.16	1019.2	1023.16	1023.2	33.1	0.04	69.43	74.169
Link526	Node505	Node505.1	Natural	4	0	7bot15top4deepNat	1	0	0	0	0.06	1019.2	1018.81	1023.2	1022.82	654	0.04	71.6	74.973
A-N308L.1	A-N308.1	Node40	Circular	2.5	0	0	1	1.5	1.5	0	0.72	949.7	949.11	952.2	951.61	82	0.013	34.79	27.861
A-N308L.2	A-N308.2	A-N308.1	Circular	1.75	0	0	1	1.5	1.5	0	0.72	951.16	949.7	953.43	952.2	203	0.013	13.44	20.083
A-N308L.3	A-N308.3	A-N308.2	Circular	1.75	0	0	1	1.5	1.5	0	0.72	951.54	951.16	953.86	953.43	53	0.013	13.42	23.586
A-N326L.1	A-N326.1	A-N324	Circular	0.67	0	0	1	0	0	0	2.07	955.47	952.7	960.94	958.45	134	0.013	1.76	3.12
F-N818L.1	F-N818.1	F-N814	Circular	2	0	0	1	0	0	0	5.5	1044.14	1033.86	1051.35	1042.31	187	0.013	53.04	6.191
F-N028L.1	F-N028.1	F-N026	Circular	2	0	0	1	0	0	0	0.54	938.69	936.83	945.12	944.08	342	0.013	16.68	7.32
F-N136L.1	F-N136.1	F-N134	Circular	1.75	0	0	1	1.5	1.5	0	0.6	938.45	937.83	941.45	940.83	104	0.013	12.23	4.254
F-N134L.1	F-N134.1	F-N132	Trapezoidal	1.5	0	0	1	1.5	1.5	0	0.54	937.37	936.43	940.07	938.53	174	0.03	8.96	4.208
Link527	Node514	Node515	Natural	4	0	7bot15top4dpHalfGun	1	0	0	0	0.06	1018.64	1018.609	1022.66	1022.609	51	0.03	96.39	120.698
Link528	Node515	Node516	Natural	3	0	7bot13top3deepConc	1	0	0	0	-1.21	1018.609	1018.9	1022.609	1021.9	24	0.017	448.75	120.64
Link529	Node516	Node517	Natural	3	0	7bot13top3deepConc	1	0	0	0	0.07	1018.9	1018.89	1021.9	1021.89	15	0.017	105.22	119.673
Link530	Node517	Node518	Natural	3	0	7bot13top3deepConc	1	0	0	0	0.07	1018.89	1018.87	1021.89	1022.87	29	0.022	107.02	118.985
Link531	Node518	Node519	Natural	4	0	7bot15top4dpHalfGun	1	0	0	0	0.06	1018.87	1018.797	1022.87	1022.8	121	0.03	96.03	118.936

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Allen-Fruitdale Links																			
Link532	Node519	Node519.1	Natural	4	0	6bot12top4deepConc	1	0	0	0	0.42	1018.8	1018.55	1022.8	1023.3	60	0.017	348.78	118.864
Link534	Node520	A-N916	Natural	4	0	6bot12top4deepConc	1	0	0	0	-0.03	1018.47	1018.69	1023.47	1022.69	698	0.017	95.93	118.579
Link532.1	Node519.1	Node520	Special	6.9	0	0	1	0	0	0	0.4	1018.55	1018.47	1023.3	1023.47	20	0.024	118.74	118.838
Link536	A-N916	Node524	Natural	2.8	0	6bot12top2.8deepConc	1	0	0	0	0.13	1018.69	1018.33	1022.69	1021.2	283	0.017	115.12	117.954
Link537	Node524	Node525	Natural	2.8	0	6bot12top2.8deepConc	1	0	0	0	0.57	1018.33	1017.77	1021.2	1021.25	98	0.017	243.99	116.302
Link538	Node525	Node526	Natural	2.8	0	6bot12top2.8deepConc	1	0	0	0	-0.26	1017.77	1018.23	1021.25	1021.03	179	0.017	163.62	115.315
Link539	Node526	Node527	Natural	2.8	0	6bot12top2.8deepConc	1	0	0	0	0	1018.23	1018.23	1021.03	1021.03	147	0.017	10.21	114.877
Link540	Node527	Node528	Natural	2.8	0	6bot12top2.8deepConc	1	0	0	0	0.03	1018.23	1018.17	1021.03	1021.97	183	0.017	58.44	114.511
Link541	Node528	Node529	Rectangular	2.8	0	0	1	0	0	9	0.16	1018.17	1017.85	1021.97	1020.65	206	0.017	90.7	114.436
Link542	Node529	Node530	Natural	2.8	0	6bot12top2.8deepConc	1	0	0	0	0.63	1017.85	1016.98	1020.65	1019.78	139	0.017	255.36	114.326
Link543	Node530	Node531	Rectangular	2.8	0	0	1	0	0	10	0.08	1016.98	1016.97	1019.78	1019.77	12	0.017	75	113.664
Link544	Node531	Node531.1	Natural	2.8	0	6bot12top2.8deepConc	1	0	0	0	0.05	1016.97	1016.87	1019.77	1019.9	196	0.017	72.91	113.206
Link546	Node532	Node534	Natural	2.8	0	6bot12top2.8deepConc	1	0	0	0	0.04	1016.8	1016.69	1019.99	1019.77	274	0.017	64.67	112.551
Link544.1	Node531.1	Node532	Natural	2.8	0	6bot12tp2.8dpHalfGun	1	0	0	0	0.05	1016.87	1016.8	1019.9	1019.99	142	0.03	40.61	112.849
Link547	Node534	Node535	Natural	2.8	0	6bot12top2.8deepConc	1	0	0	0	-1.12	1016.69	1016.97	1019.77	1019.77	25	0.017	341.59	112.263
Link548	Node535	Node536	Natural	2.8	0	6bot12top2.8deepConc	1	0	0	0	0.1	1016.97	1016.78	1019.77	1019.65	189	0.017	102.34	111.997
Link549	Node536	Node536.1	Natural	2.8	0	6bot12top2.8deepConc	1	0	0	0	0.35	1016.78	1016.48	1019.65	1019.39	85	0.017	191.76	111.703
Link551	Node537	A-N440	Natural	2.8	0	6bot12top2.8deepConc	1	0	0	0	0.02	1016.1	1016	1019.06	1020.8	452	0.017	48.01	110.935
Link549.1	Node536.1	Node537	Natural	2.8	0	6bot12top2.8deepConc	1	0	0	0	0.35	1016.48	1016.1	1019.39	1019.06	108	0.017	191.46	111.375
Link553	Node539	Node540	Natural	3.4	0	6bot12top3.4deepConc	1	0	0	0	0.18	1015.75	1014.6	1019.21	1018.44	624	0.017	184.14	116.22
Link554	Node540	Node540.1	Natural	3.4	0	6bot12top3.4deepConc	1	0	0	0	-0.19	1014.6	1014.986	1018.44	1018.49	199	0.017	188.91	116.224
Link556	Node541	Node543	Natural	3	0	6bot12top3deepconc	1	0	0	0	-0.21	1015.042	1015.08	1018.542	1018.13	18	0.017	164.24	114.196
Link554.1	Node540.1	Node541	Rectangular	3.5	0	0	1	0	0	12	-0.19	1014.986	1015.042	1018.49	1018.542	29	0.017	197.53	115.01
Link557	Node543	Node544	Natural	3	0	6bot12top3deepconc	1	0	0	0	0.21	1015.08	1014.56	1018.13	1017.88	251	0.017	162.7	112.955
Link558	Node544	Node545	Natural	3.3	0	6bot12top3.3deepConc	1	0	0	0	-0.17	1014.56	1014.9	1017.88	1018.37	197	0.017	170.67	111.446
Link559	Node545	A-N450	Natural	3.4	0	8bot20top3.4deepNat	1	0	0	0	0.23	1014.9	1014.593	1018.37	1020.554	133	0.04	143.02	110.551
Link561	Node546	Node547	Natural	3.4	0	6bot12top3.4deepConc	1	0	0	0	0.24	1014.46	1014.45	1019.46	1017.98	4.2	0.017	209.3	123.21
Link562	Node547	Node548	Natural	3.4	0	6bot12top3.4deepConc	1	0	0	0	-0.17	1014.45	1014.67	1017.98	1018.07	127	0.017	178.53	115.718
Link563	Node548	Node549	Natural	2	0	8bot16top2deepNat	1	0	0	0	0.79	1014.67	1013.96	1018.07	1017.29	90	0.04	99.88	113.553
Link564	Node549	Node550	Rectangular	2	0	0	1	0	0	8	0.8	1013.96	1013.84	1017.29	1017.29	15	0.04	45.82	112.252
Link565	Node550	Node551	Natural	1.5	0	8bot11top1.5deepRck	1	0	0	0	0.02	1013.84	1013.8	1017.29	1015.3	257	0.045	7.31	111.836
Link566	Node551	Node552	Natural	1.5	0	7bot10top1.5deepRck	1	0	0	0	-0.09	1013.8	1013.99	1015.3	1019.99	213	0.045	13.68	110.578
Link567	Node552	A-N915	Special	9	0	0	1	0	0	0	0.12	1013.99	1013.91	1019.99	1019.91	69	0.024	146.2	110.58
Link569	Node555	Node556	Natural	2.9	0	8bot16top2.9deepRck	1	0	0	0	-0.02	1013.54	1013.58	1017.23	1016.57	180	0.045	26.7	111.097
Link570	Node556	Node557	Natural	2.9	0	6bot12top2.9deepConc	1	0	0	0	-0.12	1013.58	1013.71	1016.57	1016.79	110	0.017	116.89	111.101
Link571	Node557	A-N914	Natural	2.9	0	6bot12top2.9deepConc	1	0	0	0	0.12	1013.71	1013.48	1016.79	1018.85	197	0.017	116.18	111.106
Link573	A-N108-2	A-N108-2.1	Natural	2.9	0	6bot12top2.9deepConc	1	0	0	0	0.1	1013.28	1013.21	1016.24	1016.15	71	0.017	106.76	117.183
Link574	Node559	Node560	Natural	2.9	0	6bot12top2.9deepConc	1	0	0	0	8.17	1012.63	1012.14	1016.01	1016.14	6	0.017	971.68	136.257
Link575	Node560	Node561	Natural	2.9	0	6bot12top2.9deepConc	1	0	0	0	-4	1012.14	1012.38	1016.14	1015.55	6	0.017	680.04	0.155
Link578	Node560	A-N108-1	Circular	3	0	0	1	0	0	0	12.35	1012.14	1001.767	1016.14	1017.01	84	0.013	234.38	136.298
Allencheck	Node561	Node564	0	0	0	0	0	0	0	0	0	0	0	1015.55	1015.55	0	0	0	0
Link577	Node562	Node563	Special	2	0	0	1	0	0	4	-0.31	1012.52	1012.775	1015.42	1015.68	81	0.017	22.19	-0.893

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Allen-Fruitdale Links																			
Link580	Node563	Node565	Natural	2.8	0	6bot12top2.8dpConc	1	0	0	0	-0.32	1012.775	1013.04	1015.68	1015.91	84	0.017	181.29	-1.189
Link576	Node564	Node562	Natural	2.9	0	6bot12top2.9deepConc	1	0	0	0	0.32	1012.65	1012.52	1015.55	1015.42	41	0.017	191.46	-0.283
Link581	Node565	Node566	Natural	2.8	0	8bot16top2.9deepNat	1	0	0	0	0.09	1013.04	1012.91	1015.91	1016.89	143	0.04	57.56	-1.518
Link582	Node566	Node567	Natural	3.8	0	6bot18top3.8deepNat	1	0	0	0	0.42	1012.91	1012.07	1016.89	1015.91	200	0.04	188.9	-2.135
Link583	Node567	Node568	Natural	3.8	0	6bot18top3.8deepGun	1	0	0	0	-0.37	1012.07	1012.45	1015.91	1016.25	104	0.022	320.34	-3.077
Link584	Node568	Node569	Natural	2.9	0	6bot12top2.9deepConc	1	0	0	0	-0.21	1012.45	1012.85	1016.25	1015.98	190	0.017	156.01	-4.195
Link585	Node569	Node570	Natural	2.9	0	6bot12top2.9deepConc	1	0	0	0	0.25	1012.85	1012.54	1015.98	1015.81	126	0.017	168.65	-4.809
Link586	Node570	Node571	Natural	2.9	0	6bot12top2.9deepConc	1	0	0	0	-0.1	1012.54	1012.66	1015.81	1015.62	118	0.017	108.43	-5.055
Link587	Node571	Node572	Natural	2.9	0	6bot12top2.9deepConc	1	0	0	0	0	1012.66	1012.67	1015.62	1015.57	222	0.017	22.82	-5.667
Link588	Node572	A-N912	Natural	2.9	0	6bot12top2.9deepConc	1	0	0	0	0.06	1012.67	1012.58	1015.57	1016.08	147	0.017	84.13	-6.436
Link590	Node573	Node574	Natural	3.1	0	Link 590	1	0	0	0	0.21	1012.34	1011.93	1015.84	1015.06	194	0.035	83.75	15.137
Link591	Node574	Node575	Natural	2.7	0	6bot12top2.7deepConc	1	0	0	0	0.01	1011.93	1011.91	1015.06	1014.7	166	0.017	33.56	14.698
Link592	Node575	Node576	Natural	2.7	0	6bot12top2.7deepConc	1	0	0	0	0.37	1011.91	1011.12	1014.7	1015.95	215	0.017	185.32	14.61
Link593	Node576	Node577	Special	6.9	0	0	1	0	0	0	-0.4	1011.12	1011.2	1015.95	1016.03	20	0.024	118.74	14.232
Link594	Node577	Node578	Natural	2.7	0	6bot12top2.7deepConc	1	0	0	0	-0.43	1011.2	1011.64	1016.03	1014.44	103	0.017	199.82	14.018
Link595	Node578	Node579	Rectangular	2.8	0	0	1	0	0	6	0.18	1011.64	1011.54	1014.44	1014.94	55	0.017	60.71	13.729
Link596	Node579	Node580	Natural	3.4	0	6bot12top3.4deepConc	1	0	0	0	0.07	1011.54	1010.99	1014.94	1015.99	818	0.017	111.22	13.484
Link597	Node580	Node581	Rectangular	5	0	0	1	0	0	7	0.46	1010.99	1010.925	1015.99	1015.925	14	0.017	268.08	13.196
Link598	Node581	Node582	Natural	5	0	6bot12top5deepNat	1	0	0	0	0.45	1010.925	1010.113	1015.925	1015.113	179	0.04	210.04	13.161
Link599	Node582	Node583	Rectangular	5	0	0	1	0	0	7	0.45	1010.113	1010.041	1015.113	1015.041	16	0.04	112.17	13.031
Link600	Node583	Node584	Natural	5	0	6bot12top5deepNat	1	0	0	0	0.45	1010.041	1009.86	1015.041	1014.86	40	0.04	209.78	12.989
Link601	Node584	Node585	Natural	3.9	0	6bot12top3.9deepNat	1	0	0	0	0	1009.36	1009.37	1014.86	1013.28	383	0.04	11.32	12.661
Link602	Node585	Node586	Natural	3.9	0	8bot14top3.9deepNat	1	0	0	0	0.2	1009.37	1008.986	1013.28	1012.89	192	0.04	127.93	12.371
Link604	Node586	Node588	Natural	3.9	0	6bot12top3.9deepRck	1	0	0	0	0.2	1008.986	1008.84	1012.89	1012.79	73	0.04	88.1	12.247
Link607	Node587	Node587.2	Natural	4.2	0	6bot12top4.2deepNat	1	0	0	0	-0.06	1008.77	1008.93	1013.42	1013.3	254	0.04	61.69	12.06
Link603	Node588	Node588.2	Natural	3.9	0	6bot12top3.9deepRck	1	0	0	0	0.03	1008.84	1008.8	1012.79	1013.8	154	0.04	31.75	12.184
Link603.1	Node588.1	Node587	Natural	3.9	0	6bot12top3.9deepRck	1	0	0	0	0.03	1008.79	1008.77	1013.79	1013.42	78	0.045	31.55	12.106
Link603.2	Node588.2	Node588.1	Rectangular	5	0	6bot12top3.9deepRck	1	0	0	8	0.03	1008.8	1008.79	1013.8	1013.79	30	0.04	36.16	12.135
Link610	Node591	Node594	Natural	4.2	0	6bot12tp4.2dpNatRck	1	0	0	0	-0.01	1009	1009.05	1013.26	1014.05	337	0.042	28.51	12.019
Link607.1	Node587.1	Node591	Natural	4.2	0	6bot12top4.2deepNat	1	0	0	0	-0.06	1008.94	1009	1013.3	1013.26	95	0.04	61.77	12.026
Link607.2	Node587.2	Node587.1	Rectangular	3.5	0	6bot12top4.2deepNat	1	0	0	8	-0.09	1008.93	1008.94	1013.3	1013.3	11	0.04	35.76	12.027
Link611	Node594	Node594.1	Special	6.9	0	0	1	0	0	0	0.05	1009.05	1009.04	1014.05	1014.03	20	0.024	41.98	12.044
Link614	Node595	Node595.4	Natural	4.8	0	8bot16top4.8deepNat	1	0	0	0	0.14	1008.82	1008.66	1013.63	1014.66	111	0.04	161.79	12.153
Link611.1	Node594.1	Node594.2	Natural	4.8	0	6bot12tp4.8dpNatRck	1	0	0	0	0.07	1009.04	1008.89	1014.03	1013.76	221	0.042	73.23	12.063
Link611.1.1	Node594.2	Node595	Natural	4.8	0	8bot16top4.8deepNat	1	0	0	0	0.06	1008.89	1008.82	1013.76	1013.63	111	0.04	107.01	12.109
Link621	A-N910	A-N044	Natural	4.6	0	8bot16top4.6deepNat	1	0	0	0	-0.02	1008.24	1008.27	1012.86	1013.41	163	0.04	54.39	42.268
Link614.1	Node595.1	A-N910	Natural	4.6	0	8bot16top4.6deepNat	1	0	0	0	0.15	1008.3	1008.24	1014.3	1012.86	41	0.04	153.38	12.634
Link614.2	Node595.2	Node595.1	Rectangular	6	0	0	1	0	0	12	0.18	1008.32	1008.3	1014.32	1014.3	11	0.04	181.05	12.573
Link614.3	Node595.3	Node595.2	Natural	6	0	10bot16top6deepNat	1	0	0	0	0.15	1008.64	1008.32	1014.64	1014.32	216	0.04	248.76	12.273
Link614.4	Node595.4	Node595.3	Special	8	0	0	1	0	0	0	0.15	1008.66	1008.64	1014.66	1014.64	13	0.024	114.85	12.183
Link622	Node769	Node603	Natural	4.3	0	5bot10top4.3deepGun	1	0	0	0	0.1	1008.61	1008.22	1013.41	1012.53	399	0.022	113.71	9.01
Link625.1	A-N306.1	A-N306.1.1	Circular	4	0	0	1	0	0	0	1.27	932.61	919.57	948.02	944.44	1030.37	0.013	161.59	66.897

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Allen-Fruitdale Links																			
A-N224L.1	A-N224.1	A-N222	Circular	2	0	0	1	0	0	0	0.99	905.81	903.09	913.62	911.65	275	0.013	22.5	23.769
Link642	Node607	Node607.1	Circular	1.5	0	0	1	0	0	0	2.12	922.66	914.79	936.81	927.82	371.2	0.013	15.3	12.886
A-N276L.1	A-N276.1	A-N266	Circular	2.5	0	0	1	0	0	0	0.26	909.538	908.04	927.58	916.9	581	0.013	20.83	34.661
A-N282L.1	A-N282.1	A-N276.1	Circular	2.5	0	0	1	0	0	0	0.5	913.46	909.54	926.13	927.58	784.37	0.013	29	20.556
Link345	Node610	Node345	Natural	4	0	5bot5top4deepConc	1	0	0	0	0	950.37	950.37	956.15	959.46	32	0.017	7.37	-41.467
F-N132L.1	F-N132.1	F-N130	Circular	2	0	0	1	0	0	0	0.88	932.93	925.32	937.42	935.02	868.84	0.013	21.17	8.392
A-N026L.1	A-N026.1	A-N024-1	Natural	0	0	NS_A-N026L	1	0	0	0	0.17	934.29	934.15	947.66	946.55	83	0.014	2793.6	902.941
Link449	Node615	Node441	Natural	3.8	0	8bot18top3.8deepRock	1	0	0	0	0	1028.67	1028.67	1032.47	1032.5	135	0.045	9.25	12.257
F-N054L.1	F-N054.1	F-N052	Natural	0	0	NS_F-N054L	1	0	0	0	1.8	998.47	994.27	1029.67	1029.52	233	0	168350.64	848.597
A-N266L.1	A-N266.1	A-N262	Circular	3.5	0	0	1	0	0	0	0.69	906.38	904.27	918.21	919.87	306	0.013	83.55	56.961
Link642.1	Node607.1	A-N266.1	Circular	2	0	0	1	0	0	0	2.12	914.79	906.38	927.82	918.21	397	0.013	32.93	12.872
Link645	Node621	Node622	Circular	2	0	0	1	0	0	0	4.17	1051.71	1043.13	1057.78	1049.64	206	0.012	50.02	4.263
Link646	Node622	A-N444	Circular	2	0	0	1	0	0	0	16.24	1043.13	1022.83	1049.64	1030	125	0.013	91.17	4.226
A-N442L	Node623	A-N440	Circular	2	0	0	1	0	0	0	0.4	1017.5	1017.432	1021	1020.8	17	0.013	14.31	5.012
A-N926L.1	Node392.1	A-N936	Rectangular	3	0	0	1	1	1	12	0.01	943.91	943.9	947.57	947.4	117	0.013	42.96	87.371
Link650	Node625	Node626	Trapezoidal	5.17	0	0	1	0	0	8	0.01	941.6	941.599	946.77	946.77	10	0.017	62.17	-1213.646
Link651	Node626	Node627	Trapezoidal	11.17	0	0	1	0	0	8	0.01	935.6	935.599	946.77	946.77	10	0.017	160.5	-607.091
Link652	Node627	Node628	Circular	4	0	0	1	0	0	0	0	935.6	935.6	946.77	945.5	202	0.024	2.46	78.024
Link653	Node628	Node629	Circular	4	0	0	1	0	0	0	-93.33	935.6	941.2	945.5	945.5	6	0.017	1061.2	77.036
Link654	Node629	Node630	Rectangular	3	0	0	1	0	0	2	0.25	941.2	941.1	945.5	945.5	40	0.017	18.65	77.317
A-N938L	Node630	R-N112	Circular	3	0	0	1	1	1	8	6.46	941.1	878.203	945.5	912.91	972.99	0.024	91.86	74.745
Link655	A-N344	Node631.1	Circular	2	0	0	1	0	0	0	3.21	968.3	954.77	971.3	956.77	421.88	0.013	40.51	34.706
Link655.1	Node631.1	Node385	Natural	1	0	3bot5top1deepNat	1	0	0	0	3.21	954.77	951.14	956.77	952.84	113	0.04	20.72	34.6
Link658	Node633	Node633.2	Circular	1	0	0	1	0	0	0	0.61	947.32	943.76	951.65	950.77	586.03	0.013	2.78	4.251
Link658.1	Node633.1	Node633.3	Circular	1.5	0	0	1	0	0	0	0.61	938.68	935.29	949.52	948.68	558	0.013	8.19	8.218
Link625.1.1	A-N306.1.1	A-N008	Circular	4	0	0	1	0	0	0	1.27	919.57	914.31	944.44	943	415.26	0.013	161.67	66.366
A-N054L.1	A-N054.1	A-N052	Circular	2	0	0	1	0	0	0	0.63	952.64	951.699	958.56	956.75	150.27	0.013	17.9	12.52

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Gilbert Links																			
G-L002	G-N002	G-N001	Circular	2.5	0	0	1	0	0	0	0.1	894.169	893.823	904.322	935	346.45	0.013	12.96	16.573
G-L003	G-N003	G-N002	Circular	2.5	0	0	1	0	0	0	0.1	894.3	894.169	904.85	904.322	130.298	0.013	13.01	13.437
G-L004	G-N004	G-N003	Circular	2.5	0	0	1	0	0	0	0.12	894.435	894.3	904.74	904.85	111.04	0.013	14.3	13.444
G-L005	G-N005	G-N004	Circular	2.5	0	0	1	0	0	0	0.1	894.678	894.435	903.839	904.74	243.346	0.013	12.96	13.602
G-L006	G-N006	G-N005	Circular	2.5	0	0	1	0	0	0	0.1	894.837	894.678	902.44	903.839	159.023	0.013	12.97	13.688
G-L007	G-N007	G-N007.2	Circular	1.333	0	0	1	0	0	0	0.3	895.9	895.78	901.2	901.34	40.42	0.013	4.18	4.017
G-L034	G-N034	G-N035	Circular	3.5	0	0	1	0	0	0	0.5	895	893	907.901	940	401.866	0.013	70.98	68.983
G-L014	G-N014	G-N033	Circular	3.5	0	0	1	0	0	0	0.14	896.038	895.9	901.938	903.614	100.466	0.01	48.47	65.26
G-L013	G-N013	G-N014	Circular	1.75	0	0	1	0	0	0	0.51	897.264	896.038	901.914	901.938	240.11	0.013	11.32	4.822
G-L012	G-N012	G-N013	Circular	1.75	0	0	1	0	0	0	0.41	898.45	897.264	901.654	901.914	289.598	0.013	10.14	2.088
G-L011	G-N011	G-N012	Circular	1.75	0	0	1	0	0	0	0.41	899.068	898.45	901.918	901.654	151.274	0.013	10.13	2.347
G-L015	G-N015	G-N014	Circular	3	0	0	1	0	0	0	0.17	896.75	896.038	904.711	901.938	411.501	0.013	27.74	26.341
G-L016	G-N016	G-N015	Circular	3	0	0	1	0	0	0	0.2	897.519	896.75	906.119	904.711	392.953	0.013	29.51	23.72
G-L032	G-N032	G-N014	Circular	3	0	0	1	0	0	0	0.08	896.512	896.038	905.362	901.938	628.482	0.01	23.81	21.75
G-L031	G-N031	G-N032	Circular	3	0	0	1	0	0	0	0.32	898.514	896.512	905.114	905.362	629.068	0.01	48.91	21.527
G-L017	G-N017	G-N016	Circular	2.5	0	0	1	0	0	0	0.17	898.419	897.519	904.756	906.119	534.397	0.013	16.83	16.515
G-L018	G-N018	G-N017	Circular	2.5	0	0	1	0	0	0	1.24	899.837	898.419	905.337	904.756	114.801	0.013	45.59	17.532
G-L030	G-N030	G-N031	Circular	3	0	0	1	0	0	0	0.25	900.322	898.514	906.872	905.114	728.221	0.01	43.2	22.182
G-L029	G-N029	G-N030	Circular	3	0	0	1	0	0	0	0.45	904.14	900.322	915.876	906.872	852.705	0.01	58.02	19.433
G-L028	G-N028	G-N029	Circular	2.5	0	0	1	0	0	0	0.45	905.21	904.14	913.142	915.876	238.079	0.01	35.75	12.745
G-L026	G-N026	G-N027	Circular	2.5	0	0	1	0	0	0	0.43	908.369	907.093	916.977	915.293	293.898	0.01	35.13	12.404
G-L020	G-N020	G-N019	Circular	2	0	0	1	0	0	0	0.18	902.488	902.266	907.588	907.166	125.554	0.013	9.51	1.816
G-L022	G-N022	G-N021	Circular	2	0	0	1	0	0	0	0.39	906.399	904.609	911.799	908.009	462.791	0.013	14.07	1.786
G-L023	G-N023	G-N022	Circular	2	0	0	1	0	0	0	-0.11	906.188	906.399	912.428	911.799	190.431	0.013	7.53	1.862
G-L027	G-N027	G-N028	Circular	2.5	0	0	1	0	0	0	0.45	907.093	905.21	915.293	913.142	417.847	0.01	35.8	12.648
G-L038	G-N038	G-N055	Circular	3.5	0	0	1	0	0	0	1.32	896.803	895.963	908.953	908.804	63.555	0.013	115.67	67.84
G-L054	G-N054	G-N038	Circular	3.5	0	0	1	0	0	0	0.45	897.559	896.803	910.176	908.953	167.789	0.013	67.53	61.496
G-L053	G-N053	G-N054	Circular	3.5	0	0	1	0	0	0	0.37	899.651	897.559	907.551	910.176	571.412	0.013	60.88	61.415
G-L052	G-N052	G-N053	Circular	3.5	0	0	1	0	0	0	0.53	904.675	899.651	912.875	907.551	952.764	0.013	73.06	53.713
G-L051	G-N051	G-N052	Circular	3.5	0	0	1	0	0	0	0.31	905.65	904.675	914.862	912.875	317.89	0.013	55.72	50.227
G-L050	G-N050	G-N051	Circular	3.5	0	0	1	0	0	0	0.54	906.705	905.65	915.305	914.862	196.051	0.013	73.8	42.12
G-L049	G-N049	G-N050	Circular	3.5	0	0	1	0	0	0	0.55	909.32	906.705	917.607	915.305	473.223	0.013	74.79	42.044
G-L048	G-N048	G-N049	Circular	3.5	0	0	1	0	0	0	0.5	910.96	909.32	918.285	917.607	328.022	0.013	71.14	42.363
G-L047	G-N047	G-N048	Circular	3	0	0	1	0	0	0	0.5	913.059	910.96	920.337	918.285	419.446	0.013	47.18	42.309
G-L045	G-N045	G-N046	Circular	2.25	0	0	1	0	0	0	0.95	917.309	914.009	926.831	922.159	346.058	0.013	30.24	32.501
G-L044	G-N044	G-N045	Circular	2.25	0	0	1	0	0	0	0.96	918.96	917.309	929.572	926.831	172.035	0.013	30.34	32.753
G-L043	G-N043	G-N044	Circular	2.25	0	0	1	0	0	0	0.98	919.311	918.96	929.561	929.572	35.696	0.013	30.71	32.97
G-L042	G-N042	G-N043	Circular	2	0	0	1	0	0	0	3.47	935.85	919.311	939.05	929.561	476.296	0.013	42.16	33.022
G-L041	G-N041	G-N042	Circular	2	0	0	1	0	0	0	0.73	938.839	935.85	941.34	939.05	411.825	0.013	19.27	21.135
G-L040	G-N040	G-N040.1	Circular	2	0	0	1	0	0	0	3.2	961.19	940.19	964.29	942.72	655.39	0.013	40.49	13.834
G-L068	G-N068	G-N069	Circular	3.5	0	0	1	0	0	0	1.16	895.688	892.349	909.438	930	287.794	0.013	108.37	55.962

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Gilbert Links																			
G-L067	G-N067	G-N068	Circular	3.5	0	0	1	0	0	0	1.42	900.651	895.688	910.157	909.438	349.396	0.013	119.91	56.09
G-L066	G-N066	G-N067	Circular	3.5	0	0	1	0	0	0	1.41	910.377	900.651	916.377	910.157	690.081	0.013	119.44	47.881
G-L065	G-N065	G-N066	Circular	3	0	0	1	0	0	0	0.47	913.409	910.377	918.685	916.377	648.618	0.013	45.6	39.47
G-L064	G-N064	G-N065	Circular	2.5	0	0	1	0	0	0	0.52	916.342	913.409	921.972	918.685	567.41	0.013	29.49	32.244
G-L063	G-N063	G-N064	Circular	2	0	0	1	0	0	0	0.64	918.529	916.342	923.529	921.972	340.172	0.013	18.14	20.268
G-L062	G-N062	G-N063	Circular	2	0	0	1	0	0	0	0.48	920	918.529	924.537	923.529	307.724	0.013	15.64	20.305
G-L061	G-N061	G-N062	Circular	2	0	0	1	0	0	0	0.91	924.95	920	928.6	924.537	546.902	0.013	21.52	20.342
G-L060	G-N060	G-N061	Circular	2	0	0	1	0	0	0	0.2	925.584	924.95	930.664	928.6	315.085	0.013	10.15	16.3
G-L075	G-N075	G-N076	Circular	2.5	0	0	1	0	0	0	0.58	915.71	914.5	924.008	929.5	210.137	0.013	31.12	12.467
G-L074	G-N074	G-N075	Circular	2.5	0	0	1	0	0	0	0.57	918.731	915.71	922.561	924.008	525.78	0.013	31.09	8.929
G-L073	G-N073	G-N074	Circular	2	0	0	1	0	0	0	0.02	918.798	918.731	924.378	922.561	285.356	0.013	3.47	9.063
G-L072	G-N072	G-N073	Circular	1.75	0	0	1	0	0	0	0.8	921.336	918.798	926.796	924.378	319.18	0.013	14.13	9.091
G-L071	G-N071	G-N072	Circular	1.5	0	0	1	0	0	0	0.94	923.89	921.336	929.427	926.796	272.774	0.013	10.16	5.497
G-L070	G-N070	G-N071	Circular	1.5	0	0	1	0	0	0	0.93	926.546	923.89	931.876	929.427	285.407	0.013	10.13	5.59
G-L091	G-N091	G-N092	Circular	1	0	0	1	0	0	0	0.47	913.617	912	921.867	930	343.328	0.01	3.18	7.845
G-L084	G-N084	G-N085	Circular	1	0	0	1	0	0	0	0.32	913.776	913.269	920.075	919.569	157.601	0.015	1.75	3.291
G-L083	G-N083	G-N084	Circular	1	0	0	1	0	0	0	0.53	915.564	913.776	921.914	920.075	340.009	0.015	2.24	3.291
G-L099	G-N099	G-N100	Circular	2	0	0	1	0	0	0	0.5	912.275	910.419	921.011	930	370.78	0.013	16.01	15.984
G-L098	G-N098	G-N099	Circular	2	0	0	1	0	0	0	0.5	914.174	912.275	921.774	921.011	379.911	0.013	15.99	16.188
G-L097	G-N097	G-N098	Circular	2	0	0	1	0	0	0	1.26	917.803	914.174	923.22	921.774	288.79	0.013	25.36	16.317
G-L097B	G-N097	G-N101	Circular	3.5	0	0	1	0	0	0	0.48	915.72	913.958	923.22	924.807	370	0.013	69.43	77.153
G-L090B	G-N090	G-N097	Circular	3	0	0	1	0	0	0	0.32	916.906	915.72	924.56	923.22	365	0.013	38.02	40.958
G-L082	G-N082	G-N083	Circular	1	0	0	1	0	0	0	0.61	917.772	915.564	923.972	921.914	364.432	0.015	2.4	3.291
G-L082B	G-N082	G-N090	Circular	1.25	0	0	1	0	0	0	0.3	918.072	916.906	923.972	924.56	389.989	0.013	3.53	8.864
G-L081	G-N081	G-N082	Circular	1	0	0	1	0	0	0	0.47	918.859	917.772	926.507	923.972	232.147	0.013	2.44	5.106
G-L080	G-N080	G-N081	Circular	1	0	0	1	0	0	0	0.47	920.337	918.859	928.687	926.507	314.06	0.013	2.44	4.496
G-L079	G-N079	G-N080	Circular	1	0	0	1	0	0	0	0.54	923.19	920.337	932.045	928.687	528.786	0.013	2.62	4.32
G-L089	G-N089	G-N089.1	Circular	2.5	0	0	1	0	0	0	0.57	928.77	919.06	937.47	926.9	1691.48	0.01	40.4	27.893
G-L077	G-N077	G-N078	Circular	1	0	0	1	0	0	0	0.54	927.7	926.202	936.289	935.202	278.446	0.013	2.61	3.141
G-L088	G-N088	G-N089	Circular	2.25	0	0	1	0	0	0	0.95	932.871	928.769	939.72	937.47	430.199	0.01	39.31	10.821
G-L087	G-N087	G-N087.1	Circular	1.75	0	0	1	0	0	0	0.75	939.27	937.16	946.37	944.17	279.79	0.01	17.89	11.156
G-L093	G-N093	G-N093.1	Circular	1.75	0	0	1	0	0	0	0.85	935.41	931.72	941.46	938.77	435.34	0.013	14.59	8.566
G-L094	G-N094	G-N095	Circular	2.25	0	0	1	0	0	0	0.4	927.828	926.809	935.93	934.559	254.16	0.013	19.61	22.803
G-L095	G-N095	G-N096	Circular	2.5	0	0	1	0	0	0	0.73	926.809	922.398	934.559	931	602.684	0.013	35.09	27.405
G-L096	G-N096	G-N096.1	Circular	2.5	0	0	1	0	0	0	0.56	922.4	919.09	931	927.2	590.13	0.013	30.72	36.372
G-L101	G-N101	G-N102	Circular	3.5	0	0	1	0	0	0	0.45	913.958	913.283	924.807	923.246	150.242	0.013	67.44	87.099
G-L107	G-N101	G-N107	Circular	1.25	0	0	1	0	0	0	-2.3	913.958	922.726	924.807	928.126	382.037	0.013	9.79	-4.091
G-L102	G-N102	G-N103	Circular	3.5	0	0	1	0	0	0	0.84	913.283	907	923.246	930	744.562	0.013	92.42	86.786
G-L110	G-N110	G-N112	Circular	2	0	0	1	0	0	0	1.92	908	900	921.595	930	416.78	0.013	31.34	20.187
G-L109	G-N109	G-N110	Circular	2	0	0	1	0	0	0	2.46	916	908	924.151	921.595	324.949	0.013	35.5	20.431
G-L106	G-N106	G-N108	Circular	1.5	0	0	1	0	0	0	0.63	921.387	919.308	927.087	926.508	328.996	0.013	8.35	10.687
G-L105	G-N105	G-N106	Circular	1.25	0	0	1	0	0	0	0.39	923.537	921.387	930.187	927.087	556.181	0.013	4.02	5.756

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Gilbert Links																			
G-L104	G-N104	G-N105	Circular	1	0	0	1	0	0	0	0.46	924.832	923.537	930.532	930.187	280.745	0.013	2.42	3.925
G-L127	G-N127	G-N128	Circular	1.5	0	0	1	0	0	0	1.36	948.471	940.94	950.971	943.939	554.036	0.013	12.25	1.535
G-L128	G-N128	G-N129	Circular	1.5	0	0	1	0	0	0	1.13	940.94	937.89	943.939	941.39	270.72	0.013	11.15	1.474
G-L129	G-N129	G-N130	Circular	2	0	0	1	0	0	0	0.82	937.89	934.785	941.39	943.185	379.596	0.013	20.46	6.089
G-L130	G-N130	G-N131	Circular	2	0	0	1	0	0	0	0.39	934.785	933.549	943.185	943.964	315.982	0.013	14.15	19.335
G-L131	G-N131	G-N132	Circular	2	0	0	1	0	0	0	0.39	933.549	932.75	943.964	946	202.563	0.013	14.21	19.135
G-L124	G-N124	G-N125	Circular	3	0	0	1	0	0	0	1.38	987.869	984.3	994.319	989.3	257.871	0.013	78.47	41.545
G-L138	G-N138	G-N136	Circular	2.5	0	0	1	0	0	0	1.48	1045.54	1040.5	1051.54	1052.28	340.075	0.013	49.93	12.791
G-L136	G-N136	G-N139	Circular	3	0	0	1	0	0	0	3.72	1040.5	1022.83	1052.28	1035.13	474.536	0.013	128.71	28.746
G-L140	G-N140	G-N141	Circular	3	0	0	1	0	0	0	1.01	1019.2	1016	1029.57	1040	316.888	0.013	67.03	28.223
G-L135	G-N135	G-N136	Circular	2.5	0	0	1	0	0	0	3.39	1059.26	1040.5	1066.41	1052.28	554.061	0.013	75.47	19.057
G-L144B	G-N144B	G-N148	Circular	2.5	0	0	1	0	0	0	2.38	1073.5	1070.28	1080.09	1076.31	135.235	0.013	63.29	46.966
G-L148	G-N148	G-N153	Circular	3	0	0	1	0	0	0	1.66	1070.28	1063.83	1076.31	1070.83	388.293	0.013	85.96	58.617
G-L153	G-N153	G-N154	Circular	2.5	0	0	1	0	0	0	1.23	1063.83	1063	1070.83	1069.66	67.725	0.013	45.41	73.242
G-L154	G-N154	G-N154.1	Circular	2.5	0	0	1	0	0	0	1.36	1063	1058.4	1069.66	1065.45	338.55	0.013	47.81	68.453
G-L155	G-N155	G-N156	Circular	3.5	0	0	1	0	0	0	5.43	1046	1022	1054.11	1055	442.393	0.013	234.34	107.906
G-L145	G-N145	G-N146	Circular	1	0	0	1	0	0	0	4.06	1097.15	1092.86	1102.75	1097.86	105.725	0.013	7.18	11.713
Link661	G-N145	G-N144B	Circular	2	0	0	1	0	0	0	4.11	1097.15	1073.5	1102.75	1080.09	575.98	0.013	45.84	41.136
G-L146	G-N146	G-N147	Circular	1.25	0	0	1	0	0	0	4.15	1092.86	1078	1097.86	1084.14	357.906	0.013	13.16	0
G-L147	G-N147	G-N147.1	Circular	3	0	0	1	0	0	0	4.1	1078	1074.51	1084.14	1080.6	85.15	0.013	135.03	0
G-L149	G-N149	G-N151	Circular	1.5	0	0	1	0	0	0	4.33	1123.59	1098.54	1131.04	1104.24	578.51	0.014	20.3	17.814
G-L150	G-N150	G-N151	Circular	1	0	0	1	0	0	0	-2.35	1099	1100.99	1106.53	1104.24	84.805	0.013	5.46	3.77
G-L152	G-N152	G-N153	Circular	2	0	0	1	0	0	0	3.75	1091.93	1063.83	1096.68	1070.83	748.571	0.013	43.83	28.976
G-L158	G-N158	G-N159	Circular	4	0	0	1	0	0	0	0.7	1099.78	1096.23	1109.98	1106.36	509.879	0.024	64.92	37.204
G-L159	G-N159	G-N159.1	Circular	3.5	0	0	1	0	0	0	0.85	1096.23	1093.5	1106.36	1101.96	321	0.013	92.78	36.873
G-L167	G-N167	G-N168	Circular	3.5	0	0	1	0	0	0	3.32	1089.02	1077.23	1097.57	1086.54	355.152	0.013	183.31	68.994
G-L168	G-N168	G-N168.1	Circular	3	0	0	1	0	0	0	4.39	1077.23	1065.17	1086.54	1078.77	275	0.013	139.68	68.773
G-L166	G-N166	G-N167	Circular	1.75	0	0	1	0	0	0	3.1	1106.06	1090.7	1113.86	1097.57	494.827	0.01	36.29	5.13
G-L165	G-N165	G-N166	Circular	1.75	0	0	1	0	0	0	3.33	1121.64	1106.06	1125.39	1113.86	468.062	0.01	37.58	5.005
G-L164	G-N164	G-N165	Circular	1.75	0	0	1	0	0	0	4.65	1133.53	1121.64	1139.63	1125.39	255.89	0.01	44.4	5.001
G-L163	G-N163	G-N164	Circular	1.5	0	0	1	0	0	0	2.47	1144	1133.53	1154.15	1139.63	423.315	0.01	21.48	5.611
G-L199	G-N199	G-N200	Circular	1.5	0	0	1	0	0	0	2.44	1103.4	1095.29	1109.4	1099.89	332.268	0.01	21.33	7.517
G-L200	G-N200	Node42	Circular	1.5	0	0	1	0	0	0	3.04	1095.29	1080.11	1099.89	1089.11	499.416	0.01	23.81	10.76
G-L181	G-N181	Node42	Circular	2	0	0	1	0	0	0	7.24	1084.62	1080.11	1090.79	1089.11	62.329	0.013	60.85	38.285
G-L180	G-N180	G-N181	Circular	2	0	0	1	0	0	0	4.51	1097.72	1080.59	1104.83	1090.79	379.608	0.013	48.06	34.42
G-L179	G-N179	G-N180	Circular	2	0	0	1	0	0	0	4.52	1104.9	1097.72	1109.8	1104.83	158.909	0.013	48.09	34.484
G-L178	G-N178	G-N179	Circular	2	0	0	1	0	0	0	3.69	1110.02	1104.9	1114.67	1109.8	138.655	0.013	43.47	30.754
G-L195	G-N195	G-N178	Circular	2.5	0	0	1	0	0	0	1.91	1113.73	1110.02	1118.93	1114.67	194.212	0.013	56.69	14.997
G-L177	G-N177	G-N178	Circular	1.5	0	0	1	0	0	0	4.27	1130.23	1110.02	1134.72	1114.67	472.787	0.013	21.72	16.224
G-L194	G-N194	G-N177	Circular	1.5	0	0	1	0	0	0	2.98	1137.39	1130.23	1142.96	1134.72	240.604	0.013	18.12	4.668
G-L191B	G-N191	G-N192	Circular	1.17	0	0	1	0	0	0	8.57	1139.87	1121.28	1144.87	1135.48	217.043	0.013	15.85	9.701
G-L191	G-N191	G-N193	Circular	1.17	0	0	1	0	0	0	1.07	1139.7	1138.14	1144.87	1144.98	145.44	0.013	5.61	4.691

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Gilbert Links																			
G-L176	G-N176	G-N177	Circular	1.5	0	0	1	0	0	0	3.91	1141.17	1130.23	1149.42	1134.72	279.819	0.01	27	9.408
G-L173	G-N173	G-N176	Circular	1	0	0	1	0	0	0	10.01	1169.01	1141.17	1176.54	1149.42	278.055	0.01	14.66	3.38
G-L172	G-N172	G-N173	Circular	1	0	0	1	0	0	0	10.42	1193.08	1169.01	1199.88	1176.54	230.906	0.01	14.95	3.381
G-L171	G-N171	G-N172	Circular	1	0	0	1	0	0	0	14.74	1246.27	1193.08	1253.12	1199.88	360.766	0.01	17.78	1.939
G-L170	G-N170	G-N171	Circular	1	0	0	1	0	0	0	12.9	1284.4	1246.27	1291.3	1253.12	295.51	0.01	16.64	1.94
G-L175	G-N175	G-N176	Circular	1	0	0	1	0	0	0	8.09	1158.84	1141.17	1163.84	1149.42	218.496	0.01	13.17	2.449
G-L174	G-N174	G-N175	Circular	1	0	0	1	0	0	0	10.01	1183.15	1158.84	1188.18	1163.84	242.969	0.01	14.65	2.45
G-L190	G-N190	G-N190.1	Circular	1.25	0	0	1	0	0	0	4.99	1168.27	1152.96	1174.97	1158.84	306.98	0.013	14.43	10.721
G-L254	G-N254	G-N255	Natural	0	0	G-X254	1	0	0	0	2.45	938	936	953	951	81.773	0.035	15305.67	721.792
G-L226	G-N226	G-N226.1	Natural	0	0	G-X226	1	0	0	0	6.62	1072	1063	1087	1078.7	136	0.035	13174.18	348.191
G-L230C	G-N230	G-N231	Rectangular	6	0	0	1	0	0	7	0.9	1034	1033.5	1060	1055	55.467	0.014	582.72	471.163
G-L230O	G-N230	G-N231	Trapezoidal	2	0	0	1	1	1	50	0	1042	1042	1060	1055	55.467	0.02	37.07	0
G-L231	G-N231	G-N156	Natural	0	0	G-X231	1	0	0	0	3.69	1033.5	1022	1055	1055	312.031	0.035	77386.24	471.328
R-L011	G-N001	N300	Natural	0	0	R-X011	1	0	0	0	0.12	874.87	873	935	930	1541.11	0.014	319191.29	-6045.195
R-L010	G-N035	G-N001	Natural	0	0	R-X010	1	0	0	0	0.12	876.45	874.87	940	935	1312.81	0.014	527470.22	3491.997
R-L009	G-N056	G-N035	Natural	0	0	R-X009	1	0	0	0	0.12	878.95	876.45	945	940	2058.5	0.014	554015.24	3445.982
R-L008	G-N069	G-N056	Natural	0	0	R-X008	1	0	0	0	0.12	880.08	878.95	930	945	937.58	0.014	83954.73	3397.155
G-L057	G-N057	G-N058	Circular	1	0	0	1	0	0	0	0.84	937.886	933.618	942.286	937.278	509.129	0.013	3.26	4.154
R-L006	G-N086	G-N277	Natural	0	0	R-X006	1	0	0	0	0.12	882.94	882.04	930	930	737.47	0.014	246248.33	3038.311
R-L005	G-N092	G-N086	Natural	0	0	R-X005	1	0	0	0	0.12	883.43	882.94	930	930	406	0.014	214020.11	3040.362
R-L004	G-N100	G-N092	Natural	0	0	R-X004	1	0	0	0	0.12	883.92	883.43	930	930	410.26	0.014	262260.07	3044.501
R-L003	G-N103	G-N100	Natural	0	0	R-X003	1	0	0	0	0.12	884.37	883.92	930	930	367.4	0.014	200323.56	3047.371
R-L002	G-N112	G-N103	Natural	0	0	R-X002	1	0	0	0	0.12	884.82	884.37	930	930	370	0.014	193182.07	3033.703
G-L132C	G-N132	G-N258	Rectangular	8.5	0	0	1	0	0	15	0	932	932	946	947.5	58.063	0.014	83.24	753.83
G-L132O	G-N132	G-N258	Trapezoidal	2	0	0	1	1	1	50	0	941	941	946	947.5	58.06	0.02	37.07	0
G-L245	G-N245	G-N246	Natural	0	0	G-X245	1	0	0	0	0.45	949	948	975	975	224.456	0.035	17711.93	675.68
G-L126	G-N126	G-N247	Natural	0	0	G-X126	1	0	0	0	1.21	948	945	963	960	248.909	0.035	2967.39	720.436
G-L234	G-N234	G-N234.1	Natural	0	0	G-X234	1	0	0	0	0.94	997	991.28	1020	1015.92	606.01	0.035	18572.26	638.443
G-L141	G-N141	G-N232	Natural	0	0	G-X141	1	0	0	0	1.36	1016	1010	1040	1025	442.107	0.035	15264.42	624.776
G-L156	G-N156	G-N141	Natural	0	0	G-X156	1	0	0	0	1.95	1022	1016	1055	1040	307.964	0.035	13613.49	583.848
G-L169	G-N169-2	G-N229	Natural	0	0	G-X169	1	0	0	0	1.13	1048	1042.5	1071	1065.5	487.483	0.035	12838.87	469.079
G-L151	G-N151	G-N152	Circular	1.5	0	0	1	0	0	0	2.2	1098.54	1092.08	1104.24	1096.68	293.811	0.013	15.58	20.287
G-L008.1	G-N008	G-N007.2	Circular	1	0	0	1	0	0	0	0.51	902.5	895.9	904.25	901.34	1300.6	0.013	2.54	1.942
G-L008A	G-N008	G-N007	Circular	1.33	0	0	1	0	0	0	0.51	902.5	895.901	904.25	901.2	1300.6	0.013	5.43	2.9
G-L036	G-N036	G-N037	Circular	1.25	0	0	1	0	0	0	0.3	905	900.33	915.068	908.98	1550.22	0.013	3.55	3.274
G-L036A	G-N036	G-N051	Circular	1	0	0	1	0	0	0	0.2	906	905.65	915.068	914.862	178.4	0.014	1.47	-1.79
G-L033	G-N033	G-N034	Circular	3.5	0	0	1	0	0	0	0.15	895.9	895	903.614	907.901	612.652	0.013	38.56	65.274
G-L037	G-N037	G-N037B	Circular	1.25	0	0	1	0	0	0	0.51	900.33	897.786	908.98	907.086	496.313	0.013	4.62	6.554
G-L037B	G-N037B	G-N038	Circular	1.25	0	0	1	0	0	0	0.44	897.786	896.803	907.086	908.953	222.381	0.013	4.29	6.518
G-L059	G-N059	G-N060	Circular	2	0	0	1	0	0	0	1.19	931.612	925.584	935.862	930.664	507.37	0.013	24.66	16.628
G-L217C1&2	G-N217	G-N218	Circular	2.33	0	0	2	0	0	7	6.34	1150	1147	1165	1162	47.302	0.014	79.5	114.955
G-L218	G-N218	G-N219	Natural	0	0	G-X221	1	0	0	0	3.03	1147	1140	1162	1163	231.293	0.035	4932.27	114.219

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Gilbert Links																			
G-L219C	G-N219	G-N220	Circular	4	0	0	1	0	0	7	0.96	1140	1138	1163	1163	208.815	0.014	130.54	113.272
G-L220	G-N220	G-N221	Natural	8	0	G-X221	1	3	3	12	3.85	1138	1115	1163	1130	597.506	0.035	1609.45	111.575
G-L221	G-N221	G-N203	Natural	0	0	G-X221	1	0	0	0	1.86	1115	1108	1130	1123	376.393	0.035	3866.4	113.656
G-L203	G-N203	G-N223	Natural	0	0	G-X203	1	0	0	0	1.87	1108	1100	1123	1125	428.695	0.035	7321.02	233.13
G-L223	G-N223	G-N224	Natural	0	0	G-X223	1	0	0	0	2.78	1100	1090	1125	1115	359.115	0.035	20000.55	230.563
G-L224C	G-N224	G-N225	Rectangular	6	0	0	1	0	0	7	0	1085.9	1085.9	1115	1110	81.631	0.014	19.41	342.799
G-L224O	G-N224	G-N225	Trapezoidal	2	0	0	1	1	1	50	0	1098	1098	1115	1110	81.631	0.02	37.07	0
G-L225	G-N225	G-N227	Natural	0	0	G-X225	1	0	0	0	1.82	1085.9	1072	1110	1095	763.992	0.035	14314.28	347.591
G-L228C	G-N228	G-N169-2	Rectangular	10	0	0	1	0	0	10	16.3	1057	1048	1072	1071	55.199	0.014	7894.78	357.17
G-L228O	G-N228	G-N169-2	Trapezoidal	2	0	0	1	1	1	50	0	1069	1069	1072	1071	55.199	0.02	37.07	0
G-L229	G-N229	G-N230	Natural	0	0	G-X229	1	0	0	0	2.49	1042.5	1034	1065.5	1060	340.761	0.035	25279.96	470.978
G-L232	G-N232	G-N233	Natural	0	0	G-X232	1	0	0	0	1.6	1010	1002	1025	1017	498.897	0.035	5968.68	626.075
G-L233C	G-N233	G-N234	Rectangular	6	0	0	1	0	0	7	8.32	1002	997	1017	1020	60.124	0.014	1769.91	630.173
G-L233O	G-N233	G-N234	Trapezoidal	2	0	0	1	1	1	50	0	1012	1012	1017	1020	60.124	0.02	37.07	0
G-L235	G-N235	G-N236	Natural	0	0	G-X235	1	0	0	0	1.28	990	981	1015	999	705.7	0.035	10922.9	634.276
G-L236C	G-N236	G-N237	User Defined	7	0	0	1	0	0	9	9.59	981	976	999	1000	52.128	0.014	3087.66	644.026
G-L236O	G-N236	G-N237	Trapezoidal	2	0	0	1	1	1	50	0	989	989	999	1000	52.128	0.02	37.07	0
G-L237	G-N237	G-N238	Natural	0	0	G-X237	1	0	0	0	0.42	976	975	1000	1000	235.798	0.035	7759.01	653.692
G-L240C	G-N240	G-N241	User Defined	6	0	0	1	0	0	12	2.02	967	965	982	980	98.843	0.014	1278.84	668.109
G-L240O	G-N240	G-N241	Trapezoidal	2	0	0	1	1	1	50	0	977	977	982	980	98.843	0.02	37.07	0
G-L241	G-N241	G-N242	Natural	0	0	G-X241	1	0	0	0	0.99	965	960	980	975	506.823	0.035	9458.45	667.231
G-L242	G-N242	G-N243	Natural	0	0	G-X242	1	0	0	0	1.01	960	955	975	985	497.253	0.035	4502.49	665.058
G-L243	G-N243	G-N244	Natural	0	0	G-X243	1	0	0	0	0.52	955	952	985	980	572.032	0.035	53967.59	661.921
G-L244C	G-N244	G-N245	User Defined	11	0	0	1	0	0	12	4.61	952	949	980	975	65.143	0.014	5340.43	662.23
G-L244O	G-N244	G-N245	Trapezoidal	2	0	0	1	1	1	50	0	965.5	965.5	980	975	65.143	0.02	37.07	0
G-L246C	G-N246	G-N126	User Defined	6	0	0	1	0	0	12	0	948	948	975	963	68.652	0.014	0	676.489
G-L246O	G-N246	G-N126	Trapezoidal	2	0	0	1	1	1	50	0	957.5	957.5	975	963	68.652	0.02	37.07	0
G-L247C	G-N247	G-N248	User Defined	6	0	0	1	0	0	12	0.75	945	944.5	960	959.5	66.359	0.014	780.39	718.805
G-L247O	G-N247	G-N248	Trapezoidal	2	0	0	1	1	1	50	0	955	955	960	959.5	66.359	0.02	37.07	0
G-L248	G-N248	G-N249	Natural	0	0	G-X248	1	0	0	0	0.57	944.5	943	959.5	958	261.654	0.035	8835.7	711.389
G-L249C	G-N249	G-N250	User Defined	6	0	0	1	0	0	12	1.49	943	942	958	957	66.999	0.014	1098.35	711.252
G-L249O	G-N249	G-N250	Trapezoidal	2	0	0	1	1	1	50	0	950	950	958	957	66.999	0.02	37.07	0
G-L250	G-N250	G-N251	Natural	0	0	G-X250	1	0	0	0	0.84	942	940	957	955	238.736	0.035	3543.27	722.352
G-L251C	G-N251	G-N252	User Defined	6	0	0	1	0	0	12	0	940	940	955	955	61.709	0.014	0	721.784
G-L251O	G-N251	G-N252	Trapezoidal	2	0	0	1	1	1	50	0	947	947	955	955	61.709	0.02	37.07	0
G-L252	G-N252	G-N253	Natural	0	0	G-X252	1	0	0	0	0.88	940	938	955	953	227.54	0.035	3326.98	721.325
G-L253C	G-N253	G-N254	Rectangular	6	0	G-X254	1	0	0	10	0	938	938	953	953	308.539	0.014	30.62	721.662
G-L253O	G-N253	G-N254	Trapezoidal	2	0	0	1	1	1	50	0	946	946	953	953	308.539	0.02	37.07	0
G-L255	G-N255	G-N256	Trapezoidal	9	0	0	1	7.42	4.72	15	5.75	936	934	951	949	34.79	0.04	16284.75	721.849
G-L256	G-N256	G-N257	Natural	0	0	G-X256	1	0	0	0	2.46	934	932	949	948	81.184	0.035	5735.15	738.65
G-L257C	G-N257	G-N132	Rectangular	8.5	0	0	1	0	0	15	0	932	932	948	946	58.099	0.014	83.24	741.075
G-L257O	G-N257	G-N132	Trapezoidal	2	0	0	1	1	1	50	0	941	941	948	946	58.098	0.02	37.07	0

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Gilbert Links																			
G-L258	G-N258	G-N259	Natural	0	0	G-X258	1	0	0	0	1.26	932	929	947.5	944	238.616	0.035	1484.35	754.042
G-L259C	G-N259	G-N260	User Defined	7	0	0	1	0	0	12	1.6	929	928	944	943.5	62.444	0.014	1503.61	754.013
G-L259O	G-N259	G-N260	Trapezoidal	2	0	0	1	1	1	50	0	937	937	944	943.5	62.44	0.02	37.07	0
G-L260	G-N260	G-N261	Natural	0	0	G-X260	1	0	0	0	0.47	928	927	943.5	943	213.246	0.035	1606.95	753.811
G-L261C	G-N261	G-N262	User Defined	7	0	0	1	0	0	12	0	927	927	943	943	60.705	0.014	0	756.752
G-L261O	G-N261	G-N262	Trapezoidal	2	0	0	1	1	1	50	0	934.5	934.5	943	943	60.71	0.02	37.07	0
G-L263C	G-N263	G-N264	User Defined	7	0	0	1	0	0	12	0	925.5	925.5	941	941	54.109	0.014	0	755.843
G-L263O	G-N263	G-N264	Trapezoidal	2	0	0	1	1	1	50	0	933	933	941	941	54.11	0.02	37.07	0
G-L264	G-N264	G-N265	Natural	0	0	G-X264	1	0	0	0	0.49	925.5	924	941	939	303.043	0.035	1273.44	762.144
G-L265C	G-N265	G-N266	User Defined	6.5	0	0	1	0	0	12	0	924	924	939	939	77.502	0.014	0	761.685
G-L265O	G-N265	G-N266	Trapezoidal	2	0	0	1	1	1	50	0	931	931	939	939	77.5	0.02	37.07	0
G-L266	G-N266	G-N267	Natural	0	0	G-X266	1	0	0	0	1.04	924	921	939	936	287.432	0.035	2234.56	761.154
G-L267C	G-N267	G-N268	User Defined	6.5	0	0	1	0	0	12	0	921	921	936	936	73.42	0.014	0	761.766
G-L267O	G-N267	G-N268	Trapezoidal	2	0	0	1	1	1	50	0	928	928	936	936	73.42	0.02	37.07	0
G-L268	G-N268	G-N269	Natural	0	0	G-X268	1	0	0	0	0.85	921	919	936	934	234.239	0.035	1242.32	762.168
G-L269C	G-N269	G-N270	User Defined	6.5	0	0	1	0	0	12	1.32	919	918	934	933	75.992	0.014	1194.39	762.497
G-L269O	G-N269	G-N270	Trapezoidal	2	0	0	1	1	1	50	0	926	926	934	933	79.55	0.02	37.07	0
G-L270	G-N270	G-N271	Natural	0	0	G-X270	1	0	0	0	0.84	918	916	933	931	237.818	0.035	3331.18	762.705
G-L076	G-N076	G-N272	Natural	0	0	G-X076	1	0	0	0	0.73	914.5	910	929.5	927	620.106	0.035	4749.34	776.436
G-L271C	G-N271	G-N076	User Defined	7	0	0	1	0	0	12	2.27	916	914.5	931	929.5	66.157	0.014	1789.11	766.845
G-L271O	G-N271	G-N076	Trapezoidal	2	0	0	1	1	1	50	0	924	924	931	929.5	66.16	0.02	37.07	0
G-L272C	G-N272	G-N273	User Defined	9.5	0	0	1	0	0	12.3	0	910	910	927	925	93.683	0.014	0	775.967
G-L272O	G-N272	G-N273	Trapezoidal	2	0	0	1	1	1	50	0	920	920	927	925	93.68	0.02	37.07	0
G-L273	G-N273	G-N274	Natural	0	0	G-X273	1	0	0	0	2.22	910	904	925	919	270.662	0.035	11951.76	775.652
G-N274C	G-N274	G-N275	User Defined	9.5	0	0	1	0	0	16	4.64	904	901	919	925	64.664	0.014	5685.31	778.079
G-N274O	G-N274	G-N275	Trapezoidal	2	0	0	1	1	1	50	0	916	916	919	925	64.66	0.02	37.07	0
G-L275	G-N275	G-N276	Natural	0	0	G-X275	1	0	0	0	2.62	901	891	925	920	381.54	0.035	30946.52	781.936
G-L276	G-N276	G-N277	Natural	0	0	G-X276	1	0	0	0	1.64	891	882.758	920	930	503.996	0.035	21486.41	782.52
R-L007	G-N277	G-N069	Natural	0	0	R-X007	1	0	0	0	0.12	882.04	880.08	930	930	1623	0.014	189851.14	3372.319
624.1A	G-N125	G-N126	Circular	2.5	0	0	2	0	0	0	2.68	984.3	948	989.3	963	1355.51	0.013	67.12	35.501
624.1B	G-N125	G-N126	Circular	2	0	0	1	0	0	0	2.68	984.3	948	989.3	963	1355.51	0.013	37.02	14.738
G-L216	G-N216	G-N217	Natural	5	0	G-X221	1	3	3	10	3.07	1167	1150	1175.161	1165	553	0.035	536.57	115.217
G-L238C	G-N238	G-N239	User Defined	6	0	0	1	0	0	12	0	975	975	1000	990	28.173	0.014	0	653.909
G-L238O	G-N238	G-N239	Trapezoidal	2	0	0	1	1	1	50	0	986	986	1000	990	28.173	0.02	37.07	0
G-L239	G-N239	G-N240	Natural	0	0	G-X239	1	0	0	0	2.67	975	967	990	982	300.036	0.035	11814.42	654.08
G-L262	G-N262	G-N263	Natural	0	0	G-X262	1	0	0	0	0.69	927	925.5	943	941	218.89	0.035	2066.26	756.321
G-L202	G-N202	G-N203	Trapezoidal	6	0	0	1	3	3	8	4.79	1133	1108	1148	1123	522.362	0.04	2864.03	100.452
G-L201	G-N201	G-N202	Natural	4	0	3bot12top4deepNat	1	3	3	8	1.26	1142	1133	1146	1148	712.348	0.04	198.49	100.515
G-L198	Node 42	G-N199	Circular	1.5	0	0	1	0	0	0	3.3	1115.09	1103.4	1119.29	1109.4	354.299	0.01	24.8	0
G-L197	Node43	G-N199	Circular	1	0	0	1	0	0	0	6.9	1120.9	1103.4	1126.25	1109.4	253.466	0.01	12.17	1.568
G-L196	G-N197	Node43	Circular	1	0	0	1	0	0	0	5.89	1168.9	1120.9	1174.7	1126.25	814.519	0.01	11.24	1.575
G-L185	G-N185	G-N186	Circular	1.5	0	0	1	0	0	0	8.05	1178.95	1164.59	1186	1179.6	178.308	0.013	29.81	2.255

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Gilbert Links																			
G-L186	G-N186	G-N187	Trapezoidal	10	0	0	1	3	3	10	7.9	1164.59	1154	1179.6	1169	133.999	0.04	12954.93	2.248
G-L187C	G-N187	G-N188	Circular	2	0	0	1	0	0	0	6.41	1154	1146	1169	1164	124.835	0.013	57.27	5.73
G-L187O	G-N187	G-N188	Trapezoidal	2	0	0	1	1	1	50	0	1162	1162	1169	1164	124.835	0.02	37.07	0
G-L188	G-N188	G-N192	Trapezoidal	12	0	0	1	3	3	12	6.3	1146	1122.28	1164	1135.48	376.693	0.04	18804.06	5.63
G-L192	G-N192	G-N195	Circular	2	0	0	1	0	0	0	1.75	1121.28	1113.73	1135.48	1118.93	430.857	0.024	16.22	14.992
G-L139	G-N139	G-N140	Circular	3	0	0	1	0	0	0	1.95	1022.83	1019.2	1035.13	1029.57	186.423	0.013	93.07	28.658
G-L019	G-N019	G-N018	Circular	2	0	0	1	0	0	0	0.43	902.266	899.837	907.166	905.337	560.533	0.013	14.89	1.743
G-L183	G-N183	G-N169-2	Circular	3	0	0	1	0	0	0	6.43	1059.32	1048	1064.62	1071	175.94	0.013	169.18	54.667
G-L025	G-N025	G-N026	Circular	2.5	0	0	1	0	0	0	0.43	909.977	908.369	920.327	916.977	370.166	0.01	35.14	12.629
G-L133	Node44	G-N134	Circular	2.5	0	0	1	0	0	0	1.89	1063	1060	1068.5	1065.58	158.7	0.013	56.39	17.799
G-L134	G-N134	G-N135	Circular	2.5	0	0	1	0	0	0	9.87	1060	1055.51	1065.58	1066.41	45.469	0.013	128.89	17.8
G-L157	G-N157	G-N158	Circular	4	0	0	1	0	0	0	7.36	1109.71	1099.78	1116.51	1109.98	134.92	0.024	211.08	27.504
G-L161	G-N161	G-N162	Circular	2	0	0	1	0	0	0	4.82	1154	1145	1162	1152	186.764	0.013	49.66	5
G-L162	G-N162	G-N163	Circular	2	0	0	1	0	0	0	1.22	1145	1144	1152	1154.15	81.744	0.01	32.53	5.073
G-L193	G-N193	G-N194	Circular	1.5	0	0	1	0	0	0	0.86	1138.14	1137.39	1144.98	1142.96	86.729	0.013	9.77	4.681
G-L212	G-N212	G-N213	Circular	1.5	0	0	1	0	0	0	3.91	1207.37	1191.54	1213.67	1198.24	404.787	0.01	27	6.943
G-L213	G-N213	G-N210B	Circular	1.75	0	0	1	0	0	0	0.65	1191.54	1190	1198.24	1204.5	237.335	0.01	16.59	7.57
G-L210C	G-N210	G-N210B	Circular	3	0	0	1	0	0	0	0	1188	1188	1206	1204.5	68.097	0.013	2.11	74.756
G-L208	G-N208	G-N209	Trapezoidal	4	0	0	1	2	2	8	2.81	1210	1195	1225	1210	532.947	0.04	729.27	71.682
G-L209	G-N209	G-N210	Trapezoidal	4	0	0	1	2	2	8	5.2	1195	1188	1210	1206	134.64	0.04	991.17	71.368
G-L210BC	G-N210B	G-N211	Circular	3	0	0	1	0	0	0	0	1188	1188	1204.5	1203	42.434	0.013	2.11	82.234
G-L214	G-N214	G-N214.1	Trapezoidal	4	0	0	1	2	2	8	6.43	1182	1170.65	1197	1182.92	176.58	0.04	1102.08	82.884
G-L021	G-N021	G-N020	Circular	2	0	0	1	0	0	0	1.69	904.609	902.488	908.009	907.588	125.503	0.013	29.41	1.801
G-L055	G-N055	G-N056	Circular	3.5	0	0	1	0	0	0	1.77	895.963	888	908.804	945	449.927	0.013	133.85	72.289
G-L046	G-N046	G-N047	Circular	3	0	0	1	0	0	0	0.5	914.009	913.059	922.159	920.337	189.956	0.013	47.17	41.926
G-L039	G-N039	G-N040	Circular	2	0	0	1	0	0	0	0.48	962.682	961.186	967.68	964.29	309.936	0.013	15.72	13.839
G-L058	G-N058	G-N059	Circular	2	0	0	1	0	0	0	0.96	933.618	931.612	937.278	935.862	208.289	0.013	22.2	4.168
G-L108	G-N108	G-N109	Circular	1.5	0	0	1	0	0	0	1.1	919.308	916	926.508	924.151	300.028	0.013	11.03	16.116
G-L085	G-N085	G-N086	Circular	1	0	0	1	0	0	0	0.67	913.269	910	919.569	930	486.161	0.015	2.53	3.291
G-L078	G-N078	G-N079	Circular	1	0	0	1	0	0	0	0.54	926.202	923.19	935.202	932.045	559.243	0.013	2.61	2.478
G-L123	G-N123	G-N124	Circular	3.5	0	0	1	0	0	0	1.51	991.107	987.869	997.357	994.319	214.298	0.013	123.67	41.724
G-L182	Node42	G-N182.1	Circular	2.5	0	0	1	0	0	0	2.83	1080.11	1066.09	1089.11	1072.6	494.72	0.013	69.05	48.683
G-L184	G-N184	G-N185	Circular	1	0	0	1	0	0	0	3.32	1194.1	1180.1	1202.15	1186	422.063	0.01	8.44	2.257
Link680	Node36	Node636	Natural	2	0	3bot8top2deepNat	1	0	0	0	2.5	1158.43	1153.516	1165.68	1156.27	196.525	0.04	71.74	97.066
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G-L207	G-N207	Node423	Circular	1.5	0	0	1	0	0	0	3.23	1175.22	1169.42	1180.92	1172.45	179.29	0.013	18.89	27.237
G-L205	G-N205	G-N283	Circular	2	0	0	1	0	0	0	9.23	1196.66	1193.43	1201.16	1200.44	35	0.01	89.34	45.738
G-L206	G-N206	G-N207	Circular	2	0	0	1	0	0	0	5.38	1184.75	1175.22	1189.75	1180.92	176.997	0.01	68.24	45.267
G-L204	G-N204	G-N205	Circular	2	0	0	1	0	0	0	11.87	1203.55	1196.66	1208.05	1201.16	58.033	0.013	77.95	45.94
G-L227C	G-N227	G-N226	Rectangular	6	0	0	1	0	0	7	0	1072	1072	1095	1087	41.166	0.014	19.41	348.007
G-L227O	G-N227	G-N226	Trapezoidal	2	0	0	1	1	1	50	0	1079	1079	1095	1087	41.166	0.02	37.07	0
G-L137	G-N137	G-N138	Circular	1.5	0	0	1	0	0	0	4.58	1064.14	1044.04	1071.34	1051.54	438.546	0.013	22.49	5.197

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Gilbert Links																			
G-L211	G-N211	G-N214	Trapezoidal	4	0	0	1	2	2	8	2.21	1188	1182	1203	1197	271.605	0.04	646.09	81.466
R-L001	N299	G-N112	Natural	0	0	R-X001	1	0	0	0	0.12	886	884.82	930	930	977.2	0.014	207861.93	3034.836
G-L283	G-N283	G-N206	Circular	2	0	0	1	0	0	0	2.96	1193.43	1184.75	1200.44	1189.75	292.76	0.01	50.64	45.487
G-L280	G-N280	G-N208	Trapezoidal	4	0	0	1	2	2	8	5.34	1345	1210	1350	1225	2529.75	0.04	1004.19	18.359
G-L281	G-N281	G-N123	Circular	3	0	0	1	4	4	10	6.76	1062	991.107	1069	997.357	1049.29	0.024	93.91	41.825
Link362	Node330	Node331	Natural	2	0	4bot8top2deepRck	1	0	0	0	0.04	1176.42	1176.26	1178.42	1178.26	378	0.05	8.48	-2.314
Link363	Node331	Node332	Circular	2	0	0	1	0	0	0	-0.42	1176.26	1176.39	1178.26	1178.39	31	0.013	14.65	-5.427
Link364	Node332	G-N279-2	Natural	2	0	2bot6top2deepNat	1	0	0	0	5.11	1176.39	1175.93	1178.39	1177.93	9	0.04	69.18	-5.459
Link365	G-N279-2	Node334	Circular	2	0	0	1	0	0	0	-6.77	1174.93	1175.81	1177.93	1177.81	13	0.024	31.88	29.139
Link366	G-N279-2	Node335	Natural	2	0	2bot6top2deepNat	1	0	0	0	0.03	1175.93	1175.89	1177.93	1178.14	115	0.04	5.71	16.321
Link613	Node334	Node585	Trapezoidal	5	0	0	1	2	2	4	3.18	1172.81	1165.884	1177.81	1170.884	218.11	0.04	888.63	29.164
Link367	Node335	Node336	Special	3.5	0	0	1	0	0	0	-0.01	1175.89	1175.92	1178.14	1178.23	235	0.024	3.43	15.02
Link368	Node336	Node336.2	Natural	2.3	0	4bot9top2.3deepConc	1	0	0	0	0.06	1175.92	1175.82	1178.23	1178.12	164	0.017	40.1	14.16
Link371	Node337	Node337.1	Circular	2	0	0	1	0	0	0	0.75	1175.9	1175.16	1178.2	1182.58	99	0.013	19.56	10.21
Link368.1	Node336.1	Node337	Natural	2.3	0	4bot9top2.3deepConc	1	0	0	0	-0.12	1175.81	1175.9	1178.11	1178.2	75	0.017	56.25	10.693
Link368.2	Node336.2	Node336.1	Natural	2.3	0	4bot9top2.3deepConc	1	0	0	0	0	1175.82	1175.81	1178.12	1178.11	260	0.017	10.07	12.409
Link377	Node340	Node346	Natural	3	0	1.5bot8top3deepNat	1	0	0	0	0.12	1174.44	1174.21	1178.44	1177.21	186	0.04	23.05	9.949
Link371.1	Node337.1	Node340	Circular	2	0	0	1	0	0	0	0.74	1175.16	1174.44	1182.58	1178.44	97	0.024	10.56	10.157
Link378	Node346	Node347	Circular	2	0	0	1	0	0	0	0.03	1174.21	1174.17	1177.21	1176.17	159	0.024	1.94	9.843
Link379	Node347	Node348	Natural	2	0	1.5bot6top2deepNat	1	0	0	0	0.31	1174.17	1173.61	1176.17	1175.61	178	0.04	14.04	9.795
Link380	Node348	Node349	Circular	2	0	0	1	0	0	0	-0.27	1173.61	1174.04	1175.61	1178.24	160	0.013	11.73	9.136
Link381	Node349	Node349.1	Circular	2	0	0	1	0	0	0	0.28	1174.04	1173.48	1178.24	1177.96	201	0.013	11.94	9.132
Link382	Node350	Node351	Circular	2	0	0	1	0	0	0	0.28	1173.32	1172.619	1176.32	1175.619	251	0.013	11.96	9.121
Link422	Node351	Node390	Natural	2	0	2bot4top2deepDW	1	0	0	0	0.28	1172.619	1171.81	1175.619	1173.81	286	0.055	8.2	9.119
Link381.1	Node349.1	Node350	Circular	2	0	0	1	0	0	0	0.28	1173.48	1173.32	1177.96	1176.32	57	0.013	11.99	9.126
Link389	Node354	Node359	Natural	1.5	0	5bot5top1.5deepNat	1	0	0	5	24.8	1069.3	1066.82	1071.45	1072.12	10	0.04	132.91	5.854
Link384.1	Node317.1	Node354	Rectangular	1.5	0	0	1	0	0	6	0.03	1069.32	1069.3	1072.36	1071.45	64	0.013	12.94	2.252
Link384.2	Node317.2	Node317.1	Circular	2.5	0	0	1	0	0	0	0.04	1069.34	1069.32	1073.07	1072.36	45	0.014	8.03	1.992
Link384.3	Node317.3	Node317.2	Circular	2.5	0	0	1	0	0	0	0.03	1069.45	1069.34	1075.15	1073.07	317	0.014	7.09	1.996
Link628	Node317.3	G-N154.1	Circular	3.5	0	0	1	0	0	0	2.9	1069.45	1058.4	1075.15	1065.45	380.98	0.024	92.81	9.686
Link390	Node359	Node359.1	Circular	2	0	0	1	0	0	0	0.2	1066.82	1066.31	1072.12	1071.35	253	0.013	10.16	2.576
Link392	Node360	Node362	Natural	1.7	0	5bot5top1.7deepNat	1	0	0	0	-37.22	1065.53	1068.88	1070.58	1070.58	9	0.04	194.18	2.177
Link390.1	Node359.1	Node360	Circular	2	0	0	1	0	0	0	0.2	1066.31	1065.53	1071.35	1070.58	389	0.013	10.13	2.205
Link393	Node362	Node363	Circular	1.7	0	0	1	0	0	0	0.2	1068.88	1068.78	1070.58	1071.15	49	0.013	6.63	2.111
Link394	Node363	Node364	Natural	2.2	0	6bot6top2.2deepNat	1	0	0	0	-2.4	1068.78	1068.9	1071.15	1071.15	5	0.04	89.06	2.065
Link395	Node364	Node365	Circular	1.5	0	0	1	0	0	0	0.66	1068.9	1067.45	1071.15	1070.65	221	0.013	8.51	2.035
Link396	Node365	Node366	Circular	1.5	0	0	1	0	0	0	-0.39	1067.45	1068.01	1070.65	1071.76	142	0.013	6.6	2.076
Link397	Node366	Node367	Circular	1.5	0	0	1	0	0	0	-0.22	1068.01	1068.63	1071.76	1071.63	279	0.013	4.95	-2.057
Link398	Node367	Node367.1	Natural	3	0	4bot6top3deepNatRub	1	0	0	0	0.27	1068.63	1068.24	1071.63	1071.24	146	0.025	58.06	-2.812
Link400	G-N169-1	Node370	Natural	3	0	2bot6top3deepGun	1	0	0	0	1.11	1067.94	1066.72	1070.94	1070.22	110	0.022	101.82	7.699
Link398.1	Node367.1	G-N169-1	Natural	2	0	2bot8top2deepNat	1	0	0	0	0.26	1068.24	1067.94	1071.24	1070.94	114	0.04	20.13	-4.372
Link401	Node370	Node370.3	Circular	2	0	0	1	0	0	0	0.07	1067.72	1067.7	1070.22	1070.18	28	0.014	5.61	-8.882

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Gilbert Links																			
GilbrtSpll	Node370	G-N226.1	0	0	0	0	0	0	0	0	0	0	0	1070.22	1078.7	0	0	0	0.557
1067.22	Node370	G-N226.1	0	0	0	0	0	0	0	0	0	0	0	1070.22	1078.7	0	0	5.67	8.303
Link402	Node371	Node372	Circular	1.5	0	0	1	0	0	0	1.04	1067.38	1066.59	1069.38	1068.59	76	0.024	5.8	3.906
Link408	Node372	Node377	Natural	1.19	0	4bot6top1.19deepConc	1	0	0	0	-0.03	1066.59	1066.76	1068.59	1067.95	502	0.017	8.5	3.962
Link401.1	Node370.1	Node371	Natural	2	0	3bot4top2deepGun	1	0	0	0	0.07	1067.46	1067.38	1069.58	1069.38	123	0.022	11.92	3.914
Link401.2	G-N182	Node370.1	Circular	1.5	0	0	1	0	0	0	0.06	1067.69	1067.46	1070.15	1069.58	358	0.024	1.44	3.923
Link401.3	Node370.3	G-N182	Natural	2	0	2bot6top2deepNat	1	0	0	0	0.05	1067.7	1067.69	1070.18	1070.15	19	0.04	7.02	-5.15
G-L226.1	G-N226.1	G-N228	Natural	0	0	G-X226	1	0	0	0	1.8	1063	1057	1078.7	1072	332.75	0.035	6876.83	357.164
Link409	Node377	Node378	Natural	1.19	0	4bot6top1.19deepConc	1	0	0	0	0.19	1066.76	1066.36	1067.95	1068.36	216	0.017	19.88	4.191
Link410	Node378	Node379	Natural	2	0	4bot6top2deepConc	1	0	0	0	0.05	1066.36	1066.21	1068.36	1068.21	296	0.017	21.98	4.298
411a	Node379	Node380	Circular	2	0	0	1	0	0	0	0.64	1066.21	1065.83	1068.21	1067.83	59	0.013	18.16	2.225
411b	Node379	Node380	Circular	2	0	0	1	0	0	0	0.64	1066.21	1065.83	1068.21	1067.83	59	0.013	18.16	2.225
Link412	Node380	Node381	Natural	1.9	0	3bot4top1.9deepConc	1	0	0	0	0.21	1065.83	1065.36	1067.83	1067.32	229	0.017	25.62	4.497
Link413	Node381	Node382	Rectangular	1.7	0	0	1	0	0	4.67	-0.32	1065.51	1065.66	1067.32	1067.36	47	0.017	28.6	-17.908
ValleyView	Node381	Node44	0	0	0	0	0	0	0	0	0	0	0	1067.32	1068.5	0	0	0	2.248
vallyviewO	Node381	Node44	0	0	0	0	0	0	0	0	0	0	0	1067.32	1068.5	0	0	18.07	15.582
Link414	Node382	G-N133	Natural	1.7	0	4bot6top1.7deepConc	1	0	0	0	0.08	1065.66	1065.58	1067.36	1068.58	97	0.017	22.32	-22.141
Link526	G-N133	Node495	Natural	1.7	0	4bot6top1.7deepConc	1	0	0	0	0.22	1065.58	1065.4	1068.58	1067.1	81	0.017	36.64	9.999
Link416	Node384	Node384.2	Circular	0.667	0	0	1	0	0	0	9	1161.26	1123.37	1164.66	1126.85	421	0.013	3.63	3.787
Link505	Node384	Node473	Natural	1.3	0	3.5bot8top1.3deepNat	1	0	0	0	1.83	1162.37	1161.84	1164.66	1163.84	29	0.04	33.94	1.964
Link420	Node384.1	Node388	Circular	1.25	0	0	1	0	0	0	14	1114.37	1113.67	1117.77	1117.07	5	0.013	24.17	3.782
Link416.1	Node388	G-N133	Circular	2	0	0	1	0	0	0	5.65	1113.67	1065.58	1117.07	1068.58	851	0.013	53.78	3.737
Link416.2	Node384.2	Node384.1	Circular	0.833	0	0	1	0	0	0	9	1123.37	1114.37	1126.85	1117.77	100	0.013	6.57	3.783
Link423	Node390	Node391	Circular	2	0	0	1	0	0	0	-1.15	1171.81	1172.36	1173.81	1174.36	48	0.014	22.49	9.115
Link424	Node391	Node392	Circular	2	0	0	1	0	0	0	-1.15	1172.36	1172.73	1174.36	1174.73	32.17	0.014	22.53	-13.305
1024.1	Node391	Node391.2	Natural	4	0	22bot30top4deepNat	1	1	1	3	4.2	1168	1167.79	1174.36	1174.14	5	0.013	1691.31	20.067
vet	Node391	Node391.2	0	0	0	0	0	0	0	0	0	0	0	1174.36	1174.14	0	0	17.4	0
Link426	Node392	Node394	Natural	1.3	0	4bot6top1.3deepNat	1	0	0	0	-0.41	1172.73	1173.17	1174.73	1174.48	107	0.04	13.58	-13.305
Link427	Node394	Node395	Natural	1.3	0	4bot6top1.3deepNat	1	0	0	0	-0.01	1173.17	1173.18	1174.48	1174.88	108	0.04	2.04	-13.305
Link428	Node395	Node396	Natural	1.3	0	4bot6top1.3deepNat	1	0	0	0	0.8	1173.18	1172.83	1174.88	1174.83	44	0.04	18.89	-13.306
Link429	Node396	Node397	Circular	2	0	0	1	0	0	0	1.68	1172.83	1172.51	1174.83	1174.51	19	0.014	27.26	-13.306
Link430	Node397	Node398	Natural	1.9	0	3bot4top1.9deepNat	1	0	0	0	-0.16	1172.51	1172.76	1174.51	1174.67	160	0.04	9.5	-13.389
Link431	Node398	Node399	Natural	1.9	0	4bot6top1.9deepNat	1	0	0	0	0.16	1172.76	1172.43	1174.67	1174.33	208	0.04	15.39	-13.729
Link432	Node399	Node400	Circular	2	0	0	1	0	0	0	-0.74	1171.64	1172.06	1174.33	1174.06	57	0.014	18.03	-14.769
Link433	Node400	G-N216-1	Natural	1.9	0	4bot6top1.9deepNat	1	0	0	0	-0.71	1172.06	1172.46	1174.06	1174.46	56	0.04	32.65	-18.225
Link434	G-N216-1	Node402	Natural	1.9	0	4bot6top1.9deepNat	1	0	0	0	0.35	1172.46	1171.85	1174.46	1173.85	175	0.04	22.81	-22.11
Link435	Node402	Node403	Circular	2	0	0	1	0	0	0	-0.03	1171.85	1171.93	1173.85	1175.97	289	0.013	3.76	15.175
Link436	Node403	Node586	Natural	1.9	0	4bot6top1.9deepNat	1	0	0	0	0.27	1171.93	1171.4	1175.97	1173.51	195	0.04	20.14	15.091
Link437	Node404	G-N216-2	Circular	2	0	0	1	0	0	0	0.36	1171.51	1171.41	1173.51	1173.41	28	0.024	7.32	-6.954
GilbertDem	Node404	Node586	0	0	0	0	0	0	0	0	0	0	0	1173.51	1173.51	0	0	0	7.418
Link438	G-N216-2	Node406	Natural	2	0	5bot11top2deepNat	1	0	0	0	-0.13	1171.41	1171.66	1173.41	1173.66	193	0.04	25.62	-6.36
Link439	Node406	Node407	Circular	2	0	0	1	0	0	0	-0.8	1171.66	1171.86	1173.66	1173.86	25	0.013	20.23	-5.893

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Gilbert Links																			
Link440	Node407	Node408	Natural	2	0	5bot11top2deepNat	1	0	0	0	0.3	1171.86	1171.73	1173.86	1173.73	43	0.04	39.13	-5.533
Link441	Node408	Node409	Circular	2	0	0	1	0	0	0	0.2	1171.73	1171.7	1173.73	1173.7	15	0.013	10.12	-5.135
Link442	Node409	Node410	Natural	2	0	5bot11top2deepNat	1	0	0	0	0.21	1171.7	1171.57	1173.7	1173.57	62	0.04	32.59	-6.211
Link443	Node410	Node411	Circular	2	0	0	1	0	0	0	0.11	1171.57	1171.55	1173.57	1173.55	18	0.013	7.54	-7.583
Link444	Node411	Node411.1	Natural	2	0	5bot11top2deepNat	1	0	0	0	0.49	1171.55	1170.48	1173.55	1172.48	217	0.04	49.98	-9.154
Link447	Node412	Node415	Natural	3	0	3bot15top3deepNat	1	0	0	0	-0.92	1170.17	1170.89	1173.17	1173.89	78	0.04	134.28	-17.611
Link444.1	Node411.1	Node412	Circular	2	0	0	1	0	0	0	0.48	1170.48	1170.17	1172.48	1173.17	64	0.014	14.62	-13.47
Link448	Node415	Node416	Circular	2	0	0	1	0	0	0	-0.03	1170.89	1170.91	1173.89	1173.91	61	0.014	3.8	-18.567
Link449	Node416	Node417	Natural	2.9	0	3bot15top2.9deepNat	1	0	0	0	-0.12	1170.91	1171.06	1173.91	1173.96	123	0.04	46.29	-23.263
Link450	Node417	Node418	Circular	2	0	0	1	0	0	0	0.46	1171.06	1169.98	1173.96	1174.98	233	0.013	15.4	3.106
Link451	Node418	Node419	Circular	1	0	0	1	0	0	0	0.02	1169.98	1169.92	1174.98	1171.92	311	0.013	0.49	3.106
Link452	Node419	Node420	Natural	2	0	2bot4top2deepConc	1	0	0	0	3.92	1169.92	1169.41	1171.92	1172.41	13	0.017	98.77	3.106
Link453	Node420	Node421	Circular	1.67	0	0	1	0	0	0	-0.91	1163.41	1164	1172.41	1171.498	65	0.014	12.37	-3.609
Link454	Node420	Node616	Circular	1.67	0	0	1	0	0	0	0.03	1163.4	1163.395	1172.41	1165.07	18	0.013	2.33	6.556
Link455	Node421	Node423	Circular	1.5	0	0	1	0	0	0	-0.2	1168.3	1169.35	1171.498	1172.45	516	0.013	4.74	-3.608
Link622	Node422	Node422.1	Natural	0.67	0	2bot2top.67deepConc	1	0	0	0	3.11	1163.395	1158.28	1165.07	1163.14	164.706	0.017	11.23	29.941
G-L207.2	Node423	G-N207.1	Circular	1.5	0	0	1	0	0	0	7.16	1169.35	1164.41	1172.45	1169.74	69	0.013	28.11	19.039
Link624	Node423	Node424	Circular	1.5	0	0	1	0	0	0	-0.47	1168.92	1169.14	1172.45	1171.64	47	0.013	7.19	6.307
Link456	Node424	G-N215-2	Natural	2.5	0	4bot12top2.5deepNW	1	0	0	0	0.07	1169.14	1168.96	1171.64	1171.46	267	0.045	22.36	6.288
Link457	G-N215-2	Node426	Circular	2	0	0	1	0	0	0	0.93	1168.96	1168.56	1171.46	1170.56	43	0.013	21.82	-1.937
Link626	G-N215-2	Node36	Circular	2.5	0	0	1	0	0	0	8.03	1168.96	1158.43	1171.46	1165.68	131.13	0.013	116.23	9.789
Link458	Node426	Node427	Natural	2	0	4bot8top2deepNat	1	0	0	0	0.14	1168.56	1168.36	1170.56	1170.36	147	0.04	19.01	2.844
Link459	Node427	Node428	Circular	2	0	0	1	0	0	0	2.28	1168.36	1167.95	1170.36	1169.95	18	0.013	34.14	4.457
Link460	Node428	Node428.1	Natural	0.5	0	4bot8top0.5deepNat	1	0	0	0	-0.07	1167.95	1168.06	1169.95	1168.56	165	0.04	1.48	3.252
Link462	Node429	Node431	Natural	0.5	0	4bot8top0.5deepNat	1	0	0	0	-0.28	1168.08	1168.57	1170.16	1170.57	172	0.04	3.06	-6.414
Link460.1	Node428.1	Node429	Natural	0.5	0	4bot8top0.5deepNat	1	0	0	0	-0.06	1168.06	1168.08	1168.56	1170.16	33	0.04	1.41	-6.082
Link463	Node431	G-N215-1	Circular	2	0	0	1	0	0	0	1.5	1168.57	1168.24	1170.57	1170.74	22	0.013	27.71	-6.896
Link464	G-N215-1	Node433	Natural	2.5	0	3.5bot5.5top2.5dpGun	1	0	0	0	0.37	1168.24	1167.45	1170.74	1169.95	215	0.022	53.91	7.025
Link465	Node433	Node434	Circular	1.75	0	0	1	0	0	0	0.02	1167.45	1167.4	1169.95	1171.75	245	0.013	2.26	6.217
Link466	Node434	Node435	Circular	1.75	0	0	1	0	0	0	0.03	1165.9	1165.88	1171.75	1169.96	75	0.013	2.59	6.101
Link467	Node435	Node436	Circular	2	0	0	1	0	0	0	0.78	1165.88	1165.74	1169.96	1170.89	18	0.013	19.95	6.085
Link468	Node436	Node437	Circular	2	0	0	1	0	0	0	0.52	1165.74	1165.25	1170.89	1174.66	94	0.013	16.33	6.073
Link469	Node437	Node438	Circular	2	0	0	1	0	0	0	0.29	1163.85	1163.67	1174.66	1179.75	63	0.013	12.09	6.056
Link470	Node438	Node439	Circular	2	0	0	1	0	0	0	0.39	1163.67	1163.21	1179.75	1182.7	119	0.013	14.07	6.039
Link471	Node439	Node440	Circular	2	0	0	1	0	0	0	-0.03	1163.21	1163.23	1182.7	1180.41	77	0.013	3.65	6.022
Link472	Node440	Node441	Circular	2	0	0	1	0	0	0	0.07	1163.23	1163.14	1180.41	1180.41	121	0.013	6.17	6.004
Link473	Node441	Node442	Circular	2	0	0	1	0	0	0	0.48	1163.14	1162.83	1180.41	1169.16	64	0.013	15.74	5.986
Link474	Node442	G-N198	Natural	2	0	4bot12top2deepNat	1	0	0	0	0.34	1167.1	1166.76	1169.16	1169.35	100	0.04	39.92	5.571
Link475	G-N198	Node444	Natural	2	0	4bot12top2deepNat	1	0	0	0	0.62	1166.76	1166.19	1169.35	1169.11	92	0.04	53.89	8.244
Link476	Node444	Node445	Circular	1.67	0	0	1	0	0	0	0	1166.44	1166.43	1169.11	1170.03	255	0.013	0.88	7.711
Link477	Node445	Node446	Circular	1.67	0	0	1	0	0	0	1.29	1166.43	1163.79	1170.03	1170.03	205	0.013	15.87	7.703
Link478	Node446	Node447	Circular	1.67	0	0	1	0	0	0	11.5	1165.45	1164.99	1170.03	1169.99	4	0.013	47.43	7.701

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Gilbert Links																			
Link479	Node447	Node448	Circular	1.67	0	0	1	0	0	0	100.2	1164.99	1157.36	1169.99	1169.99	7.615	0.013	140	7.701
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Link480	Node448	Node449	Circular	1.67	0	0	1	0	0	0	0.2	1157.36	1157.28	1169.99	1169.99	40	0.013	6.25	7.7
Link481	Node449	Node450	Circular	1.67	0	0	1	0	0	0	-99.8	1157.3	1164.62	1169.99	1169.99	7.335	0.013	139.72	7.699
Link487	Node450	Node450.1	Circular	1.67	0	0	1	0	0	0	1.09	1164.88	1163.248	1169.99	1166.924	150	0.013	14.59	7.698
Link482	Node451	Node452	Circular	1.75	0	0	1	0	0	0	0.39	1160.769	1159.972	1167.499	1167.99	204.5	0.013	9.89	6.792
Link483	Node452	Node453	Circular	1.75	0	0	1	0	0	0	0.39	1159.972	1159.37	1167.99	1169.49	154.5	0.013	9.89	6.792
Link484	Node453	Node454	Circular	2	0	0	1	0	0	0	0.2	1162.9	1162.74	1169.49	1170.44	80	0.013	10.12	6.792
Link488	Node454	Node457	Circular	2	0	0	1	0	0	0	0.2	1162.74	1162.488	1170.44	1170.44	126	0.013	10.12	6.792
Link485	Node455	Node451	Circular	1.75	0	0	1	0	0	0	0.39	1161.096	1160.769	1167.496	1167.499	84	0.013	9.89	6.79
Link486	Node456	Node455	Circular	1.75	0	0	1	0	0	0	1.62	1161.695	1161.096	1166.9	1167.496	37	0.013	20.16	6.79
Link489	Node457	Node458	Circular	2	0	0	1	0	0	0	0.45	1162.488	1161.14	1170.44	1168.84	298	0.013	15.22	6.792
Link490	Node458	Node459	Circular	2	0	0	1	0	0	0	-0.04	1161.14	1161.16	1168.84	1167.36	55	0.013	4.31	6.791
Link491	Node459	Node460	Circular	2	0	0	1	0	0	0	-0.18	1161.16	1161.55	1167.36	1165.75	217	0.013	9.59	6.789
Link492	Node460	Node461	Circular	2	0	0	1	0	0	0	0.87	1161.55	1161.13	1165.75	1165.13	48	0.013	21.16	6.786
Link493	Node461	Node462	Circular	2	0	0	1	0	0	0	0	1161.13	1161.13	1165.13	1169.6	64	0.013	0.72	5.733
Link494	Node462	Node463	Circular	2	0	0	1	0	0	0	-5.7	1162.1	1162.67	1169.6	1165.97	10	0.013	54.01	5.733
Link495	Node463	Node464	Circular	1.25	0	0	1	0	0	0	-0.66	1162.67	1163.32	1165.97	1167.32	99	0.013	5.23	5.733
Link496	Node464	Node465	Natural	1.2	0	6bot10top1.7deepNat	1	0	0	0	-0.04	1163.32	1163.35	1167.32	1165.44	69	0.04	6.5	5.726
Link497	Node465	Node466	Natural	1.2	0	6bot10top1.7deepNat	1	0	0	0	0.16	1163.35	1163.17	1165.44	1164.91	110	0.04	12.61	5.711
Link498	Node466	Node467	Circular	1.5	0	0	1	0	0	0	0.33	1163.17	1162.91	1164.91	1164.98	79	0.013	6.03	5.64
Link499	Node467	Node468	Circular	1.25	0	0	1	0	0	0	0.02	1162.91	1162.89	1164.98	1164.61	120	0.013	0.83	5.64
Link500	Node468	Node469	Natural	1.6	0	6bot10top1.6deepNat	1	0	0	0	0.49	1162.89	1162.1	1164.61	1163.77	160	0.04	36.69	5.64
Link501	Node469	Node470	Circular	1.67	0	0	1	0	0	0	0.86	1162.1	1161.74	1163.77	1164.53	42	0.013	12.95	5.64
Link502	Node470	Node471	Circular	1.75	0	0	1	0	0	0	2.44	1161.74	1159.74	1164.53	1164.54	82	0.013	24.75	5.64
Link503	Node471	Node472	Circular	1.75	0	0	1	0	0	0	-6.67	1159.74	1160.94	1164.54	1164.44	18	0.013	40.91	5.64
Link504	Node472	Node384	Circular	1.75	0	0	1	0	0	0	-2.18	1160.94	1161.68	1164.44	1164.66	34	0.013	23.38	5.64
Link506	Node473	Node474	Circular	2	0	0	1	0	0	0	0.5	1161.84	1161.76	1163.84	1163.92	16	0.013	16	1.963
Link507	Node474	Node475	Natural	1.3	0	3.5bot8top1.3deepNat	1	0	0	0	0.46	1162.14	1161.12	1163.92	1162.42	220	0.04	17.09	1.963
Link508	Node475	Node476	Natural	1.3	0	3.5bot8top1.3deepNat	1	0	0	0	-0.12	1161.12	1161.28	1162.42	1162.65	138	0.04	8.55	1.962
Link509	Node476	Node477	Natural	1.3	0	3.5bot8top1.3deepNat	1	0	0	0	0.27	1161.28	1160.36	1162.65	1162.12	346	0.04	12.94	1.961
Link510	Node477	Node478	Natural	1.3	0	3.5bot8top1.3deepNat	1	0	0	0	-0.2	1160.36	1160.8	1162.12	1162.1	224	0.04	11.13	1.959
Link511	Node478	Node479	Natural	1.3	0	3.5bot8top1.3deepNat	1	0	0	0	0.46	1160.8	1159.63	1162.1	1160.93	252	0.04	17.1	1.959
Link512	Node479	Node480	Natural	1.3	0	3.5bot8top1.3deepNat	1	0	0	0	-0.28	1159.63	1160.37	1160.93	1161.67	261	0.04	13.37	0
Link627	Node479	Node501	Circular	0.833	0	0	1	0	0	0	9.91	1159.63	1064.63	1160.93	1066.3	958.31	0.013	6.89	1.959
Link513	Node480	Node481	Natural	1.3	0	3bot5top1.3deepNat	1	0	0	0	3.16	1160.37	1159.77	1161.67	1161.07	19	0.04	30.27	0
Link514	Node481	Node482	Natural	1.3	0	3bot5top1.3deepNat	1	0	0	0	-0.15	1159.77	1159.9	1161.07	1161.2	84	0.04	6.7	0
Link643	Node482	Node507	Natural	0.5	0	3bot4top0.5deepNat	1	0	0	0	9.45	1159.9	1063.948	1161.2	1065.948	1015.43	0.04	10.79	0
G-L007.1	G-N007.1	G-N006	Circular	1.5	0	0	1	0	0	0	0.28	895.67	894.84	901.47	902.44	293.46	0.013	5.59	5.967
G-L007.2	G-N007.2	G-N007.1	Circular	1.333	0	0	1	0	0	0	0.27	895.78	895.67	901.34	901.47	40.41	0.013	4	5.96
G-L087.1	G-N087.1	G-N088	Circular	2	0	0	1	0	0	0	0.76	937.16	932.87	944.17	939.72	567	0.01	25.58	10.959
G-L093.1	G-N093.1	G-N094	Circular	2	0	0	1	0	0	0	0.85	931.72	927.83	938.77	935.93	460	0.013	20.8	8.425

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Gilbert Links																			
G-L089.1	G-N089.1	G-N090	Circular	3	0	0	1	0	0	0	0.57	919.06	916.91	926.9	924.56	375	0.01	65.65	27.896
G-L096.1	G-N096.1	G-N097	Circular	3	0	0	1	0	0	0	0.55	919.09	915.72	927.2	923.22	618	0.013	49.25	36.364
G-L090	Node490	G-N091	Circular	1	0	0	1	0	0	0	0.39	915.06	913.617	924.56	921.867	371	0.013	2.22	1.686
G-L147.1	G-N147.1	G-N148	Circular	2	0	0	1	0	0	0	4.11	1074.51	1070.28	1080.6	1076.31	103	0.013	45.84	-0.242
G-L154.1	G-N154.1	G-N155	Circular	3.5	0	0	1	0	0	0	1.36	1058.4	1046	1065.45	1054.11	913	0.013	117.25	107.903
G-L182.1	G-N182.1	G-N183	Circular	3	0	0	1	0	0	0	2.83	1066.09	1059.32	1072.6	1064.62	239	0.013	112.26	48.608
G-L190.1	G-N190.1	G-N191	Circular	1.17	0	0	1	0	0	0	4.98	1152.96	1139.7	1158.84	1144.87	266	0.013	12.09	10.675
Link527	Node495	Node496	Circular	1	0	0	1	0	0	0	0.25	1065.4	1065.06	1067.1	1066.06	138	0.013	1.77	4.286
Link528	Node496	Node497	Natural	1	0	4bot7top1deepNat	1	0	0	0	0.08	1065.06	1064.967	1066.06	1065.967	117	0.014	4.64	4.282
Link529	Node497	Node498	Natural	1	0	5bot7top1deepNat	1	0	0	0	0.08	1064.967	1064.79	1065.967	1066.79	224	0.04	5.25	4.267
Link530	Node498	Node499	Natural	2	0	5bot9top2deepGun	1	0	0	0	0.16	1064.79	1064.34	1066.79	1066.34	283	0.022	45.23	4.244
Link531	Node499	Node500	Circular	2	0	0	1	0	0	0	0.09	1064.34	1064.22	1066.34	1066.3	132	0.024	3.69	4.238
Link532	Node500	Node501	Rectangular	1.67	0	0	1	0	0	4.67	0	1064.63	1064.63	1066.3	1066.3	22	0.017	1.56	-1.309
Link533	Node500	G-N138	Circular	1	0	0	1	0	0	0	5.79	1064.22	1044.04	1066.3	1051.54	348.28	0.013	8.58	5.129
Link534	Node501	Node503	Natural	1.6	0	5bot11top1.6 deepNW	1	0	0	0	0.28	1064.63	1063.89	1066.3	1065.89	269	0.045	23.4	0.65
Link535	Node503	Node504	Circular	2	0	0	1	0	0	0	-0.03	1063.89	1063.902	1065.89	1065.902	39	0.013	3.97	0.649
Link536	Node504	Node505	Circular	1.5	0	0	1	0	0	0	-0.03	1063.902	1063.912	1065.902	1065.412	32	0.013	1.86	0.649
Link537	Node505	Node506	Circular	1.5	0	6bot12top2deepNW	1	0	0	0	-0.03	1063.912	1063.937	1065.412	1065.437	81	0.013	1.85	0.649
Link538	Node506	Node507	Natural	1.5	0	6bot12top2deepNW	1	0	0	0	-0.03	1063.937	1063.948	1065.437	1065.948	38	0.045	7.34	0.649
Link539	Node507	Node508	Natural	2	0	6bot12top2deepNW	1	0	0	0	-0.03	1063.948	1063.96	1065.948	1065.96	39	0.045	12.81	0.649
Link540	Node507	G-N233	Circular	1	0	0	1	0	0	0	5.16	1063.948	1002	1065.948	1017	1200	0.013	0	0
Link541	Node508	Node509	Natural	1.5	0	6bot12top1.5deepNat	1	0	0	0	0.04	1063.96	1063.91	1065.96	1065.41	138	0.04	9.94	0.648
Link542	Node509	Node510	Circular	1.5	0	0	1	0	0	0	0.22	1063.91	1063.64	1065.41	1065.14	120	0.013	4.98	0.648
Link543	Node510	Node511	Natural	1.5	0	6bot12top1.5deepNat	1	0	0	0	0.28	1063.64	1063.41	1065.14	1067.41	82	0.04	27.65	0.648
Link544	Node511	Node512	Circular	2	0	0	1	0	0	0	-0.09	1063.41	1063.44	1067.41	1065.44	32.9	0.013	6.83	0.647
Link545	Node512	Node512.1	Natural	1.5	0	5bot9top1.5deepNat	1	0	0	0	-0.08	1063.44	1063.68	1065.44	1066.4	288	0.04	11.63	0.646
Link546	Node513	Node514	Circular	2	0	0	1	0	0	0	1.18	1063.77	1063.11	1066.77	1065.31	56	0.013	24.56	0.646
Link547	Node514	Node515	Natural	2.2	0	3bot9top2.2deepGun	1	0	0	0	0.22	1063.11	1062.13	1065.31	1065.13	436	0.022	49.42	0.646
Link548	Node515	Node516	Circular	2	0	0	1	0	0	0	0.98	1062.13	1061.58	1065.13	1064.58	56	0.013	22.42	0.646
Link549	Node516	Node516.2	Circular	2	0	0	1	0	0	0	-0.01	1061.58	1061.6	1064.58	1064.1	160	0.013	2.53	0.646
Link552	Node517	Node517.1	Natural	1.5	0	4bot6top1.5deepConc	1	0	0	0	0.15	1061.61	1061.4	1063.11	1063.4	144	0.017	24.8	0.645
Link549.1	Node516.1	Node517	Natural	1.5	0	4bot6top1.5deepConc	1	0	0	0	-0.01	1061.6	1061.61	1063.1	1063.11	82	0.017	7.17	0.646
Link549.2	Node516.2	Node516.1	Circular	1.5	0	0	1	0	0	0	0	1061.6	1061.6	1064.1	1063.1	24	0.024	0.18	0.646
Link554	Node520	Node522	Circular	2	0	0	1	0	0	0	0.06	1060.73	1060.63	1063.73	1063.63	181	0.013	5.32	0.643
Link552.1	Node517.1	Node520	Natural	2	0	5bot8top2deepNat	1	0	0	0	0.15	1061.4	1060.73	1063.4	1063.73	447	0.04	22.27	0.644
Link555	Node522	Node523	Circular	2	0	0	1	0	0	0	-0.34	1060.63	1061.33	1063.63	1064.33	203	0.013	13.28	0.643
Link556	Node523	Node524	Circular	2	0	0	1	0	0	0	0.78	1061.33	1060.77	1064.33	1063.47	72	0.013	19.95	0.643
Link557	Node524	Node524.1	Circular	1.5	0	0	1	0	0	0	0.1	1060.77	1060.67	1063.47	1063.63	99	0.013	3.34	0.643
Link559	Node525	Node527	Natural	1.5	0	4bot6top1.5deepGun	1	0	0	0	0.12	1060.29	1059.92	1062.49	1062.34	297	0.022	17.71	0.642
Link557.1	Node524.1	Node525	Circular	1.5	0	0	1	0	0	0	0.1	1060.67	1060.29	1063.63	1062.49	366	0.013	3.38	0.643
Link560	Node527	Node527.2	Natural	2.4	0	5bot11top2.4deepNat	1	0	0	0	-0.02	1059.92	1059.93	1062.34	1062.56	52	0.04	13.04	0.642
Link563	Node528	Node531	Natural	2.9	0	5bot11top2.9deepNat	1	0	0	0	0.26	1059.93	1059.31	1062.88	1062.21	236	0.04	63.87	-1.124

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Gilbert Links																			
Link560.1	Node527.1	Node528	Natural	2.6	0	5bot11top2.6deepNat	1	0	0	0	0	1059.93	1059.93	1062.61	1062.88	143	0.04	3.35	0.642
Link560.2	Node527.2	Node527.1	Circular	2	0	0	1	0	0	0	0	1059.93	1059.93	1062.56	1062.61	20	0.024	0.39	0.642
Link564	Node531	Node531.1	Natural	2	0	3bot5top2deepConc	1	0	0	0	0.22	1059.31	1059.22	1062.21	1062.12	40	0.017	34.71	-1.819
Link565	Node532	Node532.1	Circular	2	0	0	1	0	0	0	-1.3	1040.69	1042.46	1062.68	1062.43	136	0.013	25.81	-2.883
Link567	Node533	Node535	Natural	3	0	4bot8top3deepNat	1	0	0	0	0.03	1057.34	1057.314	1060.34	1060.314	99	0.04	14.86	2.552
Link564.1	Node531.1	Node532	Natural	2.9	0	5bot11top2.9deepNat	1	0	0	0	0.23	1059.22	1058.88	1062.12	1062.68	151	0.04	59.13	-2.42
Link568	Node535	Node536	Circular	2	0	0	1	0	0	0	0.03	1057.314	1057.3	1060.314	1060.3	56	0.013	3.58	2.494
Link569	Node536	Node536.1	Natural	3	0	3.5bot10top3dpRubber	1	0	0	0	0.05	1057.3	1057.15	1060.3	1060.15	275	0.015	65.16	2.485
Link571	Node537	Node539	Natural	3	0	6bot12top3deepNat	1	0	0	0	-2.81	1057.08	1061.46	1060.08	1067.46	156	0.04	254.56	0
Link569.1	Node536.1	Node537	Natural	2	0	3.5bot7.5top2dpConc	1	0	0	0	0.05	1057.15	1057.08	1060.15	1060.08	134	0.017	24.83	2.075
Link573	Node539	Node541	Circular	2	0	0	1	0	0	0	1.73	1061.46	1059.176	1067.46	1063.176	132	0.013	29.76	0
G-L207.1	G-N207.1	G-N207.1.1	Circular	2.5	0	0	1	0	0	0	4.76	1163.99	1162.8	1169.74	1168.8	25	0.013	89.49	89.462
Link574	Node541	Node542	Circular	2	0	0	1	0	0	0	1.74	1059.176	1054.75	1063.176	1058.57	255	0.013	29.8	0
Link575	Node542	Node543	Circular	1.5	0	0	1	0	0	0	0.3	1054.75	1054.18	1058.57	1057.08	193	0.013	5.71	0
Link576	Node543	Node544	Circular	1.5	0	0	1	0	0	0	0.09	1054.18	1053.81	1057.08	1055.91	435	0.013	3.06	0
Link577	Node544	Node544.3	Natural	1.9	0	5bot9top1.9deepNat	1	0	0	0	-0.04	1053.81	1053.89	1055.91	1055.94	208	0.04	11.33	-0.038
Link583	Node545	Node545.3	Natural	1.9	0	4.5bot8.5top1.9dpGun	1	0	0	0	0.23	1054.02	1053.76	1055.98	1055.8	111	0.022	46.42	-0.279
Link577.1	Node544.1	Node545	Natural	1.9	0	4.5bot8.5top1.9dpGun	1	0	0	0	-0.04	1053.94	1054.02	1055.95	1055.98	224	0.022	18.13	-0.178
Link577.2	Node544.2	Node544.1	Circular	1.5	0	4.5bot9.5top1.9dpGun	1	0	0	0	-0.07	1053.93	1053.94	1055.95	1055.95	14	0.024	1.52	-0.072
Link577.3	Node544.3	Node544.2	Natural	1.9	0	4.5bot8.5top1.9dpGun	1	0	0	0	-0.04	1053.89	1053.93	1055.94	1055.95	110	0.022	18.29	-0.066
Link587	Node551	Node551.1	Natural	1.9	0	5bot9top1.9deepNat	1	0	0	0	-0.2	1052.32	1052.61	1054.87	1054.51	143	0.04	26.02	0.744
Link583.1	Node545.1	Node551	Natural	1.9	0	6bot10top2.5deepNat	1	0	0	0	0.24	1052.74	1052.32	1055.14	1054.87	173	0.04	57.07	0.925
Link632	Node545.1	Node545.2	Circular	1.25	0	3bot4top0.5deepNat	1	0	0	0	6.27	1052.74	1052.05	1055.14	1054.45	11	0.013	16.18	3.566
Link583.2	G76	Node545.1	Natural	1.9	0	5bot9top2.5deepNat	1	0	0	0	0.24	1053.69	1052.74	1055.76	1055.14	394	0.04	47.82	4.491
Link583.3	Node545.3	G76	Circular	1.5	0	0	1	0	0	0	0.25	1053.76	1053.69	1055.8	1055.76	28	0.024	2.84	-0.327
Link588	Node555	Node556	Natural	1.8	0	7bot11top1.8deepNat	1	0	0	0	0.03	1052.86	1052.83	1054.68	1054.63	97	0.04	12.66	0.463
Link590	Node556	Node556.2	Circular	1.5	0	0	1	0	0	0	0.13	1052.83	1052	1054.63	1054.05	646	0.013	3.77	0.375
Link587.1	Node551.1	Node555	Natural	1.8	0	7bot11top1.8deepNat	1	0	0	0	-0.2	1052.61	1052.86	1054.51	1054.68	127	0.04	31.94	0.584
Link591	G60	Node559	Circular	1.5	0	0	1	0	0	0	-0.06	1051.38	1051.5	1054.38	1054.5	185	0.013	2.68	2.343
Link594	Node559	Node559.1	Circular	1.5	0	0	1	0	0	0	39.95	1051.5	1025.93	1054.5	1027.43	64	0.014	61.65	2.338
Link590.1	Node556.1	G60	Circular	1.5	0	0	1	0	0	0	0.13	1051.72	1051.38	1054.2	1054.38	264	0.013	3.77	0.453
Link590.2	Node556.2	Node556.1	Circular	2	0	0	1	0	0	0	0.13	1052	1051.72	1054.05	1054.2	221	0.013	8.05	0.392
Link596	Node562	Node564	Circular	1.5	0	0	1	0	0	0	11.08	1050.5	1030.67	1053.5	1036.62	179	0.013	34.96	0
Link594.1	Node559.1	Node562	Circular	1.5	0	0	1	0	0	0	-24.09	1025.93	1050.5	1027.43	1053.5	102	0.014	47.87	0
Link633	Node559.1	G73	Circular	1.5	0	0	1	0	0	0	4.5	1025.93	1024.49	1027.43	1025.99	32	0.014	20.69	2.336
Link597	Node564	Node565	Circular	1.5	0	0	1	0	0	0	0	1030.67	1030.67	1036.62	1063.62	341	0.013	0.33	0
Link598	Node565	Node565.2	Circular	0.833	0	0	1	0	0	0	5.49	1034	1022.89	1063.62	1040.51	202.26	0.014	4.76	0
Link599	Node566	Node567	Circular	1	0	0	1	0	0	0	4.61	1004.44	995.58	1009.44	1000.28	192	0.013	7.65	0
Link600	Node567	Node568	Circular	1	0	0	1	0	0	0	2.62	995.58	989.79	1000.28	994.59	221	0.013	5.77	0
Link601	Node568	Node569	Circular	1	0	0	1	0	0	0	3.71	989.79	986.67	994.59	992.67	84	0.013	6.87	0
Link602	Node569	G58 G75	Circular	1	0	0	1	0	0	0	12.09	986.67	949.19	992.67	951.19	310	0.013	12.39	0
Link603	G58 G75	Node571	Natural	2	0	5bot25top2deepNW	1	0	0	0	2.68	949.19	946.4	951.19	948.4	104	0.045	181.32	10.13

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Gilbert Links																			
Link604	Node571	Node572	Circular	1.5	0	0	1	0	0	0	1.56	946.4	945.9	948.4	948.4	32	0.013	13.13	10.062
Link605	Node572	Node573	Natural	1.7	0	3bot3top1.7deepNat	1	0	0	0	0.26	945.9	945.61	948.4	947.62	110	0.04	19.85	9.977
Link606	Node573	node5769	Natural	1.7	0	3bot3top1.7deepNat	1	0	0	0	0.27	945.61	944.97	947.62	947.22	237	0.04	20.09	9.656
Link607	node5769	G61	Circular	2	0	0	1	0	0	0	0	944.97	944.97	947.22	947.22	5	0.014	0.66	10.094
Link608	G61	Node576	Natural	2.1	0	2bot8top2.1deepNat	1	0	0	0	0.77	944.97	942.11	947.22	944.21	371	0.04	37.07	14.996
Link609	Node576	Node577	Circular	1.5	0	0	1	0	0	0	3.3	942.11	941.45	944.21	943.55	20	0.024	10.34	14.67
Link610	Node577	Node578	Natural	1.8	0	4bot10top1.8deepGun	1	0	0	0	-0.01	941.45	941.47	943.55	943.27	137	0.022	11.26	14.68
Link614	Node580	G-N157	Special	3.5	0	0	1	0	0	0	3.22	1112.14	1108.66	1117.34	1116.51	107.95	0.024	54.48	16.325
Link613.1	Node334.1	Node580	Circular	3	0	0	1	0	0	0	4.19	1130.12	1112.14	1133.12	1117.34	429	0.024	73.96	16.325
Link613.2	Node334.2	Node334.1	Circular	1.5	0	0	1	0	0	0	4.19	1144.29	1130.12	1147.29	1133.12	338	0.014	19.97	16.325
Link613.3	Node334.3	Node334.2	Circular	3	0	0	1	0	0	0	4.19	1149.82	1144.29	1153.32	1147.29	132	0.024	73.95	16.325
Link613.4	Node334.4	Node334.3	Special	3.5	2.25	0	1	0	0	0	4.19	1163.44	1149.82	1166.94	1153.32	325	0.024	62.11	16.325
Link619	Node585	Node334.4	Circular	1.5	0	0	1	0	0	0	3.17	1165.884	1163.44	1170.884	1166.94	77	0.024	10.14	16.325
GcreekEst	Node586	G-N216	0	0	0	0	0	0	0	0	0	0	0	1173.51	1175.161	0	0	20.58	14.184
G-L214.1	G-N214.1	G-N207.1	Circular	2	0	0	1	2	2	8	6.43	1170.65	1164.41	1182.92	1169.74	97	0.013	57.38	72.928
Link545.1	Node512.1	Node513	Natural	1.5	0	5bot9top1.5deepNat	1	0	0	0	-0.08	1063.68	1063.77	1066.4	1066.77	111	0.04	11.47	0.646
starlite	Node512.1	Node644	0	0	0	0	0	0	0	0	0	0	0	1066.4	1066.4	0	0	0	0
G-L234.1	G-N234.1	G-N235	Natural	0	0	G-X234	1	0	0	0	0.94	991.28	990	1015.92	1015	136	0.035	18545.66	636.593
Link634	G73	G-N042	Natural	0.5	0	6bot7top0.5deepNat	1	0	0	0	4.91	1024.49	935.85	1025.99	939.05	1803.96	0.04	15.44	5.229
Link598.1	Node565.1	Node566	Circular	0.833	0	0	1	0	0	0	5.5	1010.69	1007.94	1015.15	1009.44	50	0.014	4.77	0
Link598.2	Node565.2	Node565.1	Circular	1.5	0	0	1	0	0	0	5.5	1022.89	1010.69	1040.51	1015.15	222	0.014	22.87	0
Link487.1	Node450.1	Node456	Circular	1.67	0	0	1	0	0	0	0.4	1163.248	1163.2	1166.924	1166.9	12	0.013	8.85	7.164
Link639	Node596	Node596.1	Rectangular	2	0	0	1	0	0	1.8	3.64	968.53	966.49	978.03	974.41	56	0.02	31.02	11.239
Link639.1	Node596.1	G-N039	Trapezoidal	0.5	0	0	1	1	1	4	3.66	966.49	962.68	974.41	967.68	104.22	0.035	10.17	11.237
641.3	Node598	Node596	0	0	0	0	0	0	0	0	0	0	0	978.03	978.03	0	0	0	0
641.1	Node598	Node596	0	0	0	0	0	0	0	0	0	0	0	978.03	978.03	0	0	6.3	11.24
641.2	Node598	Node596	0	0	0	0	0	0	0	0	0	0	0	978.03	978.03	0	0	1.09	0
Link642	G28 G59	Node598	Circular	2	0	0	1	0	0	0	6.27	975.573	972	978.03	978.03	57	0.013	56.64	15.64
Link622.1	Node422.1	G-N201	Circular	1	0	0	1	0	0	0	3.11	1158.28	1142	1163.14	1146	524	0.017	4.8	5.732
sk15	Node603	Node604	0	0	0	0	0	0	0	0	0	0	0	1102.67	1102.67	0	0	0	80.267
sk14	Node603	Node604	0	0	0	0	0	0	0	0	0	0	0	1102.67	1102.67	0	0	6.3	12.061
Link647	Node604	G-N224	Circular	3	0	0	1	0	0	0	2.55	1095	1089.4	1102.67	1115	220	0.013	106.41	92.182
Link649	Node605	G-N042	Circular	1	0	0	1	0	0	0	0.2	936.85	936.24	939.95	939.05	307	0.013	1.59	-0.107
Link650	Node606	Node605	Circular	1	0	0	1	0	0	0	2.28	939.8	937.05	946.42	939.95	120.5	0.013	5.38	0
Link651	Node607	Node606	Circular	1	0	0	1	0	0	0	7.17	961.5	940	969.53	946.42	300	0.013	9.54	0
Link652	Node608	Node607	Circular	1	0	0	1	0	0	0	4.55	971.65	961.7	977.05	969.53	218.5	0.013	7.6	0
Link653	Node609	Node608	Circular	1	0	0	1	0	0	0	5.77	980	971.85	987.88	977.05	141.3	0.013	8.56	0
Link654	Node610	Node609	Circular	1	0	0	1	0	0	0	3.13	982	981	984.96	987.88	31.9	0.013	6.31	0
Link425.1	Node391.1	Node391..1	Circular	4	0	0	1	1	1	3	4.26	1154.23	1132.44	1160.25	1137.94	511	0.013	296.62	105.224
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
trailerw	Node613	Node613.3	0	0	0	0	0	0	0	0	0	0	0	1149	1147.66	0	0	0	10.607
trailero	Node613	Node613.3	0	0	0	0	0	0	0	0	0	0	0	1149	1147.66	0	0	1.11	3.029

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Gilbert Links																			
G-L040.1	G-N040.1	G-N041	Circular	2.25	0	0	1	0	0	0	3.21	940.19	938.84	942.72	941.34	42	0.013	55.52	13.83
rockretain	Node616	Node422	0	0	0	0	0	0	0	0	0	0	0	1165.07	1165.07	0	0	0	-12.856
rckretain2	Node616	Node422	0	0	0	0	0	0	0	0	0	0	0	1165.07	1165.07	0	0	6.3	-5.318
Link425.2	Node391..1	Node603	Natural	4	0	22bot30top4deepNat	1	1	1	3	4.26	1132.44	1098	1137.94	1102.67	807.61	0.04	1704.24	103.416
Link425.3	Node391.2	Node391.1	Natural	4	0	22bot30top4deepNat	1	1	1	3	4.26	1167.79	1154.23	1174.14	1160.25	318	0.04	1704.18	105.86
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G-L168.1	G-N168.1	G-N169-2	Circular	3	0	0	1	0	0	0	4.44	1065.17	1058.95	1078.77	1071	140	0.013	140.59	68.569
G-L159.1	G-N159.1	G-N167	Circular	3.5	0	0	1	0	0	0	1.3	1093.5	1089.32	1101.96	1097.57	321	0.013	114.81	37.21
G-L215.1	Node36.1	G-N201	Special	3.4	0	0	1	3	3	8	2.23	1142.67	1142	1145.68	1146	30	0.013	83.71	95.086
G-L215.2	Node36.2	Node36.1	Natural	2	0	3bot8top2deepNat	1	3	3	8	2.22	1149.31	1142.67	1152.06	1144.83	299	0.04	67.61	96.945
G-L215.3	Node36.3	Node36.2	Circular	2.75	0	3bot8top2deepNat	1	3	3	8	2.2	1149.75	1149.31	1152.5	1152.06	20	0.013	78.44	96.942
G-L215.4	Node36.4	Node36.3	Natural	2	0	3bot8top2deepNat	1	3	3	8	2.21	1150.5	1149.75	1153.25	1152.5	34	0.04	67.38	96.962
Link681	Node636	Node637	Special	3.4	2.25	0	1	0	0	0	2.22	1153.516	1153.027	1156.27	1155.78	22	0.013	83.51	97.039
Link682	Node637	Node638	Natural	2	0	3bot8top2deepNat	1	0	0	0	2.22	1153.027	1150.889	1155.78	1153.639	96.32	0.04	67.59	97.022
Link683	Node638	Node36.4	Circular	2.75	0	0	1	0	0	0	2.16	1150.889	1150.5	1153.639	1153.25	18	0.013	77.75	96.973
Link658.1	Node613.1	G-N145	Circular	2	0	0	1	0	0	0	3.35	1121.08	1097.15	1131	1102.75	715	0.013	41.39	13.631
Link658.2	Node613.2	Node613.1	Circular	2	0	0	1	0	0	0	1.22	1121.75	1121.08	1130	1131	55	0.013	24.97	13.633
Link658.3	Node613.3	Node613.2	Circular	2	0	0	1	0	0	0	9.93	1145	1121.75	1147.66	1130	234.11	0.013	71.29	13.633
G-L207.1.1	G-N207.1.1	Node36	Circular	2.5	0	0	1	0	0	0	3.36	1162.63	1158.43	1168.8	1165.68	125	0.013	75.19	89.461
Link632.1	Node545.2	G28 G59	Natural	0.5	0	3bot4top0.5deepNat	1	0	0	0	6.27	1052.05	975.57	1054.45	978.03	1220	0.04	8.78	3.501
Link631	Node644	G-N234.1	Circular	1	0	0	1	0	0	0	6.47	1059.6	991.28	1066.4	1015.92	1055.55	0.013	9.06	0
Link565.1	Node532.1	Node533	Circular	2	0	0	1	0	0	0	-1.3	1042.46	1057.34	1062.43	1060.34	1144	0.013	25.8	2.845
spill 7	Node532.1	G-N281	0	0	0	0	0	0	0	0	0	0	0	1062.43	1069	0	0	6.3	-5.207

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sand Links																			
SA-N009L2	SA-N009	SA-N010	Natural	0	0	SA-N009XS2	1	0	0	0	0.31	930	929	938.84	937	325.8	0	777.06	667.575
SA-N066L	SA-N066	SA-N067	Natural	0	0	SA-N066XS	1	0	0	0	4.68	909	873.73	933.69	898.42	753.7	0	69297.11	97.739
SA-N070L	SA-N070	SA-N071	Trapezoidal	3	0	SA-N070XS	1	0.83	0.83	3	0.39	915	912	918	915	769.5	0.02	101.45	53.778
SA-N123L2	SA-N122	SA-N123	Circular	3	0	0	1	0	0	0	0.45	908.48	906.93	921.2	920.44	344	0.013	44.77	46.665
SA-N144L	SA-N144	SA-N145	Circular	3.5	0	0	1	0	0	0	1.06	900.68	899	908.58	906	158	0.013	103.74	106.525
SA-N132L	SA-N132	SA-N133	Trapezoidal	3	0	0	1	1	1	2	1.02	914.38	911.33	917.4	915.5	300.2	0.024	118.86	2.363
SA-N131L	SA-N131	SA-N132	Circular	1	0	0	1	0	0	0	0.81	913.72	910.69	918.77	917.4	372.9	0.013	3.21	2.392
SA-N134L	SA-N134	SA-N133	Circular	1	0	0	1	0	0	0	1.19	914.42	909.1	919.42	915.5	445.4	0.013	3.89	4.754
SA-N145L	SA-N145	SA-N146	Circular	3.5	0	0	1	0	0	0	2.13	899	893.91	906	902.89	239.1	0.013	146.79	114.952
SA-N007L1	SA-N007	SA-N008	Rectangular	6	0	0	1	0	0	20	0	931	931	940	940	34.6	0.02	49.24	621.717
SA-N007L2	SA-N007	SA-N008	Trapezoidal	2	0	0	1	1	1	100	0	938	938	940	940	50	0.014	106.17	0
SA-N003L1	SA-N003	SA-N004	Rectangular	7	0	0	2	0	0	10	0.72	949	948.5	959.79	959.5	69.3	0.02	714.96	567.488
SA-N003L2	SA-N003	SA-N004	Trapezoidal	1	0	0	1	1	1	200	0	958	958	959.79	959.5	69.3	0.014	67.06	0
SA-N011L	SA-N011	SA-N012	Natural	0	0	SA-N011XS	1	0	0	0	0.5	928	923	937	930	996.2	0	786.48	663.12
SA-N013L	SA-N013	SA-N014	Natural	0	0	SA-N013XS	1	0	0	0	0.74	923	883	930	891	5402.4	0	1112.98	710.46
SA-N029L	SA-N029	SA-N030	Special	4.3	0	5bot17top4.3deepNW	1	0	0	8	0.16	937.72	937.55	943.32	943.8	105	0.024	19.08	34.005
SA-N014L	SA-N014	SA-N015	Rectangular	8	0	0	1	0	0	20	0	883	883	891	899	62.9	0.02	75.69	703.979
SA-N069L	SA-N069	SA-N070	Circular	2.5	0	0	1	0	0	0	0.14	916.9	915	927.34	918	1326.9	0.013	15.52	32.968
SA-N057L1	SA-N057	SA-N058	Rectangular	2.33	0	0	1	0	0	8.5	3.63	923.82	921.12	927	930.52	74.3	0.013	406.55	93.071
SA-N005L1	SA-N005	SA-N006	Rectangular	8	0	0	1	0	0	10	1.32	940	938	954	954	151.6	0.02	1162.61	292.994
SA-N005L2	SA-N005	SA-N006	Trapezoidal	2	0	0	1	1	1	100	0	952	952	954	954	100	0.014	106.17	0
SA-N005L3	SA-N005	SA-N006	Rectangular	8	0	0	1	0	0	10	1.32	940	938	954	954	151.2	0.02	1164.15	293.419
SA-N080L	SA-N080	SA-N080.1	Circular	2	0	0	1	0	0	0	0.17	900.36	900.01	910.57	910.58	209.7	0.013	9.24	14.697
SA-N102L	SA-N102	SA-N102.1	Natural	0	0	SA-N102XS	1	0	0	0	0.66	905.04	901.87	913	909.26	481.3	0	162.28	122.105
SA-N140L	SA-N140	SA-N140.1	Circular	2.25	0	0	1	0	0	0	0.36	918.87	916.52	928.23	929.1	655.3	0.013	18.55	16.682
SA-N159L	SA-N159	SA-N159.1	Circular	1.5	0	0	1	0	0	0	0.36	915.46	914.2	918.96	918.59	345.8	0.013	6.34	8.135
SA-N025L	SA-N025	SA-N026	Rectangular	3	0	0	1	0	0	6	0.16	938.16	938.04	943.86	944.64	75	0.013	82.3	47.231
SA-N147L1	SA-N147	SA-N148	Rectangular	5	0	0	1	0	0	18	0.14	890	889.9	897	897.5	70.1	0.02	395.09	169.832
SA-N147L2	SA-N147	SA-N148	Trapezoidal	1	0	0	1	1	1	100	0	896	896	897	897.5	50	0.014	33.5	0
SA-N104L1	SA-N104	SA-N105	Circular	2	0	0	2	0	0	0	1.44	889	888	897	897	69.3	0.013	27.18	60.962
SA-N104L2	SA-N104	SA-N105	Special	2.33	0	0	2	0	0	0	1.44	889	888	897	897	69.3	0.023	40.64	84.618
SA-N104L3	SA-N104	SA-N105	Trapezoidal	1	0	0	1	1	1	100	0	895	895	897	897	50	0.014	33.5	39.899
SA-N068L	SA-N068	SA-N068.2	Circular	1.25	0	0	1	0	0	0	1.08	930.13	925.21	934.65	931.58	456.7	0.013	6.7	2.258
SA-N072L	SA-N072	SA-N073	Circular	3	0	0	1	0	0	0	0.39	911.5	910.18	915	914	338	0.02	27.09	30.565
SA-N084L	SA-N084	SA-N084.1	Circular	1.25	0	0	1	0	0	0	1.07	902.63	901.83	909.96	910.35	74.8	0.013	6.68	10.009
SA-N168L	SA-N168	SA-N168.2	Circular	1	0	0	1	0	0	0	0.62	905.35	903.58	911.65	910.31	284.1	0.013	2.81	3.141
SA-N169L	SA-N169	SA-N145	Circular	1.5	0	0	1	0	0	0	0.81	901.25	899	908.55	906	276.7	0.013	9.47	3.113
SA-N137L	SA-N137	SA-N137.1	Circular	1.5	0	0	1	0	0	0	1.07	926.05	922.31	931.95	926.08	638.38	0.013	8.04	10.891
SA-N136L	SA-N136	SA-N137	Circular	1.5	0	0	1	0	0	0	0.78	927.5	926.05	931.7	931.95	185.6	0.013	9.28	4.775
SA-N121L	SA-N121	SA-N122	Circular	3	0	0	1	0	0	0	0.81	916.54	908.48	925.68	921.2	1000.2	0.013	59.87	24.177
SA-N146L	SA-N146	SA-N147	Natural	0	0	SA-N146XS	1	0	0	0	0.34	893.91	890	902.89	897	1159.1	0	414.89	112.287

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sand Links																			
SA-N133L1	SA-N133	SA-N133A	Circular	2	0	0	1	0	0	0	0.2	911.33	911.23	915.5	915.5	50	0.024	5.48	14.514
SA-N133L2	SA-N133	SA-N133A	Trapezoidal	1	0	0	1	1	1	100	0	914.5	914.5	915.5	915.5	50	0.014	33.5	0
SA-N135L	SA-N135	SA-N136	Circular	1.25	0	0	1	0	0	0	0.57	928.81	927.5	933.08	931.7	230.4	0.013	4.87	4.86
SA-N138L	SA-N138	SA-N139	Circular	2.5	0	0	1	0	0	0	0.24	922.06	921.75	926.24	927.92	127.7	0.013	20.21	10.742
SA-N113L	SA-N113	SA-N097	Circular	1.25	0	0	1	0	0	0	0.7	912.58	911.24	920.22	920	192.4	0.013	5.39	1.737
Link375	SA-N139	Node356	Circular	3	0	0	1	0	0	0	0.2	921.75	921.65	927.92	927.81	48.9	0.013	30.16	24.512
SA-N160L	SA-N160	SA-N161	Circular	2	0	0	1	0	0	0	0.93	911.14	901.05	917.56	909.73	1086	0.013	21.81	19.86
SA-N128L	SA-N128	SA-N128.1	Circular	2	0	0	1	0	0	0	0.37	918.28	916.93	924.48	923.61	368.2	0.013	13.7	-3.589
SA-N129L	SA-N129	SA-N122	Circular	2.5	0	0	1	0	0	0	3.07	916.05	908.48	923.05	921.2	246.3	0.013	71.91	5.973
SA-N130L	SA-N130	SA-N130.1	Circular	1	0	0	1	0	0	0	1.13	918.77	914.05	921.97	921.62	418.1	0.013	3.79	3.947
SA-N124L	SA-N124	SA-N125	Circular	3	0	SA-N124XS	1	0	0	0	0.26	912.21	911.1	915.5	915.2	428.9	0.013	33.93	32.176
SA-N123L1	SA-N123	SA-N124	Circular	3	0	0	1	0	0	0	0.25	906.93	905.67	920.44	915.5	499.1	0.013	33.51	46.723
SA-N083L	SA-N083	SA-N084	Circular	1.25	0	0	1	0	0	0	0.83	906.54	902.63	912.8	909.96	471.5	0.013	5.88	5.656
SA-N078L	SA-N078	SA-N079	Circular	1.5	0	0	1	0	0	0	0.17	905.49	904.87	911.74	913.06	358.7	0.013	4.37	6.629
SA-N079L	SA-N079	SA-N080	Circular	1.5	0	0	1	0	0	0	0.38	904.87	903.69	913.06	910.57	312	0.013	6.46	6.666
SA-N081L	SA-N081	SA-N082	Circular	2.5	0	0	1	0	0	0	1.21	899.76	893	910.58	900	559.3	0.024	24.43	24.459
SA-N115L	SA-N115	SA-N115.1	Circular	1	0	0	1	0	0	0	0.35	914.19	912.32	917.64	915.82	535.1	0.013	2.11	2.146
SA-N117L	SA-N117	SA-N118	Circular	1.75	0	0	1	0	0	0	0.19	910.52	909.57	915.27	915.35	491.4	0.013	6.97	5.42
SA-N116L	SA-N116	SA-N117	Circular	2	0	0	1	0	0	0	1.2	911.92	910.52	915.43	915.27	116.7	0.013	24.78	-2.541
SA-N118L	SA-N118	SA-N100	Circular	1.75	0	0	1	0	0	0	0.26	909.57	908	915.35	912.6	606.7	0.013	8.06	13.432
SA-N119L	SA-N119	SA-N120	Circular	1	0	0	1	0	0	0	0.49	912.82	911.35	918.75	917.22	299.6	0.013	2.5	1.932
SA-N120L	SA-N120	SA-N118	Circular	1.5	0	0	1	0	0	0	0.58	911.35	909.57	917.22	915.35	304.5	0.013	8.03	2.408
SA-N100L1	SA-N100	SA-N101	Circular	3	0	0	2	0	0	0	0.73	908	907.57	912.6	912.6	58.7	0.024	30.92	84.603
SA-N101L	SA-N101	SA-N102	Natural	0	0	SA-N101XS	1	0	0	0	0.35	907.57	905.04	912.6	913	713.7	0	62.91	84.079
SA-N090L	SA-N090	SA-N090.1	Special	2.74	0	0	1	0	0	0	0.24	918.02	917.14	926.69	923.63	370.1	0.013	43.57	30.034
SA-N085L	SA-N085	SA-N085.2	Circular	1.25	0	0	1	0	0	0	0.07	923.47	923.33	929.15	928.45	205	0.013	1.69	9.482
SA-N091L	SA-N091	SA-N092	Special	3.4	0	0	1	0	0	0	0.1	916.09	915.8	921.32	919.5	276.8	0.013	46.17	61.738
SA-N093L	SA-N093	SA-N094	Circular	3.5	0	0	1	0	0	0	0.73	915.18	915	922.15	922.6	24.5	0.013	86.24	74.145
SA-N095L	SA-N095	SA-N096	Natural	0	0	SA-N095XS	1	0	0	0	0	915	915	921	921	224.1	0	174.83	72.789
416.1	SA-N096	SA-N097	Circular	4	0	0	2	0	0	0	0.69	912.98	911.74	921	920	179.3	0.013	119.46	72.502
SA-N097L	SA-N097	SA-N098	Natural	0	0	SA-N097XS	1	0	0	0	0	912	912	920	920	381.6	0	390.23	74.929
SA-N098L	SA-N098	SA-N099	Natural	0	0	SA-N098XS	1	0	0	0	0	912.5	912.5	920	916	238.4	0	96.74	73.493
SA-N099L	SA-N099	SA-N100	Natural	0	0	SA-N099XS	1	0	0	0	0.86	910.06	908	916	912.6	240.8	0	104.73	72.589
421.1&2	SA-N110	SA-N111	Circular	2	0	0	2	0	0	0	0.03	916.42	916.32	920.17	920.15	313.62	0.013	4.04	8.27
SA-N111L	SA-N111	SA-N091	Circular	2.5	0	0	1	0	0	0	0.14	916.32	916.09	920.15	921.32	162.01	0.013	15.45	8.183
SA-N112L	SA-N112	SA-N093	Circular	1	0	0	1	0	0	0	0.39	916.46	915.18	921.15	922.15	328	0.013	2.23	-0.115
SA-N074L	SA-N074	SA-N075	Circular	1.25	0	0	1	0	0	0	0.58	927.39	924.51	932.52	928.01	500.7	0.013	4.9	3.598
SA-N075L	SA-N075	SA-N076	Circular	1.25	0	0	1	0	0	0	0.73	924.51	922.22	928.01	925.9	313.7	0.013	5.52	4.928
SA-N076L	SA-N076	SA-N077	Circular	1.5	0	0	1	0	0	0	1.06	922.22	920.18	925.9	926.67	193	0.013	10.8	7.208
SA-N077L	SA-N077	SA-N069	Circular	1.5	0	0	1	0	0	0	0.37	920.18	918.4	926.67	927.34	485.3	0.013	6.36	8.755
SA-N056L	SA-N056	SA-N057	Natural	0	0	SA-N056XS	1	0	0	0	0.6	926.95	923.82	928.66	927	521.6	0	108.48	63.707
430.1	SA-N058	SA-N058.1	Circular	2	0	SA-N058XS	1	0	0	0	0.04	921.12	921.03	930.52	930.43	209.4	0.024	2.54	7.01

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sand Links																			
430.2&3	SA-N058	SA-N058.1	Circular	4	0	0	2	0	0	0	0.04	921.12	921.03	930.52	930.43	209.4	0.024	16.13	85.888
SA-N059L	SA-N059	SA-N060	Circular	4	0	0	2	0	0	0	0.6	920.95	920.7	930.35	925.4	41.6	0.024	60.32	89.36
SA-N060L	SA-N060	SA-N061	Natural	0	0	SA-N060XS	1	0	0	0	0.59	920.7	920.4	925.4	925.1	50.9	0	678.4	89.472
SA-N061L	SA-N061	SA-N062	Circular	4	0	0	2	0	0	0	5.52	920.4	918.02	925.1	923.57	43.1	0.013	337.55	89.62
SA-N062L	SA-N062	SA-N063	Natural	0	0	SA-N062XS	1	0	0	0	0.31	918.02	917.54	923.57	923.09	155.5	0	565.9	89.2
SA-N063L	SA-N063	SA-N064	Circular	4	0	0	2	0	0	0	0.3	917.54	917.44	923.09	921.44	33.3	0.013	78.72	88.602
SA-N064L	SA-N064	SA-N065	Natural	0	0	SA-N064XS	1	0	0	0	0.37	917.44	916.14	921.44	926.14	349.9	0	378.34	88.291
SA-N065L	SA-N065	SA-N066	Rectangular	3	0	0	1	1	1	5	5.22	916.14	909	926.14	933.69	136.9	0.013	375.08	97.654
SA-N050L	SA-N050	SA-N050.2	Circular	1.25	0	0	1	0	0	0	0.55	930.26	929.29	935.47	934.9	176	0.013	4.8	8.363
SA-N051L	SA-N051	SA-N052	Circular	2	0	0	1	0	0	0	0.01	923.57	923.56	931.53	928.1	175.9	0.013	1.71	8.314
SA-N053L	SA-N053	SA-N053.1	Special	1.6	0	0	1	0	0	0	8.38	923.56	905.69	926.56	908.69	213.2	0.024	32.7	17.755
SA-N052L	SA-N052	SA-N053	Special	1.66	0	0	1	0	0	0	0	923.56	923.56	928.1	926.56	131.6	0.024	0.36	15.525
SA-N055L	SA-N055	SA-N052	Special	1.66	0	0	1	0	0	0	0.57	927.16	926	933.91	928.1	202.3	0.024	8.55	7.213
SA-N033L	SA-N033	Node229	Circular	4	0	0	1	0	0	0	4.52	936.22	933.6	940.22	941.341	58	0.013	305.3	31.979
SA-N049L	SA-N049	SA-N032	Circular	2.5	0	0	1	0	0	0	0.56	936.96	936.41	941	940.75	99	0.013	30.57	0
234	SA-N031	Node228	Circular	3.5	0	0	1	0	0	0	1.63	936.6	935.1	940.99	942.65	92	0.013	128.47	15.89
234.1	SA-N031	Node228	Circular	3.5	0	0	1	0	0	0	1.63	936.6	935.1	940.99	942.65	92	0.013	128.47	15.89
SA-N032L	SA-N032	SA-N033	Circular	4	0	0	1	0	0	0	0.06	936.41	936.22	940.75	940.22	305	0.013	35.85	31.895
Link239	SA-N034	Node233	Circular	5	0	0	1	0	0	0	0.64	933.1	932.03	939.6	940.6	167	0.024	112.92	56.287
SA-N027L	SA-N027	SA-N028	Rectangular	3	0	0	1	0	0	6	1.32	937.9	936.84	944.26	942.44	80	0.013	236.84	30.19
Link282	SA-N027	Node282	Circular	2	0	0	1	0	0	0	1.04	936.23	927.7	944.26	934.03	819.84	0.013	23.08	19.267
SA-N022L	SA-N022	SA-N023	Circular	4	0	0	1	0	0	0	0.35	939.4	938.31	947.13	944.91	315	0.013	84.5	72.649
Link203	SA-N023	SA-N023.1	Natural	4.3	0	8bot18top4.3deepNat	1	0	0	0	-0.74	938.31	939.54	944.91	944.67	166	0.04	341.3	77.036
SA-N038L	SA-N038	SA-N023	Circular	1	0	0	1	0	0	0	1.51	945.53	940.76	951.23	944.91	314.9	0.013	4.38	3.08
SA-N047L	SA-N047	SA-N048	Circular	1	0	0	1	0	0	0	1.16	950.06	947.89	953.69	951.83	186.6	0.013	3.84	3.102
SA-N048L	SA-N048	SA-N046	Circular	1.5	0	0	1	0	0	0	5.45	947.89	946	951.83	951.89	34.7	0.013	24.52	3.099
SA-N040L	SA-N040	SA-N041	Circular	1.25	0	0	1	0	0	0	1.93	968.14	959.81	974.38	964.79	432.1	0.013	8.97	5.508
SA-N042L	SA-N042	SA-N043	Circular	0.67	0	0	1	0	0	0	11.09	957.9	953.42	963.9	959.06	40.4	0.013	4.08	2.566
SA-N043L	SA-N043	SA-N044	Circular	1.25	0	0	1	0	0	0	0.69	953.42	951.87	959.06	955.72	223.9	0.013	5.37	7.953
SA-N041L1	SA-N041	SA-N043	Circular	1.25	0	0	1	0	0	0	6.48	959.81	953.42	964.79	959.06	98.6	0.013	16.44	6.012
SA-N041L2	SA-N041	SA-N042	Circular	1.25	0	0	1	0	0	0	1.81	959.81	957.9	964.79	963.9	105.6	0.013	8.69	3.157
SA-N044L	SA-N044	SA-N045	Circular	1.75	0	0	1	0	0	0	2.02	951.87	947.76	955.72	952.51	203.4	0.013	22.52	12.225
SA-N045L	SA-N045	SA-N046	Circular	2.5	0	0	1	0	0	0	2.29	947.76	946	952.51	951.89	76.9	0.013	62.05	12.199
SA-N149L	SA-N149	SA-N150	Circular	1	0	0	1	0	0	0	1.26	924.05	922.16	926.3	927	150.4	0.013	3.99	2.518
SA-N150L	SA-N150	Node356	Circular	1	0	0	1	0	0	0	1.12	922.16	921.65	927	927.81	45.6	0.013	3.77	2.494
SA-N141L	SA-N141	SA-N142	Circular	3	0	0	1	0	0	0	0.37	914.82	910.57	930	920.32	1150.5	0.013	40.54	43.151
SA-N142L	SA-N142	SA-N143	Circular	3	0	0	1	0	0	0	0.65	910.57	906.21	920.32	914.46	674	0.013	53.64	60.244
SA-N154L	SA-N154	SA-N142	Circular	1.5	0	0	1	0	0	0	0.99	913.8	911.87	918.55	920.32	195.7	0.013	10.43	5.248
SA-N125L	SA-N125	SA-N125.1	Circular	3.5	0	SA-N125XS	1	0	0	0	0.4	911.1	910.71	915.2	915.54	97.3	0.013	63.7	33.829
SA-N126L1	SA-N126	SA-N127	Special	3.75	0	0	1	0	0	0	0.22	910.16	910.06	916	916	44.8	0.024	17.65	29.074
SA-N114L	SA-N114	SA-N097	Circular	1	0	0	1	0	0	0	0.24	911.6	911.24	917.38	920	150.8	0.013	1.74	3.937
SA-N018L	SA-N018	SA-N019	Natural	0	0	SA-N018XS	1	0	0	0	0.91	958.38	952.46	967.57	961.65	649.1	0	6170.85	83.415

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sand Links																			
SA-N019L	SA-N019	SA-N020	Circular	2.5	0	0	1	0	0	0	2.05	952.46	949.05	961.65	953.05	166.1	0.013	58.77	53.338
SA-N020L	SA-N020	SA-N006	Natural	0	0	SA-N020XS	1	0	0	0	1.22	949.05	938	953.05	954	903.1	0	838.82	53.339
SA-N006L	SA-N006	SA-N007	Natural	0	0	SA-N006XS	1	0	0	0	0.61	938	931	954	940	1138.6	0	1197.5	631.141
SA-N153L	SA-N153	SA-N153.1	Circular	1.25	0	0	1	0	0	0	0.53	916.28	915.24	919.38	919.03	197.2	0.013	4.69	1.443
SA-N155L	SA-N155	SA-N143	Circular	1.25	0	0	1	0	0	0	0.45	909.02	906.21	916.77	914.46	627.6	0.013	4.32	4.379
SA-N143L	SA-N143	SA-N144	Circular	3	0	0	1	0	0	0	0.72	906.21	900.68	914.46	908.58	772	0.013	56.45	73.38
SDWLW1	SA-N152	SA-N152.1	0	0	0	0	0	0	0	0	0	0	0	926.7	925.65	0	0	0	18.401
Link284.1	SA-N151	SA-N152	Natural	2	0	26bot30top2deepNW	1	0	0	0	0.73	927.8	924	931.6	926.7	520.75	0.1	231.06	19.637
Link222	SA-N028	Node218	Natural	4.3	0	6bot18top4.3deepNat	1	0	0	0	-0.46	936.84	937.81	942.44	943.51	209	0.04	239.6	29.914
Link280	SA-N028	SA-N028.1	Circular	0.38	0	0	1	0	0	0	1.63	936.8	933.5	942.44	938.56	202.75	0.024	0.19	0.281
Link227	SA-N030	Node222	Circular	4	0	0	1	0	0	0	0.16	937.55	937.44	943.8	942.84	70	0.013	56.94	33.822
SA-N026L	SA-N026	SA-N027	Circular	4	0	SA-N026XS	1	0	0	0	0.03	938.04	937.9	944.64	944.26	506	0.024	12.94	47.231
SA-N010L1	SA-N010	SA-N011	Rectangular	6.5	0	0	1	0	0	23	2.56	929	928	937	937	39.1	0.035	1886.67	665.367
SA-N010L2	SA-N010	SA-N011	Trapezoidal	2	0	0	1	1	1	100	0	935	935	937	937	50	0.013	114.34	0
SA-N008L	SA-N008	SA-N009	Natural	0	0	SA-N008XS	1	0	0	0	0.32	931	930	940	938.84	311	0	947.6	621.482
SA-N012L1	SA-N012	SA-N013	Rectangular	3	0	0	1	0	0	10	0	923	923	930	930	61.4	0.02	7.75	250.488
SA-N012L2	SA-N012	SA-N013	Rectangular	3	0	0	2	0	0	5.5	0	923	923	930	930	61.4	0.02	3.8	266.021
SA-N012L3	SA-N012	SA-N013	Trapezoidal	1	0	0	1	1	1	100	0	929	929	930	930	61.4	0.014	33.5	271.286
SA-N015L	SA-N015	SA-N016	Natural	0	0	SA-N015XS	1	0	0	0	1.85	883	859.16	899	875.16	1287.4	0	9417.16	703.308
SA-N148L	SA-N148	SA-N106	Natural	0	0	SA-N148XS	1	0	0	0	1.59	889.9	869.82	897.5	879.19	1266.8	0	3632.26	168.202
SA-N105L	SA-N105	SA-N106	Natural	0	0	SA-N105XS	1	0	0	0	0.53	888	869.82	897	879.19	3414.7	0	145.3	170.344
SA-N106L	SA-N106	SA-N107	Natural	0	0	SA-N106XS	1	0	0	0	1.19	869.82	862.13	879.19	868.13	644	0	497.87	305.62
SA-N127L	SA-N127	SA-N127.1	Circular	2.5	0	SA-N127XS	1	0	0	0	0.72	910.06	908.56	916	915.1	209.2	0.024	18.81	29.074
SA-N046L	SA-N046	SA-N024	Circular	2.5	0	0	1	0	0	0	1.89	946	940.04	951.89	945.11	315.7	0.013	56.36	22.206
SA-N086L	SA-N086	SA-N087	Circular	2.5	0	0	1	0	0	0	0.12	920.68	920.64	927.23	927.12	34.4	0.013	13.99	25.93
SA-N087L1	SA-N087	SA-N088	Circular	2.5	0	0	2	0	0	7	0.24	920.79	920.74	927.12	926.47	21.1	0.013	19.97	30.335
SA-N088L	SA-N088	SA-N090	Circular	3	0	0	1	5	5	3	3	919.49	918.12	926.47	926.69	45.6	0.013	115.61	30.325
SA-N094L	SA-N094	SA-N095	Natural	0	0	SA-N094XS	1	0	0	0	0.21	915	914.49	922.6	921	240.9	0	474.06	74.039
SA-N103L	SA-N103	SA-N104	Natural	0	0	SA-N103XS	1	0	0	0	0.62	891.49	889	897	897	401.8	0	972.4	184.349
SA-N161L	SA-N161	SA-N144	Circular	3	0	0	1	0	0	0	0.54	901.05	900.68	909.73	908.58	68.8	0.013	48.91	26.831
Link209	SA-N024	Node205	Natural	4.3	0	6bot18top4.3deepNat	1	0	0	0	0.33	940.04	939.33	945.11	944.1	218	0.04	200.71	64.933
SA-N004L	SA-N004	SA-N005	Natural	0	0	SA-N004XS	1	0	0	0	0.68	948.5	940	959.5	954	1247.5	0	351.35	562.029
SA-N092L	SA-N092	SA-N093	Natural	0	0	SA-N092XS	1	0	0	0	0.29	915.8	915.18	919.5	922.15	210.3	0	107.88	59.595
SA-N071L	SA-N071	SA-N072	Circular	3	0	0	1	0	0	0	0.33	912	911.5	915	915	153.1	0.02	24.78	32.488
SA-N039L	SA-N039	SA-N040	Circular	1.25	0	0	1	0	0	0	3.42	974.39	968.14	977.89	974.38	182.9	0.013	11.94	3.095
SA-N016L	SA-N016	R-N010	Trapezoidal	12	0	0	1	2	2	20	0.25	859.16	858.89	875.16	885.52	109.1	0.035	4145.72	703.016
SA-N002L	SA-N002	SA-N003	Natural	0	0	SA-N002XS	1	0	0	0	0.68	958.88	949	976.93	959.79	1444.6	0	2825.44	521.687
SA-N001L	SA-N001	SA-N002	Natural	0	0	SA-N001XS	1	0	0	0	1.03	982	958.88	1000.05	976.93	2241.5	0	7008.74	262.857
SA-N017L	SA-N017	SA-N002	Natural	0	0	SA-N017XS	1	0	0	0	2.24	1003.4	958.88	1005.1	976.93	1986.1	0	463.67	274.761
Link196	SA-N021	Node193	Circular	5	0	0	1	0	0	0	0.74	942.4	941.7	955.14	954.93	95	0.013	223.56	67.21
SA-N054L	SA-N054	R-N003	Trapezoidal	3	0	0	1	1	1	20	5.29	890.1	873.58	893.1	932.16	312.4	0.035	1215.07	49.057
SA-N067L	SA-N067	R-N004	Trapezoidal	3	0	0	1	1	1	20	0.12	873.73	873.6	898.42	923.75	111.4	0.035	180.5	116.448

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sand Links																			
SA-N082L	SA-N082	R-N006	Trapezoidal	5	0	0	1	1	1	20	18.59	893	871.19	900	913.94	117.3	0.035	5436.08	28.05
SA-N073L	SA-N073	R-N005	Trapezoidal	3.5	0	0	1	1	1	20	32.75	910.18	871.17	914	916.52	119.1	0.02	6866.54	31.707
SA-N167L	SA-N167	SA-N161	Natural	0	0	SA-N167XS	1	0	0	0	1.35	912.96	901.05	916	909.73	880.2	0	585.36	8.648
SA-N107L	SA-N107	R-N009	Trapezoidal	6	0	0	1	3	3	12	0.23	862.13	861.87	868.13	885.87	113.9	0.035	858.27	367.666
SA-N109L	SA-N109	SA-N086	Circular	2.5	0	0	1	0	0	0	0.2	921.32	920.96	926.86	927.23	180.8	0.024	9.91	17.239
SA-N108L	SA-N108	SA-N109	Circular	2	0	SA-N108XS	1	0	0	0	0.2	921.75	921.42	927.1	926.86	165.1	0.013	10.11	17.241
R-N001L	R-N001	R-N002	Natural	0	0	R-N001XS	1	0	0	0	0.08	876.71	875.37	933.04	933.95	1643.5	0	311849.67	2646.767
R-N011L	R-N011	R-N012	Natural	0	0	R-N011XS	1	0	0	0	0.02	859.1	858.69	885.73	874.22	2581.3	0	14377.65	3007.346
R-N002L	R-N002	R-N003	Natural	0	0	R-N002XS	1	0	0	0	0.15	875.37	873.58	933.95	932.16	1156	0	691761.92	2638.8
R-N003L	R-N003	R-N004	Natural	0	0	R-N003XS	1	0	0	0	0	873.58	873.6	932.16	923.75	1303.8	0	37775.94	2641.064
R-N004L	R-N004	R-N005	Natural	0	0	R-N004XS	1	0	0	0	0.16	873.6	871.17	923.75	916.52	1494.2	0	312402.96	2657.75
R-N005L	R-N005	R-N006	Natural	0	0	R-N005XS	1	0	0	0	0	871.17	871.19	916.52	913.94	1087.3	0	28218.79	2670.557
R-N006L	R-N006	R-N007	Natural	0	0	R-N006XS	1	0	0	0	0.18	871.19	867.81	913.94	903.57	1906.5	0	145388.76	2669.202
R-N007L	R-N007	R-N008	Natural	0	0	R-N007XS	1	0	0	0	0.07	867.81	865.73	903.57	901.49	2841	0	142305.45	2653.948
R-N008L	R-N008	R-N009	Natural	0	0	R-N008XS	1	0	0	0	0.12	865.73	861.87	901.49	885.87	3290.4	0	24772.47	2636.581
R-N009L	R-N009	R-N010	Natural	0	0	R-N009XS	1	0	0	0	0.1	861.87	858.89	885.87	885.52	3037.8	0	72331.77	2730.464
R-N010L	R-N010	R-N011	Natural	0	0	R-N010XS	1	0	0	0	-0.01	858.89	859.1	885.52	885.73	2440.8	0	22531.91	3001.803
SA-N133AL	SA-N133A	SA-N103	Trapezoidal	3	0	0	1	4	4	3	0.99	911.23	891.49	915.5	897	1991.56	0.035	262.62	11.968
SA-N166L	SA-N166	SA-N159	Circular	1.5	0	0	1	0	0	0	1.15	917	915.46	919.35	918.96	133.92	0.014	10.46	6.363
SA-N158L	SA-N158	SA-N159	Circular	1.5	0	0	1	0	0	0	0.47	916.1	915.46	919.66	918.96	137.05	0.014	6.67	4.886
SA-N172L1	SA-N172	SA-N158	Circular	0.5	0	0	1	0	0	0	0	916.1	916.1	920	919.66	50	0.014	0.02	0.841
Overflow1	SA-N172	SA-N158	0	0	0	0	0	0	0	0	0	0	0	920	919.66	0	0	0	-5.424
SA-N171L	SA-N171	SA-N172	Circular	1.5	0	0	1	0	0	0	0.26	915.48	915	922	920	185.89	0.014	4.96	6.534
SA-N170L	SA-N170	SA-N171	Circular	0.833	0	0	1	0	0	0	1.69	917.94	915.48	924.4	922	145.5	0.014	2.64	1.585
SA-N162L	SA-N162	SA-N162.1	Circular	1	0	0	1	0	0	0	0.42	919.56	917.67	922.56	920.9	445.93	0.014	2.15	1.503
SA-N157L	SA-N157	SA-N158	Circular	1.5	0	0	1	0	0	0	0.48	918.48	916.1	921.71	919.66	496.98	0.014	6.75	4.283
SA-N156L	SA-N156	SA-N157	Circular	1.5	0	0	1	0	0	0	0.1	919	918.48	924.78	921.71	512.06	0.014	3.11	1.257
SA-N164L	SA-N164	SA-N171	Circular	1.5	0	0	1	0	0	0	0.36	917.28	915.48	921.66	922	505.32	0.014	5.82	5.001
SA-N163L	SA-N163	SA-N164	Circular	1	0	0	1	0	0	0	0.93	919.36	917.28	922.75	921.66	224.38	0.014	3.19	3.258
Link197	Node193	Node194	Circular	5	0	0	1	0	0	0	-2.54	938.7	941.8	954.93	951.81	122	0.013	415.16	67.063
Link198	Node194	Node195	Circular	5	0	0	1	0	0	0	1.76	941.8	938.4	951.81	950.73	193	0.013	345.68	66.755
Link199	Node195	Node196	Circular	5	0	0	1	0	0	0	0.5	940.7	940.5	950.73	950.78	40	0.013	184.16	66.706
Link200	Node196	Node197	Circular	5	0	0	1	0	0	0	0.07	940.5	940.4	950.78	950.67	137	0.013	70.36	66.658
Link201	Node197	SA999	Circular	5	0	0	1	0	0	0	0.21	940.4	939.8	950.67	948	287	0.013	119.08	66.647
Link202	SA999	SA-N022	Circular	4	0	0	1	0	0	0	0.07	939.8	939.4	948	947.13	586	0.013	37.53	72.657
Link206	Node199	Node202	Natural	4.3	0	6bot18top4.3deepNat	1	0	0	0	0.12	940.18	939.97	944.54	944.27	176	0.04	121.49	75.823
Link203.1	SA-N023.1	Node199	Natural	4.3	0	6bot18top4.3deepNat	1	0	0	0	-0.74	939.54	940.18	944.67	944.54	86	0.04	303.4	76.4
Link207	Node202	SA-N024	Natural	4.3	0	6bot18top4.3deepNat	1	0	0	0	-0.03	939.97	940.04	944.27	945.11	249	0.04	58.97	75.427
Link208	Node203	Node204	Rectangular	3	0	0	1	0	0	10	0	939.34	939.34	942.34	942.34	4	0.04	3.88	47.231
Link215	Node204	Node204.1	Natural	3	0	8bot14top3deepNat	1	0	0	0	0.16	939.34	939.09	942.34	943.39	158	0.04	77.46	47.231
Link210	Node205	Node206	Natural	3.4	0	6bot18top3.4deepNat	1	0	0	0	-0.18	939.33	939.62	944.1	943.08	157	0.04	105.51	64.557
Link211	Node206	Node207	Natural	3.4	0	6bot18top3.4deepNat	1	0	0	0	0.2	939.62	939.22	943.08	943.87	201	0.04	109.52	63.911

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sand Links																			
Link212	Node207	Node208	Natural	4.3	0	6bot18top4.3deepNat	1	0	0	0	0.07	939.22	939	943.87	943.58	318	0.04	92.51	63.344
Link213	Node208	Node208.1	Natural	4.3	0	6bot18top4.3deepNat	1	0	0	0	-0.13	939	939.22	943.58	943.52	166	0.04	128.04	90.588
Link213.1	Node208.1	Node203	Natural	2.5	0	8bot14top2.5deepNat	1	0	0	0	-0.13	939.22	939.34	943.52	942.34	96	0.04	52.24	47.231
Link217	Node212	Node212.1	Natural	3.76	0	6bot18top3.76deepNat	1	0	0	0	0	938.89	938.89	942.65	943.19	98	0.04	9.07	47.231
Link215.1	Node204.1	Node212	Natural	3.4	0	6bot18top3.4deepNat	1	0	0	0	0.15	939.09	938.89	943.39	942.65	130	0.04	96.29	47.231
Link219	Node214	Node216	Rectangular	3	0	0	1	0	0	9	0	938.89	938.89	943.19	943.19	7	0.04	3.43	47.231
Link217.1	Node212.1	Node214	Natural	2.5	0	8bot14top2.5deepNat	1	0	0	0	0	938.89	938.89	943.19	943.19	119	0.04	4.67	47.231
Link220	Node216	Node217	Natural	3.4	0	8bot14top3.4deepNat	1	0	0	0	0.05	938.89	938.79	943.19	942.2	185	0.04	54.5	47.231
Link221	Node217	SA-N025	Natural	3.4	0	8bot14top3.4deepNat	1	0	0	0	0.38	938.79	938.16	942.2	943.86	164	0.04	145.28	47.231
Link223	Node218	Node219	Rectangular	3	0	0	1	0	0	6	0.26	937.81	937.62	943.51	943.32	74	0.013	104.26	29.914
Link224	Node219	Node220	Natural	4.3	0	5bot17top4.3deepNW	1	0	0	0	-0.03	937.62	937.72	943.32	942.32	325	0.045	55.75	29.914
Link225	Node220	Node221	Rectangular	4	0	0	1	0	0	5.25	-1	937.72	937.84	942.32	942.44	12	0.04	84.89	29.913
Link226	Node221	SA-N029	Natural	4.3	0	5bot17top4.3deepNW	1	0	0	0	1.09	937.84	937.72	942.44	943.32	11	0.045	331.97	29.913
Link228	Node222	Node223	Natural	4.5	0	7bot17top4.5deepGun	1	0	0	0	0.24	937.44	937.13	942.84	941.63	129	0.022	341.55	32.975
Link229	Node223	Node224	Natural	4.5	0	7bot17top4.5deepNat	1	0	0	0	0.21	937.13	936.64	941.63	941.62	230	0.04	176.88	31.525
Link230	Node224	Node224.1	Natural	4.5	0	7bot17top4.5deepNat	1	0	0	0	-0.03	936.64	936.68	941.62	941.37	145	0.04	63.65	31.564
Link232	Node225	SA-N031	Circular	3.9	0	0	1	0	0	0	0.08	936.76	936.6	940.85	940.99	210	0.04	12.04	31.733
Link230.1	Node224.1	Node225	Natural	3.9	0	6bot16top3.9deepNat	1	0	0	0	-0.03	936.68	936.76	941.37	940.85	249	0.04	49.72	31.647
445.1	Node227	SA-N032	Circular	3.5	0	0	1	0	0	0	-0.74	934.6	936.41	941.92	940.75	243	0.013	86.83	15.903
445.2	Node227	SA-N032	Circular	3.5	0	0	1	0	0	0	-0.74	934.6	936.41	941.92	940.75	243	0.013	86.83	15.903
233	Node228	Node227	Circular	3.5	0	0	1	0	0	0	0.43	935.1	934.6	942.65	941.92	116	0.013	66.05	15.896
233.1	Node228	Node227	Circular	3.5	0	0	1	0	0	0	0.43	935.1	934.6	942.65	941.92	116	0.013	66.05	15.896
Link235	Node229	Node230	Circular	4	0	0	1	0	0	0	-1.19	933.6	935.2	941.341	939.21	135	0.013	156.38	31.984
Link236	Node230	Node231	Natural	4	0	10bot15top4deepRck	1	0	0	0	-3.13	935.2	935.67	939.21	941.17	15	0.04	493.89	57.565
Link237	Node231	Node232	Rectangular	3	0	0	1	0	0	10	0.19	935.67	935.62	941.17	941.12	26	0.05	43.01	57.546
Link238	Node232	SA-N034	Natural	3	0	5bot10top4deepRck	1	0	0	0	4.5	935.62	933.1	941.12	939.6	56	0.05	206.5	57.488
Link240	Node233	Node234	Circular	5	0	0	1	0	0	0	0.86	932.3	931.24	940.6	940.89	123	0.024	130.96	56.287
Link241	Node234	Node235	Circular	5	0	0	1	0	0	0	0.64	931.24	929.91	940.89	938	208	0.024	112.81	56.287
Link242	Node235	Node236	Circular	5	0	0	1	0	0	0	0.13	929.91	929.29	938	936.31	479	0.024	50.75	56.287
Link243	Node236	Node237	Circular	5	0	0	1	0	0	0	0.12	929.29	928.69	936.31	937.61	497	0.024	49.02	56.287
Link244	Node237	Node238	Circular	5	0	0	1	0	0	0	0.12	928.69	928.46	937.61	935.52	196	0.024	48.33	50.6
Link307	Node237	Node273	Circular	0.5	0	0	1	0	0	0	3.8	930.69	930.5	937.61	932.5	5	0.013	1.09	5.688
Link245	Node238	Node239	Circular	5	0	0	1	0	0	0	0.12	928.46	928.22	935.52	936.93	204	0.024	48.39	50.6
Link246	Node239	Node240	Circular	5	0	0	1	0	0	0	0.12	928.22	927.95	936.93	937.89	224	0.024	48.98	50.6
Link247	Node240	Node241	Circular	5	0	0	1	0	0	0	-0.41	931.5	933	937.89	939.62	368	0.024	90.07	50.602
Link250	Node241	Node244	Circular	4	0	0	1	0	0	0	-9.23	933	934.2	939.62	939.62	13	0.024	236.39	50.609
Link249	Node242	Node243	Circular	4	0	0	1	0	0	0	0.5	934.41	934.15	938.41	938.41	52	0.024	55.02	0
Link248	Node244	Node245	Rectangular	4	0	0	1	0	0	5	-0.16	934.2	934.32	939.62	938.32	74	0.017	75.52	50.611
SandCrkSM	Node245	Node269	0	0	0	0	0	0	0	0	0	0	0	938.32	938.32	0	0	0	50.613
SandCrkSM2	Node245	Node270	0	0	0	0	0	0	0	0	0	0	0	938.32	938.32	0	0	0	0
SA-N050L.1	SA-N050.1	SA-N051	Circular	1.75	0	0	1	0	0	0	0.55	925.93	923.57	932.92	931.53	429	0.013	11.75	8.317
SA-N050L.2	SA-N050.2	SA-N050.1	Circular	1.5	0	0	1	0	0	0	0.55	929.29	925.93	934.9	932.92	613	0.013	7.78	8.32

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sand Links																			
SA-N053L.1	SA-N053.1	SA-N054	Circular	2	0	0	1	0	0	0	8.38	905.69	890.1	908.69	893.1	186	0.013	65.49	17.744
SA-N058L.1	SA-N058.1	SA-N059	Natural	0	0	SA-N058XS	1	0	0	0	0.05	921.03	920.95	930.43	930.35	177	0	917.49	90.611
SA-N068L.1	SA-N068.1	SA-N069	Circular	1.75	0	0	1	0	0	0	1.08	922.6	918.4	929.95	927.34	389	0.013	16.46	6.656
SA-N068L.2	SA-N068.2	SA-N068.1	Circular	1.5	0	0	1	0	0	0	1.08	925.21	922.6	931.58	929.95	242	0.013	10.91	6.685
SA-N084L.1	SA-N084.1	SA-N080	Circular	1.5	0	0	1	0	0	0	1.07	901.83	901.39	910.35	910.57	41	0.013	10.88	10.061
SA-N080L.1	SA-N080.1	SA-N081	Circular	2.5	0	0	1	0	0	0	0.17	900.01	899.76	910.58	910.58	149	0.013	16.8	14.767
SA-N115L.1	SA-N115.1	SA-N116	Circular	1.75	0	0	1	0	0	0	0.35	912.32	911.92	915.82	915.43	115	0.013	9.34	2.301
SA-N085L.1	SA-N085.1	SA-N085.5	Circular	1.75	0	0	1	0	0	0	0.6	923.26	920.74	928.11	927.67	416.7	0.013	12.32	9.58
SA-N085L.2	SA-N085.2	SA-N085.1	Circular	1.5	0	0	1	0	0	0	0.07	923.33	923.26	928.45	928.11	100	0.013	2.78	9.487
SA-N090L.1	SA-N090.1	SA-N091	Special	3.4	0	0	1	0	0	0	0.23	917.14	916.09	923.63	921.32	464	0.013	67.86	31.728
SA-N130L.1	SA-N130.1	SA-N130.4	Circular	1.25	0	0	1	0	0	0	1.12	914.05	913.15	921.62	921.55	80	0.013	6.85	3.961
SA-N130.L1	SA-N130.4	SA-N122	Circular	1.5	0	0	1	0	0	0	1.13	913.15	908.48	921.55	921.2	414	0.013	11.16	4.023
SA-N128L.1	SA-N128.1	SA-N129	Circular	2.5	0	0	1	0	0	0	0.37	916.93	916.05	923.61	923.05	239	0.013	24.89	3.762
SA-N125L.1	SA-N125.1	SA-N126	Natural	0	0	SA-N125XS	1	0	0	0	0.41	910.71	910.16	915.54	916	135	0	29.28	27.481
SA-N127L.1	SA-N127.1	SA-N102	Natural	0	0	SA-N127XS	1	0	0	0	0.72	908.56	905.04	915.1	913	490	0	281.75	29.073
SA-N162L.1	SA-N162.1	SA-N159	Circular	1.5	0	0	1	0	0	0	0.42	917.67	915.46	920.9	918.96	520	0.014	6.36	1.498
SA-N140L.1	SA-N140.1	SA-N140.2	Circular	2.5	0	0	1	0	0	0	0.26	916.52	915.48	929.1	930.12	403.5	0.013	20.82	15.105
SA-N159L.1	SA-N159.1	SA-N160	Circular	1.5	0	0	1	0	0	0	0.37	914.2	910.64	918.59	917.56	975	0.013	6.35	8.136
SA-N153L.1	SA-N153.1	SA-N154	Circular	1.5	0	0	1	0	0	0	0.53	915.24	913.8	919.03	918.55	272	0.013	7.64	2.011
SA-N168L.1	SA-N168.1	SA-N169	Circular	1.5	0	0	1	0	0	0	0.62	902.77	901.25	909.7	908.55	245	0.013	8.27	3.102
SA-N168L.2	SA-N168.2	SA-N168.1	Circular	1.25	0	0	1	0	0	0	0.62	903.58	902.77	910.31	909.7	130	0.013	5.1	3.089
Link276	Node269	SA-N009	Natural	4	0	4bot4top4deepConc	1	0	0	0	21.6	934.32	930	938.32	938.84	20	0.017	787.43	50.642
Link251	Node270	Node242	Rectangular	4	0	0	1	0	0	5	-0.3	934.32	934.41	938.32	938.41	30	0.017	102.72	0
Link280.1	SA-N028.1	SA-N068	Circular	1	0	0	1	0	0	0	1.65	933.5	930.13	938.56	934.65	204	0.024	2.48	0.281
Link284.3	Node273	Node273.2	Natural	2	0	26bot30top2deepNW	1	0	0	0	0.3	928.479	927	932.5	931.6	485	0.04	149.36	18.862
Link292	Node281	SA-N021	Circular	5	0	0	1	0	0	0	0.48	943.09	942.4	948.09	955.14	144	0.013	180.28	20.289
Link319	Node282	SA-N068.2	Circular	0.67	0	0	1	0	0	0	5.8	927.7	924.57	934.03	931.58	53.99	0.013	2.95	5.361
Link320	Node282	Node309	Circular	1.25	0	0	1	0	0	0	-2.79	927.7	930.6	934.03	932.27	104	0.013	10.79	11.991
SA-N139L.1	SA-N139.1	SA-N140	Circular	2.5	0	0	1	0	0	0	0.46	921.49	920.87	928.2	928.23	134	0.013	27.9	18.389
SA-N152L.1	SA-N152.1	Node387	Circular	2	0	0	1	0	0	0	4.6	919.8	918.9	925.65	927.84	20	0.013	47.99	18.401
Link284.2	Node273.2	SA-N151	Natural	2	0	26bot30top5deepNW	1	0	0	0	0.32	928.1	927.8	931.6	931.6	94	0.024	146.23	18.86
Link305	Node292	Node295	Circular	0.5	0	0	1	0	0	0	1.69	957	944	961	951.4	771	0.013	0.73	0.86
SDP5O1	Node293	Node344	0	0	0	0	0	0	0	0	0	0	0	956.3	936.9	0	0	0	3.992
SDP5O2	Node293	Node345	0	0	0	0	0	0	0	0	0	0	0	956.3	936.9	0	0	0	3.992
SDP5W3	Node293	Node346	0	0	0	0	0	0	0	0	0	0	0	956.3	936.9	0	0	0	2.659
SDP5W4	Node293	Node347	0	0	0	0	0	0	0	0	0	0	0	956.3	936.9	0	0	0	2.659
Link283	Node294	Node273	Circular	2	0	0	1	0	0	0	0.67	930.583	930.3	937.61	932.5	42.2	0.013	18.53	13.303
Link308	Node295	Node298	Circular	2	0	0	1	0	0	0	0.66	939.15	937.6	951.4	941	235.25	0.014	17.05	23.098
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SDP3W1	Node297	Node349	0	0	0	0	0	0	0	0	0	0	0	940.4	940.4	0	0	0	0
pond1baff1	Node298	Node299	0	0	0	0	0	0	0	0	0	0	0	941	941	0	0	0	17.119
SDW1	Node299	Node300	0	0	0	0	0	0	0	0	0	0	0	941	941	0	0	0	13.667

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sand Links																			
pond1SDor	Node299	Node300	0	0	0	0	0	0	0	0	0	0	0	941	941	0	0	1.11	2.443
Link312	Node300	Node301	Circular	2.5	0	0	1	0	0	0	0.85	936.4	935.6	941	938.6	94	0.013	37.84	16.014
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SD2W1	Node301	Node302	0	0	0	0	0	0	0	0	0	0	0	938.6	938.6	0	0	0	14.375
SD2W2	Node302	Node303	0	0	0	0	0	0	0	0	0	0	0	938.6	938.77	0	0	0	11.305
holes2	Node303	Node342	0	0	0	0	0	0	0	0	0	0	0	938.77	938.6	0	0	0	1.84
holes1	Node303	Node343	0	0	0	0	0	0	0	0	0	0	0	938.77	938.6	0	0	0	1.84
SDP2W3	Node303	Node341	0	0	0	0	0	0	0	0	0	0	0	938.77	938.77	0	0	0	7.757
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SD3W1	Node304	Node305	0	0	0	0	0	0	0	0	0	0	0	937.3	937.3	0	0	0	-14.255
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SD3W2	Node305	Node306	0	0	0	0	0	0	0	0	0	0	0	937.3	937.3	0	0	0	-20.505
SDP4W3	Node306	Node307	0	0	0	0	0	0	0	0	0	0	0	937.3	937.86	0	0	0	7.943
SDP4O6	Node306	Node358	0	0	0	0	0	0	0	0	0	0	0	937.3	937.86	0	0	0	-5.946
SDP4O5	Node306	Node359	0	0	0	0	0	0	0	0	0	0	0	937.3	937.86	0	0	0	-5.946
Link359	Node307	Node293	Circular	1.5	0	0	1	0	0	0	4.62	933.5	932.3	937.86	956.3	26	0.013	22.57	16.317
Link321	Node309	Node310	Natural	1.67	0	1.5bot3.8top1.7dpCnc	1	0	0	0	0.26	930.6	929	932.27	930.67	625.77	0.017	25.93	11.971
Link322	Node310	Node311	Circular	1.5	0	0	1	0	0	0	0	925	925	930.67	929.17	72.04	0.013	0.33	11.496
Link323	Node311	Node312	Natural	1.67	0	1.5bot3.8top1.7dpCnc	1	0	0	0	0.15	927.5	927.2	929.17	928.87	200.62	0.017	19.83	9.479
Link329	Node311	Node311a	Circular	0.67	0	0	1	0	0	0	0.63	927.17	923.61	929.17	925.9	561.6	0.013	0.97	1.042
Link324	Node312	Node313	Circular	1.25	0	0	1	0	0	0	-0.08	927.2	927.3	928.87	928.97	123.74	0.014	1.71	7.803
Link325	Node313	Node314	Natural	1	0	1bot2top1deepNat	1	0	0	0	-4	927.3	927.7	928.97	928.7	10	0.04	6.68	4.545
Link328	Node313	Node317	Natural	1.67	0	1.5bot3.8top1.7dpCnc	1	0	0	0	1.86	927.3	927.17	928.97	928.84	7	0.017	69.88	4.08
Link326	Node314	Node311a	Natural	1	0	1bot2top1deepNat	1	0	0	0	2.7	927.7	922.07	928.7	925.9	208.58	0.04	5.48	4.527
Link335	Node317	Node317a	Circular	1.5	0	0	1	0	0	0	0.19	927.17	927.08	928.84	928.75	47.8	0.013	4.56	4.074
Link329.1	Node311.1	SA-N070	Circular	0.67	0	0	1	0	0	0	0.64	915.54	915	918.5	918	85	0.013	0.98	1.35
Link329.2	Node311.2	Node311.1	Circular	0.67	0	0	1	0	0	0	0.63	919.27	915.54	921.92	918.5	588	0.013	0.98	1.35
Link329.3	Node311.3	Node311.2	Natural	2	0	2bot4top2deepNat	1	0	0	0	0.64	921.66	919.27	924.11	921.92	376	0.013	16.9	1.571
Link329.4	Node311.4	Node311.3	Circular	0.67	0	0	1	0	0	0	0.63	922.77	921.66	925.13	924.11	175	0.013	0.98	1.573
Link329a	Node311a	Node311.4	Circular	0.67	0	0	1	0	0	0	0.64	923.61	922.77	925.9	925.13	132	0.013	0.98	1.694
Link341	Node323	Node329	Circular	2	0	0	1	0	0	0	5.71	921.2	918	926.27	926.27	56	0.013	54.08	2.903
Link335.1	Node317.1	Node323	Natural	1.67	0	1.5bot3.8top1.7dpCnc	1	0	0	0	0.2	924.78	924.6	926.45	926.27	92	0.017	22.68	3.061
Link335.2	Node317.2	Node317.1	Circular	1.25	0	0	1	0	0	0	0.2	926	924.78	927.67	926.45	622	0.013	2.86	3.207
Link335.3	Node317.3	Node317.2	Natural	1.67	0	1.5bot3.8top1.7dpCnc	1	0	0	0	0.2	926.74	926	928.41	927.67	375	0.017	22.78	3.85
Link335.4	Node317.4	Node317.3	Circular	1.5	0	0	1	0	0	0	0.2	922.87	922.74	928.54	928.41	65	0.013	4.7	3.986
Link335a	Node317a	Node317.4	Natural	1.67	0	1.5bot3.8top1.7dpCnc	1	0	0	0	0.2	927.08	926.87	928.75	928.54	104	0.017	23.04	4.028
Link342	Node329	Node330	Circular	2	0	0	1	0	0	0	0.2	919.25	918.92	926.27	926.27	166	0.013	10.09	2.813
Link343	Node330	Node330.2	Circular	0.833	0	0	1	0	0	0	0.61	922.94	920.318	926.27	921.988	432	0.013	1.71	2.732
Link343.1	Node330.1	Node330.3	Circular	1	0	0	1	0	0	0	0.61	920.08	917.97	921.75	921.48	347.15	0.013	2.78	2.732
Link343.2	Node330.2	Node330.1	Natural	1.67	0	1.5bot3.8top1.7dpCnc	1	0	0	0	0.61	920.318	920.075	921.988	921.75	40	0.017	39.97	2.732
Link343.8	Node330.7	SA-N096	Circular	0.83	0	0	1	0	0	0	0.61	917.56	914.2	921.43	921	553	0.013	1.69	0.086
Link350	Node330.7	Node338	Circular	1.5	0	0	1	0	0	0	0.66	917.04	910.679	921.43	913.96	961.46	0.014	7.93	2.646

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sand Links																			
Link352	Node338	SA-N102.1	Natural	0	0	SA-N102XS	1	0	0	0	0.66	910.679	901.87	913.96	909.26	1331.6	0.04	162.64	2.645
SA-N102L.1	SA-N102.1	SA-N103	Natural	0	0	SA-N102XS	1	0	0	0	0.66	901.87	891.49	909.26	897	1575	0	162.33	122.445
Link315	Node341	Node306	Circular	2.5	0	0	1	0	0	0	0.43	934.3	934	938.77	937.3	70	0.013	26.85	10.492
SDP2O1	Node342	Node341	0	0	0	0	0	0	0	0	0	0	0	938.6	938.77	0	0	1.11	1.536
SDP2O2	Node342	Node341	0	0	0	0	0	0	0	0	0	0	0	938.6	938.77	0	0	3.99	0.371
SDP2O3	Node343	Node341	0	0	0	0	0	0	0	0	0	0	0	938.6	938.77	0	0	1.11	1.536
SDP2O4	Node343	Node341	0	0	0	0	0	0	0	0	0	0	0	938.6	938.77	0	0	3.99	0.371
SDP5O3	Node344	Node346	0	0	0	0	0	0	0	0	0	0	0	936.9	936.9	0	0	3.99	3.992
SDP5O4	Node345	Node346	0	0	0	0	0	0	0	0	0	0	0	936.9	936.9	0	0	3.99	3.992
Link372	Node346	Node352	Circular	2	0	0	1	0	0	0	0.65	931.7	931.462	936.9	936.77	36.63	0.013	18.24	13.303
Link366	Node347	Node346	Circular	1.5	0	0	1	0	0	0	0	932.33	932.33	936.9	936.9	1.5	0.013	0.33	2.659
Link343.7	Node330.3	Node330.7	Circular	1.5	0	0	1	0	0	0	0.6	917.97	917.56	921.48	921.43	68	0.013	8.16	2.732
SDP3W2	Node349	Node350	0	0	0	0	0	0	0	0	0	0	0	940.4	940.4	0	0	0	0
SDP3W3	Node350	Node351	0	0	0	0	0	0	0	0	0	0	0	940.4	940.75	0	0	0	0
SDP3O1	Node350	Node351	0	0	0	0	0	0	0	0	0	0	0	940.4	940.75	0	0	1.11	0
SDP3O2	Node350	Node351	0	0	0	0	0	0	0	0	0	0	0	940.4	940.75	0	0	1.11	0
SDP3O3	Node350	Node351	0	0	0	0	0	0	0	0	0	0	0	940.4	940.75	0	0	1.11	0
Link368	Node351	Node304	Circular	2	0	0	1	0	0	0	1.03	935.8	935	940.75	937.3	78	0.014	21.27	-0.181
Link306	Node352	Node294	Circular	2	0	0	1	0	0	0	0.65	931.462	930.583	936.77	937.61	135.22	0.013	18.24	13.303
Link386	SA-N152.2	Node364	Circular	2.5	0	0	1	0	0	0	0.2	918.21	917.51	928.22	928.82	350.9	0.013	18.32	20.099
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SA-N139L	Node356	Node356.2	Circular	3	0	0	1	0	0	0	0.09	921.65	921.53	927.81	927.42	130.3	0.013	20.24	26.672
SDP54O1	Node358	Node307	0	0	0	0	0	0	0	0	0	0	0	937.86	937.86	0	0	1.11	1.516
SDP4O3	Node358	Node307	0	0	0	0	0	0	0	0	0	0	0	937.86	937.86	0	0	3.99	3.606
SDP4O2	Node359	Node307	0	0	0	0	0	0	0	0	0	0	0	937.86	937.86	0	0	1.11	1.516
SDP4O4	Node359	Node307	0	0	0	0	0	0	0	0	0	0	0	937.86	937.86	0	0	3.99	3.606
Link381	Node376	Node230	Circular	3	0	0	1	0	0	0	0.66	939.5	935.2	943.7	939.21	647.31	0.013	54.36	43.355
SA-N140L.5	SA-N140.2	SA-N141	Circular	3	0	0	1	0	0	0	0.63	915.38	914.92	930.12	930	73.5	0.013	52.77	43.005
Link382	Node361	SA-N140.2	Circular	3	0	0	1	0	0	0	0.21	915.55	915.48	931.14	930.12	32.8	0.013	30.81	30.215
Link383	Node362	Node361	Circular	3	0	0	1	0	0	0	0.2	916.41	915.65	930.01	931.14	377.7	0.013	29.92	20.705
Link384	Node363	Node362	Circular	3	0	0	1	0	0	0	0.2	916.75	916.51	929.42	930.01	119.6	0.013	29.88	20.397
Link385	Node364	Node363	Circular	2.5	0	0	1	0	0	0	0.2	917.41	916.85	928.82	929.42	280.4	0.013	18.33	20.212
Link387	Node365	SA-N152.2	Circular	2	0	0	1	0	0	0	0.34	922.2	922	928.05	928.22	58.1	0.013	13.27	7.491
Link388	Node366	Node365	Circular	2	0	0	1	0	0	0	0.33	922.33	922.3	928.04	928.05	9	0.013	13.06	7.458
Link389	Node366	SA-N139.1	Circular	2.5	0	0	1	0	0	0	-1.46	921.23	921.49	928.04	928.2	17.81	0.013	49.56	18.781
SA-N139L.2	Node356.2	Node366	Circular	3	0	0	1	0	0	0	0.1	921.53	921.23	927.42	928.04	311.2	0.013	20.71	25.261
SA-N085L.5	SA-N085.5	SA-N086	Circular	1.75	0	0	1	0	0	0	0.11	920.74	920.68	927.67	927.23	55.1	0.013	5.23	9.593
Link396	Node372	SA-N108	Circular	2	0	0	1	0	0	0	0.2	922.6	921.85	928.22	927.1	372.6	0.013	10.15	17.243
Link395	Node371	Node372	Circular	1.25	0	0	1	0	0	0	0.2	924.73	924.32	927.79	928.22	202.3	0.013	2.91	8.119
SA-N137L.1	SA-N137.1	SA-N138	Circular	2.5	0	0	1	0	0	0	0.28	922.21	922.16	926.08	926.24	18	0.013	21.62	10.857
Link398	Node387	SA-N152.2	Circular	2.25	0	0	1	0	0	0	0.057	918.9	918.88	927.84	928.22	35	0.013	7.4	18.401

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sakunk-Jones Links																			
SK-N548L	SK-N548	SK-N547	Circular	2.5	0	0	1	0	0	0	0.39	930.3	929.599	934.799	937	181.093	0.013	25.46	3.775
SK-N547L	SK-N547	SK-N540	Circular	2.75	0	0	1	0	0	0	1.7	929.599	915.957	937	940	802.471	0.013	68.96	7.384
SK-N546L	SK-N546	SK-N547	Circular	1.5	0	0	1	0	0	0	1.76	933.5	929.599	941	937	221.608	0.013	13.94	1.69
SK-N545L	SK-N545	SK-N546	Circular	1.5	0	0	1	0	0	0	0.61	937	933.5	942	941	571.031	0.013	8.22	0.32
SK-N544L	SK-N544	SK-N543	Circular	3	0	0	1	0	0	0	0.4	929.15	927.2	942	941	482.137	0.013	42.42	17.212
SK-N543L	SK-N543	SK-N542	Circular	3	0	0	1	0	0	0	1.17	927.2	918.75	941	934	719.709	0.013	72.27	19.268
SK-N542L	SK-N542	SK-N541	Circular	3.5	0	0	1	0	0	0	1.2	918.75	916.857	934	940	157.732	0.013	110.65	20.773
SK-N551L	SK-N551	SK-N550	Circular	3	0	0	1	0	0	0	0.2	933	931.299	944	945.75	839.931	0.013	30.02	17.214
SK-N550L	SK-N550	SK-N544	Circular	3	0	0	1	0	0	0	0.6	931.299	929.15	945.75	942	360.268	0.013	51.51	17.162
SK-N418L	SK-N418	SK-N418.1	Circular	1.75	0	0	1	0	0	0	1.3	966.04	962.91	972.8	969	241.05	0.013	18.06	15.629
SK-N416L	SK-N416	SK-N415	Circular	2.5	0	0	1	0	0	0	1.39	957.554	946.239	962.5	954.5	814.628	0.013	48.34	40.017
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SK-N415L	SK-N415	SK-N415.1	Circular	2.5	0	0	1	0	0	0	1.1	946.24	939.85	954.5	948.17	579.93	0.024	23.32	27.935
SK-N413L	SK-N413	SK-N412	Circular	3	0	0	1	0	0	0	0.69	935.44	931.96	943.8	937.2	501.571	0.024	30.09	40.601
SK-N412L	SK-N412	SK-N411	Circular	3	0	0	1	0	0	0	0.36	931.96	930.719	937.2	936	340.932	0.024	21.8	35.795
SK-N411L	SK-N411	SK-N410	Circular	3	0	0	1	0	0	0	0.8	930.719	929.76	936	936	119.734	0.024	32.28	37.267
SK-N410L	SK-N410	SK-N409	Circular	4	0	0	1	0	0	0	0.07	929.76	929.48	936	937.5	389.542	0.024	20.86	40.404
SK-N419L	SK-N419	SK-N419.1	Circular	1.25	0	0	1	0	0	0	1.42	972.7	969.37	980.1	976.45	234.29	0.013	7.7	0
SK-N414L	SK-N414	SK-N414.1	Circular	1.5	0	0	1	0	0	0	2.93	950.44	942.94	956.8	950.3	256.27	0.013	17.97	4.725
SK-N432L	SK-N432	SK-N430	Circular	2.25	0	0	1	0	0	0	0.55	953.299	951.919	960.2	958	249.907	0.013	23.01	17.484
SK-N430L	SK-N430	SK-N429	Circular	2.25	0	0	1	0	0	0	0.91	951.919	949.59	958	955.799	255.681	0.013	29.56	18.518
SK-N429L	SK-N429	SK-N428	Circular	2.25	0	0	1	0	0	0	0.91	949.59	947.38	955.799	953.799	242.109	0.013	29.59	18.501
SK-N428L	SK-N428	SK-N425	Circular	2.25	0	0	1	0	0	0	0.82	947.38	945.2	953.799	951.7	267.221	0.013	27.97	18.434
SK-N425L	SK-N425	SK-N422	Circular	2.5	0	0	1	0	0	0	1.47	945.2	940.34	951.7	948.5	331.356	0.013	49.67	20.208
SK-N422L	SK-N422	SK-N421	Circular	3	0	0	1	0	0	0	0.64	940.34	938.739	948.5	946	250.759	0.013	53.29	20.108
SK-N421L	SK-N421	SK-N420	Circular	3	0	0	1	0	0	0	1.48	938.739	936	946	947	184.493	0.013	81.18	20.128
SK-N420L	SK-N420	SK-N403	Circular	3	0	0	1	0	0	0	1	936	927	947	936	898.986	0.013	66.74	24.529
SK-N409L	SK-N409	SK-N408	Circular	4	0	0	1	0	0	0	0.05	929.48	929.419	937.5	937.2	126.371	0.024	17.07	44.746
SK-N408L	SK-N408	SK-N403	Circular	4	0	0	1	0	0	0	0.24	929.419	927	937.2	936	989.156	0.024	38.48	44.745
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SK-N503L	SK-N503	SK-N502	Circular	1.5	0	0	1	0	0	0	0.3	928.9	928	936	934.5	299.802	0.013	5.76	6.8
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SK-N502L	SK-N502	SK-N501	Circular	1.5	0	0	1	0	0	0	0.3	928	927.349	934.5	933.75	214.405	0.013	5.79	7.373
SK-N501L	SK-N501	SK-N500	Circular	1.5	0	0	1	0	0	0	0.26	927.349	926	933.75	932.1	517.041	0.013	5.37	5.909
SK-N528L	SK-N528	SK-N529	Circular	3	0	0	1	0	0	0	0.24	929	927.7	937	935	546.119	0.013	32.54	30.575
SK-N529L	SK-N529	SK-N525	Circular	3	0	0	1	0	0	0	0.04	927.7	927.5	935	935	505.585	0.013	13.27	31.396
SK-N525L	SK-N525	SK-N524	Circular	3	0	0	1	0	0	0	1.31	927.5	923.299	935	931	321.382	0.013	76.26	31.838
SK-N522L	SK-N522	SK-N521	Circular	3	0	0	1	0	0	0	1.66	919.7	911.789	929.2	920	476.539	0.013	85.94	38.54
SK-N521L	SK-N521	SK-N520	Circular	2	0	0	1	0	0	0	1.66	911.789	907.65	920	935	249.343	0.013	29.15	38.863
SK-N423L	SK-N423	SK-N424	Circular	1.5	0	0	1	0	0	0	1.31	945.4	940.7	956.5	958.5	358.766	0.013	12.02	7.786
Link467	SK-N424	Node449	Circular	2.5	0	0	1	0	0	0	0.58	940.7	938.4	958.5	943.62	398	0.024	16.89	27.589
SK-N427L	SK-N427	SK-N423	Circular	1.25	0	0	1	0	0	0	1.2	949.15	945.4	955	956.5	313.416	0.013	7.07	5.765

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sakunk-Jones Links																			
SK-N310L	SK-N310	SK-N311	Circular	1.25	0	0	1	0	0	0	3.17	981.88	973.099	986.1	979.299	277.386	0.013	11.49	10.55
SK-N311L	SK-N311	SK-N312	Circular	1.25	0	0	1	0	0	0	3.16	973.099	948.78	979.299	955.5	770.048	0.013	11.48	12.479
SK-N312L	SK-N312	SK-N313	Circular	2	0	0	1	0	0	0	0.42	948.78	946.799	955.5	952.5	470.587	0.013	14.68	22.215
SK-N313L	SK-N313	SK-N314	Circular	2	0	0	1	0	0	0	2.65	946.799	942.88	952.5	952.2	148.081	0.013	36.76	21.733
SK-N314L	SK-N314	SK-N315	Circular	4	0	0	1	0	0	0	0.86	942.88	940.979	952.2	947.5	221.65	0.013	133.03	93.739
SK-N315L	SK-N315	SK-N307	Special	4	0	0	1	0	0	0	1.05	940.979	931.5	947.5	938	902.874	0.013	89.71	101.134
SK-N320L	SK-N320	SK-N321	Circular	2	0	0	1	0	0	0	5	1028.4	1013.5	1040.5	1020.5	298.121	0.013	50.57	13.862
SK-N321L	SK-N321	SK-N321.1	Circular	2	0	0	1	0	0	0	4.96	1013.5	997.83	1020.5	1004.08	316.07	0.013	50.37	13.861
SK-N322L	SK-N322	SK-N323	Circular	2.5	0	0	1	0	0	0	3.27	971.4	957.6	976.4	968.2	422.358	0.013	74.14	25.773
SK-N323L	SK-N323	SK-N324	Circular	3.5	0	0	1	0	0	0	1.36	957.6	955.3	968.2	966.9	168.805	0.013	117.87	67.44
SK-N324L	SK-N324	SK-N324.2	Circular	3.5	0	0	1	0	0	0	1.34	955.3	953.38	966.9	964.63	142.95	0.013	116.5	77.195
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SK-N326L	SK-N326	SK-N323	Circular	2.5	0	0	1	0	0	0	4.01	976.75	957.6	983.15	968.2	477.109	0.013	82.18	38.884
SK-N325L	SK-N325	SK-N326	Circular	2.5	0	0	1	0	0	0	3.26	982.18	976.75	991.5	983.15	166.42	0.013	73.83	29.755
SK-N329L	SK-N329	SK-N328	Circular	1.75	0	0	1	0	0	0	7.73	1061.34	1029.25	1070.15	1037.5	415.135	0.013	44.05	27.66
SK-N328L	SK-N328	SK-N330	Circular	2	0	0	1	0	0	0	5.29	1029.25	1006.25	1037.5	1011.25	434.785	0.013	52.03	29.863
SK-N330L	SK-N330	SK-N327	Circular	2	0	0	1	0	0	0	3.26	1006.25	997.83	1011.25	1002.25	258.545	0.013	40.83	29.418
SK-N327L	SK-N327	SK-N325	Circular	2.5	0	0	1	0	0	0	3.26	997.83	982.18	1002.25	991.5	479.97	0.013	74.07	29.299
SK-N234L	SK-N234	SK-N233	Circular	3	0	0	1	0	0	0	3.26	1031.51	1008.98	1037.15	1016.5	690.907	0.013	120.44	65.092
SK-N235L	SK-N235	SK-N234	Circular	2.5	0	0	1	0	0	0	1.96	1039.56	1031.51	1048.9	1037.15	410	0.013	57.47	16.532
SK-N236L1	SK-N236	SK-N235	Circular	2	0	0	1	0	0	0	3.78	1062.92	1043.9	1074.4	1048.9	503	0.013	43.99	16.533
SK-N166L	SK-N166	SK-N161	Circular	1	0	0	1	0	0	0	2.11	1029.25	1018.26	1033.75	1024.3	520.127	0.013	5.18	2.35
SK-N161L	SK-N161	SK-N156	Circular	1.5	0	0	1	0	0	0	2.52	1018.26	1006.07	1024.3	1011.79	484.37	0.013	16.66	12.202
SK-N156L	SK-N156	SK-N151	Circular	2	0	0	1	0	0	0	2.12	1006.07	1003.342	1011.79	1009	128.64	0.013	33.03	17.661
630.1&2	SK-N152	SK-N148	Circular	1.5	0	0	2	0	0	0	1.69	1000	997.52	1004	1002.59	146.958	0.013	13.7	43.504
SK-N173L	SK-N173	SK-N171	Circular	1.25	0	0	1	0	0	0	2.89	1045.56	1034.85	1050.5	1040	371.213	0.013	10.97	2.767
SK-N171L	SK-N171	SK-N169	Circular	1.5	0	0	1	0	0	0	1.59	1034.85	1031.79	1040	1036.59	192.949	0.013	13.2	12.958
SK-N169L	SK-N169	SK-N167	Special	2.5	0	0	1	0	0	0	1.1	1031.79	1030.25	1036.59	1035	139.928	0.024	13.31	16.965
SK-N167L	SK-N167	SK-N167.1	Special	2.5	0	0	1	0	0	0	1.98	1030.25	1025.71	1035	1030.46	229.11	0.024	17.88	16.853
SK-N168L	SK-N168	SK-N169	Special	2.5	0	0	1	0	0	0	1.8	1033	1031.79	1039	1036.59	67.311	0.024	17.06	4.521
SK-N436L	SK-N436	SK-N435	Circular	1.5	0	0	1	0	0	0	1.08	964.159	961.859	973.5	967.5	212.837	0.013	10.92	1.117
SK-N435L	SK-N435	SK-N434	Circular	1.5	0	0	1	0	0	0	2.7	961.859	960.38	967.5	966.5	54.843	0.013	17.27	1.107
SK-N434L	SK-N434	SK-N433	Circular	1.5	0	0	1	0	0	0	0.95	960.38	957.36	966.5	960.62	317.618	0.013	10.24	8.561
Link457	SK-N433	Node441	Circular	2	0	0	1	0	0	0	1.29	957.3	956.85	960.62	960.8	35	0.013	25.83	13.767
SK-N500L	SK-N500	SK-N500.1	Circular	1.5	0	0	1	0	0	0	0.17	926	925.35	932.1	932.62	385.67	0.013	4.31	9.462
SK-N401L	SK-N401	SK-N400	Circular	6	0	0	1	0	0	0	0.11	926.32	925.56	938	934.5	674.817	0.024	76.99	102.926
SK-N400L	SK-N400	SK-N204	Circular	6	0	0	1	0	0	0	0.11	925.56	924.5	934.5	932	942.945	0.024	76.91	107.315
SK-N513L	SK-N513	SK-N512	Circular	1.5	0	0	1	0	0	0	0.66	919.9	917.5	928.9	926.2	366.059	0.013	8.51	15.448
SK-N511L	SK-N511	SK-N510	Circular	1.5	0	0	1	0	0	0	1.59	916.9	914.5	926.799	929.49	150.495	0.013	13.24	16.23
SK-N307L	SK-N307	SK-N307.1	Circular	6	0	0	1	0	0	0	0.45	931.5	930.572	938	936.88	208	0.013	282.88	134.171
560.1&2&3	SK-N306	SK-N300	Circular	4	0	0	3	0	0	0	0.2	927.299	926.2	934	934	562.202	0.013	63.51	132.8
SK-N300L	SK-N300	SK-N213	Natural	0	0	SK-N300XS	1	0	0	0	0.08	926.2	926	934	934	254.763	0.035	336.81	92.841

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sakunk-Jones Links																			
SK-N317L	SK-N317	SK-N317.2	Circular	1.25	0	0	1	0	0	0	0.88	935.58	935.13	939	938.98	51.19	0.013	6.04	15.83
SK-N308L	SK-N308	SK-N307	Circular	2.5	0	0	1	0	0	0	0.08	931.72	931.5	938.8	938	274.221	0.013	11.62	22.912
SK-N318L	SK-N318	SK-N318.1	Circular	2	0	0	1	0	0	0	0.33	938.8	938.32	944.5	941.17	147.67	0.013	12.86	3.817
SK-N316L	SK-N316	SK-N317	Circular	1	0	0	1	0	0	0	0.36	938.146	935.58	940	939	718.851	0.013	2.13	2.386
SK-N303L	SK-N303	SK-N302	Natural	0	0	SK-N303XS	1	0	0	0	0.12	926.7	926.4	934	934	256.21	0.035	152.26	-29.004
SK-N304L	SK-N304	SK-N303	Circular	3	0	0	1	0	0	0	0.11	926.8	926.7	934	934	90.496	0.024	12.04	-21.285
SK-N302L	SK-N302	SK-N301	Circular	3	0	0	1	0	0	0	0.16	926.4	926.3	934	934	62.144	0.024	14.47	-38.925
SK-N301L	SK-N301	SK-N300	Natural	0	0	SK-N303XS	1	0	0	0	0.24	926.3	926.2	934	934	41.694	0.035	217.87	-51.059
SK-N305L	SK-N305	SK-N304	Natural	0	0	SK-N305XS	1	0	0	0	0.05	927.1	926.8	938	934	621.162	0.035	400.81	-10.239
N213A1	SK-N213	SK-N212	Special	3.9	0	0	2	0	0	6	0.08	926	925.93	934	936	92.332	0.024	34.3	146.248
N213P	SK-N213	SK-N212	Circular	4	0	0	1	0	0	0	0.08	926	925.93	934	936	92.332	0.024	21.43	45.689
SK-N212L	SK-N212	SK-N211	Circular	7	0	0	1	0	0	0	0.08	925.93	925.6	936	933.5	406.442	0.024	98.6	191.537
SK-N211L	SK-N211	SK-N210	Natural	0	0	SK-N211XS	1	0	0	0	0.08	925.6	925.46	933.5	933	172.627	0.035	282.82	186.668
SK-N208L	SK-N208	SK-N207	Special	5.583	0	0	1	0	0	7.92	0.08	925.13	925.02	933	933	137.605	0.024	86.28	185.566
SK-N207L	SK-N207	SK-N206	Natural	0	0	SK-N207XS	1	0	0	0	0.08	925.02	924.88	933	933	170.692	0.035	255.01	185.847
SK-N206L	SK-N206	SK-N205	Special	5.583	0	0	1	0	0	7.92	0.08	924.88	924.81	933	933	85.883	0.024	87.24	186.208
SK-N205L	SK-N205	SK-N204	Natural	0	0	SK-N205XS	1	0	0	0	0.08	924.81	924.5	933	932	388.486	0.035	118.79	196.256
SK-N204L	SK-N204	SK-N203	Natural	6	0	SK-N204XS	1	0	0	0	0.56	924.5	923	932	934.47	267.306	0.035	648.6	307.222
SK-N600L	SK-N600	SK-N204	Rectangular	2	0	0	1	0	0	3	1.35	926.7	924.5	931	932	163.214	0.024	30.66	20.571
595.1A&B	SK-N214	SK-N213	Circular	3.5	0	0	2	0	0	0	0.76	930.83	926	936	934	635.395	0.013	87.72	116.123
SK-N228L	SK-N228	SK-N229	Circular	3.5	0	0	1	0	0	0	1.19	972.7	968.5	980	973	352.621	0.013	109.8	87.916
SK-N229L	SK-N229	SK-N227	Circular	3	0	0	1	0	0	3	0.63	968.5	968.25	973	972.75	39.578	0.013	52.85	87.139
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SK-N164L	SK-N164	SK-N162	Circular	3	0	0	1	0	0	0	2.31	1015.45	1013.2	1022.25	1018	97.531	0.013	101.06	35.378
SK-N162L	SK-N162	SK-N160	Circular	3	0	0	1	0	0	0	3.86	1013.2	1007.785	1018	1017.5	140.433	0.013	130.89	35.337
614.1&2	SK-N157	SK-N157.1	Circular	2	0	0	2	0	0	0	2.37	999	997.47	1004	1002.47	64.6	0.013	34.76	35.863
SK-N227L	SK-N227	SK-N227.1	Circular	3	0	0	1	0	0	3	1.35	968.25	959.418	972.75	965.38	653.88	0.013	77.52	88.257
SK-N226L	SK-N226	SK-N225	Circular	3.5	0	0	1	0	0	3	0.74	953.88	951.96	958	956.75	260	0.013	86.46	91.04
590.1&2	SK-N225	SK-N224	Circular	2.75	0	0	2	0	0	3	1.35	951.96	951	956.75	955	71.35	0.013	61.07	91.045
SK-N224L	SK-N224	SK-N222	Trapezoidal	4	0	0	1	0.5	0.5	4	0.75	951	949	955	954	267.336	0.017	273.86	91.049
SK-N403L	SK-N403	SK-N402	Natural	0	0	SK-N403XS	1	0	0	0	0	927	927	936	938.5	76.363	0.035	10.62	59.556
Link463	SK-N431	Node446	Circular	2.5	0	0	1	0	0	0	1.53	953.78	952.45	958.4	956.91	87	0.024	27.52	14.41
SK-N221L	SK-N221	SK-N220	Trapezoidal	4	0	0	1	1	1	4	1.29	946	937	950.5	941.5	698.881	0.017	518.82	116.935
SK-N222L	SK-N222	SK-N221	Rectangular	3	0	0	1	0	0	3	1.63	949	946	954	950.5	184.2	0.013	108.17	91.047
SK-N231L	SK-N231	SK-N230	Natural	0	0	SK-N231XS	1	0	0	0	1.78	982	975.099	987	980	386.667	0.035	128.2	70.847
SK-N232L	SK-N232	SK-N231	Circular	3	0	0	1	0	0	0	3.25	1004.5	982	1010	987	692.671	0.013	120.21	70.422
SK-N233L	SK-N233	SK-N232	Circular	3	0	0	1	0	0	0	3.25	1008.98	1004.5	1016.5	1010	137.765	0.013	120.16	65.101
SK-N220L	SK-N220	SK-N219	Trapezoidal	2.5	0	0	1	0.5	0.5	3	1.42	937	934.5	941.5	939.5	175.515	0.017	127.93	116.38
SK-N223L	SK-N223	SK-N221	Rectangular	2	0	0	1	0	0	7.5	3.46	948	945.5	952	950.5	72.26	0.013	272.92	14.379
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SK-N219L	SK-N219	SK-N218	Circular	3	0	0	1	0	0	3	0.2	934.5	934.399	939.5	938.8	51.013	0.013	29.52	116.311
SK-N218L	SK-N218	SK-N218.1	Trapezoidal	2	0	0	1	0.5	0.5	3	0.33	934.4	934	938.8	938.4	121.28	0.017	42.15	117.741

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sakunk-Jones Links																			
N215P1	SK-N215	SK-N214	Circular	3.5	0	0	1	0	0	0	0.76	931.46	930.83	938	936	82.422	0.013	88.44	56.525
N215B	SK-N215	SK-N214	Circular	3.5	0	0	1	0	0	3	0.76	931.46	930.83	938	936	82.422	0.013	88.44	56.525
SK-N165L	SK-N165	SK-N163	Circular	3	0	0	1	0	0	0	2.14	1020.25	1016.7	1025	1022.25	165.896	0.013	97.9	17.002
SK-N163L	SK-N163	SK-N164	Circular	3	0	0	1	0	0	0	2.44	1016.7	1015.45	1022.25	1022.25	51.247	0.013	103.86	35.486
SK-N160L	SK-N160	SK-N159	Circular	3	0	0	1	0	0	0	3.85	1007.785	1006	1017.5	1014.5	46.365	0.013	130.02	35.482
SK-N159L	SK-N159	SK-N157	Circular	3	0	0	1	0	0	0	2.12	1006	999	1014.5	1004	329.998	0.013	97.14	35.719
SK-N170L	SK-N170	SK-N163	Circular	1.5	0	0	1	0	0	0	2.37	1031.81	1016.7	1035.75	1022.25	638.224	0.013	16.16	13.007
SK-N172L	SK-N172	SK-N170	Circular	1.5	0	0	1	0	0	0	2.92	1042.97	1031.81	1047.5	1035.75	382.843	0.013	17.93	3.66
SK-N147L	SK-N147	SK-N146	Circular	3	0	0	1	0	0	0	1.84	987	983.799	992	988	174.152	0.013	90.66	91.527
SK-N146L	SK-N146	SK-N145	Circular	3	0	0	1	0	0	0	2.83	983.799	980	988	985	134.364	0.013	111.68	106.492
SK-N145L	SK-N145	SK-N144	Natural	0	0	SK-N145XS	1	0	0	0	1.64	980	975.5	985	981.3	275.03	0.035	354.74	125.308
SK-N144L	SK-N144	SK-N143	Natural	0	0	SK-N144XS	1	0	0	0	0.98	975.5	973	981.3	978.8	255.814	0.035	1058.41	124.819
SK-N143L	SK-N143	SK-N142	Circular	5	0	0	1	0	0	0	1.77	973	971.87	978.8	977	63.667	0.024	188.51	124.965
SK-N142L	SK-N142	SK-N141	Circular	5	0	0	1	0	0	0	1.78	971.87	967.2	977	975.799	262.931	0.024	188.01	124.958
SK-N141L	SK-N141	SK-N140	Circular	5	0	0	1	0	0	0	1.81	967.2	966.96	975.799	975.2	13.282	0.024	189.17	135.842
SK-N140L	SK-N140	SK-N139	Circular	5	0	0	1	0	0	0	1.78	966.96	961.53	975.2	968.15	305.684	0.024	188.02	141.414
SK-N139L	SK-N139	SK-N138	Circular	4	0	0	1	0	0	0	1.68	961.53	960.45	968.15	966.25	64.285	0.024	100.9	141.265
SK-N138L	SK-N138	SK-N137	Rectangular	4	0	0	1	0	0	4	1.19	960.45	959.47	966.25	964.599	82.617	0.013	198.13	141.194
SK-N137L	SK-N137	SK-N136	Rectangular	4	0	0	1	0	0	4	1.19	959.47	958.36	964.599	963.5	93.614	0.013	199.02	143.454
SK-N136L	SK-N136	SK-N135	Rectangular	4	0	0	1	0	0	4	1.19	958.36	955.54	963.5	960	237.908	0.013	199.12	143.522
SK-N135L	SK-N135	SK-N134	Rectangular	4	0	0	1	0	0	4	1.18	955.54	953.1	960	959	205.916	0.013	199.09	143.562
SK-N130L	SK-N130	SK-N129	Natural	0	0	SK-N130XS	1	0	0	0	0.71	941.66	940.77	947	946	124.716	0.035	430.83	184.47
SK-N129L	SK-N129	SK-N128	Rectangular	4.333	0	0	1	0	0	6	0.71	940.77	939.72	946	945	147.243	0.013	291.26	184.68
SK-N128L	SK-N128	SK-N127	Natural	0	0	SK-N128XS	1	0	0	0	0.71	939.72	938.59	945	944	159.368	0.035	167.5	188.28
SK-N127L	SK-N127	SK-N126	Natural	0	0	SK-N128XS	1	0	0	0	0.71	938.59	937.81	944	943	109.817	0.035	167.64	189.926
SK-N126L	SK-N126	SK-N125	Natural	0	0	SK-N126XS	1	0	0	0	0.71	937.81	937.26	943	943	77.064	0.035	130.99	190.248
SK-N125L	SK-N125	SK-N124	Rectangular	5	0	0	1	0	0	7	0.71	937.26	936.47	943	942	110.691	0.013	433.36	201.775
SK-N124L	SK-N124	SK-N123	Natural	0	0	SK-N124XS	1	0	0	0	0.71	936.47	935.24	942	941	172.347	0.035	330.32	201.277
SK-N123L	SK-N123	SK-N122	Rectangular	4.5	0	0	1	0	0	6	0.71	935.24	934.71	941	940	74.612	0.013	309.13	200.881
SK-N122L	SK-N122	SK-N121	Natural	0	0	SK-N122XS	1	0	0	0	0.71	934.71	933.55	940	938.56	162.764	0.035	846.64	206.72
N121B	SK-N121	SK-N120	Rectangular	3.5	0	0	1	0	0	6	0.71	933.55	932.34	938.56	939.49	169.479	0.013	216.23	121.997
N121P	SK-N121	SK-N120	Circular	5	0	0	1	0	0	0	0.71	933.55	932.34	938.56	939.49	169.479	0.013	219.46	86.747
SK-N120L	SK-N120	SK-N119	Natural	0	0	SK-N120XS	1	0	0	0	0.69	932.34	930.78	939.49	937.93	227.239	0.035	3084.53	215.54
SK-N119L	SK-N119	SK-N118	Circular	4	0	0	2	0	0	0	0.72	930.78	929.91	937.93	936	121.675	0.024	65.86	213.972
SK-N118L	SK-N118	SK-N117	Natural	0	0	SK-N118XS	1	0	0	0	0.71	929.91	929.25	936	936	93.027	0.035	707.54	213.672
SK-N117L	SK-N117	SK-N116	Special	6.5	0	0	1	0	0	9	0.72	929.25	928.44	936	935	113.096	0.024	429.18	213.233
SK-N116L	SK-N116	SK-N115	Natural	0	0	SK-N116XS	1	0	0	0	0.71	928.44	927.47	935	935	136.883	0.035	397.49	212.54
SK-N115L	SK-N115	SK-N114	Special	6.5	0	0	1	0	0	9	0.71	927.47	927.03	935	934	61.736	0.024	428.1	212.458
SK-N114L	SK-N114	SK-N113	Natural	0	0	SK-N114XS	1	0	0	0	0.71	927.03	925.28	934	933	245.885	0.035	295.71	215.289
J-N110L	J-N110	J-N109	Rectangular	8	0	0	1	0	0	12	4.33	1025	1011	1063	1063	323.276	0.013	4093.53	229.915
J-N109L	J-N109	J-N108	Natural	0	0	J-N109XS	1	0	0	0	2.37	1011	997	1063	1043.65	591.921	0.035	434443.43	316.332
J-N108L	J-N108	J-N107	Natural	0	0	J-N108XS	1	0	0	0	2.19	997	983	1043.65	1032.79	639.802	0.035	945742.11	302.771

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sakunk-Jones Links																			
J-N107L	J-N107	J-N106	Natural	0	0	J-N107XS	1	0	0	0	2.05	983	966	1032.79	1021.16	828.667	0.035	989676.94	304.923
J-N106L	J-N106	J-N105	Natural	0	0	J-N106XS	1	0	0	0	2.12	966	951	1021.16	1006.16	708.178	0.035	1605346.2	305.42
J-N105L	J-N105	J-N104	Natural	0	0	J-N105XS	1	0	0	0	1.97	951	939	1006.16	967.67	610.041	0.035	252084.49	309.711
J-N104L	J-N104	J-N103	Rectangular	8	0	0	1	0	0	12	0	939	939	967.67	960.5	82.124	0.024	52.51	320.488
J-N103L	J-N103	J-N102	Natural	0	0	J-N103XS	1	0	0	0	2.64	939	924	960.5	949	568.199	0.035	39859.08	317.545
J-N102L	J-N102	J-N101	Rectangular	8	0	0	1	0	0	12	6.07	924	917	949	949	115.294	0.024	2628.61	334.324
J-N101L	J-N101	J-N100	Natural	0	0	J-N101XS	1	0	0	0	2.49	917	900.5	949	945	663.19	0.035	67880.36	336.182
J-N100L	J-N100	SK-N541	Natural	0	0	J-N100XS	1	0	0	0	0.05	900.5	900	945	940	1050.03	0.035	110018.12	2382.048
SK-N440L	SK-N440	SK-N417	Circular	2	0	0	1	0	0	2	0.35	965	960	970	970	1427.25	0.03	5.81	8.279
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SK-N113L	SK-N113	SK-N112	Special	6.5	0	0	1	0	0	9	0.71	925.28	924.87	933	933	57.678	0.024	426.06	215.237
SK-N112L	SK-N112	SK-N111	Natural	0	0	SK-N112XS	1	0	0	0	0.71	924.87	923.13	933	932	244.686	0.035	275.52	215.319
SK-N111L	SK-N111	SK-N110	Special	6.5	0	0	1	0	0	9	0.72	923.13	922.67	932	932	63.892	0.024	428.07	214.35
SK-N110L	SK-N110	SK-N109	Natural	0	0	SK-N110XS	1	0	0	0	0.71	922.67	922.03	932	932	90.48	0.035	316.16	218.639
SK-N109L	SK-N109	SK-N108	Special	6.5	0	0	1	0	0	9	0.71	922.03	921.75	932	932	39.374	0.024	428.49	218.897
SK-N108L	SK-N108	SK-N107	Natural	0	0	SK-N108XS	1	0	0	0	0.71	921.75	920.75	932	932	141.003	0.035	938.83	218.574
SK-N102L	SK-N102	SK-N101	Special	7.5	0	0	1	0	0	9	2.61	918	916	930	930	76.501	0.013	2276.58	529.348
SK-N101L	SK-N101	SK-N100	Natural	0	0	SK-N101XS	1	0	0	0	9.45	916	895	930	928.99	222.316	0.035	19576.85	529.381
SK-N201L	SK-N201	SK-N200	Natural	0	0	SK-N201XS	1	0	0	0	0.67	920	918	932.91	930.91	297.965	0.035	3486.18	318.155
SK-N202L	SK-N202	SK-N201	Rectangular	7	0	0	1	0	0	8	1.81	921.5	920	932.97	932.91	82.698	0.013	1300.68	318.134
SK-N203L	SK-N203	SK-N202	Natural	0	0	SK-N203XS	1	0	0	0	0.66	923	921.5	934.47	932.97	227.359	0.035	2458.97	318.155
SK-N150L	SK-N150	SK-N147	Circular	2.5	0	0	1	0	0	0	1.81	991	987	998	992	221.287	0.013	55.15	52.755
SK-N149L	SK-N149	SK-N150	Trapezoidal	4	0	0	1	1	1	4	1.69	996.02	991	1001.5	998	296.915	0.035	288.75	43.503
SK-N148L	SK-N148	SK-N149	Circular	2.5	0	0	1	0	0	0	1.69	997.52	996.02	1002.59	1001.5	88.96	0.013	53.08	43.505
SK-N134L	SK-N134	SK-N133	Natural	0	0	SK-N134XS	1	0	0	0	0.13	953.1	953	959	959	76.172	0.035	135.47	140.312
SK-N133L	SK-N133	SK-N132	Rectangular	5	0	0	1	0	0	5	1.33	953	950.58	959	956	182.377	0.024	207.07	138.852
SK-N132L	SK-N132	SK-N131	Rectangular	5	0	0	1	0	0	4	1.33	950.58	949.39	956	954.5	89.752	0.024	152.75	159.034
SK-N131L	SK-N131	SK-N130	Rectangular	5	0	0	2	0	0	4	0.72	949.39	941.66	954.5	947	1079.69	0.013	207.64	184.588
SK-N107L	SK-N107	SK-N106	Natural	0	0	SK-N107XS	1	0	0	0	0.71	920.75	919.4	932	930	189.362	0.035	620.56	217.403
SK-N104L	SK-N104	SK-N103	Special	6.5	0	0	1	0	0	9	0.72	918.34	918	932	932	47.301	0.024	427.78	215.684
SK-N622L	SK-N622	SK-N621	Trapezoidal	3	0	0	1	1	1	2	0.07	944	943.5	948	947.5	739.687	0.03	24.53	1.889
SK-N621L	SK-N621	SK-N620	Trapezoidal	3	0	0	1	1	1	2	0.07	943.5	943	947.5	947	703.7	0.03	25.15	2.157
SK-N619L	SK-N619	SK-N618	Trapezoidal	3	0	0	1	1	1	2	0.36	943	941	947	945	561.101	0.03	56.32	8.544
SK-N620L	SK-N620	SK-N619	Rectangular	3	0	0	1	0	0	3	0	943	943	947	947	92.04	0.013	3.97	8.659
SK-N618L	SK-N618	SK-N617	Rectangular	3	0	0	1	0	0	3	0	941	941	945	945	78.861	0.013	4.26	10.14
SK-N617L	SK-N617	SK-N616	Trapezoidal	3	0	0	1	1	1	2	0.2	941	938	945	942	1501.93	0.03	42.12	10.315
SK-N616L	SK-N616	SK-N615	Rectangular	3	0	0	1	0	0	3	0	938	938	942	942	68.007	0.013	4.59	10.866
SK-N615L	SK-N615	SK-N614	Trapezoidal	3	0	0	1	1	1	2	0.49	938	933	942	937	1022.65	0.03	66.04	10.748
SK-N614L	SK-N614	SK-N613	Rectangular	3	0	0	1	0	0	3	0	933	933	937	937	52.951	0.013	5.21	11.442
SK-N613L	SK-N613	SK-N612	Trapezoidal	3	0	0	1	1	1	2	0	933	933	937	937	512.72	0.03	2.98	11.213
SK-N612L	SK-N612	SK-N611	Rectangular	3	0	0	1	0	0	3	0	933	933	937	937	59.234	0.013	4.92	11.228
SK-N611L	SK-N611	SK-N610	Trapezoidal	3	0	0	1	1	1	2	0	933	933	937	937	274.37	0.03	2.98	11.15

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sakunk-Jones Links																			
SK-N610L	SK-N610	SK-N609	Rectangular	3	0	0	1	0	0	3	0	933	933	937	937	62.868	0.013	4.78	11.152
SK-N609L	SK-N609	SK-N608	Trapezoidal	3	0	0	1	1	1	2	0.2	933	932	937	936	501.283	0.03	42.13	11.029
SK-N608L	SK-N608	SK-N607	Rectangular	3	0	0	1	0	0	3	0	932	932	936	936	54.214	0.013	5.13	10.887
SK-N607L	SK-N607	SK-N606	Trapezoidal	3	0	0	1	1	1	2	0	932	932	936	936	266.221	0.03	2.98	10.81
SK-N606L	SK-N606	SK-N605	Rectangular	3	0	0	1	0	0	3	0	932	932	936	936	71.394	0.013	4.48	10.819
SK-N605L	SK-N605	SK-N604	Trapezoidal	3	0	0	1	1	1	2	0	932	932	936	936	378.671	0.03	2.98	10.782
SK-N604L	SK-N604	SK-N603	Rectangular	3	0	0	1	0	0	3	0	932	932	936	936	66.064	0.013	4.65	10.819
SK-N603L	SK-N603	SK-N602	Trapezoidal	3	0	0	1	1	1	2	0.35	932	930.5	936	934.5	431.092	0.03	55.64	10.82
SK-N602L	SK-N602	SK-N601	Trapezoidal	3	0	0	1	1	1	2	0.28	930.5	929	934.5	933	540.014	0.03	49.72	16.078
SK-N601L	SK-N601	SK-N600	Trapezoidal	3	0	0	1	1	1	2	0.57	929	926.7	933	931	401.586	0.03	71.39	16.392
SK-N512L	SK-N512	SK-N511	Circular	1.5	0	0	1	0	0	0	0.66	917.5	916.9	926.2	926.799	90.264	0.013	8.6	15.453
SK-N524L	SK-N524	SK-N522	Circular	3	0	0	1	0	0	0	0.73	923.299	919.7	931	929.2	494.116	0.013	56.92	36.745
SK-N549L	SK-N549	SK-N548	Circular	2.5	0	0	1	0	0	0	0.46	934	930.3	937	934.799	797.254	0.013	27.94	3.814
SK-N158L	SK-N158	SK-N155	Circular	2	0	0	1	0	0	0	2.37	1028	1014.08	1032	1016.75	588.498	0.025	18.09	18.656
SK-N155L	SK-N155	SK-N154	Circular	2	0	0	1	0	0	0	2.35	1014.08	1011.433	1016.75	1015.433	112.755	0.013	34.52	32.263
SK-N154L	SK-N154	SK-N153	Trapezoidal	4	0	SK-N154XS	1	1	1	4	2.45	1011.433	1008.737	1015.433	1012.74	110.03	0.035	347.07	32.111
SK-N541L	SK-N541	SK-N540	Natural	0	0	SK-N541XS	1	0	0	0	0.02	900	899.5	940	940	2147.58	0.035	79502.03	2383.273
SK-N540L	SK-N540	SK-N520	Natural	0	0	SK-N540XS	1	0	0	0	0.19	899.5	895	940	935	2359.75	0.035	180889.08	2396.905
SK-N520L	SK-N520	R-N002	Natural	0	0	SK-N520XS	1	0	0	0	0.11	895	893	935	935	1822.46	0.035	178325.53	2426.049
SK-N510L	SK-N510	SK-N100	Natural	0	0	SK-N510XS	1	0	0	0	0.04	887.5	887	929.49	928.99	1130.9	0.035	140242.66	2437.284
SK-N153L	SK-N153	SK-N151	Circular	2	0	0	1	0	0	0	2.45	1008.737	1003.342	1012.74	1009	220.2	0.013	35.41	31.035
SK-N151L	SK-N151	SK-N152	Rectangular	2	0	0	1	0	0	3	2.12	1003.342	1000	1009	1004	157.642	0.013	71.3	55.625
Link344	SK-N704	SK-N703	Circular	3	0	0	1	0	0	0	-0.02	1072.32	1072.39	1076.2	1075.39	284	0.013	10.47	4.418
Link341	SK-N703	Node329	Natural	1	0	6bot8top1deepNat	1	0	0	0	-0.02	1072.39	1072.47	1075.39	1074.63	327	0.04	3.48	4.195
SK-N702L	SK-N702	SK-N701	Special	3.5	0	0	1	0	0	3	0.05	1070.873	1070.82	1074.04	1075.42	111.031	0.024	6.62	12.534
SK-N701L	SK-N701	SK-N701.3	Circular	2.5	0	0	1	1	1	4	0.17	1070.82	1070.19	1075.42	1075.82	363	0.013	17.09	12.322
SK-N706L	SK-N706	SK-N705	Natural	3.2	0	4bot10top3.2deepNat	1	0	0	3	-0.42	1073.87	1074.12	1077.12	1077.37	59	0.04	78.87	-12.186
SK-N707L	SK-N707	SK-N706	Circular	3	0	0	1	0	0	3	-0.06	1073.02	1073.12	1077.02	1077.12	178	0.013	15.76	-12.17
SK-N708L1	SK-N708	Node322	Circular	3	0	0	1	1	1	4	0.4	1074.5	1072.92	1082	1075.92	394	0.013	42.24	32.716
SK-N709L	SK-N709	SK-N708	Circular	2.5	0	0	1	0	0	3	0.44	1074.72	1074.5	1082	1082	50.243	0.014	25.26	21.627
SK-N236L2	SK-N712	SK-N236	Circular	2.5	0	0	1	0	0	0	38.33	1074.7	1063.2	1083	1074.4	30	0.013	255.72	16.517
Link329	SK-N712	Node319	Circular	1.5	0	0	1	0	0	0	-0.53	1075.08	1076.35	1083	1078.29	239	0.013	7.66	-8.059
SK-N713L	SK-N713	SK-N712	Special	4.83	0	0	1	0	0	3	0.33	1075.45	1075.26	1078.51	1083	57	0.024	45.2	8.455
Link326	SK-N714	Node317	Natural	1.8	0	3bot8.5top1.8deepGun	1	0	0	0	0.07	1076.53	1076.3	1078.45	1078.56	329	0.022	19.47	-4.918
SK-N716L	SK-N716	SK-N714	Natural	1.8	0	3bot8.5top1.8deepGun	1	0	0	3	-0.59	1075.5	1076.53	1078.88	1078.45	175	0.022	56.44	-4.817
SK-N715L	SK-N715	SK-N716	Circular	3.5	0	0	1	0	0	3	0.06	1075.41	1075.38	1083	1078.88	50.975	0.024	13.24	-5.133
SK-N718L	SK-N718	SK-N715	Circular	3.5	0	0	1	1	1	4	-0.12	1074.14	1074.41	1081.34	1083	226	0.024	18.84	-6.921
SK-N710L	SK-N710	SK-N710.1	Circular	2.5	0	0	1	1	1	4	0.43	1076.55	1075.56	1082.5	1082.23	228	0.024	14.64	5.381
SK-N711L	SK-N711	SK-N710	Rectangular	1.17	0	0	1	0	0	6	0.44	1076.77	1076.55	1077.94	1082.5	50	0.017	25.28	5.384
SK-N719L2	SK-N717	SK-N717.1	Circular	1.75	0	0	1	0	0	0	9.71	1065.9	1065.34	1079.4	1078.26	5.77	0.013	49.54	20.67
Link325	SK-N717	SK-N718	Circular	2	0	0	1	0	0	0	-1.56	1067.4	1069.64	1079.4	1081.34	144	0.013	28.29	-6.986
Link506	SK-N717	Node471	Circular	1	0	0	1	0	0	0	4.53	1065.9	1062.985	1079.4	1074.5	64.33	0.013	7.56	7.716

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sakunk-Jones Links																			
SK-N719L1	SK-N719	SK-N717	Rectangular	11.6	0	0	1	0	0	3	0	1065.9	1065.9	1080	1079.4	6	0.013	79.92	11.09
Beacon	SK-N719	Node401	0	0	0	0	0	0	0	0	0	0	0	1080	1088.38	0	0	0	0
Link317	SK-N720	Node309	Natural	2.5	0	6bot10top2.5deepConc	1	0	0	0	-0.01	1076.45	1076.47	1083	1079.12	341	0.017	18.41	7.103
SK-N721L	SK-N721	SK-N720	Special	3.9	0	0	1	0	0	3	-0.15	1076.364	1076.45	1080.46	1083	59	0.024	47.66	7.503
SK-N722L2	SK-N722	SK-N320	Circular	2	0	0	1	0	0	0	9.95	1076.95	1028.4	1083	1040.5	487.724	0.013	71.38	12.553
Link312	SK-N722	Node305	Natural	2.5	0	4bot9top2.5deepGun	1	0	0	0	0.11	1077.47	1077.19	1083	1079.69	244	0.022	48.02	0.056
SK-N723L	SK-N723	SK-N722	Rectangular	3	0	0	1	0	0	3	0.57	1077.38	1076.95	1083	1083	76	0.017	48.75	12.606
Link309	SK-N724	Node303	Natural	3.2	0	6bot12top3.2deepgun	1	0	0	0	0.36	1078.63	1077.43	1083.13	1080.63	335	0.022	181.7	11.87
SK-N725L	SK-N725	SK-N724	Special	5	0	0	1	0	0	3	0.37	1078.74	1078.63	1081.94	1083.13	30	0.024	47.34	11.897
SK-N726L1	SK-N726	Node301	Natural	4	0	8bot15.7top4deepconc	1	1	1	4	-0.05	1077.62	1077.76	1081.62	1081.76	277	0.017	170.48	10.317
SK-N727L	SK-N727.1	SK-N726	Circular	4	0	0	1	0	0	3	0.56	1078.26	1077.62	1082.26	1081.62	115	0.024	58.04	10.502
SK-N216L	SK-N216	SK-N215	Special	3.58	0	0	1	0	0	5	0.77	933.4	931.46	939	938	252.918	0.024	83.5	110.365
SK-N210L	SK-N210	SK-N209	Special	5.583	0	0	1	0	0	7.92	0.08	925.46	925.19	933	933	339.229	0.024	86.06	185.999
SK-N209L	SK-N209	SK-N208	Natural	0	0	SK-N209XS	1	0	0	0	0.08	925.19	925.13	933	933	74.163	0.035	226.52	185.453
SK-N437L	SK-N437	SK-N432	Circular	2.25	0	0	1	0	0	0	0.63	955	953.299	963	960.2	270.333	0.013	24.57	17.26
SK-N230L	SK-N230	SK-N228	Circular	3.5	0	0	1	0	0	0	1.32	975.099	972.7	980	980	181.122	0.013	115.52	88.215
SK-N527L	SK-N527	SK-N528	Circular	2.5	0	0	1	0	0	0	0.51	931.9	929	939	937	564.543	0.013	29.4	12.393
SK-N526L	SK-N526	SK-N528	Circular	1.25	0	0	1	0	0	0	1.09	934.25	929	938	937	482.556	0.013	6.74	0.561
SK-N523L	SK-N523	SK-N524	Circular	2	0	0	1	0	0	0	1	927.55	923.299	933	931	424.771	0.013	22.63	3.449
SK-N309L	SK-N309	SK-N309.1	Circular	1	0	0	1	0	0	0	2.61	1002.05	992.33	1006.5	996.67	371.98	0.013	5.76	5.178
SK-N319L	SK-N319	SK-N317	Circular	1.25	0	0	1	0	0	0	0.93	940	935.58	942	939	473.727	0.013	6.24	5.124
SK-N103L	SK-N103	SK-N102	Natural	0	0	SK-N103XS	1	0	0	0	0	918	918	932	930	644.672	0.035	147.25	217.056
SK-N106L	SK-N106	SK-N105	Special	6.5	0	0	1	0	0	9	0.72	919.4	919.16	930	930	33.295	0.024	429.09	217.187
SK-N105L	SK-N105	SK-N104	Natural	0	0	SK-N105XS	1	0	0	0	0.71	919.16	918.34	930	932	115.684	0.035	697.44	216.544
SK-N217L	SK-N217	SK-N216	Special	3.58	0	0	1	0	0	6	0.38	933.6	933.4	938	939	52.977	0.024	58.35	110.474
756.1&2	SK-N402	SK-N402.1	Circular	4	0	0	2	0	0	0	0.11	927	926.81	938.5	938.36	175.41	0.024	25.58	95.272
SK-N439L	SK-N439	SK-N439.1	Circular	1.75	0	0	1	0	0	0	1.07	969.46	966.73	976.8	972.83	254.79	0.013	16.4	12.445
SK-N100L	SK-N100	R-N001	Natural	0	0	SK-N100XS	1	0	0	0	0.25	887	885	928.99	925.48	792.691	0.035	255274.57	2937.544
SK-N417L	SK-N417	SK-N416	Circular	2	0	0	1	0	0	0	0.5	960	957.554	970	962.5	488.797	0.013	16	13.144
SK-N554L	SK-N554	SK-N555	Circular	1.5	0	0	1	0	0	0	2.62	957.5	944.9	962.5	958.2	480.495	0.013	17.01	8.579
SK-N555L	SK-N555	SK-N553	Circular	2	0	0	1	0	0	0	1.92	944.9	936.75	958.2	944	425.254	0.013	31.32	11.615
SK-N553L	SK-N553	SK-N552	Circular	3	0	0	1	0	0	0	0.97	936.75	934.4	944	944.2	242.797	0.013	65.62	14.589
SK-N552L	SK-N552	SK-N551	Circular	3	0	0	1	0	0	0	0.23	934.4	933	944.2	944	607.637	0.013	32.02	14.436
SK-N438L	SK-N438	SK-N437	Circular	2	0	0	1	0	0	0	1.33	964.44	955	969.5	963	709.559	0.013	26.09	12.086
SK-N407L	SK-N407	SK-N405	Circular	1.5	0	0	1	0	0	0	0.06	932.5	932.4	937	938.5	167.689	0.013	2.57	-0.322
SK-N405L	SK-N405	SK-N406	Circular	2	0	0	1	0	0	0	0.19	932.4	932.099	938.5	938	156.914	0.013	9.92	-0.82
SK-N406L	SK-N406	SK-N404	Circular	2.5	0	0	1	0	0	0	0.94	932.099	930.5	938	938.5	170.195	0.013	39.73	-2.837
SK-N404L	SK-N404	SK-N403	Circular	3.5	0	0	1	0	0	0	2.13	930.5	927	938.5	936	164.38	0.013	146.63	-19.225
SK-N200L	SK-N200	SK-N102	Rectangular	7	0	0	1	0	0	8	0	918	918	930.91	930	83.382	0.013	47.49	318.672
SK-N804L	SK-N804	Node347	Circular	2	0	0	1	1	1	2	0.08	1183.42	1183.1	1186.7	1187.13	378	0.013	6.58	4.633
SK-N803L1	SK-N803	Node406	Circular	1.5	0	0	1	0	0	0	6.56	1183	1177	1187	1185	91.395	0.013	26.88	4.195
SK-N801L1	SK-N801	SK-N805	Circular	2.33	0	0	1	0	0	0	6.44	1180.47	1179.44	1183.2	1182	16	0.013	85.71	38.486

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sakunk-Jones Links																			
Link391	SK-N801	Node375	Natural	2.7	0	2bot8top2.7deepNat	1	0	0	0	-2.12	1180.47	1180.81	1183.2	1183.81	16	0.04	87.84	3.242
Link335	SK-N705	Node324	Natural	3.2	0	6bot12top3.2deepNat	1	0	0	0	1.11	1074.12	1072.81	1077.37	1076.06	118	0.04	175.09	20.031
Link363	SK-N806	Node349	Circular	1.5	0	0	1	0	0	0	-0.43	1179.63	1183.18	1187.13	1187	835	0.013	6.85	-2.051
Link508.2	SK-N806	Node406	Circular	0.5	0	0	1	0	0	0	0	1177	1177	1187.13	1185	15	0.013	0.06	4.3
SK-N805L	SK-N805	SK-N805.1	Trapezoidal	3	0	0	1	1	1	4	7.91	1178	1162.1	1182	1165.1	201	0.035	354.66	38.454
Link368	SK-N802	Node354	Special	2.5	0	0	1	0	0	0	-4.92	1178.4	1181.6	1186.5	1184.88	65	0.024	28.14	-4.31
R-N002L	R-N002	SK-N510	Natural	0	0	R-N002XS	1	0	0	0	0.33	893	887.5	935	929.49	1664.05	0.035	387156.47	2433.252
R-N003L	R-N003	J-N100	Natural	0	0	R-N003XS	1	0	0	0	0.11	902	900.5	950	945	1381.42	0.035	123715.8	2082.763
SK-N504L	SK-N504	SK-N203	Circular	2	0	0	1	0	0	0	0.17	924.5	923	933.29	934.47	890.67	0.013	9.28	11.689
SK-N402L.1	SK-N402.1	SK-N401	Circular	6	0	0	1	0	0	0	0.11	926.81	926.32	938.36	938	443	0.024	76.29	95.256
SK-N317L.1	SK-N317.1	SK-N308	Circular	2.5	0	0	1	0	0	0	0.88	933.65	931.72	938.9	938.8	219.18	0.013	38.49	16.038
Link504	SK-N158.1	SK-N158.2	Trapezoidal	2	0	0	1	0.3	0.3	1.5	2.94	1047	1043.5	1050	1045.5	118.98	0.04	21.86	21.728
Link301	SK-N727	Node296	Natural	3.5	0	8bot15top3.5deepconc	1	0	0	0	0.18	1081.42	1080.29	1084.94	1084.09	642	0.017	253.35	16.911
Link302	Node296	Node297	Natural	3.5	0	6bot15top3.5deepNW	1	0	0	0	0.17	1080.29	1079.64	1084.09	1084.05	390	0.045	81.55	14.666
Link303	Node297	Node298	Natural	3.2	0	6bot18top3.2deepDW	1	0	0	0	-0.05	1079.64	1079.97	1084.05	1083.19	714	0.05	34.92	12.616
Link304	Node298	Node299	Natural	2.6	0	8bot13top2.6deepconc	1	0	0	0	0.26	1079.97	1079.12	1083.19	1083.53	323	0.017	180.77	12.049
Link305	Node299	Node300	Special	4.67	0	0	1	0	0	0	0.19	1079.15	1078.73	1083.53	1082.73	218	0.024	34.33	11.937
Link306	Node300	SK-N727.1	Natural	4	0	8bot15.7top4deepconc	1	0	0	0	0.05	1078.73	1078.2	1082.73	1082.26	1063	0.017	169.59	11.084
Link308	Node301	SK-N725	Natural	3.2	0	6bot12top3.2deepgun	1	0	0	0	-0.09	1077.76	1078.74	1081.76	1081.94	1122	0.022	89.73	10.164
Link310	Node303	Node304	Natural	3.2	0	6bot12top3.2deepgun	1	0	0	0	-0.31	1077.43	1077.86	1080.63	1081.13	140	0.022	168.31	11.813
Link311	Node304	SK-N723	Circular	4	0	0	1	0	0	0	-0.13	1077.13	1077.38	1081.13	1083	199	0.024	27.62	11.808
Link313	Node305	Node306	Natural	2.5	0	5bot9top2.5deepPlast	1	0	0	0	0.12	1077.19	1077.05	1079.69	1079.81	119	0.014	59.44	-0.314
Link314	Node306	Node307	Circular	4	0	0	1	0	0	0	-0.12	1075.81	1076.2	1079.81	1080.3	336	0.024	26.51	-0.69
Link315	Node307	Node307.1	Circular	4	0	0	1	0	0	0	-0.15	1076.2	1076.34	1080.3	1080.44	93	0.024	30.13	-1.032
Link315.1	Node307.1	SK-N721	Special	5	0	0	1	0	0	0	-0.15	1076.344	1076.36	1080.44	1080.46	11	0.024	29.98	-1.307
Link318	Node309	Node310	Rectangular	2.5	0	0	1	0	0	12	0	1076.47	1076.47	1079.12	1079.12	16	0.017	30.04	6.674
Link319	Node310	Node311	Natural	2.5	0	6bot10top2.5deepConc	1	0	0	0	0.03	1076.47	1076.42	1079.12	1079.03	195	0.017	38.46	6.338
Link320	Node311	Node312	Natural	2.5	0	6bot10top2.5deepConc	1	0	0	0	0.13	1076.42	1076.08	1079.03	1079.63	253	0.017	88.13	6.327
Link352	Node311	Node338	Circular	2	0	0	1	0	0	0	-17.12	1076.42	1183.24	1079.03	1188.94	624	0.013	93.6	-0.753
Link321	Node312	Node312.2	Special	5.6	0	0	1	0	0	0	0.07	1076.08	1076.06	1079.63	1079.66	30	0.024	28.37	6.238
Link324	Node313	SK-N719	Special	1.4	1	0	1	0	0	3	-0.12	1075.88	1075.9	1078.38	1080	17	0.024	4.88	6.128
Link321.1	Node312.1	Node313	Natural	2.5	0	5bot10top2.5deepNat	1	0	0	0	0.05	1075.96	1075.88	1078.74	1078.38	160	0.04	20.88	6.104
Link321.2	Node312.2	Node312.1	Natural	2.5	0	6bot10top2.5deepConc	1	0	0	0	0.05	1076.06	1075.96	1079.66	1078.74	194	0.017	54.72	6.156
Link327	Node317	Node318	Natural	2.2	0	5bot10top2.2deepNW	1	0	0	0	0.01	1076.3	1076.29	1078.56	1078.68	165	0.045	5.34	-5.119
Link328	Node318	SK-N713	Natural	2.2	0	5bot10top2.2deepNW	1	0	0	0	0.18	1076.29	1075.45	1078.68	1078.51	470	0.045	29.03	8.642
Link330	Node319	Node320	Circular	1.5	0	0	1	0	0	0	0.12	1076.13	1076.01	1078.29	1078.13	98	0.013	3.68	-8.061
Link331	Node320	SK-N711	Circular	1.5	0	0	1	0	0	0	0.22	1076.08	1075.6	1078.13	1077.94	215	0.013	4.96	5.428
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SK-N710L.1	SK-N710.1	SK-N709	Circular	2.5	0	0	1	1	1	4	0.44	1075.56	1074.72	1082.23	1082	192	0.024	14.71	5.478
SK-N708L2	Node322	SK-N234	Circular	2	0	0	1	0	0	0	5.11	1070.92	1032.15	1075.92	1037.15	758.385	0.013	51.15	42.694
Link333	Node322	Node323	Circular	2	0	0	1	0	0	0	0	1072.92	1072.92	1075.92	1075.92	3	0.013	5.81	-12.182
Link334	Node323	SK-N707	Natural	1.5	0	5bot7top1.5deepNat	1	0	0	0	-0.1	1072.92	1073.02	1075.92	1077.02	101	0.04	10.85	-12.145

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sakunk-Jones Links																			
SK-N705.1L	Node324	Node324.1	Special	2	0	0	1	0	0	0	4.81	1072.81	1051	1076.06	1054	453	0.024	27.87	21.901
Link336	Node324	Node325	Natural	3.2	0	6bot12top3.2deepNat	1	0	0	0	-0.11	1072.81	1072.95	1076.06	1077.95	128	0.04	54.91	6.309
Link337	Node325	Node325.1	Circular	3	0	0	1	0	0	0	-0.06	1072.95	1073.04	1077.95	1076.89	154	0.013	16.13	5.958
Link339	Node326	Node328	Natural	1	0	5bot7top1deepNW	1	0	0	0	0.01	1073.14	1073.11	1075.79	1076.2	563	0.045	1.21	5.367
Link337.1	Node325.1	Node326	Circular	2	0	0	1	0	0	0	-0.06	1073.04	1073.14	1076.89	1075.79	159	0.013	5.67	5.79
Link340	Node328	SK-N704	Natural	3	0	5bot15top3deepNat	1	0	0	0	0.25	1073.11	1072.32	1076.2	1076.2	315	0.04	82.6	4.751
Link343	Node329	Node331	Circular	2	0	0	1	0	0	0	0	1072.47	1072.47	1074.63	1074.63	9	0.013	3.32	4.077
Link347	Node330	SK-N702	Special	3.5	0	0	1	0	0	0	0.05	1071	1070.873	1073.22	1074.04	263	0.024	6.67	8.54
Link342	Node331	Node331.1	Natural	2	0	6bot12top2deepNW	1	0	0	0	0.32	1072.47	1072.36	1074.63	1074.52	34	0.04	41.45	3.937
Link456	Node334	Node440	Circular	2.5	0	0	1	0	0	0	0.03	1069.6	1069.45	1076.2	1075.15	466	0.014	6.83	11.693
SK-N701L.1	SK-N701.1	Node334	Rectangular	3	0	0	1	1	1	2	0.17	1069.74	1069.6	1076.11	1076.2	81	0.013	20.22	11.687
SK-N701L.2	SK-N701.2	SK-N701.1	Circular	2.5	0	0	1	1	1	4	0.17	1070.09	1069.74	1075.88	1076.11	204	0.013	16.99	11.786
SK-N701L.3	SK-N701.3	SK-N701.2	Rectangular	3	0	0	1	1	1	4	0.17	1070.19	1070.09	1075.82	1075.88	58	0.013	51.4	11.909
Link353	Node338	Node339	Circular	2	0	0	1	0	0	0	-0.74	1183.24	1184.42	1188.94	1187.72	160	0.024	10.51	-0.752
Link354	Node339	Node340	Circular	2	0	0	1	0	0	0	-0.17	1184.42	1184.65	1187.72	1187.21	135	0.024	5.06	-0.753
Link355	Node340	Node341	Natural	2.5	0	5bot15top2.5deepGun	1	0	0	0	0.18	1184.65	1184.48	1187.21	1187.09	92	0.022	97.15	-0.945
Link356	Node341	Node342	Circular	2	0	0	1	0	0	0	0.32	1184.48	1183.84	1187.09	1186.84	202	0.024	6.9	-1.928
Link357	Node342	Node343	Circular	2	0	0	1	0	0	0	-0.62	1183.84	1184.2	1186.84	1187.9	58	0.024	9.67	-2.615
Link358	Node343	Node344	Circular	3	0	0	1	0	0	0	-0.16	1179	1179.33	1187.9	1186.32	212	0.024	14.25	-2.12
Link359	Node344	Node345	Natural	2.4	0	3bot8top2.4deepConc	1	0	0	0	0.06	1183.89	1183.67	1186.32	1186.36	349	0.017	35.02	-10.456
Link360	Node345	SK-N804	Circular	2	0	0	1	0	0	0	0.08	1183.67	1183.42	1186.36	1186.7	296	0.013	6.57	-5.52
Link404	Node347	SK-N806	Circular	2	0	0	1	0	0	0	2.07	1183.1	1179.63	1187.13	1187.13	168	0.013	32.55	4.642
Link364	Node349	Node350	Natural	2	0	4bot10top2deepNat	1	0	0	0	0.91	1183.18	1182.32	1187	1184.82	94	0.04	57.74	-2.434
Link365	Node350	Node351	Circular	2	0	0	1	0	0	0	-0.95	1182.32	1182.93	1184.82	1185.93	64	0.024	11.94	-6.216
Link366	Node351	Node351.1	Natural	2	0	4bot10top2deepNat	1	0	0	0	0.21	1182.93	1182.72	1185.93	1186.11	98	0.04	27.92	-7.107
Link366.1	Node351.1	SK-N802	Natural	2	0	4bot10top2deepNat	1	0	0	0	0.43	1182.72	1181.8	1186.11	1186.5	212	0.04	39.73	-8.922
Link370	Node354	Node356	Circular	2	0	0	1	0	0	0	0.12	1182.2	1182.01	1184.88	1184.51	155	0.024	4.3	8.951
Link371	Node356	Node357	Natural	2.5	0	4bot4top2.5deepNat	1	0	0	0	-11.33	1182.01	1182.35	1184.51	1184.85	3	0.04	134.14	8.099
Link372	Node357	Node358	Circular	1.5	0	0	1	0	0	0	0.46	1182.35	1181.91	1184.85	1185	95	0.014	6.67	8.086
Link373	Node358	Node359	Natural	1	0	3bot5top1deepNat	1	0	0	0	-0.28	1181.91	1182.01	1185	1184.01	36	0.04	6.08	8.071
Link374	Node359	Node360	Natural	2	0	3bot7top2deepNat	1	0	0	0	-0.6	1182.01	1182.39	1184.01	1185.39	63	0.04	31.84	7.935
Link375	Node360	Node361	Natural	2	0	3bot7top2deepNat	1	0	0	0	0.16	1182.39	1182.36	1185.39	1185.36	19	0.04	16.29	7.921
Link376	Node361	Node362	Natural	2	0	3bot7top2deepNat	1	0	0	0	0.09	1182.36	1182.32	1185.36	1185.32	47	0.04	11.93	7.91
Link377	Node362	Node363	Natural	3	0	3bot9top3deepNat	1	0	0	0	-0.38	1182.32	1182.5	1185.32	1186.5	47	0.04	55.81	7.903
Link378	Node363	Node364	Natural	3	0	3bot9top3deepNW	1	0	0	0	0.47	1182.5	1182.3	1186.5	1186.3	43	0.045	54.6	7.899
Link379	Node364	Node365	Natural	3	0	2bot8top3deepDW	1	0	0	0	0.2	1182.3	1182.1	1186.3	1186.1	102	0.05	25.07	7.897
Link381	Node365	Node367	Natural	3	0	2bot8top3deepDW	1	0	0	0	0.54	1182.1	1181.7	1186.1	1185.7	74	0.05	41.63	7.895
Link383	Node367	Node368	Natural	2	0	2bot7top2deepNat	1	0	0	0	-0.24	1181.7	1181.92	1185.7	1183.92	93	0.04	17.01	7.893
Link384	Node368	Node369	Natural	1.94	0	4bot4top1.94deepConc	1	0	0	0	-0.33	1181.98	1182.03	1183.92	1184.53	15	0.017	38.4	7.893
Link385	Node369	Node370	Circular	2	0	0	1	0	0	0	0.49	1182.03	1181.54	1184.53	1183.54	100	0.013	15.82	7.893
Link386	Node370	Node371	Natural	2	0	3bot13top2deepNat	1	0	0	0	0.18	1181.54	1181.19	1183.54	1185.62	199	0.04	27.55	7.894
Link387	Node371	Node372	Natural	2.75	0	2bot8top2.7deepNat	1	0	0	0	1.05	1181.19	1179.92	1185.62	1182.92	121	0.04	64.14	7.905

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sakunk-Jones Links																			
Link388	Node372	Node373	Circular	3	0	0	1	0	0	0	2.8	1179.92	1179.64	1182.92	1182.64	10	0.024	60.08	8.022
Link389	Node373	SK-N801	Natural	2.7	0	5bot15top2.7deepNat	1	0	0	0	-0.72	1179.64	1180.47	1182.64	1183.2	115	0.04	119.11	8.144
Link392	Node374	Node376	Special	3	0	0	1	0	0	0	0.28	1180.77	1180.64	1183.51	1182.64	47	0.024	12.02	2.492
Link390	Node375	Node374	Natural	2.7	0	5bot15top2.7deepNat	1	0	0	0	0.03	1180.81	1180.77	1183.81	1183.51	149	0.04	22.96	2.733
Link393	Node376	Node381	Natural	2	0	4bot9top2deepNat	1	0	0	0	-0.18	1180.64	1180.8	1182.64	1182.8	90	0.04	23.65	2.242
Link396	Node379	Node380	Natural	2	0	4bot9top2deepNat	1	0	0	0	0.35	1180.63	1179.72	1183.01	1182.72	263	0.04	32.96	1.933
Link398	Node380	Node382	Circular	3	0	0	1	0	0	0	-0.4	1179.72	1179.86	1182.72	1182.86	35	0.024	22.94	1.659
Link395	Node381	Node379	Natural	2	0	4bot9top2deepNat	1	0	0	0	0.09	1180.8	1180.63	1182.8	1183.01	190	0.04	16.75	2.122
Link399	Node382	Node383	Natural	2.7	0	5bot15top2.7deepNat	1	0	0	0	-0.02	1179.86	1179.87	1182.86	1182.87	43	0.04	21.41	1.412
Link400	Node383	Node384	Circular	3	0	0	1	0	0	0	-1.52	1179.86	1180.18	1182.87	1183.18	21	0.024	44.47	1.236
Link401	Node384	Node385	Natural	2.5	0	2bot10top2.5deepNat	1	0	0	0	0.5	1180.18	1179.34	1183.18	1182.5	169	0.04	47.04	1.218
Link402	Node385	Node386	Natural	2.5	0	2bot10top2.5deepNat	1	0	0	0	-0.08	1179.34	1179.5	1182.5	1182.5	190	0.04	19.37	1.199
Link403	Node386	G-N278	Natural	2.5	0	2bot10top2.5deepNat	1	0	0	0	0.6	1179.5	1178.93	1182.5	1181.48	95	0.04	51.67	1.212
GLink350	G-N278	G-Node319	Natural	2.5	0	5bot10top2.5deep Nat	1	0	0	0	-0.49	1178.98	1179.34	1181.48	1182.83	74	0.04	65.25	0.55
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SK-N500L.1	SK-N500.1	SK-N504	Circular	2	0	0	1	0	0	0	0.17	925.35	924.5	932.62	933.29	505	0.013	9.28	9.463
SK-N415L.1	SK-N415.1	SK-N413	Circular	3	0	0	1	0	0	0	1.1	939.85	935.44	948.17	943.8	400	0.024	37.93	27.935
SK-N414L.1	SK-N414.1	SK-N413	Circular	2	0	0	1	0	0	0	2.93	942.94	935.44	950.3	943.8	256.28	0.013	38.7	4.624
SK-N439L.1	SK-N439.1	SK-N438	Circular	2	0	0	1	0	0	0	1.07	966.73	964.44	972.83	969.5	214	0.013	23.4	12.327
SK-N418L.1	SK-N418.1	SK-N416	Circular	2	0	0	1	0	0	0	1.3	962.91	957.55	969	962.5	413	0.013	25.77	15.172
SK-N419L.1	SK-N419.1	SK-N418	Circular	1.5	0	0	1	0	0	0	1.49	969.37	966.04	976.45	972.8	224	0.013	12.81	0
SK-N309L.1	SK-N309.1	SK-N310	Circular	1.25	0	0	1	0	0	0	2.61	992.33	981.88	996.67	986.1	400	0.013	10.44	5.136
SK-N324L.1	SK-N324.1	SK-N314	Circular	3.5	0	0	1	0	0	0	1.34	945.85	942.88	955.72	952.2	221	0.013	116.63	75.172
SK-N324L.2	SK-N324.2	SK-N324.1	Circular	4	0	0	1	0	0	0	1.34	953.38	945.85	964.63	955.72	560	0.013	166.57	77.779
SK-N321L.1	SK-N321.1	SK-N322	Circular	2.5	0	0	1	0	0	0	4.96	997.83	971.4	1004.08	976.4	533	0.013	91.34	13.86
SK-N227L.1	SK-N227.1	SK-N226	Circular	3.5	0	0	1	0	0	3	1.35	959.418	953.88	965.38	958	410	0.013	116.93	88.262
SK-N167L.1	SK-N167.1	SK-N165	Circular	2.5	0	0	1	0	0	0	1.98	1025.71	1020.25	1030.46	1025	276	0.013	57.69	16.961
SK-N157L.1	SK-N157.1	SK-N147	Natural	1.5	0	3bot4top1.5deepconc	1	0	0	0	2.37	997.47	987	1002.47	992	442	0.013	63.48	35.892
Link494	Node401	SK-N717.1	Circular	1	0	0	1	0	0	0	157.8	1076.97	1065.34	1088.38	1078.26	7.37	0.013	44.68	0
Link342.1	Node331.1	Node330	Natural	2	0	6bot12top2deepNW	1	0	0	0	0.32	1072.36	1071	1074.52	1073.22	419	0.04	41.62	8.691
G-L142	Node387.1	G-N143	Circular	1.5	0	0	1	0	0	0	2.41	1090.2	1077.34	1095.95	1082.6	533.339	0.013	16.31	16.53
G-L143	G-N143	G-N144	Circular	1.5	0	0	1	0	0	0	1.1	1077.34	1074.55	1082.6	1079.82	254.439	0.013	11	18.751
SK-N806L	Node406	Node406.2	Circular	2	0	0	1	1	1	4	8.9	1177	1165.09	1185	1172.4	133.83	0.013	67.7	14.848
SK-N806L.1	Node406.1	Node406.3	Trapezoidal	4	0	0	1	1	1	4	8.9	1153.34	1132.61	1159.97	1138.03	233	0.035	662.37	14.779
SK-N806L.2	Node406.2	Node406.1	Circular	2	0	0	1	1	1	4	8.9	1165.09	1153.34	1172.4	1159.97	132	0.013	67.25	14.822
SK-N806L.4	Node406.3	Node320	Circular	1.5	0	0	1	1	1	4	8.9	1132.61	1076.01	1138.03	1078.13	636	0.013	31.34	14.733
SK-N805L.1	SK-N805.1	SK-N805.4	Circular	1.5	0	0	1	1	1	4	7.5	1162.1	1159.1	1165.1	1162.1	40	0.013	28.84	32.39
SK-N805L.7	SK-N805.4	SK-N805.2	Trapezoidal	3	0	0	1	1	1	4	13.78	1159.1	1154	1162.1	1157	37	0.035	466.74	32.385
SK-N805L.6	SK-N805.2	SK-N805.3	Trapezoidal	3	0	0	1	1	1	4	3.91	1154	1150.4	1157	1153.4	92	0.035	249.85	32.369
SK-N805L.5	SK-N805.3	Node414	Circular	3	0	0	1	1	1	4	6.82	1150.4	1136.9	1153.4	1139.9	198	0.013	174.63	32.363
Link430	Node414	Node414.2	Trapezoidal	3	0	0	1	1	1	4	2.32	1136.9	1136.18	1139.9	1139.18	31	0.035	191.89	32.373
Link430.1	Node414.1	Node414.6	Circular	1.5	0	0	1	1	1	4	2.99	1135.9	1126.1	1138.9	1128.2	328	0.013	18.16	18.051

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sakunk-Jones Links																			
Link430.2	Node414.2	Node414.1	Trapezoidal	3	0	0	1	1	1	4	2.33	1136.18	1135.9	1139.18	1138.9	12	0.035	192.02	18.062
Link434	Node414.2	Node418	Trapezoidal	3	0	0	1	1	1	4	0.67	1136.18	1136.1	1139.18	1139.1	12	0.035	102.64	14.311
Link441	Node418	Node425	Circular	1.5	0	0	1	0	0	0	3.42	1136.1	1134.8	1139.1	1137.8	38	0.013	19.31	14.302
Link430.1.1	Node414.6	Node414.4	Trapezoidal	3	0	0	1	1	1	4	4.08	1125.2	1121.2	1128.2	1124.2	98	0.035	254.76	18.047
Link430.3	Node414.4	Node414.5	Circular	1.5	0	0	1	1	1	4	5.27	1121.2	1118.3	1124.2	1121.3	55	0.013	24.18	18.044
Link430.4	Node414.5	Node422	Trapezoidal	3	0	0	1	1	1	4	6.4	1118.3	1113.82	1121.3	1116.82	70	0.035	319.11	18.037
Link438	Node422	Node422.1	Circular	2.5	0	0	1	1	1	4	6.39	1113.82	1110.18	1116.82	1112.68	57	0.013	104.25	18.036
Link438.1	Node422.1	Node422.2	Trapezoidal	0.5	0	0	1	1	1	4	6.39	1110.18	1081.98	1112.68	1082.48	441	0.035	13.45	18.043
Link438.1.1	Node422.2	SK-N705	Trapezoidal	0.5	0	0	1	1	1	4	6.39	1081.98	1074.12	1082.48	1077.37	123	0.035	13.47	32.23
Link442	Node425	Node425.1	Trapezoidal	3	0	0	1	1	1	4	2.08	1134.8	1125.2	1137.8	1128.2	462	0.035	181.77	14.297
Link443	Node426	Node427	Trapezoidal	3	0	0	1	1	1	4	-1.33	1111	1111.4	1114	1114.4	30	0.035	145.13	14.31
Link444	Node427	Node427.1	Circular	1.5	0	0	1	0	0	0	5.81	1111.4	1109.83	1114.4	1112.52	27	0.013	25.21	14.31
Link445	Node428	Node422.2	Trapezoidal	0.5	0	0	1	1	1	4	4.61	1106.4	1081.98	1108.4	1082.48	530	0.035	11.42	14.288
Link444.1	Node427.1	Node428	Circular	2	0	0	1	0	0	0	5.81	1109.83	1106.4	1112.52	1108.4	59	0.013	54.24	14.31
Link442.1	Node425.1	Node426	Circular	1.5	0	0	1	0	0	0	4.24	1125.2	1111	1128.2	1114	335	0.013	21.63	14.303
Link419.1	Node387.2	Node387.4	Natural	2	0	4bot6top2deepNat	1	0	0	0	6.67	1095.7	1086.3	1097.7	1089.77	141	0.04	107.09	11.594
G-L278.1	Node387.2	Node387.1	Circular	1.5	0	4bot6top2deepNat	1	0	0	0	4.17	1091.2	1090.7	1097.7	1095.95	12	0.013	21.34	16.544
G-L278.2	Node387.3	Node387.2	Circular	1.5	0	4bot6top2deepNat	1	0	0	0	6.03	1099	1095.2	1101	1097.7	63	0.013	25.78	27.953
Link419.2.	Node387.4	Node387.3.	Circular	1	0	4bot6top2deepNat	1	0	0	0	0.26	1086.3	1085.9	1089.77	1088.6	152	0.013	1.83	5.017
Link419.4.	Node387.3.	Node331.1	Circular	0.833	0	4bot6top2deepNat	1	0	0	0	3.9	1083.8	1072.36	1088.6	1074.52	293	0.013	4.32	5.011
559.1&2.1	SK-N307.1	SK-N306	Circular	4	0	0	2	0	0	0	0.44	930.572	927.299	936.88	934	743.706	0.013	95.29	131.69
SK-N318L.1	SK-N318.1	SK-N316	Circular	0.67	0	0	1	0	0	0	0.33	938.32	938.15	941.17	940	52	0.013	0.7	2.23
SK-N317L.2	SK-N317.2	SK-N317.1	Circular	2.5	0	0	1	0	0	0	0.88	935.13	933.65	938.98	938.9	168	0.013	38.55	15.837
SK-N218L.1	SK-N218.1	SK-N217	Trapezoidal	3	0	0	1	0.5	0.5	3	0.33	934	933.6	938.4	938	123	0.017	84.04	115.347
Link458	Node441	Node442	Circular	2	0	0	1	0	0	0	0.62	956.52	956.47	960.8	961.4	8	0.013	17.88	13.597
Link459	Node442	Node443	Circular	2	0	0	1	0	0	0	0.39	956.37	956.15	961.4	961.9	56	0.013	14.14	13.688
Link460	Node443	Node444	Circular	2	0	0	1	0	0	0	0.4	956.05	955.07	961.9	960.31	242	0.013	14.4	13.75
Link461	Node444	Node445	Circular	2	0	0	1	0	0	0	1.3	954.97	954.05	960.31	959.32	71	0.013	25.9	13.754
Link462	Node445	SK-N431	Circular	2	0	0	1	0	0	0	0.21	953.95	953.78	959.32	958.4	82	0.013	10.33	13.698
Link464	Node446	Node447	Circular	2.5	0	0	1	0	0	0	1.82	952.45	950.9	956.91	954.8	85	0.024	30.09	14.317
Link465	Node447	Node448	Circular	2.5	0	0	1	0	0	0	0.89	950.9	944	954.8	951.76	774	0.024	20.98	13.969
Link466	Node448	SK-N424	Circular	2.5	0	0	1	0	0	0	2.21	944	940.7	951.76	958.5	149	0.024	33.09	14.036
Link468	Node449	Node450	Circular	2.5	0	0	1	0	0	0	0.69	938.4	937.8	943.62	943.05	87	0.024	18.48	27.575
Link469	Node450	Node451	Circular	2.5	0	0	1	0	0	0	0.46	937.8	937.2	943.05	945.73	130	0.024	15.13	27.564
Link470	Node451	Node452	Circular	2.5	0	0	1	0	0	0	0	937.2	937.2	945.73	947.54	10	0.024	3.12	38.62
Link471	Node452	Node453	Special	5.33	0	0	1	0	0	0	0.59	937.2	935.8	947.54	939.18	236	0.024	84.66	38.531
Link472	Node453	Node456	Natural	2.6	0	6bot10top2.6deepNat	1	0	0	0	0.39	935.8	934.2	939.18	938.7	411	0.04	67.48	38.158
Link474	Node455	SK-N402	Natural	2	0	3bot5top2deepNat	1	0	0	0	1.18	933.8	927	938.3	938.5	575	0.04	33.82	37.128
Link473	Node456	Node455	Circular	4.5	0	0	1	0	0	0	0.18	934.2	933.8	938.7	938.3	220	0.024	45.42	37.667
GLink351	G-Node319	G-Node320	Circular	4	0	0	1	0	0	0	0	1176.2	1176.2	1182.83	1182.79	149	0.024	2.85	0.285
GLink353	G-Node320	GNode320.2	Natural	2.5	0	4bot8top2.5deepNat	1	0	0	0	0.16	1179.27	1178.77	1182.79	1182.13	306	0.04	28.75	0
GLink353.2	GNode320.2	GNode320.1	Natural	2.5	0	5bot10top2.5deep Nat	1	0	0	0	0.17	1178.77	1178.44	1182.13	1181.7	197	0.04	38.24	0

Name	Upstream Node Name	Downstream Node Name	Shape	Diameter (ft.)	Height of Rectangle (ft.)	Natural Section Reference	Number of Barrels	Right-hand Side Slope	Left-hand side slope	Bottom Width (ft.)	Conduit Slope	Upstream Invert Elevation	downstream Invert Elevation	Upstream Ground Elevation (ft.)	Downstream Ground Elevation (ft.)	Length (ft.)	Roughness	25 yr Design Full Flow cfs	25 yr Max Flow cfs
Sakunk-Jones Links																			
GLink353.1	GNode320.1	G-Node322	Natural	2.5	0	4bot8top2.5deepNat	1	0	0	0	0.16	1178.44	1177.61	1181.7	1180.61	507	0.04	28.78	0
GLink356	G-Node322	G-Node325	Circular	3	0	0	1	0	0	0	-1.4	1177.61	1177.89	1180.61	1180.89	20	0.024	42.69	0
GLink357	G-Node325	G-Node326	Natural	2.5	0	3.5bot8top2.5deepNat	1	0	0	0	-0.06	1177.89	1178.08	1180.89	1180.58	313	0.04	16.51	0
GLink358	G-Node326	GNode326.1	Circular	1.5	0	0	1	0	0	0	0.56	1178.08	1175.82	1180.58	1180.2	400	0.014	7.33	0
GLink358.1	GNode326.1	G-Node327	Circular	2	0	0	1	0	0	0	0.56	1175.82	1174.66	1180.2	1180	206	0.014	15.76	0
GLink360	G-Node327	G-N279-1	Natural	2.6	0	3bot8top2.6deepConc	1	0	0	0	0.04	1177.31	1177.21	1180	1179.9	258	0.017	30.8	0
Glink361	G-N279-1	Node468	Circular	2	0	0	1	0	0	0	0.09	1177.21	1176.42	1179.9	1178.42	900	0.013	6.7	0
G-L144	G-N144	G-N144B	Circular	1.5	0	0	1	0	0	0	3.15	1074.55	1073.5	1079.82	1080.09	33.35	0.013	18.67	18.751
Link507	Node471	SK-N329	Circular	1	0	0	1	0	0	0	4.52	1062.985	1061.34	1074.5	1070.15	36.4	0.013	7.64	7.577
SK-N719L2.1	SK-N717.1	SK-N329	Circular	1.75	0	0	1	0	0	0	9.76	1065.34	1061.34	1078.26	1070.15	41	0.013	49.37	20.41
Link495	Node473	Node474	Circular	4	0	0	1	0	0	0	2.72	959.6	957.2	964.6	962.2	88.38	0.013	237.86	0
Link496	Node474	Node475	Circular	4	0	0	1	0	0	0	1.17	957.2	953.6	962.2	958.6	306.86	0.013	155.58	0
Link497	Node475	Node478	Circular	4	0	0	1	0	0	0	1.14	953.6	951.5	958.6	956.5	184.92	0.013	153.08	0
Link502	Node476	Node480	Circular	4	0	0	1	0	0	0	2.41	950.7	950.3	955.7	955.3	16.63	0.013	225.71	0
Link499	Node477	SK-N223	Special	5.6	0	0	1	0	0	0	0.62	948.25	947.75	952.5	952	80.6	0.024	86.78	-0.123
Link500	Node478	Node476	Circular	4	0	0	1	0	0	0	0.68	951.5	950.7	956.5	955.7	118.15	0.013	118.1	0
Link501	Node479	Node473	Circular	4	0	0	1	0	0	0	5.15	962.3	959.6	967.3	964.6	52.43	0.013	323.83	0
Link498	Node480	Node477	Circular	4	0	0	1	0	0	0	0.73	950.3	948.25	955.3	952.5	281.81	0.013	122.51	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Link505	Node324.1	SK-N158.1	Trapezoidal	1	0	0	1	0.5	0.5	6	40	1051	1049	1054	1050	5	0.04	130.93	21.96
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SK-N158.1L.1	SK-N158.2	SK-N158	Circular	2	0	0	1	2	2	4	1.79	1043.5	1028	1045.5	1032	868	0.028	14.04	15.075
G-L278	G-N278	Node387.3	Natural	2	0	4bot6top2deepNat	1	0	0	0	5.37	1178.84	1099	1181.48	1101	1486.22	0.04	96.1	31.431

Appendix C
Flow Monitoring Data & Model Calibration

WHERE THE ROGUE RIVER RUNS
GRANTS PASS
OREGON

KELLER associates

N

Legend

- Flow Monitoring Location
- Allen- Fruitdale Links
- Gilbert Links
- Sand Links
- Skunk-Jones Links

0 1,000 2,000 4,000 6,000 8,000 Feet

Background Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

drawn by:NCJ

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure C.1 Flow Monitoring Locations.mxd

KELLER associates

GRANTS PASS — WHERE THE ROGUE RIVER RUNS

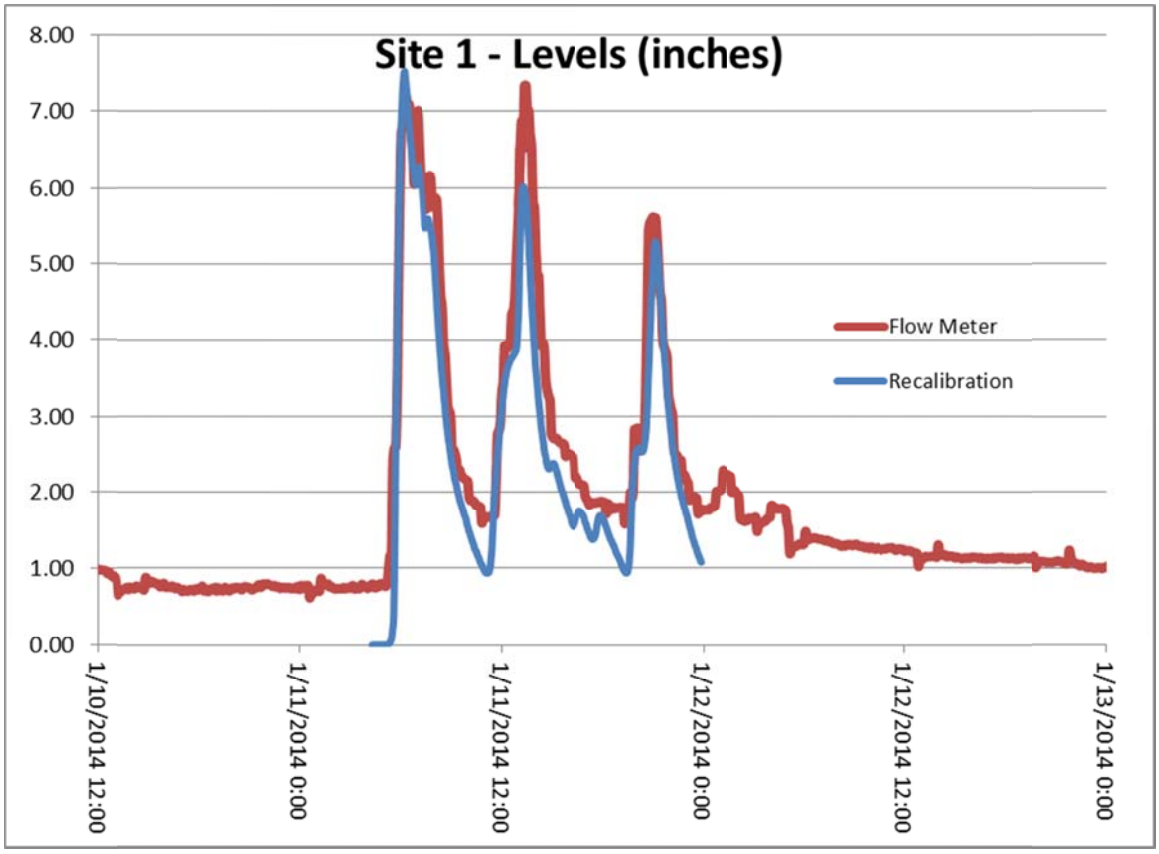
Prepared for:

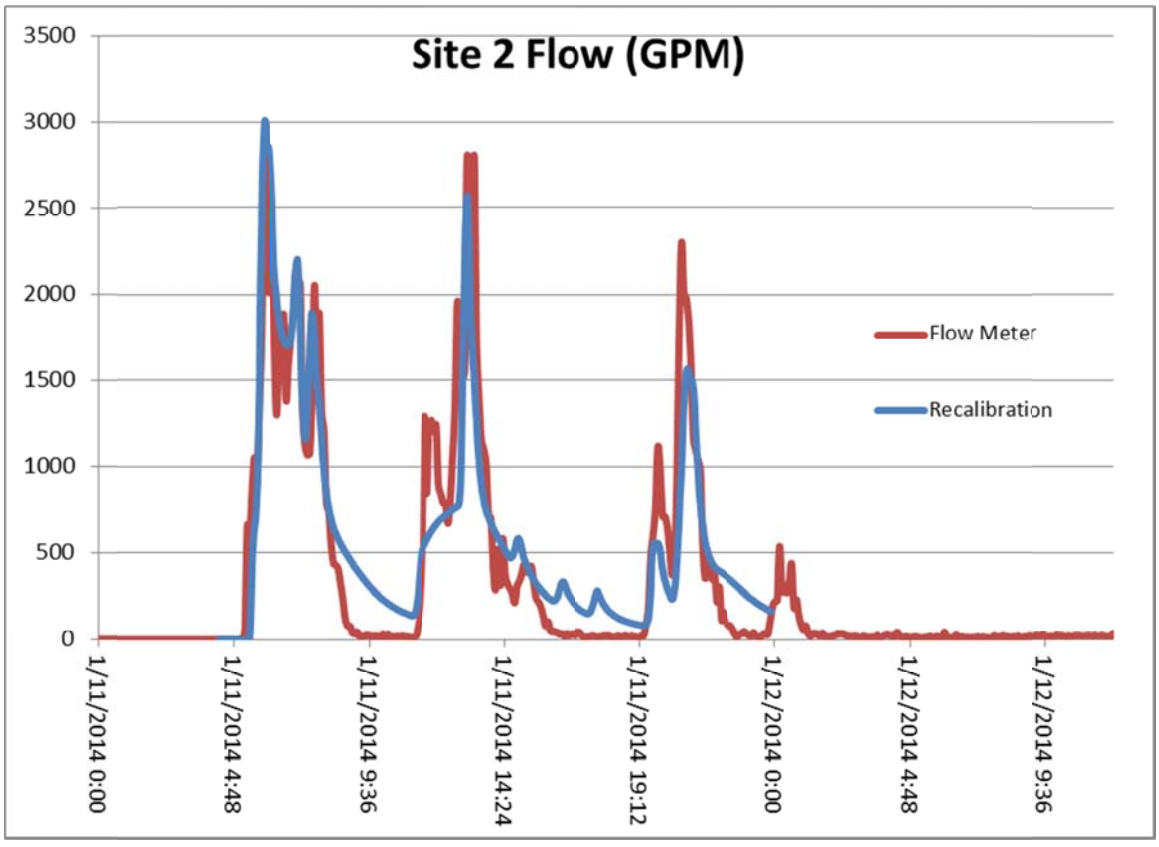
CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

Title: FLOW MONITORING LOCATIONS

Figure: C.1


Site 1 - Levels (inches)
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Flow Meter
Recalibration
1/10/2014 12:00
1/11/2014 0:00
1/11/2014 12:00
1/12/2014 0:00
1/12/2014 12:00
1/13/2014 0:00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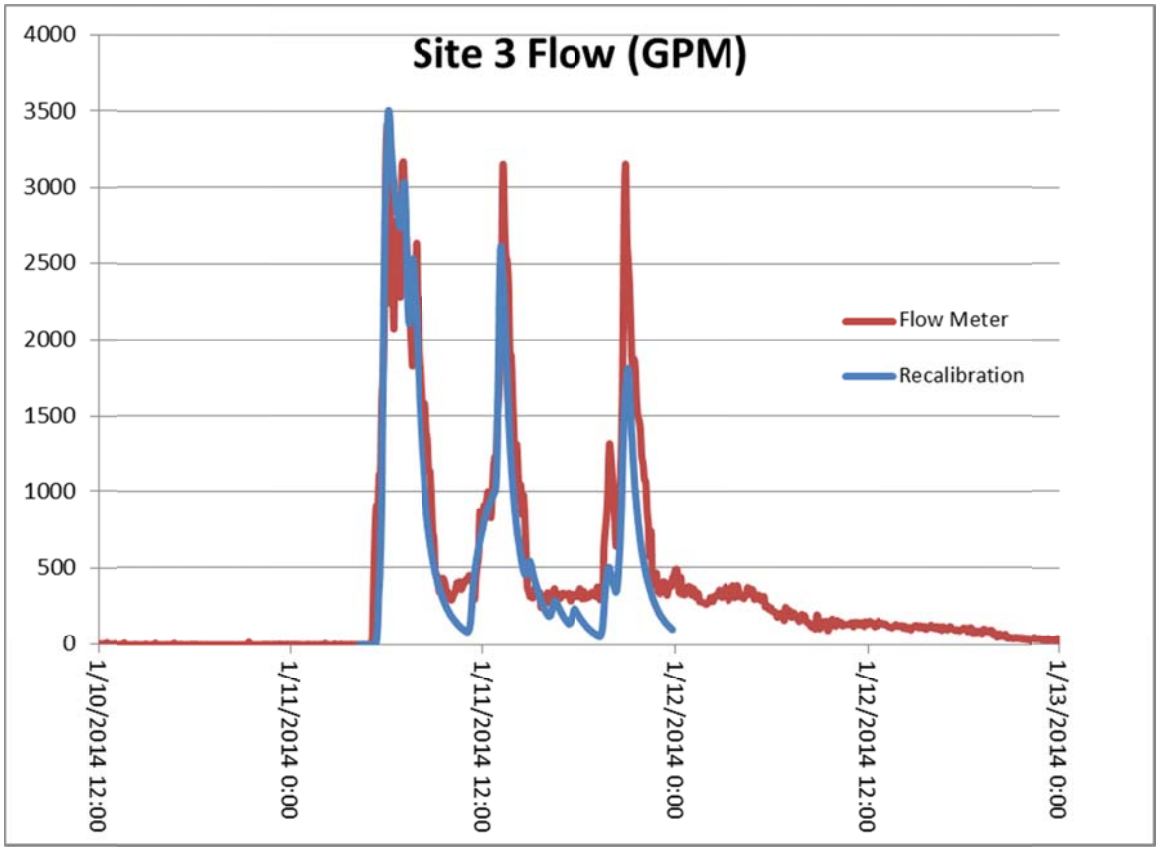
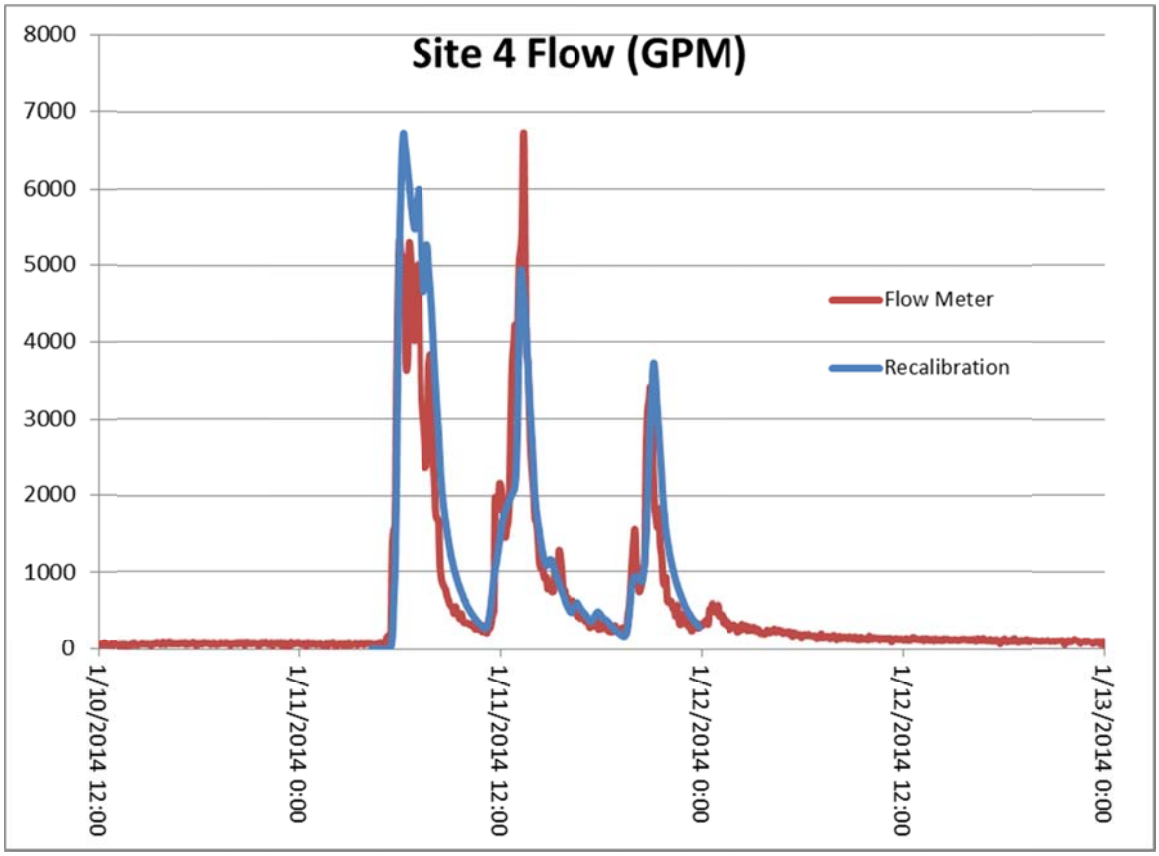
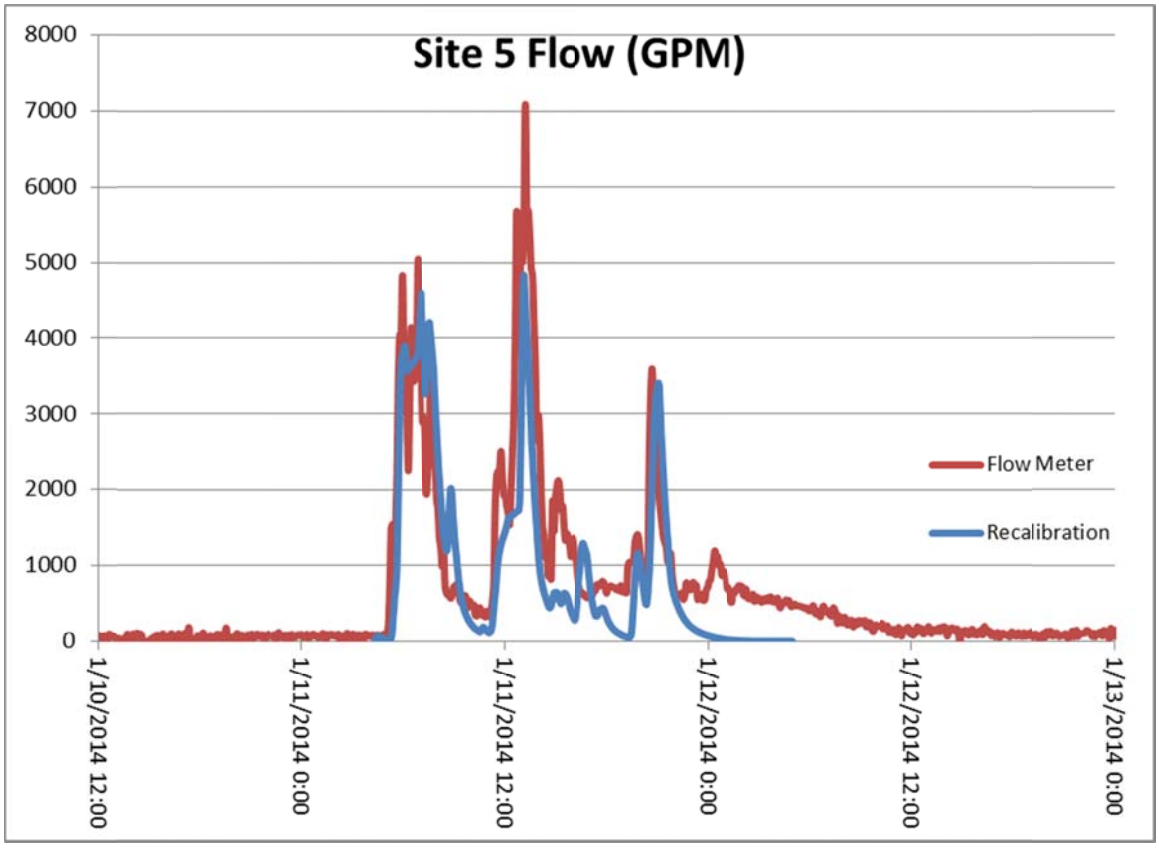
3500
3000
2500
2000
1500
1000
500
0
Flow Meter
Recalibration
1/11/2014 0:00
1/11/2014 4:48
1/11/2014 9:36
1/11/2014 14:24
1/11/2014 19:12
1/12/2014 0:00
1/12/2014 4:48
1/12/2014 9:36


Site 3 Flow (GPM)
4000
3500
3000
2500
2000
1500
1000
500
0
1/10/2014 12:00
1/11/2014 0:00
1/11/2014 12:00
1/12/2014 0:00
1/12/2014 12:00
1/13/2014 0:00
Flow Meter
Recalibration


Site 4 Flow (GPM)
8000
7000
6000
5000
4000
3000
2000
1000
0
1/10/2014 12:00
1/11/2014 0:00
1/11/2014 12:00
1/12/2014 0:00
1/12/2014 12:00
1/13/2014 0:00
Flow Meter
Recalibration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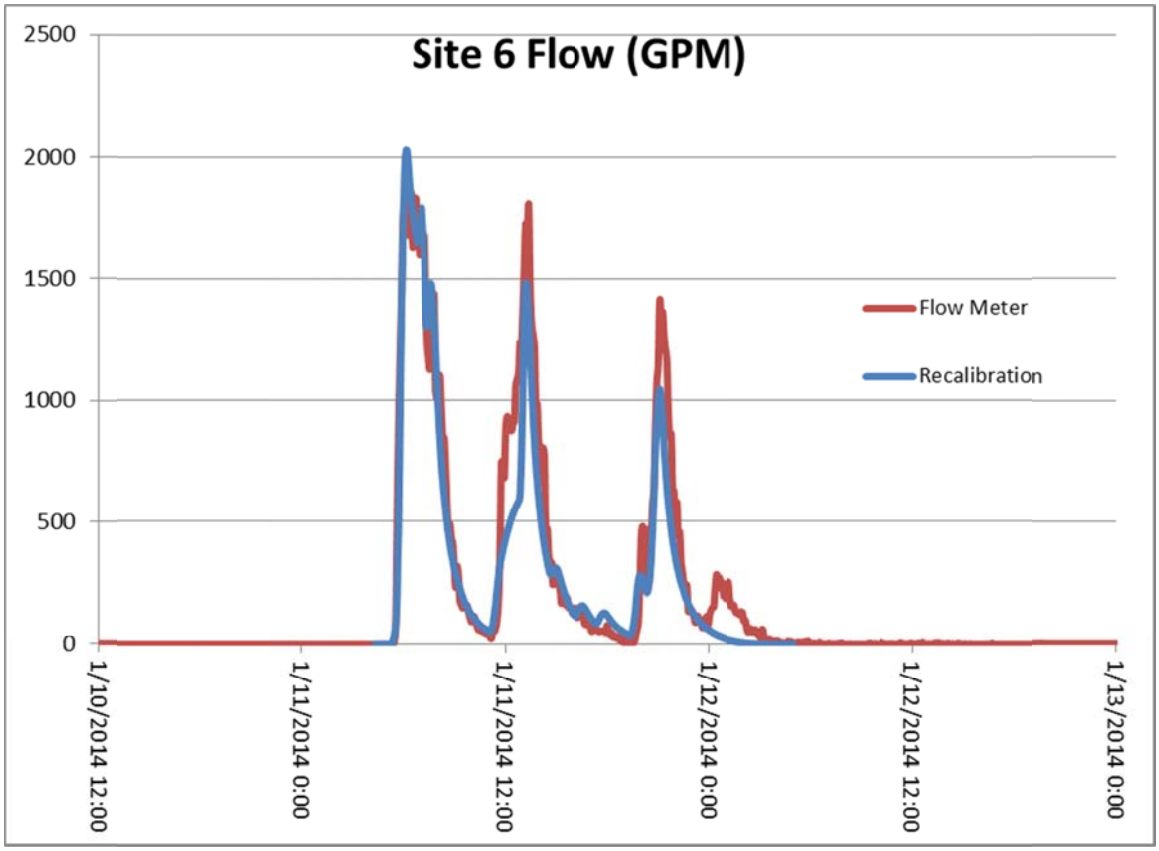
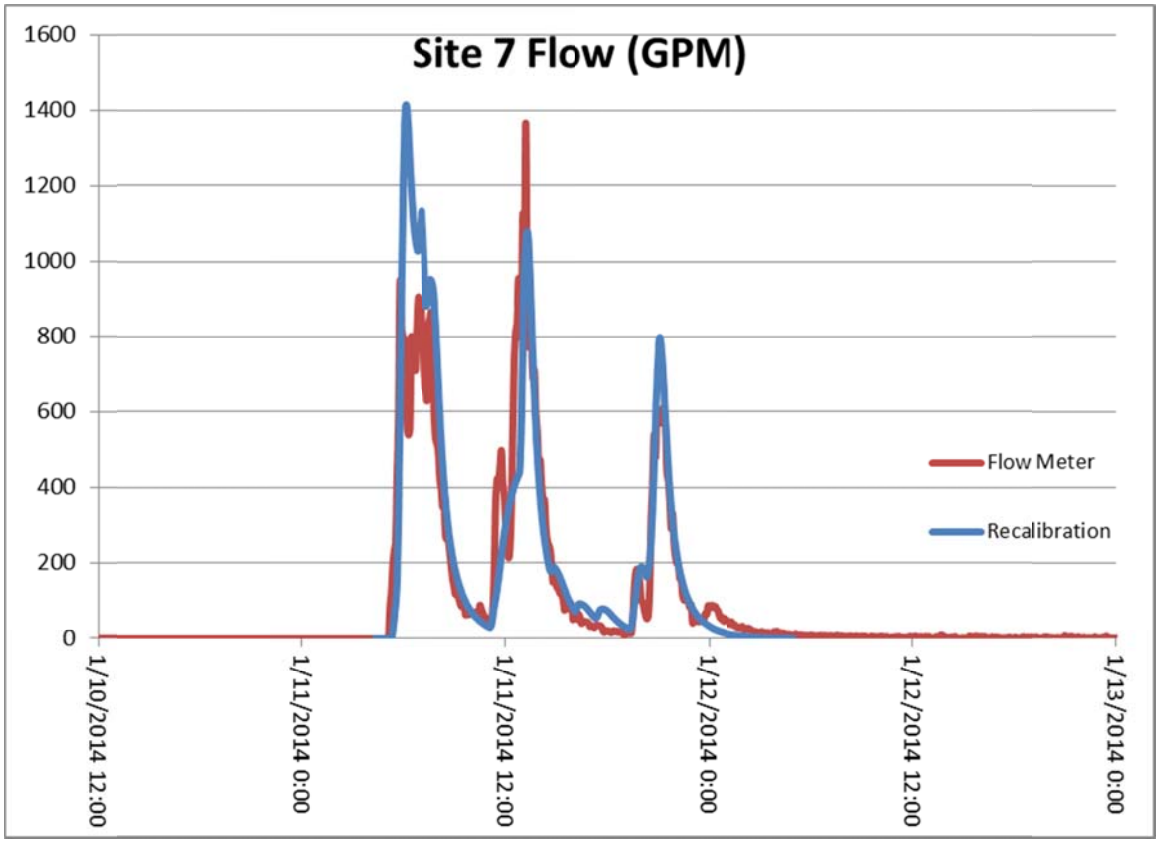
7000
6000
5000
4000
3000
2000
1000
0
1/10/2014 12:00
1/11/2014 0:00
1/11/2014 12:00
1/12/2014 0:00
1/12/2014 12:00
1/13/2014 0:00
Flow Meter
Recalibration


Site 6 Flow (GPM)
2500
2000
1500
1000
500
0
1/10/2014 12:00
1/11/2014 0:00
1/11/2014 12:00
1/12/2014 0:00
1/12/2014 12:00
1/13/2014 0:00
Flow Meter
Recalibration


Site 7 Flow (GPM)
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1400
1200
1000
800
600
400
200
0
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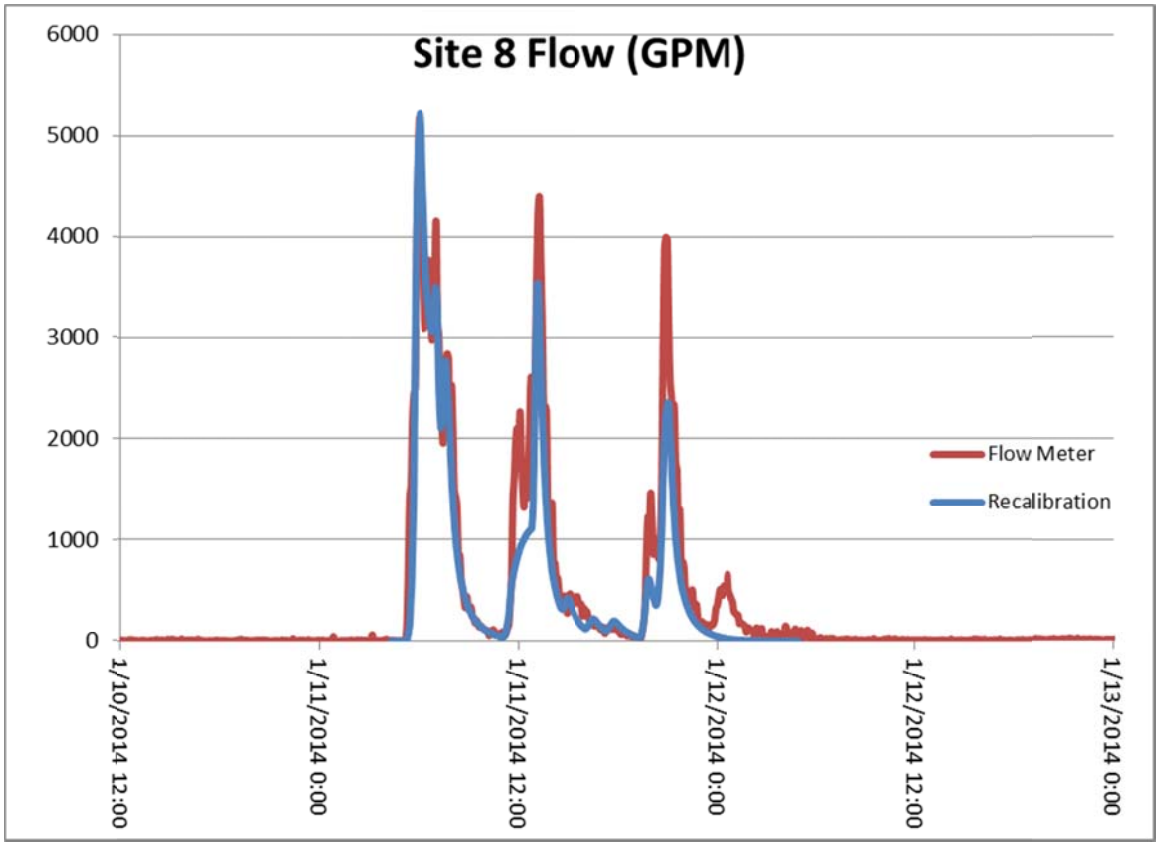
1/11/2014 0:00
1/11/2014 12:00
1/12/2014 0:00
1/12/2014 12:00
1/13/2014 0:00
Flow Meter
Recalibration


Site 8 Flow (GPM)
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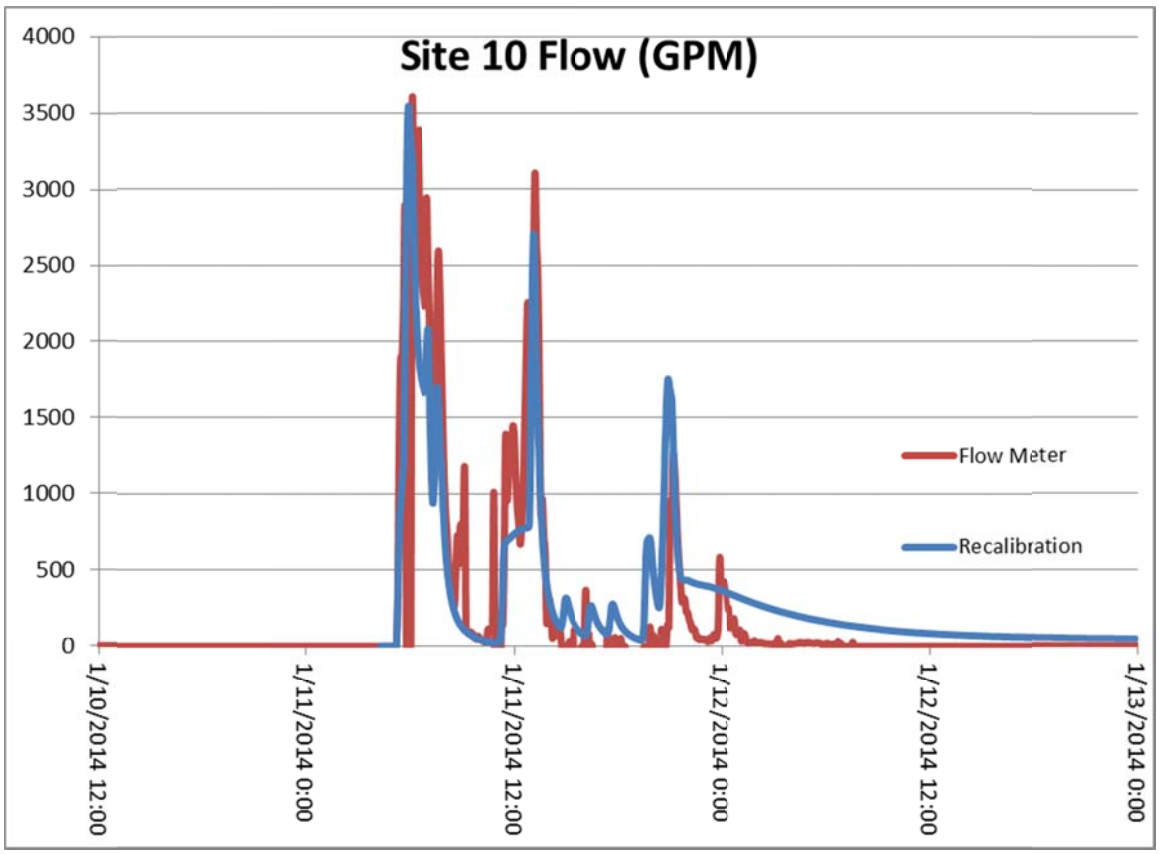
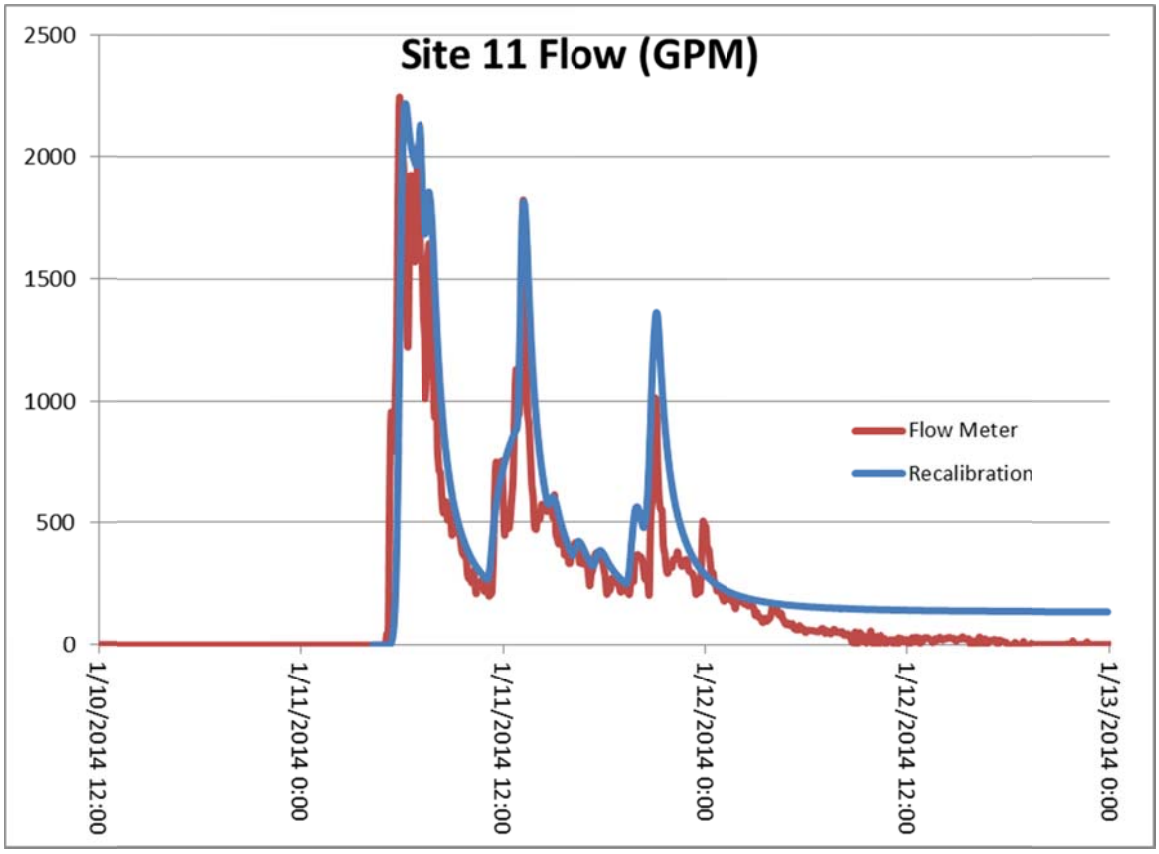
5000
4000
3000
2000
1000
0
1/10/2014 12:00
1/11/2014 0:00
1/11/2014 12:00
1/12/2014 0:00
1/12/2014 12:00
1/13/2014 0:00
Flow Meter
Recalibration

Site 9 had data errors, so it could not be used.




Site 11 Flow (GPM)
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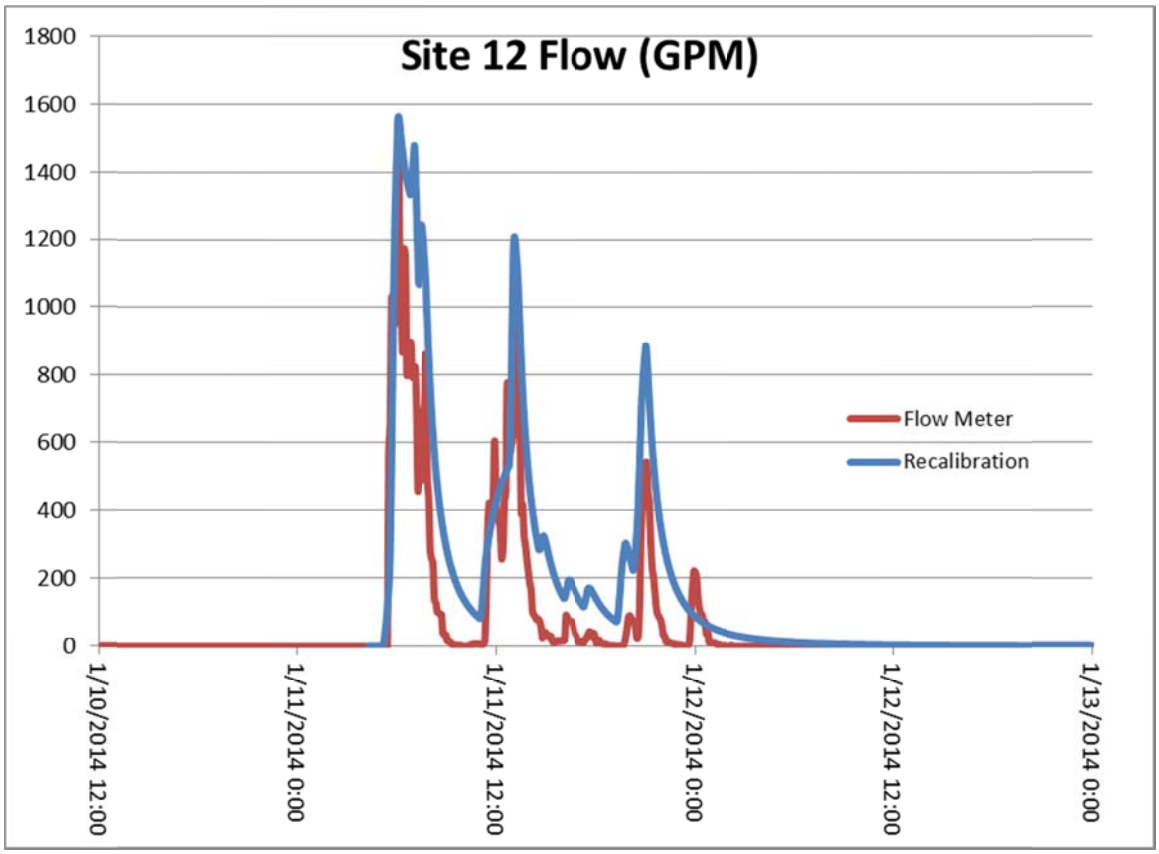
2000
1500
1000
500
0
1/10/2014 12:00
1/11/2014 0:00
1/11/2014 12:00
1/12/2014 0:00
1/12/2014 12:00
1/13/2014 0:00
Flow Meter
Recalibration


Site 12 Flow (GPM)
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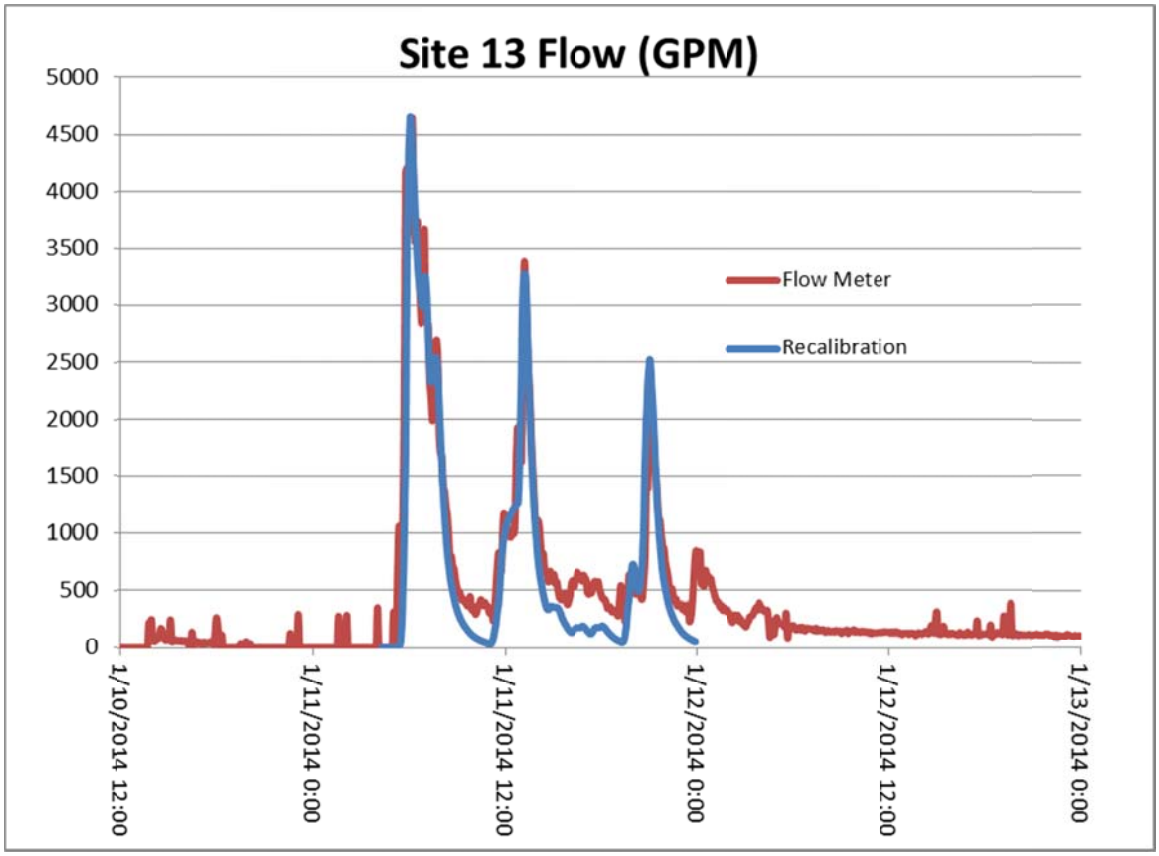
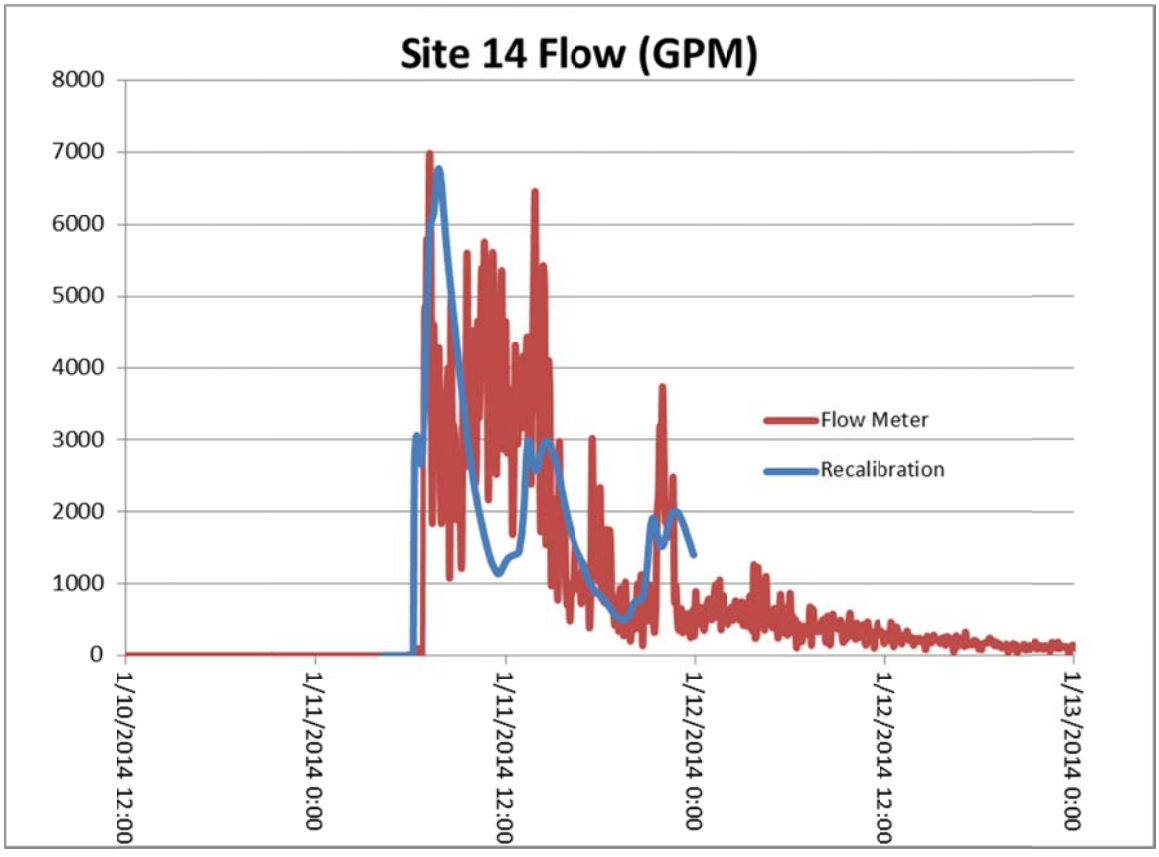
1600
1400
1200
1000
800
600
400
200
0
1/10/2014 12:00
1/11/2014 0:00
1/11/2014 12:00
1/12/2014 0:00
1/12/2014 12:00
1/13/2014 0:00
Flow Meter
Recalibration


Site 13 Flow (GPM)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Flow Meter
Recalibration
1/10/2014 12:00
1/11/2014 0:00
1/11/2014 12:00
1/12/2014 0:00
1/12/2014 12:00
1/13/2014 0:00


Site 14 Flow (GPM)
8000
7000
6000
5000
4000
3000
2000
1000
0
Flow Meter
Recalibration
1/10/2014 12:00
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1/11/2014 12:00
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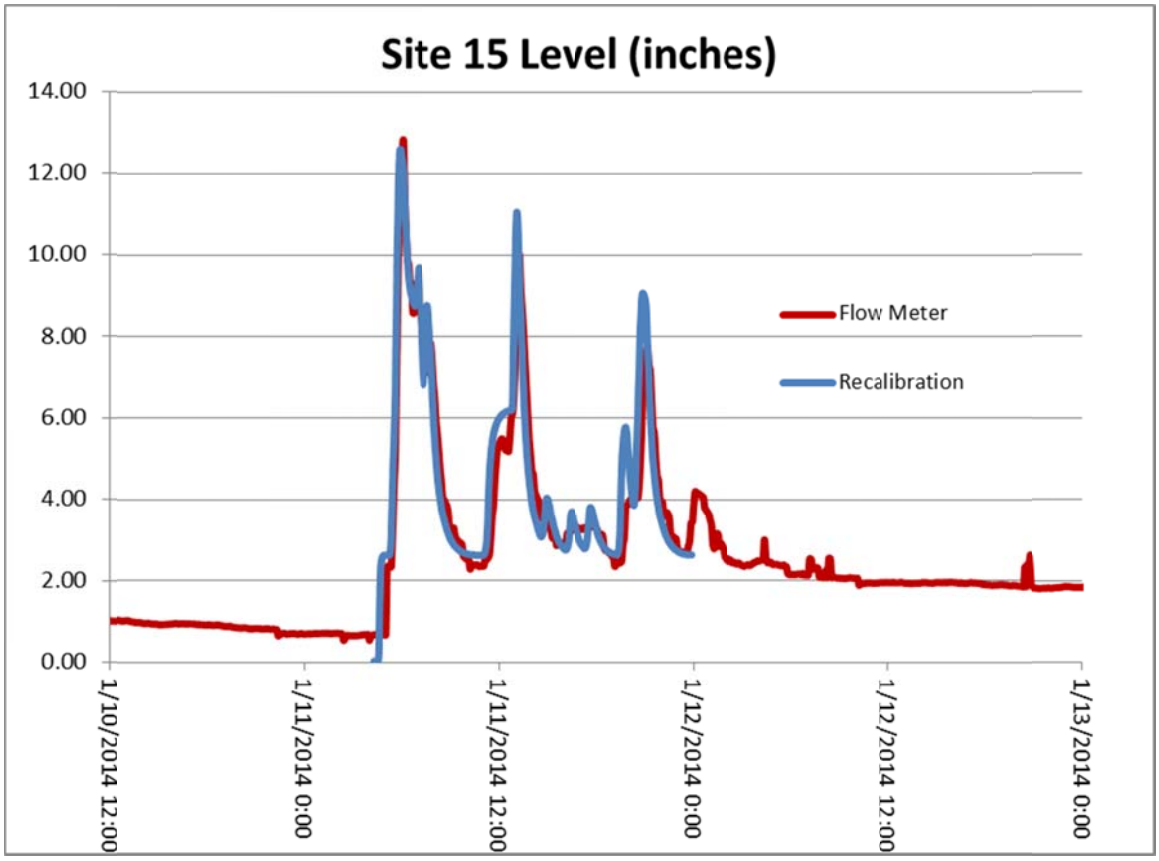
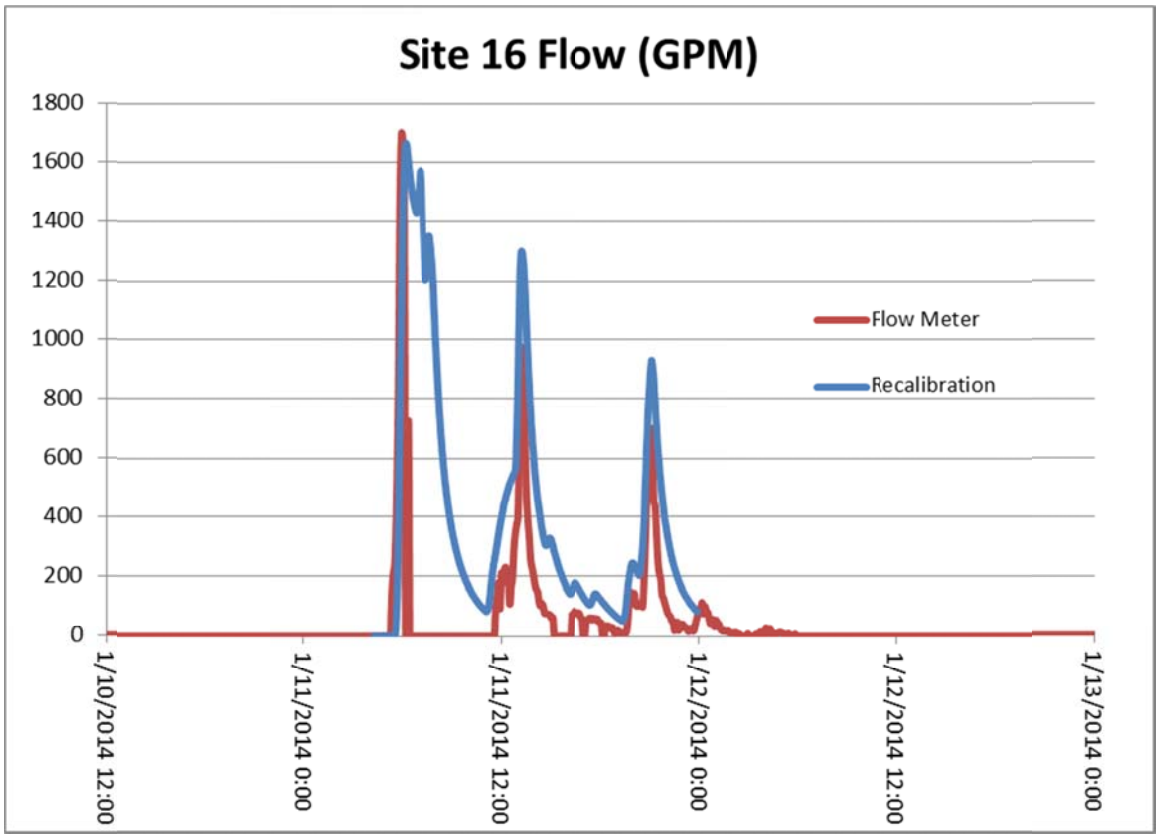
1/12/2014 12:00
1/13/2014 0:00


Site 15 Level (inches)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Flow Meter
Recalibration
1/10/2014 12:00
1/11/2014 0:00
1/11/2014 12:00
1/12/2014 0:00
1/12/2014 12:00
1/13/2014 0:00


Site 16 Flow (GPM)
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1600
1400
1200
1000
800
600
400
200
0
Flow Meter
Recalibration
1/10/2014 12:00
1/11/2014 0:00
1/11/2014 12:00
1/12/2014 0:00
1/12/2014 12:00
1/13/2014 0:00

Appendix D
Comparisons with Other Models

KELLER associates

N

Legend

- Model Comparison Locations
- Flow Monitoring Location
- Sand Creek 1D Model links
- County 2D Model Links
- Links in Both 1D & 2D Models

0 500 1,000 2,000 3,000 4,000 5,000 Feet

Background Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

drawn by:NCJ

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure D.1 Model comparison.mxd

KELLER associates

GRANTS PASS — WHERE THE ROGUE RIVER RUNS

Prepared for:

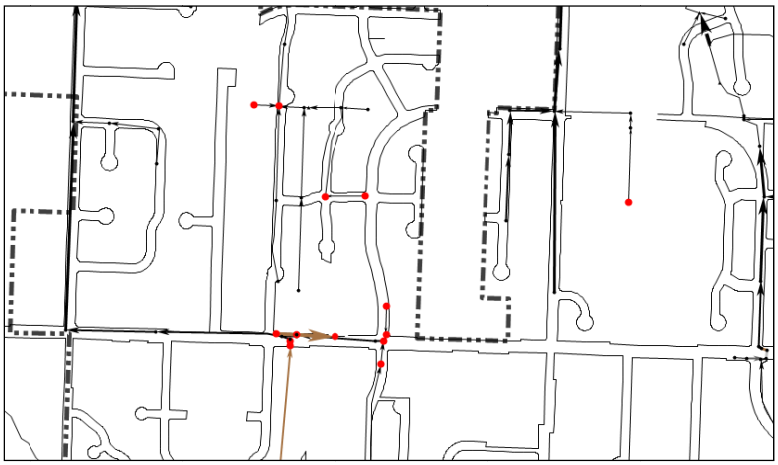
CITY OF GRANTS PASS, OREGON

STORMWATER MASTER PLAN

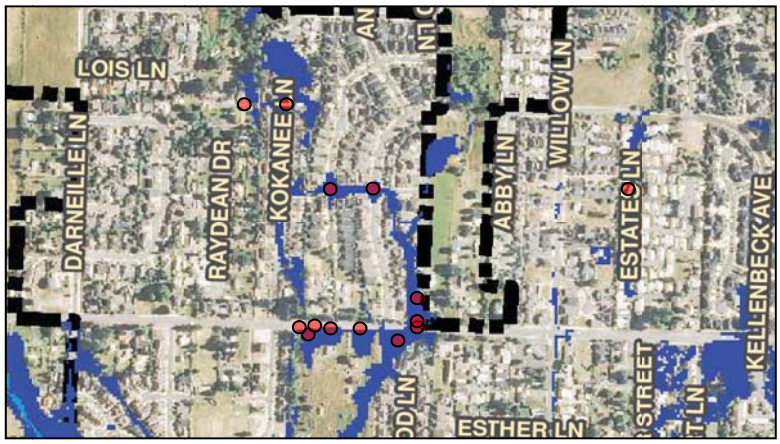
Title: 1D - 2D MODEL COMPARISON

Figure: D.1

Redwood Avenue Keller Associates Phase II 1D Model Results
(flooding shown as red circles)



Redwood Avenue Keller Associates Phase II 1D Model Results (flooding shown as red circles)
Redwood Avenue Cardno WRG 2D Model Results (flooding shown as blue areas)



Appendix E
Existing Field Conditions

GRANTS PASS
WHERE THE ROGUE RIVER RUNS
OREGON

KELLER associates

E-1:
Rating System

RATING SYSTEM

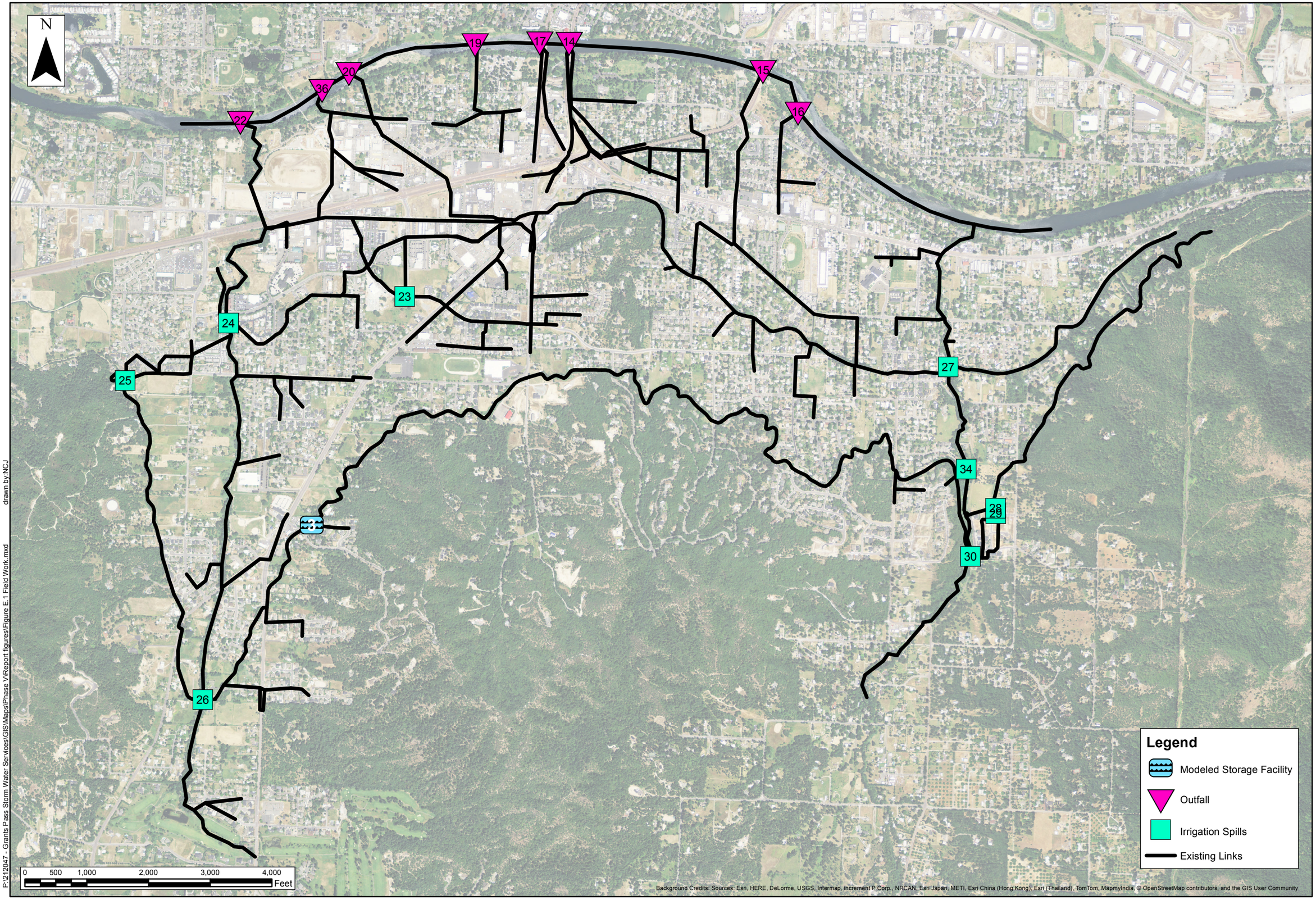
Excellent Condition: No sediment, no immediate maintenance, very good structural condition, function as if it was brand new.

Good Condition: Structurally functional, flow passes as intended, some minor maintenance may be needed such as debris removal between outfall pipe and river water surface or sediment removal in pipe.

Fair Condition: Minor to major damage to structure, functions as intended, but structurally not good; such as cracking, rusting, spawling, etc. These items should be repaired when possible, some may be capital improvements, and others may be maintenance repairs. One common cause for fair rating is a large amount of debris.

Poor Condition: This facility needs major renovations or complete replacement. If it is a facility of minor importance, it may be postponed and not placed in capital improvement list. It is not functioning as intended.

E-2:
Figures



drawn by:NCJ

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase VI\Report figures\Figure E.1 Field Work.mxd

KELLER associates

GRANTS PASS
WHERE THE ROGUE RIVER RUNS

Prepared for:
CITY OF
GRANTS PASS, OREGON

STORMWATER
MASTER PLAN

Title:
ALLEN-FRUITDALE
EXISTING SYSTEM
EVALUATION

Figure:
E.1

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure E.2 Field Work.mxd drawn by:NCJ

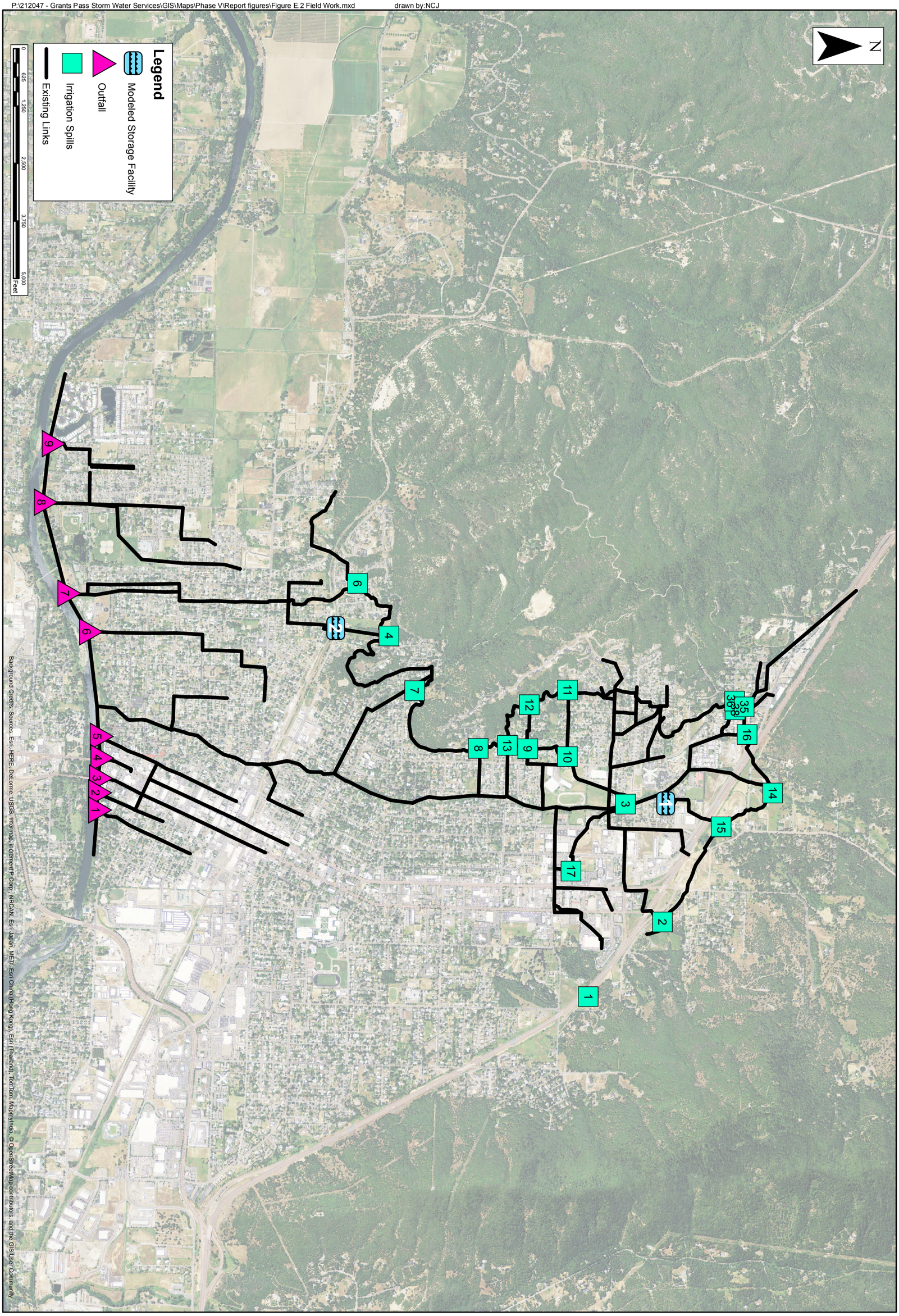


Figure:	Title:		Prepared for:		
E.2	**GILBERT EXISTING SYSTEM EVALUATION**	**STORMWATER MASTER PLAN**	**CITY OF GRANTS PASS, OREGON**	GRANTS PASS NEVER THE ROGUE RIVER RUNS OREGON	KELLER associates

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure E.3 Field Work.mxd drawn by:NCJ

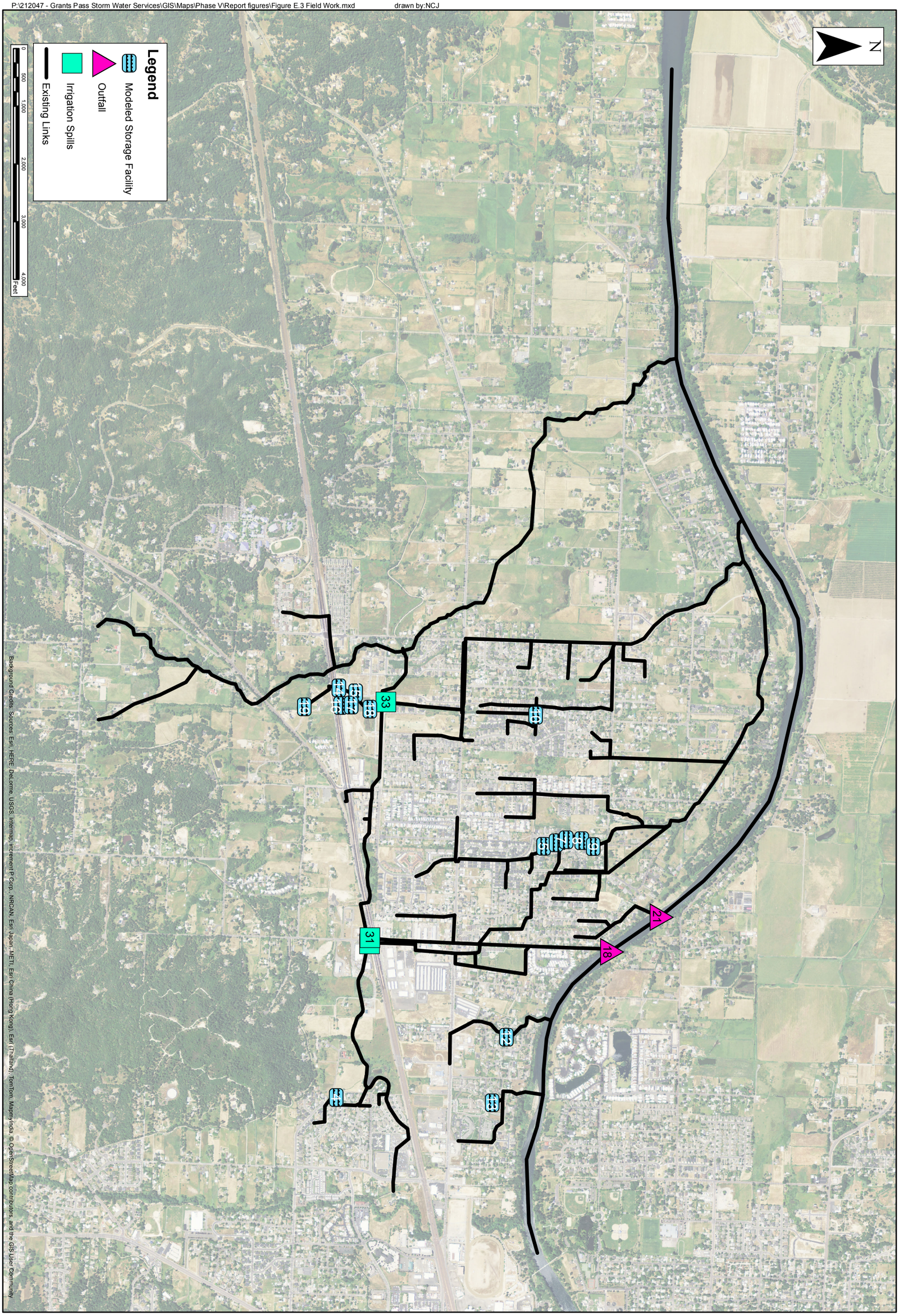


Figure:	Title:		Prepared for:		
E.3	**SAND EXISTING SYSTEM EVALUATION**	**STORMWATER MASTER PLAN**	**CITY OF GRANTS PASS, OREGON**	GRANTS PASS NEVER THE ROGUE RIVER RUNS OREGON	KELLER associates

P:\212047 - Grants Pass Storm Water Services\GIS\Maps\Phase V\Report figures\Figure E.4 Field Work.mxd drawn by:NCJ

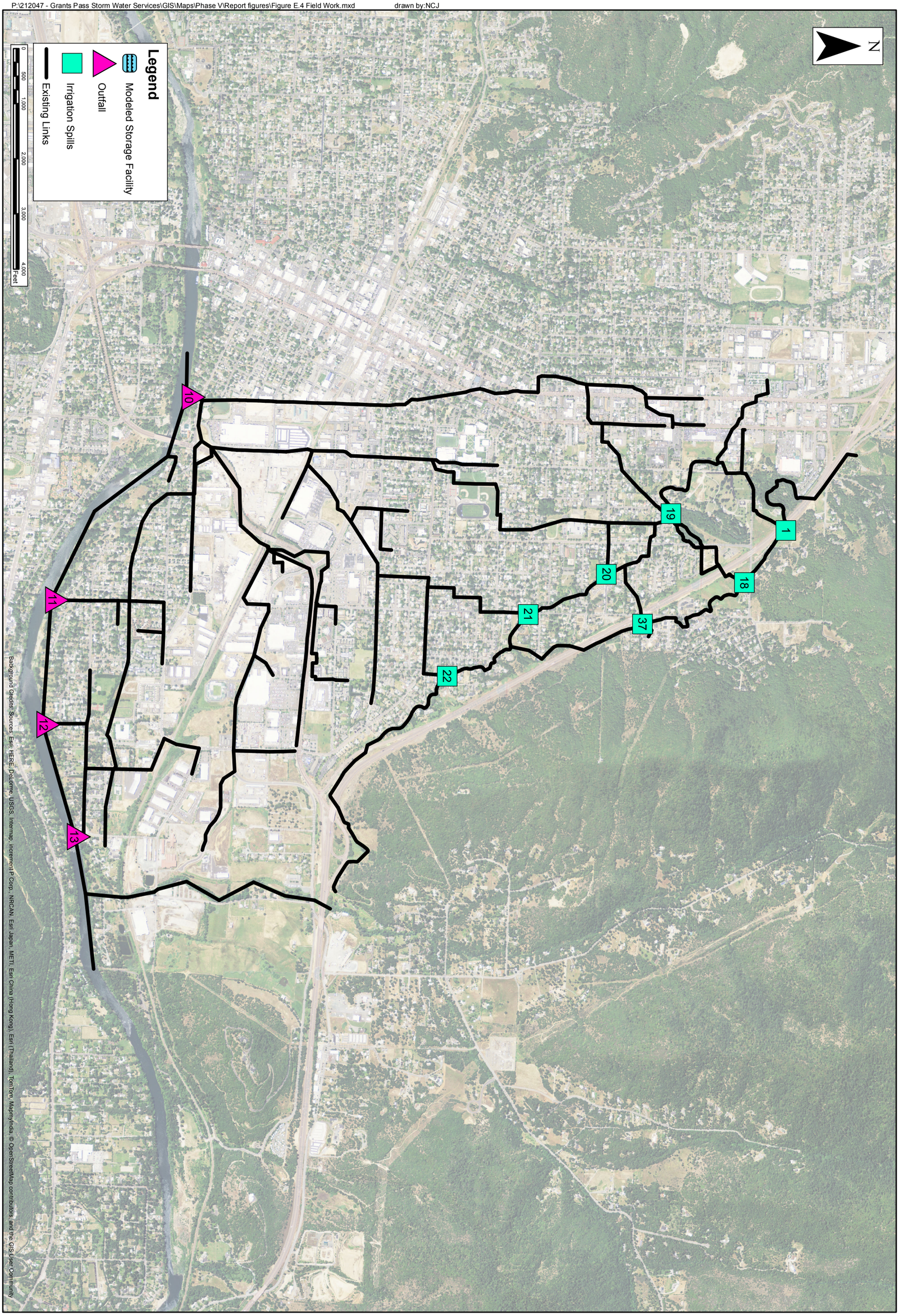


Figure:	Title:		Prepared for:		
E.4	**SKUNK-JONES EXISTING SYSTEM EVALUATION**	**STORMWATER MASTER PLAN**	**CITY OF GRANTS PASS, OREGON**	GRANTS PASS OREGON — NEVER THE ROGUE RIVER RUNS	KELLER associates

Appendix F

CIP

GRANTS PASS
WHERE THE ROGUE RIVER RUNS
OREGON

KELLER associates

Grants Pass Stormwater Master Plan
Capital Improvement Plan

ID#	Priority	Item	Total Estimated Cost (2015)
Priority 1A Improvements (0-15 years)			
Allen Fruitdale			
AF-1	1A	Golf Course	$ 371,000
AF-2	1A	South Highline Canal near Allen Creek	$ 1,211,000
AF-3	1A	Harbeck Road, Nebraska Avenue	$ 200,000
AF-4	1A	Pond Near Calvary Chapel off Harbeck Road	$ 629,000
AF-5	1A	Grandview Avenue and the Hospital	$ 611,000
AF-7	1A	Lower Parkdale Drive/Highway 199 Trunkline	$ 1,590,000
AF-11	1A	Sugar Beet Line, East Park Street	$ 1,330,000
AF-12	1A	Sunset Way and Tributary Pipes	$ 2,226,000
AF-13	1A	Harbeck Road and Southridge Way	$ 1,082,000
AF-14	1A	Highway 238	$ 661,000
AF-15	1A	Main Gravity Canal Spills and Central Parkdale Drive Trunkline	$ 889,000
AF-16	1A	Upper Parkdale Drive Trunkline and South Highland Canal Spill	$ 601,000
AF-17	1A	Highways 238/199/99 Intersection Detention	$ 959,000
AF-18	1A	Union Avenue	$ 646,000
AF-19	1A	Meadow Glen	$ 236,000
AF-20	1A	Liberty Drive	$ 473,000
Gilbert			
G-1	1A	5th Street, 6th Street	$ 1,656,000
G-3	1A	G Street, I Street, Alder Street, L Street	$ 795,000
G-4	1A	Demoray Canal Spills- Southwest	$ 127,000
G-5	1A	Demoray Canal Spills- Central West	$ 29,000
G-6	1A	Hilcrest Drive, 6th Street, 7th Street	$ 1,664,000
G-7	1A	Demoray Spill-South East	$ 106,000
G-8	1A	Demoray Canal Spills- North Central	$ 810,000
G-9	1A	Demoray Canal Spills- Northwest	$ 460,000
G-10	1A	Demoray Canal Spills- Northeast	$ 438,000
Sand			
S-1	1A	Trunkline from South Main Canal to River along Dowell Road	$ 3,412,000
S-2	1A	Flow-split Kellenback Avenue to Dowell Road	$ 691,000
S-3	1A	Expansion of South Main Canal	$ 583,000
S-6	1A	Leonard Road to Ditch	$ 926,000
S-7	1A	Willow Lane to Ditch	$ 975,000
S-8	1A	Willow Court, Estates Lane	$ 696,000
S-10	1A	Kokanee Lane, Leonard Road	$ 1,613,000
S-12	1A	Rainwood Lane to Leonard Road	$ 141,000
S-13	1A	ODOT Pond South of Redwood Highway	$ 1,353,000
S-14	1A	New Flow Diversion to Sand Creek at Redwood Hwy	$ 168,000
S-15	1A	Yellowtail Lane to Mary Lynn Lane	$ 392,000
S-16	1A	Darnelle Lane	$ 1,138,000
Skunk Jones			
SJ-10	1A	Channel Northwest of Dewey Drive and 10th Street	$ 3,000
		Total Priority 1A Improvements	**$ 31,891,000**

Grants Pass Stormwater Master Plan
Capital Improvement Plan

ID#	Priority	Item	Total Estimated Cost (2015)
Priority 1B Improvements (15-20 years)			
Allen Fruitdale			
AF-6	1B	West Park Street, Josephine County Yard, Tussing Park	$ 407,000
Sand			
S-4	1B	Redwood Circle to River	$ 650,000
Skunk Jones			
SJ-1	1B	F Street	$ 1,829,000
SJ-8	1B	Spill Northwest of I-5 and Hilcrest Drive to 7th Street	$ 386,000
SJ-11	1B	Rogue Drive Trunkline	$ 2,938,000
SJ-12	1B	M Street	$ 759,000
SJ-13	1B	A Street-West	$ 1,126,000
		Total Priority 1B Improvements	**$ 8,095,000**
Priority 2A Improvements (20-25 years)			
Gilbert			
G-2	2A	9th Street	$ 457,000
Skunk Jones			
SJ-7	2A	Demoray Canal	$ 61,000
		Total Priority 2A Improvements	**$ 518,000**
Priority 2B Improvements (20-25 years)			
Skunk Jones			
SJ-2	2B	D Street	$ 2,181,000
		Total Priority 2B Improvements	**$ 2,181,000**

Grants Pass Stormwater Master Plan
Capital Improvement Plan

ID#	Priority	Item	Total Estimated Cost (2015)
Priority 3A Improvements (25-30 years)			
Allen Fruitdale			
AF-8	3A	Haviland Drive and Grandview Avenue	$ 3,000
AF-10	3A	Canal spill East of UGB	$ 306,000
Sand			
S-5	3A	Mesman Drive to River	$ 240,000
S-9	3A	George Tweed Boulevard and Spurs	$ 464,000
S-11	3A	Pond South of Redwood Highway	$ 72,000
Skunk Jones			
SJ-5	3A	Tokay Canal from Savage Street to Dewey Drive	$ 236,000
SJ-9	3A	Rose Lane to River	$ 212,000
		Total Priority 3A Improvements	**$ 1,533,000**
Priority 3B Improvements (25-30 years)			
Skunk Jones			
SJ-3	3B	A Street - East	$ 526,000
SJ-4	3B	Madrone Street	$ 631,000
		Total Priority 3B Improvements	**$ 1,157,000**
Priority 3C Improvements (25-30 years)			
Skunk Jones			
SJ-6	3C	Dewey Drive to 6th Street	$ 795,000
		Total Priority 3C Improvements	**$ 795,000**
Priority 4 Improvements (30-35years)			
Allen Fruitdale			
AF-9	4	Spill North of Harpazo Lane	$ 280,000
		Total Priority 4 Improvements	**$ 280,000**
		TOTAL STORMWATER IMPROVEMENTS COSTS (rounded)	**$ 46,450,000**

* All costs in 2015 Dollars. Costs include contractor overhead and profit (OH&P; 15%), contingency (30%), engineering and construction management services (CMS; 20%), and legal, administrative, and permitting services (2%).

** Costs assume open cut construction. Alternative technologies (i.e. pipe bursting) should be explored during pre-design phase.

The cost estimate herein is concept level information only based on our perception of current conditions at the project location and its accuracy is subject to significant variation depending upon project definition and other factors. This estimate reflects our opinion of probable costs at this time and is subject to change as the project design matures. This cost opinion is in 2015 dollars and does not include escalation to time of actual construction. Keller Associates has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Keller Associates cannot and does not warrant or guarantee that proposals, bids, or actual construction costs will not vary from the cost presented herein.

Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 1A					
AF-1: Golf Course					
27" Pipe - Excavation, Backfill less than 10' deep	LF	$138	688	$94,894	
30" Pipe - Excavation, Backfill less than 10' deep	LF	$144	218	$31,500	
Remove Old Pipe - 20" thru 21"	LF	$16	906	$14,687	
Connect/Reconnect Pipes at Manholes	EA	$2,000	1	$2,000	
Manhole 60"	EA	$5,690	3	$17,069	
outfall	EA	$5,000	1	$5,000	
Reconnect Laterals	LF	$17	906	$15,407	
Existing Utility Protection	LF	$4	906	$3,625	
Traffic Control	LF	$2	688	$1,377	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	688	$36,256	
Miscellaneous Surface Repair	LF	$5	218	$1,090	
Mobilization - Percent of Item Cost Sum	%	5%		$11,145	
Contingency - % of construction costs	%	30%		$70,215	
Total Construction Costs					$304,264
Engineering and CMS - % of construction costs	%	20%		$60,853	
Legal, Administration, and Permitting - % of construction costs	%	2%		$6,085	
Total Project Cost (rounded)					*$371,000*
AF-2: South Highline Canal near Allen Creek					
54" Pipe - Excavation, Backfill less than 10' deep	LF	$305	1986	$606,126	
Remove Old Pipe - 24" thru 36"	LF	$19	84	$1,634	
Connect/Reconnect Pipes at Manholes	EA	$2,000	2	$4,000	
Manhole 84"	EA	$6,219	9	$55,975	
Manhole 108"	EA	$9,453	2	$18,906	
inlet	EA	$728	1	$728	
outfall	EA	$5,000	1	$5,000	
catch basins for new alignments	EA	$728	13	$9,458	
Existing Utility Protection	LF	$4	1986	$7,943	
Miscellaneous Surface Repair	LF	$5	1986	$9,928	
Concrete Lining	LF	$500	15	$7,500	
Mobilization - Percent of Item Cost Sum	%	5%		$36,360	
Contingency - % of construction costs	%	30%		$229,067	
Total Construction Costs					$992,623
Engineering and CMS - % of construction costs	%	20%		$198,525	
Legal, Administration, and Permitting - % of construction costs	%	2%		$19,852	
Total Project Cost (rounded)					*$1,211,000*
AF-3: Harbeck Road, Nebraska Avenue					
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	573	$77,301	
36" Pipe - Excavation, Backfill less than 10' deep	LF	$180	606	$109,316	
Remove Old Pipe - 15" thru 18"	LF	$13	573	$7,421	
Remove Old Pipe - 24" thru 36"	LF	$19	606	$11,788	
Connect/Reconnect Pipes at Manholes	EA	$2,000	3	$6,000	
Manhole 48"	EA	$3,500	2	$7,000	
Manhole 60"	EA	$5,690	1	$5,690	
control structure	EA	$12,000	1	$12,000	
Reconnect Laterals	LF	$17	1179	$20,037	
Existing Utility Protection	LF	$4	1179	$4,715	
Traffic Control	LF	$2	1179	$2,357	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	1179	$62,086	
Mobilization - Percent of Item Cost Sum	%	5%		$16,286	
Contingency - % of construction costs	%	30%		$102,599	
Total Construction Costs					$444,596
Engineering and CMS - % of construction costs	%	20%		$88,919	
Legal, Administration, and Permitting - % of construction costs	%	2%		$8,892	
Total Project Cost (rounded)					*$200,000*
AF-4: Pond Near Calvary Chapel off Harbeck Road					
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	1	$135	
Detention Pond Excavation	CF	$0	567014	$105,003	
outfall	EA	$5,000	1	$5,000	
control structure	EA	$12,000	1	$12,000	
Existing Utility Protection	LF	$4	500	$2,000	
Water Quality Landscaping	SY	$10	14520	$145,200	
Mobilization - Percent of Item Cost Sum	%	5%		$13,467	
Contingency - % of construction costs	%	30%		$84,841	
Total Construction Costs					$367,646
Engineering and CMS - % of construction costs	%	20%		$73,529	
Legal, Administration, and Permitting - % of construction costs	%	2%		$7,353	
Easement Purchase Slough, Field	AC	$60,000	3	$180,000	
Total Project Cost (rounded)					*$629,000*

Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 1A					
AF-5: Grandview Avenue and the Hospital					
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	866	$116,910	
27" Pipe - Excavation, Backfill less than 10' deep	LF	$138	47	$6,480	
30" Pipe - Excavation, Backfill less than 10' deep	LF	$144	338	$48,838	
Remove Old Pipe - 20" thru 21"	LF	$16	256	$4,148	
Remove Old Pipe - 24" thru 36"	LF	$19	129	$2,509	
Connect/Reconnect Pipes at Manholes	EA	$2,000	9	$18,000	
Manhole 48"	EA	$3,500	2	$7,000	
Manhole 60"	EA	$5,690	3	$17,069	
Manhole 96"	EA	$7,627	1	$7,627	
inlet	EA	$728	1	$728	
outfall	EA	$5,000	1	$5,000	
control structure	EA	$12,000	2	$24,000	
catch basins for new alignments	EA	$728	5	$3,638	
Reconnect Laterals	LF	$17	385	$6,545	
Existing Utility Protection	LF	$4	1251	$5,004	
Traffic Control	LF	$2	1251	$2,502	
Flow Split Manhole (Does not include control structures)	LS	$1,000	2	$2,000	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	1251	$65,896	
Mobilization - Percent of Item Cost Sum	%	5%		$17,195	
Contingency - % of construction costs	%	30%		$108,327	
Total Construction Costs					$469,416
Engineering and CMS - % of construction costs	%	20%		$93,883	
Legal, Administration, and Permitting - % of construction costs	%	2%		$9,388	
Easement Purchase Industrial Downtown	AC	$200,000	0	$38,000	
Total Project Cost (rounded)					***$611,000***
AF-7: Lower Parkdale Drive/Highway 199 Trunkline					
54" Pipe - Excavation, Backfill less than 10' deep	LF	$305	685	$209,241	
83"x53" squash pipe- Excavation, Backfill less than 10' deep	LF	$130	419	$54,645	
54" Pipe - Excavation, Backfill 10'-20' deep	LF	$351	337	$118,292	
83"x53" squash pipe- Excavation, Backfill 10'-20' deep	LF	$136	1093	$148,170	
Regrading Channel to Match Proposed Pipes	EA	$1,000	1	$1,000	
Remove Old Pipe - 24" thru 36"	LF	$19	2535	$49,297	
Connect/Reconnect Pipes at Manholes	EA	$2,000	3	$6,000	
Manhole 84"	EA	$6,219	3	$18,658	
Manhole 120"	EA	$11,278	4	$45,113	
outfall	EA	$5,000	1	$5,000	
Reconnect Laterals	LF	$17	2535	$43,088	
Existing Utility Protection	LF	$4	2535	$10,138	
Traffic Control	LF	$2	2535	$5,069	
Full Lane Pavement Repair (8 ft. wide)	LF	$84	2535	$213,613	
Under Highway	LF	$200	137	$27,400	
Mobilization - Percent of Item Cost Sum	%	5%		$47,736	
Contingency - % of construction costs	%	30%		$300,738	
Total Construction Costs					$1,303,200
Engineering and CMS - % of construction costs	%	20%		$260,640	
Legal, Administration, and Permitting - % of construction costs	%	2%		$26,064	
Total Project Cost (rounded)					***$1,590,000***
AF-11: Sugar Beet Line, East Park Street					
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	1078	$107,776	
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	3168	$427,746	
Remove Old Pipe - 15" thru 18"	LF	$13	1078	$13,968	
Remove Old Pipe - 24" thru 36"	LF	$19	3168	$61,627	
Connect/Reconnect Pipes at Manholes	EA	$2,000	1	$2,000	
Manhole 48"	EA	$3,500	3	$10,500	
Manhole 72"	EA	$5,955	1	$5,955	
outfall	EA	$5,000	1	$5,000	
Reconnect Laterals	LF	$17	4246	$72,186	
Existing Utility Protection	LF	$4	4246	$16,985	
Traffic Control	LF	$2	1078	$2,156	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	1078	$56,771	
Miscellaneous Surface Repair	LF	$5	3168	$15,842	
Mobilization - Percent of Item Cost Sum	%	5%		$39,926	
Contingency - % of construction costs	%	30%		$251,531	
Total Construction Costs					$1,089,968
Engineering and CMS - % of construction costs	%	20%		$217,994	
Legal, Administration, and Permitting - % of construction costs	%	2%		$21,799	
Total Project Cost (rounded)					***$1,330,000***

Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 1A					
AF-12: Sunset Way and Tributary Pipes					
15" Pipe - Excavation, Backfill less than 10' deep	LF	$65	374	$24,330	
18" Pipe - Excavation, Backfill less than 10' deep	LF	$75	714	$53,562	
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	472	$47,200	
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	625	$84,434	
36" Pipe - Excavation, Backfill less than 10' deep	LF	$180	382	$68,882	
36" Pipe - Excavation, Backfill 10'-20' deep	LF	$213	466	$99,250	
42" Pipe - Excavation, Backfill 10'-20' deep	LF	$277	396	$109,513	
48" Pipe - Excavation, Backfill 10'-20' deep	LF	$310	630	$195,262	
Remove Old Pipe - 12"	LF	$10	1088	$10,885	
Remove Old Pipe - 15" thru 18"	LF	$13	1007	$13,055	
Remove Old Pipe - 20" thru 21"	LF	$16	464	$7,513	
Remove Old Pipe - 24" thru 36"	LF	$19	466	$9,065	
Connect/Reconnect Pipes at Manholes	EA	$2,000	2	$4,000	
Manhole 48"	EA	$3,500	4	$14,000	
Manhole 60"	EA	$5,690	1	$5,690	
Manhole 72"	EA	$5,955	4	$23,818	
inlet	EA	$728	1	$728	
control structure	EA	$12,000	1	$12,000	
catch basins for new alignments	EA	$728	6	$4,365	
Reconnect Laterals	LF	$17	3025	$51,433	
Existing Utility Protection	LF	$4	4059	$16,237	
Traffic Control	LF	$2	3121	$6,242	
Bore Long Length (>100feet) - incl casing & carrier pipe	LF	$750	360	$270,000	
Flow Split Manhole (Does not include control structures)	LS	$1,000	1	$1,000	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	2882	$151,784	
Full Lane Pavement Repair (8 ft. wide)	LF	$84	464	$39,076	
Controlled Density Backfill	LF	$40	220	$8,800	
Miscellaneous Surface Repair	LF	$5	938	$4,690	
Under Highway	LF	$0	220		
Mobilization - Percent of Item Cost Sum	%	5%		$66,841	
Contingency - % of construction costs	%	30%		$421,096	
Total Construction Costs					$1,824,751
Engineering and CMS - % of construction costs	%	20%		$364,950	
Legal, Administration, and Permitting - % of construction costs	%	2%		$36,495	
Total Project Cost (rounded)					***$2,226,000***
AF-13: Harbeck Road and Southridge Way					
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	896	$89,617	
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	437	$58,946	
27" Pipe - Excavation, Backfill less than 10' deep	LF	$138	61	$8,420	
30" Pipe - Excavation, Backfill less than 10' deep	LF	$144	750	$108,370	
33" Pipe - Excavation, Backfill less than 10' deep	LF	$162	535	$86,881	
Remove Old Pipe - 12"	LF	$10	896	$8,962	
Remove Old Pipe - 15" thru 18"	LF	$13	1187	$15,379	
Remove Old Pipe - 24" thru 36"	LF	$19	483	$9,393	
Connect/Reconnect Pipes at Manholes	EA	$2,000	3	$6,000	
Manhole 48"	EA	$3,500	2	$7,000	
Manhole 60"	EA	$5,690	6	$34,138	
control structure	EA	$12,000	1	$12,000	
Reconnect Laterals	LF	$17	2679	$45,539	
Existing Utility Protection	LF	$4	2679	$10,715	
Traffic Control	LF	$2	2679	$5,358	
Flow Split Manhole (Does not include control structures)	LS	$1,000	1	$1,000	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	2679	$141,104	
Remove Concrete Plug	EA	$1,000	1	$1,000	
Mobilization - Percent of Item Cost Sum	%	5%		$32,491	
Contingency - % of construction costs	%	30%		$204,694	
Total Construction Costs					$887,007
Engineering and CMS - % of construction costs	%	20%		$177,401	
Legal, Administration, and Permitting - % of construction costs	%	2%		$17,740	
Total Project Cost (rounded)					***$1,082,000***

Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 1A					
AF-14: Highway 238					
15" Pipe - Excavation, Backfill less than 10' deep	LF	$65	1082	$70,319	
18" Pipe - Excavation, Backfill less than 10' deep	LF	$75	275	$20,657	
Remove Old Pipe - 4" thru 10"	LF	$10	532	$5,323	
Remove Old Pipe - 12"	LF	$10	825	$8,250	
Connect/Reconnect Pipes at Manholes	EA	$2,000	2	$4,000	
Manhole 48"	EA	$3,500	4	$14,000	
Reconnect Laterals	LF	$17	1357	$23,073	
Existing Utility Protection	LF	$4	1357	$5,429	
Traffic Control	LF	$2	825	$1,650	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	825	$43,456	
Controlled Density Backfill	LF	$40	825	$33,000	
Miscellaneous Surface Repair	LF	$5	532	$2,661	
Under Highway	LF	$200	825	$165,000	
Mobilization - Percent of Item Cost Sum	%	5%		$19,841	
Contingency - % of construction costs	%	30%		$124,998	
Total Construction Costs					$541,657
Engineering and CMS - % of construction costs	%	20%		$108,331	
Legal, Administration, and Permitting - % of construction costs	%	2%		$10,833	
Total Project Cost (rounded)					***$661,000***
AF-15: Main Gravity Canal Spills and Central Parkdale Drive Trunkline					
15" Pipe - Excavation, Backfill less than 10' deep	LF	$65	103	$6,685	
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	188	$18,793	
42" Pipe - Excavation, Backfill less than 10' deep	LF	$221	862	$190,650	
54" Pipe - Excavation, Backfill less than 10' deep	LF	$305	457	$139,502	
Regrading Channel to Match Proposed Pipes	EA	$1,000	1	$1,000	
Remove Old Pipe - 15" thru 18"	LF	$13	222	$2,880	
Remove Old Pipe - 24" thru 36"	LF	$19	457	$8,889	
Connect/Reconnect Pipes at Manholes	EA	$2,000	5	$10,000	
Manhole 48"	EA	$3,500	4	$14,000	
Manhole 60"	EA	$5,690	2	$11,379	
Manhole 72"	EA	$5,955	2	$11,909	
inlet	EA	$728	3	$2,183	
catch basins for new alignments	EA	$728	6	$4,365	
Reconnect Laterals	LF	$17	679	$11,547	
Existing Utility Protection	LF	$4	1610	$6,438	
Traffic Control	LF	$2	1432	$2,863	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	975	$51,339	
Full Lane Pavement Repair (8 ft. wide)	LF	$84	457	$38,517	
Miscellaneous Surface Repair	LF	$5	178	$890	
Mobilization - Percent of Item Cost Sum	%	5%		$26,691	
Contingency - % of construction costs	%	30%		$168,156	
Total Construction Costs					$728,677
Engineering and CMS - % of construction costs	%	20%		$145,735	
Legal, Administration, and Permitting - % of construction costs	%	2%		$14,574	
Total Project Cost (rounded)					***$889,000***
AF-16: Upper Parkdale Drive Trunkline and South Highland Canal Spill					
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	687	$68,700	
30" Pipe - Excavation, Backfill less than 10' deep	LF	$144	308	$44,544	
36" Pipe - Excavation, Backfill less than 10' deep	LF	$180	586	$105,741	
Remove Old Pipe - 15" thru 18"	LF	$13	895	$11,593	
Manhole 48"	EA	$3,500	2	$7,000	
Manhole 60"	EA	$5,690	2	$11,379	
inlet	EA	$728	1	$728	
catch basins for new alignments	EA	$728	4	$2,910	
Reconnect Laterals	LF	$17	895	$15,207	
Existing Utility Protection	LF	$4	1582	$6,326	
Traffic Control	LF	$2	1582	$3,163	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	1582	$83,307	
Mobilization - Percent of Item Cost Sum	%	5%		$18,030	
Contingency - % of construction costs	%	30%		$113,588	
Total Construction Costs					$492,215
Engineering and CMS - % of construction costs	%	20%		$98,443	
Legal, Administration, and Permitting - % of construction costs	%	2%		$9,844	
Total Project Cost (rounded)					***$601,000***

Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 1A					
AF-17: Highways 238/199/99 Intersection Detention					
Detention Pond Excavation	CF	$0	261796	$48,481	
control structure	EA	$12,000	1	$12,000	
Existing Utility Protection	LF	$4	730	$2,920	
Water Quality Landscaping	SY	$10	14520	$145,200	
Mobilization - Percent of Item Cost Sum	%	5%		$10,430	
Contingency - % of construction costs	%	30%		$65,709	
Total Construction Costs					$284,740
Engineering and CMS - % of construction costs	%	20%		$56,948	
Legal, Administration, and Permitting - % of construction costs	%	2%		$5,695	
Easement Purchase Industrial Downtown	AC	20000000%	3	$612,000	
Easement Purchase Slough, Field					
Total Project Cost (rounded)					*$959,000*
AF-18: Union Avenue					
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	1981	$198,103	
Remove Old Pipe - 12"	LF	$10	586	$5,860	
Remove Old Pipe - 15" thru 18"	LF	$13	1395	$18,079	
Connect/Reconnect Pipes at Manholes	EA	$2,000	1	$2,000	
Manhole 48"	EA	$3,500	4	$14,000	
Reconnect Laterals	LF	$17	1981	$33,678	
Existing Utility Protection	LF	$4	1981	$7,924	
Traffic Control	LF	$2	1981	$3,962	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	1981	$104,351	
Mobilization - Percent of Item Cost Sum	%	5%		$19,398	
Contingency - % of construction costs	%	30%		$122,206	
Total Construction Costs					$529,561
Engineering and CMS - % of construction costs	%	20%		$105,912	
Legal, Administration, and Permitting - % of construction costs	%	2%		$10,591	
Total Project Cost (rounded)					*$646,000*
AF-19: Meadow Glen					
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	768	$76,812	
Remove Old Pipe - 12"	LF	$10	768	$7,681	
Manhole 48"	EA	$3,500	2	$7,000	
outfall	EA	$5,000	1	$5,000	
Reconnect Laterals	LF	$17	768	$13,058	
Existing Utility Protection	LF	$4	768	$3,072	
Traffic Control	LF	$2	506	$1,013	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	506	$26,675	
Miscellaneous Surface Repair	LF	$5	262	$1,309	
Mobilization - Percent of Item Cost Sum	%	5%		$7,081	
Contingency - % of construction costs	%	30%		$44,610	
Total Construction Costs					$193,311
Engineering and CMS - % of construction costs	%	20%		$38,662	
Legal, Administration, and Permitting - % of construction costs	%	2%		$3,866	
Total Project Cost (rounded)					*$236,000*
AF-20: Liberty Drive					
27" Pipe - Excavation, Backfill less than 10' deep	LF	$138	1153	$159,023	
Remove Old Pipe - 15" thru 18"	LF	$13	1153	$14,949	
Connect/Reconnect Pipes at Manholes	EA	$2,000	3	$6,000	
Manhole 60"	EA	$5,690	3	$17,069	
Reconnect Laterals	LF	$17	1153	$19,608	
Existing Utility Protection	LF	$4	1153	$4,614	
Traffic Control	LF	$2	1153	$2,307	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	1153	$60,757	
Mobilization - Percent of Item Cost Sum	%	5%		$14,216	
Contingency - % of construction costs	%	30%		$89,563	
Total Construction Costs					$388,107
Engineering and CMS - % of construction costs	%	20%		$77,621	
Legal, Administration, and Permitting - % of construction costs	%	2%		$7,762	
Total Project Cost (rounded)					*$473,000*

Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 1A					
G-1: 5th Street, 6th Street					
18" Pipe - Excavation, Backfill less than 10' deep	LF	$75	278	$20,883	
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	559	$75,498	
27" Pipe - Excavation, Backfill less than 10' deep	LF	$138	529	$72,903	
30" Pipe - Excavation, Backfill less than 10' deep	LF	$144	546	$78,922	
36" Pipe - Excavation, Backfill less than 10' deep	LF	$180	862	$155,487	
18" Pipe - Excavation, Backfill 10'-20' deep	LF	$90	343	$30,900	
36" Pipe - Excavation, Backfill 10'-20' deep	LF	$213	486	$103,532	
Remove Old Pipe - 12"	LF	$10	3604	$36,042	
Connect/Reconnect Pipes at Manholes	EA	$2,000	2	$4,000	
Manhole 48"	EA	$3,500	3	$10,500	
Manhole 60"	EA	$5,690	7	$39,828	
outfall	EA	$5,000	2	$10,000	
Reconnect Laterals	LF	$17	3604	$61,272	
Existing Utility Protection	LF	$4	3604	$14,417	
Traffic Control	LF	$2	3604	$7,208	
Flow Split Manhole (Does not include control structures)	LS	$1,000	1	$1,000	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	3604	$189,852	
Controlled Density Backfill	LF	$40	343	$13,720	
Under Highway	LF	$200	343	$68,600	
Mobilization - Percent of Item Cost Sum	%	5%		$49,728	
Contingency - % of construction costs	%	30%		$313,288	
Total Construction Costs					$1,357,580
Engineering and CMS - % of construction costs	%	20%		$271,516	
Legal, Administration, and Permitting - % of construction costs	%	2%		$27,152	
Total Project Cost (rounded)					*$1,656,000*
G-3: G Street, I Street, Alder Street, L Street					
15" Pipe - Excavation, Backfill less than 10' deep	LF	$65	509	$33,093	
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	315	$42,536	
30" Pipe - Excavation, Backfill less than 10' deep	LF	$144	340	$49,152	
2 ft. x 2 ft. rectangular pipe- Excavation, Backfill less than 10' deep	LF	$248	547	$135,677	
Remove Old Pipe - 12"	LF	$10	509	$5,091	
Remove Old Pipe - 24" thru 36"	LF	$19	1202	$23,382	
Connect/Reconnect Pipes at Manholes	EA	$2,000	5	$10,000	
Manhole 48"	EA	$3,500	5	$17,500	
Manhole 60"	EA	$5,690	2	$11,379	
Reconnect Laterals	LF	$17	1711	$29,092	
Existing Utility Protection	LF	$4	1711	$6,845	
Traffic Control	LF	$2	1711	$3,423	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	1711	$90,142	
Controlled Density Backfill	LF	$40	509	$20,365	
Mobilization - Percent of Item Cost Sum	%	5%		$23,884	
Contingency - % of construction costs	%	30%		$150,469	
Total Construction Costs					$652,031
Engineering and CMS - % of construction costs	%	20%		$130,406	
Legal, Administration, and Permitting - % of construction costs	%	2%		$13,041	
Total Project Cost (rounded)					*$795,000*
G-4: Demoray Canal Spills- Southwest					
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	124	$16,740	
Repair/Raise Ground Elevations (assume 0.5 ft x 1 ft. per LF the entire leng	cf	$0	101	$19	
Remove Old Pipe - 15" thru 18"	LF	$13	120	$1,555	
Remove Old Pipe - 24" thru 36"	LF	$19	851	$16,552	
Connect/Reconnect Pipes at Manholes	EA	$2,000	5	$10,000	
Manhole 48"	EA	$3,500	3	$10,500	
inlet	EA	$728	1	$728	
control structure	EA	$12,000	1	$12,000	
Existing Utility Protection	LF	$4	124	$496	
Traffic Control	LF	$2	124	$248	
Flow Split Manhole (Does not include control structures)	LS	$1,000	1	$1,000	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	124	$6,532	
Mobilization - Percent of Item Cost Sum	%	5%		$3,818	
Contingency - % of construction costs	%	30%		$24,056	
Total Construction Costs					$104,244
Engineering and CMS - % of construction costs	%	20%		$20,849	
Legal, Administration, and Permitting - % of construction costs	%	2%		$2,085	
Total Project Cost (rounded)					*$127,000*

Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 1A					
G-5: Demoray Canal Spills- Central West					
12" Pipe - Excavation, Backfill 10'-20' deep	LF	$70	36	$2,520	
Connect/Reconnect Pipes at Manholes	EA	$2,000	3	$6,000	
Manhole 48"	EA	$3,500	1	$3,500	
outfall	EA	$5,000	1	$5,000	
Existing Utility Protection	LF	$4	36	$144	
Miscellaneous Surface Repair	LF	$5	36	$180	
Mobilization - Percent of Item Cost Sum	%	5%		$867	
Contingency - % of construction costs	%	30%		$5,463	
Total Construction Costs					$23,675
Engineering and CMS - % of construction costs	%	20%		$4,735	
Legal, Administration, and Permitting - % of construction costs	%	2%		$473	
Total Project Cost (rounded)					*$29,000*
G-6: Hilcrest Drive, 6th Street, 7th Street					
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	294	$29,381	
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	30	$4,050	
27" Pipe - Excavation, Backfill less than 10' deep	LF	$138	576	$79,410	
33" Pipe - Excavation, Backfill less than 10' deep	LF	$162	135	$21,966	
42" Pipe - Excavation, Backfill less than 10' deep	LF	$221	68	$14,982	
48" Pipe - Excavation, Backfill less than 10' deep	LF	$253	1252	$316,997	
Remove Old Pipe - 15" thru 18"	LF	$13	294	$3,808	
Remove Old Pipe - 24" thru 36"	LF	$19	1117	$21,735	
Remove Old Pipe - 42" thru 48"	LF	$50	913	$45,778	
Connect/Reconnect Pipes at Manholes	EA	$2,000	12	$24,000	
Manhole 48"	EA	$3,500	3	$10,500	
Manhole 60"	EA	$5,690	3	$17,069	
Manhole 72"	EA	$5,955	2	$11,909	
control structure	EA	$12,000	2	$24,000	
Reconnect Laterals	LF	$17	2324	$39,513	
Existing Utility Protection	LF	$4	2354	$9,417	
Traffic Control	LF	$2	2324	$4,649	
Bore Short Length (<60feet) - incl casing & carrier pipe	LF	$800	150	$120,000	
Flow Split Manhole (Does not include control structures)	LS	$1,000	1	$1,000	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	1005	$52,940	
Full Lane Pavement Repair (8 ft. wide)	LF	$84	1319	$111,188	
Controlled Density Backfill	LF	$40	870	$34,792	
Miscellaneous Surface Repair	LF	$5	30	$150	
Mobilization - Percent of Item Cost Sum	%	5%		$49,962	
Contingency - % of construction costs	%	30%		$314,759	
Total Construction Costs					$1,363,956
Engineering and CMS - % of construction costs	%	20%		$272,791	
Legal, Administration, and Permitting - % of construction costs	%	2%		$27,279	
Total Project Cost (rounded)					*$1,664,000*
G-7: Demoray Spill-South East					
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	13	$1,755	
2 ft. x 3 ft. rectangular pipe- Excavation, Backfill less than 10' deep	LF	$319	77	$24,555	
Open Channel Excavation	CF	$0	3803	$1,409	
Regrading Channel to Match Proposed Pipes	EA	$1,000	2	$2,000	
Remove Old Pipe - 15" thru 18"	LF	$13	415	$5,378	
Remove Old Pipe - 24" thru 36"	LF	$19	13	$253	
Connect/Reconnect Pipes at Manholes	EA	$2,000	2	$4,000	
Manhole 60"	EA	$5,690	1	$5,690	
inlet	EA	$728	3	$2,183	
outfall	EA	$5,000	2	$10,000	
Reconnect Laterals	LF	$17	90	$1,530	
Existing Utility Protection	LF	$4	90	$360	
Traffic Control	LF	$2	77	$154	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	77	$4,056	
Miscellaneous Surface Repair	LF	$5	13	$65	
Mobilization - Percent of Item Cost Sum	%	5%		$3,169	
Contingency - % of construction costs	%	30%		$19,967	
Total Construction Costs					$86,524
Engineering and CMS - % of construction costs	%	20%		$17,305	
Legal, Administration, and Permitting - % of construction costs	%	2%		$1,730	
Total Project Cost (rounded)					*$106,000*

Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 1A					
G-8: Demoray Canal Spills- North Central					
20" Pipe - Excavation, Backfill less than 10' deep	LF	$100	18	$1,800	
30" Pipe - Excavation, Backfill less than 10' deep	LF	$144	1430	$206,579	
Open Channel Excavation	CF	$0	7120	$2,637	
Regrading Channel to Match Proposed Pipes	EA	$1,000	2	$2,000	
Remove Old Pipe - 12"	LF	$10	835	$8,350	
Remove Old Pipe - 20" thru 21"	LF	$16	18	$292	
Remove Old Pipe - 24" thru 36"	LF	$19	294	$5,718	
Connect/Reconnect Pipes at Manholes	EA	$2,000	3	$6,000	
Manhole 48"	EA	$3,500	1	$3,500	
Manhole 60"	EA	$5,690	6	$34,138	
inlet	EA	$728	1	$728	
outfall	EA	$5,000	1	$5,000	
control structure	EA	$12,000	1	$12,000	
catch basins for new alignments	EA	$728	3	$2,183	
Reconnect Laterals	LF	$17	924	$15,703	
Existing Utility Protection	LF	$4	1448	$5,791	
Traffic Control	LF	$2	818	$1,636	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	818	$43,088	
Controlled Density Backfill	LF	$40	233	$9,320	
Miscellaneous Surface Repair	LF	$5	630	$3,149	
Under Interstate Freeway	LF	$500	233	$116,500	
Mobilization - Percent of Item Cost Sum	%	5%		$24,306	
Contingency - % of construction costs	%	30%		$153,125	
Total Construction Costs					$663,542
Engineering and CMS - % of construction costs	%	20%		$132,708	
Legal, Administration, and Permitting - % of construction costs	%	2%		$13,271	
Total Project Cost (rounded)					***$810,000***
G-9: Demoray Canal Spills- Northwest					
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	964	$130,158	
36" Pipe - Excavation, Backfill less than 10' deep	LF	$180	125	$22,546	
1 ft. x 1 ft. rectangular pipe- Excavation, Backfill less than 10' deep	LF	$136	47	$6,385	
Regrading Channel to Match Proposed Pipes	EA	$1,000	1	$1,000	
Repair/Raise Ground Elevations (assume 0.5 ft x 1 ft. per LF the entire leng	cf	$0	355	$66	
Remove Old Pipe - 15" thru 18"	LF	$13	295	$3,827	
Remove Old Pipe - 24" thru 36"	LF	$19	165	$3,209	
Connect/Reconnect Pipes at Manholes	EA	$2,000	5	$10,000	
Manhole 48"	EA	$3,500	3	$10,500	
Manhole 60"	EA	$5,690	2	$11,379	
inlet	EA	$728	3	$2,183	
outfall	EA	$5,000	2	$10,000	
control structure	EA	$12,000	2	$24,000	
catch basins for new alignments	EA	$728	4	$2,910	
Reconnect Laterals	LF	$17	420	$7,145	
Existing Utility Protection	LF	$4	1136	$4,545	
Traffic Control	LF	$2	420	$841	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	420	$22,139	
Miscellaneous Surface Repair	LF	$5	716	$3,579	
Mobilization - Percent of Item Cost Sum	%	5%		$13,821	
Contingency - % of construction costs	%	30%		$87,070	
Total Construction Costs					$377,302
Engineering and CMS - % of construction costs	%	20%		$75,460	
Legal, Administration, and Permitting - % of construction costs	%	2%		$7,546	
Total Project Cost (rounded)					***$460,000***
G-10: Demoray Canal Spills- Northeast					
Open Channel Excavation	CF	$0	8833	$3,271	
Repair/Raise Ground Elevations (assume 0.5 ft x 1 ft. per LF the entire leng	cf	$0	330	$61	
Remove Old Pipe - 24" thru 36"	LF	$19	289	$5,621	
control structure	EA	$12,000	1	$12,000	
Concrete Lining	LF	$500	484	$242,000	
Mobilization - Percent of Item Cost Sum	%	5%		$13,148	
Contingency - % of construction costs	%	30%		$82,830	
Total Construction Costs					$358,932
Engineering and CMS - % of construction costs	%	20%		$71,786	
Legal, Administration, and Permitting - % of construction costs	%	2%		$7,179	
Total Project Cost (rounded)					***$438,000***

Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 1A					
S-1: Trunkline from South Main Canal to River along Dowell Road					
48" Pipe - Excavation, Backfill less than 10' deep	LF	$253	1494	$378,519	
60" Pipe - Excavation, Backfill less than 10' deep	LF	$357	2250	$803,563	
72" Pipe - Excavation, Backfill less than 10' deep	LF	$490	338	$165,471	
Regrading Channel to Match Proposed Pipes	EA	$1,000	1	$1,000	
Remove Old Pipe - 4" thru 10"	LF	$10	203	$2,028	
Remove Old Pipe - 12"	LF	$10	204	$2,040	
Remove Old Pipe - 15" thru 18"	LF	$13	699	$9,055	
Remove Old Pipe - 20" thru 21"	LF	$16	389	$6,304	
Remove Old Pipe - 24" thru 36"	LF	$19	1818	$35,360	
Connect/Reconnect Pipes at Manholes	EA	$2,000	2	$4,000	
Manhole 72"	EA	$5,955	4	$23,818	
Manhole 84"	EA	$6,219	2	$12,439	
Manhole 96"	EA	$7,627	1	$7,627	
inlet	EA	$728	1	$728	
outfall	EA	$5,000	1	$5,000	
Reconnect Laterals	LF	$17	4082	$69,393	
Existing Utility Protection	LF	$4	4082	$16,328	
Traffic Control	LF	$2	3541	$7,082	
Bore Long Length (>100feet) - incl casing & carrier pipe	LF	$750	203	$152,250	
Flow Split Manhole (Does not include control structures)	LS	$1,000	1	$1,000	
Full Lane Pavement Repair (8 ft. wide)	LF	$84	3541	$298,452	
Miscellaneous Surface Repair	LF	$5	338	$1,690	
Under Highway	LF	$200	203	$40,600	
Permit for Work in River	EA	$5,000	1	$5,000	
Mobilization - Percent of Item Cost Sum	%	5%		$102,437	
Contingency - % of construction costs	%	30%		$645,355	
Total Construction Costs					$2,796,540
Engineering and CMS - % of construction costs	%	20%		$559,308	
Legal, Administration, and Permitting - % of construction costs	%	2%		$55,931	
Total Project Cost (rounded)					*$3,412,000*
S-2: Flow-split Kellenback Avenue to Dowell Road					
18" Pipe - Excavation, Backfill less than 10' deep	LF	$75	205	$15,375	
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	1374	$137,360	
30" Pipe - Excavation, Backfill less than 10' deep	LF	$144	485	$70,121	
Remove Old Pipe - 15" thru 18"	LF	$13	1197	$15,513	
Connect/Reconnect Pipes at Manholes	EA	$2,000	2	$4,000	
Manhole 48"	EA	$3,500	6	$21,000	
Manhole 60"	EA	$5,690	1	$5,690	
catch basins for new alignments	EA	$728	5	$3,638	
Reconnect Laterals	LF	$17	1197	$20,349	
Existing Utility Protection	LF	$4	2064	$8,256	
Traffic Control	LF	$2	2064	$4,128	
Flow Split Manhole (Does not include control structures)	LS	$1,000	1	$1,000	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	2064	$108,716	
Mobilization - Percent of Item Cost Sum	%	5%		$20,757	
Contingency - % of construction costs	%	30%		$130,771	
Total Construction Costs					$566,673
Engineering and CMS - % of construction costs	%	20%		$113,335	
Legal, Administration, and Permitting - % of construction costs	%	2%		$11,333	
Total Project Cost (rounded)					*$691,000*
S-3: Expansion of South Main Canal					
3ft.x 6ft. Rectangular Pecast Pipe- Excavation, Backfill less than 10' deep	LF	$530	506	$267,978	
3ft.x9ft. Rectangular pipe -two parallel barrels- Excavation, Backfill less tha	LF	$1,345	7	$9,415	
3ft.x10ft. Rectangular pipe -two parallel barrels- Excavation, Backfill less th	LF	$1,786	4	$7,142	
Regrading Channel to Match Proposed Pipes	EA	$1,000	1	$1,000	
Repair/Raise Ground Elevations (assume 0.5 ft x 1 ft. per LF the entire leng	cf	$0	595	$111	
Remove Old Pipe - 42" thru 48"	LF	$50	506	$25,371	
Reconnect Laterals	LF	$17	506	$8,602	
Existing Utility Protection	LF	$4	517	$2,068	
Traffic Control	LF	$2	517	$1,034	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	506	$26,654	
Full Lane Pavement Repair (8 ft. wide)	LF	$84	11	$927	
0	0	$0	8		
Mobilization - Percent of Item Cost Sum	%	5%		$17,515	
Contingency - % of construction costs	%	30%		$110,345	
Total Construction Costs					$478,162
Engineering and CMS - % of construction costs	%	20%		$95,632	
Legal, Administration, and Permitting - % of construction costs	%	2%		$9,563	
Total Project Cost (rounded)					*$583,000*

Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 1A					
S-6: Leonard Road to Ditch					
27" Pipe - Excavation, Backfill less than 10' deep	LF	$138	607	$83,645	
36" parallel pipes (3)- Excavation, Backfill less than 10' deep	LF	$541	714	$386,354	
Regrading Channel to Match Proposed Pipes	EA	$1,000	2	$2,000	
Remove Old Pipe - 20" thru 21"	LF	$16	607	$9,832	
Manhole 60"	EA	$5,690	1	$5,690	
outfall	EA	$5,000	1	$5,000	
control structure	EA	$12,000	1	$12,000	
Reconnect Laterals	LF	$17	607	$10,314	
Existing Utility Protection	LF	$4	1321	$5,283	
Traffic Control	LF	$2	607	$1,213	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	607	$31,958	
Miscellaneous Surface Repair	LF	$5	607	$3,034	
Mobilization - Percent of Item Cost Sum	%	5%		$27,816	
Contingency - % of construction costs	%	30%		$175,241	
Total Construction Costs					$759,380
Engineering and CMS - % of construction costs	%	20%		$151,876	
Legal, Administration, and Permitting - % of construction costs	%	2%		$15,188	
Total Project Cost (rounded)					***$926,000***
S-7: Willow Lane to Ditch					
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	40	$4,000	
28" Pipe - Excavation, Backfill less than 10' deep	LF	$144	16	$2,312	
Open Channel Excavation	CF	$0	22560	$8,356	
Regrading Channel to Match Proposed Pipes	EA	$1,000	2	$2,000	
Repair/Raise Ground Elevations (assume 0.5 ft x 1 ft. per LF the entire leng	cf	$0	100	$19	
Remove Old Pipe - 15" thru 18"	LF	$13	135	$1,750	
Remove Old Pipe - 24" thru 36"	LF	$19	271	$5,271	
inlet	EA	$728	2	$1,455	
outfall	EA	$5,000	2	$10,000	
Reconnect Laterals	LF	$17	56	$952	
Existing Utility Protection	LF	$4	56	$224	
Miscellaneous Surface Repair	LF	$5	56	$280	
Mobilization - Percent of Item Cost Sum	%	5%		$1,831	
Contingency - % of construction costs	%	30%		$11,535	
Total Construction Costs					$49,983
Engineering and CMS - % of construction costs	%	20%		$9,997	
Legal, Administration, and Permitting - % of construction costs	%	2%		$1,000	
Total Project Cost (rounded)					***$975,000***
S-8: Willow Court, Estates Lane					
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	844	$113,952	
27" Pipe - Excavation, Backfill less than 10' deep	LF	$138	498	$68,673	
30" Pipe - Excavation, Backfill less than 10' deep	LF	$144	414	$59,819	
Remove Old Pipe - 12"	LF	$10	418	$4,181	
Remove Old Pipe - 15" thru 18"	LF	$13	494	$6,402	
Connect/Reconnect Pipes at Manholes	EA	$2,000	3	$6,000	
Manhole 48"	EA	$3,500	3	$10,500	
Manhole 60"	EA	$5,690	3	$17,069	
Manhole 108"	EA	$9,453	1	$9,453	
catch basins for new alignments	EA	$728	5	$3,638	
Reconnect Laterals	LF	$17	912	$15,506	
Existing Utility Protection	LF	$4	1756	$7,025	
Traffic Control	LF	$2	1756	$3,512	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	1756	$92,507	
Mobilization - Percent of Item Cost Sum	%	5%		$20,912	
Contingency - % of construction costs	%	30%		$131,745	
Total Construction Costs					$570,893
Engineering and CMS - % of construction costs	%	20%		$114,179	
Legal, Administration, and Permitting - % of construction costs	%	2%		$11,418	
Total Project Cost (rounded)					***$696,000***

Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 1A					
S-10: Kokanee Lane, Leonard Road					
18" Pipe - Excavation, Backfill less than 10' deep	LF	$75	818	$61,346	
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	520	$70,200	
30" Pipe - Excavation, Backfill less than 10' deep	LF	$144	346	$49,965	
36" Pipe - Excavation, Backfill less than 10' deep	LF	$180	2061	$371,744	
42" Pipe - Excavation, Backfill less than 10' deep	LF	$221	69	$15,220	
Remove Old Pipe - 12"	LF	$10	446	$4,459	
Remove Old Pipe - 15" thru 18"	LF	$13	1841	$23,857	
Remove Old Pipe - 24" thru 36"	LF	$19	1155	$22,461	
Connect/Reconnect Pipes at Manholes	EA	$2,000	5	$10,000	
Manhole 48"	EA	$3,500	3	$10,500	
Manhole 60"	EA	$5,690	2	$11,379	
Manhole 84"	EA	$6,219	3	$18,658	
control structure	EA	$12,000	1	$12,000	
catch basins for new alignments	EA	$728	2	$1,455	
Reconnect Laterals	LF	$17	3442	$58,506	
Existing Utility Protection	LF	$4	3814	$15,254	
Traffic Control	LF	$2	3814	$7,627	
Flow Split Manhole (Does not include control structures)	LS	$1,000	1	$1,000	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	3745	$197,255	
Full Lane Pavement Repair (8 ft. wide)	LF	$84	69	$5,798	
Mobilization - Percent of Item Cost Sum	%	5%		$48,434	
Contingency - % of construction costs	%	30%		$305,136	
Total Construction Costs					$1,322,256
Engineering and CMS - % of construction costs	%	20%		$264,451	
Legal, Administration, and Permitting - % of construction costs	%	2%		$26,445	
Total Project Cost (rounded)					***$1,613,000***
S-12: Rainwood Lane to Leonard Road					
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	445	$60,129	
Remove Old Pipe - 12"	LF	$10	445	$4,454	
Manhole 48"	EA	$3,500	1	$3,500	
outfall	EA	$5,000	1	$5,000	
Reconnect Laterals	LF	$17	445	$7,572	
Existing Utility Protection	LF	$4	445	$1,782	
Miscellaneous Surface Repair	LF	$5	445	$2,227	
Mobilization - Percent of Item Cost Sum	%	5%		$4,233	
Contingency - % of construction costs	%	30%		$26,669	
Total Construction Costs					$115,566
Engineering and CMS - % of construction costs	%	20%		$23,113	
Legal, Administration, and Permitting - % of construction costs	%	2%		$2,311	
Total Project Cost (rounded)					***$141,000***
S-13: ODOT Pond South of Redwood Highway					
42" Pipe - Excavation, Backfill less than 10' deep	LF	$221	2389	$528,507	
Manhole 60"	EA	$5,690	8	$45,518	
control structure	EA	$12,000	1	$12,000	
catch basins for new alignments	EA	$728	15	$10,913	
Existing Utility Protection	LF	$4	2389	$9,556	
Traffic Control	LF	$2	2389	$4,778	
Full Lane Pavement Repair (8 ft. wide)	LF	$84	2389	$201,345	
Mobilization - Percent of Item Cost Sum	%	5%		$40,631	
Contingency - % of construction costs	%	30%		$255,974	
Total Construction Costs					$1,109,222
Engineering and CMS - % of construction costs	%	20%		$221,844	
Legal, Administration, and Permitting - % of construction costs	%	2%		$22,184	
Total Project Cost (rounded)					***$1,353,000***
S-14: New Flow Diversion to Sand Creek at I-5					
18" Pipe - Excavation, Backfill less than 10' deep	LF	$75	771	$57,825	
Open Channel Excavation	CF	$0	14942	$5,534	
Remove Old Pipe - 4" thru 10"	LF	$10	771	$7,710	
Manhole 48"	EA	$3,500	1	$3,500	
outfall	EA	$5,000	1	$5,000	
Reconnect Laterals	LF	$17	771	$13,107	
Existing Utility Protection	LF	$4	771	$3,084	
Flow Split Manhole (Does not include control structures)	LS	$1,000	1	$1,000	
Miscellaneous Surface Repair	LF	$5	771	$3,855	
Mobilization - Percent of Item Cost Sum	%	5%		$5,031	
Contingency - % of construction costs	%	30%		$31,694	
Total Construction Costs					$137,340
Engineering and CMS - % of construction costs	%	20%		$27,468	
Legal, Administration, and Permitting - % of construction costs	%	2%		$2,747	
Total Project Cost (rounded)					***$168,000***

Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 1A					
S-15: Yellowtail Lane to Mary Lynn Lane					
18" Pipe - Excavation, Backfill less than 10' deep	LF	$75	224	$16,829	
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	825	$111,393	
Remove Old Pipe - 12"	LF	$10	224	$2,244	
Remove Old Pipe - 15" thru 18"	LF	$13	825	$10,694	
Connect/Reconnect Pipes at Manholes	EA	$2,000	2	$4,000	
Manhole 48"	EA	$3,500	5	$17,500	
Reconnect Laterals	LF	$17	1050	$17,842	
Existing Utility Protection	LF	$4	1050	$4,198	
Traffic Control	LF	$2	916	$1,831	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	916	$48,229	
Miscellaneous Surface Repair	LF	$5	134	$670	
Mobilization - Percent of Item Cost Sum	%	5%		$11,771	
Contingency - % of construction costs	%	30%		$74,160	
Total Construction Costs					$321,359
Engineering and CMS - % of construction costs	%	20%		$64,272	
Legal, Administration, and Permitting - % of construction costs	%	2%		$6,427	
Total Project Cost (rounded)					*$392,000*
S-16: Darnelle Lane					
42" parallel pipes (2)- Excavation, Backfill less than 10' deep	LF	$442	1159	$512,845	
Connect/Reconnect Pipes at Manholes	EA	$2,000	2	$4,000	
Manhole 84"	EA	$6,219	3	$18,658	
Manhole 120"	EA	$11,278	1	$11,278	
control structure	EA	$12,000	1	$12,000	
Reconnect Laterals	LF	$17	1159	$19,705	
Existing Utility Protection	LF	$4	1159	$4,636	
Traffic Control	LF	$2	1159	$2,318	
Full Lane Pavement Repair (8 ft. wide)	LF	$84	1159	$97,689	
Mobilization - Percent of Item Cost Sum	%	5%		$34,156	
Contingency - % of construction costs	%	30%		$215,186	
Total Construction Costs					$932,472
Engineering and CMS - % of construction costs	%	20%		$186,494	
Legal, Administration, and Permitting - % of construction costs	%	2%		$18,649	
Total Project Cost (rounded)					*$1,138,000*
SJ-10: Channel Northwest of Dewey Drive and 10th Street					
Open Channel Excavation	CF	$0	120	$44	
Reconnect Laterals	LF	$17	120	$2,043	
Mobilization - Percent of Item Cost Sum	%	5%		$104	
Contingency - % of construction costs	%	30%		$658	
Total Construction Costs					$2,849
Engineering and CMS - % of construction costs	%	20%		$570	
Legal, Administration, and Permitting - % of construction costs	%	2%		$57	
Total Project Cost (rounded)					*$3,000*
				Total Priority 1A Cost (rounded)	**$31,891,000**

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Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 1B					
AF-6: West Park Street, Josephine County Yard, Tussing Park					
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	371	$37,098	
30" Pipe - Excavation, Backfill less than 10' deep	LF	$144	625	$90,335	
36" Pipe - Excavation, Backfill less than 10' deep	LF	$180	111	$19,990	
Remove Old Pipe - 12"	LF	$10	625	$6,252	
Remove Old Pipe - 15" thru 18"	LF	$13	371	$4,808	
Connect/Reconnect Pipes at Manholes	EA	$2,000	5	$10,000	
Manhole 48"	EA	$3,500	2	$7,000	
Manhole 60"	EA	$5,690	2	$11,379	
inlet	EA	$728	1	$728	
outfall	EA	$5,000	1	$5,000	
Reconnect Laterals	LF	$17	996	$16,935	
Existing Utility Protection	LF	$4	1107	$4,428	
Traffic Control	LF	$2	482	$964	
Flow Split Manhole (Does not include control structures)	LS	$1,000	1	$1,000	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	482	$25,379	
Miscellaneous Surface Repair	LF	$5	625	$3,126	
Mobilization - Percent of Item Cost Sum	%	5%		$12,221	
Contingency - % of construction costs	%	30%		$76,993	
Total Construction Costs					$333,636
Engineering and CMS - % of construction costs	%	20%		$66,727	
Legal, Administration, and Permitting - % of construction costs	%	2%		$6,673	
Total Project Cost (rounded)					***$407,000***
S-4: Redwood Circle to River					
20" Pipe - Excavation, Backfill less than 10' deep	LF	$100	213	$21,320	
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	1218	$164,430	
27" Pipe - Excavation, Backfill less than 10' deep	LF	$138	132	$18,144	
20x28" squash pipe- Excavation, Backfill less than 10' deep	LF	$69	213	$14,613	
Remove Old Pipe - 15" thru 18"	LF	$13	789	$10,225	
Remove Old Pipe - 20" thru 21"	LF	$16	429	$6,952	
Connect/Reconnect Pipes at Manholes	EA	$2,000	4	$8,000	
Manhole 48"	EA	$3,500	3	$10,500	
Manhole 60"	EA	$5,690	3	$17,069	
Reconnect Laterals	LF	$17	1776	$30,192	
Existing Utility Protection	LF	$4	1776	$7,104	
Traffic Control	LF	$2	1218	$2,436	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	1218	$64,158	
Controlled Density Backfill	LF	$40	213	$8,528	
Miscellaneous Surface Repair	LF	$5	345	$1,724	
Permit for Work in River	EA	$5,000	1	$5,000	
Mobilization - Percent of Item Cost Sum	%	5%		$19,520	
Contingency - % of construction costs	%	30%		$122,974	
Total Construction Costs					$532,889
Engineering and CMS - % of construction costs	%	20%		$106,578	
Legal, Administration, and Permitting - % of construction costs	%	2%		$10,658	
Total Project Cost (rounded)					***$650,000***

Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 1B					
SJ-1: F Street					
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	624	$84,233	
33" Pipe - Excavation, Backfill less than 10' deep	LF	$162	980	$159,171	
36" Pipe - Excavation, Backfill less than 10' deep	LF	$180	502	$90,469	
42" Pipe - Excavation, Backfill less than 10' deep	LF	$221	850	$188,088	
48" Pipe - Excavation, Backfill less than 10' deep	LF	$253	126	$32,008	
24" Pipe - Excavation, Backfill 10'-20' deep	LF	$150	636	$95,469	
Remove Old Pipe - 24" thru 36"	LF	$19	1942	$37,775	
Remove Old Pipe - 42" thru 48"	LF	$50	516	$25,868	
Connect/Reconnect Pipes at Manholes	EA	$2,000	3	$6,000	
Manhole 48"	EA	$3,500	5	$17,500	
Manhole 60"	EA	$5,690	6	$34,138	
Manhole 72"	EA	$5,955	2	$11,909	
outfall	EA	$5,000	1	$5,000	
control structure	EA	$12,000	1	$12,000	
catch basins for new alignments	EA	$728	8	$5,820	
Reconnect Laterals	LF	$17	2458	$41,787	
Existing Utility Protection	LF	$4	3718	$14,874	
Traffic Control	LF	$2	3718	$7,437	
Flow Split Manhole (Does not include control structures)	LS	$1,000	2	$2,000	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	2742	$144,430	
Full Lane Pavement Repair (8 ft. wide)	LF	$84	977	$82,306	
Mobilization - Percent of Item Cost Sum	%	5%		$54,914	
Contingency - % of construction costs	%	30%		$345,959	
Total Construction Costs					$1,499,155
Engineering and CMS - % of construction costs	%	20%		$299,831	
Legal, Administration, and Permitting - % of construction costs	%	2%		$29,983	
Total Project Cost (rounded)					***$1,829,000***
SJ-8: Spill Northwest of I-5 and Hilcrest Drive to 7th Street					
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	596	$59,634	
27" Pipe - Excavation, Backfill less than 10' deep	LF	$138	288	$39,677	
Remove Old Pipe - 15" thru 18"	LF	$13	884	$11,458	
Connect/Reconnect Pipes at Manholes	EA	$2,000	3	$6,000	
Manhole 48"	EA	$3,500	1	$3,500	
Manhole 60"	EA	$5,690	3	$17,069	
inlet	EA	$728	1	$728	
control structure	EA	$12,000	2	$24,000	
Reconnect Laterals	LF	$17	884	$15,030	
Existing Utility Protection	LF	$4	884	$3,537	
Traffic Control	LF	$2	2370	$4,741	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	884	$46,572	
Mobilization - Percent of Item Cost Sum	%	5%		$11,597	
Contingency - % of construction costs	%	30%		$73,063	
Total Construction Costs					$316,606
Engineering and CMS - % of construction costs	%	20%		$63,321	
Legal, Administration, and Permitting - % of construction costs	%	2%		$6,332	
Total Project Cost (rounded)					***$386,000***
SJ-11: Rogue Drive Trunkline					
48" Pipe - Excavation, Backfill less than 10' deep	LF	$253	1219	$308,710	
54" Pipe - Excavation, Backfill less than 10' deep	LF	$305	1798	$548,726	
48" Pipe - Excavation, Backfill 10'-20' deep	LF	$310	660	$204,633	
Remove Old Pipe - 24" thru 36"	LF	$19	2047	$39,813	
Connect/Reconnect Pipes at Manholes	EA	$2,000	5	$10,000	
Manhole 72"	EA	$5,955	6	$35,727	
Manhole 84"	EA	$6,219	5	$31,097	
outfall	EA	$5,000	1	$5,000	
control structure	EA	$12,000	1	$12,000	
catch basins for new alignments	EA	$728	10	$7,275	
Reconnect Laterals	LF	$17	2047	$34,798	
Existing Utility Protection	LF	$4	3676	$14,706	
Traffic Control	LF	$2	3676	$7,353	
Bore Long Length (>100feet) - incl casing & carrier pipe	LF	$750	250	$187,500	
Flow Split Manhole (Does not include control structures)	LS	$1,000	2	$2,000	
Full Lane Pavement Repair (8 ft. wide)	LF	$84	3676	$309,852	
Permit for Work in River	EA	$5,000	1	$5,000	
Mobilization - Percent of Item Cost Sum	%	5%		$88,210	
Contingency - % of construction costs	%	30%		$555,720	
Total Construction Costs					$2,408,120
Engineering and CMS - % of construction costs	%	20%		$481,624	
Legal, Administration, and Permitting - % of construction costs	%	2%		$48,162	
Total Project Cost (rounded)					***$2,938,000***

Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 1B					
SJ-12: M Street					
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	386	$52,065	
30" Pipe - Excavation, Backfill less than 10' deep	LF	$144	891	$128,694	
Remove Old Pipe - 15" thru 18"	LF	$13	386	$4,998	
Remove Old Pipe - 24" thru 36"	LF	$19	891	$17,324	
Connect/Reconnect Pipes at Manholes	EA	$2,000	3	$6,000	
Manhole 48"	EA	$3,500	2	$7,000	
Manhole 60"	EA	$5,690	1	$5,690	
outfall	EA	$5,000	1	$5,000	
Reconnect Laterals	LF	$17	1276	$21,698	
Existing Utility Protection	LF	$4	1276	$5,105	
Traffic Control	LF	$2	1276	$2,553	
Bore Long Length (>100feet) - incl casing & carrier pipe	LF	$750	150	$112,500	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	1276	$67,231	
Under Highway	LF	$200	100	$20,000	
Mobilization - Percent of Item Cost Sum	%	5%		$22,793	
Contingency - % of construction costs	%	30%		$143,595	
Total Construction Costs					$622,246
Engineering and CMS - % of construction costs	%	20%		$124,449	
Legal, Administration, and Permitting - % of construction costs	%	2%		$12,445	
Total Project Cost (rounded)					***$759,000***
SJ-13: A Street-West					
3ft.x 5ft. Rectangular Pecast Pipe- Excavation, Backfill less than 10' deep	LF	$441	1133	$499,969	
Connect/Reconnect Pipes at Manholes	EA	$2,000	4	$8,000	
control structure	EA	$12,000	5	$60,000	
catch basins for new alignments	EA	$728	7	$5,093	
Existing Utility Protection	LF	$4	1133	$4,531	
Traffic Control	LF	$2	1133	$2,266	
Flow Split Manhole (Does not include control structures)	LS	$1,000	1	$1,000	
Full Lane Pavement Repair (8 ft. wide)	LF	$84	1133	$95,477	
Mobilization - Percent of Item Cost Sum	%	5%		$33,817	
Contingency - % of construction costs	%	30%		$213,046	
Total Construction Costs					$923,199
Engineering and CMS - % of construction costs	%	20%		$184,640	
Legal, Administration, and Permitting - % of construction costs	%	2%		$18,464	
Total Project Cost (rounded)					***$1,126,000***
				Total Priority 1B Cost (rounded)	**$7,445,000**

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Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 2A					
G-2: 9th Street					
18" Pipe - Excavation, Backfill less than 10' deep	LF	$75	837	$62,769	
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	629	$62,902	
Remove Old Pipe - 12"	LF	$10	281	$2,807	
Remove Old Pipe - 15" thru 18"	LF	$13	1185	$15,360	
Connect/Reconnect Pipes at Manholes	EA	$2,000	1	$2,000	
Manhole 48"	EA	$3,500	5	$17,500	
Reconnect Laterals	LF	$17	1466	$24,921	
Existing Utility Protection	LF	$4	1466	$5,864	
Traffic Control	LF	$2	1466	$2,932	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	1466	$77,219	
Mobilization - Percent of Item Cost Sum	%	5%		$13,714	
Contingency - % of construction costs	%	30%		$86,397	
Total Construction Costs					$374,386
Engineering and CMS - % of construction costs	%	20%		$74,877	
Legal, Administration, and Permitting - % of construction costs	%	2%		$7,488	
Total Project Cost (rounded)					***$457,000***
SJ-7: Demoray Canal					
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	40	$4,000	
28" Pipe - Excavation, Backfill less than 10' deep	LF	$144	16	$2,312	
Open Channel Excavation	CF	$0	22560	$8,356	
Regrading Channel to Match Proposed Pipes	EA	$1,000	2	$2,000	
Repair/Raise Ground Elevations (assume 0.5 ft x 1 ft. per LF the entire lengt	cf	$0	100	$19	
Remove Old Pipe - 15" thru 18"	LF	$13	135	$1,750	
Remove Old Pipe - 24" thru 36"	LF	$19	271	$5,271	
inlet	EA	$728	2	$1,455	
outfall	EA	$5,000	2	$10,000	
Reconnect Laterals	LF	$17	56	$952	
Existing Utility Protection	LF	$4	56	$224	
Miscellaneous Surface Repair	LF	$5	56	$280	
Mobilization - Percent of Item Cost Sum	%	5%		$1,831	
Contingency - % of construction costs	%	30%		$11,535	
Total Construction Costs					$49,983
Engineering and CMS - % of construction costs	%	20%		$9,997	
Legal, Administration, and Permitting - % of construction costs	%	2%		$1,000	
Total Project Cost (rounded)					***$371,000***
				Total Priority 2A Cost (rounded)	**$1,168,000**

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Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 2B					
SJ-2: D Street					
18" Pipe - Excavation, Backfill less than 10' deep	LF	$75	751	$56,333	
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	770	$77,005	
24" Pipe - Excavation, Backfill less than 10' deep	LF	$135	52	$7,020	
30" Pipe - Excavation, Backfill less than 10' deep	LF	$144	1776	$256,599	
36" Pipe - Excavation, Backfill less than 10' deep	LF	$180	274	$49,461	
38"x60" squash pipe- Excavation, Backfill less than 10' deep	LF	$352	903	$318,083	
Remove Old Pipe - 4" thru 10"	LF	$10	52	$520	
Remove Old Pipe - 12"	LF	$10	719	$7,189	
Remove Old Pipe - 15" thru 18"	LF	$13	1572	$20,378	
Remove Old Pipe - 24" thru 36"	LF	$19	1280	$24,897	
Remove Old Pipe - 42" thru 48"	LF	$50	902	$45,226	
Connect/Reconnect Pipes at Manholes	EA	$2,000	1	$2,000	
Manhole 48"	EA	$3,500	4	$14,000	
Manhole 60"	EA	$5,690	7	$39,828	
Manhole 72"	EA	$5,955	1	$5,955	
Manhole 84"	EA	$6,219	1	$6,219	
Manhole 96"	EA	$7,627	1	$7,627	
Reconnect Laterals	LF	$17	4526	$76,944	
Existing Utility Protection	LF	$4	4526	$18,105	
Traffic Control	LF	$2	4526	$9,052	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	3623	$190,856	
Full Lane Pavement Repair (8 ft. wide)	LF	$84	903	$76,094	
Mobilization - Percent of Item Cost Sum	%	5%		$65,470	
Contingency - % of construction costs	%	30%		$412,459	
Total Construction Costs					$1,787,320
Engineering and CMS - % of construction costs	%	20%		$357,464	
Legal, Administration, and Permitting - % of construction costs	%	2%		$35,746	
Total Project Cost (rounded)					***$2,181,000***
			Total Priority 2B Cost (		**$2,181,000**

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Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 3A					
AF-8: Haviland Drive and Grandview Avenue					
Open Channel Excavation	CF	$0.37	4312	$1,597	
Repair/Raise Ground Elevations (assume 0.5 ft x 1 ft. per LF the entire lengt	cf	$0.19	97	$18	
Mobilization - Percent of Item Cost Sum	%	5%		$81	
Contingency - % of construction costs	%	30%		$509	
Total Construction Costs					$2,205
Engineering and CMS - % of construction costs	%	20%		$441	
Legal, Administration, and Permitting - % of construction costs	%	2%		$44	
Total Project Cost (rounded)					*$3,000*
AF-10: Canal spill East of UGB					
30" Pipe - Excavation, Backfill 10'-20' deep	LF	$176	786	$138,037	
Manhole 48"	EA	$3,500	2	$7,000	
inlet	EA	$728	1	$728	
outfall	EA	$5,000	1	$5,000	
catch basins for new alignments	EA	$728	5	$3,638	
Existing Utility Protection	LF	$4	786	$3,143	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	60	$3,161	
Controlled Density Backfill	LF	$40	60	$2,400	
Miscellaneous Surface Repair	LF	$5	726	$3,630	
Under Highway	LF	$200	60	$12,000	
Permit for Work in River	EA	$5,000	1	$5,000	
Mobilization - Percent of Item Cost Sum	%	5%		$9,187	
Contingency - % of construction costs	%	30%		$57,877	
Total Construction Costs					$250,799
Engineering and CMS - % of construction costs	%	20%		$50,160	
Legal, Administration, and Permitting - % of construction costs	%	2%		$5,016	
Total Project Cost (rounded)					*$306,000*
S-5: Mesman Drive to River					
36" Pipe - Excavation, Backfill less than 10' deep	LF	$180	559	$100,881	
Remove Old Pipe - 24" thru 36"	LF	$19	559	$10,878	
Connect/Reconnect Pipes at Manholes	EA	$2,000	1	$2,000	
Manhole 60"	EA	$5,690	1	$5,690	
outfall	EA	$5,000	1	$5,000	
Reconnect Laterals	LF	$17	559	$9,508	
Existing Utility Protection	LF	$4	559	$2,237	
Miscellaneous Surface Repair	LF	$5	559	$2,797	
Permit for Work in River	EA	$5,000	1	$5,000	
Mobilization - Percent of Item Cost Sum	%	5%		$7,200	
Contingency - % of construction costs	%	30%		$45,357	
Total Construction Costs					$196,548
Engineering and CMS - % of construction costs	%	20%		$39,310	
Legal, Administration, and Permitting - % of construction costs	%	2%		$3,931	
Total Project Cost (rounded)					*$240,000*
S-9: George Tweed Boulevard and Spurs					
15" Pipe - Excavation, Backfill less than 10' deep	LF	$65	230	$14,976	
18" Pipe - Excavation, Backfill less than 10' deep	LF	$75	196	$14,700	
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	824	$82,398	
Remove Old Pipe - 12"	LF	$10	196	$1,960	
Remove Old Pipe - 15" thru 18"	LF	$13	1054	$13,665	
Connect/Reconnect Pipes at Manholes	EA	$2,000	1	$2,000	
Manhole 48"	EA	$3,500	5	$17,500	
Manhole 60"	EA	$5,690	2	$11,379	
Reconnect Laterals	LF	$17	1250	$21,256	
Existing Utility Protection	LF	$4	1250	$5,002	
Traffic Control	LF	$2	1250	$2,501	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	1250	$65,864	
Controlled Density Backfill	LF	$40	638	$25,535	
Mobilization - Percent of Item Cost Sum	%	5%		$13,937	
Contingency - % of construction costs	%	30%		$87,802	
Total Construction Costs					$380,475
Engineering and CMS - % of construction costs	%	20%		$76,095	
Legal, Administration, and Permitting - % of construction costs	%	2%		$7,609	
Total Project Cost (rounded)					*$464,000*

Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 3A					
S-11: Pond South of Redwood Highway					
42" Pipe - Excavation, Backfill less than 10' deep	LF	$221	74	$16,260	
Remove Old Pipe - 24" thru 36"	LF	$19	74	$1,430	
Connect/Reconnect Pipes at Manholes	EA	$2,000	3	$6,000	
Manhole 60"	EA	$5,690	1	$5,690	
Manhole 72"	EA	$5,955	1	$5,955	
Reconnect Laterals	LF	$17	74	$1,250	
Existing Utility Protection	LF	$4	74	$294	
Traffic Control	LF	$2	74	$147	
Full Lane Pavement Repair (8 ft. wide)	LF	$84	74	$6,195	
Mobilization - Percent of Item Cost Sum	%	5%		$2,161	
Contingency - % of construction costs	%	30%		$13,614	
Total Construction Costs					$58,994
Engineering and CMS - % of construction costs	%	20%		$11,799	
Legal, Administration, and Permitting - % of construction costs	%	2%		$1,180	
Total Project Cost (rounded)					***$72,000***
SJ-5: Tokay Canal from Savage Street to Dewey Drive					
36" Pipe - Excavation, Backfill less than 10' deep	LF	$180	394	$71,066	
Open Channel Excavation	CF	$0.37	4647	$1,721	
Remove Old Pipe - 24" thru 36"	LF	$19	394	$7,663	
Connect/Reconnect Pipes at Manholes	EA	$2,000	7	$14,000	
Manhole 60"	EA	$5,690	2	$11,379	
control structure	EA	$12,000	2	$24,000	
catch basins for new alignments	EA	$728	2	$1,455	
Reconnect Laterals	LF	$17	394	$6,698	
Existing Utility Protection	LF	$4	394	$1,576	
Miscellaneous Surface Repair	LF	$5	394	$1,970	
Mobilization - Percent of Item Cost Sum	%	5%		$7,076	
Contingency - % of construction costs	%	30%		$44,582	
Total Construction Costs					$193,187
Engineering and CMS - % of construction costs	%	20%		$38,637	
Legal, Administration, and Permitting - % of construction costs	%	2%		$3,864	
Total Project Cost (rounded)					***$236,000***
SJ-9: Rose Lane to River					
21" Pipe - Excavation, Backfill less than 10' deep	LF	$100	607	$60,682	
Remove Old Pipe - 15" thru 18"	LF	$13	607	$7,864	
Manhole 48"	EA	$3,500	3	$10,500	
outfall	EA	$5,000	1	$5,000	
Reconnect Laterals	LF	$17	607	$10,316	
Existing Utility Protection	LF	$4	607	$2,427	
Traffic Control	LF	$2	456	$913	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	456	$24,037	
Miscellaneous Surface Repair	LF	$5	150	$752	
Permit for Work in River	EA	$5,000	1	$5,000	
Mobilization - Percent of Item Cost Sum	%	5%		$6,375	
Contingency - % of construction costs	%	30%		$40,160	
Total Construction Costs					$174,026
Engineering and CMS - % of construction costs	%	20%		$34,805	
Legal, Administration, and Permitting - % of construction costs	%	2%		$3,481	
Total Project Cost (rounded)					***$212,000***
			Total Priority 3A Cost (		**$1,533,000**

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Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 3B					
SJ-3: A Street - East					
15" Pipe - Excavation, Backfill less than 10' deep	LF	$65	2138	$138,954	
Connect/Reconnect Pipes at Manholes	EA	$2,000	2	$4,000	
Manhole 48"	EA	$3,500	7	$24,500	
control structure	EA	$12,000	1	$12,000	
catch basins for new alignments	EA	$728	14	$10,185	
Existing Utility Protection	LF	$4	2138	$8,551	
Traffic Control	LF	$2	2138	$4,276	
Flow Split Manhole (Does not include control structures)	LS	$1,000	1	$1,000	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	2138	$112,606	
Mobilization - Percent of Item Cost Sum	%	5%		$15,804	
Contingency - % of construction costs	%	30%		$99,562	
Total Construction Costs					$431,437
Engineering and CMS - % of construction costs	%	20%		$86,287	
Legal, Administration, and Permitting - % of construction costs	%	2%		$8,629	
Total Project Cost (rounded)					***$526,000***
SJ-4: Madrone Street					
2 ft. x 3 ft. rectangular pipe- Excavation, Backfill less than 10' deep	LF	$319	896	$285,764	
Connect/Reconnect Pipes at Manholes	EA	$2,000	3	$6,000	
Manhole 72"	EA	$5,955	3	$17,864	
control structure	EA	$12,000	1	$12,000	
catch basins for new alignments	EA	$728	5	$3,638	
Existing Utility Protection	LF	$4	896	$3,584	
Traffic Control	LF	$2	896	$1,792	
Flow Split Manhole (Does not include control structures)	LS	$1,000	1	$1,000	
1/2 Lane Pavement Repair (5 ft. wide)	LF	$53	896	$47,200	
Mobilization - Percent of Item Cost Sum	%	5%		$18,942	
Contingency - % of construction costs	%	30%		$119,335	
Total Construction Costs					$517,119
Engineering and CMS - % of construction costs	%	20%		$103,424	
Legal, Administration, and Permitting - % of construction costs	%	2%		$10,342	
Total Project Cost (rounded)					***$631,000***
			Total Priority 3B Cost (		**$1,157,000**

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Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 3C					
SJ-6: Dewey Drive to 6th Street					
24" Pipe - Excavation, Backfill less than 10' deep	**LF**	**$135**	**1574**	**$212,524**	
30" Pipe - Excavation, Backfill less than 10' deep	**LF**	**$144**	**236**	**$34,088**	
2 ft. x 3 ft. rectangular pipe- Excavation, Backfill less than 10' deep	**LF**	**$319**	**220**	**$70,165**	
Open Channel Excavation	**CF**	**$0.37**	**952**	**$353**	
Regrading Channel to Match Proposed Pipes	**EA**	**$1,000**	**2**	**$2,000**	
Remove Old Pipe - 15" thru 18"	**LF**	**$13**	**147**	**$1,905**	
Remove Old Pipe - 24" thru 36"	**LF**	**$19**	**1878**	**$36,535**	
Connect/Reconnect Pipes at Manholes	**EA**	**$2,000**	**3**	**$6,000**	
Manhole 48"	**EA**	**$3,500**	**2**	**$7,000**	
Manhole 60"	**EA**	**$5,690**	**2**	**$11,379**	
Manhole 72"	**EA**	**$5,955**	**1**	**$5,955**	
inlet	**EA**	**$728**	**1**	**$728**	
outfall	**EA**	**$5,000**	**2**	**$10,000**	
control structure	**EA**	**$12,000**	**2**	**$24,000**	
Reconnect Laterals	**LF**	**$17**	**2025**	**$34,431**	
Existing Utility Protection	**LF**	**$4**	**2030**	**$8,121**	
Controlled Density Backfill	**LF**	**$40**	**50**	**$2,000**	
Miscellaneous Surface Repair	**LF**	**$5**	**2030**	**$10,152**	
Mobilization - Percent of Item Cost Sum	**%**	**5%**		**$23,867**	
Contingency - % of construction costs	**%**	**30%**		**$150,361**	
Total Construction Costs					**$651,562**
Engineering and CMS - % of construction costs	**%**	**20%**		**$130,312**	
Legal, Administration, and Permitting - % of construction costs	**%**	**2%**		**$13,031**	
Total Project Cost (rounded)					***$795,000***
			Total Priority 3C Cost (		**$795,000**

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Item	Unit	Unit Price	Estimated Quantity	Item Cost (Rounded)	Total Cost (Rounded)
Priority 4					
AF-9: Spill North of Harpazo Lane					
36" Pipe - Excavation, Backfill 10'-20' deep	**LF**	**$213**	**667**	**$142,043**	
Manhole 60"	**EA**	**$5,690**	**2**	**$11,379**	
inlet	**EA**	**$728**	**1**	**$728**	
outfall	**EA**	**$5,000**	**1**	**$5,000**	
catch basins for new alignments	**EA**	**$728**	**4**	**$2,910**	
Existing Utility Protection	**LF**	**$4**	**667**	**$2,668**	
Miscellaneous Surface Repair	**LF**	**$5**	**667**	**$3,335**	
Mobilization - Percent of Item Cost Sum	**%**	**5%**		**$8,403**	
Contingency - % of construction costs	**%**	**30%**		**$52,940**	
Total Construction Costs					**$229,406**
Engineering and CMS - % of construction costs	**%**	**20%**		**$45,881**	
Legal, Administration, and Permitting - % of construction costs	**%**	**2%**		**$4,588**	
Total Project Cost (rounded)					***$280,000***
		Total Priority 4 Cost (rounded)			**$280,000**

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