City of Coeur d'Alene, Idaho

2022 Wastewater Collection System Master Plan Update

November 2022

Prepared by

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Abbreviations

AC	Acre
ACI	Area of City Impact
CFS	Cubic Foot per Second
CIP	Capital Improvement Plan
d/D	Depth Over Diameter
DU	Dwelling Unit
ERU	Equivalent Residential Unit
FT	Feet
GIS	Geographical Information System
GPAD	Gallons Per Acre per Day
GPDU	Gallons Per Dwelling Unit
GPM	Gallons Per Minute
GPS	Global Positioning System
HP	Horsepower
IDEQ	Idaho Department of Environmental Quality
IDWR	Idaho Department of Water Resources
I&I	Infiltration and/or Inflow
IN	Inches
ITD	Idaho Transportation Department
J-U-B	J-U-B ENGINEERS, Inc.
LS	Lift Station
MH	Manhole
MHID	Manhole Identification Number
MGD	Million Gallons per Day
PER	Preliminary Engineering Report
ROW	Right-of-Way
SHPO	State of Idaho Historical Preservation Office
USGS	United States Geologic Survey
WWTP	Wastewater Treatment Plant

Executive Summary

ES-1 Purpose

The last comprehensive Sewer Master Plan for the City of Coeur d'Alene (the City) was completed in 2013. The City has experienced significant growth since then and although portions of the 2013 Master Plan have been updated as growth occurred, much of the 2013 Master Plan needs updating. The City's Wastewater Utility authorized J-U-B ENGINEERS, Inc. to undertake a Comprehensive Collection System Master Plan update, with major goals as follows:

- Create a system for prioritizing existing main lines for rehabilitation and replacement.
- Develop a hydraulic model to assess the existing conditions (current flows), near-term conditions (areas the City has committed to serve that may be developed soon), and long-term conditions (areas beyond the current City limits to the expected service boundary).
- Identify limitations in the existing collection system and necessary improvements to maintain an appropriate level of service.
- Establish a comprehensive Capital Improvement Plan (CIP) with particular emphasis on the next five to ten years.

The sections below provide a brief summary of each component of the 2022 Collection System Master Plan Update and the associated results.

ES-2 Existing Collection System Summary

The City's Wastewater Utility utilizes geographic information system (GIS) for maintenance and operations, planning, project concept development, and hydraulic modeling. The City of Coeur d'Alene Wastewater staff continues to grow their GIS database with collection system infrastructure and resolve identified data gaps in the system. As new developments pass City inspection, the Wastewater Utility Staff captures manhole rim and inverts, and other applicable infrastructure, with a GPS unit for immediate input into GIS. The City regularly updates sanitary sewer lateral locations based on CCTV footage. The timely input of new sanitary sewer infrastructure into their GIS database assists City staff with providing accurate system locates.

ES-3 Existing Model Summary

The Existing Model uses water meter data provided by the City to establish existing flows for each parcel connected to the system. The meter data indicated the current average daily flow for a residential unit is 150 gpd (approximately 62.5 gpcd based on 2.4 persons per household). No rain event occurred during the 2021 flow monitoring efforts. Therefore, the City selected a five year design storm, equivalent to 2.0

inches of rain, to establish existing capacity under peak wet weather conditions. Historic studies were used to correspond inflow and impervious acreage for each basin in the collection system. Dry weather flows were calibrated to 2021 flow monitoring performed at eight locations throughout the City (reference **Appendix D** for calibration results).

Figures A5 and **A6** in **Appendix A** depict the flow inputs used in the Existing Model, while **Figures A7.1, A7.2,** and **A8** show the available capacity of the existing collection system during a design storm event. Few issues were identified in the Existing Model and are summarized below. A detailed discussion of each is included in **Appendix E**, with output from the existing model for each pipe in **Appendix F**.

- Manhole BUS1-01B – Surcharge of ~1.56 feet
- Manhole BUS1-02 – Surcharge of ~1.58 feet
- Manhole M1-20 – Surcharge of ~0.45 feet
- Manhole M2-01AA – Surcharge of ~0.31 feet
- Manhole M2-02 – Surcharge of ~0.08 feet
- Manhole M2-03 – Surcharge of ~0.29 feet
- Manhole M2-04 – Surcharge of ~0.46 feet
- Manhole M2-05 – Surcharge of ~0.63 feet
- Manhole M2-09D – Surcharge of ~0.87 feet
- Manhole M3-21 – Surcharge of ~0.11 feet
- Manhole M3-24 – Surcharge of ~0.19 feet
- Manhole M3-25 – Surcharge of ~0.14 feet
- Manhole D1-02 – Surcharge of ~0.02 feet
- Manhole GAR1-04 – Surcharge of ~0.31 feet
- Manhole GAR1-05 – Surcharge of ~0.31 feet
- Manhole BEXT1-22B – Surcharge of ~0.09 feet
- Manhole RAM1-43B – Surcharge of 0.19 feet

ES-4 Committed Model Summary

The Committed Model includes everything that the City has committed to serve. This includes parcels annexed into the City, other agreements made with areas outside the City limits, and assumes no vacancy in the existing service area. Committed flows from parcels of property that were not already

included in the Existing Model were developed using unit flows derived from the water meter data provided by the City. The Committed Model is used to evaluate how the existing system will accommodate future flows the City has already committed to serve. Future capital improvements were not included, which allowed prioritization of capital improvements needed to address collection system capacity.

Appendix A, Figure A9 depicts flow inputs in the Committed Model, and **Figures A10.1, A10.2,** and **A11** show the available capacity of the existing collection system during a design storm event. No additional issues were identified during the Committed Model analysis, although the magnitude of the problems increased due to the additional flows in the system. Issues identified in the Committed Model are listed below and a detailed discussion of each is included in **Appendix E**, with output from the committed model for each pipe in **Appendix G**.

- Manhole BUS1-01B – Surcharge of ~1.62 feet
- Manhole BUS1-02 – Surcharge of ~1.67 feet
- Manhole M1-20 – Surcharge of ~0.50 feet
- Manhole M2-01AA – Surcharge of ~0.45 feet
- Manhole M2-02 – Surcharge of ~0.17 feet
- Manhole M2-03 – Surcharge of ~0.46 feet
- Manhole M2-04 – Surcharge of ~0.77 feet
- Manhole M2-05 – Surcharge of ~1.05 feet
- Manhole M2-09D – Surcharge of ~1.37 feet
- Manhole M3-19 – Surcharge of ~0.03 feet
- Manhole M3-21 – Surcharge of ~0.13 feet
- Manhole M3-24 – Surcharge of ~0.24 feet
- Manhole M3-25 – Surcharge of ~0.23 feet
- Manhole D1-02 – Surcharge of ~0.03 feet
- Manhole GAR1-04 – Surcharge of ~0.34 feet
- Manhole GAR1-05 – Surcharge of ~0.34 feet
- Manhole BEXT1-22B – Surcharge of ~0.11 feet
- Manhole RAM1-43B – Surcharge ~0.87 feet

ES-5 Population Growth and Study Boundary Summary

The City has experienced significant growth in the past 30 years and based on discussions with the City Wastewater Utility Staff and the City's current Comprehensive Plan (2022-2042), is anticipated to grow at a rate of 2.5 percent through 2040. It is estimated that undeveloped land within the future wastewater service boundary (reference **Figure A4**) includes approximately 650 acres of infill within City limits and an additional 3,300 acres outside the current City limits. Growth is generally expected to occur in infill areas, and then to the western and northern edges of the study boundary.

ES-6 Master Plan Model Summary

The Master Plan Model shows the results of full build-out of the City's future wastewater service area that encompasses approximately 22 square miles. It also includes location, size, and depth of master planned sewer lines required to provide sewer service to new areas within the wastewater service area.

Master plan flows that were not already included in the Committed Model were developed using unit flows derived from the water meter data provided by the City. Future capital improvements were not included, except the re-grading of existing pipes necessary to connect master plan piping, allowing identification of all capital improvements needed to address collection system capacity.

Figures A12 and **A14** in **Appendix A** show the ultimate pipe sizes and approximate depths of master plan lines. **Figure A13** depicts flow inputs in the Master Plan Model. **Figures A15.1**, **A15.2**, and **A16** show the available capacity of the existing collection system during a design storm event. The specific depth required for each master plan line, along with the master plan model output, can be found in **Appendix H**. Issues identified in the Master Plan Model include:

- Manhole BUS1-01B – Surcharge of ~1.62 feet
- Manhole BUS1-02 – Surcharge of ~1.67 feet
- Manhole M1-19 – Surcharge of ~0.57 feet
- Manhole M1-20 – Surcharge of ~0.44 feet
- Manhole M1-20A – Surcharge of ~0.70 feet
- Manhole M2-01AA – Surcharge of ~0.77 feet
- Manhole M3-19 – Surcharge of ~0.03 feet
- Manhole M3-21 – Surcharge of ~0.13 feet
- Manhole M3-24 – Surcharge of ~0.15 feet
- Manhole M3-25 – Surcharge of ~0.23 feet

- Manhole D1-02 – Surcharge of ~0.03 feet
- Manhole GAR1-03 – Surcharge of ~0.68 feet
- Manhole GAR1-04 – Surcharge of ~1.60 feet
- Manhole GAR1-05 – Surcharge of ~1.68 feet
- Manhole GAR1-06 – Surcharge of ~1.86 feet
- Manhole GAR1-07 – Surcharge of ~1.18 feet
- Manhole GAR1-08 – Surcharge of ~1.21 feet
- Manhole GAR1-09 – Surcharge of ~1.15 feet
- Manhole GAR1-10 – Surcharge of ~1.37 feet
- Manhole GAR1-11 – Surcharge of ~1.64 feet
- Manhole GAR1-12 – Surcharge of ~1.40 feet
- Manhole GAR1-13 – Surcharge of ~1.39 feet
- Manhole GAR1-14 – Surcharge of ~1.19 feet
- Manhole GAR1-15 – Surcharge of ~1.16 feet
- Manhole BEXT1-22B – Surcharge of ~0.11 feet
- Manhole RAM1-43 – Surcharge of ~0.08 feet
- Manhole RAM1-43B – Surcharge of ~1.56 feet
- Manhole RAM1-44 – Surcharge of ~0.26 feet
- Manhole RAM1-45A – Surcharge of ~1.16 feet
- Manhole RAM1-46 – Surcharge of ~1.46 feet
- Manhole RAM1-46A – Surcharge of ~2.03 feet
- Manhole RAM1-46B1 – Surcharge of ~2.13 feet
- Manhole RAM1-47 – Surcharge of ~1.87 feet
- Manhole DEP1-01 – Surcharge of ~3.54 feet
- Manhole DEP1-02 – Surcharge of ~3.51 feet
- Manhole DEP1-03 – Surcharge of ~3.11 feet
- Manhole DEP1-04 – Surcharge of 2.72 feet
- Manhole DEP1-05 – Surcharge of ~2.45 feet

- Manhole DEP1-06 – Surcharge of ~1.80 feet
- Manhole DEP1-07 – Surcharge of 1.35 feet
- Manhole DEP1-08 – Surcharge of ~0.13 feet
- Manhole RIV1-03D – Surcharge of ~0.35 feet
- Manhole RIV1-03C – Surcharge of ~0.55 feet
- Manhole RIV1-03B – Surcharge of ~0.64 feet
- Manhole RIV1-03A – Surcharge of ~0.54 feet
- Manhole RIV1-04 – Surcharge of ~0.44 feet
- Manhole RIV1-05 – Surcharge of ~0.40 feet
- Manhole RIV1-06 – Surcharge of ~0.35 feet
- Manhole RIV1-07 – Surcharge of ~0.39 feet
- Manhole RIV1-08 – Surcharge of ~0.27 feet
- Manhole RIV1-09 – Surcharge of ~0.26 feet
- Manhole RIV1-10 – Surcharge of ~0.32 feet
- Manhole RIV1-11 – Surcharge of ~0.25 feet
- Manhole RIV1-12 – Surcharge of ~0.22 feet
- Manhole RIV1-13 – Surcharge of ~0.22 feet
- Manhole RIV1-15 – Surcharge of ~0.15 feet
- Manhole RIV1-16 – Surcharge of ~0.13 feet
- Manhole RIV1-17A – Surcharge of ~0.13 feet
- Manhole RIV1-18 – Surcharge of ~0.07 feet
- Manhole RIV1-25A – Surcharge of ~0.08 feet
- Manhole RIV1-26 – Surcharge of ~0.08 feet
- Manhole RIV1-29 – Surcharge of ~0.06 feet
- Manhole RIV1-30 – Surcharge of ~0.13 feet
- Manhole RIV1-31 – Surcharge of ~0.30 feet

No additional Master Plan Scenarios were evaluated at this time.

ES-7 Assessment Management Program and Capital Improvement Plan (CIP) Summary

A preliminary condition assessment was performed and is summarized in **Figure A3.1** in **Appendix A**. The following recommendations will help augment the GIS and improve its value to the City:

- Add fields within GIS & POSM to correlate defect codes assigned in POSM to a Pipe ID in GIS.
- Keep only current CCTV results in GIS.
- Continue utilizing the Wastewater Utility's current condition assessment matrix, located in **Appendix K**. Refine only as necessary, keeping consistent condition assessment methodology will assist with defining a consistent Likelihood of Failure (LoF) score each reach.
- Include a condition assessment score in GIS; update annually or as projects are completed and new CCTV is collected.
- Review and establish a consistent risk-based scoring system and include this value in GIS.
- Establish a timeframe for completing CCTV inspection. Utilize **Figure A3.3** in **Appendix A** as a tool when prioritizing CCTV inspections.

Additionally, the Wastewater Utility continues replacement of all non-plastic sewer mains. The Wastewater Utility Department will continue to implement the condition and risk-based assessments. The system life and corresponding replacement and rehabilitation budget will be re-evaluated and adjusted as appropriate.

The CIP identifies and describes the improvements necessary to provide service to the future wastewater service area at a suitable level of service and reserve capacity. It also provides an approximate timeline for implementation of these projects. The following guidelines are used to determine the timeframe for CIP projects:

- **0 to 5 Years**: Issues identified in the Existing Model represent problems that could occur "today" and should therefore be addressed within the first planning period.
- **5 to 10 Years**: Issues identified in the Committed Model represent likely problems as currently annexed land begins developing, which is generally expected to occur within the next ten years.
- **10 to 20 Years**: Most issues in this category arise from ongoing maintenance of the Utility's lift stations.
- **As Needed with Growth**: Remaining issues and some identified under the Master Plan Model will not become critical until growth begins to develop in the corresponding areas. Consequently, a significant portion of the CIP falls into this category.

- **As Needed for Replacement and Rehabilitation:** Pipes were categorized into rehabilitation or replacement projects based on City identified structural defects resulting from the Asset Management Program. Pipes that were identified as having capacity issues or requiring system modifications were not programmed for replacement/rehabilitation projects.

Table ES-1 lists the CIP projects with recommended action. **Figure A17** shows the location and type of each project in the CIP. **Appendix I** contains a project summary and associated capital cost for each CIP project.

Table ES-1 – CIP Projects

ID	Project/MH ID	Recommend Action	Capital Cost (1)	Timeframe				
				0-5 Years	5-10 Years	10-20 Years	As needed with growth	As needed with RR
C.1	BUS1-01 to BUS2-01	Pipe replacement and inflow reduction	$386,000	X				
C.2	M1-21 to M2-09B	Pipe replacement and re-route flow	$1,212,000	X				
C.3	M3-17	Verify slopes and inverts	-					
C.4	RIV1-02 to FWN1-01	New parallel pipe and re-route flow	$8,170,000				X	
C.5	RAM1-38B	Project eliminated in 2022 CIP	-					
C.6	GAR1-01 to GAR1-15	Pipe replacement	$1,616,000				X	
C.7	M1-14 to M1-18	Pipe replacement	$1,978,000		X			
C.8	ARM1-01	Project eliminated in 2022 CIP	-					
C.9	Mill River Lift Station and Force Main	Upgrade pumps, utilize existing 8" pipe for upsized force main, and add emergency storage	$431,000				X	
C.10	FWN1-22A to FWN1-23HA	Pipe replacement and re-grade	$2,278,000				X	
C.11	FWN1-04 to FWN1-11	Pipe re-grade	$1,579,000				X	
C.12	RAM1-42 to RAM1-46B	New parallel pipe and re-route flow	$588,000				X	

ID	Project/MH ID	Recommend Action	Capital Cost (1)	Timeframe				
				0-5 Years	5-10 Years	10-20 Years	As needed with growth	As needed with RR
S.1	FWN1-22 to FWN1-24	Pipe replacement to accommodate growth	$290,000				X	
S.2	BEXT1-06DE3 to BEXT1-06DE6B	Pipe replacement to accommodate growth	$348,000				X	
S.3	B1-13	Project eliminated in 2022 CIP	-					
S.4	Hawk's Nest Lift Station	Upgrade pumps	$805,000				X	
S.5	Woodside Lift Station	Project eliminated in 2022 CIP	-					
S.6	Foothills Lift Station	Abandon lift station	$110,000				X	
S.7	Canfield Lift Station and Force Main	Project eliminated in 2022 CIP	-					
RR.30	M2-04B to M2-03A (New MH)	8" Open Trench Replacement	$265,000					X
RR.31	M4-09HN to M4-09HN3 M4-09GN to M4-09GN1 M4-09FN to M4-09FN1	8" Open Trench Replacement	$686,000					X
RR.32	DAV1-05A to DAV1-05C	8" Open Trench Replacement	$173,000					X
RR.33	M3-22C to M3-22E	8" Open Trench Replacement	$342,000					X
RR.35	M2-22A to M2-22C	8" Open Trench Replacement	$364,000					X
RR.36	M2-25 to M2-26A	8" Open Trench Replacement	$402,000					X
RR.37	M1-37B to M1-37E	8" Open Trench Replacement	$601,000					X

ID	Project/MH ID	Recommend Action	Capital Cost (1)	Timeframe				
				0-5 Years	5-10 Years	10-20 Years	As needed with growth	As needed with RR
	M1-37C to M1-37D							
RR.38	M3-20D to M3-20E	8” Open Trench Replacement	$253,000					X
RR.39	M7-07 to M7-08	8” CIPP Rehabilitation	$20,000					X
RR.40	Varies (see Appendix I)	8” to 12” CIPP Rehabilitation	$1,114,000					X
RR.41	Varies (see Appendix I)	8” to 12” CIPP Rehabilitation	$386,000					X
RR.42	GAR1-110B to GAR1-11M M7-09D to M7-09D1	8” Open Trench Replacement & 8” CIPP Rehabilitation	$779,000					X
RR.43	M1-23EE to M1-23FE	8” Open Trench Replacement	$270,000					X
RR.44	B1-42 to B1-43	24” CIPP Rehabilitation	$187,000					X
RR.45	B1-17 to B1-18	24” CIPP Rehabilitation	$97,000					X
RR.46	M1-26 to M3-02	15” CIPP Rehabilitation	$73,000					X
RR.47	M1-21C to M1-21D	8” Open Trench Replacement	$539,000					X
RR.48	M2-05 to M2-06B	8” Open Trench Replacement	$312,000					X
Point Repair	Varies (see Appendix I)	Point repair to fix high priority defect	$145,000					X

ID	Project/MH ID	Recommend Action	Capital Cost (1)	Timeframe				
				0-5 Years	5-10 Years	10-20 Years	As needed with growth	As needed with RR
E.1	Seltice Siphon Extension and Headworks	Project eliminated in 2022 CIP	-					
E.2.01	Lakeside Study Extension North	Construction as required with Growth	$858,000				X	
E.2.02	Lakeside Study Extension South	Construction as required with Growth	$1,004,000				X	
E.3	Government Way	Project completed	-					
E.4	Nettleton Gulch Extension	Construction as required with Growth	$1,486,000				X	
E.5	Hill Drive Extension	Construction as required with Growth	$646,000				X	
E.6	Silver Beach Interceptor	Construction as required with Growth	$607,000				X	
E.7	Blackwell Hill Interceptor	Construction as required with Growth	$4,171,000				X	
E.8	Cougar Bay Interceptor	Construction as required with Growth	$484,000				X	
E.9	Montana Pressure Sewer	Incorporate unsewered areas into collection system	$130,000				X	
LS.1	Blackwell Hill	Construction as required with Growth	$3,491,000				X	
LS.2	Cougar Bay	Construction as required with Growth	$3,126,000				X	
LS.3	Nettleton Gulch	Project eliminated in 2022 CIP	-					

ID	Project/MH ID	Recommend Action	Capital Cost (1)	Timeframe				
				0-5 Years	5-10 Years	10-20 Years	As needed with growth	As needed with RR
LS.4	Silver Beach	Construction as required with Growth	$3,521,000				X	
LS.5	Evergreen	Construction as required with Growth	$1,590,000				X	

1. *All capital costs are in 2022 dollars and are a Class 4 cost opinion (i.e., -30% to +50% per AACE).*

ES-8 Budgeting CIP Projects

The costs associated with each CIP project were grouped by time and are summarized in **Table ES-2**. Reference **Appendix I** for a detailed breakdown of each project. The timeframes listed are intended to begin in Fiscal Year 2023-2024 since Fiscal Year 2022-2023 is underway and projects have already been established for this year. For Fiscal Years 2022 -2023, the Wastewater Utility has budgeted $800,000 per year for replacement/rehabilitation projects. The additional CIP costs identified herein for lift station replacement/rehabilitation should be reviewed and integrated as budget permits. If this work is not completed in the 0-5-year timeframe, the work should be carried forward into the 5-10-year timeframe.

Table ES-2 – CIP Projects

CIP Project Timeframe	20-YR Capital Cost (1)
0 – 5 Years	$1,598,000
5 – 10 Years	$2,108,000
10-20 Years	$0
As Needed with Growth	$37,199,000
As Needed with RR	$7,008,000
Totals	$47,913,000

1. *All capital costs are in 2022 dollars and are a Class 4 cost opinion (i.e., -30% to +50% per AACE).*

ES-9 Summary

Overall, the existing collection system is in good condition and will have adequate capacity to convey current flows through master plan flows as the CIP is implemented. This is evidenced by the relatively few capacity issues within the existing system compared to necessary upgrades to accommodate growth beyond the City's current service limits.

The hydraulic model used in this analysis was created based on land use and zoning conditions at the time of the study, both of which will change over time. Since the models are based on these parameters, it is critical to keep them updated over time to reflect up-to-date conditions. The Master Plan will therefore require periodic updates to remain a current, accurate, and applicable tool in future evaluations. As part of this ongoing maintenance, the Wastewater Utility currently plans to update the Master Plan Model every five years with the assistance of a consultant. Updates may be implemented more frequently if there are significant changes to land use, impact area, collection system, or the rate of development.

ES-10 Acknowledgements

Many people were extremely helpful in providing documentation, information, and input throughout the course of this project. We wish, however, to especially thank the City of Coeur d'Alene Wastewater Utility staff who contributed to this report: Mike Becker, Mike Anderson, Rob Grytness, Larry Parsons, Darrell Castleberry and Ben Martin were instrumental in collecting data, presenting improvement ideas, evaluating alternatives, expressing system concerns, and giving timely, pointed feedback. This assistance is gratefully acknowledged.

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Chapter 1

Introduction

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Chapter 1 – Introduction

1.1 Background

The City of Coeur d'Alene has experienced significant growth episodes throughout its history. The expansion that occurred shortly after the year 2000 resulted in significant development in the northwest quadrant of the City, that included leapfrog developments with non-contiguous sewer development and semi-permanent sewer systems. Due to this rapid growth, the Collection System Master Plan previously completed by HDR Engineers in 2002 was updated by J-U-B ENGINEERS, Inc. (J-U-B) in early 2005 to supplement the previous study and provide more detailed sewer master planning for the northwest corner of the City. The 2005 revision also updated the existing collection system model with pipes and manholes for areas of new construction. The land use and flow generation layers of the previous Hydra model were also reevaluated for the study area through additional flow monitoring and calibration. Another update was initiated in 2009 for the Northwest Quadrant with the following objectives:

- Review land use changes and trends
- Develop a committed model for the area (i.e., convert all non-sewered land into sewered land)
- Analyze the impacts of the potential annexation of adjacent land along Huetter Road

In 2010, the model was updated to evaluate expanded service to the Government Way Corridor north of Dalton Avenue, thereby providing service to commercial properties in this area of Dalton Gardens.

J-U-B completed the most recent update to the Collection System Master Plan in 2013. The review included updating the InfoSWMM model with existing pipe and manhole infrastructure, updating land use to be concurrent with the City's 2022 Comprehensive Plan and updating the flow generation layers. Flow monitoring was completed in 2013 to confirm dry and wet weather model calibration.

1.2 Study Scope

Due to the current significant growth in the Coeur d'Alene area, especially in continued development in the northwest quadrant of the City, significant development along the western City limits, and infill in the older and downtown corridors, the City of Coeur d'Alene Wastewater Utility authorized J-U-B to undertake a Comprehensive Collection System Master Plan Update in 2021/2022. The plan's objectives follow the vision statement of the City of Coeur d'Alene and the mission statement of the City Wastewater Utility, which is to provide safe, reliable, and cost-effective solutions to convey wastewater while protecting the water and environment and minimizing impacts to the ratepayers.

The items specifically addressed in this plan are as follows:

- Compile City-provided condition information on the existing collection system
- Integrate the City's GIS database, which is updated yearly, into a hydraulic model
- Evaluate the integrity and completeness of the existing geometric data for sewer trunk lines and supplement as required
- Review the existing sewer system model assumptions and incorporate previous evaluations in 2005, 2009, 2010, and 2013
- Update current and planned land uses during the study period
- Analyze available water meter usage and evaluate flow generation assumptions used in the previous modeling efforts
- Conduct flow monitoring to calibrate the updated model
- Update inflow data utilized in the model based on previous inflow source identification studies and recent efforts to remove inflow from the system
- Evaluate the existing collection system trunk lines based on existing dry weather flows and wet weather flows to determine recommended improvements under current conditions
- Evaluate the existing collection system trunk lines assuming all vacant lots and unoccupied businesses and houses are active to determine recommended improvements in the near term
- Estimate probable build-out extents, densities, and total population in conjunction with City Planning and available population projection data; summarized potential growth patterns for the next five years
- Review existing gravity sewer alignments and lift stations to determine if future lines could be constructed to eliminate the lift stations
- Conceptually route future trunk sewers ten inches and larger to the ultimate service boundary
- Determine preferred routing through the existing system and impacts to the existing system
- Integrate hydraulic modeling results into the Utility's GIS database
- Develop prioritization criteria with the Wastewater Utility based on capacity, age, condition, risk, and other customizable criteria
- Establish long-term improvements for the collection system with a specific 5-year Capital Improvement Plan (CIP) based on established prioritization criteria

Subsequent chapters and appendices in this report document the development of the Master Plan and are summarized as follows:

Chapter 2 – Existing Summary and Condition Assessment

A summary of the existing system, including City-provided data relative to infrastructure condition, is presented in this chapter. This data is a foundational element in an overall Asset Management Plan that will include condition assessment, risk of continued degradation or failure, and available capacity.

Chapter 3 – Existing Model

The initial phase of the capacity analysis consists of developing and calibrating a base hydraulic model that will be used in subsequent evaluations and scenarios. Background information collected and assimilated into the model generally includes the following:

- Flow data from current flow monitoring efforts
- Flow data from the wastewater treatment plant (WWTP)
- Historic precipitation data
- Manhole and sewer pipe data from the City's current GIS
- Lift station operational data
- Current land use from City's current 2022 Comprehensive Plan Update
- Water usage data from the City Water Department
- Inflow sources and contribution to the collection system

Once collated, this information is used to create a calibrated model of the existing collection system under dry weather and wet weather conditions, and to identify any potential deficiencies within the current system.

Chapter 4 – Committed Model

After the existing system has been evaluated, the model is modified to reflect all "committed" land within the City. This includes all parcels that have been annexed into the City (even if the land is not currently developed) and assumes housing and business vacancy is zero. Results of this evaluation will indicate if there is sufficient capacity remaining in the collection system that is not already committed to serving areas within the City.

Chapter 5 – Population Growth and Study Boundaries

The planning horizon for collection system master plans is usually on the order of 40 to 50 years and/or to a defined build-out boundary. This chapter reviews past growth within the City, documents decisions made by the Wastewater Utility and City Planning relative to build-out service area and expected growth in the near term.

Chapter 6 – Master Plan Model

The Master Plan Model itself is a representative layout of a future sewer system that will serve the City to the delineated build-out conditions and accommodate potential changes in land use within the existing service area. The model identifies probable sizing and alignments for future trunk lines, areas serviceable by gravity, preliminary design criteria for future lift stations, opportunities to remove existing lift stations, routing alternatives through the existing collection system, and ultimately a list of long-term improvements for the existing system.

Chapter 7 – Asset Management Program and Capital Improvement Plan

The growth assumptions developed in **Chapter 5** are used in conjunction with the results from the Existing Model, Committed Model, and Master Plan Model to develop a 5-year Capital Improvement Plan (CIP) and long-term improvement plan. Additionally, tools for continued prioritization of existing sewer lines were developed to assess infrastructure condition, age (or remaining service life), capacity, and other City-defined criteria associated with likelihood of failure and consequence of failure that may be accessed and updated through GIS.

Chapter 8 – Report Summary

Conclusions from the Master Plan are summarized as well as recommendations regarding model and master plan maintenance.

Appendix A – Figures

In general, figures in the document are included in **Appendix A** rather than immediately within the text. This allows figures to be grouped and accessed more readily. Additionally, full-size prints are included for some figures when necessary to convey the appropriate detail.

Appendix B – Data Compiled for Use in Model Development

Background data is summarized with the source and date of acquisition. Flow monitoring data from the collection system is also presented.

Appendix C – Model Assumptions

The Hydraulic Model consists of two main components–a system layer and a flow generation layer. Assumptions made regarding specific model parameters are documented.

Appendix D – Model Calibration

Calibration of the model is summarized. Graphs are included for each flow monitoring site comparing the calibrated model output to the monitored flow.

Appendix E – System Issues

This appendix includes background information and a more detailed discussion of each issue identified. Potential deficiencies from the Existing, Committed, and Master Plan analyses are discussed, and a Hydraulic Grade Line (HGL) plot is included for each issue.

Appendix F – Existing Model Results

Results for the Existing Model are included in table format for trunk lines. Data consists of rim, invert, size, flow, velocity, depth over diameter, and reserve capacity. Results are not included for 6-inch and 8-inch collectors, except for those specifically identified by City Staff.

Appendix G – Committed Model Results

Results for the Committed Model are included in table format for trunk lines. Data consists of rim, invert, size, flow, velocity, depth over diameter, and reserve capacity. Results are not included for 6-inch and 8-inch collectors, except for those specifically identified by City Staff.

Appendix H – Master Plan Model Results

Results for the Master Plan Model are included in table format for existing and master planned trunks. Data consists of rim, invert, size, flow, velocity, depth over diameter, and depth. Reserve capacity is also included for existing trunk lines. Results are not included for 6-inch and 8-inch collectors, except for those specifically identified by City Staff.

Appendix I – CIP Packets

The CIP Packets contain pertinent information for the improvements deemed necessary from this Master Plan. These packets include a brief narrative of the issue, maps, cost estimates, and project timing.

Appendix J – Additional Services Master Plan Model Scenarios (2013 Master Plan)

As requested by City Staff, Appendix J from the 2013 Master Plan Update was included in this Master Plan under Appendix J. No edits were made to Appendix J in this Master Plan Update.

Appendix K – Asset Management

This appendix includes background information on the City's defect scoring criteria. It also outlines the methodology used to score the structural and maintenance Likelihood of Failure (LoF) and Consequence of Failure (CoF) for each pipe.

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Chapter 2

Existing Collection System Summary

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Chapter 2 – Existing Collection System Summary

2.1 System Overview

The first sewer mains for the City of Coeur d'Alene's collection system were constructed in the early 20th century, with subsequent extensions to serve the City's wastewater treatment plant constructed in the late 1930s. As growth continued, the system was evaluated, expanded, and modified to convey the increasing volume of wastewater. The current system is comprised of over one million feet of gravity sewer mains, force mains, and siphons as summarized in **Table 2-1** and shown in **Figure A1**. Additionally, the system includes ten (10) City lift stations and two privately owned and maintained lift stations– Orchard and Blackwell Island. A summary of each City lift station is included in **Table 2-2**. All totaled, this infrastructure serves a current population of approximately 55,000 people and includes 1,947 commercial connections and 16,788 residential connections (April, 2022).

Table 2-1 – Summary of Existing Collection System Piping Network[2]

Pipe Material	Length (ft) by Pipe Size											Total Length (ft)
	Unknown (1)	<6 in	8 in	10 in	12 in	15 in	18 in	21 in	24 in	30 in	36 in	
Cured-in-Place Pipe (CIPP)	-	182	88,621	11,577	13,160	7,727	-	-	1,780	986	-	124,033
Clay	-	2,895	1,026	301	397	-	-	-	-	-	-	4,619
Concrete	-	21,887	47,494	10,524	12,240	11,024	13,232	116	23,381	2,917	4,437	147,252
HPDE	-	313	1,049	-	-	-	-	-	-	-	-	1,362
PVC	-	6,813	607,550	57,215	63,943	11,714	20,201	1,063	15,049	53	-	783,601
Unknown (1) – *gravity collector*	150	2,380	103,416	5,165	1,460	912	1,050	-	499	-	463	115,495
Unknown (1) – *force main*	44	17,509	1,930	-	-	-	-	-	-	-	-	19,483
Subtotal	194	51,979	851,086	84,782	91,200	31,377	34,483	1,179	40,709	3,956	4,900	1,195,845 (226 miles)

1. *Items noted as "unknown" have not yet been labeled through the City's GIS.*
2. *Table does not include information on private or abandoned pipes.*

Table 2-2 – Summary of Existing City Lift Stations[1]

Lift Station Name	Year Constructed/Last Major Rehabilitation	Wet Well		Pump			Comments
		Diameter (ft)	Depth (ft)	Type	Horsepower	Quantity	
15th & Ash	1997	8	10.5	Submersible	2.7 & 3.0	2	
Woodside	1996	6	11	Submersible	2.0 & 3.0	2	
Fernan	2019	12	23.5	Submersible	4	2	Retrofitted in 2019. SprayRoq Coated.
Indian Meadows	1990	6	21	Submersible	3	2	
Foothills	1993	8	20	Submersible	5	2	Panel replaced in 2010
Canfield	2019	8	21	Submersible	10	2	Panel replacement in progress, 2021/2022
Cumberland Meadows	2000	6	15.5	Submersible	7.5	2	
Mill River	2005	10	28.5	Submersible	40	2	Epoxy coated wet well
Riverside ("Bellerive")	2007	8	37	Submersible	7.5	2	Epoxy coated wet well
Hawk's Nest	2014	10	50	Submersible	25	2	Epoxy coated wet well

1. *Table does not include information on privately owned and maintained lift stations – Orchard and Blackwell Island.*

2.2 Data Collected in GIS

The City of Coeur d'Alene has been a consistent leader in the use of geographic information systems (GIS) for managing their wastewater system. On a routine basis, the Wastewater Utility captures growth and/or resolves identified data gaps in the system, providing an up-to-date repository of information that is used for maintenance and operations, planning, project concept development, and the hydraulic modeling presented in subsequent chapters. The data captured in GIS is summarized as follows:

- Sewer Manholes
  - Manhole identifier
  - Location (i.e., northing and easting)
  - Survey data, including year
  - Rim elevation and source
  - GPS Point ID
  - Depth to center of the manhole and corresponding invert
  - Pipe size, depth, and elevation for all pipes entering the manhole
  - Manhole type and rehabilitation status
- Sewer Mains
  - Size
  - Length
  - Material
  - Rehabilitation with CIPP, as applicable, including year
  - Replacement through traditional open trench excavation pipe bursting, including year
  - A link to CCTV Video
  - Connection detail to upstream and downstream manholes
- Sewer Service Laterals
  - Downstream MH ID
  - Distance from Downstream MH
- Abandoned manholes and abandoned pipes
- Air release valves
- Identified inflow locations

- Lift stations
- Private manholes, pipes, laterals, and lift stations
- Valve vaults
- Callout locations and history
- CCTV history
- Flushing history

2.3 Summary

The City of Coeur d'Alene Wastewater staff continues to grow their GIS database with collection system infrastructure and resolve identified data gaps in the system. As new developments pass City inspection, the Wastewater Utility Staff captures manhole rim and inverts, and other applicable infrastructure, with a GPS unit for immediate input into GIS. The City regularly updates sanitary sewer lateral locations based on CCTV footage. The timely input of new sanitary sewer infrastructure into their GIS database assists City staff with providing accurate system locates.

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Chapter 3

Existing Model

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Chapter 3 – Existing Model

3.1 General

The Existing Model in this study was built using the City's GIS data and InfoSWMM modeling software. Previous modeling efforts (2002-2010) for the City utilized Hydra Modeling software. InfoSWMM was selected in 2013 and again with this update to provide a GIS-based modeling platform well suited to integrate the City's GIS data and to provide a more sophisticated hydraulic modeling engine. The Existing Model's primary purposes are to:

- Provide a snapshot of current system flows.
- Identify potential existing capacity issues.
- Calibrate unit flows for use in the Committed Model (**Chapter 4**) and Master Plan Model (**Chapter 6**).

The Existing Model consists of two layers–the System Layer and the Flow Generation Layer. Each layer includes multiple parameters and corresponding assumptions that characterize the area and system being modeled. The assumptions are based on the City's GIS data, surveyed pipe inverts, record drawing data, flow monitoring, characteristics learned from the physical system, similar studies done in the region, and general and historical knowledge gained through previous work for the City. Key assumptions used in the Existing Model are documented in **Appendix C**. These are utilized in the InfoSWMM modeling software to analyze the City sewer collection system. The Existing Model is representative of the City's sewer system and flows as of February 2021.

3.2 Existing Model System Layer

The Existing Model System Layer consists of the manholes, gravity sewer pipes, force mains, and lift stations in the collection system. A map of the Existing Model System Layer is found in **Figure A1**, and the study area is shown in **Figure A4**.

3.2.1 City GIS

The City's sewer system GIS was used as the main source of information for rim elevations, invert elevations, pipe sizes, and pipe lengths. The first phase of this master planning effort consisted of identifying trunk lines (≥ 10-inches) in the system that had been updated since 2013 modeling efforts using the City's current GIS system. In addition to trunk lines, three 8-inch collector pipe reaches were added to the model: Manhole RAM 1-42 to RAM 1-46A, RX1-07 to RX1-18, and RX1-18 to RX1-28 per the City's request. Updates were made to manhole and pipe alignment, rim elevations, invert elevations, pipe material and pipe sizes using current GIS records. Data was reviewed with the City and then supplemented with record drawings, field checks, or City GPS if necessary. The remaining missing or questionable data in

the GIS for trunk lines was resolved by using data from the previous model or by straight-grading individual sections of pipe (i.e., interpolating an invert based on upstream and downstream inverts). These manholes and pipes are tagged in the model accordingly.

Additional collector pipes (8-inch and less) were added to facilitate flow routing due to the flow generation method used in the Existing Model. Missing or questionable data in the GIS for collectors was resolved by using data from the previous model or by straight-grading sections of pipe. Since the collector's main purpose is to route the flow to the trunk lines so that peak attenuation through the trunk lines is represented correctly, this approach was deemed sufficient and appropriate.

3.2.2 City Lift Stations

Lift station and force main data were added to the Existing Model based on record drawings and discussions with City staff. **Table 3-1** lists the current lift stations that are operating in the City and represented in the model. Design operating points were obtained from the City and previous reports. Some of the lift stations were modeled as "ideal pumps" (i.e., the flow rate at the discharge manhole matches the influent to the wet well, resulting in no storage in the wet well). The lift stations that were modeled as "ideal pumps" have either small service areas and pump into large trunk lines, or no information was available for the lift station. For these lift stations, the "ideal pump" model was the best available information.

Table 3-1 – Existing City Lift Stations

Lift Station Name	Design Operating Point	Pump Description	Wet Well Diameter (ft)	Modeled as Ideal Pump?
15th & Ash	170 gpm, 22 ft	(2) 2.7 HP Gorman Rupp – Submersible	8.0	Yes
Woodside (4)	60 gpm, 45 ft	(1) 0.5 HP, (1) 0.33 HP Hydromatic – Submersible (1)	6.0	Yes
Fernan	200 gpm, 48 ft	(2) 4.0 HP Flygt - Submersible	12.0 w/ fiberglass lined prism	Yes
Indian Meadows	330 gpm, 19 ft	(2) 3.0 HP Hydromatic – Submersible	6.0	No
Foothills	270 gpm, 31 ft	(2) 5.0 HP Hydromatic – Submersible	8.0	No
Canfield	500 gpm, 48 ft	(2) 10.0 HP Hydromatic – Submersible	8.0	No
Cumberland Meadows	300 gpm, 45 ft	(2) 7.5 HP Hydromatic – Submersible	6.0	Yes
Mill River	300 gpm, 120 ft (2)	(2) 40.0 HP Hydromatic – Submersible	10.0	No
Riverside ("Bellerive")	300 gpm, 60 ft	(2) 7.5 HP Hydromatic – Submersible	8.0	Yes
Hawk's Nest	1,200gpm, 52 ft	(2) 25.0 HP Flygt - Submersible	10.0	No
Orchard (3)	-	-	-	Yes
Blackwell RV (3)	-	-	-	Yes

1. *Grinder pumps*
2. *Interim design point with 10.75" impeller. Build-out design point is 675 gpm at 120 ft with 11.375" impeller.*
3. *Privately Owned and Maintained Lift Station – Information not available.*
4. *Data from 2013 Master Plan Update. No new information available.*

3.3 Existing Model Flow Generation Layer

3.3.1 Water Meter Usage Data

Sanitary flows for the Existing Model were developed from City of Coeur D' Alene recorded water meter data from the period between November 2020 and February 2021 and exclude water meter data from

KC District No. 1, Hoffman, HLID, Dalton and Huetter. During these winter months, the vast majority of metered water used by customers is discharged to the collection system and is, therefore, a good indicator of base sanitary flow contribution. Utilizing potable water service meter usage data, provided actual usage to generate sewer flows in the model rather than relying on typical unit flow data. This method yields a more accurate spatial distribution of existing flows in the system. Sanitary flows for areas not serviced by the City of Coeur d'Alene Water Department, but serviced by City sewer were generated from unit flows calculated for each residential and non-residential usage types.

The average daily flow for each water meter was calculated from the average winter monthly volume recorded by each meter, yielding an average water use of **150 gpd per residential dwelling unit**. For the purposes of this study, an equivalent residential unit (ERU) will therefore be defined as **150 gpd**. Based on **2.4 persons per household** (reference **Section 5.1**), this yields a per capita flow of **62.5 gpd**. Average daily flows were then adjusted by typical peaking factors to reflect weekend and weekday flows. These factors were specific to each land use type and were adjusted during calibration of the model.

A majority of the City is characterized by residential flows. Since the highest average and peak residential flows usually occur on weekends, the majority of the trunk lines will experience peak flows on the weekend. However, smaller basins with a high percentage of non-residential flows may experience peak flows during the weekdays. For example, a school generates the majority of its wastewater during the week, so the daily average was adjusted so that the majority of the flow is distributed throughout the week and very little flow is distributed over the weekend. Therefore, the Existing Model was built using factors to adjust the average daily flows from the water meters to average weekday and weekend flows to capture both maximum peak possibilities.

Currently, the City collects water meter data monthly and the data is reported as a volume in thousands of gallons. Due to the low resolution and infrequent data collection of the water meter data, an average for specific days of the week was unobtainable. The factors described above were used to approximate weekday and weekend averages and were adjusted during the calibration process. Refining these factors further would require collecting water meter data daily and at a higher resolution than currently available with the existing water meters.

3.3.2 Land Use

Data fields in the parcel and structure shape files available from Kootenai County were used to generate the list of existing land use types found in **Table 3-2**. City zoning and land use identifiers, from the current 2022 City Comprehensive Plan, were used as the primary designation to determine the land use type. The commercial zoning designations were further refined using additional characteristics such as the "structure type" field found in the structure shape file. The **Low-Density** Residential land use type is comprised of all the single-family dwelling units (typically zoned R-1, R-3, and R-3PUD). **Medium Density Residential** consists of multi-family dwelling units with between two and four dwelling units, as well as

mobile home and RV parks (typically zoned R-5, R-5PUD, R-8, R-8PUD, R-8SF, R-12, R-12PUD, MH-8, and MH-8PUD). **High Density Residential** includes all apartments and multi-family dwelling units with over four dwelling units (typically zoned R-17 and R-17PUD). **Figure A5** shows the land use incorporated into the Existing Model.

Table 3-2 – Existing Model Land Use Types

➢ Assisted Living	➢ Public
➢ Church	➢ Residential – High Density
➢ Commercial	➢ Residential – Medium Density
➢ Hospital	➢ Residential – Low Density
➢ Industrial	➢ Restaurant
➢ Office	➢ School
➢ Open Space	

Water meter data was coupled with the land use to determine probable daily flow fluctuations. The City's water meter data was supplied to J-U-B in a geo-referenced shape file showing the location of each meter. Each water meter was linked to the parcel it served and assigned the land use designated to that parcel. Diurnal curves (the typical 24-hour shape of the flow) were robustly developed and modified to represent City of Coeur d'Alene flow patterns for each land use type during calibration efforts for the 2013 Master Plan Update. Diurnal curves for the 2022 Master Plan Update were developed using the historic modeling efforts and the 2013 diurnal curves for each land use type. The residential diurnal curve was modified to more closely reflect current 2022 Flow Monitoring Results. Diurnal curves used in the model can be found in **Appendix C**.

3.3.3 Sanitary Flow Allocation

The flows generated from each water meter were injected into the Existing Model at the nearest manhole upstream of the service connection. **Figure A5** shows the injection points for each water meter.

3.3.4 Infiltration and Inflow

Infiltration is groundwater entering the sewer through cracked pipes or other deficiencies in the system. This can be groundwater from a high-water table or rainfall induced groundwater. The majority of the City is constructed over sandy soils and has a very low water table. As such, infiltration is not likely, which is supported by historical flow monitoring and WWTP records. The Existing Model does not include an infiltration component in the system.

Inflow is the flow of water directly into the sewer during and after a rainfall event due to direct connection to the sewer from storm drains, roof drains, parking lots, manholes, etc. Past inflow studies have specifically identified 14 acres in the B, BUS, CEN, FG, and M drainage basins (J-U-B, 2006). It has been suggested that the City has between 22 and 33 acres of impervious area for storms with less than 1.2 inches

of rain (J-U-B, 2004). Larger inflow events may find new paths to the sewer, and the impervious area has been estimated as high as 60.34 acres (HDR, 2002). In 2012, analysis of a rain on snow event that occurred on January 29-30, 2012 indicated a total impervious area of 39.0 acres. The January 29-30, 2012 event is further discussed in **Section 3.4.2**. This storm was used as the basis for impervious area in the 2013 Wastewater Collection System hydraulic model. Additional flow monitoring in 2015 further refined the quantities for impervious acreage in the BUS, CEN, FG, and LIN drainage basins (J-U-B, 2021). The January 29-30, 2012 storm was used as the basis for impervious area for the current hydraulic model, with modification to the BUS, CEN, FG and LIN drainage basins per results from the updated 2015 flow monitoring data, summarized in **Table 3-3.**

Table 3-3 summarizes the basins in the system, the total impervious areas connected to the sewer identified to date in each basin, and how that area is allocated in the model. The impervious areas that have been identified were assigned to the nearest upstream manhole. The additional area added to each basin was divided evenly among all the manholes in the basin. **Figure A6** shows the extents of each basin and a normalized amount of impervious area for each basin.

The Existing Model includes a simulated rainfall event from a design storm. The design storm used was a 24-hour Type II SCS design storm with a total rainfall amount of 2.0 inches. Equivalent to a five-year storm for the Coeur d'Alene area. To simulate a worst-case condition in the model, the peak inflow from the storm event was aligned with the peak in the sanitary flow on the weekend. This results in a larger net return period for the sewer event compared to the storm event.

3.4 Existing Model Calibration

Calibration is the process of modifying various parameters and their assumed values in order to match flow monitoring data collected from multiple locations. Sewer flows were monitored at the WWTP as well as eight locations in the system between March 4 and April 20, 2021. These flows are assumed to be representative for the City since the period was relatively dry and historical flow data shows no substantial seasonal changes in the flows at the WWTP throughout the year. A summary of the 2021 flow monitoring is contained in **Appendix B**. Flow monitoring locations are shown on **Figure B2**.

The dataset itself has limitations that prevent 'perfect' calibration between model output and real flows. Some of the factors affecting calibration include the level of uncertainty of the flow monitoring data and the averaging of water meter usage data. Additionally, COVID trends (i.e. working/school from home, restaurant takeout, and etc.) could have influenced water use. Considering these limitations, the model calibrated well without significant changes to base assumptions or parameters, providing a high level of confidence in the Existing Model results and in the subsequent development of the Committed and Master Plan Models. A complete listing of model assumptions and parameters are included in **Appendix C**.

3.4.1 Dry Weather Calibration

As discussed in **Section 3.3.1**, the model was calibrated to both weekend and weekday flows from 2021 flow monitoring efforts. Individual days were plotted to show the uncertainty and variability of flow at each point in the system. Large service areas showed less variability in flow than smaller service areas due to the number of customers upstream. An average weekend diurnal and average weekday diurnal were determined for each site from the flow monitoring data. Final flow calibration graphs for dry weather at each of the eight 2021 flow monitoring locations are included in **Appendix D.**

Table 3-3 – Assumed Impervious Area in the Model by Basin

Major Basin	Sub-Basin	Historically Identified Impervious Area [1] (AC)	Removed Impervious Area [2] (AC)	Calculated Remaining Impervious Area [3] (AC)	Impervious Area Added in 2013 Model for Calibration (AC)	Total Impervious Area 2013 Model [4] (AC)	Impervious Area from 2015 Flow Monitoring (AC)	Impervious Area Added in 2022 Model for Calibration (AC)	Total Impervious Area in 2022 Model (AC)
A	Basin Total	0.00	0.00	0.00	1.16	1.16		1.16	1.16
B	B	1.65	1.56	0.09	4.22	4.31		4.22	4.31
	GOV	0.00	0.00	0.00	0.99	0.99		0.99	0.99
	HON	0.00	0.00	0.00	0.83	0.83		0.83	0.83
	Basin Total	1.65	1.56	0.09	6.04	6.13		6.04	6.13
BUS	Basin Total	3.23	0.32	2.91	1.26	4.17	2.25	0.00[6]	2.91[6]
CEN	Basin Total	1.00	0.00	1.00	3.25	4.25	1.33	0.33	1.33
FG	Basin Total	4.10	3.72	0.38	0.35	2.28 [5]	0.62	0.24	0.62
LIN	Basin Total	0.00	0.00	0.00	0.64	0.64	1.68	1.68	1.68
M	CH	0.00	0.00	0.00	0.30	0.30		0.30	0.30
	GAR	0.29	0.00	0.29	0.76	1.05		0.76	1.05
	M1-14	2.14	0.00	2.14	1.55	3.69		1.55	3.69
	M1-32	0.52	0.00	0.52	0.82	1.34		0.82	1.34
	M3-01	0.00	0.00	0.00	1.11	1.11		1.11	1.11
	M3-29	0.00	0.00	0.00	1.56	1.56		1.56	1.56
	M4-01	0.85	0.71	0.14	1.31	1.45		1.31	1.45
	M	0.37	0.00	0.37	0.30	0.67		0.30	0.67
	Basin Total	4.17	0.71	3.46	7.71	11.17		7.71	11.17
RIV	FWN/AF/AEX	0.00	0.00	0.00	1.60	1.60		1.60	1.60
	RIV	0.00	0.00	0.00	0.22	0.22		0.22	0.22
	RX/REX/RAM	0.00	0.00	0.00	3.71	3.71		3.71	3.71
	Basin Total	0.00	0.00	0.00	5.53	5.53		5.53	5.53
WWTP	Basin Total	-	-	0.00	3.67	3.67		-	-
TOTAL	-	14.15	6.31	7.84	29.61	39.00[4]		22.69	30.53

1. *Areas identified in previous inflow studies from 2002 to 2005. See Table3 in the 2005 Inflow Source Identification Technical Memorandum #2 by J-U-B ENGINEERS (April 2006).*
2. *Following identification of inflow sources, several have been corrected and therefore "removed" from the wastewater collection system. Not included in hydraulic model.*
3. *Calculated by Subtracting Removed Impervious Area from Historically Identified Impervious Area. Identified Inflow values assigned to nearest manhole in hydraulic model.*
4. *Total impervious area for each basin and sub-basin as applied in the hydraulic model for 2013 Master Plan Update.*
5. *Discrepancy between calculated value and model input. 2013 hydraulic model input listed in Table.*
6. *No additional impervious area acreage added to BUS basin. 2015 flow monitoring results and previously identified point source*

3.4.2 Wet Weather Calibration

Flow monitoring was conducted at eight locations in the Spring of 2021, prior to the collection system master plan update. No significant rainfall event occurred during the flow monitoring period, March 4, 2021 to April 20, 2021. Therefore, wet weather modeling parameters “time to peak” and “time of recession” remained the same as in the 2013 hydraulic model, which were derived/calibrated previously from the impacts of the January 29-30, 2012 storm. Contributing area from each manhole was assigned as discussed in **Section 3.3.4**.

As stated in the 2013 Collection System Master Plan Update, a significant rainfall event occurred during the flow monitoring period on January 29-30, 2012. Prior to the storm event, approximately 3 to 6 inches of snowpack was present on the ground. The snow contained an estimated water equivalent of 0.3 to 1.0 inches. Snow depth and water equivalence were obtained from NOAA. The rain event that began the afternoon of January 29 provided approximately 1.3 inches of rain over a 24-hour period. The rainfall resulted in a near-complete snowmelt in the downtown area and significant snowmelt over the study area. NOAA models estimated snowmelt water equivalence between 0.3 to 0.4 inches for the study area. The total rainfall and snowmelt runoff for the January 29-30, 2012 event was estimated to be 1.7 inches.

Unfortunately, in 2012 only two of the five flow monitors recorded accurate data during that time. The two monitoring sites (RIV1-04 and RAM1-01) and the WWTP influent were used to calibrate the system response to inflow. A composite synthetic unit hydrograph was used to approximate flow into the sewer through direct connections from a rainfall event. The modeling parameters “time to peak” and “time of recession” were modified during the calibration process in 2013 as necessary and remain the same in the 2022 hydraulic model.

Graphs showing the model results of a wet weather event, compared to dry weather model results, at the eight flow monitoring locations included in **Appendix D**.

3.5 Existing Model Analysis

The design storm discussed in **Section 3.4.2** was added to the calibrated model for analysis of the existing system capacity. **Table 3-4** contains a list of the areas where issues were identified in the existing system. Each potential problem reach is discussed in detail in **Appendix E** as wells as what actions, if any, are recommended to address the issue. Each potential problem is identified using the downstream manhole. The issues requiring action are also grouped into the CIP, as discussed in **Chapter 7**.

Figures A7.1, A7.2, and **A8** in **Appendix A** show the Depth over Diameter Criteria Exceedance, Depth over Diameter, and Reserve Capacity for the Existing Model, illustrating the issues discovered. The

Depth over Diameter Criteria Exceedance plot can be used to identify the individual pipes that exceed the City defined maximum allowed depth over diameter listed in **Appendix C**. The Depth over Diameter plot can be used to identify the extents of surcharging or limited capacity and includes backwater effects from downstream pipe segments. The Reserve Capacity plot can be used to identify individual pipes that could be the root cause of the surcharging or limited capacity but does not include backwater effects from downstream pipe segments.

Appendix E has additional information and hydraulic grade line plots for each issue. **Appendix F** contains results from the Existing Model Analysis. All Existing Model results and figures included the design storm event.

Table 3-4 – Existing Model Issues

MH Identifier	Issue	Reference	Recommended Action
BUS1-01B	Surcharge ~ 1.56 ft	Appendix E, Section 2.1	Replace - *See CIP C.1 for details*
BUS1-02	Surcharge ~ 1.58 ft	Appendix E, Section 2.1	Do Nothing
M1-20	Surcharge ~ 0.45 ft	Appendix E, Section 2.2	Divert to new line - *See CIP C.2 for details*
M2-01AA	Surcharge ~ 0.31 ft	Appendix E, Section 2.2	Divert to new line - *See CIP C.2 for details*
M2-02	Surcharge ~ 0.08 ft	Appendix E, Section 2.2	Divert to new line - *See CIP C.2 for details*
M2-03	Surcharge ~ 0.29 ft	Appendix E, Section 2.2	Divert to new line - *See CIP C.2 for details*
M2-04	Surcharge ~ 0.46 ft	Appendix E, Section 2.2	Divert to new line - *See CIP C.2 for details*
M2-05	Surcharge ~ 0.63 ft	Appendix E, Section 2.2	Divert to new line - *See CIP C.2 for details*
M2-09D	Surcharge ~ 0.87 ft	Appendix E, Section 2.2	Divert to new line - *See CIP C.2 for details*
M3-21	Surcharge ~ 0.11 ft	Appendix E, Section 2.3	Verify Slopes and Inverts
M3-24	Surcharge ~ 0.19 ft	Appendix E, Section 2.3	Verify Slopes and Inverts
M3-25	Surcharge ~ 0.14 ft	Appendix E, Section 2.3	Verify Slopes and Inverts
D1-02	Surcharge ~ 0.02 ft	Appendix E, Section 2.3	Do Nothing
GAR1-04	Surcharge ~ 0.31 ft	Appendix E, Section 2.4	Replace - *See CIP C.6 for details*
GAR1-05	Surcharge ~ 0.31 ft	Appendix E, Section 2.4	Replace - *See CIP C.6 for details*
BEXT1-22B	Surcharge ~ 0.09 ft	Appendix E, Section 2.7	Do Nothing
RAM1-43B	Surcharge ~ 0.19 ft	Appendix E, Section 2.9	Divert to new line - *See CIP C.12 for details*

Table 3-5 contains a summary of each City lift station and the remaining capacity. All City lift stations show sufficient capacity.

Table 3-5 – Existing Model City Lift Station Summary

Lift Station Name	Pump Design Capacity (GPM)	Existing Influent Peak Flow (GPM)	Lift Station Safety Factor (1)	Existing Influent Peak Flow w/ SF (GPM)	Calculated Remaining Pump Capacity (GPM)	Calculated Remaining ERU(5)
15th & Ash	170	32	10%	35	135	1,297
Woodside	60	8	10%	9	51	490
Fernan	200	38	10%	42	158	1,517
Indian Meadows	330	104	10%	115	215	2,068
Foothills	270	68	10%	74	196	1,877
Canfield	500	367	10%	404	96	922
Cumberland Meadows	300	49	10%	54	246	2,360
Mill River (2)	300	145	10%	159	141	1,350
Riverside ("Bellerive") (4)	300	32	10%	35	265	2,544
Hawk's Nest	1,200	567	20%	681	519	4,982
Orchard (3)	-	-	-	-	-	-
Blackwell RV (3)	-	-	-	-	-	-

1. *Safety factor as defined in Appendix C, Table C-4, is added to peak flow to define lift station capacity.*
2. *Interim design point with 10.75" impeller. Build-out design point is 675 gpm, 120 ft with 11.375" impeller*
3. *Privately Owned and Maintained Lift Station – Design information not available*
4. *Riverside (Bellerive) undergoing upgrades during 2022 Collection System Master Plan Update. Information not available.*
5. *Remaining ERU's were calculated using the Residential High flow generation value of 150 GPD/ERU.*

Chapter 4

Committed Model

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Chapter 4 – Committed Model

4.1 General

The Committed Model represents everything the City has committed to serve, and generally includes all parcels that have been annexed into the City, developed or not. Additionally, vacancy rates are taken to zero throughout the service area. The Committed Model is a tool to estimate available collection system capacity, taking into account annexations that are proposed in the City. The Committed Model's primary purposes are to:

- Show the remaining, uncommitted capacity in the system.
- Identify potential capacity issues that may arise as the City develops area already within the City limits that they have committed to serve.

If a new annexation or development is seeking approval, the associated flows can be added to the flow generation layer in the Committed Model to check for capacity. The model will show if there is sufficient capacity remaining in the downstream lines that is not already committed to serve a different area. The Committed Model represents what the City has committed to serve as of February 2022.

4.2 Committed Model System Layer

The Committed Model uses the same system layer as the Existing Model (see **Section 3.2**).

4.3 Committed Model Flow Generation Layer

The Existing Model Flow Generation Layer is used as the base for the Committed Model Flow Generation Layer. The flows added to the Committed Model come from two areas. First, all undeveloped area already within the City limits is assigned flow according to the current land use and zoning. Second, existing flows from multi-family residential are adjusted to remove any vacancy.

4.3.1 Land Use and Unit Flows

Land use designations for the Committed Model were determined from parcel data in the same manner as the Existing Model. **Table 4-1** lists the non-residential land use types used in the Committed Model and the corresponding unit flows used in a previous evaluation for the Northwest Quadrant (J-U-B, 2009), the 2013 Master Plan Update (2012 water meter data), and this study for comparison purposes. Unit flows for the current Committed Model were developed by analyzing City water meter data from November 2020 to February 2021 and the area of the parcel(s) associated with each meter, similar to the 2013 Master Plan analysis approach. The current water usage values were compared to the previous values and updated per discussions with City staff to reflect current water use accordingly. The water meter data was not available for the 2009 evaluation; therefore, the previous 2009 values were

estimates from similar studies and other communities. The November 2020 to February 2021 values are specific to the City of Coeur d'Alene and will be used in subsequent analyses. Also shown are the approximate equivalent residential units (ERUs) for each land use type (based on average daily flows), which provides a common metric for comparing residential and non-residential unit flows.

The flows reported in **Table 4-1** are broken into two primary categories–gross unit flow and net unit flow. These categories are generally defined as follows:

- Gross Unit Flow – The gross unit flow for a parcel **includes** all developable land, some of which must be allocated for right-of-way, open spaces, roads, parks, and landscape buffers. Consequently, the unit flows on a gross basis are lower than on a net basis.
- Net Unit Flow – The net unit flow for a parcel **excludes** right-of-way, open spaces, roads, parks, and landscape buffers. These unit flows are therefore higher than those reported on a gross basis.

Table 4-1 – Committed Model Unit Flows – Non-Residential

Land Use Type	Total Area (AC)	2013 Gross Unit Flow (GPAD)	2013 Net Unit Flow (GPAD)	2013 ERU/AC(3)	2022 Gross Unit Flow (GPAD)	2022 Net Unit Flow (GPAD)	2022 ERU/AC(3)
Assisted Living	51	1,530	1,700	11.0	1,565	1,700	11.5
Church	88	150	170	1.1	155	170	1.1
Commercial (1)	1,261	720	800	5.2	775	800	5.7
Mixed Use Commercial (2)	-	1,650	1,830	11.8	1,665	1,830	12.2
Hospital	16	740	820	5.3	4,530	4,960	33.1
Hotel	43	3,740	4,160	26.8	4,530	4,980	33.2
Industrial	35	130	150	1.0	200	220	1.5
Office	49	980	1,080	7.0	380	420	2.8
Open Space	-	-	-	---	18	20	0.1
Public	663	240	270	1.7	265	290	1.9
Restaurant	88	2,250	2,500	16.1	2,275	2,500	16.7
School	261	200	230	1.5	210	230	1.5

1. *Commercial unit flow is a composite unit flow of Assisted Living, Hospital, Hotel, Office, Public, and Restaurant. Acreage listed is for commercial retail only.*
2. *Mixed Use Commercial unit flows correspond to 12.2 ERUs and are used for all new committed and master plan commercial flows*
3. *The values shown are based on a comparison of average day flows and are, therefore, approximate.*

Flows for the Committed Model started with a copy of the flows from the Existing Model. New committed non-residential parcels with an area less than 5 acres were considered developed and flows for these parcels were allocated using net unit flows listed in **Table 4-1**. Flows for committed non-residential parcels over 5 acres were allocated using gross unit flows, since further development of these larger parcels would add right-of-way and open space.

The conversion between net and gross area is estimated to be 75 percent for residential areas, based on a review of residential neighborhoods recently developed in the City. A conversion factor of 91 percent was used for non-residential areas based on several existing non-residential areas in the City. Residential densities and unit flows shown in **Table 4-2** were based on the analysis of the water meter data used for this project. The table also illustrates the differences between the previous 2013 Collection System Master Plan evaluation (J-U-B, 2013) and this study. Both studies utilized actual water meter records. The number of dwelling units (DU) for each developed parcel was determined using the various county and City GIS shape files. New committed residential parcels were assigned a number of DU based on the parcel area. Parcels with an area greater than 2 acres used gross densities listed in **Table 4-2** to calculate the number of DUs, while parcels less than 2 acres in size used net densities. The corresponding unit flows were used to generate flows.

Table 4-2 – Committed Model Unit Flows – Residential

Land Use Type	Total Area (AC)	2013 Net Unit Flows (1)			2022 Net Unit Flows		
		(GPDU)	(DU/AC)	(GPAD)	(GPDU)	(DU/AC)	(GPAD)
Low Density Residential	3,725	155	2.9	450	150	4.0	600
Medium Density Residential	526	131	5.7	750	130	7.4	960
High Density Residential	365	131	13.4	1,760	110	14.2	1,560

1. Reflects values used in the prior 2013 Master Planning evaluation (J-U-B, 2013).

Vacancies in single-family dwelling units (Low Density Residential) were filled in the Committed Model using the unit flows from **Table 4-2**. Existing multi-family dwelling units (Medium and High Density Residential) with unit flows below 75 percent of the average unit flow listed in the table had flows adjusted to 100 percent of the average unit flow to fill vacancies for the Committed Model.

The unit flows and densities listed in **Table 4-1** and **Table 4-2** represent average values for each land use. Specific developments that fall within a certain land use type may have flows that vary significantly from these averages. In such cases, the City should consider using a more representative unit flow value on a case-by-case basis when determining whether or not they can provide service to the development.

4.3.2 Flow Allocation

Each parcel that has been committed is modeled by injecting flow into the nearest upstream manhole in the system layer. Since the current system layer has not been extended to all of the committed flow parcels, these committed flows are injected into the system at the manhole from which the system layer will most likely be extended to serve the area. Some large, committed parcels were divided and injected into multiple locations following the Master Plan. **Figure A9** shows the injection points for each parcel in the Committed Model.

4.3.3 Infiltration and Inflow

The same infiltration and inflow used in the Existing Model was used in the Committed Model (see **Section 3.3.4**). The total impervious area included in the Committed Model was 30.53 acres. City Wastewater Staff continues to identify inflow points and refine impervious acreage values in each basin with inflow studies and flow monitoring efforts. The Wastewater staff continues to work with the City's Stormwater Department to eliminate identified cross connections.

4.3.4 Dalton Gardens Committed Flows

In 2018, an 8-inch sanitary sewer line was installed in Government Way, north of Hanley Avenue to south of Prairie Avenue, servicing Aqua Circle. The City services the Dalton Gardens Commercial Corridor from Dalton Avenue to Prairie Avenue. Per a Memorandum of Understanding (MOU), properties between Dalton Avenue and Hanley Avenue are required to connect by March of 2028. Properties from Hanley Avenue to Prairie Avenue are required to connect by September of 2032. These additional flows have been included in the Committed Model. The previous modeling effort designated these flows with a commercial land use type and a unit flow of 720 GPAD (J-U-B, 2013). A net commercial unit flow of 800 GPAD has been applied to these areas for the current 2022 Master Plan Update.

4.4 Committed Model Analysis

The Committed Model analysis shows the results if all of the current committed flows are developed without the addition of any relief lines or correction of existing system deficiencies. This helps identify priorities for Capital Improvement Projects in subsequent chapters.

Table 4-3 contains a list of the areas where issues were identified in the system for the Committed Model. Each problem reach is discussed in detail in **Appendix E**. Each problem is identified using the downstream manhole. The issues are also grouped into the CIP as discussed in **Chapter 7**.

Figures A10.1, A10.2, and A11 in **Appendix A** show the Depth over Diameter Exceedance, Depth over Diameter, and Reserve Capacity, respectively, for the Committed Model. The depth over diameter exceedance plot can be used to identify the pipe reaches that exceed the City's established criteria stated in **Appendix C**. The depth over diameter plot can be used to identify the extents of surcharging or

limited capacity and includes backwater effects from downstream pipe segments. The reserve capacity plot can be used to identify individual pipes that could be the root cause of the surcharging or limited capacity but does not include backwater effects from downstream pipe segments.

Appendix E has additional information and hydraulic grade line plots for each issue. **Appendix G** contains results from the Committed Model Analysis. All Committed Model results and figures include the design storm event.

Table 4-3 – Committed Model Issues

MH Identifier	Issue	Identified Under Existing Model Analysis	Reference	Recommended Action *(to be determined after Master Plan model scenario is completed)*
BUS1-01B	Surcharge ~ 1.62 ft	X	Appendix E, Section 3.1	Replace - *See CIP C.1 for details*
BUS1-02	Surcharge ~ 1.67 ft	X	Appendix E, Section 3.1	Do Nothing
M1-20	Surcharge ~ 0.50 ft	X	Appendix E, Section 3.2	Divert to new line - *See CIP C.2 for details*
M2-01AA	Surcharge ~ 0.45 ft	X	Appendix E, Section 3.2	Divert to new line - *See CIP C.2 for details*
M2-02	Surcharge ~ 0.17 ft	X	Appendix E, Section 3.2	Divert to new line - *See CIP C.2 for details*
M2-03	Surcharge ~ 0.46 ft	X	Appendix E, Section 3.2	Divert to new line - *See CIP C.2 for details*
M2-04	Surcharge ~ 0.77 ft	X	Appendix E, Section 3.2	Divert to new line - *See CIP C.2 for details*
M2-05	Surcharge ~ 1.05 ft	X	Appendix E, Section 3.2	Divert to new line - *See CIP C.2 for details*
M2-09D	Surcharge ~ 1.37 ft	X	Appendix E, Section 3.2	Divert to new line - *See CIP C.2 for details*
M3-19	Surcharge ~ 0.03 ft		Appendix E, Section 3.3	Verify Slopes and Inverts
M3-21	Surcharge ~ 0.13 ft	X	Appendix E, Section 3.3	Verify Slopes and Inverts
M3-24	Surcharge ~ 0.24 ft	X	Appendix E, Section 3.3	Verify Slopes and Inverts
M3-25	Surcharge ~ 0.23 ft	X	Appendix E, Section 3.3	Verify Slopes and Inverts
D1-02	Surcharge ~ 0.03 ft	X	Appendix E, Section 3.3	Do Nothing
GAR1-04	Surcharge ~ 0.34 ft	X	Appendix E, Section 3.4	Replace - *See CIP C.6 for details*
GAR1-05	Surcharge ~ 0.34 ft	X	Appendix E, Section 3.4	Replace - *See CIP C.6 for details*
BEXT1-22B	Surcharge ~ 0.11 ft	X	Appendix E, Section 3.7	Do Nothing
RAM1-43B	Surcharge ~ 0.87 ft	X	Appendix E, Section 3.9	Divert to new line - *See CIP C.12 for details*

Table 4-4 contains a summary of each City lift station and the remaining capacity. All City lift stations show sufficient capacity.

Table 4-4 – Committed Model City Lift Station Summary

Lift Station Name	Pump Design Capacity (GPM)	Committed Influent Peak Flow (GPM)	Lift Station Safety Factor (1)	Committed Influent Peak Flow w/ SF (GPM)	Calculated Remaining Pump Capacity (GPM)	Calculated Remaining ERU(5)
15th & Ash	170	32	10%	35	135	1,297
Woodside	60	8	10%	9	51	488
Fernan	200	38	10%	42	158	1,517
Indian Meadows	330	175	10%	193	137	1,319
Foothills	270	68	10%	74	196	1,877
Canfield	500	386	10%	425	75	724
Cumberland Meadows	300	54	10%	60	240	2,308
Mill River (2)	300	198	10%	217	83	793
Riverside (Bellerive) (4)	300	65	10%	72	228	2,191
Hawk's Nest	1,200	631	20%	758	442	4,246
Orchard (3)	-	-	-		-	
Blackwell RV (3)	-	-	-		-	

1. *Safety factor as defined in Appendix C, Table C-4, is added to peak flow to define lift station capacity.*
2. *Interim design point with 10.75" impeller. Build-out design point is 675 gpm, 120 ft with 11.375" impeller.*
3. *Privately Owned and Maintained Lift Station – Design information not available.*
4. *Riverside (Bellerive) undergoing upgrades during 2022 Collection System Master Plan Update. Information not available.*
5. *Remaining ERU's were calculated using the Residential High flow generation value of 150 GPD/ERU.*

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Chapter 5

Population Growth and Study Boundaries

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Chapter 5 – Population Growth and Study Boundaries

5.1 Population Data and Projections

The City of Coeur d'Alene has experienced variable rates of growth in its history. The most recent growth phases occurred in the late 1990s, after the 2000s, and again after 2020. These periods of growth are bracketed with economic downturns or disruptions; therefore, the last 30 years is considered representative of historical growth in the area. US Census data and annual average growth rates for the period 1990 through 2020 are summarized in **Table 5-1**.

Table 5-1 – US Census Bureau Population Data for Coeur d'Alene and Kootenai County

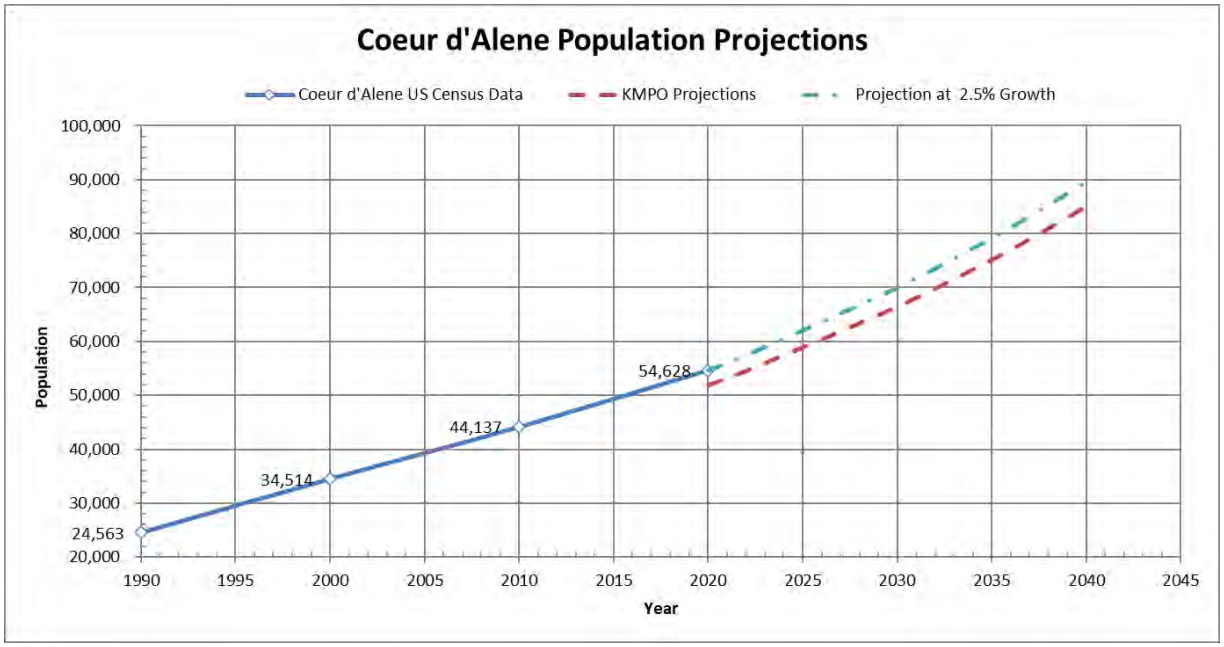
Year	Coeur d'Alene Population	Annual Growth Rate from Prior Period	Kootenai County Population	Annual Growth Rate from Prior Period
1990	24,563	-	69,795	-
2000	34,514	3.46%	108,685	4.53%
2010	44,137	2.49%	138,494	2.45%
2020	54,628	2.16%	171,362	2.15%

Population projections for the City of Coeur d'Alene have been developed by the Kootenai Metropolitan Planning Organization, KMPO. KMPO utilized US Census Bureau data for Kootenai County and the individual cities within the county from 1990, 2000, and 2010 to formulate projections for 2016, 2020, 2035 and 2040. In 2018, KMPO updated growth projections for 2020, 2035 and 2040. For the forecast period extending through 2040, KMPO assumed a consistent annual growth rate of 2.5 percent for the City of Coeur d'Alene, and a Kootenai County growth rate of 2.4 percent. Forecasts for Coeur d'Alene were made with a baseline population from the 2010 census.

Observed US Census Bureau annual average growth rates are shown in **Table 5-1.** KMPO's most recent update in 2018, did not include the 2020 Census Data.

Additionally, population growth was coordinated with the City's current Comprehensive Plan, adopted in February of 2022. The City's 2022-2042 Comprehensive Plan references KMPO's estimated 2040 population for the City to be approximately 85,000 people. The population projections from the City and KMPO as well as an assumed growth of 2.5 percent, are shown on **Figure 5-1**. Projections were not extended beyond 2040 due to the limitations on the KMPO study and to approximately match the near-term objectives of this study.

Figure 5-1 – City of Coeur d'Alene Population Projections (2020 to 2040)

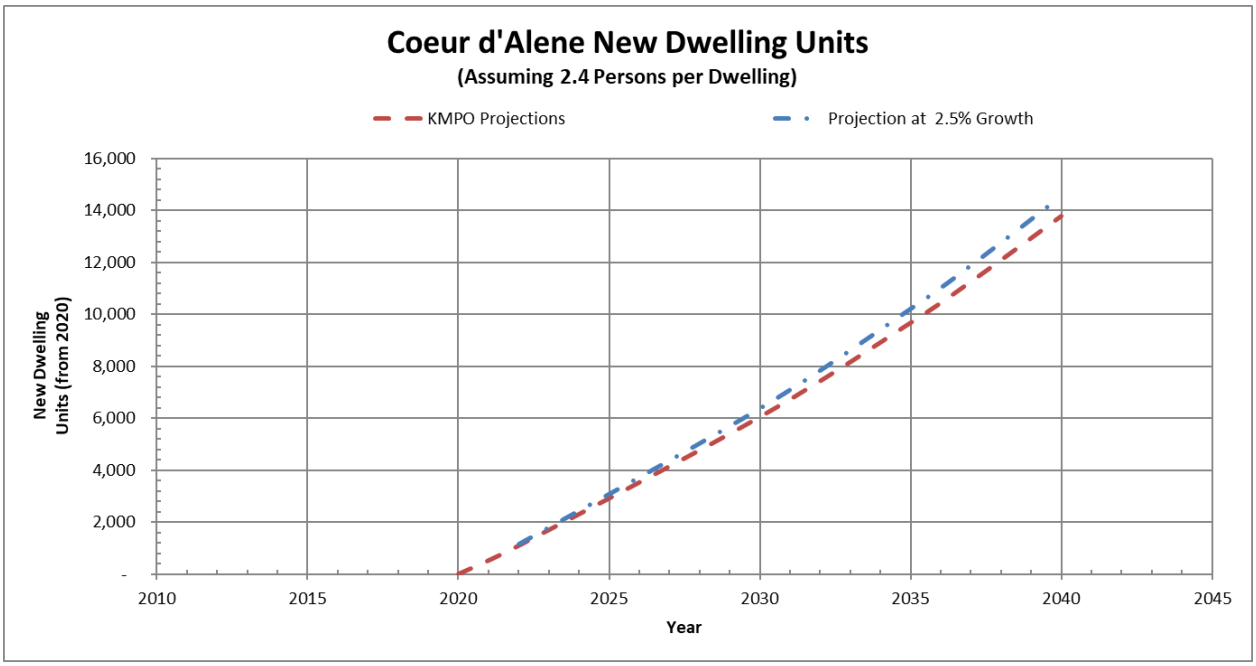


Based on discussions with the Wastewater Utility Department, a growth rate of 2.5 percent will be utilized for this study. This matches well with the City's 2022-2042 Comprehensive Plan and KMPO's planning documents. Actual growth rates should therefore be reviewed periodically and compared to the recommendations in this study.

The Census Bureau statistics indicate persons per household for the period 2016 through 2020 was 2.27. The KMPO data show a current value of 2.40 persons per household based on total occupied housing, which was used in KMPO's subsequent projections for the forecast period. For consistency with the stated KMPO assumption, it is assumed that the number of persons per household will be 2.40 throughout the forecasting period. The corresponding number of new residential dwelling units (2020 baseline) based on the preceding population projections is shown on **Figure 5-2**. In summary:

- The KMPO population estimates result in approximately 13,800 additional new residential households by 2040.
- At an assumed annual growth rate of 2.5 percent, approximately 14,000 additional new residential households will be developed by 2040.

Figure 5-2 – City of Coeur d'Alene New Dwelling Units (2020 to 2040)



5.2 Infill within Existing City Limits

Approximately 650 acres of land that has not been developed yet exists within the City limits. It is assumed that these areas will be developed consistent with the current zoning and the City's Comprehensive Plan (2022-2042). As growth occurs, these areas will likely be developed prior to growth outside the current City limits.

5.3 Future Service Boundary Extents

During the 2013 Collection System Master Plan Update, the City of Coeur d'Alene Wastewater Staff coordinated with the City's Planning Department to define areas of anticipated growth outside the City limits, including identifying the City's future wastewater service boundary and the City's Area of City Impact (ACI). For the 2022 update, City Wastewater Staff selected to maintain the same future wastewater service boundary as defined in the 2013 Master Plan Update. The City's ACI was updated to reflect the City's current Comprehensive Plan (2022 -2042). Both the City's future wastewater service area and ACI are depicted in **Figure A4.** The total area of growth for wastewater represented by these boundaries is approximately 3,300 acres. Although build-out growth for the wastewater collection system is not expected to reach the southern and eastern edges of the City's ACI, expansion of the collection system to the western and northern edges of the ACI is expected.

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Chapter 6

Master Plan Model

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Chapter 6 – Master Plan Model

6.1 General

The Master Plan Model represents the ultimate build-out of the future wastewater service area. **Figure A4** defines the assumed future wastewater service area, which encompasses approximately 22 square miles. The Master Plan Model is a tool to guide growth and expansion of the collection system and also identify potential future deficiencies in the current collection system. The Master Plan Model's primary purposes are, therefore, as follows:

- Provide the size, approximate location, and depth for master planned sewer lines 10 inches in size and larger.
- Identify potential capacity issues that may arise in the existing collection system as the City develops new areas beyond the City limits in the future wastewater service area.
- Develop base model to use in evaluating future wastewater service scenarios.

6.2 Master Plan Model System Layer

6.2.1 Master Plan Trunk Lines

The Master Plan system layer was developed to take advantage of existing and future public right-of-way and the low-lying areas along natural drainages. During the development of the system, the following information was taken into consideration:

- Previous master plan routing.
- Lakeside Real Estate Holdings IV, LLC – Coeur Terra Development Wastewater Collection Study (i.e. Lakeside Study)
- Preliminary design pipe routing and invert elevations from the C.2 Project
- The prevailing topography in the study area slopes to the south towards Lake Coeur d'Alene and the Spokane River.
- Current and future right-of-way is expected to be along section lines, quarter section lines, and extension of existing roads.

To reduce capital construction costs and operation and maintenance costs, the depth of master plan trunk lines (10 inches and larger) was held as shallow as possible while still providing service and minimizing the number of lift stations. Service area "check lines" were included in the model to ensure that the trunk lines have sufficient depth to serve to the boundary of its service area. The check lines start with 5 feet of cover and have a minimum slope of 0.40 percent. Some check lines were reduced to 3 feet of cover to

reduce the depth of the trunk line and/or reduce the likelihood of adding a lift station to the system. In some cases, the check lines forced the trunk line deeper to help ensure serviceability of the service area.

A “meander” factor was added to the model. This safety factor adds a drop at each manhole to account for possible changes to master plan alignments that may occur as parcels are subsequently developed. Manhole drops are based on the length and slope of upstream pipe. Each drop provides at least 20 percent of additional length if the minimum slope for the given pipe size is maintained. This allows each trunk line to “meander” and add up to 20 percent to its length without lowering the downstream pipe invert.

Additionally, headloss occurs in most manholes unless the manhole is constructed as a doghouse manhole. The loss comes from the change in geometry as flow enters the manhole and exits to the downstream piping. Manhole headloss is approximated as 10 percent of the velocity head of the upstream pipe.

Sizing of master planned lines was accomplished using the design parameters listed in **Table 6-1**. Some of the study area has sufficient slope to allow trunk lines to be constructed at steeper than minimum grade, thereby allowing reduced trunk line sizes. Care must be taken that trunks are designed and installed at the same or steeper slope than those listed in the Master Plan. **Appendix H** lists the proposed sizes, inverts, and slopes of the master planned trunk lines, and denotes any trunk lines that require steeper than minimum slopes.

Piping location, size and general flow routing was modified along the City’s Western Wastewater Service Expansion Area (Lakeside Properties) from the 2013 Master Plan to reflect more closely the Coeur Terra Development Wastewater Collection Study proposed flow routing. These modifications expand the Hawks Nest Lift Station Service Area and route flow through the Laurel/Sherwood, Appaloosa, and Fairway Trunk Mains. The proposed modifications eliminate the need for the deep Huetter Interceptor gravity sewer and the three-pipe siphon identified in the 2013 Master Plan.

Figure A12 shows proposed sizes and locations for the master planned trunk lines. **Appendix C** has further discussion of the parameters and methods used to develop the master plan system layer.

Table 6-1 – Master Plan Pipe Design Parameters

Pipe Diameter (in)	Maximum Allowed Depth/Diameter (d/D)	Minimum Slope
8	0.50	0.40%
10	0.55	0.28%
12	0.60	0.22%
15	0.65	0.15%
18	0.75	0.12%
≥21	0.75	0.10%

Between the initial conceptual layout and the final model results, several alignment changes were made to provide service to the study area extents, minimize the sewer depths, and minimize the number of lift stations. Re-grading of existing pipes was necessary to connect master plan piping for the Lakeside Development, the extension to the Forest Service area, and the Nettleton Gulch Extension. The final model results indicate that most of the future trunk lines as located are at planned depths of less than 20 feet below the ground surface, as shown in **Figure A14**.

6.2.2 Lift Stations

The system's lift stations, both existing and proposed with extension into the service area, are listed in **Table 6-2**. In summary:

- The Hawks Nest Lift Station will remain in service and continue to serve the Hawk's Nest and Landings Developments. Additionally the lift station size will be increased to provide service to the northern area of the future Lakeside Development, reference **Section 6.4.1 Hawk's Nest Lift Station** for additional details.
- The Foothills Lift Station can be abandoned after the Nettleton Gulch Extension is built to Maple Leaf Road.
- Canfield Lift Station service area to remain the same.
- The Orchard Lift Station (privately owned and maintained lift stations) could also potentially be abandoned and routed by gravity along back-lot lines and Atlas Road to a future gravity line on Seltice Avenue, which would then discharge to the Mill River Lift Station. This alternative was discussed with the Wastewater Utility as part of the 2013 MP, but a preliminary alignment and grade check was not developed.
- Several new lift stations will be required to serve the study boundary.

Table 6-2 – Master Plan Model Lift Station Summary

Lift Station Name	Pump Design Capacity (GPM)	Master Plan Influent Peak Flow (GPM)	Lift Station Safety Factor[1]	Master Plan Influent Peak Flow w/ SF (GPM)	Calculated Remaining Capacity (GPM)	Calculated Remaining ERU[5]
Existing Lift Stations						
15th & Ash	170	32	10%	35	135	1,297
Woodside	60	8	10%	9	51	488
Fernan	200	40	10%	44	156	1,502
Indian Meadows	330	175	10%	193	137	1,319
Foothills	270	- [6]		-	-	
Canfield	500	371	10%	409	91	875
Cumberland Meadows	300	54	10%	60	240	2,308
Mill River [2]	675	341	10%	375	300	2,881
Riverside ("Bellerive") [4]	300	65	10%	72	228	2,191
Hawk's Nest	1,200	1,072	20%	1,287	-87	0
Orchard [3]	-	18	-	20	-	-
Blackwell RV [3]	-	37	-	40	-	-
New Lift Stations						
Blackwell Hill	-	874	10%	962	-	-
Cougar Bay	-	514	10%	565	-	-
Silver Beach	-	647	10%	711	-	-
Evergreen	-	234	10%	257	-	-

1. *Safety factor as defined in Appendix C, Table C-4, is added to peak flow to define lift station capacity.*
2. *Build-out design point with 11.375" impeller*
3. *Privately Owned and Maintained Lift Station – Design information not available.*
4. *Riverside (Bellerive) undergoing upgrades during 2022 Collection System Master Plan Update. Information not available.*
5. *Remaining ERU's were calculated using the Residential High flow generation value of 150 GPD/ERU.*
6. *Abandoned in Master Plan Scenario.*

6.3 Master Plan Model Flow Generation Layer

6.3.1 Land Use and Unit Flows

Land use designations for the Master Plan Model were determined through comparisons with previous Master Plans, discussions with the City, and City's current Comprehensive Plan (2022-2042). The same unit flows that were used in the Committed Model (**Chapter 4**) were also used in the Master Plan Model. Non-residential unit flows are listed in **Table 4-1** and residential unit flows are listed in **Table 4-2**. Flows for the Master Plan Model started with a copy of the flows from the Committed Model. The same allocation guidelines used in the Committed Model were followed in the Master Plan Model to determine whether new master plan flows should be allocated on a net or gross basis (reference **Section 4.4**).

6.3.2 Flow Allocation

Each parcel in the future wastewater service area was modeled by injecting flow into the nearest upstream manhole in the system layer. The injections were to existing manholes or new master plan manholes, depending on location in the system. Some large master plan parcels were divided and injected into multiple locations based on topography and trunk line serviceability. **Figure A13** shows the injection points for each parcel in the Master Plan Model.

It is important to note that the service area boundaries for each trunk line shown on the map are based on aerial mapping and USGS contours and are therefore approximate. The individual service area boundaries will likely change slightly as field survey is performed and development occurs. While safety factors built into the model allow for these minor changes, significant proposed changes or the cumulative effect of minor changes should be analyzed to prevent over-allocation of trunk capacity in the future.

6.3.3 Infiltration and Inflow

The infiltration and inflow (I/I) used in the Committed Model was also used as the base for the Master Plan Model. I/I is expected in the new master plan areas, but without direct connections such as roof drains and catch basins. Data collected during the 2012 flow monitoring efforts in the Northwest Quadrant was used for applying I/I to future master plan areas. The catchment areas for each new master plan manhole were adjusted to take into account the removal of the 8-inch lines and associated manholes in order to produce a similar runoff response for the same gross area as the Northwest Quadrant. The additional impervious area added by the master plan areas is equivalent to 1 acre per 500 acres, totaling 6.53 AC. The total impervious area included in the Master Plan Model to 37.06 AC.

6.4 Master Plan Model Analysis

The Master Plan Model analysis shows the results if all of the master plan flows are developed without the addition of any relief lines or correction of existing system deficiencies, except for the re-grading of existing pipes necessary to connect master plan piping. This helps identify the priorities for Capital Improvement Projects.

Table 6-3 contains a list of the issues identified in the system for the Master Plan Model. Similar to the existing and committed model results, each problem reach is identified by the downstream manhole and is discussed in detail in **Appendix E**.

Several issues are relatively minor and corrective actions are not currently recommended. However, these areas should be monitored in the future, and the recommendation reviewed if the capacity of the system is compromised or if master plan assumptions are modified.

Figures A15.1, A15.2 and **A16** show the Depth over Diameter Exceedance, Depth over Diameter and Reserve Capacity, respectively, for the Master Plan Model. The depth over diameter exceedance plot can be used to identify the pipe reaches that exceed the City's established criteria stated in **Appendix C**. The depth over diameter plot can be used to identify the extents of surcharging or limited capacity and includes backwater effects from downstream pipe segments. The reserve capacity plot can be used to identify individual pipes that could be the root cause of the surcharging or limited capacity but does not include backwater effects from downstream pipe segments.

Appendix H contains results from the Master Plan Model Analysis. All Master Plan Model results and figures include the design storm event listed in **Section 3.3.4**. The increase in number of issues identified from the previous Master Plan is related to the City's population growth, modification in criteria, increased storm event, and decrease of existing pipes' allowable d/D.

Table 6-3 – Master Plan Model Issues

MH Identifier	Issue	Identified Under Committed Model Analysis	Issue ID	Recommended Action *(to be determined after CIP model scenario is completed)*
BUS1-01B	Surcharge ~ 1.62 ft	X	Appendix E, Section 4.1	Replace - *See CIP C.1 for details*
BUS1-02	Surcharge ~ 1.67 ft	X	Appendix E, Section 4.1	Do Nothing
M1-19	Surcharge ~ 0.57 ft		Appendix E, Section 4.2	Divert to new line - *See CIP C.2 for details*
M1-20	Surcharge ~ 0.44 ft	X	Appendix E, Section 4.2	Divert to new line - *See CIP C.2 for details*

MH Identifier	Issue	Identified Under Committed Model Analysis	Issue ID	Recommended Action *(to be determined after CIP model scenario is completed)*
M1-20A	Surcharge ~ 0.70 ft		Appendix E, Section 4.2	Divert to new line - *See CIP C.2 for details*
M2-01AA	Surcharge ~ 0.77 ft		Appendix E, Section 4.2	Divert to new line - *See CIP C.2 for details*
M3-19	Surcharge ~ 0.03 ft	X	Appendix E, Section 4.3	Verify Slopes and Inverts
M3-21	Surcharge ~ 0.13 ft	X	Appendix E, Section 4.3	Verify Slopes and Inverts
M3-24	Surcharge ~ 0.25 ft	X	Appendix E, Section 4.3	Verify Slopes and Inverts
M3-25	Surcharge ~ 0.23 ft	X	Appendix E, Section 4.3	Verify Slopes and Inverts
D1-02	Surcharge ~ 0.03 ft	X	Appendix E, Section 4.3	Do Nothing
GAR1-03	Surcharge ~ 0.68 ft		Appendix E, Section 4.4	Replace - *See CIP C.6 for details*
GAR1-04	Surcharge ~ 1.60 ft	X	Appendix E, Section 4.4	Replace - *See CIP C.6 for details*
GAR1-05	Surcharge ~ 1.68 ft	X	Appendix E, Section 4.4	Replace - *See CIP C.6 for details*
GAR1-06	Surcharge ~ 1.86 ft		Appendix E, Section 4.4	Replace - *See CIP C.6 for details*
GAR1-07	Surcharge ~ 1.18 ft		Appendix E, Section 4.4	Replace - *See CIP C.6 for details*
GAR1-08	Surcharge ~ 1.21 ft		Appendix E, Section 4.4	Replace - *See CIP C.6 for details*
GAR1-09	Surcharge ~ 1.15 ft		Appendix E, Section 4.4	Replace - *See CIP C.6 for details*
GAR1-10	Surcharge ~ 1.37 ft		Appendix E, Section 4.4	Replace - *See CIP C.6 for details*
GAR1-11	Surcharge ~ 1.64 ft		Appendix E, Section 4.4	Replace - *See CIP C.6 for details*
GAR1-12	Surcharge ~ 1.40 ft		Appendix E, Section 4.4	Replace - *See CIP C.6 for details*
GAR1-13	Surcharge ~ 1.39 ft		Appendix E, Section 4.4	Replace - *See CIP C.6 for details*
GAR1-14	Surcharge ~ 1.19 ft		Appendix E, Section 4.4	Replace - *See CIP C.6 for details*
GAR1-15	Surcharge ~ 1.16 ft		Appendix E, Section 4.4	Replace - *See CIP C.6 for details*
BEXT1-22B	Surcharge ~ 0.11 ft	X	Appendix E, Section 4.7	Do Nothing

MH Identifier	Issue	Identified Under Committed Model Analysis	Issue ID	Recommended Action *(to be determined after CIP model scenario is completed)*
RAM1-43	Surcharge ~ 0.08 ft		Appendix E, Section 4.9	Divert to new line - *See CIP C.12 for details*
RAM1-43B	Surcharge ~ 1.56 ft	X	Appendix E, Section 4.9	Divert to new line - *See CIP C.12 for details*
RAM1-44	Surcharge ~ 0.26 ft		Appendix E, Section 4.9	Divert to new line - *See CIP C.12 for details*
RAM1-45A	Surcharge ~ 1.16 ft		Appendix E, Section 4.9	Divert to new line - *See CIP C.12 for details*
RAM1-46	Surcharge ~ 1.46 ft		Appendix E, Section 4.9	Divert to new line - *See CIP C.12 for details*
RAM1-46A	Surcharge ~ 2.03 ft		Appendix E, Section 4.9	Divert to new line - *See CIP C.12 for details*
RAM1-46B1	Surcharge ~ 2.13 ft		Appendix E, Section 4.9	Divert to new line - *See CIP C.12 for details*
RAM1-47	Surcharge ~ 1.87 ft		Appendix E, Section 4.9	Divert to new line - *See CIP C.12 for details*
DEP1-01	Surcharge ~ 3.54 ft		Appendix E, Section 4.13	Do Nothing
DEP1-02	Surcharge ~ 3.51 ft		Appendix E, Section 4.13	Do Nothing
DEP1-03	Surcharge ~ 3.11 ft		Appendix E, Section 4.13	Do Nothing
DEP1-04	Surcharge ~ 2.72 ft		Appendix E, Section 4.13	Do Nothing
DEP1-05	Surcharge ~ 2.45 ft		Appendix E, Section 4.13	Do Nothing
DEP1-06	Surcharge ~ 1.80 ft		Appendix E, Section 4.13	Do Nothing
DEP1-07	Surcharge ~ 1.35 ft		Appendix E, Section 4.13	Do Nothing
DEP1-08	Surcharge ~ 0.13 ft		Appendix E, Section 4.13	Do Nothing
RIV1-03D	Surcharge ~ 0.35 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-03C	Surcharge ~ 0.55 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-03B	Surcharge ~ 0.64 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-03A	Surcharge ~ 0.54 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-04	Surcharge ~ 0.44 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*

MH Identifier	Issue	Identified Under Committed Model Analysis	Issue ID	Recommended Action *(to be determined after CIP model scenario is completed)*
RIV1-05	Surcharge ~ 0.40 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-06	Surcharge ~ 0.35 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-07	Surcharge ~ 0.39 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-08	Surcharge ~ 0.27 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-09	Surcharge ~ 0.26 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-10	Surcharge ~ 0.32 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-11	Surcharge ~ 0.25 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-12	Surcharge ~ 0.22 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-13	Surcharge ~ 0.22 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-15	Surcharge ~ 0.15 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-16	Surcharge ~ 0.13 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-17A	Surcharge ~ 0.13 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-18	Surcharge ~ 0.07 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-25A	Surcharge ~ 0.08 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-26	Surcharge ~ 0.08 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-29	Surcharge ~ 0.06 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-30	Surcharge ~ 0.13 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*
RIV1-31	Surcharge ~ 0.30 ft		Appendix E, Section 4.15	Divert to new line - *See CIP C.4 for details*

6.4.1 Hawk's Nest Lift Station

Previous City master planning efforts eliminated the Hawks Nest Lift Station with the addition of the deep Huetter Interceptor under I-90 and Seltice three pipe siphon, in order to service the properties immediately east of Huetter Avenue and the Hawk's Nest and Landings developments. The Hawk's Nest lift station was not originally intended to permanently serve the Hawk's Nest and Landings developments.

In May of 2022, J-U-B conducted a wastewater collection system study for Coeur Terra Development, subsequently referred to in this Master Plan as the Lakeside Study. The Lakeside Study evaluated different options for re-routing sewer flow for future development of the properties immediately east of Huetter Avenue, south of Prairie Avenue. During the Lakeside Study, City staff worked closely with Coeur Terra Development to develop sewer routing that would eliminate the need for deep gravity sewer, another I-90 crossing and inverted siphon.
This Master Plan update followed the same sewer routing methodology proposed in the Lakeside Study:

- Expanding the Hawks Nest Lift Station service area to include permanent service for the northern portion of the Lakeside Study area, Hawks Nest and Landings Developments.
- Route flow by gravity through existing Laurel/Sherwood, Appaloosa, and Fairway Trunk Main
- Add another gravity interceptor parallel to existing Riverside Interceptor

6.4.2 Nettleton Gulch

Prior to the 2013 Master Plan, previous system analysis proposed abandoning the Canfield and Foothills Lift Stations in favor of gravity service through Nettleton Gulch, Maple Leaf Road, Thomas Lane, and north to Shadduck Lane. However, during the 2013 Master Plan evaluation it was discovered the Copper Ridge Subdivision discharges into the Canfield Lift Station significantly lower than the other incoming sewer lines (approximately three feet), meaning the Canfield Lift Station can no longer be abandoned.

In order to maximize the Canfield Lift Station Service area and minimize areas of deep gravity sewer through Nettleton Gulch, this Master Plan outlines the following flow routing:

- Re-grade approximately 750 LF of existing 12-inch sewer between Best Avenue and east of Grand Fir Drive.
- Construct the new lines below minimum slopes (0.20 percent) for the entire length of the extension from Best Avenue to the intersection of Maple Leaf Road and Thomas Lane.
- Extend new 8-inch gravity sewer from the intersection of East Thomas Hill Drive and Thomas Lane to serve the nearby auto recycling store and abandon the existing Foothills Lift Station in favor of gravity service to the South through Maple Leaf Road.
- Retain the current Canfield Lift Station to serve area.

The alignment shown in the Master Plan is necessary to avoid excessive depths, FEMA identified flood plains, and connect to the downstream gravity sewer. The current alignment is along anticipated public right-of-way and lot lines as required and includes 0.1-foot drops for each manhole but does not include any allowance for meander. If an alignment following Nettleton Gulch Road is pursued, excavation to depths exceeding 30 feet would be required; additionally, rock excavation would be likely due to observed geology along the road.

6.4.3 Blackwell Hill

Extending service to the Blackwell Hill area will be challenging due to steep slopes and underlying rock. Two new lift stations in addition to the small privately owned and maintained lift station on Blackwell Island will be needed to serve the area. A third lift station will be required if the gravity route along the western edge of the study boundary (that goes outside the ACI) is not implemented.

Potential conflicts and issues with serving the area include the following:

- Approximately 500 LF of the Blackwell Hill Interceptor is over 25 feet deep on Millview Lane through a section with existing homes on both sides of the road.
- Two Highway 95 crossings are required for collectors upstream of the future Cougar Bay Lift Station.
- Easement acquisition is necessary for the Cougar Bay Collector south of Highway 95.
- Limited space is available for hanging multiple force mains on the Highway 95 bridge. Currently, one 6-inch force main exists with hangers for a future parallel force main. Possibilities include combining future force mains, re-routing the current privately owned and maintained lift station force main to the future Cougar Bay Lift Station, or directional drilling under the river and routing all future force mains through the bore.

Therefore, we recommend that a detailed feasibility study be done before sewer service is extended to Blackwell Hill.

6.4.4 Silver Beach

Two new lift stations will be necessary to serve the area near Silver Beach. A single lift station is possible but would require significant pipe depths along Coeur d'Alene Lake Drive where space is limited. The main lift station shown near Silver Beach Road will also serve the Terraces. The Terraces is part of a PUD that is required to build a public lift station when a second user connects. Additionally, Coeur d'Alene Lake Drive is Owned by East Side Highway District (ESHD). Easements, special permits and a feasibility study would be required to service the area.

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Chapter 7

Asset Management Program and Capital Improvement Plan

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Chapter 7 – Asset Management Program and Capital Improvement Plan

7.1 Asset Management Program

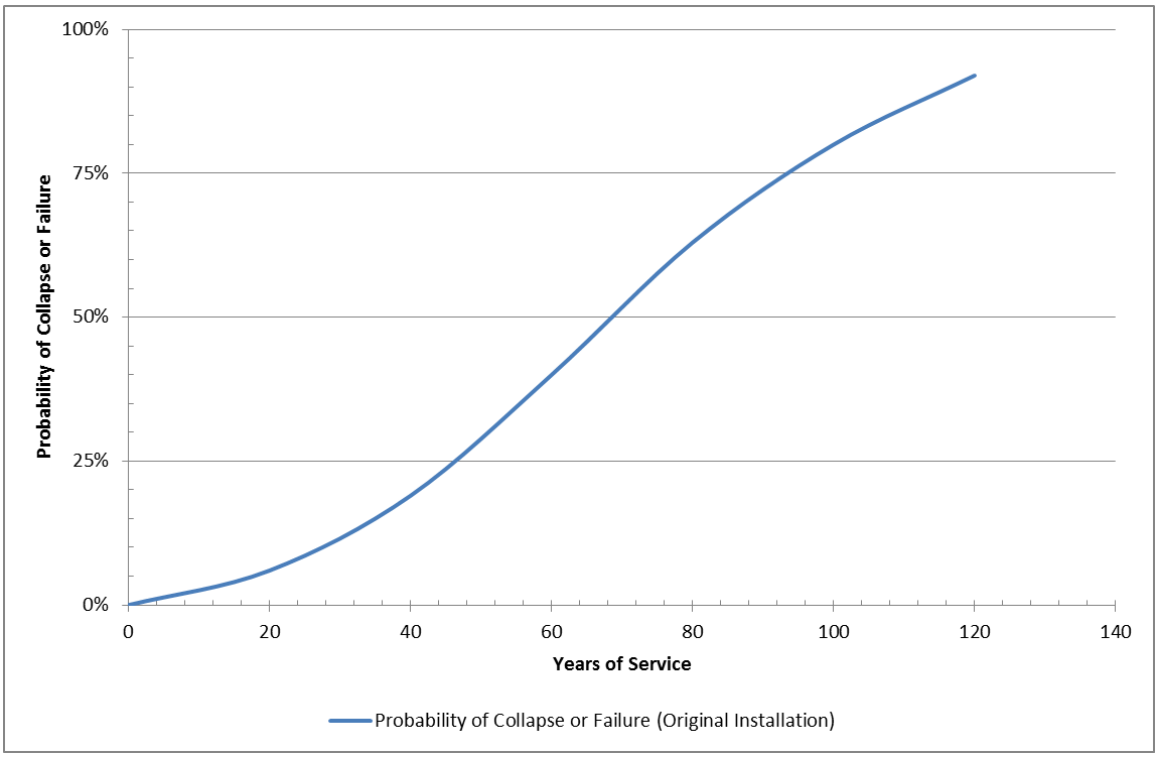
7.1.1 Condition Assessment – General

The City of Coeur d' Alene's (the City's) GIS contains a considerable amount of data that may be used for whole system and reach-specific condition assessments. This data, in turn, may then be used in an overall Asset Management Plan for the City's wastewater collection system. Asset management may be generally grouped into four categories–*Operative – Reactive, Inspection – Condition Based, Proactive,* and *Predictive* (Ugarelli et al, 2010). A summary of each is listed below. Of the four categories, the City of Coeur d'Alene Wastewater Utility generally applies the *Inspection – Condition Based* and *Proactive* approaches, with minimal *Operative – Reactive* work.

- **Operative – Reactive**: Also termed fail and fix, this approach effectively results in operating an asset through its complete, useful life. However, doing so limits a utility's ability to fund maintenance since projects arise on an emergency basis only. Costs may be low in some years, while extremely high in other years.
- **Inspection – Condition Based**: This approach is often dubbed find and fix since it relies on inspecting lines, assessing the structural condition, and scheduling the line for replacement. In practice, this approach identifies lines that are approaching failure (typically with an expected remaining life of one to ten years) or have unnecessarily high maintenance costs. Utilities are better able to fund maintenance projects through yearly budgets provided the inspection window covers several years of potential work. A consistent approach to prioritizing lines is critical to the success of this approach of asset management since decisions made in one year must be equivalent to assessments of other lines in subsequent years.
- **Proactive**: This approach involves replacing or rehabilitating a main line before there is a likelihood of failure. Through regular inspections and condition assessments, the utility can monitor the rate of degradation of the line and schedule replacement or rehabilitation prior to an elevated risk of failure.
- **Predictive**: Under this scenario, a utility combines condition assessment, potential rehabilitation costs, expected maintenance costs with and without rehabilitation, risk of failure, and economic impacts to minimize the life cycle cost of the utility. As its name implies, the approach includes a predictive component for utility degradation versus increased maintenance as well as a probabilistic element for failure and the related impacts to ratepayers, the environment, level of service, etc.

Each of these scenarios ultimately approaches the central issue of line deterioration and remaining service life. Various research efforts have quantified the useful and ultimate life of sewer utilities in an attempt to define predictive models (Ugarelli et al; Younis and Knight; Salman and Salem). Common to these studies has been the impact of site-specific parameters. For practical application of these concepts to the City's collection system, it is advantageous to consider deterioration on a probabilistic basis with an endpoint being collapse or failure. As shown in **Figure 7-1**, the probability of collapse or failure, either in the foreseeable future or imminently, is expected to gradually increase over time with a noticeable acceleration after 40 to 50 years of service for a mainline. Continuing forward, the probability of collapse or failure exhibits a relatively steady and consistent rise.

Figure 7-1 – Theorized Probability of Collapse or Failure for a Mainline



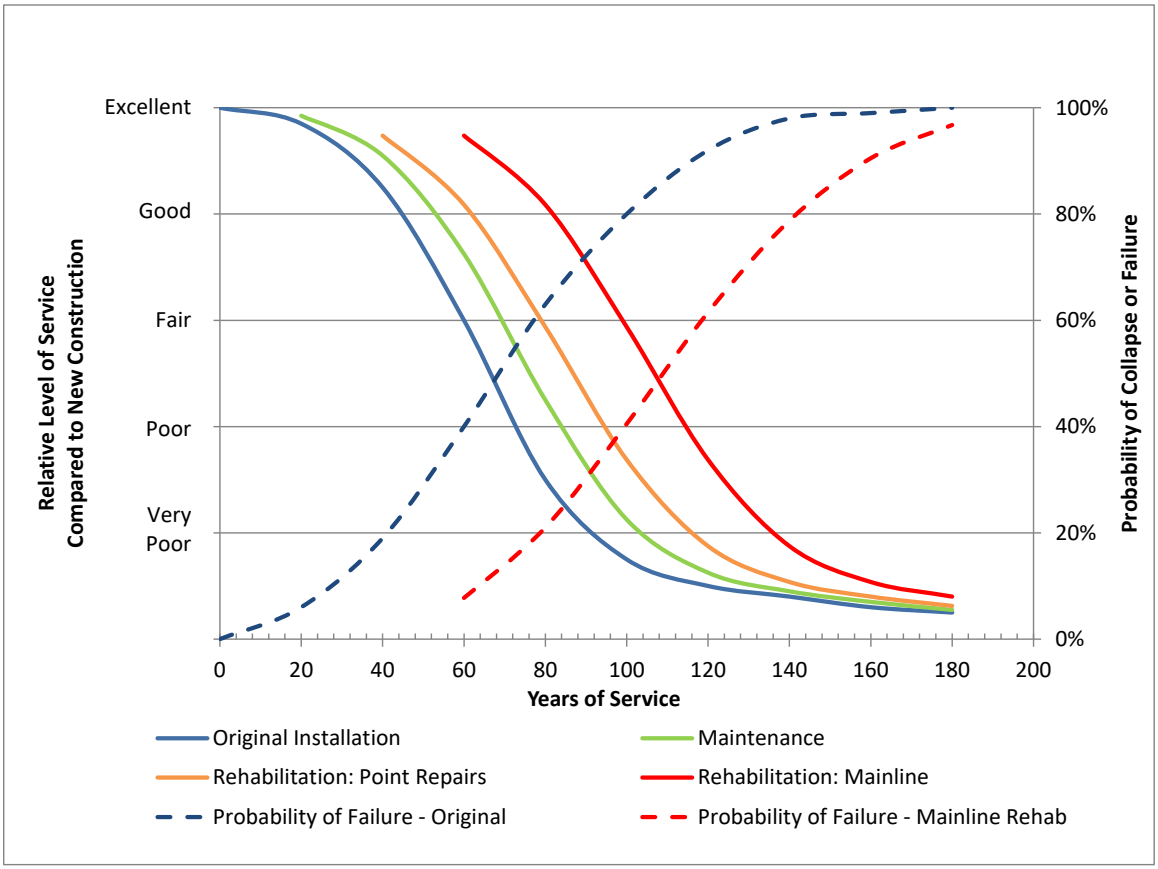
The likelihood of failure is generally reciprocal to the level of service when compared to a new installation with several stages.

- Within the first 20 years, it is expected that maintenance activities on mainlines will be relatively minor (e.g., routine cleaning and inspection).
- In the following 20 years, maintenance activities will generally increase but are necessary to maintain a desired level of service in the mainline. More frequent cleaning is required in addition to root cutting and possible point repairs to replace disconnected services, alignment problems, or other structural deficiencies.

- As these costs escalate, it may become cost effective to undertake a rehabilitation of the mainline using cured-in-place pipe (CIPP), sliplining, pipe bursting, or another trenchless technology.

Each of these rehabilitation steps resets the deterioration curve, but does not re-establish the level of service equal to a newly constructed line. Consequently, these maintenance and rehabilitation activities will reach a point of diminishing return and require complete replacement of the mainline. These repeated cycles of deterioration and rehabilitation are illustrated conceptually in **Figure 7-2**. A key conclusion of these theoretical curves is that through continued maintenance, point repairs, and rehabilitation, the useful life of a mainline may be greatly extended.

Figure 7-2 – Theorized Deterioration Cycles of a Mainline with Multiple Rehabilitation Steps



7.1.2 Overall Prioritization of Existing Mainlines

Following the 2013 Master Plan Update, City staff developed and began implementing a standard sewer conditional assessment methodology for use during routine sewer closed-circuit television video (CCTV) assessments. The objective of standardizing sewer condition assessments was to assist the City in prioritizing and scheduling pipe replacement and rehabilitation before pipelines fail, or experience severe maintenance issues. Adjustments to the City's condition assessment methodology have been made over the years to tailor the program more adequately to the City's needs. The City's current condition assessment method identifies both structural and maintenance defects.

For this Master Plan update, pipes were placed into two categories, with CCTV inspection or without CCTV inspection. Pipes with current CCTV inspections using the City's defect code were given a Structural Overall Priority Score (**Figure A3.1)** and a Maintenance Overall Priority Score (**Figure A3.2)**. Pipes without current CCTV were evaluated and assigned a CCTV Overall Prioritization Score anticipated for the City's use for future CCTV efforts (**Figure A3.3)**. Methodology for outlining CCTV Overall Prioritization Score is outlined in **Appendix K.**

Overall Pipe Priority Categorization

The Overall Pipe Priority for each category (Structural and Maintenance, or CCTV) was quantified by defining a pipe's *likelihood* and *consequence* of failure. The Overall Pipe Priority ranking was then categorized as either a high, moderate, or low priority level plotted in a fashion similar to the example Priority Categorization shown in **Figure 7-3.**

Figure 7-3 - Priority Categorization

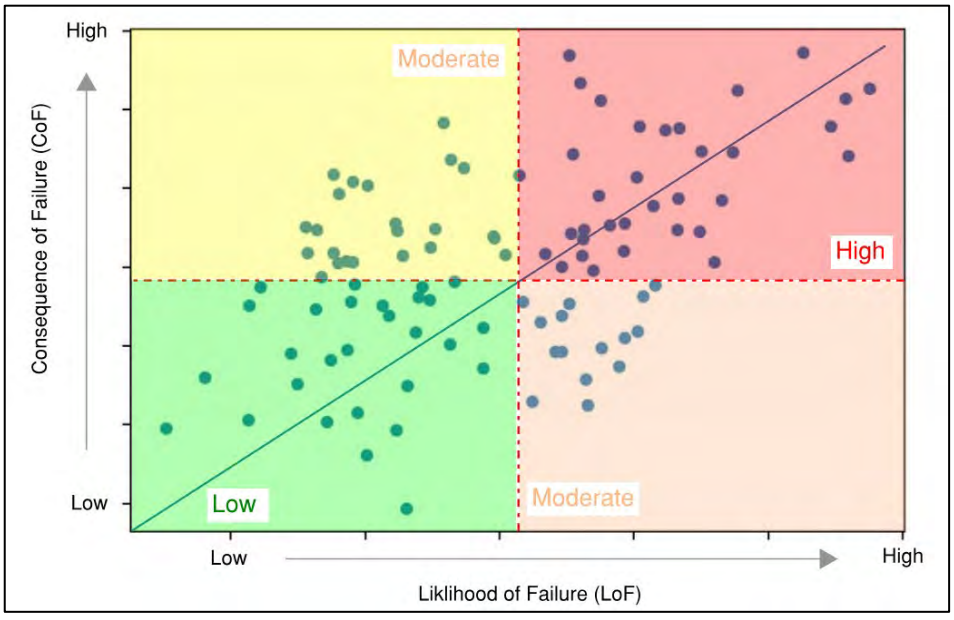


Table 7-1 – Overall Priority Grouping

Priority Rank	Description
High	The line is generally considered as being in very poor condition with significant corrective actions needed within the next 10 years to maintain a high level of service.
Moderate	The line is generally considered as serviceable; however repairs and/or frequent additional maintenance activities are likely needed to maintain a high level of service. Rehabilitation or replacement is anticipated to be needed in more than 10 years.
Low	The line is generally considered in fair condition, and repairs are not currently needed in the near term. Inspection and review of the pipe's condition is recommended once every two to five years. Rehabilitation or replacement not anticipated to be required in the next 10 years or more.

Likelihood of Failure

The City's sewer condition assessment program begins with quantifying the *likelihood* a pipe would experience a failure, by identifying noteworthy collection system defects during CCTV assessments of each pipe's reach. Noteworthy issues include moderate to severe defects, uncommon defects, or defects that limit the use of certain rehabilitation/repair methods. Each defect was given a rating of light, moderate, or high severity, which are weighted by 3, 10, and 15 points, respectively. To achieve objective assessments by multiple users, the severity of each defect is defined by measurable characteristics. The City's current Condition Assessment Method Matrix is summarized in **Appendix K.**

Consequence of Failure

The second step used in defining the pipe's overall prioritization was quantifying the risk, or *consequence*, associated with each pipe reach's potential failure. The *consequence* associated with a pipe's failure is dependent on many factors directly associated to site-specific conditions. The City has selected to evaluate the *consequence* of each pipe reach failure based on pipe diameter and normalized by the pipe's length. The scores associated with each consequence are located in **Appendix K.**

Appendix K contains a detailed breakdown of the pipe prioritizing methodology used in this Master Plan Update for each of the following three categories:

- Structural Overall Priority Score (pipe with CCTV & defect scoring)
- Maintenance Overall Priority Score (pipe with CCTV & defect scoring)
- CCTV Priority Score (pipe without CCTV & defect scoring)

7.1.3 Existing System Rehabilitation or Replacement Projects

City staff elected to prioritize pipes for rehabilitation or replacement based on each pipe's Structural Defect Scoring **(Figure A3.1)**. Pipes ranking as High Likelihood of Failure (LoF) and High Consequence of Failure (CoF) were categorized into rehabilitation or replacement projects, as shown in **Figure A3.4**. Preliminary cost estimates and project maps were prepared for each project location, located in **Appendix I.** As established in the previous 2013 Master Plan, City staff will continue to target non-plastic pipes for rehabilitation and replacement. Additionally, using the City's current asset management program, plastic pipes in poor condition will also be flagged and scheduled for rehabilitation or replacement. It is anticipated pipes prioritized for rehabilitation and replacement will evolve as City staff continues to perform CCTV assessments and more pipelines are scored.

Pipes were categorized into rehabilitation or replacement projects based on City identified structural defects. Pipes with 6-inch diameters and smaller were targeted solely as replacement or open trench projects and planned to be upsized to 8-inch diameter pipe per IDAPA code. Defects on pipes 8-inches and larger were reviewed for either open trench replacement or trenchless rehabilitation. Defects that could be fully structurally rehabilitated using trenches technologies, such as surface damage, roots, and light cracking or breaks, were identified as potential cured-in-place pipe (CIPP) projects. Defects such as dimples, grade breaks, or significant pipe breaks, that are not mitigated using CIPP were identified as potential open trench projects. A detailed list of the identified rehabilitation or replacement (RR) projects is located in **Table 7-4.** Individual project maps for each identified RR project are in **Appendix I** for reference.

Costs for each rehabilitation and replacement project were developed using historical bid prices for projects in Coeur d'Alene since 2004 and other comparable projects. Project costs are preliminary and were developed in 2022 (September) dollars and should be reviewed at the time of preliminary design. Additionally, a considerable portion of the older, 6- and 8-inch mains were constructed in alleys, are relatively deep, and have multiple utility conflicts; these factors tend to increase the per foot replacement cost compared to construction in new developments. An alleyway construction contingency was added to the cost estimates as needed. The Wastewater Utility Department has primarily used cured-in-place pipe (CIPP) for trenchless rehabilitation when feasible. Costs for rehabilitation projects were developed using September 2022 CIPP liner costs. Alternate trenchless methods and costs should be reviewed at the time of preliminary design.

The lift stations must also be rehabilitated and replaced as necessary. Major mechanical rehabilitation is often required every 15 to 30 years, while electrical upgrades are often required every 15 to 20 years. A major rehabilitation or replacement should be expected every 50 years. As shown in **Table 7-2**, several lift stations will need mechanical and/or electrical upgrades within the next 10 years. None of the lift stations are expected to undergo a major rehabilitation or replacement within the next 10 years. For

budgetary purposes, the following costs are assumed: a mechanical upgrade is $50,000 to $75,000 and an electrical upgrade is $50,000 to $100,000, depending on the lift station's size (2022 dollars).

An additional deficiency noted in a subsequent analysis for the Mill River Lift Station is the lack of emergency storage volume in the event of a lift station failure. Although the Lift Station satisfies Idaho Code requirements by including emergency standby power, the Wastewater Utility has a policy requiring 30-minute storage to respond to an overall system failure. An upgrade to include emergency storage is discussed in **Appendix J** and is subsequently included in the Capital Improvement Plan.

Table 7-2 – Lift Station Rehabilitation/Replacement Expectations[1]

Lift Station Name	Year Constructed/ Last Major Rehabilitation	Comments	Rehabilitation Expected In...		
			Mechanical (15 to 30 years)	Electrical (15 to 20 years)	Major Rehabilitation/ Replacement (50 years ±)
15th & Ash	1997		0 - 5 years	0 - 5 years	10 - 20 years
Woodside	1996	Panel replacement in 2013	0 - 5 years	15 - 20 years	25 - 35 years
Fernan	2019	SprayRoq coated wet well	15 - 30 years	15 - 20 years	40 - 50 years
Indian Meadows	1990		0 - 5 years	0 - 5 years	25 - 35 years
Foothills[2]	1993	Panel replaced in 2010	0 - 5 years	15 - 20 years	25 - 35 years
Canfield	2019	Panel replacement in progress, 2021/2022	0 - 5 years	15 - 20 years	25 - 35 years
Cumberland Meadows	2000		5 - 10 years	5 - 10 years	35 - 45 years
Mill River[3]	2005	Epoxy coated wet well	10 - 15 years	10 - 15 years	40 - 50 years
Riverside ("Bellerive")	2007	Epoxy coated wet well	10 - 15 years	10 - 15 years	40 - 50 years
Hawk's Nest[3]	2014	Epoxy coated wet well	10 - 15 years	10 - 15 years	40 - 50 years

1. *Table does not include information on privately owned and maintained lift stations – Orchard and Blackwell Island.*
2. *Foothills lift station to be abandoned with buildout, reference Appendix I.*
3. *Capacity improvements at Mill River and Hawk's Nest lift stations are included in Appendix I.*

7.1.4 Recommendations

The preceding analysis illustrates that a system as large as the City of Coeur d'Alene's may be prioritized into manageable categories for further investigation. To refine these results, the following is recommended:

- Establish a timeframe for completing CCTV inspections. Utilize **Figure A3.3** as tool for prioritization.
- Review "unknown" information in GIS and update.
- Add fields within GIS to identify year of construction for mainlines; when the dates are available, include the year of construction for lines already in GIS.
- Add fields within GIS to tie daily maintenance activities to pipe and manhole files.
- Review the Wastewater Utility's current condition assessment matrix, refine as necessary, and use on subsequent CCTV inspections.
- Continue to evaluate pipe reaches with CCTV using the City's current Condition Assessment Method. Update the structural and maintenance LoF and CoF scores as data is collected.

Additionally, the Wastewater Utility continues the replacement of all non-plastic sewer mains. The Wastewater Utility Department will continue to implement the condition and risk-based assessments, and the system life and corresponding replacement and rehabilitation budget will be re-evaluated and adjusted as appropriate.

7.2 Capital Improvement Plan

7.2.1 CIP Overview

The Capital Improvement Plan (CIP) prioritizes the improvements that are necessary in the near term to relieve capacity issues, replace deteriorated segments of the system, and implement improvements that will be needed as infill occurs within the City and as the wastewater service area is expanded to the future boundary. The CIP is organized into the following categories:

- Capacity Projects – Required due to insufficient capacity at some point in the future.
- System Modifications – Modifications to the existing system required to serve additional areas or accomplish goals of the Wastewater Utility.
- Rehabilitation/Replacement – Required to maintain the integrity of the existing system.
- Master Plan Extensions – Required to expand service to new areas currently outside the City boundary.
- Future Lift Stations – Required to expand service to areas not serviceable by gravity sewer.

Figure A17 shows the location and type of each project in the CIP. **Appendix I** contains a summary matrix for the CIP projects, detailed opinions of probable cost, and a CIP summary/figure for each project. All capital costs are in September 2022 dollars and are a Class 4 cost opinion (i.e., -30% to +50% per AACE). Further refinement of the cost opinions will be required during subsequent preliminary engineering and design phases.

The timeframe for implementing CIP projects not related to rehabilitation/replacement will ultimately depend on realized growth and non-residential development. The probable average flows, equivalent residential units (ERUs), and time to reach the modeled levels for residential conditions based on the growth rate selected in **Chapter 5** for the Existing, Committed, and Master Plan models are listed in **Table 7-3**.

Table 7-3 – Flow and ERU Summary for Each Model Condition

Model Condition	Non-Residential		Residential		
	Average Day Flow (MGD)	Approximate ERUs[1]	Average Day Flow (MGD)	Approximate ERUs[1]	Approximate Year
Existing	1.29	8,600	3.17	21,130	-
Committed	1.77	11,800	3.66	24,400	2025
Master Plan Model	1.81	12,070	5.85	39,000	2042

1. *Approximate ERUs are calculated using the Low-Density Residential flow value of 150 GPDU.*

The following guidelines are therefore used to determine the timeframe for CIP projects:

- **0 to 5 Years**: Issues identified in the Existing Model represent problems that could occur "today" and should therefore be addressed within the first planning period.
- **5 to 10 Years**: Issues identified in the Committed Model represent likely problems as currently annexed land begins developing. Based on the population projections and number of ERUs in **Table 7-3**, this is generally expected to occur within the next ten years.
- **10 to 20 Years**: Most issues in this category arise from ongoing maintenance of the Utility's lift stations.
- **As Needed with Growth**: Remaining issues and some identified under the Master Plan Model will not become critical until growth begins to develop in the corresponding areas. Consequently, a significant portion of the CIP falls into this category.
- **As Needed for Replacement and Rehabilitation:** Pipes were categorized into rehabilitation or replacement projects based on City identified structural defects resulting from the Asset Management Program. Pipes that were identified as having capacity issues or requiring system modifications were not programmed for replacement/rehabilitation projects.

7.2.2 CIP Projects

Table 7-4 includes a summary of all identified projects in the CIP (September 2022 dollars) and the recommended timeframe for their completion.

Table 7-4 – CIP Project Summary

ID	Project/MH ID	Recommend Action	Capital Cost(1)	Timeframe				
				0-5 Years	5-10 Years	10-20 Years	As needed with growth	As needed with RR
C.1	BUS1-01 to BUS2-01	Pipe replacement and inflow reduction	$386,000	X				
C.2	M1-21 to M2-09B	Pipe replacement and re-route flow	$1,212,000	X				
C.3	M3-17	Verify slopes and inverts	-					
C.4	RIV1-02 to FWN1-01	New parallel pipe and re-route flow	$8,170,000				X	
C.5	RAM1-38B	Project eliminated in 2022 CIP	-					
C.6	GAR1-01 to GAR1-15	Pipe replacement	$1,616,000				X	
C.7	M1-14 to M1-18	Pipe replacement	$1,978,000		X			
C.8	ARM1-01	Project eliminated in 2022 CIP	-					
C.9	Mill River Lift Station and Force Main	Upgrade pumps, utilize existing 8" pipe for upsized force main, and add emergency storage	$431,000				X	
C.10	FWN1-22A to FWN1-23HA	Pipe replacement and re-grade	$2,278,000				X	
C.11	FWN1-04 to FWN1-11	Pipe re-grade	$1,579,000				X	
C.12	RAM1-42 to RAM1-46B	New parallel pipe and re-route flow	$588,000				X	
S.1	FWN1-22 to FWN1-24	Pipe replacement to accommodate growth	$290,000				X	
S.2	BEXT1-06DE3 to BEXT1-06DE6B	Pipe replacement to accommodate growth	$348,000				X	

ID	Project/MH ID	Recommend Action	Capital Cost(1)	Timeframe				
				0-5 Years	5-10 Years	10-20 Years	As needed with growth	As needed with RR
S.3	B1-13	Project eliminated in 2022 CIP	-					
S.4	Hawk's Nest Lift Station	Upgrade pumps	$805,000				X	
S.5	Woodside Lift Station	Project eliminated in 2022 CIP	-					
S.6	Foothills Lift Station	Abandon lift station	$110,000				X	
S.7	Canfield Lift Station and Force Main	Project eliminated in 2022 CIP	-					
RR.30	M2-04B to M2-03A (New MH)	8" Open Trench Replacement	$265,000					X
RR.31	M4-09HN to M4-09HN3 M4-09GN to M4-09GN1 M4-09FN to M4-09FN1	8" Open Trench Replacement	$686,000					X
RR.32	DAV1-05A to DAV1-05C	8" Open Trench Replacement	$173,000					X
RR.33	M3-22C to M3-22E	8" Open Trench Replacement	$342,000					X
RR.35	M2-22A to M2-22C	8" Open Trench Replacement	$364,000					X
RR.36	M2-25 to M2-26A	8" Open Trench Replacement	$402,000					X
RR.37	M1-37B to M1-37E M1-37C to M1-37D	8" Open Trench Replacement	$601,000					X
RR.38	M3-20D to M3-20E	8" Open Trench Replacement	$253,000					X

ID	Project/MH ID	Recommend Action	Capital Cost(1)	Timeframe				
				0-5 Years	5-10 Years	10-20 Years	As needed with growth	As needed with RR
RR.39	M7-07 to M7-08	8" CIPP Rehabilitation	$20,000					X
RR.40	Varies (see Appendix I)	8" to 12" CIPP Rehabilitation	$1,114,000					X
RR.41	Varies (see Appendix I)	8" to 12" CIPP Rehabilitation	$386,000					X
RR.42	GAR1-110B to GAR1-11M M7-09D to M7-09D1	8" Open Trench Replacement & 8" CIPP Rehabilitation	$779,000					X
RR.43	M1-23EE to M1-23FE	8" Open Trench Replacement	$270,000					X
RR.44	B1-42 to B1-43	24" CIPP Rehabilitation	$187,000					X
RR.45	B1-17 to B1-18	24" CIPP Rehabilitation	$97,000					X
RR.46	M1-26 to M3-02	15" CIPP Rehabilitation	$73,000					X
RR.47	M1-21C to M1-21D	8" Open Trench Replacement	$539,000					X
RR.48	M2-05 to M2-06B	8" Open Trench Replacement	$312,000					X
Point Repair	Varies (see Appendix I)	Point repair to fix high priority defect	$145,000					X
E.1	Seltice Siphon Extension and Headworks	Project eliminated in 2022 CIP	-					
E.2.01	Lakeside Study Extension North	Construction as required with Growth	$858,000				X	

ID	Project/MH ID	Recommend Action	Capital Cost(1)	Timeframe				
				0-5 Years	5-10 Years	10-20 Years	As needed with growth	As needed with RR
E.2.02	Lakeside Study Extension South	Construction as required with Growth	$1,004,000				X	
E.3	Government Way	Project completed	-					
E.4	Nettleton Gulch Extension	Construction as required with Growth	$1,486,000				X	
E.5	Hill Drive Extension	Construction as required with Growth	$646,000				X	
E.6	Silver Beach Interceptor	Construction as required with Growth	$607,000				X	
E.7	Blackwell Hill Interceptor	Construction as required with Growth	$4,171,000				X	
E.8	Cougar Bay Interceptor	Construction as required with Growth	$484,000				X	
E.9	Montana Pressure Sewer	Incorporate unsewered areas into collection system	$130,000				X	
LS.1	Blackwell Hill	Construction as required with Growth	$3,491,000				X	
LS.2	Cougar Bay	Construction as required with Growth	$3,126,000				X	
LS.3	Nettleton Gulch	Project eliminated in 2022 CIP	-					
LS.4	Silver Beach	Construction as required with Growth	$3,521,000				X	
LS.5	Evergreen	Construction as required with Growth	$1,590,000				X	

1. All capital costs are in 2022 dollars and are a Class 4 cost opinion (i.e., -30% to +50% per AACE).

7.2.3 Budgeting CIP Projects

The costs associated with each CIP project were grouped by time and are summarized in **Table 7-5**. Reference **Appendix I** for a detailed breakdown of each project. The timeframes listed are intended to

begin in Fiscal Year 2023-2024 as Fiscal Year 2022-2023 is underway currently and projects have already been established for this year. For Fiscal Years 2022-2023, the Wastewater Utility has budgeted $800,000 per year for replacement/rehabilitation projects. The additional CIP costs identified herein for lift station replacement/rehabilitation should be reviewed and integrated as the budget permits. If this work is not completed in the 0-5 year timeframe, the work should be carried forward into the 5-10-year timeframe and the budgets revised accordingly. Costs associated with expansion and growth projects should be negotiated with the developer.

Table 7-5 – CIP Cost Summary

CIP Project Timeframe	20-YR Capital Cost (1)
0 – 5 Years	$1,598,000
5 – 10 Years	$2,108,000
10 – 20 Years	$0
As Needed with Growth	$37,199,000
As Needed with RR	$7,008,000
Totals	$47,913,000

1. *All capital costs are in 2022 dollars and are a Class 4 cost opinion (i.e., -30% to +50% per AACE).*

Chapter 8

Report Summary

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Chapter 8 – Report Summary

8.1 Summary and Recommendations

Overall, the existing City of Coeur d' Alene (City) Collection System is in good condition and will have adequate capacity to convey current flows through Master Plan flows as the Capital Improvement Plan (CIP) is implemented. This Collection System Master Plan provides the City with a planning tool to guide the expansion of the sewer system in the wastewater service area. The following recommendations will help ensure that the City is able to provide service to the entire future wastewater service area and that the Master Plan is implemented as intended.

- Follow the recommendations contained in the CIP.
- Evaluate the effect of redevelopment at higher densities within the existing system, if applicable, before the implementation of the recommended CIP projects.
- Periodically review and assess the issues that were identified but did not currently have a recommended improvement.
- Continue eliminating known inflow sources.
- Continue to evaluate pipe reaches with CCTV Inspection using the City's current Condition Assessment Method. Update the structural and maintenance Likelihood of Failure (LoF) and Consequence of Failure (CoF) scores as data is collected.

To maintain and improve the quality of future Master Plan updates, the following is recommended:

- Collect unknown or missing data in the base GIS data such as pipe size, pipe material, rim elevation, and invert elevation.
- Remove non-current CCTV inspections and associated defect information from GIS.
- Add GMIID field to Jet Log shapefile on GIS.
- Complete CCTV inspection using the City's current condition assessment method for remainder of piping, using the CCTV prioritization map for guidance. Develop structural and maintenance LoF and CoF scores as data is collected and integrated into the GIS system.

The Master Plan will also require periodic updates to remain a current, accurate, and applicable tool in future evaluations. As part of this ongoing maintenance, the Wastewater Utility currently plans to update the Master Plan Model every five years with the assistance of a consultant. Updates may be implemented more frequently if there are significant changes to land use, the impact area, the collection system, or the rate of development.

8.2 Report Limitations

The hydraulic model used in this analysis was created based on land use and zoning conditions at the time of the study, both of which will change over time. Since the models are based on these parameters, it is critical to keep them updated over time to reflect current conditions. Analysis of redevelopment of the existing system to higher densities was not completed. If redevelopment occurs, the model should be updated to reflect the new conditions. The model is considered sufficiently accurate for its intended purpose on the date this report was submitted.

The pipe slopes used for the existing pipes are based on City's GIS data from February 2022 with supplemental information gathered through the course of this Master Plan Update. Remaining unknown rim and invert elevations were supplemented with previous model data or straight graded. Pipe slopes and depths for the master planned pipes are based on United States Geological Survey (USGS) contours supplemented by visual field investigation. Flows and pipe capacities for all models and recommended CIP projects are, therefore, approximate and are intended to be used for planning purposes only. Field verification of all data must be performed prior to preliminary and final design of any system improvements.

It is important to emphasize the intent of Master Plan alignments, depths, and invert elevations. The Master Plan is a planning tool to guide system improvements, but the Master Plan elevations are not intended to serve as final design elevations. Service depths in the model should be considered as minimums only and may be affected by several factors, including the accuracy of base mapping or variations in sewer alignments, development patterns, utility conflicts, and other assumptions made throughout this study.

Select model output from this study will also be added to the Wastewater Utility's GIS during the next update cycle, and is expected to include peak flow, peak velocity, reserve capacity, maximum depth over diameter, depth over diameter criteria, and depth over diameter criteria exceedance. This information is intended for use by Wastewater Staff for overall system management. The limitations described previously apply to the model output attached to the GIS as well.

Works Cited

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Appendices

Appendix A – Figures
Appendix B – Data Compiled for Use in Model Development
Appendix C – Model Assumptions
Appendix D – Model Calibration
Appendix E – System Issues
Appendix F – Existing Model Results
Appendix G – Committed Model Results
Appendix H – Master Plan Model Results
Appendix I – CIP Packets
Appendix J – Additional Master Plan Model Scenarios (2013 Master Plan)
Appendix K - Asset Management

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Appendix A

Figures

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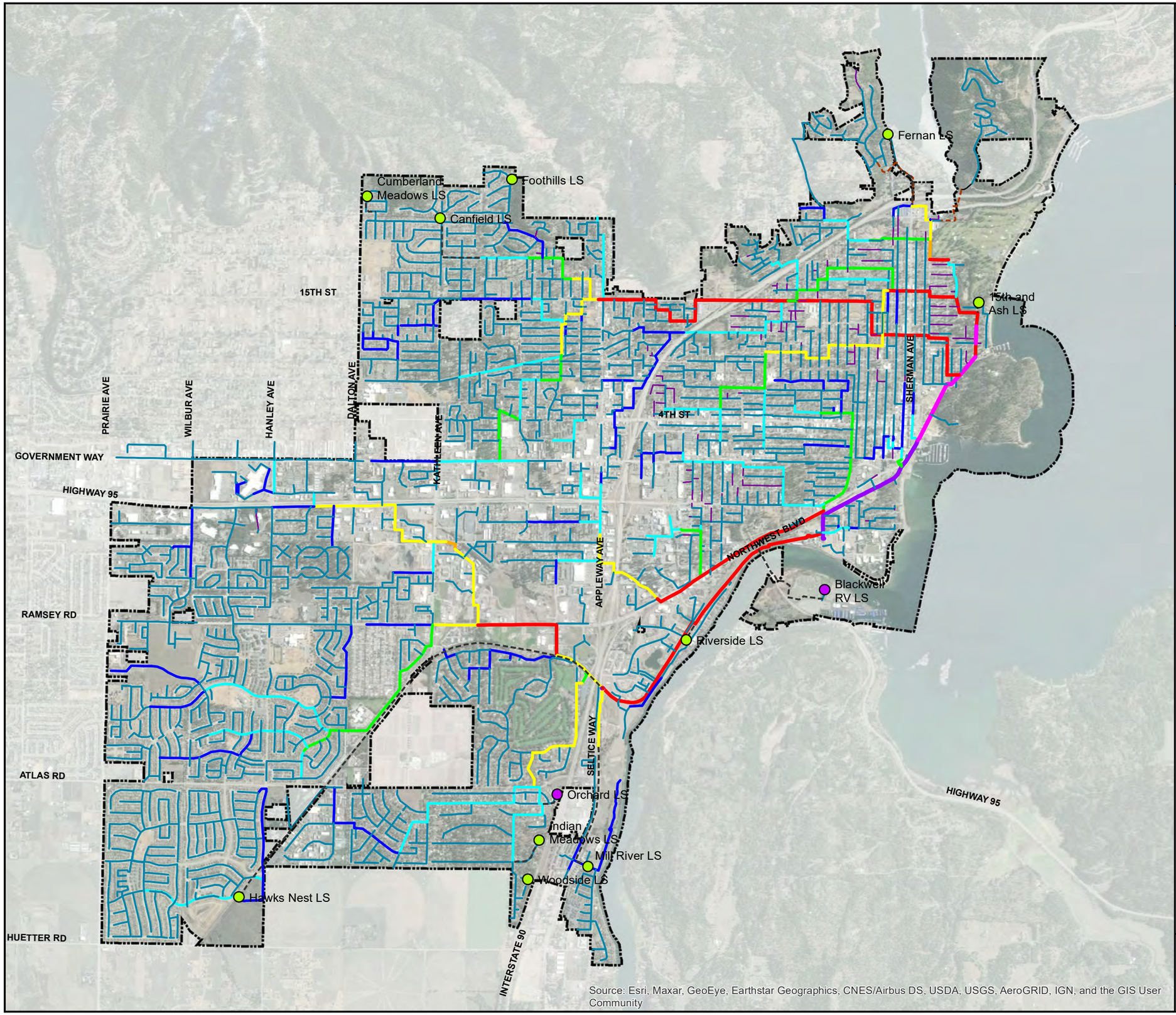

City of Coeur d'Alene
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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Figure A1

Existing Pipe Sizes

Lift Stations

- City
- Privately Owned & Maintained

Pipe Size (in)

- 6
- 8
- 10
- 12
- 15
- 18
- 21
- 24
- 30
- 36

- Siphon
- Force Main
- City Limits

Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 1,500 3,000 6,000 Feet

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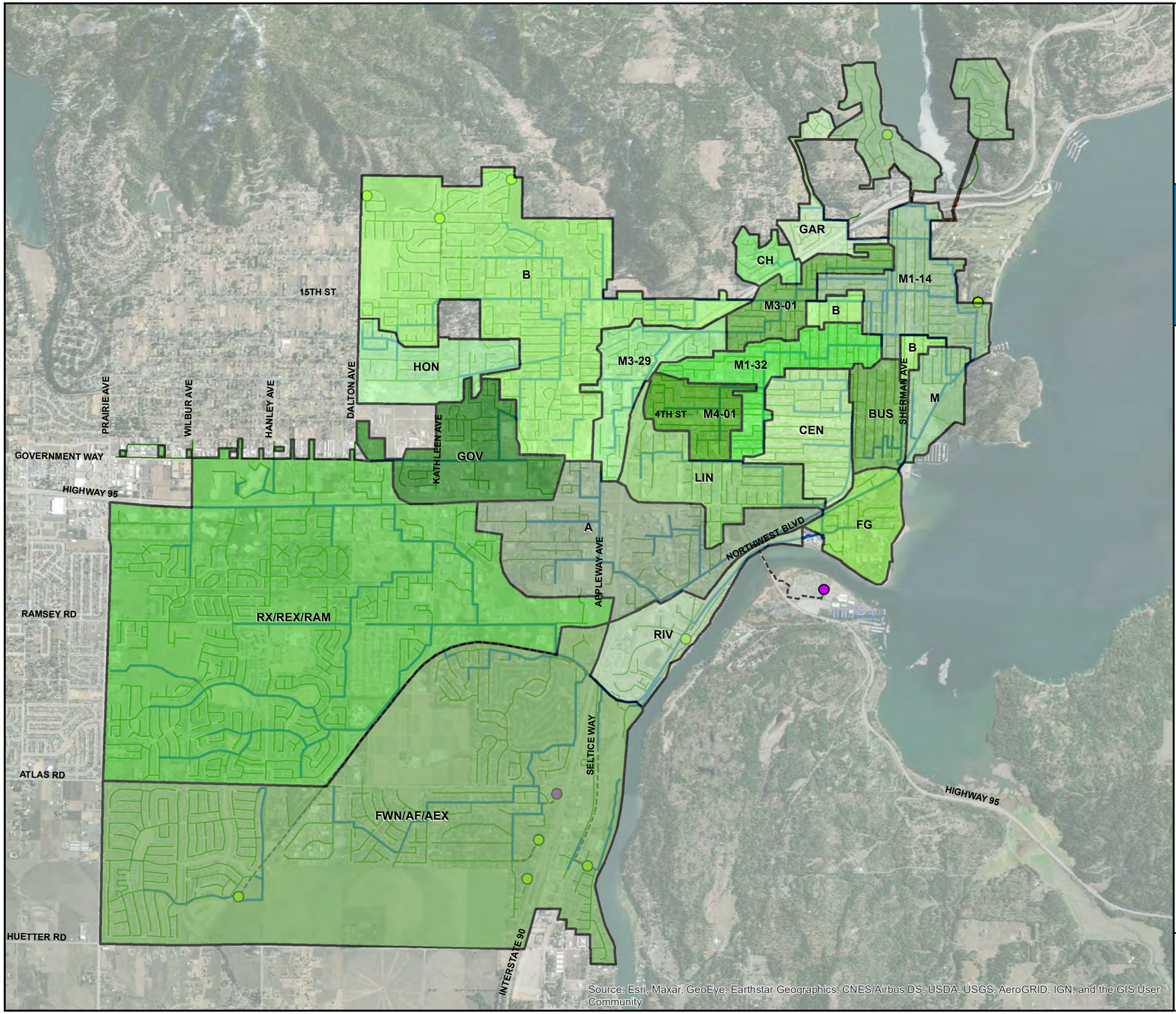

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2022 Wastewater Collection System Master Plan

Figure A2

Sewer Basins

Lift Stations
- City
- Privately Owned & Maintained

Sewer Basins
- A
- B
- BUS
- CEN
- CH
- FG
- FWN/AF/AEX
- GAR
- GOV
- HON
- LIN
- M
- M1-14
- M1-32
- M3-01
- M3-29
- M4-01
- RIV
- RX/REX/RAM

Trunk
- Collector
- Siphon
- Force Main

Feet
0 1,500 3,000 6,000

N E S W

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Priority	Segments	Linear Feet
Needs CCTV	1447	336,182
High	119	38,513
Low	2231	407,928
Moderate	1184	413,250

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City of Coeur d'Alene
2022 Wastewater Collection System Master Plan

Figure A3.1

Composite Structural LoF & CoF Scores

Composite Score
Combined Rating

- High
- Moderate
- Low
- Needs CCTV

Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 2,500 5,000 Feet

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J-U-B

Priority	Segments	Linear Feet
High	164	52,072
Moderate	1166	403,482
Low	2205	404,331
Needs CCTV	1446	335,988

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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Figure A3.2

Composite Maintenance LoF & CoF Scores

Composite Score

Combined Rating

- High
- Moderate
- Low
- Needs CCTV

Note:

1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 2,500 5,000 Feet

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2022 Wastewater Collection System Master Plan

Figure A3.3

CCTV Priorities

CCTV Priorities

- High
- Moderate
- Low - No CCTV
- Low - CCTV
- Forcemain

Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 2,500 5,000 Feet

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J-U-B

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

City of Coeur d'Alene IDAHO

Figure A3.4 RR Summary Map

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench
- Point Repair

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0 500 1,000 2,000 Feet

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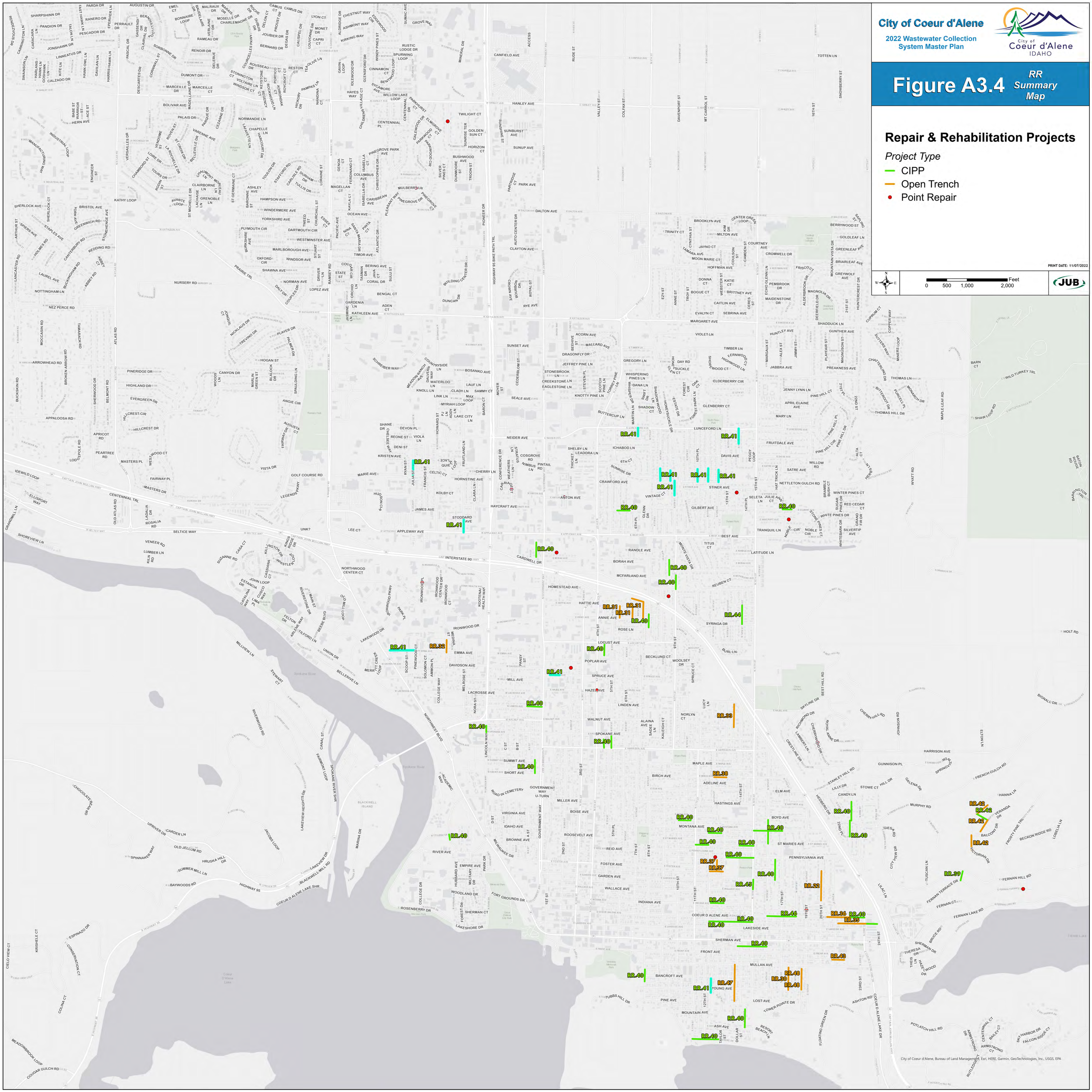
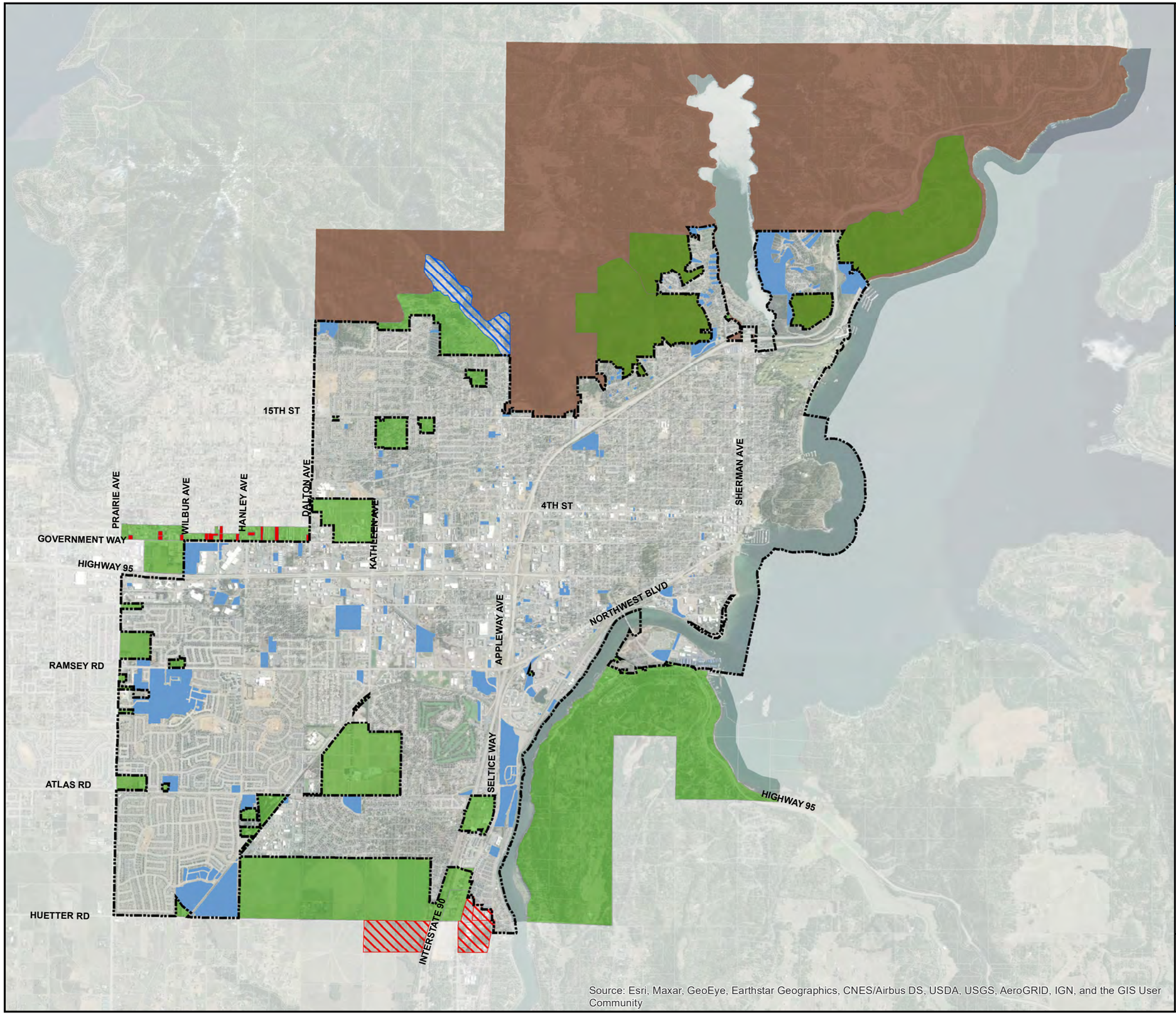


City of Coeur d'Alene, Bureau of Land Management, Esri, HERE, Garmin, GeoTechnologies, Inc., USGS, EPA



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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Figure A4

Study Area

- City Limits
- Area of City Impact
- Existing Dalton Gardens Commercial
- Future WW Service Area
- Infill Areas

No Service Areas

- Not Served by City
- FEMA Flood Plain

Note:
1. Area of City Impact that is not included in the future service areas is not modeled or have applied flows.
2. Previous Master Plan piping within the FEMA Flood Plain footprint has been removed. Per City direction, gravity sewer is not permitted within a flood plain. Flood plain footprint obtained from the FEMA Flood Map Service Center website.

Feet
0 2,000 4,000 8,000

N E S W

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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

City of Coeur d'Alene IDAHO

Figure A5

Dry Weather Flows & Injection Points Existing Model

Land Use Type
- Assisted Living
- Church
- Commercial
- Hospital
- Hotel
- Industrial
- Office
- Open Space
- Public
- Restaurant
- School
- Low Density Residential
- Med Denstiy Residential
- High Density Residential

Pipe Size (in)
- 6
- 8
- 10
- 12
- 15
- 18
- 21
- 24
- 30
- 36
- Siphon
- Force Main

- Manholes
- Injection Point
- City Limits
- Parcel Line

Lift Stations
- City
- Privately Owned & Maintained

Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

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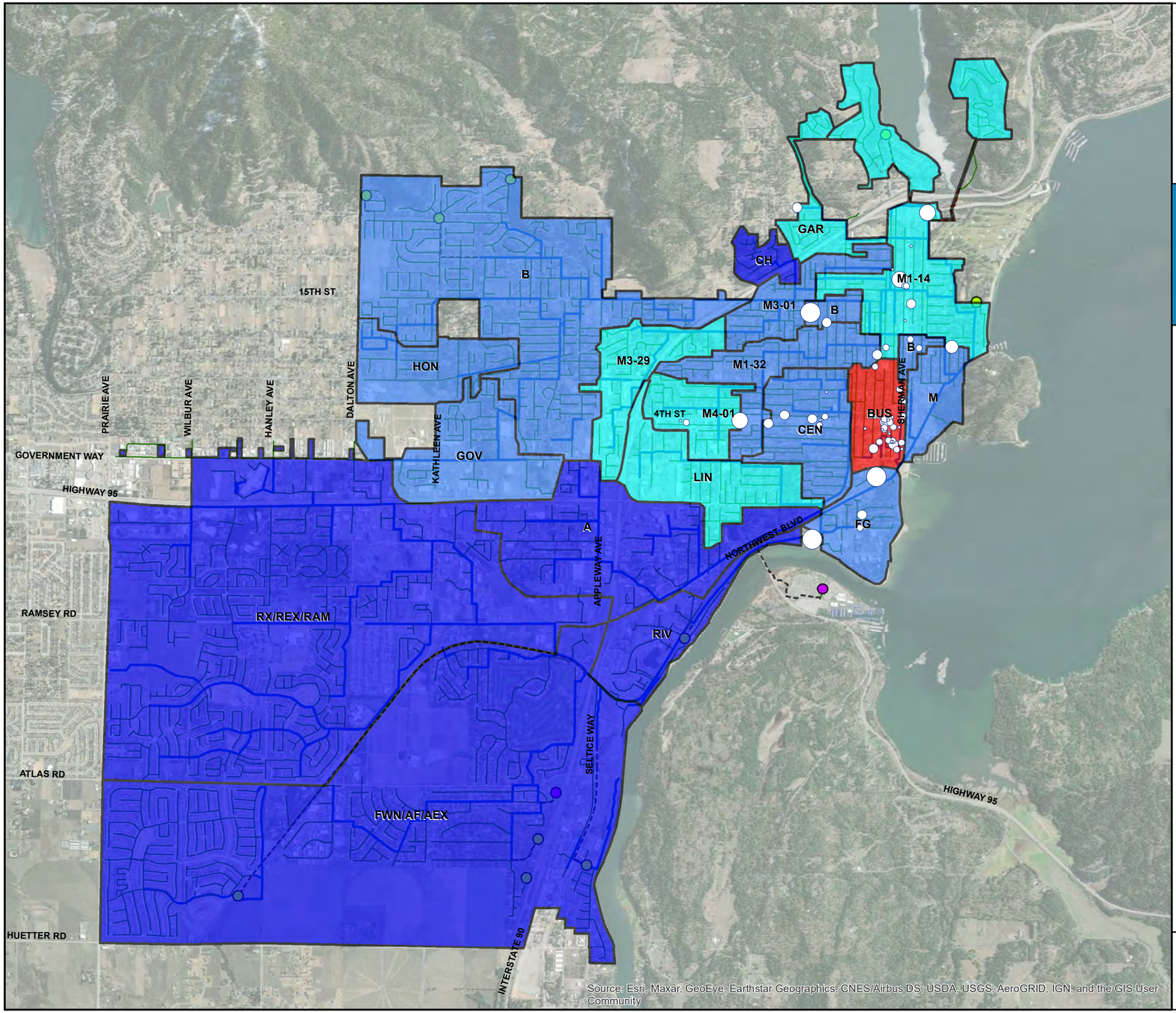
N W E S

0 750 1,500 3,000 Feet

JUB

Hawks Nest LS
Cumberland Meadows LS
Canfield LS
Foothills LS
Woodside LS
Indian Meadows LS
Orchard LS
Mill River LS
Riverside LS
Blackwell RV LS
Fernan LS
15th and Ash LS

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



City of Coeur d'Alene
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City of Coeur d'Alene
2022 Wastewater Collection System Master Plan

Figure A6

Wet Weather Inflow Areas Existing Model

Identified Inflow Sources - Area (SF)
- 0 - 3,750
- 3,751 - 7,500
- 7,501 - 15,000
- 15,001 - 30,000
- 30,001 - 60,000
- > 60,000

Basin Density - Inflow Area (SF) per MH
- 0 - 250
- 251 - 500
- 501 - 750
- 751 - 1000
- 1001 - 1500
- 1501 - 2000
- > 2000

Existing Lift Stations
- City
- Privately Owned & Maintained

- Trunk
- Collector
- Siphon
- Force Main

Feet
0 1,500 3,000 6,000

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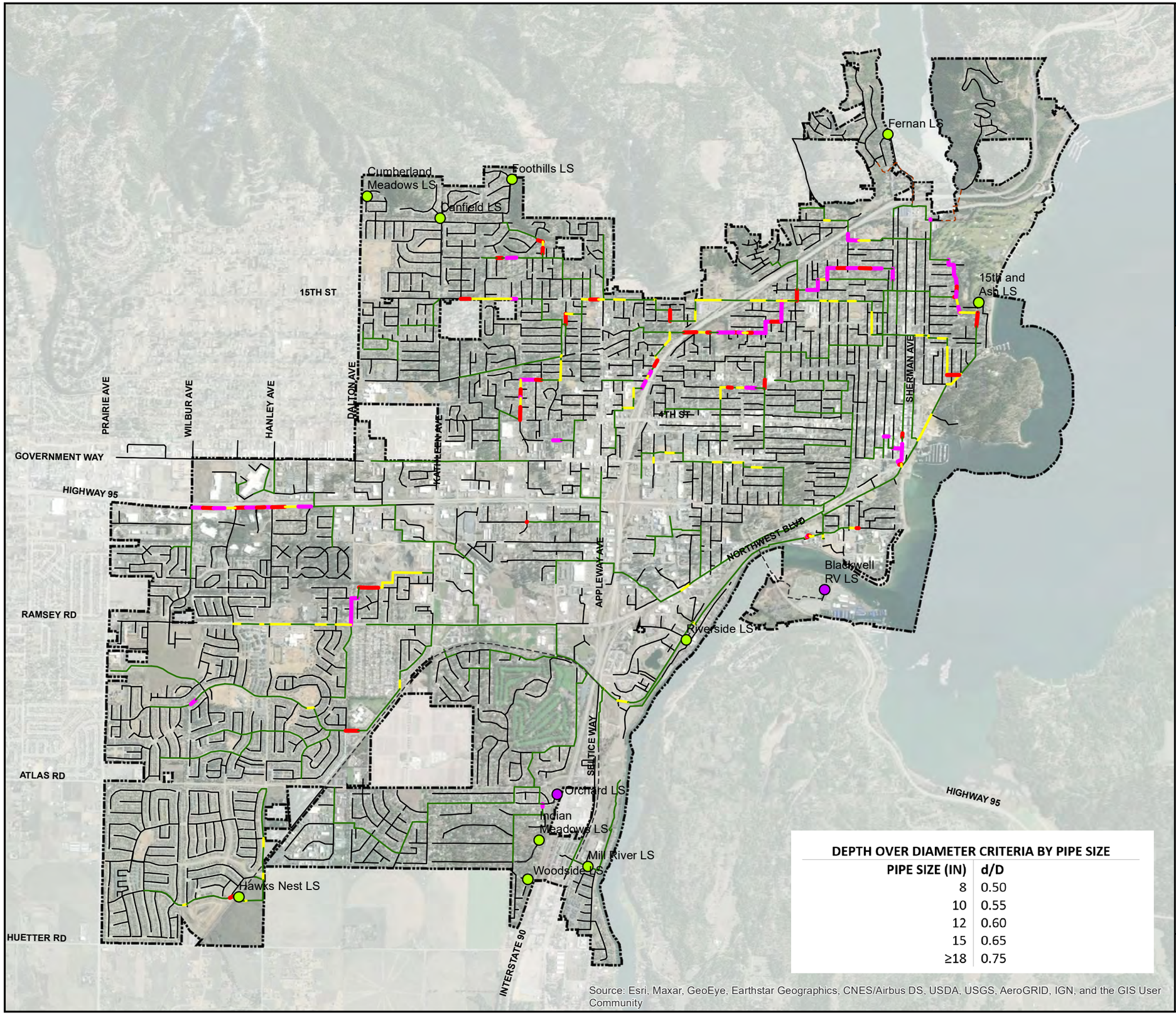
2022 Wastewater Collection System Master Plan

Figure A7.1

d/D Exceedence Existing Model



DEPTH OVER DIAMETER CRITERIA BY PIPE SIZE

PIPE SIZE (IN)	d/D
8	0.50
10	0.55
12	0.60
15	0.65
≥18	0.75

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Existing Lift Stations

- City
- Privately Owned & Maintained

- Siphon
- Force Main
- City Limits
- Collector

d/D Criteria Exceedance

- 0.00 - 0.85
- 0.85 - 1.00
- 1.00 - 1.15
- >= 1.15

Note:
1. Results include the design storm event - 2.0"
2. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.
3. d/D Exceedance is a normalized value calculated as the d/D result divided by the d/D criteria for the corresponding pipe size. Reference Appendix E for Existing Model Results.

Feet
0 1,500 3,000 6,000

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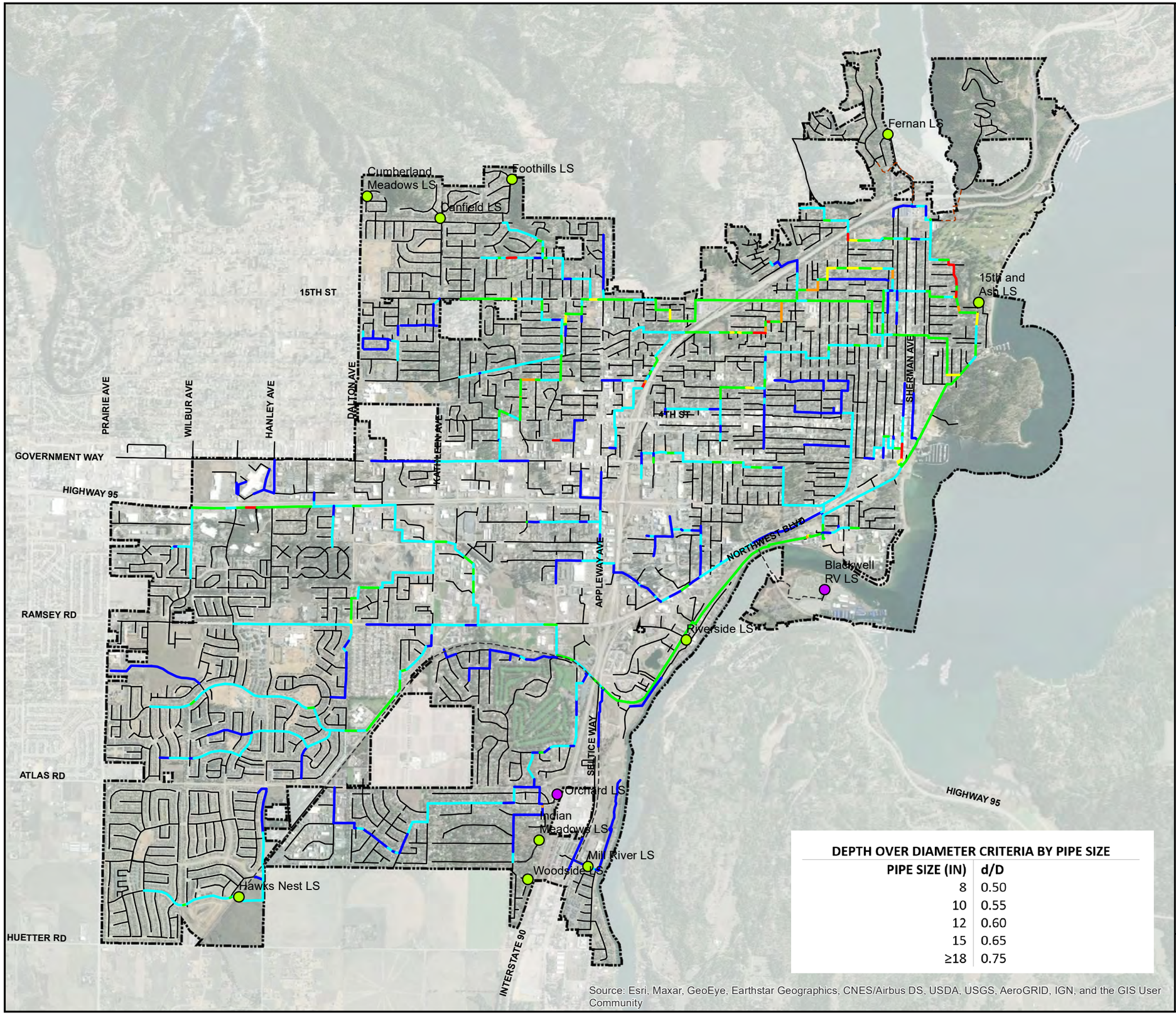

DEPTH OVER DIAMETER CRITERIA BY PIPE SIZE

PIPE SIZE (IN)	d/D
8	0.50
10	0.55
12	0.60
15	0.65
≥18	0.75

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Coeur d'Alene
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City of Coeur d'Alene
2022 Wastewater Collection System Master Plan

Figure A7.2
Depth over Diameter Existing Model

Lift Stations
- City
- Privately Owned & Maintained

- City Limits
- Siphon
- Force Main
- Collector

Trunk Lines d/D
- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 0.85
- 0.85 - 1.00
- >= 1.00

Note:
1. Results include the design storm event - 2.0"
2. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 1,500 3,000 6,000 Feet

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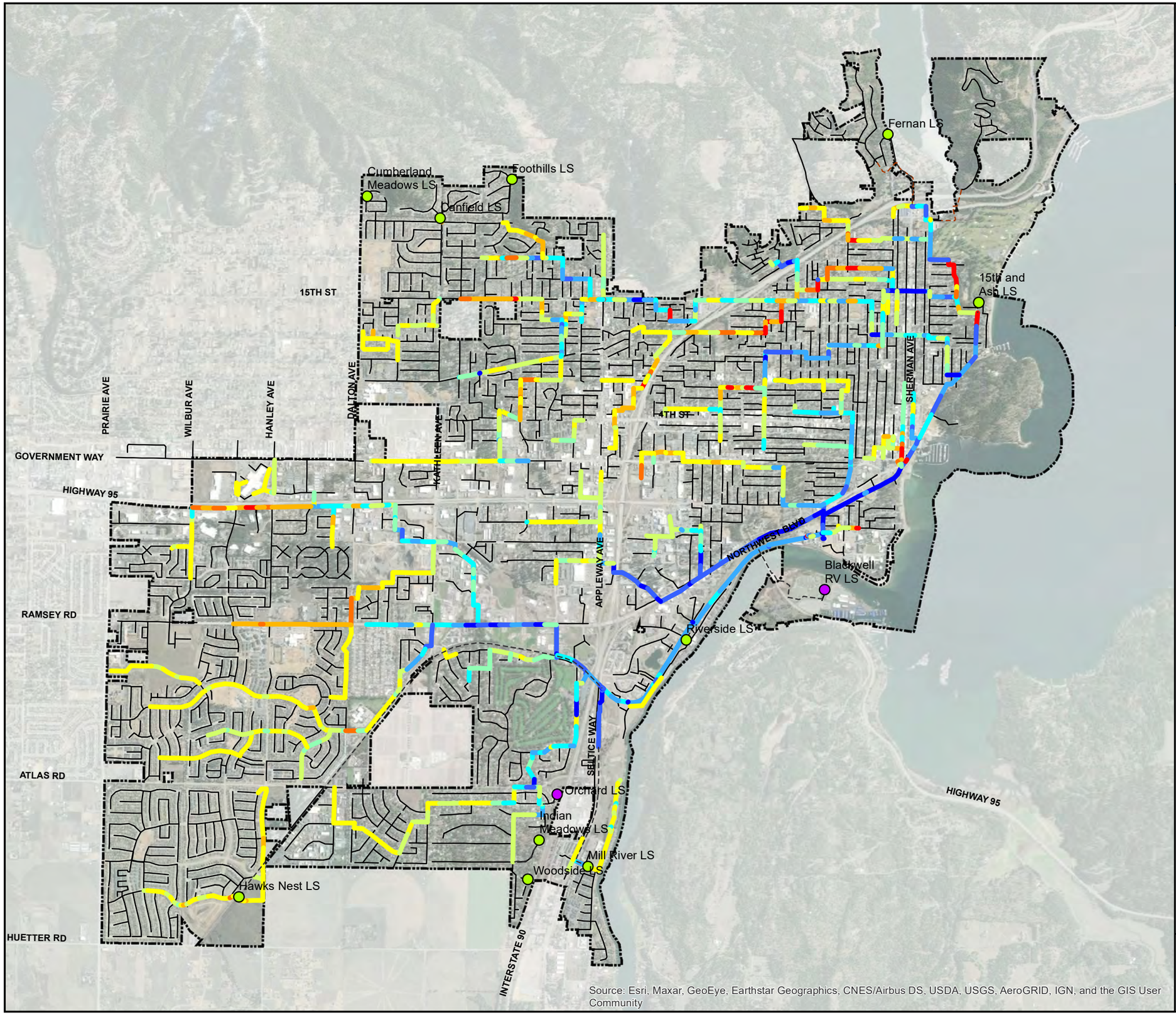
City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Figure A8

Reserve Capacity Existing Model



Lift Stations

- City
- Privately Owned & Maintained

Reserve Capacity (MGD)
Trunk Lines

- Over Capacity
- 0.01 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- 2.00 - 3.00
- 3.00 - 5.00
- 5.00 - 10.00
- > 10.00

- Siphon
- Force Main
- Collector
- City Limits

Note:
1. Results include the design storm event - 2.0"
2. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.
3. Reserve capacity is calculated relative to the full pipe depth using the Mannings Equation and not in relation to the City's d/D criteria.

0 1,500 3,000 6,000 Feet

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2022 Wastewater Collection System Master Plan

City of Coeur d'Alene IDAHO

Figure A9

Dry Weather Flows & Injection Points Committed Model

Land Use Type
- Assisted Living
- Church
- Commercial
- Hospital
- Hotel
- Industrial
- Office
- Open Space
- Public
- Restaurant
- School
- Low Density Residential
- Med Density Residential
- High Density Residential

Pipe Size (in)
- 6
- 8
- 10
- 12
- 15
- 18
- 21
- 24
- 30
- 36
- Siphon
- Force Main

- Manholes
- Injection Point
- City Limits
- Parcel Line

No Service Areas
- Not Served by City
- FEMA Flood Plain

Lift Stations
- City
- Privately Owned & Maintained

Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

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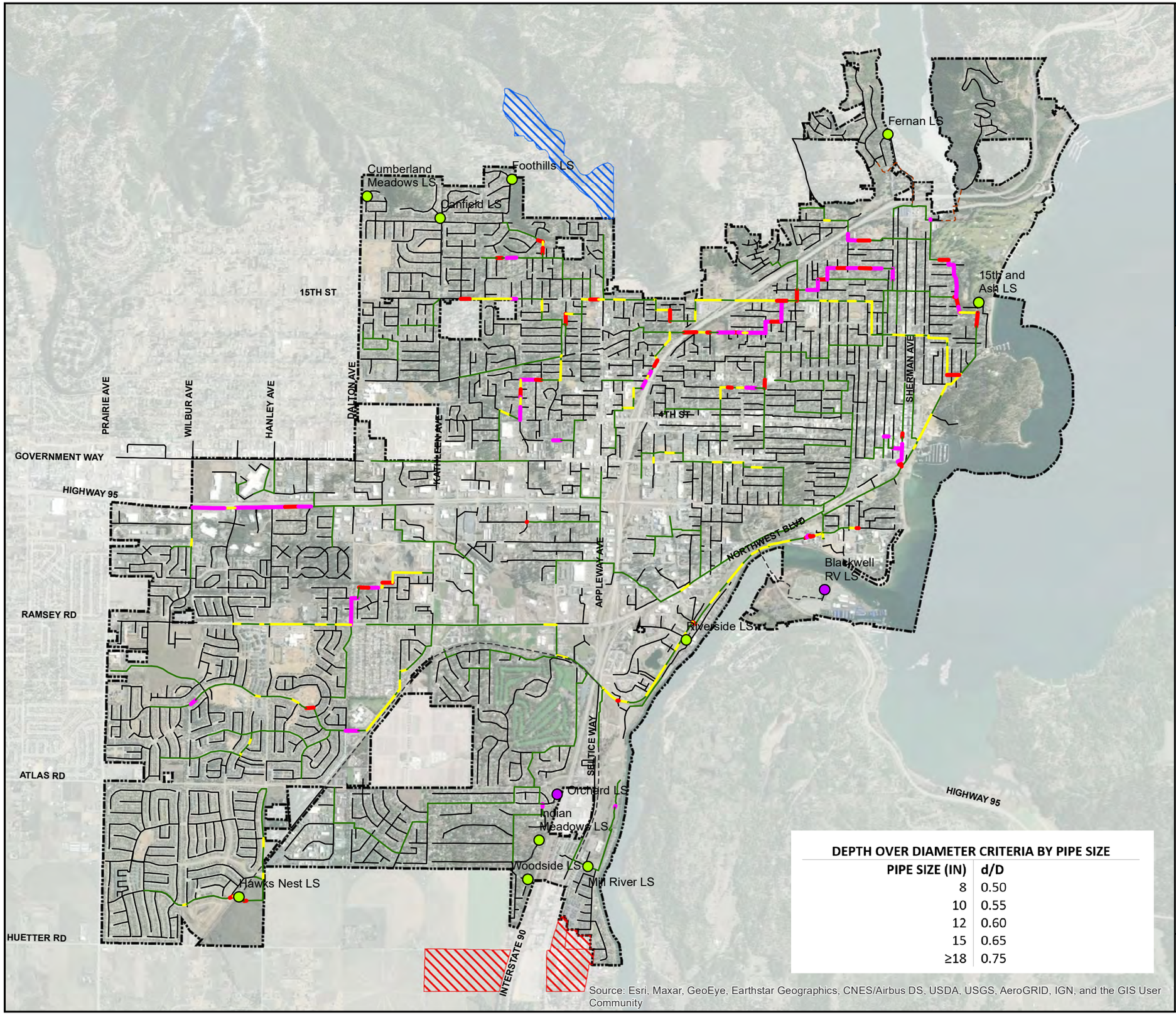
N W E S

0 750 1,500 3,000 Feet

JUB

Hawks Nest LS
Cumberland Meadows LS
Canfield LS
Foothills LS
Woodside LS
Indian Meadows LS
Orchard LS
Mill River LS
Riverside LS
Blackwell RV LS
Fernan LS
15th and Ash LS

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



DEPTH OVER DIAMETER CRITERIA BY PIPE SIZE	
PIPE SIZE (IN)	**d/D**
8	0.50
10	0.55
12	0.60
15	0.65
≥18	0.75

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

City of Coeur d'Alene IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Figure A10.1

d/D Exceedence Committed Model

Lift Stations

- City
- Privately Owned & Maintained

d/D Criteria Exceedance

- 0.00 - 0.85
- 0.85 - 1.00
- 1.00 - 1.15
- >= 1.15

- Siphon
- Force Main
- Collector

No Service Areas

- Not Served by City
- FEMA Flood Plain
- City Limits

Note:
1. Results include the design storm event - 2.0"
2. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.
3. d/D Exceedance is a normalized value calculated as the d/D result divided by the d/D criteria for the corresponding pipe size. Reference Appendix E for Committed Model Results.

Feet
0 1,500 3,000 6,000

N E S W

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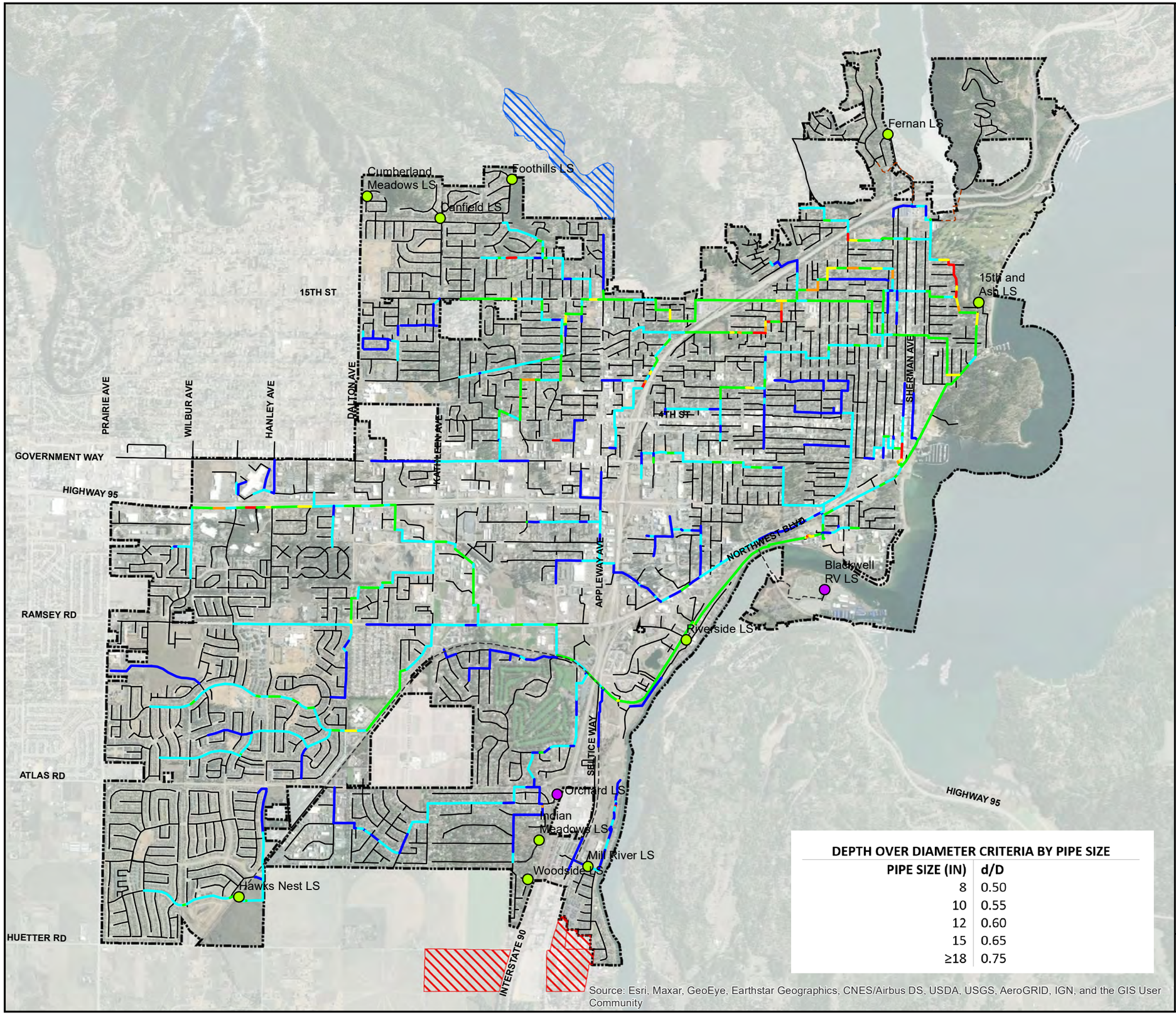

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DEPTH OVER DIAMETER CRITERIA BY PIPE SIZE

PIPE SIZE (IN)	d/D
8	0.50
10	0.55
12	0.60
15	0.65
≥18	0.75

City of Coeur d'Alene IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Figure A10.2

Depth over Diameter Committed Model

Lift Stations

- City
- Privately Owned & Maintained

Trunk Lines d/D

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 0.85
- 0.85 - 1.00
- >= 1.0

- Siphon
- Force Main
- Collector

No Service Areas

- Not Served by City
- FEMA Flood Plain
- City Limits

Note:
1. Results include the design storm event - 2.0"
2. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

Feet
0 1,500 3,000 6,000

N E S W

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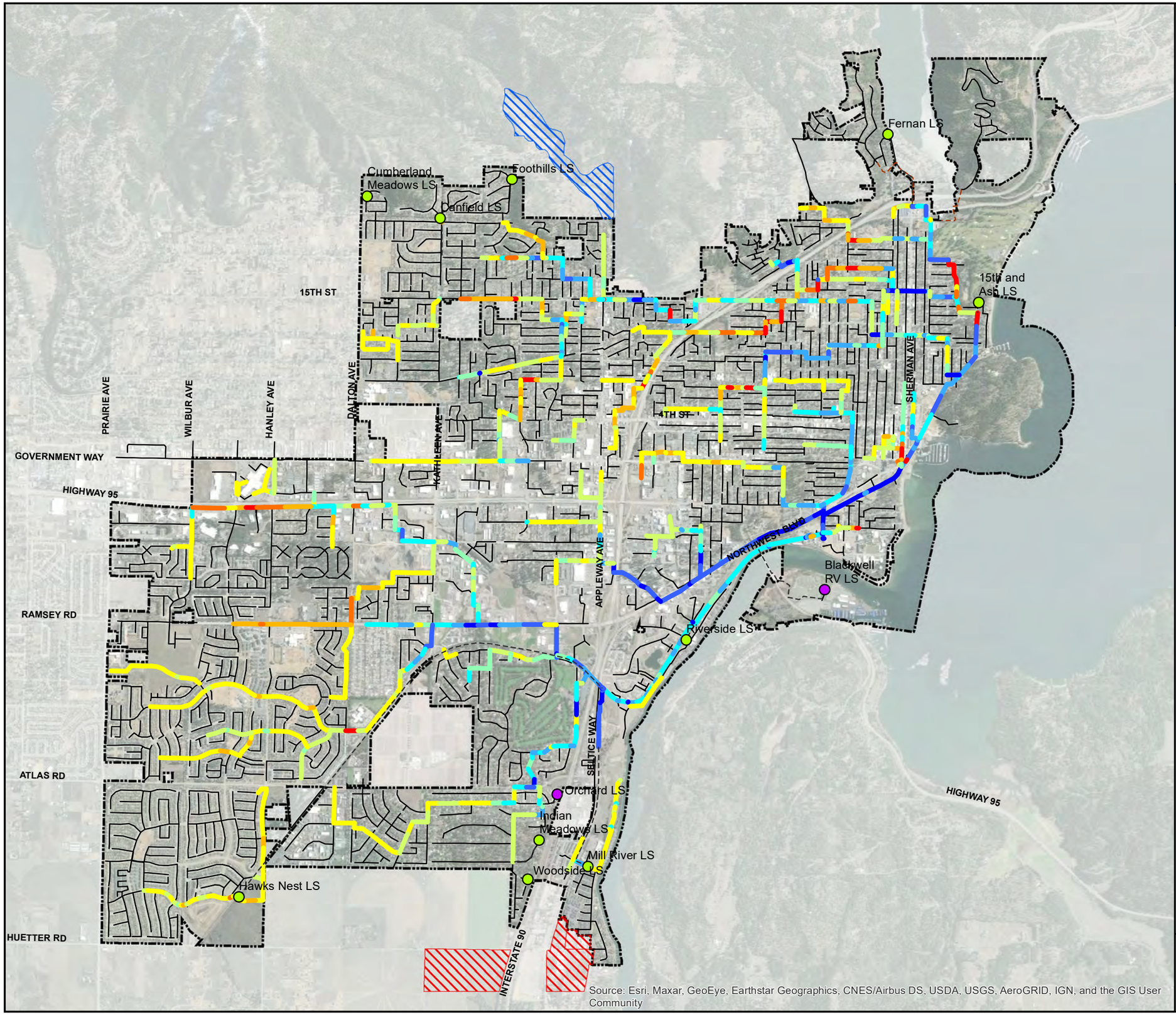

City of Coeur d'Alene
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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Figure A11

Reserve Capacity Committed Model

Lift Stations

- City
- Privately Owned & Maintained

Reserve Capacity (MGD)

Trunk Lines

- Over Capacity
- 0.01 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- 2.00 - 3.00
- 3.00 - 5.00
- 5.00 - 10.00
- > 10.00

- Siphon
- Force Main
- Collector

No Service Areas

- Not Served by City
- FEMA Flood Plain
- City Limits

Note:
1. Results include the design storm event - 2.0"
2. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.
3. Reserve capacity is calculated relative to the full pipe depth using the Mannings Equation and not in relation to the City's d/D criteria.

0 1,500 3,000 6,000 Feet

N E S W

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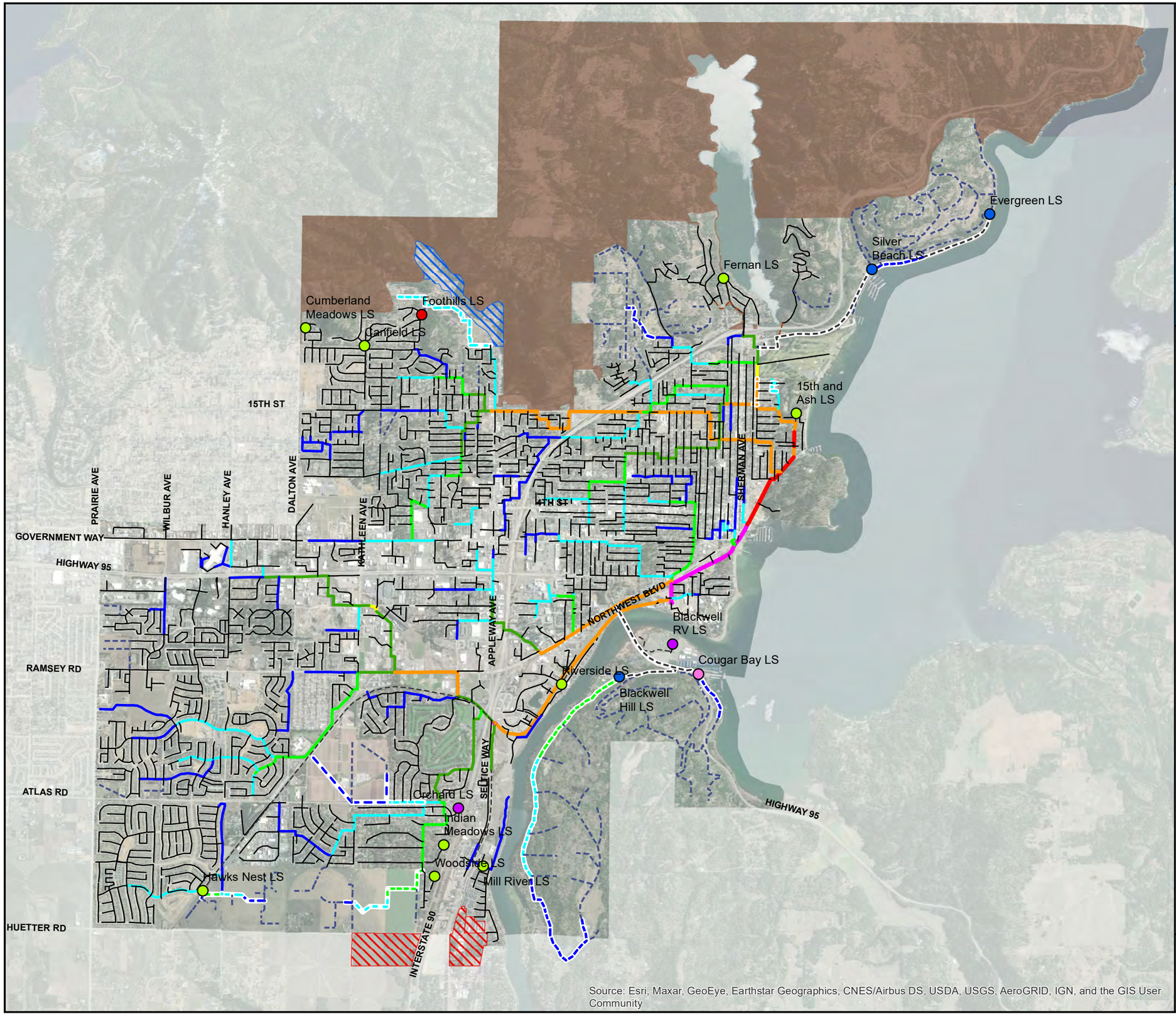

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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Figure A12

Master Plan Pipe Sizes

Existing Size (in)	Master Plan Size (in)
10	10
12	12
15	15
18	18
21	21
24	24
30	30
36	36
Collector	Check Line
Force Main	Force Main
Siphon	

Lift Stations

- Existing - City
- Existing Privately Owned & Maintained
- Abandoned
- Master Planned - City
- Master Planned - Privately Owned & Maintained

No Service Areas

- Not Served by City
- FEMA Flood Plain
- Area of City Impact Outside Study Boundary

Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

Feet
0 2,000 4,000 8,000

N E S W

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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

City of Coeur d'Alene IDAHO

Figure A13

Dry Weather Flows & Injection Points Master Plan Model

Land Use Type
- Assisted Living
- Church
- Commercial
- Hospital
- Hotel
- Industrial
- Mixed-Use Commercial
- Office
- Open Space
- Public
- Restaurant
- School
- Low Density Residential
- Medium Density Residential
- High Density Residential

No Service Areas
- Not Served by City
- FEMA Flood Plain

Master Plan Size (in)
- 10
- 12
- 15
- 18
- 21
- 24
- 30
- 36
- Check Line
- Force Main

Lift Stations
- Existing - City
- Existing Privately Owned & Maintained
- Abandoned
- Master Planned - City
- Master Planned - Privately Owned & Maintained

Existing Size (in)
- 10
- 12
- 15
- 18
- 21
- 24
- 30
- 36
- Collector
- Force Main
- Siphon
- Injection Point
- Manholes
- Parcel Line
- Area of City Impact Outside Study Boundary

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N W E S

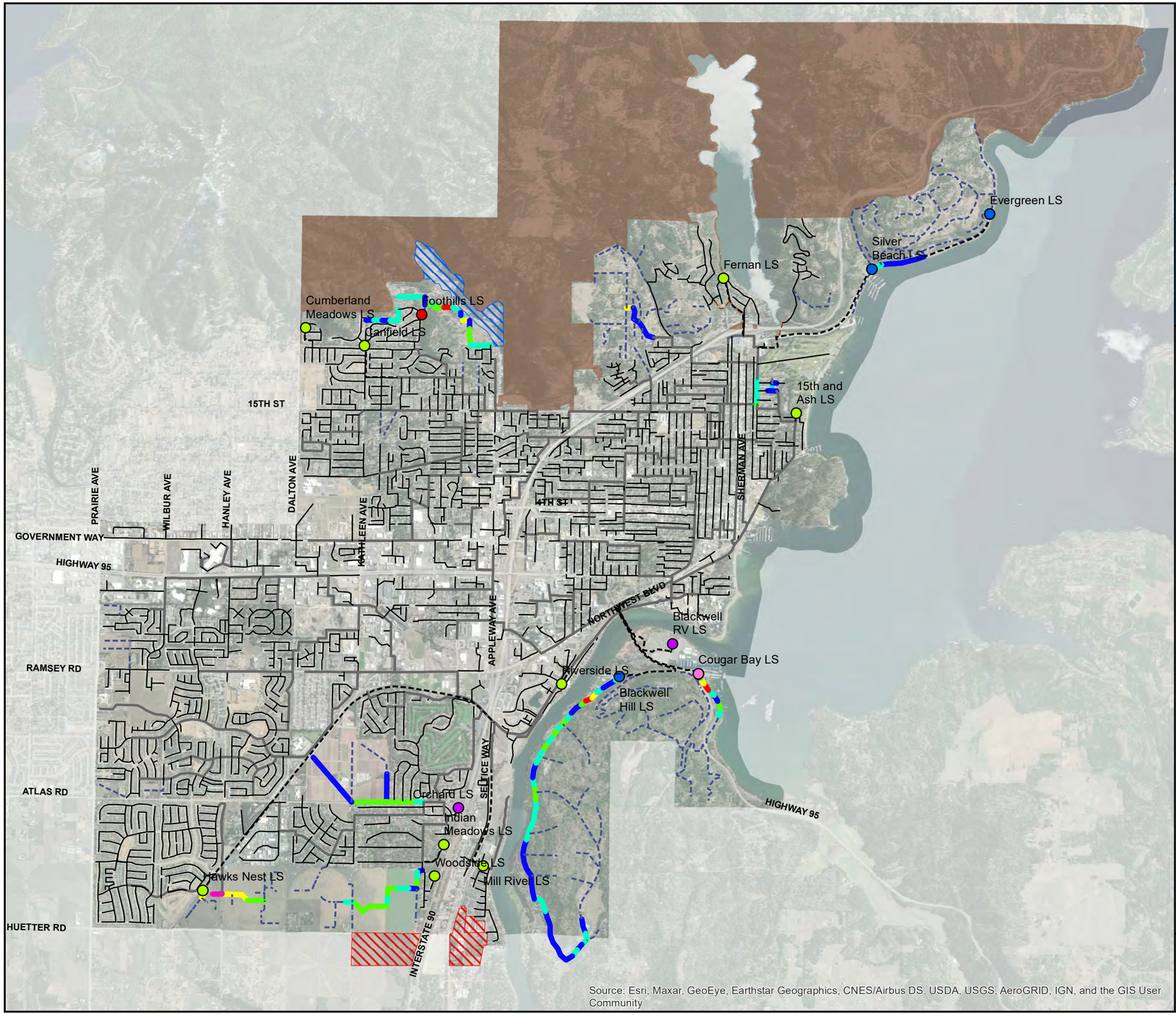
0 750 1,500 3,000 Feet

JUB

Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

Hawks Nest LS
Woodside LS
Indian Meadows LS
Orchard LS
Mill River LS
Riverside LS
Blackwell Hill LS
Blackwell RV LS
Cougar Bay LS
Cumberland Meadows LS
Canfield LS
Foothills LS
Fernan LS
15th and Ash LS
Silver Beach LS
Evergreen LS

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Figure A14

Trunk Depth Master Plan Model

Master Plan Trunk Depth (ft)

- < 10.0
- 10.1 - 15.0
- 15.1 - 20.0
- 20.1 - 25.0
- 25.1 - 30.0
- > 30.0

- Trunk
- Collector
- Force Main
- Siphon
- Check Line

Lift Stations

- Existing - City
- Existing Privately Owned & Maintained
- Abandoned
- Master Planned - City
- Master Planned - Privately Owned and Maintained

No Service Areas

- Not Served by City
- FEMA Flood Plain
- Area of City Impact Outside Study Boundary

Note:
1. Trunk Depth only shown for master plan pipes.
2. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

Feet
0 2,000 4,000 8,000

N E S W

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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Figure A15.1

d/D Exceedence Master Plan Model

Cumberland Meadows LS
Foothills LS
Garfield LS
Fernan LS
Silver Beach LS
Evergreen LS
15th and Ash LS
Blackwell RV LS
Cougar Bay LS
Riverside LS
Blackwell Hill LS
Orchard LS
Indian Meadows LS
Woodside LS
Mill River LS
Hawks Nest LS

15TH ST
4TH ST
PRAIRIE AVE
WILBUR AVE
HANLEY AVE
DALTON AVE
KATHLEEN AVE
SHERMAN AVE
APPLEWAY AVE
SELTICE WAY
NORTHWEST BLVD
GOVERNMENT WAY
HIGHWAY 95
RAMSEY RD
ATLAS RD
HUETTER RD
INTERSTATE 90

d/D Criteria Exceedance

- 0.00 - 0.85
- 0.85 - 1.00
- 1.00 - 1.15
- >= 1.15

- Collector
- Siphon
- Force Main
- Check Line
- Master Plan

Lift Stations

- Existing - City
- Existing Privately Owned & Maintained
- Abandoned
- Master Planned - City
- Master Planned - Privately Owned & Maintained

No Service Areas

- Not Served by City
- FEMA Flood Plain
- Area of City Impact Outside Study Boundary

Note:
1. Results include the design storm event - 2.0"
2. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.
3. d/D Exceedance is a normalized value calculated as the d/D result divided by the d/D criteria for the corresponding pipe size. Reference Appendix E for Master Plan Model Results.

Feet
0 2,000 4,000 8,000

DEPTH OVER DIAMETER CRITERIA BY PIPE SIZE

PIPE SIZE (IN)	d/D
8	0.50
10	0.55
12	0.60
15	0.65
≥18	0.75

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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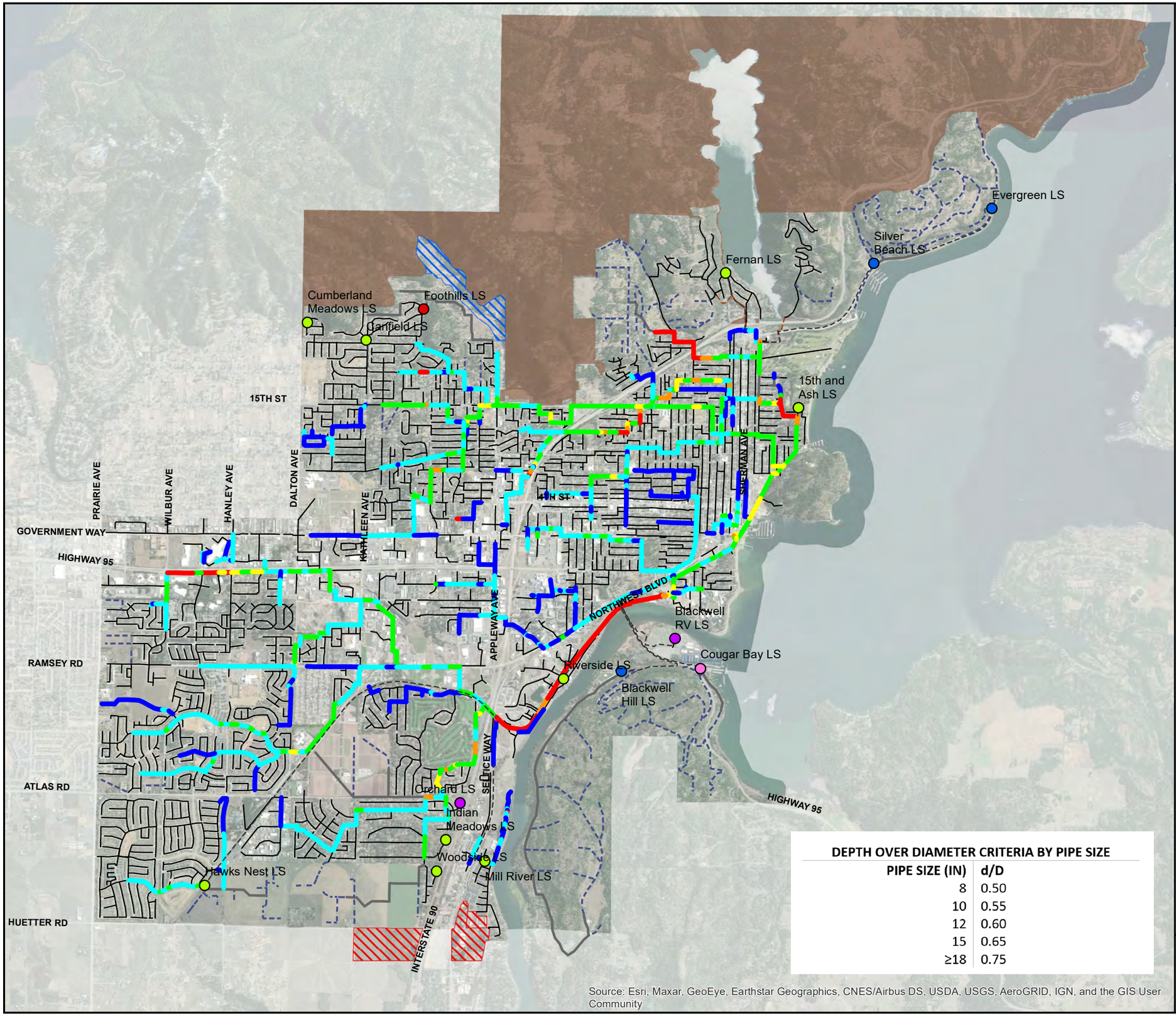
City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Figure A15.2

Depth over Diameter Master Plan Model



Trunk Lines d/D

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 0.85
- 0.85 - 1.00
- >= 1.0

- Collector
- Siphon
- Force Main
- Check Line
- Master Plan

Lift Stations

- Existing - City
- Existing Privately Owned & Maintained
- Abandoned
- Master Planned - City
- Master Planned - Privately Owned & Maintained

No Service Areas

- Not Served by City
- FEMA Flood Plain
- Area of City Impact Outside Study Boundary

DEPTH OVER DIAMETER CRITERIA BY PIPE SIZE

PIPE SIZE (IN)	d/D
8	0.50
10	0.55
12	0.60
15	0.65
≥18	0.75

Note:
1. Results include the design storm event - 2.0"
2. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 2,000 4,000 8,000 Feet

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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City of Coeur d'Alene
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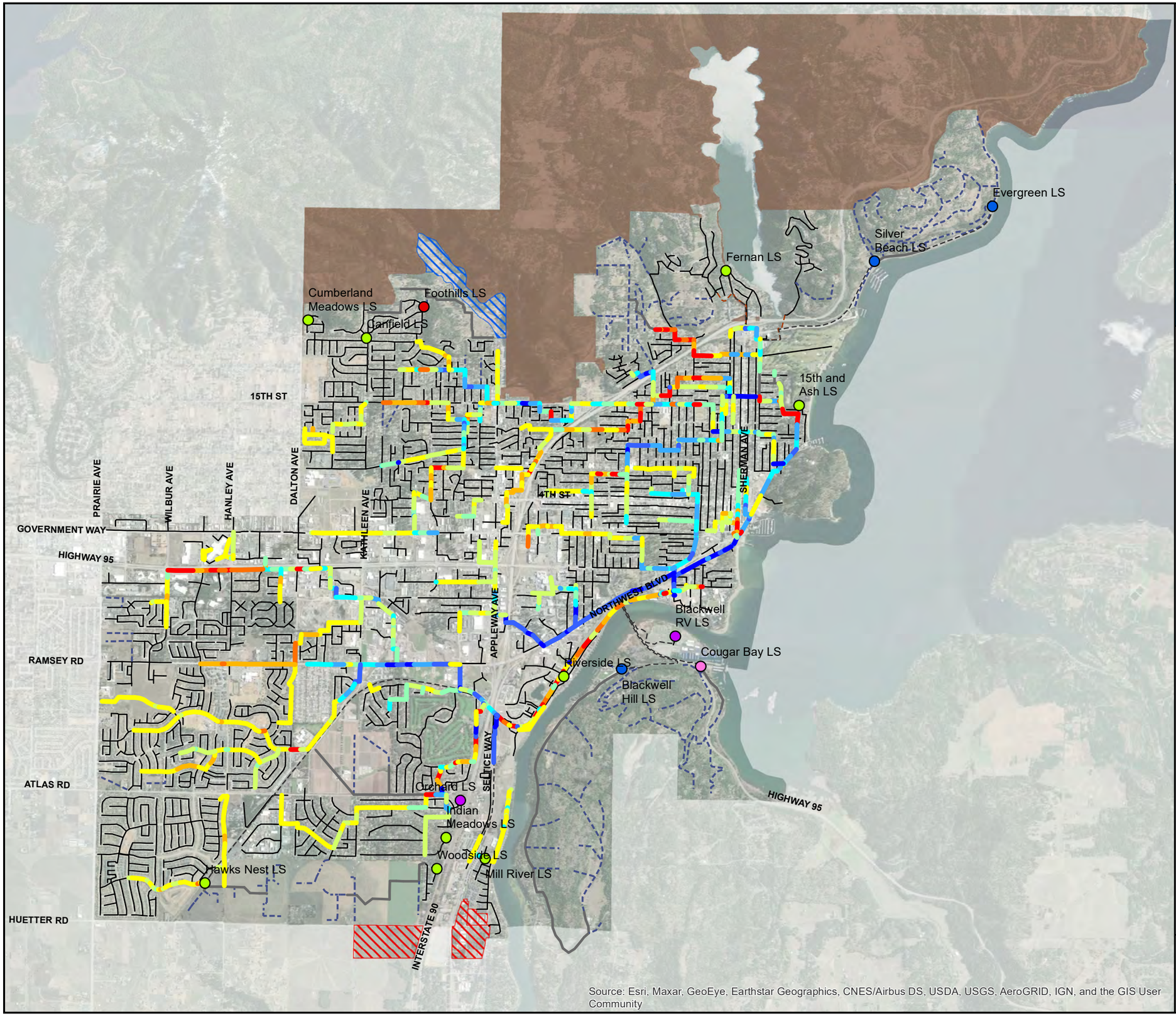
City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Figure A16

Reserve Capacity Master Plan Model



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Reserve Capacity (MGD)

Trunk Lines

- Over Capacity
- 0.01 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 1.50
- 1.50 - 2.00
- 2.00 - 3.00
- 3.00 - 5.00
- 5.00 - 10.00
- > 10.00

Area of City Impact Outside Study Boundary

Lift Stations

- Existing - City
- Existing Privately Owned & Maintained
- Abandoned
- Master Planned - City
- Master Planned - Privately Owned & Maintained

- Collector
- Siphon
- Force Main
- Check Line
- Master Plan

No Service Areas

- Not Served by City
- FEMA Flood Plain

Note:

1. Results include the design storm event - 2.0"
2. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.
3. Reserve capacity is calculated relative to the full pipe depth using the Mannings Equation and not in relation to the City's d/D criteria.
4. Reserve Capacity only shown for existing pipes.

Feet
0 2,000 4,000 8,000

N E S W

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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

City of Coeur d'Alene IDAHO

Figure A17

CIP Summary Map

Master Plan Size (in)
- 10
- 12
- 15
- 18
- 21
- 24
- 30
- 36
- Check Line
- Force Main

CIP Timeframe
- 0 - 5 Years
- 5 - 10 Years
- As Needed With Growth
- Do Nothing

Existing Size (in)
- 10
- 12
- 15
- 18
- 21
- 24
- 30
- 36
- Collector
- Force Main
- Siphon

No Service Areas
- Not Served by City
- FEMA Flood Plain

Lift Stations
- Existing - City
- Existing Privately Owned & Maintained
- Abandoned
- Master Planned - City
- Master Planned - Privately Owned & Maintained
- Manholes
- Parcel Line
- Area of City Impact Outside Study Boundary
- Future WW Service Area

PRINT DATE: 11/4/2022

N W E S

0 750 1,500 3,000 Feet

JUB

Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

HUETTER RD
ATLAS RD
RAMSEY RD
HIGHWAY 95
GOVERNMENT WAY
PRAIRIE AVE
WILBUR AVE
HANLEY AVE
15TH ST
DALTON AVE
KATHLEEN AVE
INTERSTATE 90
APPLEWAY AVE
SHERMAN AVE
NORTHWEST BLVD

Hawks Nest LS
S.4 Hawks Nest LS
E.2.01 Lakeside Study Extension North
C.12 RAM1-42
E.2.02 Lakeside Study Extension South
Cumberland Meadows LS
Canfield LS
S.6 Foothills LS
Foothills LS
E.4 Nettleton Gulch Extension
Woodside LS
Indian Meadows LS
Orchard LS
C.11 FWN1-04
C.10 FWN1-22A
C.9 Mill River LS
Mill River LS
S.1 FWN1-22
S.2 BEXT1-06DE3
Riverside LS
E.7 Blackwell Hill Interceptor
LS.1 Master Plan Blackwell Hill LS
Blackwell Hill LS
E.9 Montana Pressure Sewer
E.5 Hill Drive Extension
Blackwell RV LS
C.3 M3-17
LS.2 Master Plan Cougar Bay LS
Cougar Bay LS
C.4 RIV1-02
C.6 GAR1-01
Fernan LS
E.8 Cougar Bay Interceptor
C.2 M1-21
C.1 BUS1-01
15th and Ash LS
C.7 M1-14
LS.4 Master Plan Silver Beach LS
Silver Beach LS
LS.5 Master Plan Evergreen LS
E.6 Silver Beach Interceptor
Evergreen LS

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Appendix B

Data Compiled for Use in Model Development

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Contents

Appendix B Data Compiled for Use in Model Development

B.1 Background Data

Data in this study is summarized in **Table B-1**.

B.2 Collection System Flow Monitoring

B.2.1 General

Flow monitoring available for the Master Plan includes the following:

- 1998 – City of Coeur d'Alene Wastewater Flow Monitoring
- 2004 – City of Coeur d'Alene 2004 Inflow Source Identification
- 2005 – City of Coeur d'Alene 2005 Inflow Source Identification
- 2005 – City of Coeur d'Alene 2005 Northwest Quadrant Sewer Master Plan
- 2012 – City of Coeur d'Alene 2013 Collection System Master Plan
- 2015 – City of Coeur d' Alene 2015 Inflow Source Technical Memorandum
- 2021 – City of Coeur d'Alene 2022 Collection System Master Plan

Figure B-1 shows flow monitoring locations for the City of Coeur d'Alene. Flow monitoring data from each project is summarized in subsequent sections. Use of the data is documented in the main report.

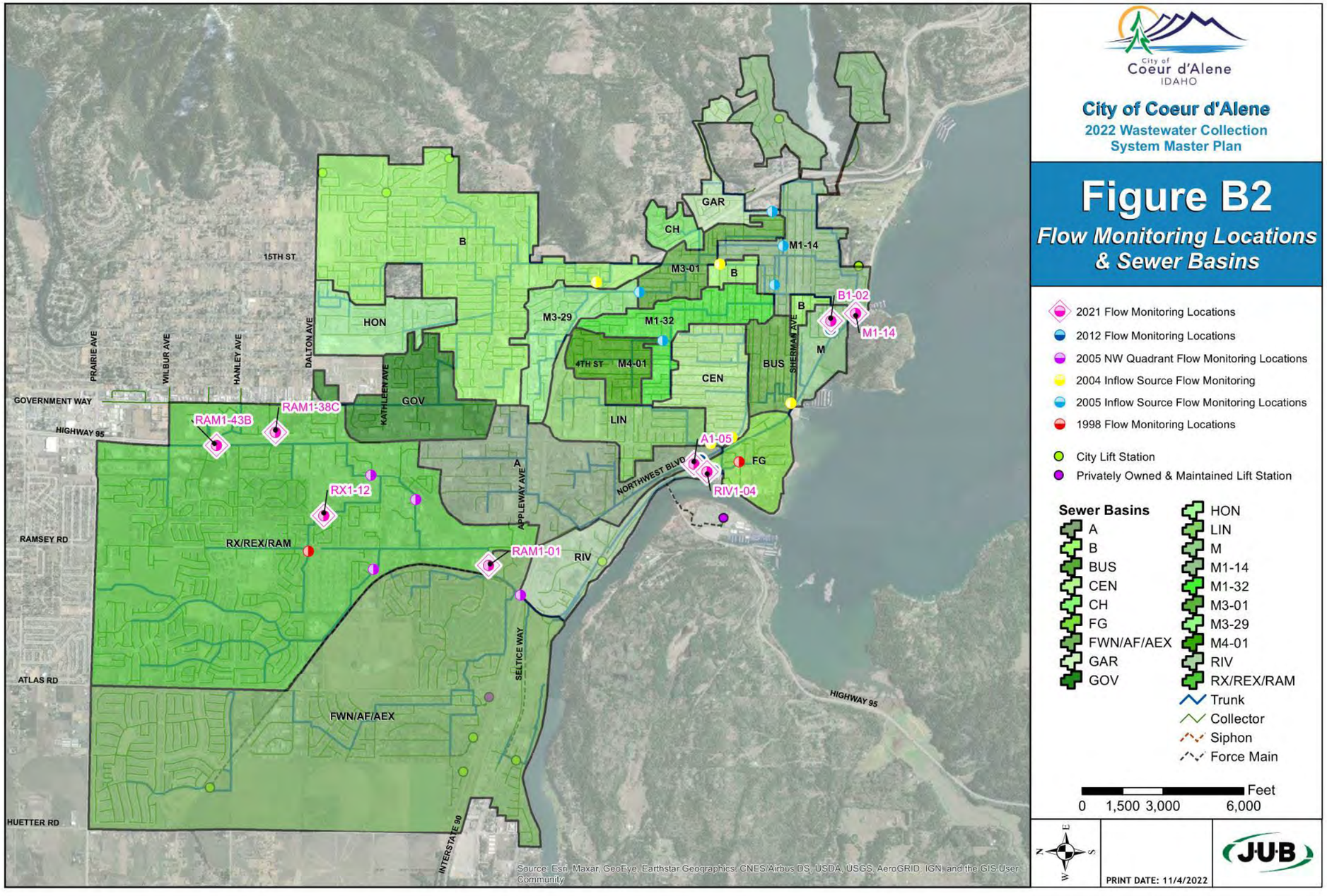
Table B-1 – Background Data Sources

Item Requested	City Contact Person	Date Received	Comments	Status
GIS Basemap Data				
Collection System	Mike Becker / Debbie Frisbie	3/1/2021	Shape file database received from City staff.	Completed
Parcels	Mike Becker / Debbie Frisbie	2/16/2021	Shape file from county FTP	Completed
Roads	Mike Becker / Debbie Frisbie	2/16/2021	Shape file from county FTP	Completed
City Limits		March 2022	Included in City 2022 – 2042 Comp Plan.	Completed
Zoning	Mike Becker / Debbie Frisbie	2/16/2021	Shape file from county FTP	Completed
Structures	Mike Becker / Debbie Frisbie	2/16/2021	Shape file from county FTP	Completed
Impact Area		March 2022	Included in City 2022 – 2042 Comp Plan.	Completed
Comprehensive Plan		March 2022	Downloaded City 2022-2042 Comp Plan.	Completed
Subdivisions	Mike Becker / Debbie Frisbie	2/16/2021	Shape file from county FTP	Completed
Contours		2/16/2021	Shape file from county FTP	Completed
Imagery	Mike Becker / Debbie Frisbie	2/16/2021	2020 Images	Completed

Item Requested	City Contact Person	Date Received	Comments	Status
Treatment Plant Flows				
Avg Day Flows	Mike Becker	5/14/2021	Monthly data for last 10 years (2011 -2021). Reported flows are from the effluent flow meter.	Completed
Peak Day Flows	Mike Becker	5/14/2021	Monthly data for last 10 years (2011 – 2021). Reported flows are from the effluent flow meter.	Completed; received minimum / average / maximum flows per day.
Avg Hour Flows	Mike Becker	5/14/2021	Values are not directly recorded. Per Mike Becker email on 5/14/2021, values ca be approximated off AVG Day and Peak Day Flows.	Completed; not available.
Peak Hour Flows	Mike Becker	5/14/2021	Values are not directly recorded. Per Mike Becker email on 5/14/2021, values ca be approximated off AVG Day and Peak Day Flows.	Completed; not available.
Hourly Flows	Mike Becker	5/14/2021	Values are not directly recorded. Per Mike Becker email on 5/14/2021, values ca be approximated off AVG Day and Peak Day Flows.	Completed; not available.
Lift Station Flows (Each Lift Station)				
Lift Stations	Mike Becker / City Staff	July 2021	Number of pumps. Design point and/or curve. Wet well dimensions and on/off levels.	Completed
Avg Hour Flows	Mike Becker	N/A	Daily data for last 1 year, if available	Completed; data is not available
Peak Hour Flows	Mike Becker	N/A	Daily data for last 1 year, if available	Completed; data is not available
SCADA Flows	Mike Becker	N/A	1 min Data, if available	Completed; data is not available
Record Drawings / Design Information	Mike Becker / City Staff	July 2021	Available record drawings, design memoranda, pump operating data (e.g. pump curves).	Completed

Item Requested	City Contact Person	Date Received	Comments	Status
Water Meters				
GIS shapefile	Mike Becker / Terry Pickle	2/16/2021	Location with address and Water Meter ID (ID corresponding to billing)	Completed
Usage Data	Rob Stark / Terry Pickle	5/18/2021	Data for winter use (Nov, Dec, Jan, Feb). Minimum 1 year, ideally 3 years.	Completed
Daily Usage Data	Rob Stark / Terry Pickle	5/14/2021	SCADA data on wells, booster pumps, tanks. Received Daily Pump data for Nov, Dec, Jan and Feb from 2018-2021. Received monthly total from 2017 -2021.	Completed
Other Data				
Rainfall Data		May 2021	No rainfall event during 2021 Flow Monitoring.	Completed
Pipe Condition Data	Mike Becker / Debbie Frisbie	3/1/2021	Age, material, condition, etc.	Completed; data as available in existing GIS
Development plans and preliminary plats for developments in the study area	Mike Becker / City Staff	-	City regularly updates GIS to include new developments for existing and committed model analysis. Future developments will be reviewed on case- by case basis.	Completed

Figure B-1 – Flow Monitoring Locations & Sewer Basins



B.2.2 Historical Flow Monitoring

B.2.2.1 1988 Flow Monitoring

Table B-2 summarizes locations for 1998 Flow Monitoring. Flow monitoring was performed in May and June. Graphs of the final results from the 1998 flow monitoring project are shown in **Figure B-2** through **Figure B-5**.

Table B-2 – Flow Monitoring Summary for 1998

Project	Manhole	Basin/ Interceptor	Date Monitored	Location
1998 Flow Monitoring	BUS1-01; Site 01	BUS	May 21 – May 30	1st St. between Sherman Avenue and Lakeside Avenue
	FG2-03; Site 02	FG	May 21 – May 30	Alley between Smylie Street and Hubbard Street (Note: This manhole was removed and the name given to a new manhole as part of the 2011 Education Corridor Project)
	RX1-18A; Site 03	RX/REX/RAM	May 21 – May 30; May 31 – June 6	Dalton Avenue just west of intersection with Ramsey Road
	RAM1-38A; Site 04	RX/REX/RAM	May 21 – May 30; June 18 – June 25	Adjacent to bike path along U.S. Highway 95 southwest of Silver Lake Motel

Figure B-2 – 1998 Flow Monitoring Results for MH BUS1-01 – 60 Minute Average Flow and Precipitation Data

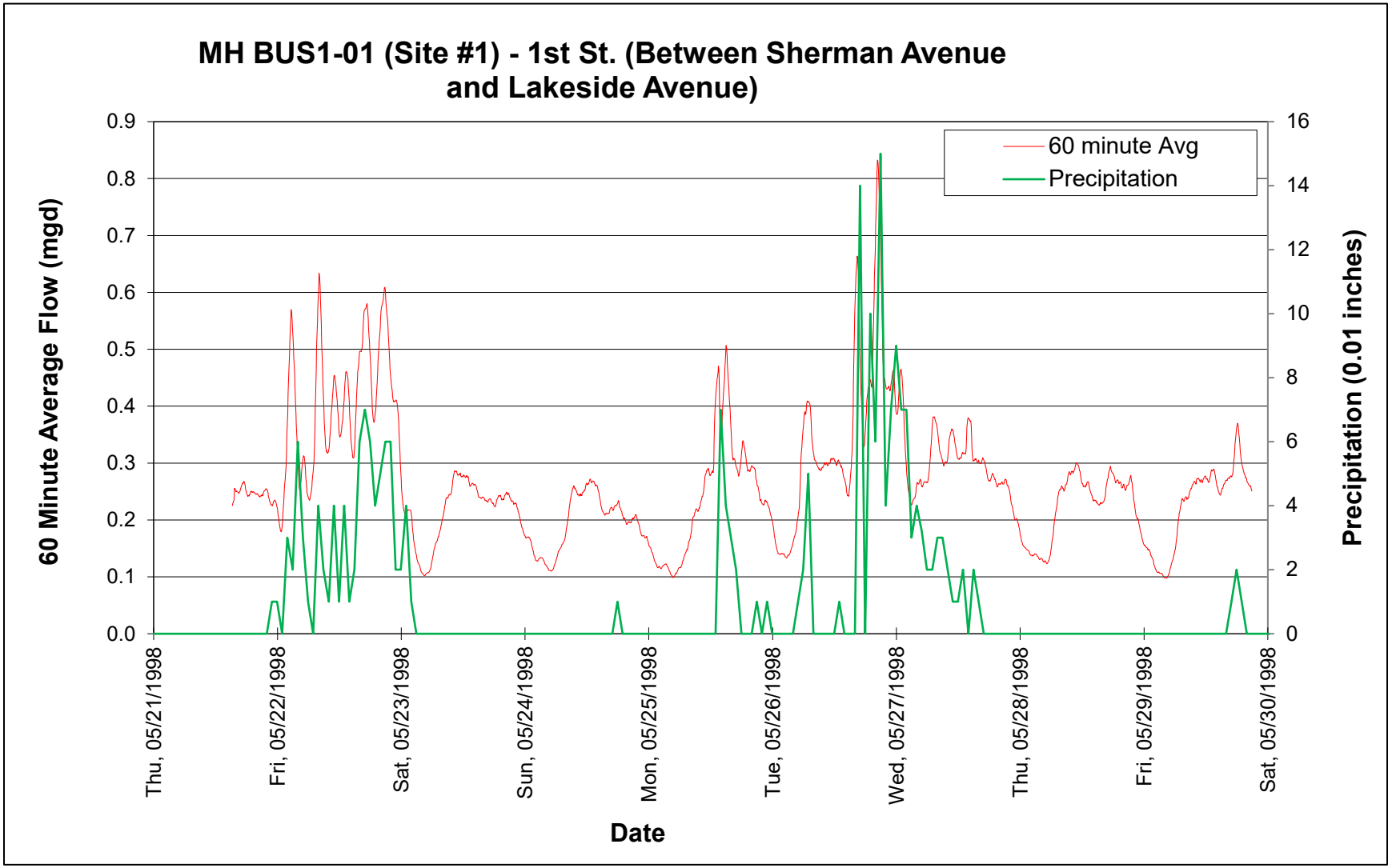


Figure B-3 – 1998 Flow Monitoring Results for MH FG2-02 – 60 Minute Average Flow and Precipitation Data

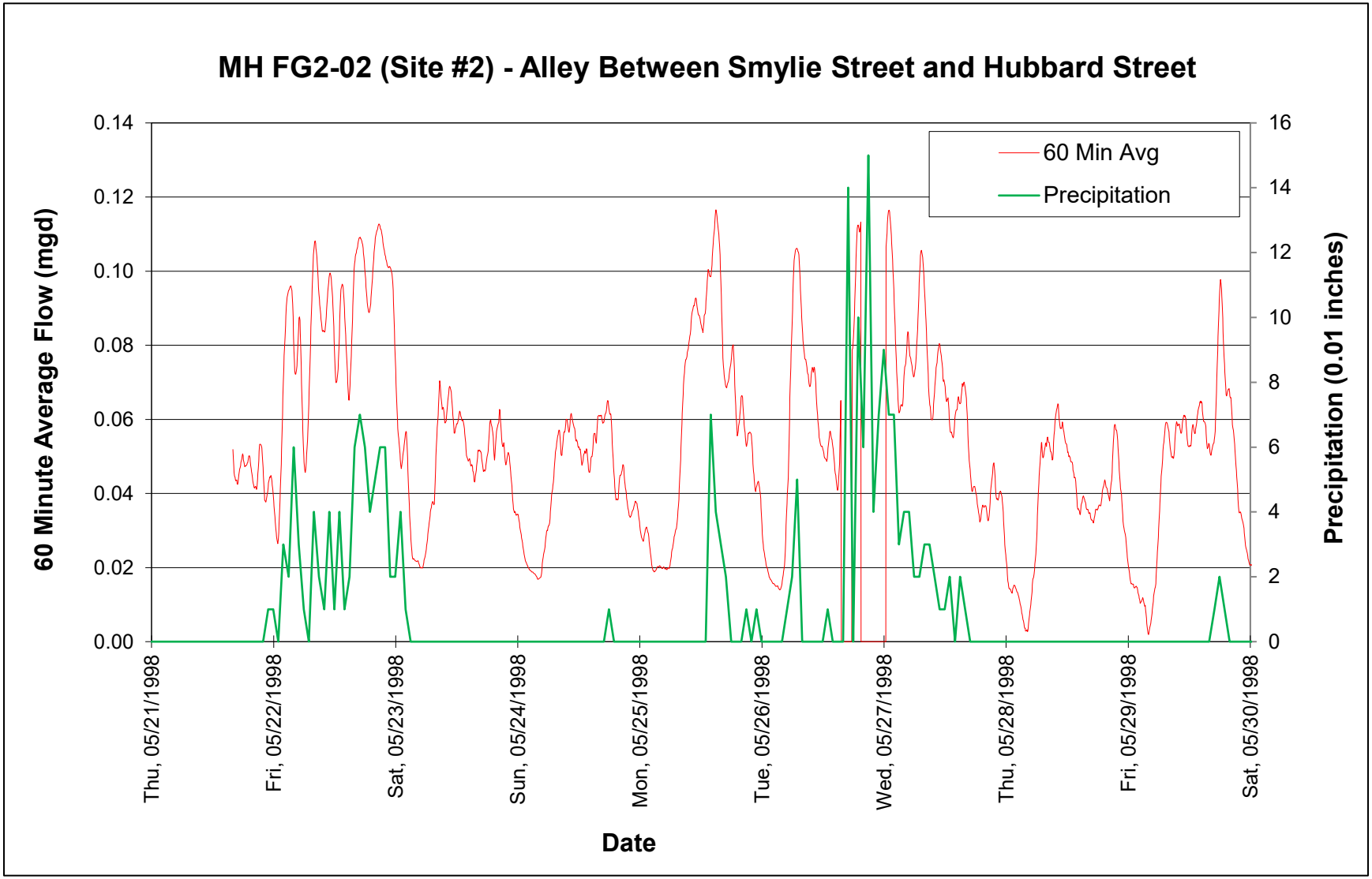


Figure B-4 – 1998 Flow Monitoring Results for MH RX1-18A – Raw Flow and 60 Minute Average

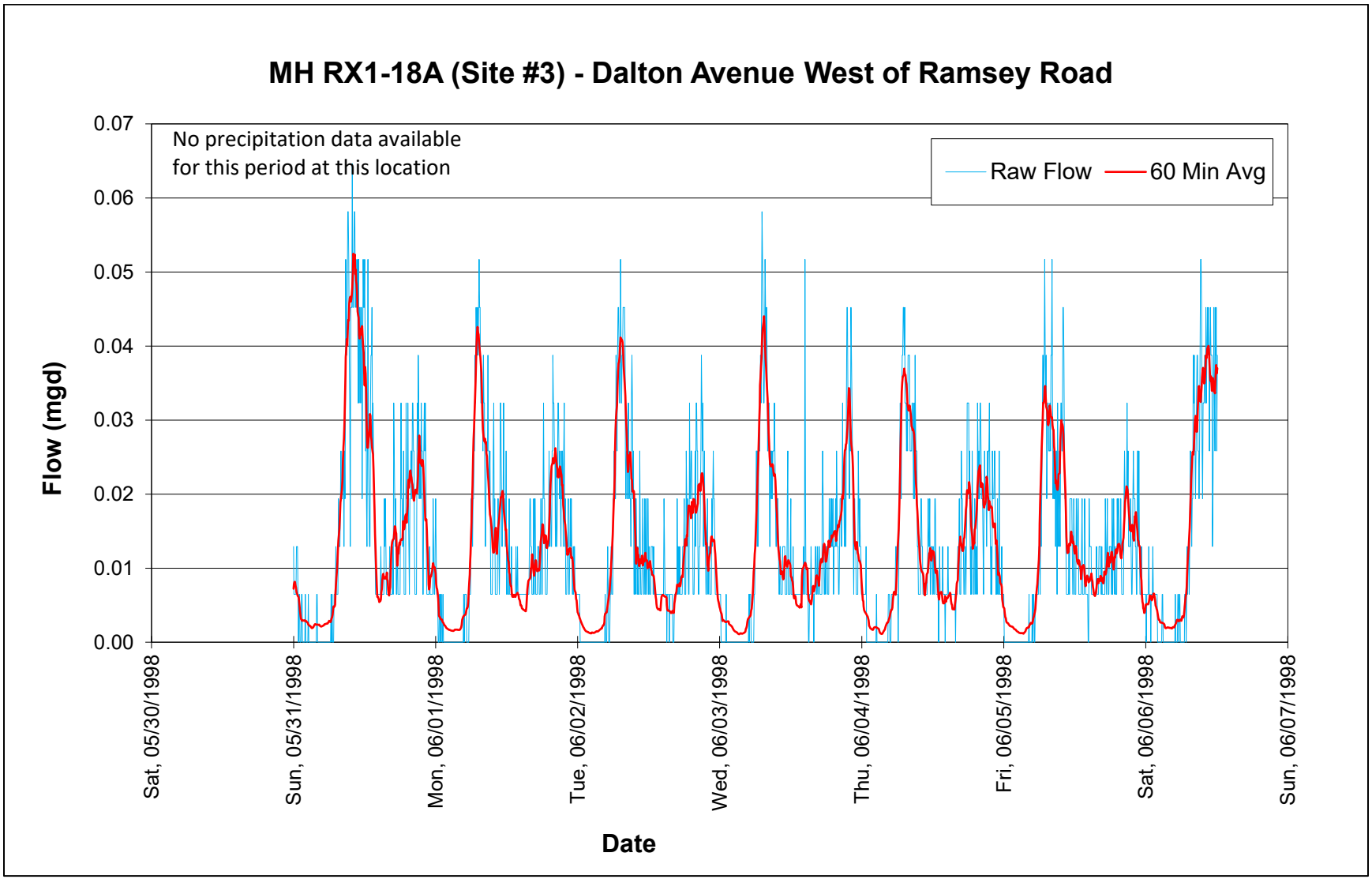
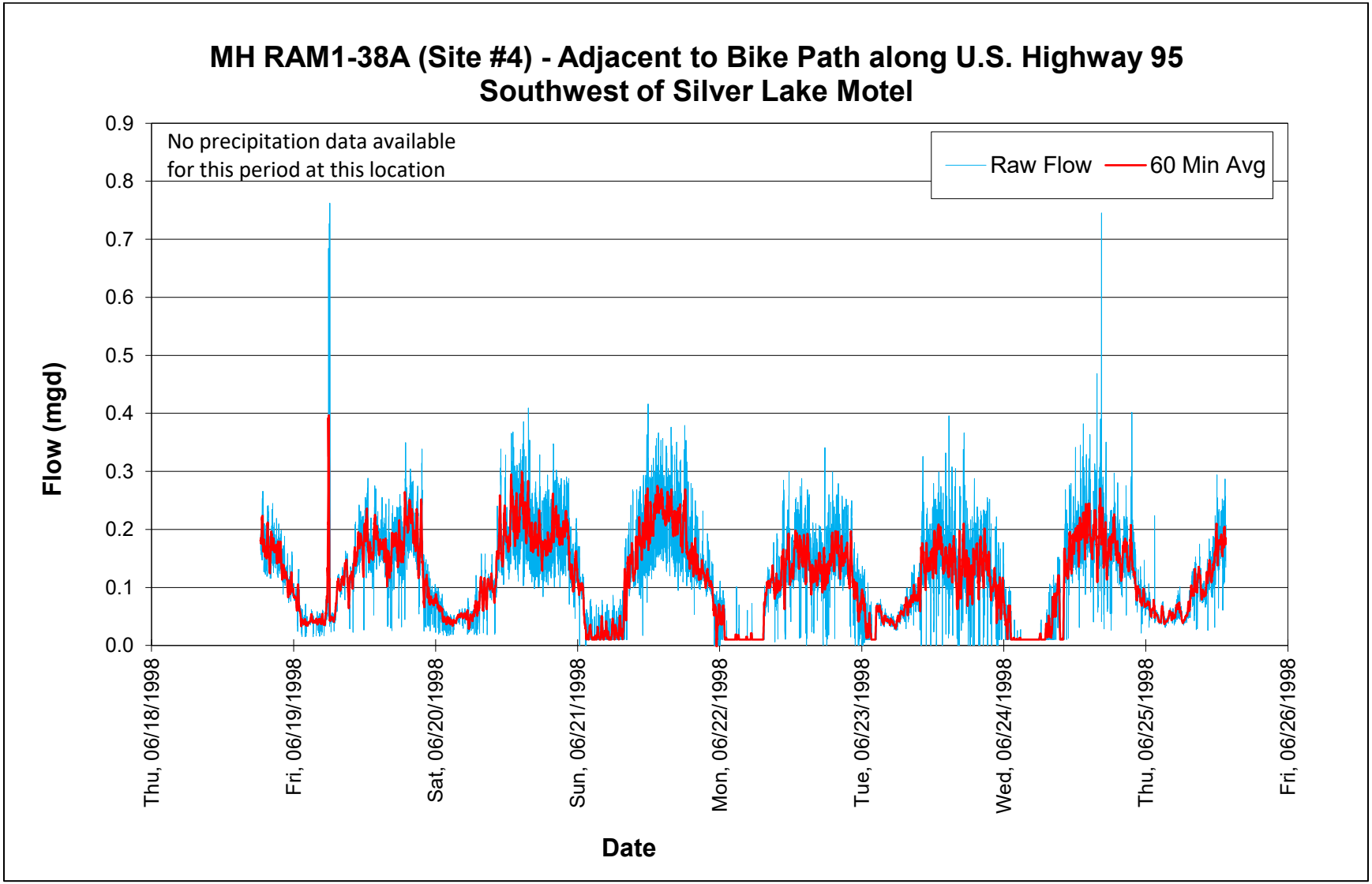


Figure B-5 – 1998 Flow Monitoring Results for MH RAM1-38A – Raw Flow and 60 Minute Average



B.2.2.2 2004 Inflow Source Identification Flow Monitoring

Table B-3 summarizes locations for the 2004 Inflow Source Identification flow monitoring. Flow monitoring was performed in May, June, July, and November. Graphs of the final results from the 2004 flow monitoring project are shown in **Figure B-6** through **Figure B-13**. Precipitation was recorded at the Coeur d'Alene airport and from a tipping bucket rain gauge installed on 15th Street just north of Interstate 90.

Table B-3 – Flow Monitoring Summary for 2004

Project	Manhole	Basin/ Interceptor	Dates Monitored	Location
2004 Inflow Source Flow Monitoring	M1-14	M	May 28 – July 6; November 22 – November 29	East Lakeshore Drive across from the Tubbs Hill parking lot
	B1-01	B	June 1 – July 6	Intersection of 9th Street and Young Avenue
	B1-25	B	June 1 – June 16	15th Street north of Montana Avenue
	B1-40	B	May 28 – July 9	Intersection of Locust Avenue and 13th Street
	CEN1-01	CEN	Jun 15 – July 9	Intersection of Milwaukee Drive and Browne Avenue
	BUS1-01	BUS	May 28 – July 9	In the alley between Sherman Avenue and Lakeside Avenue on 1st Street
	L1-03	LIN	June 1 – July 9	Lincoln Way, north of Virginia Avenue

Figure B-6 – May to July 2004 Flow Monitoring Results for MH M1-14 – 30 Minute Average Flow and Precipitation Data

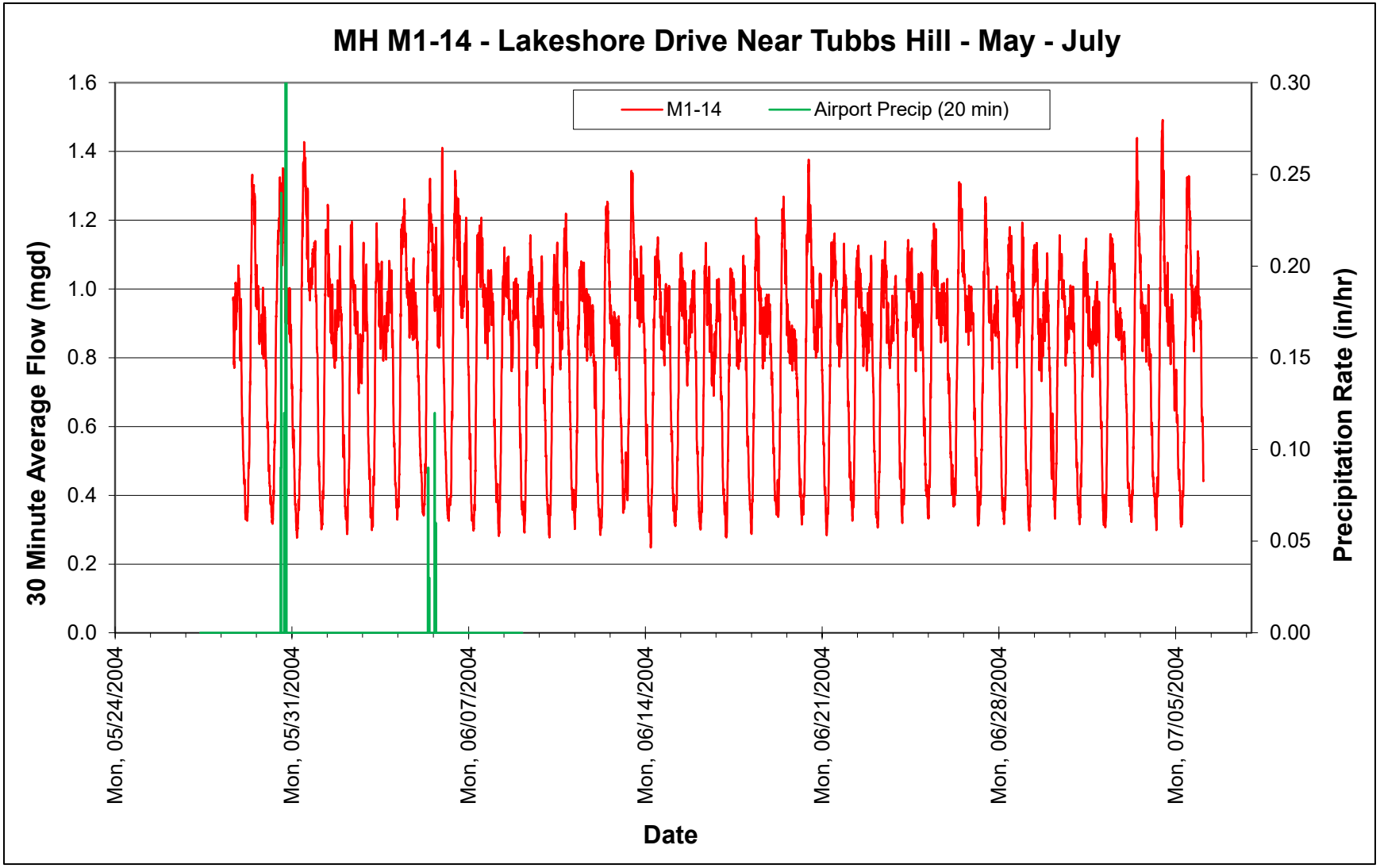


Figure B-7 – November 2004 Flow Monitoring Results for MH M1-14 – 30 Minute Average Flow

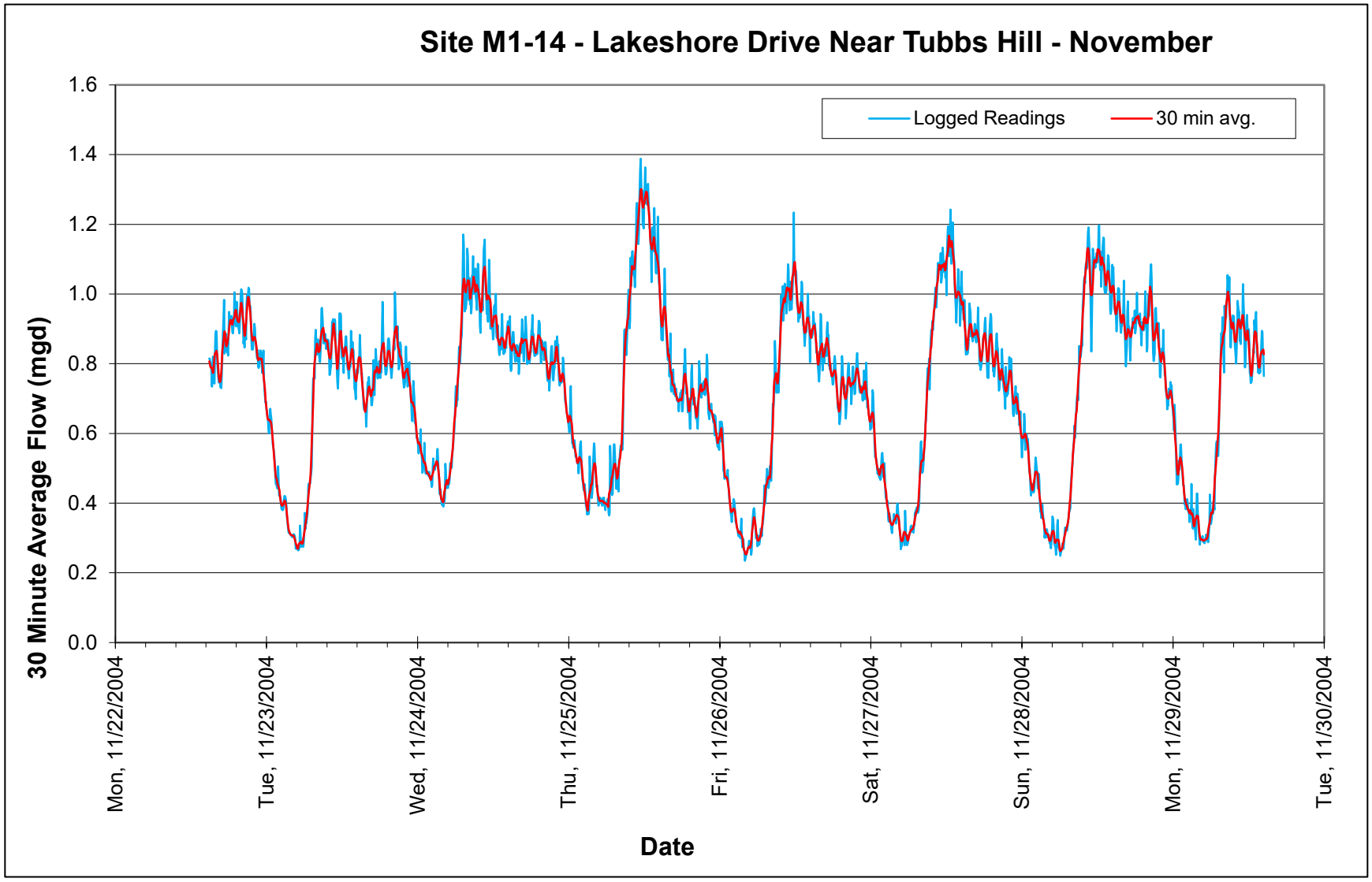


Figure B-8 – May to July 2004 Flow Monitoring Results for MH B1-01 – 30 Minute Average Flow and Precipitation Data

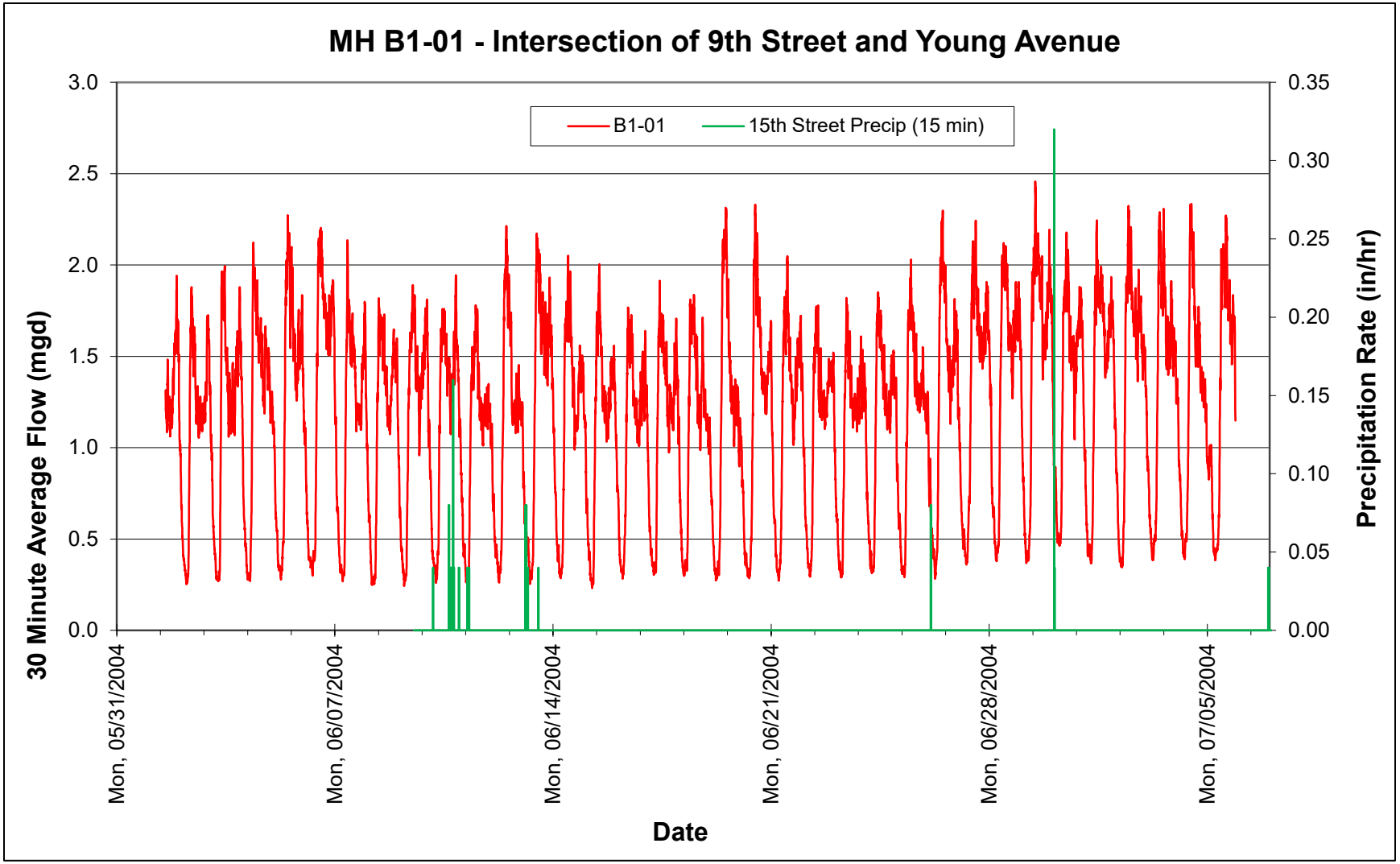


Figure B-9 – May to July 2004 Flow Monitoring Results for MH B1-25 – 30 Minute Average Flow and Precipitation Data

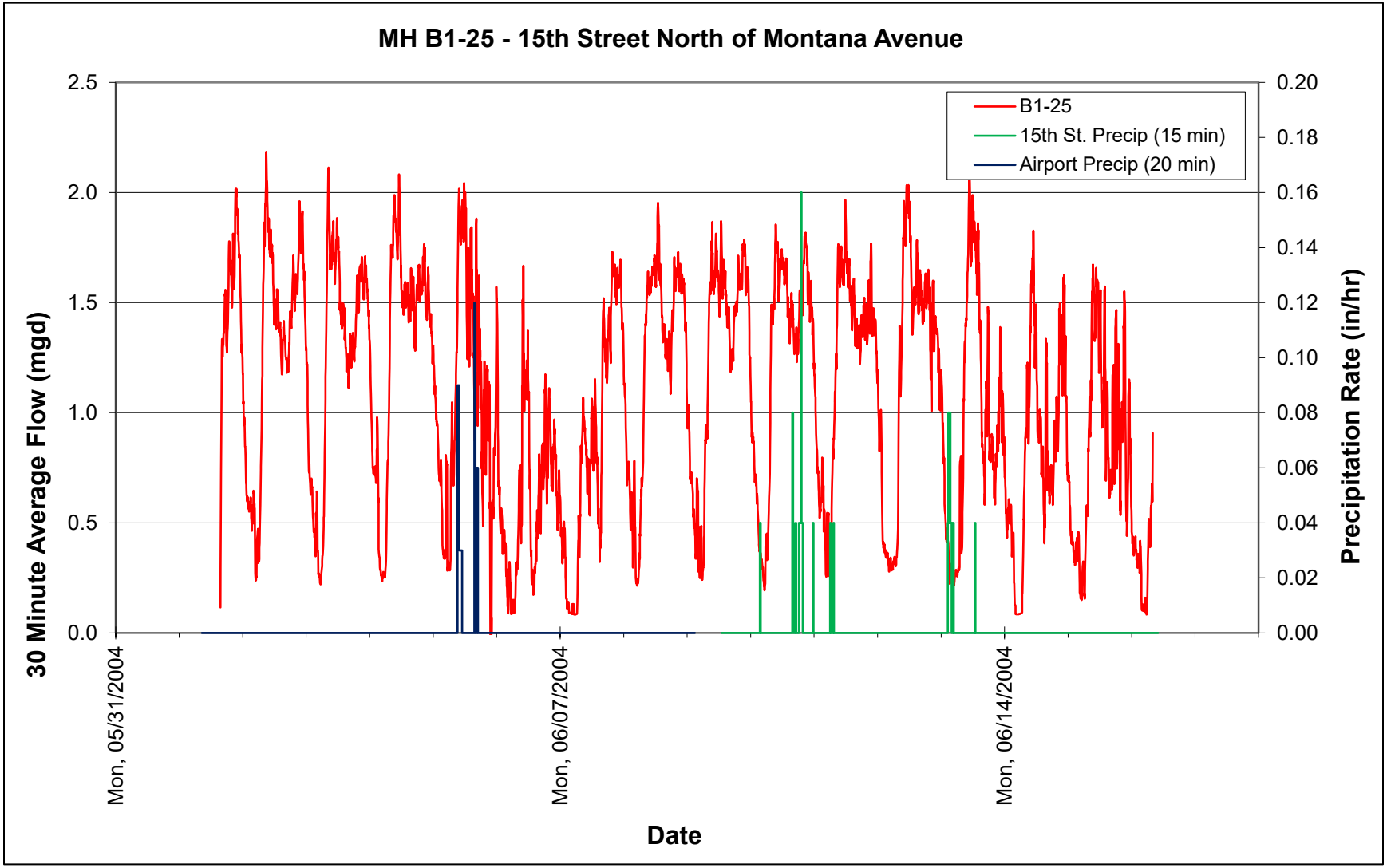


Figure B-10 – May to July 2004 Flow Monitoring Results for MH B1-40 – 30 Minute Average Flow and Precipitation Data

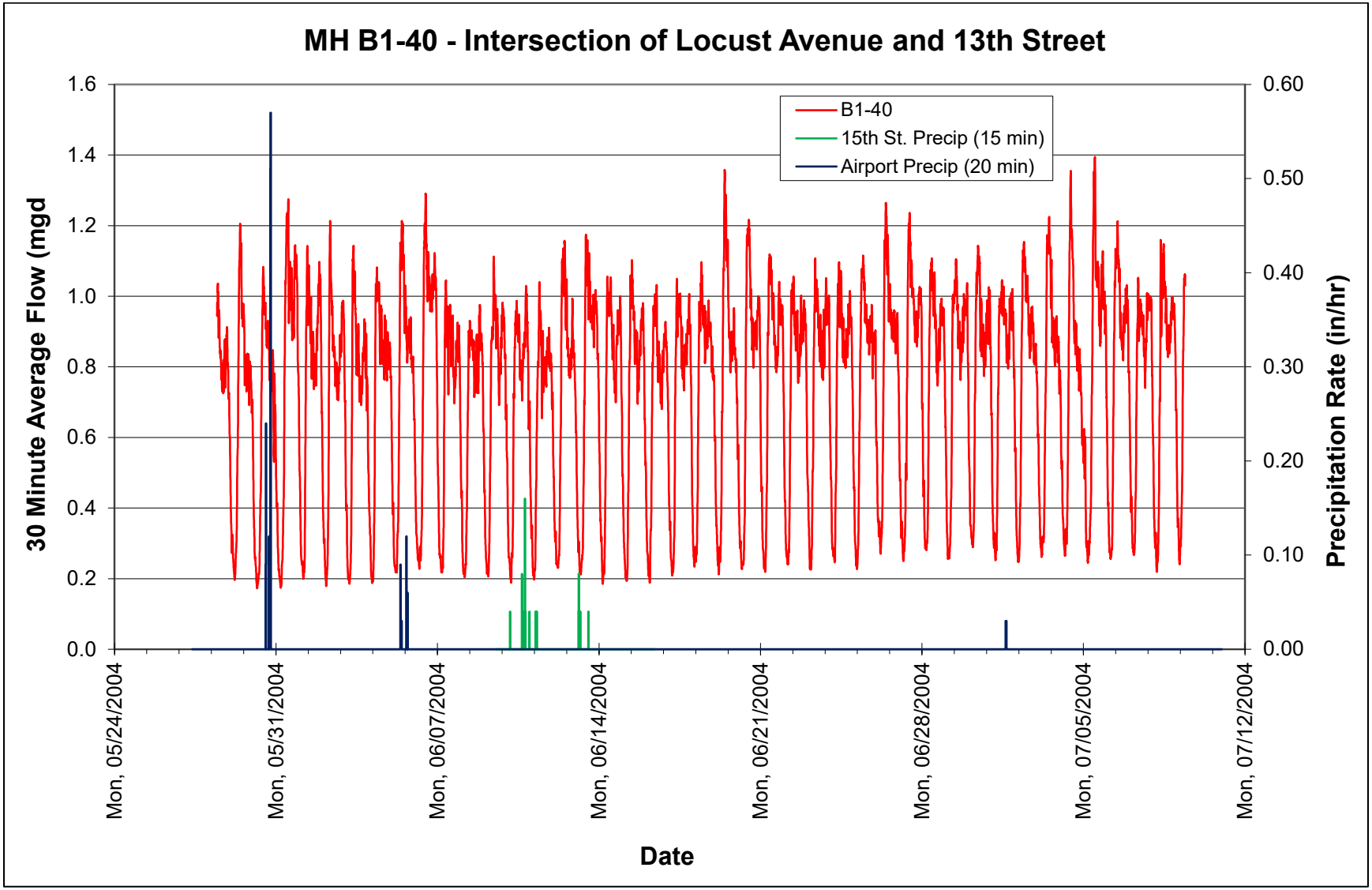


Figure B-11 – May to July 2004 Flow Monitoring Results for MH CEN1-10 – 30 Minute Average Flow and Precipitation Data

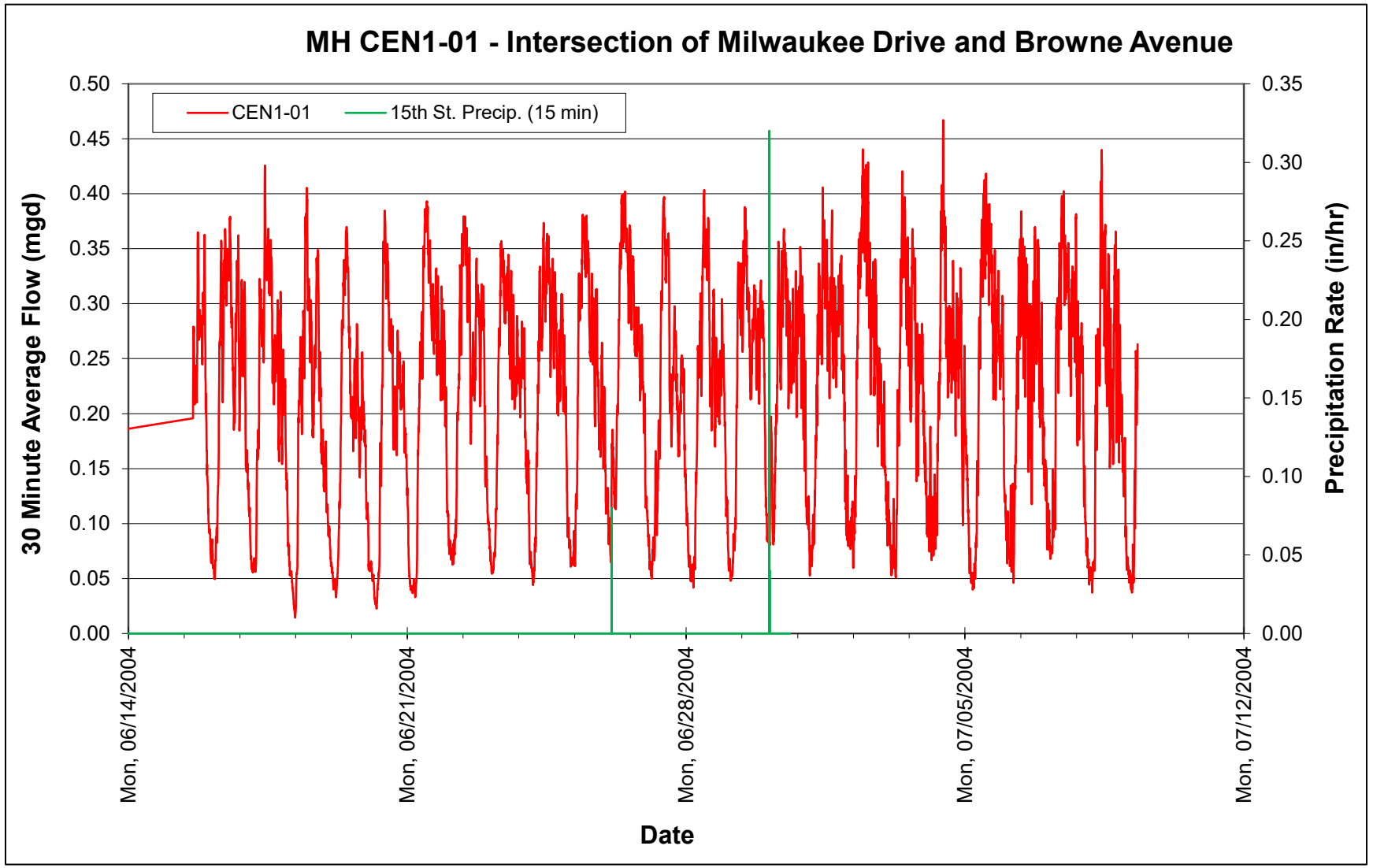


Figure B-12 – May to July 2004 Flow Monitoring Results for MH BUS1-01 – 30 Minute Average Flow and Precipitation Data

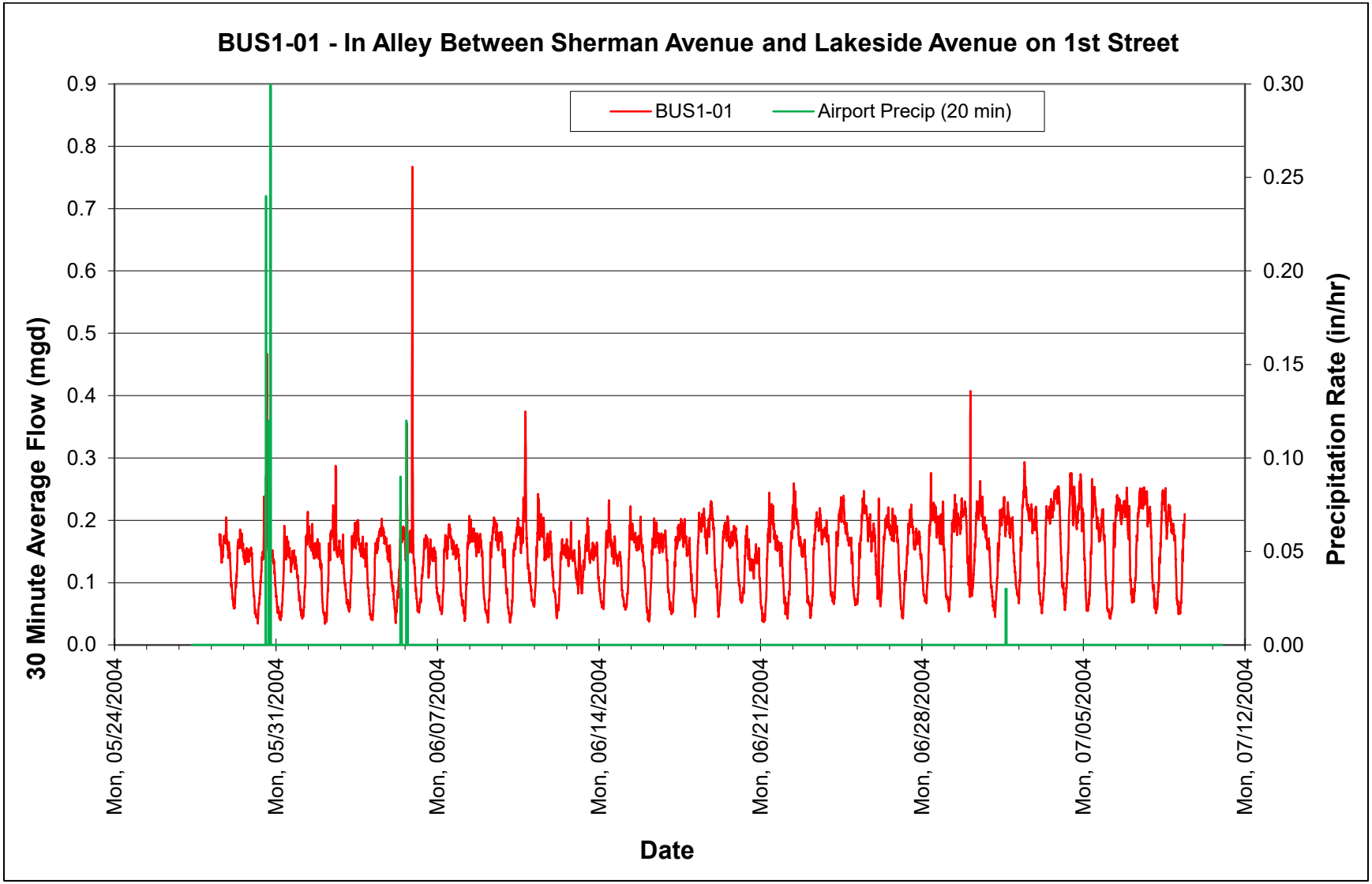
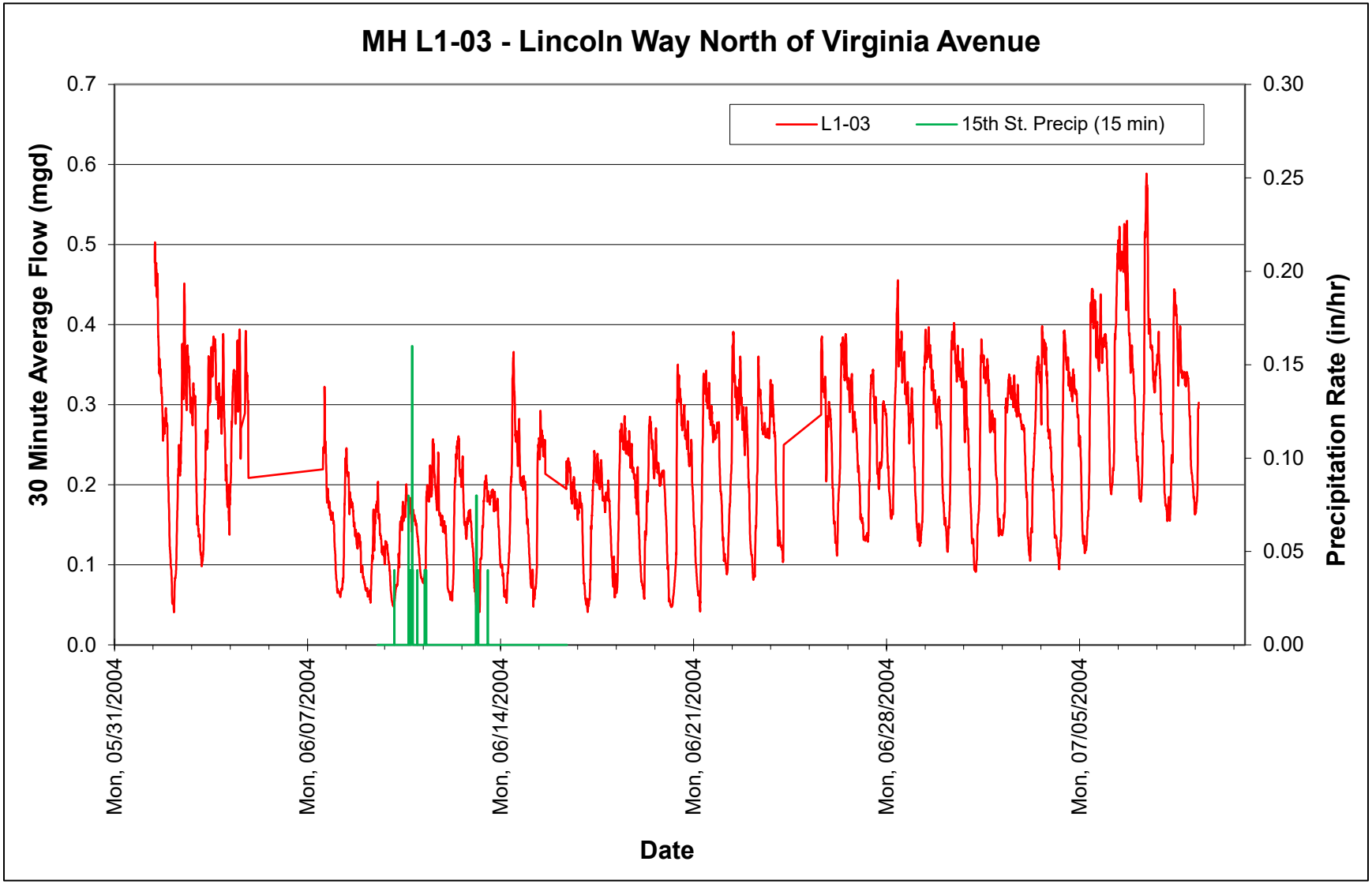


Figure B-13 – June to July 2004 Flow Monitoring Results for MH L1-03 – 30 Minute Average Flow and Precipitation Data



B.2.2.3 2005 Inflow Source Identification Flow Monitoring

Table B-4 summarizes locations for 2005 Inflow Source Identification flow monitoring. Flow monitoring was performed in May, June, and July. Graphs of the final results from the 2005 inflow source identification flow monitoring project are shown in **Figure B-14** through **Figure B-19**. Precipitation data was recorded at the Coeur d'Alene Airport, Coeur d'Alene Wastewater Treatment Plant, and from a tipping bucket rain gauge installed at the intersection of 9th Street and Boyd Avenue. Precipitation data is shown on **Figure B-20**.

Table B-4 – Flow Monitoring Summary for 2005

Project	Manhole	Basin / Interceptor	Dates Monitored	Location
2005 Inflow Source Flow Monitoring	M3-29	M	May 16 – July 18	Intersection of 12th Street and Hazel Avenue
	M4-01	M	May 16 – July 18	Intersection of 7th Street and Spokane Street
	GAR3-06	GAR	May 16 – July 18	21st Street between Garden Avenue and Coeur d'Alene Avenue
	M3-01	M	May 16 – July 18	Intersection of 17th Street and Coeur d'Alene Avenue
	M1-32	M	May 16 – July 18	Intersection of 13th Street and Indiana Avenue
	M1-14	M	May 16 – July 18	East Lakeshore Drive across from the Tubbs Hill parking lot

Figure B-14 – May to July 2005 Flow Monitoring Results for MH M3-29 – 30 Minute Average Flow

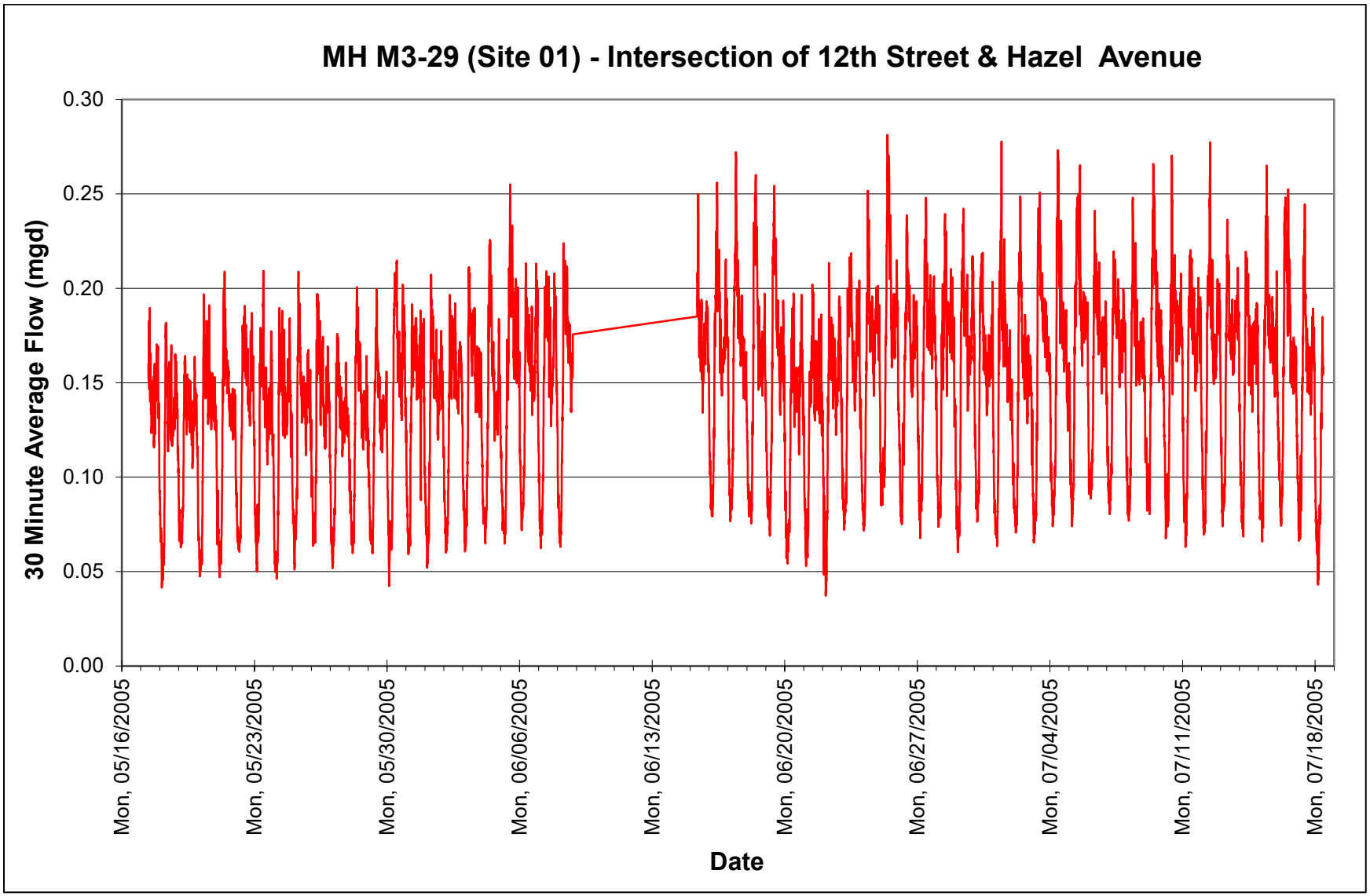


Figure B-15 – May to July 2005 Flow Monitoring Results for MH M4-01 – 30 Minute Average Flow

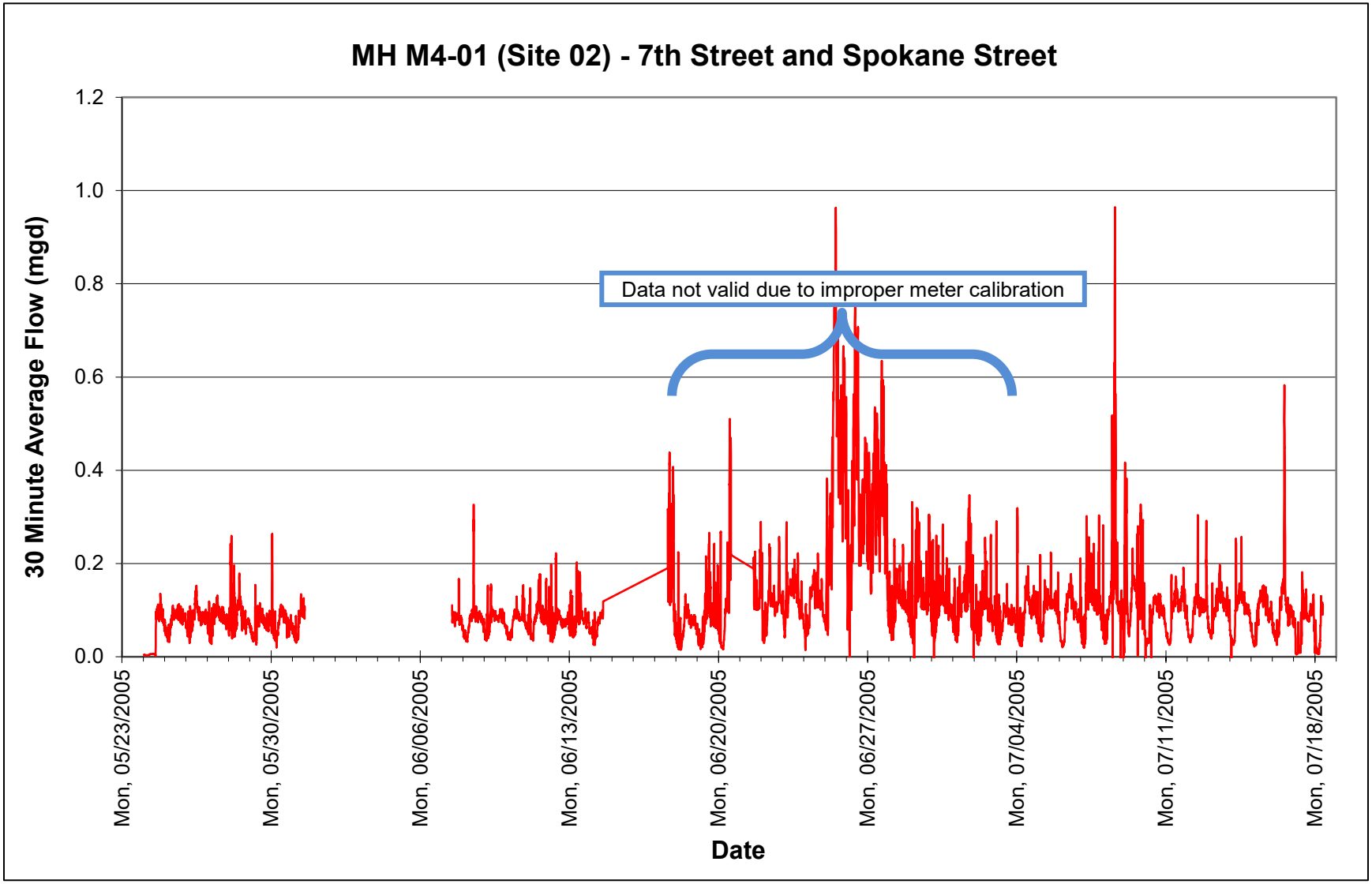


Figure B-16 – May to July 2005 Flow Monitoring Results for MH GAR3-06 – 30 Minute Average Flow

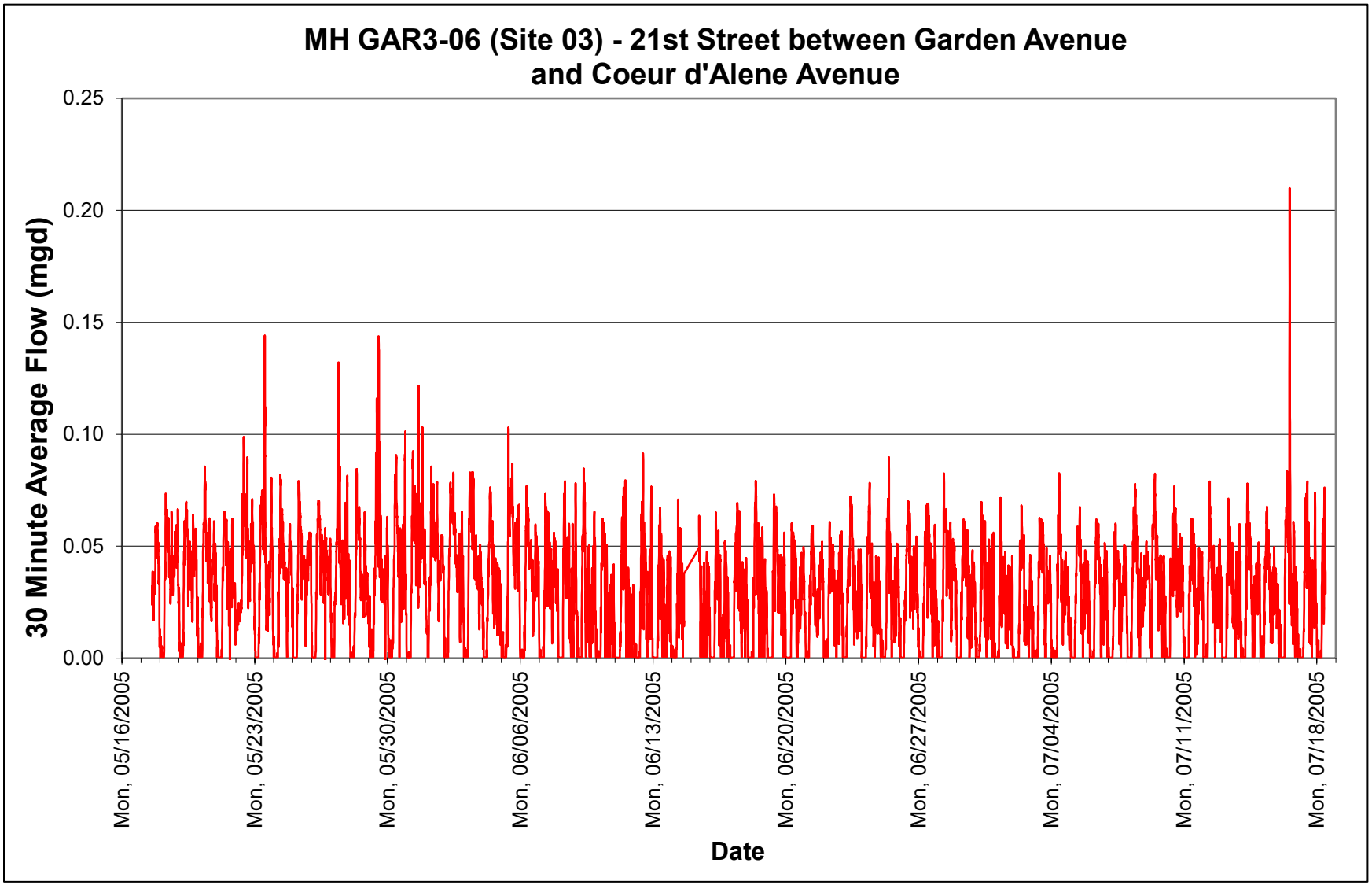


Figure B-17 – May to July 2005 Flow Monitoring Results for MH M3-01 – 30 Minute Average Flow

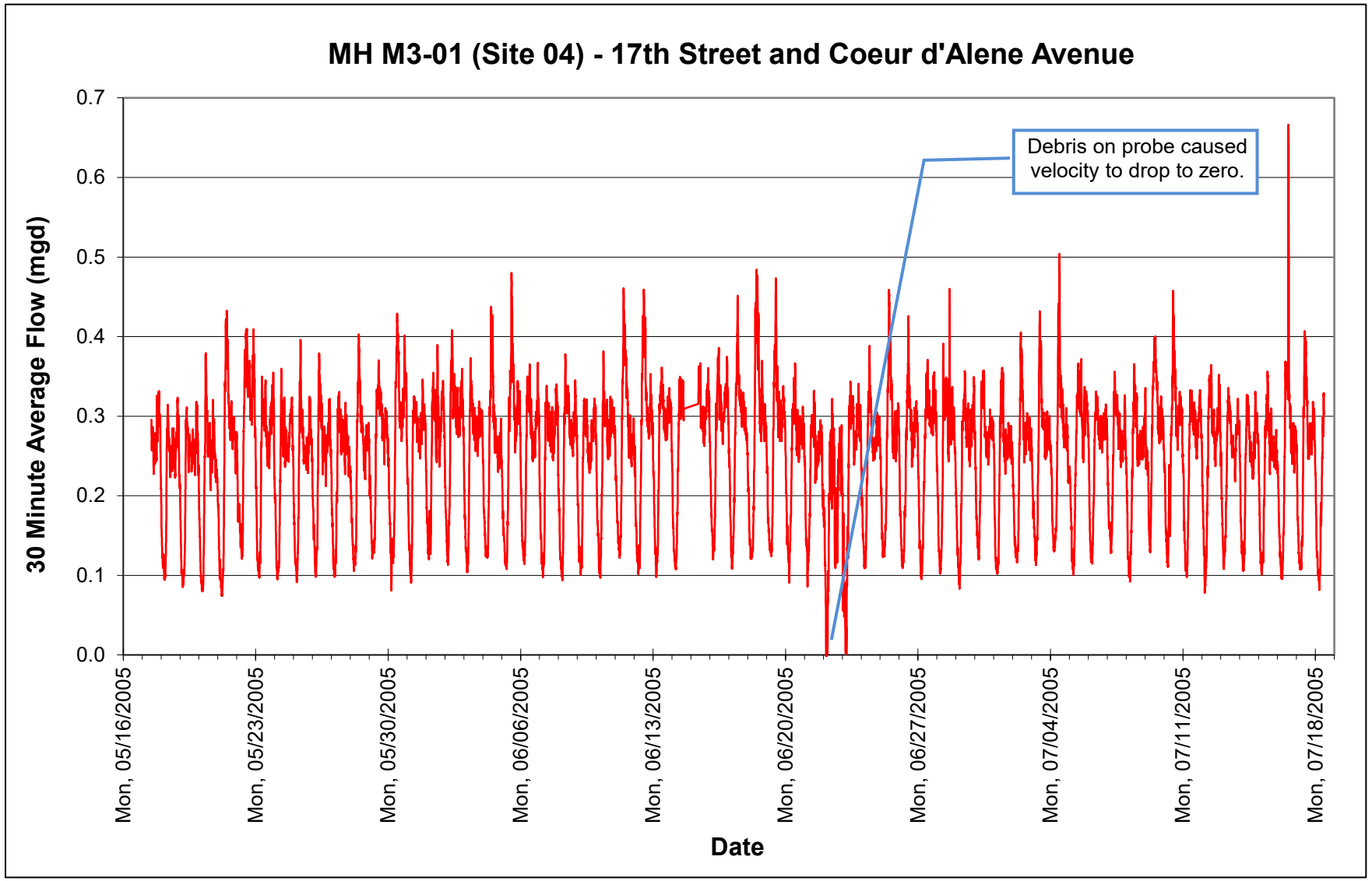


Figure B-18 – May to July 2005 Flow Monitoring Results for MH M1-32 – 30 Minute Average Flow

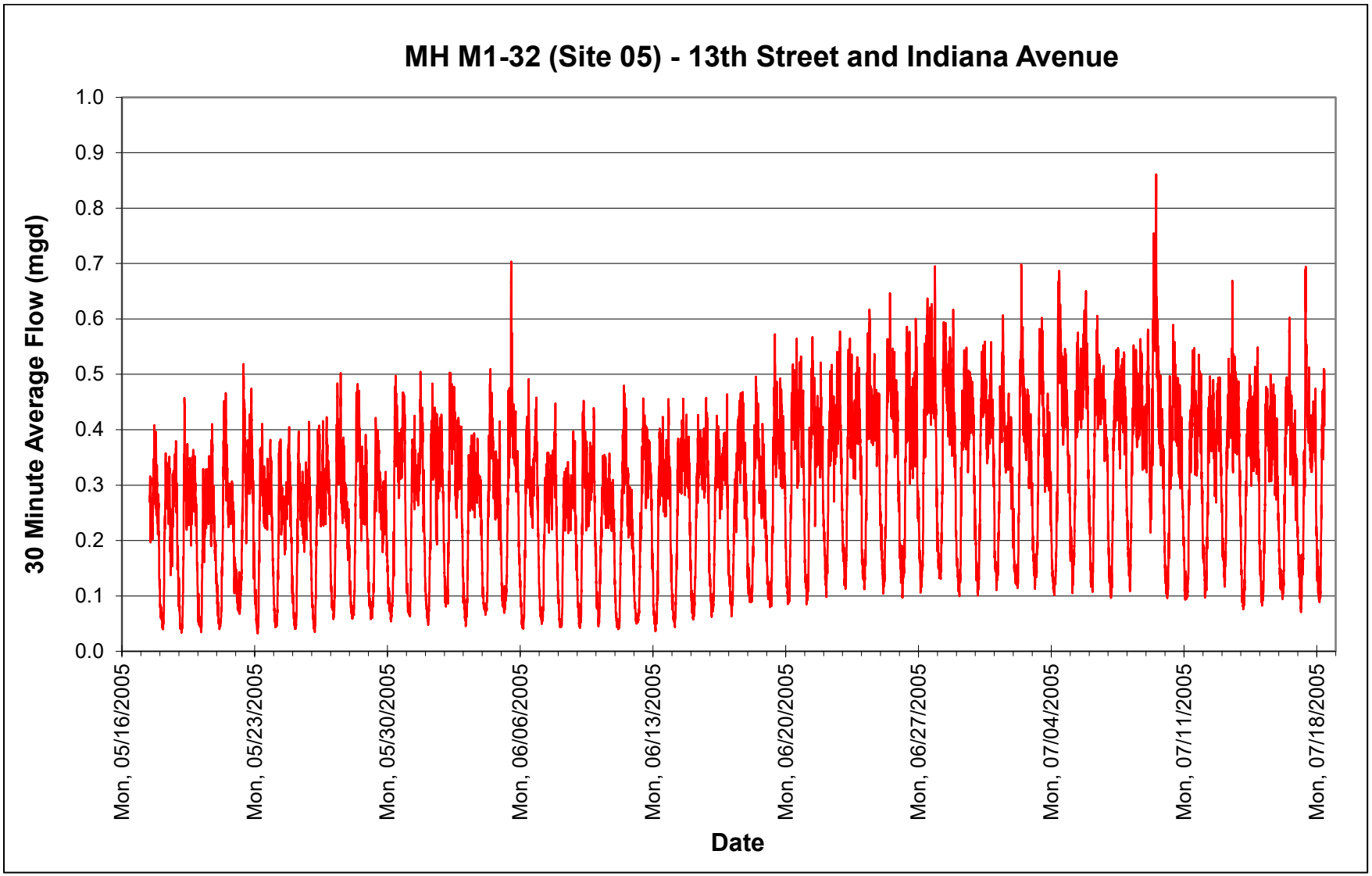


Figure B-19 – May to July 2005 Flow Monitoring Results for MH M1-14 – 30 Minute Average Flow

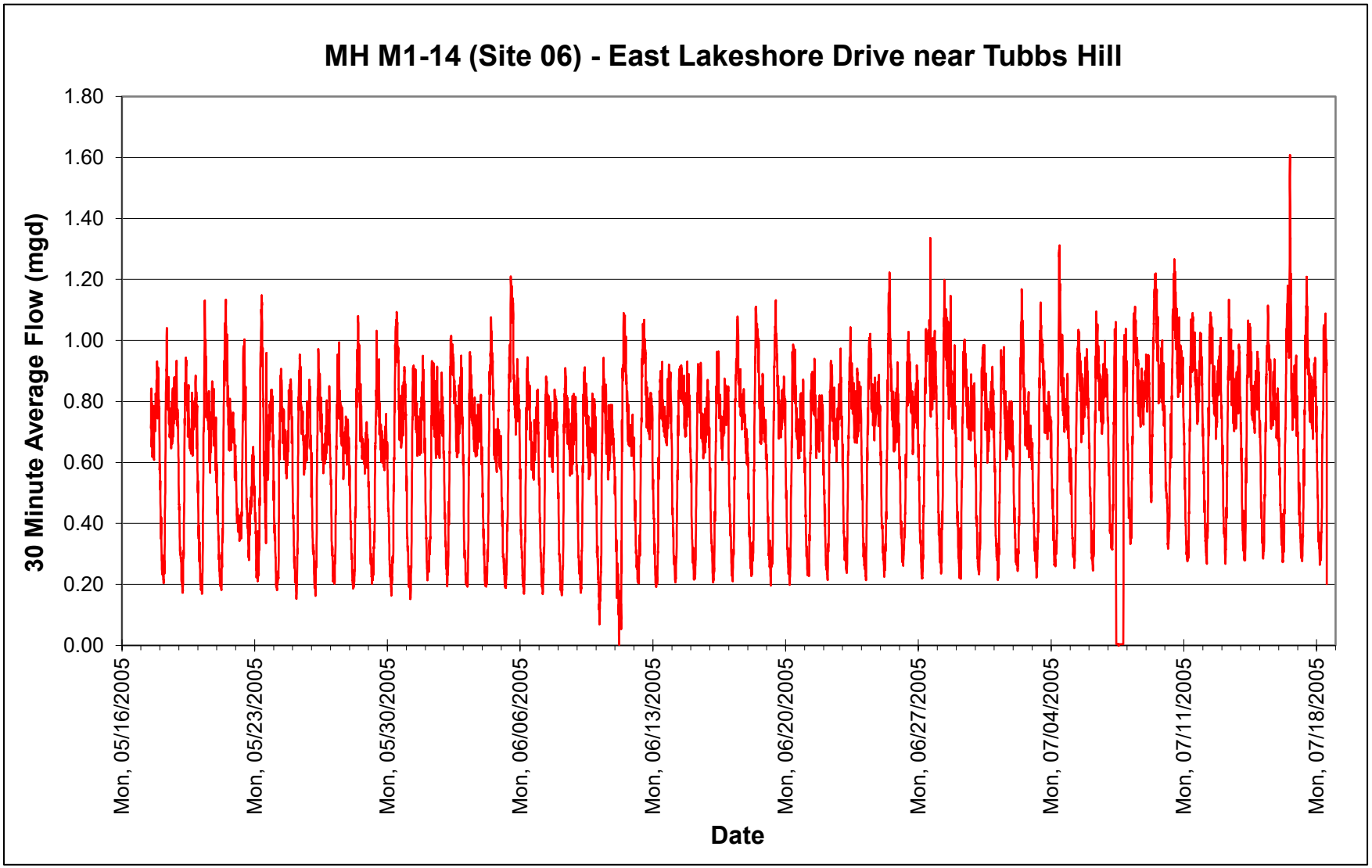
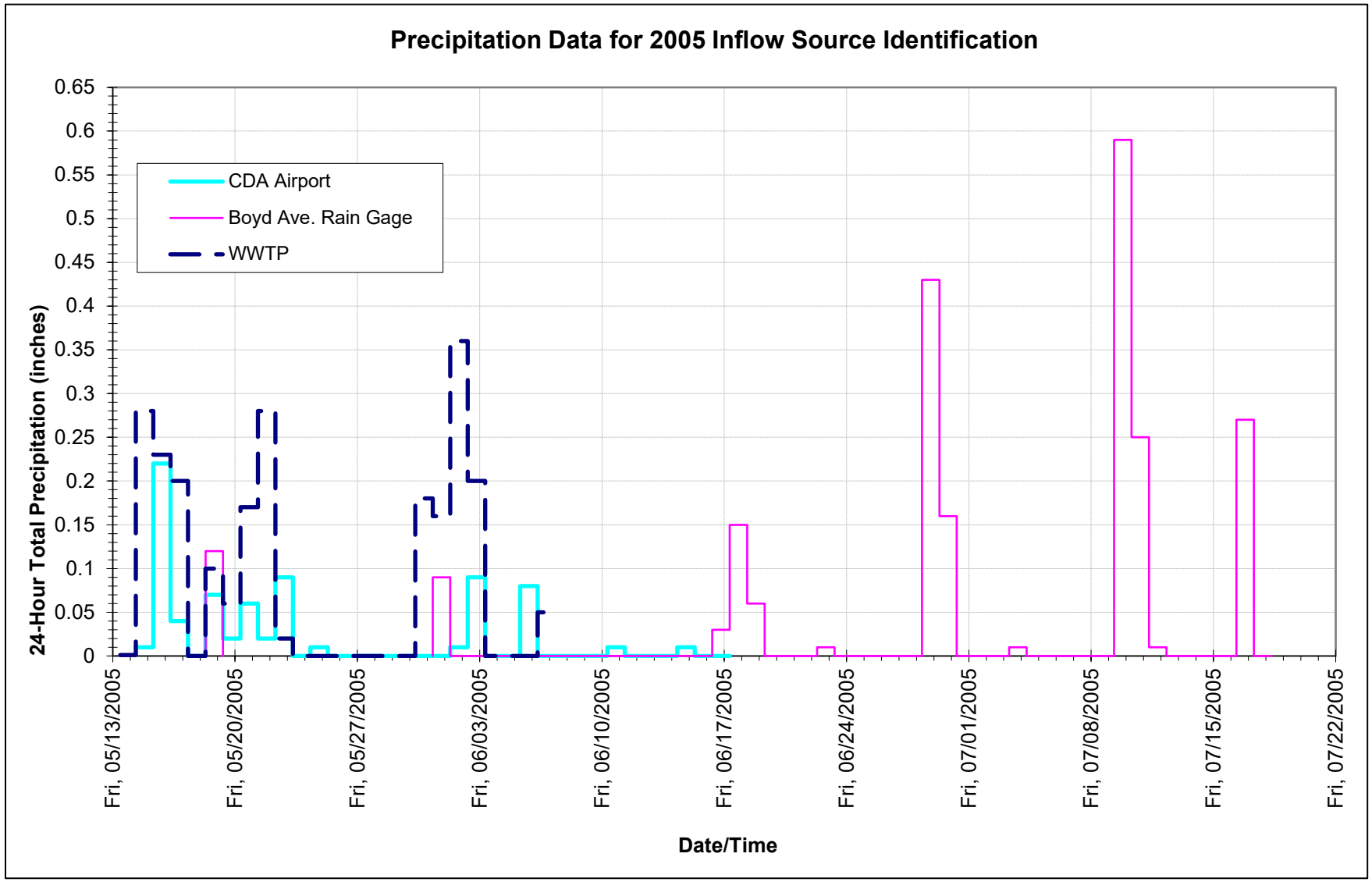


Figure B-20 – May to July 2005 Precipitation Data for 2005 Inflow Source Identification Flow Monitoring



B.2.2.4 2005 Northwest Quadrant Sewer Master Plan Flow Monitoring Locations

Table B-5 summarizes locations for 2005 Northwest Quadrant Sewer Master Plan flow monitoring. Flow monitoring was performed in November. Graphs of the final results from the 2005 Northwest Quadrant Sewer Master Plan flow monitoring project are shown in **Figure B-21** through **Figure B-24**. Precipitation data is not available for this period.

Table B-5 – Flow Monitoring Summary for 2005, Northwest Quadrant

Year/Project	Manhole	Basin / Interceptor	Dates Monitored	Location
2005 NW Quadrant Flow Monitoring	AEXT2-02	FWN/AF/AEX	November 12 – November 23	I-90 downstream of Fairway Interceptor tie-in and upstream of Mill River Interceptor tie -in
	RAM1-16	RX/REX/RAM	November 12 – November 22	Southeast Schreiber Way
	RAM1-23A	RX/REX/RAM	November 11 – November 23	Building Center Drive across from Interstate Asphalt pit entrance
	REX1-08	RX/REX/RAM	November 11 – November 23	Daly Drive between Couples Drive and Player Drive, east of intersection with Player Drive

Figure B-21 – November 2005 Flow Monitoring Results for MH AEXT2-02 – Raw Flow and 30 Minute Average

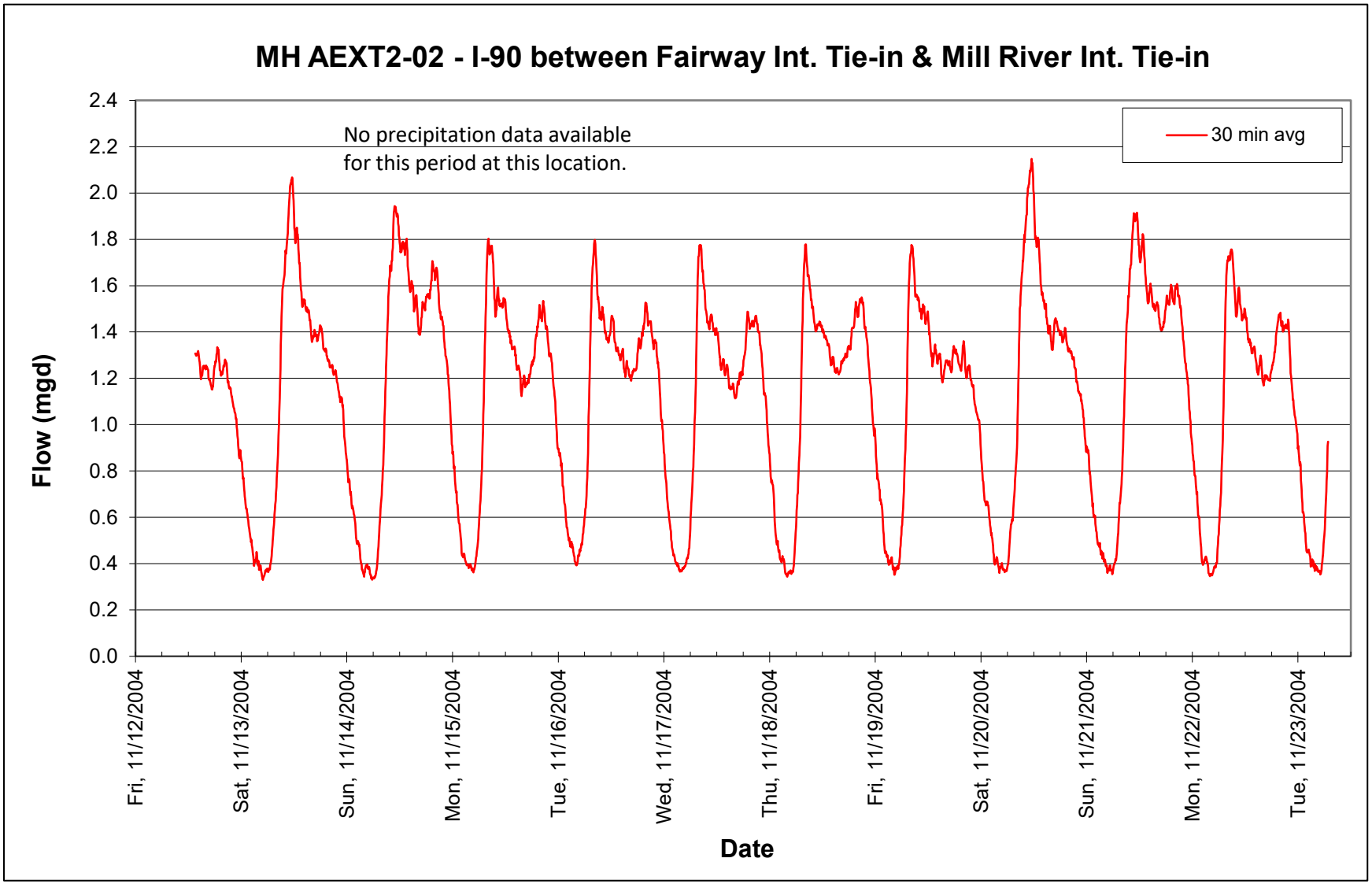


Figure B-22 – November 2005 Flow Monitoring Results for MH RAM1-16 – Raw Flow and 30 Minute Average

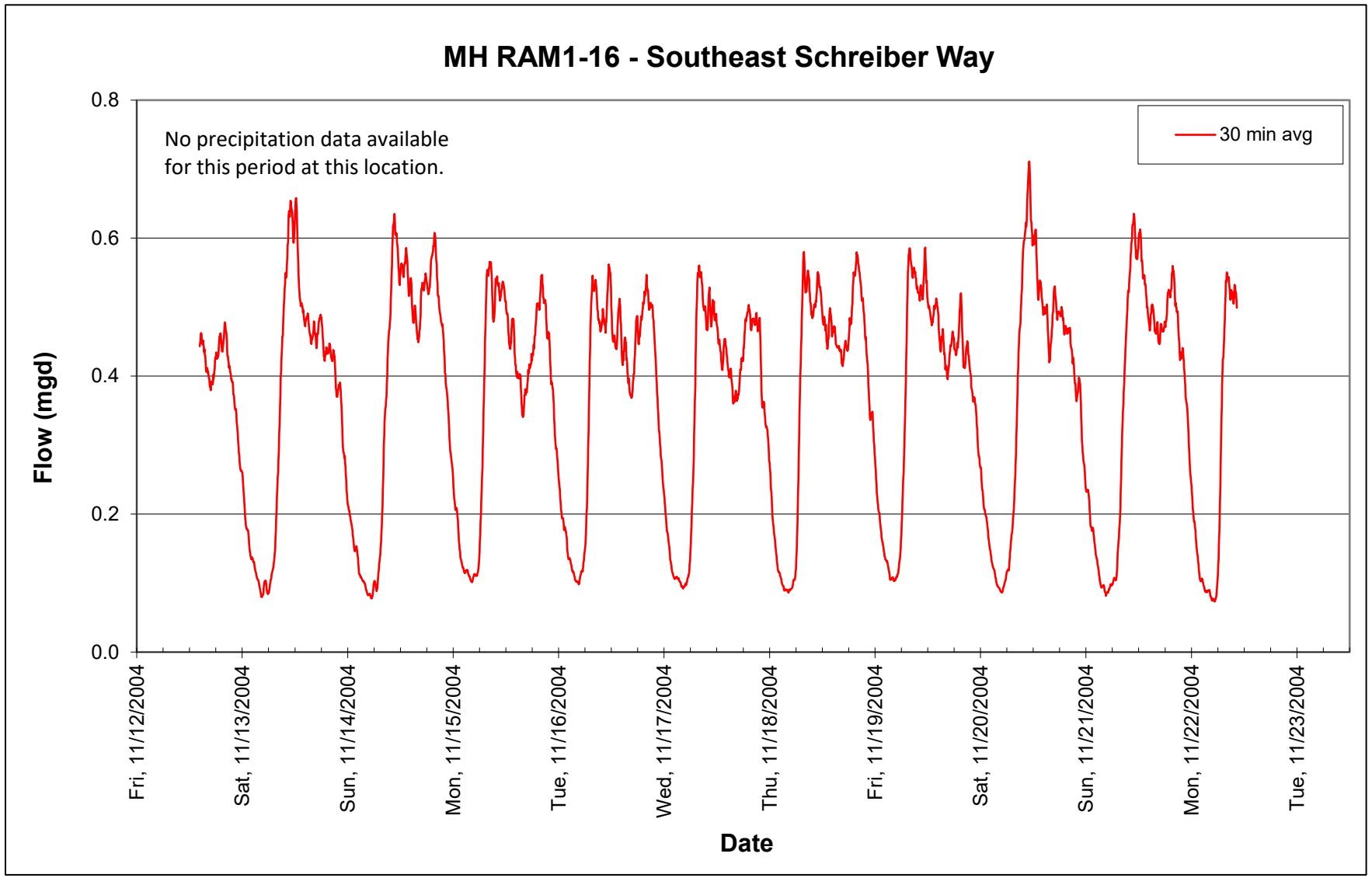


Figure B-23 – November 2005 Flow Monitoring Results for MH RAM1-23A – Raw Flow and 30 Minute Average

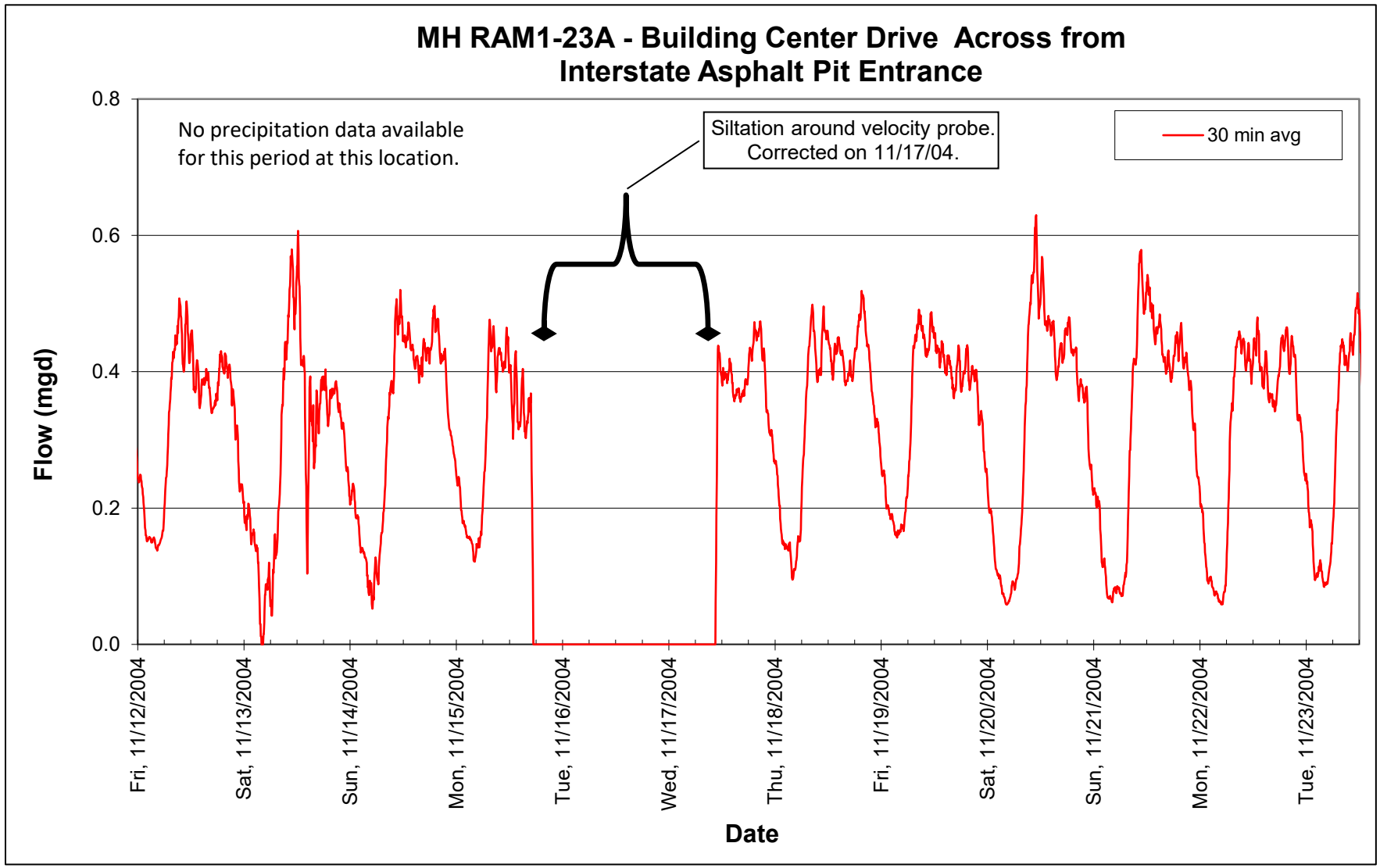
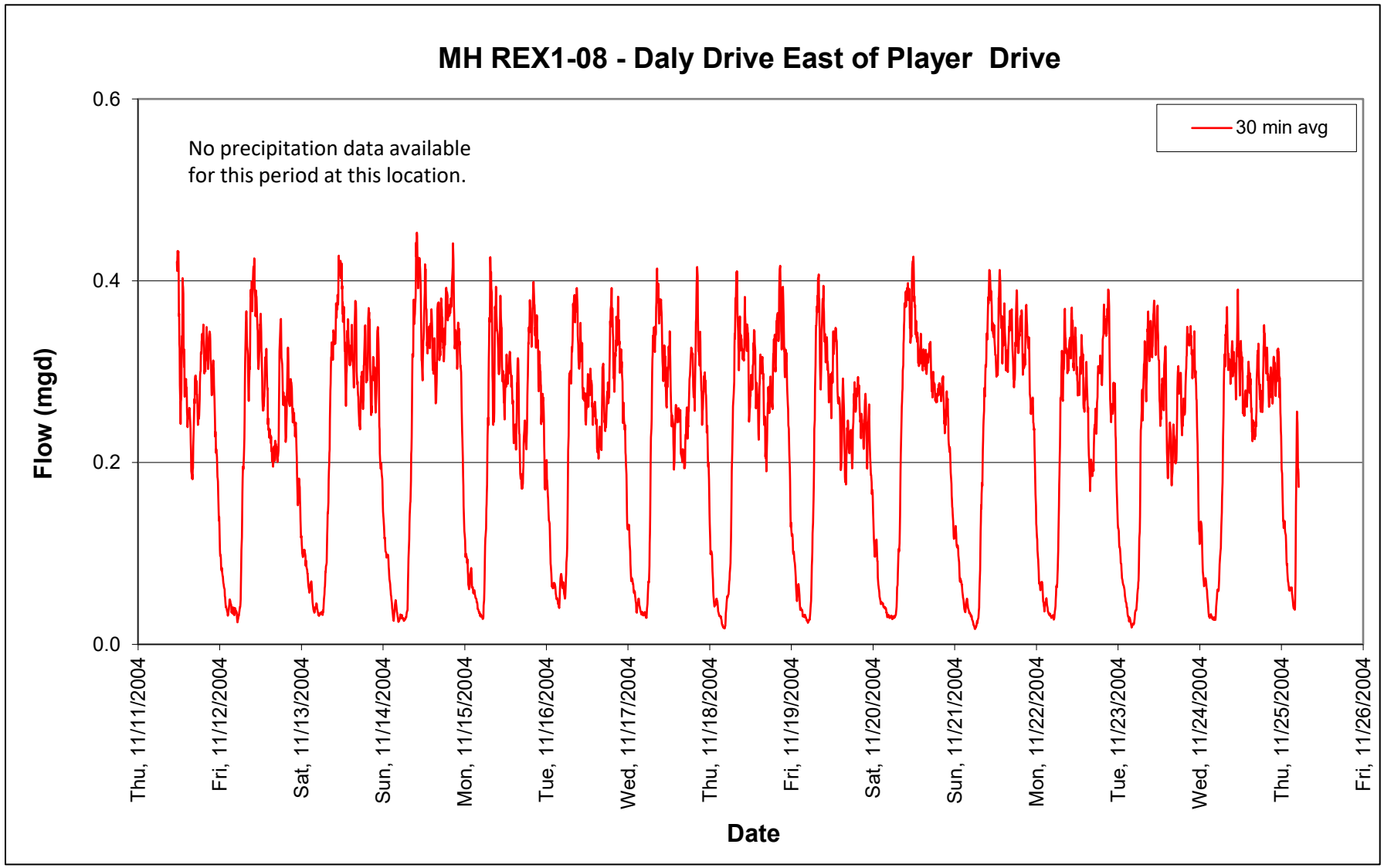


Figure B-24 – November 2005 Flow Monitoring Results for MH REX1-08 – Raw Flow and 30 Minute Average



B.2.2.5 2012 Flow Monitoring Locations

The five sites that were selected to conduct flow monitoring in 2012 are listed in **Table B-6** and are shown in **Figure B-1**. The purpose for flow monitoring was to collect data to be used for model calibration purposes and potentially supplementing inflow information depending on weather conditions.

Table B-6 – Summary of 2012 Flow Monitoring Sites

Manhole Name	Location	Site Number	Basin / Interceptor	Nominal Pipe Diameter
RAM1-01	Kroc Center	101	RX/REX/RAM	24"
RIV1-04	Wastewater Treatment Plant	104	RIV	24"
A1-05	Northwest Boulevard	105	A	21"
M1-14	Tubbs Hill	114	M	24"
B1-01	Intersection of 9th & Young	9101	B	24"

Flow Monitoring Equipment and Process

American Sigma flow monitors were used for this study. Flow monitoring sites are selected based on location, access, and uniformity of flow through the manhole. Flow monitor installation required measurement of horizontal and vertical pipe diameters and then use of size-specific steel bands for the sewer pipe to be monitored.

The steel bands support one of two setup types. For a submerged transducer setup, the band supports one area-velocity (AV) sensor mounted at the pipe invert to measure both depth and velocity. In an ultrasonic setup, the band supports an ultrasonic level sensor mounted at the crown of the pipe and a submerged velocity sensor mounted at the pipe invert. Bands are placed in the manhole's upstream pipe far enough to be in the near-uniform flow condition before flow enters the manhole.

After installation, flow depth was manually checked and the flow monitor was calibrated to depth. Flow monitors were set to automatically record both level and velocity at five minute intervals. Flow is calculated by the monitor based on the level and velocity measurements in conjunction with user programmed pipe geometry information. Data was periodically downloaded from the monitors and processed in the office. Prior to removing the monitors and sensors, flow depth was again manually measured to provide additional calibration. This manual measurement was compared to the monitor reading and a shift was applied if the values differed. This shift is referred to as a "delta" value. Figures in this section represent shifted data.

Due to several equipment malfunctions, each site had different combinations of flow monitoring and measurement equipment. The configurations are summarized in subsequent sections as well as a recommendation regarding the acceptability of the data.

Precipitation data was collected from a tipping bucket rain gauge installed on Greenleaf Lane.

MH RAM1-01 (Site 101) – Kroc Center – "RAM" Basin

Site 101 was located at Coeur d'Alene Manhole RAM1-01 on West Golf Course Road just south of the Salvation Army Ray & Joan Kroc Center. The manhole is in the middle of the road next to the entrance to the top level of the Kroc Center parking garage. **Table B-7** summarizes flow monitoring activity at the site while **Figure B-25** and **Figure B-26** show graphical results.

Table B-7 – Flow Monitoring Summary for Site 101

Date Range	Flow Monitoring Unit Designation	Sensor		Acceptable Level Data?	Acceptable Velocity Data?	Date of Manual Measurement	Shift in Depth Measurement
		Area-Velocity	Ultrasonic				
01/18 – 01/20	CFS	X		Yes	No	01/19	0.0 in.
01/20 – 01/27	Rental 2132	X		No	No	01/20	0.222 in.
01/27 – 02/24	COA		X	Yes	Yes	01/27	0.159 in
02/25 – 03/09	COA		X	No	Yes	03/09	-0.150 in

Figure B-25 – Raw Data for MH RAM1-01 (Site 101), RAM Basin

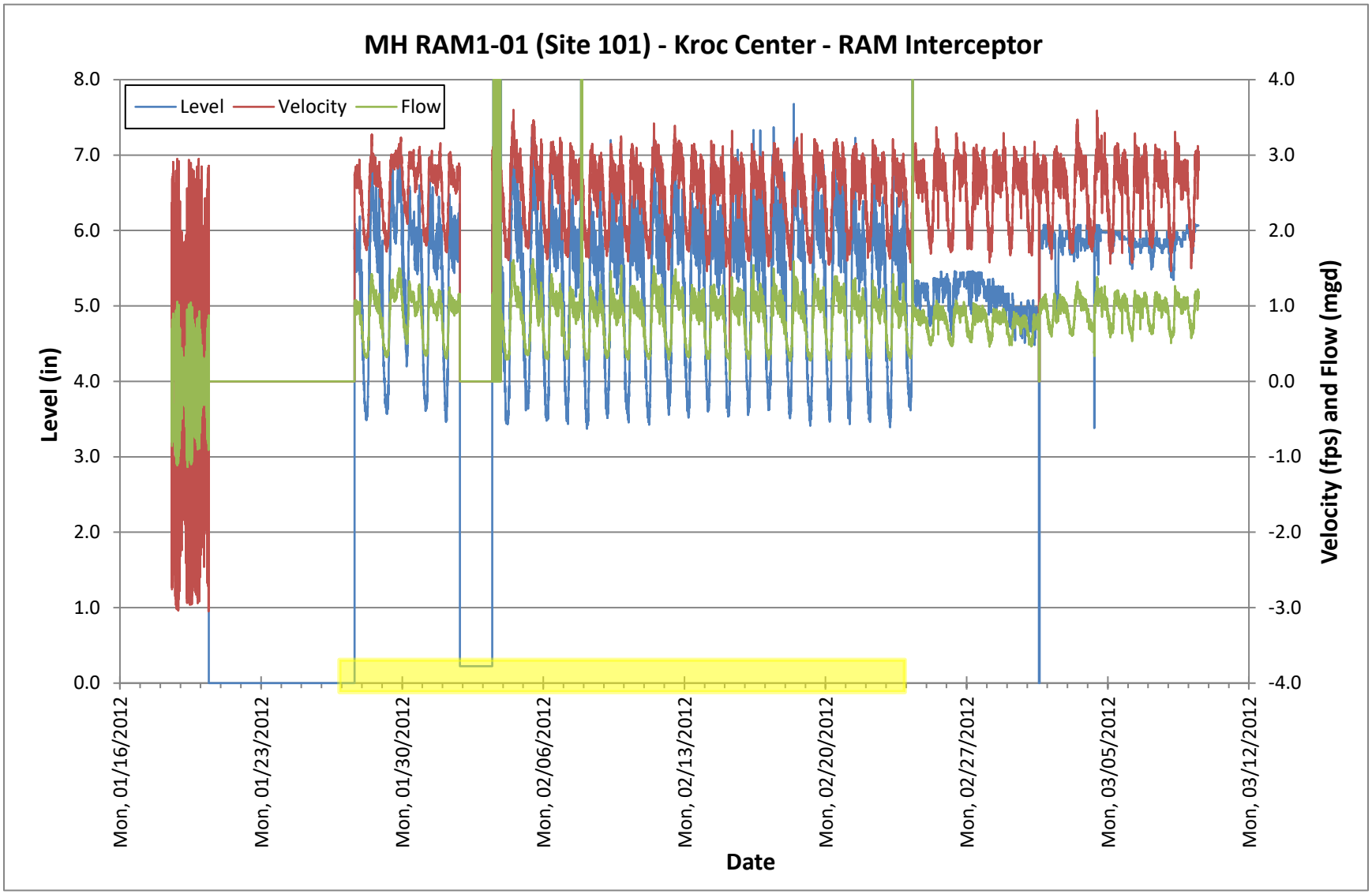
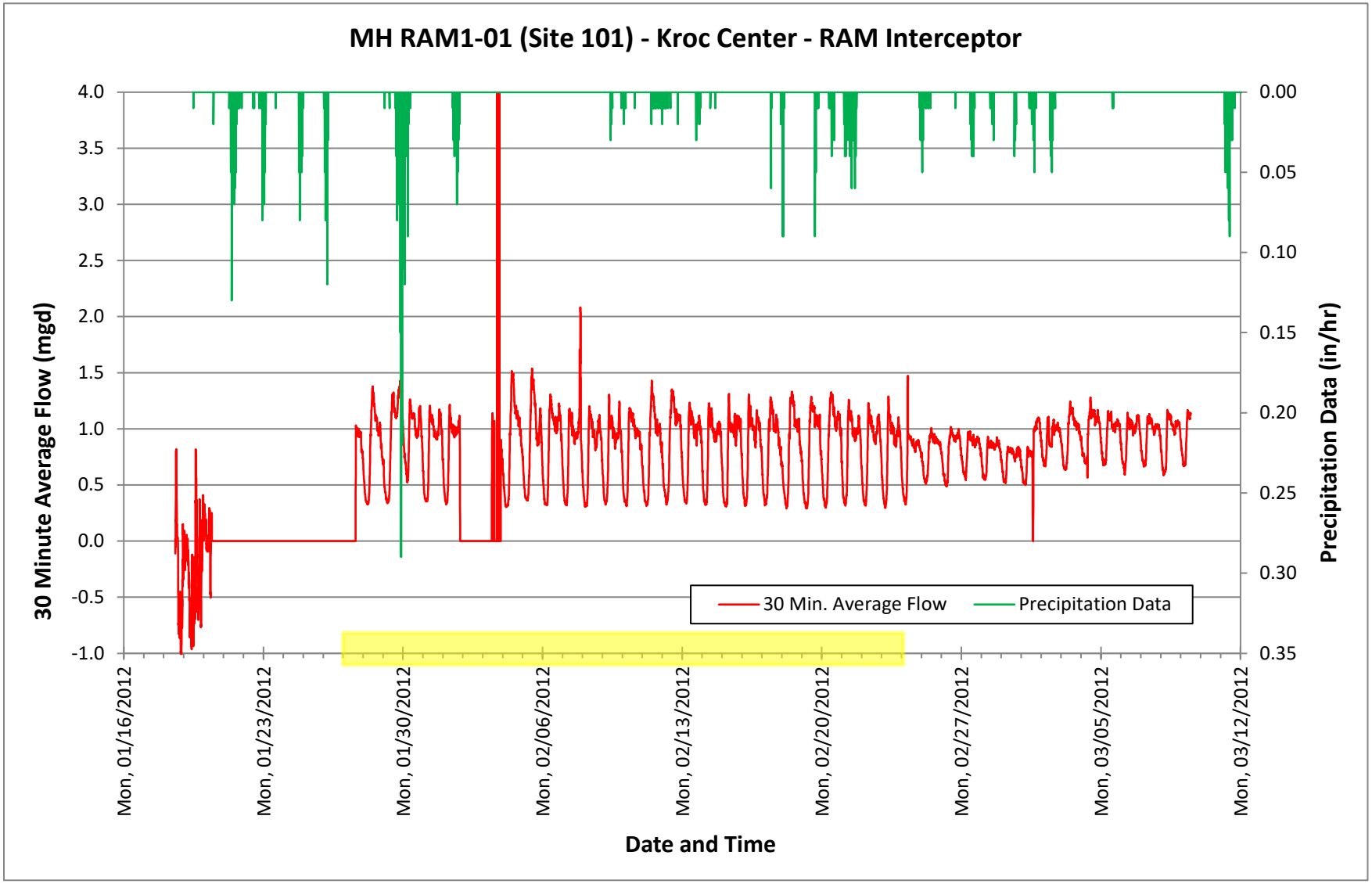


Figure B-26 – 30 Minute Average Flow and Precipitation Data for MH RAM1-01 (Site 101), RAM Basin



MH RIV1-04 (Site 104) – WWTP – RIV Basin

Site 104 was located at Coeur d'Alene Manhole RIV1-04 at the Wastewater Treatment Plant. **Table B-8** summarizes flow monitoring activity at the site while **Figure B-27** and **Figure B-28** show graphical results.

Table B-8 – Flow Monitoring Summary for Site 104

Date Range	Flow Monitoring Unit Designation	Sensor		Acceptable Level Data?	Acceptable Velocity Data?	Date of Manual Measurement	Shift in Depth Measurement
		Area-Velocity	Ultrasonic				
01/18 – 01/21	COA	X		Yes	Yes	01/18	
01/21 – 01/22	COA	X		Yes	No		0.00 in.
01/23 – 01/27	COA	X		Yes	Yes	01/27	0.39 in.
01/27 – 02/09	Rental EOO	X		Yes	Yes	01/27; 02/09	-0.10 in.
02/09 – 02/23	CFS		X	Yes	No	02/09	0.00 in.
02/23 – 03/09	Rental EOO	X		Yes	Yes	02/23; 03/09	-0.10 in.

Figure B-27 – Raw Data for MH RIV1-04 (Site 104), RIV Basin

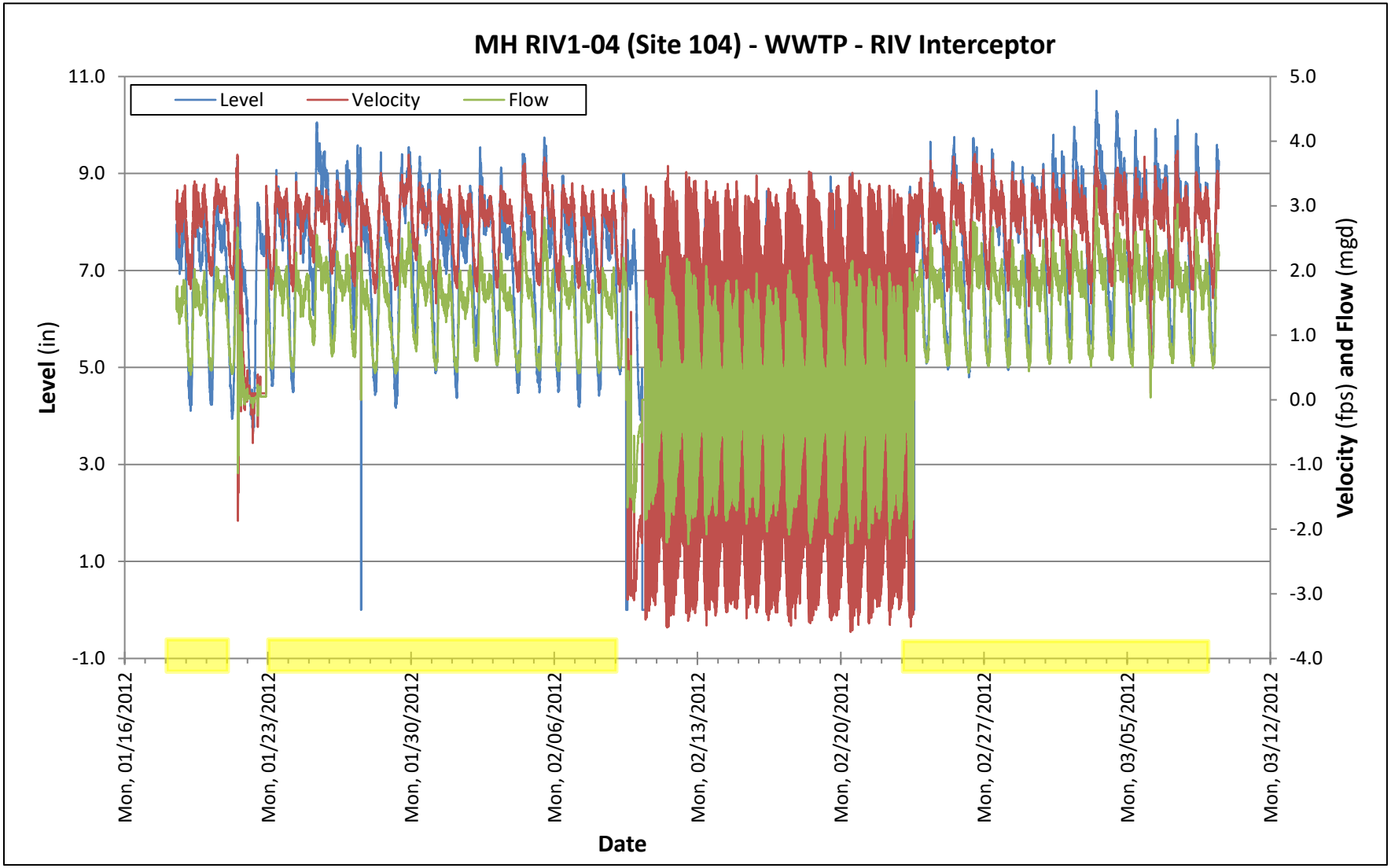
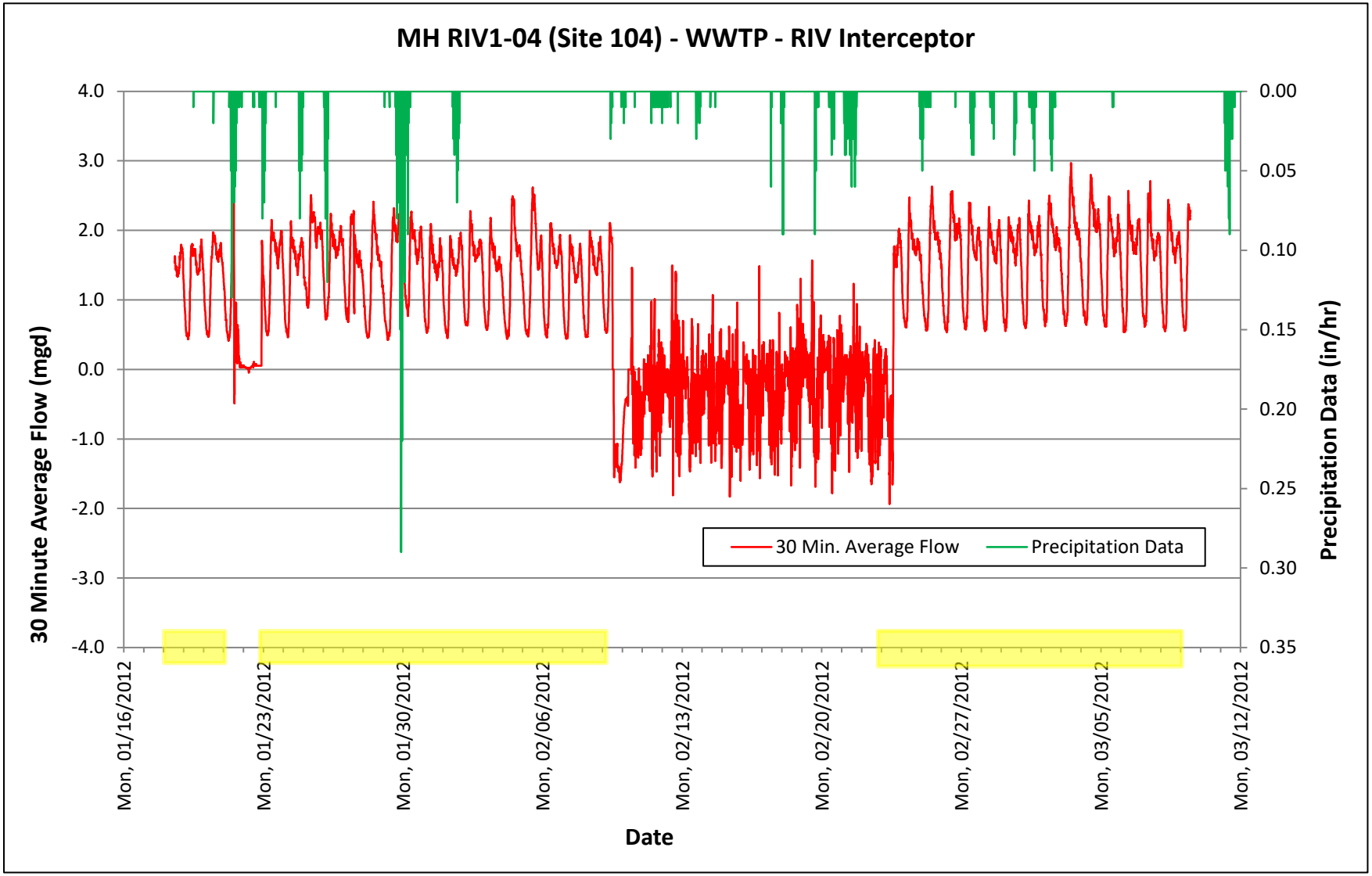


Figure B-28 – 30 Minute Average Flow and Precipitation Data for MH RIV1-04 (Site 104), RIV Basin



MH A1-05 (Site 10) – Northwest Boulevard – A Basin

Site 105 was located at Coeur d'Alene Manhole A1-05 along Northwest Boulevard. The manhole is located in the fill slope of the southbound right turn lane at the intersection of Northwest Boulevard and Hubbard. **Table B-9** summarizes flow monitoring activity at the site while **Figure B-29** and **Figure B-30** show graphical results.

Table B-9 – Flow Monitoring Summary for Site 105

Date Range	Flow Monitoring Unit Designation	Sensor		Acceptable Level Data?	Acceptable Velocity Data?	Date of Manual Measurement	Shift in Depth Measurement
		Area-Velocity	Ultrasonic				
01/20 – 01/25	CFS		X	Yes	No	01/20	0.00 in.
01/26 – 02/09	CFS		X	No	No	02/09	0.243 in.
02/09 – 02/23	Rental EOO	X		No	Yes	02/09	0.00 in.
02/23 – 03/09	CFT	X		Yes	Yes	02/23; 03/09	0.17 in.

Figure B-29 – Raw Data for MH A1-05 (Site 105), A Basin

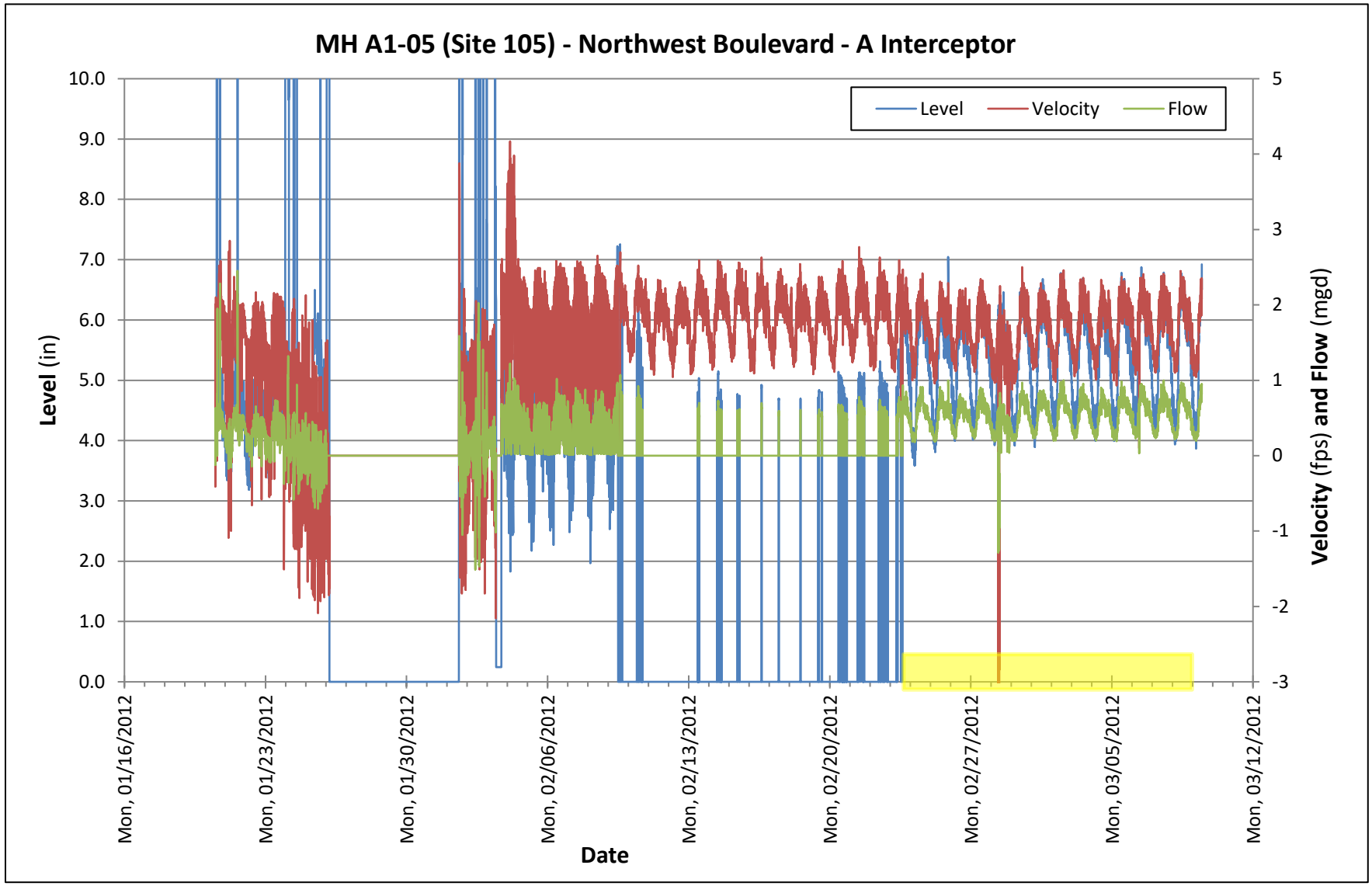
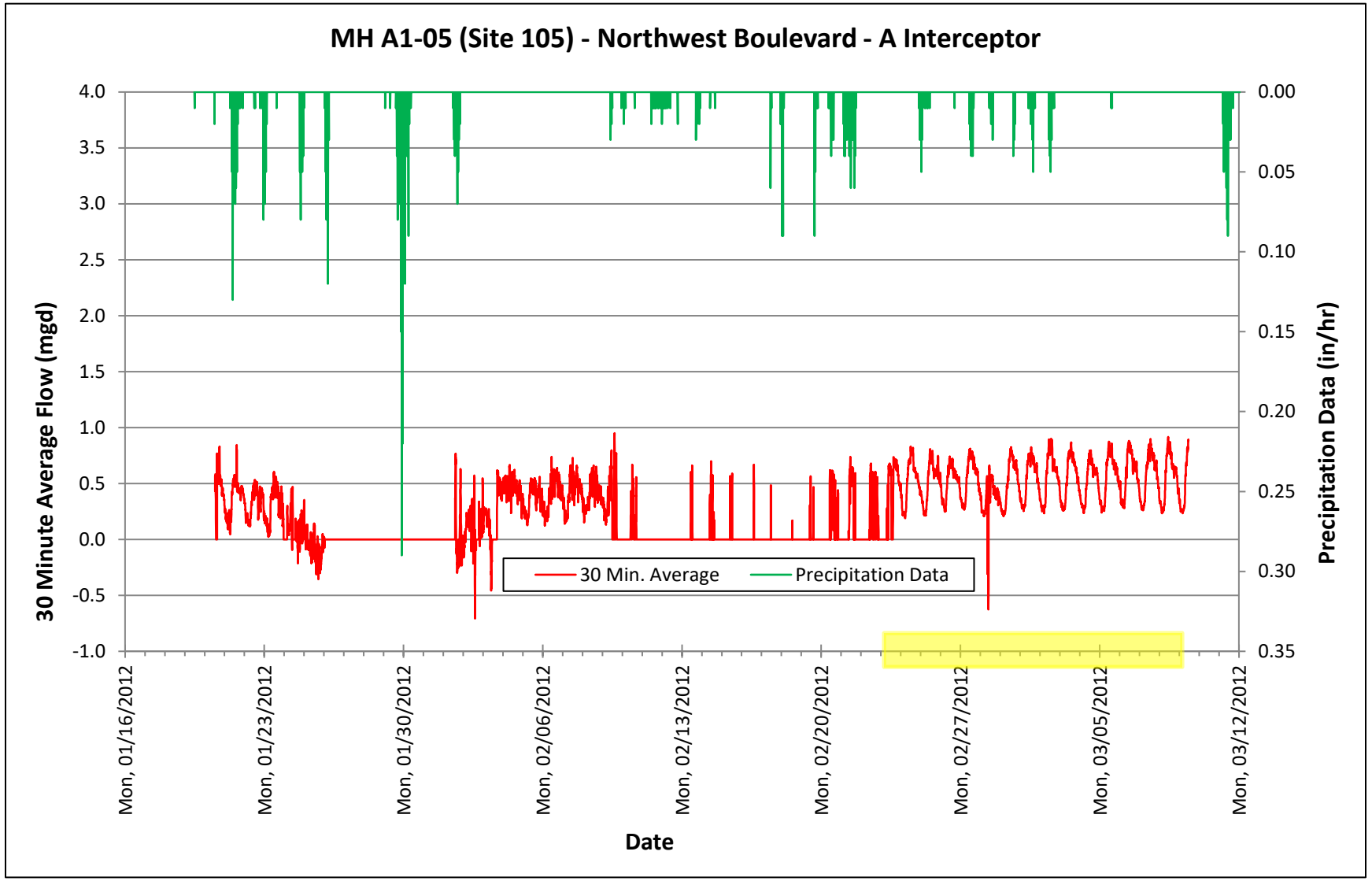


Figure B-30 – 30 Minute Average Flow and Precipitation Data for MH A1-05 (Site 105), A Basin



MH M1-14 (Site 114) – Tubbs Hill – M Basin

Site 114 was located at Coeur d'Alene Manhole M1-14 near Tubbs Hill. The manhole is located in East Lakeshore Drive across the street from the Tubbs Hill parking lot. **Table B-10** summarizes flow monitoring activity at the site while **Figure B-31** and **Figure B-32** show graphical results.

Table B-10 – Flow Monitoring Summary for Site 114

Date Range	Flow Monitoring Unit Designation	Sensor		Acceptable Level Data?	Acceptable Velocity Data?	Date of Manual Measurement	Shift in Depth Measurement
		Area-Velocity	Ultrasonic				
01/18 – 01/24	Rental FR8	X		Yes	Yes	01/18	0.00 in.
01/24 – 02-09	Rental FR8	X		No	Yes	02/01; 02/03; 02/09	1.53 in.
02/09 – 02/23	DCA	X		Yes	Pattern – Yes; Value – No	02/29; 02/23	0.172 in.
02/23 – 03/09	Rental FR8	X		Yes	Yes	02/23; 03/09	-0.013 in.

Figure B-31 – Raw Data for MH M1-14 (Site 114), M Basin

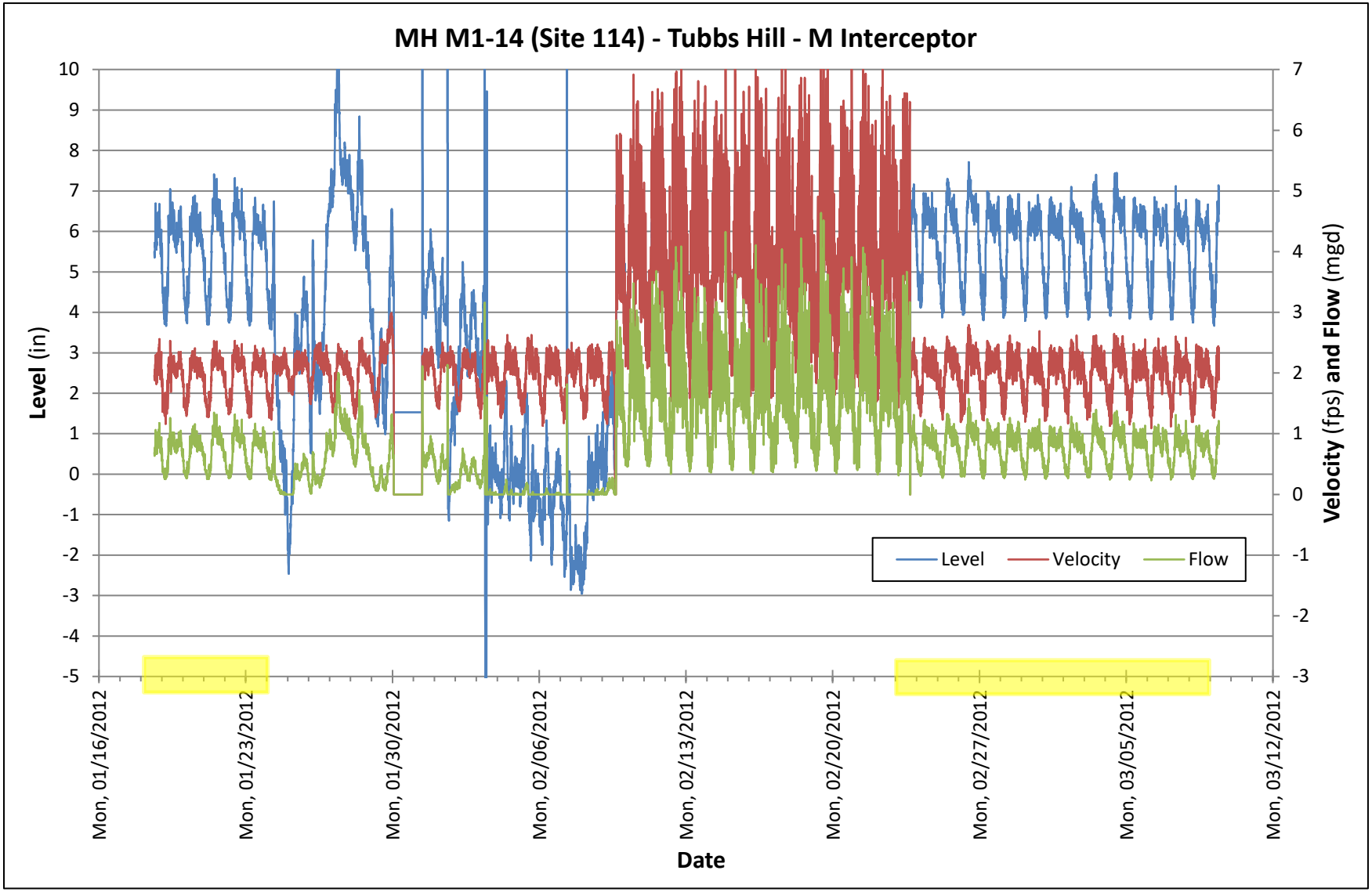
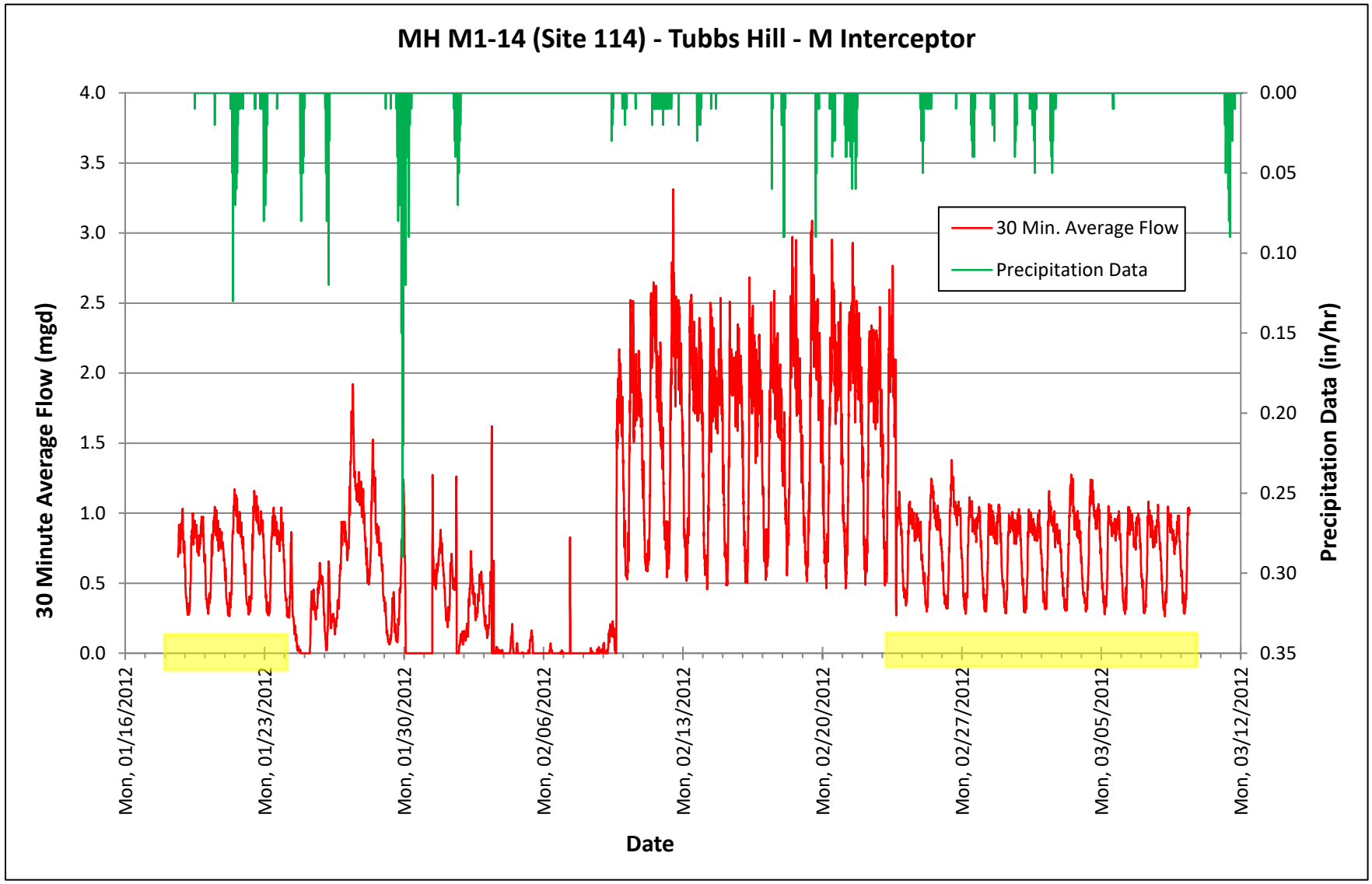


Figure B-32 – 30 Minute Average Flow and Precipitation Data for MH M1-14 (Site 114), M Basin



MH B1-01 (Site 9101) – 9th and Young – B Basin

Site 9101 was located at Coeur d'Alene Manhole B1-01 at the intersection of 9th Street and Young Avenue. **Table B-11** summarizes flow monitoring activity at the site while **Figure B-33** and **Figure B-34** show graphical results.

Table B-11 – Flow Monitoring Summary for Site 114

Date Range	Flow Monitoring Unit Designation	Sensor		Acceptable Level Data?	Acceptable Velocity Data?	Date of Manual Measurement	Shift in Depth Measurement
		Area-Velocity	Ultrasonic				
01/18 – 02/09	DCA	X		Yes	Pattern – Yes; Value – No	01/18; 02/09	0.705 in
02/09 – 02/23	Rental FR8	X		No	Yes	02/09; 02/23	3.25 in.
02/23 – 03/09	DRP / XOI	X		Yes	Yes	02/23; 03/09	-0.081 in.

Figure B-33 – Raw Data for MH B1-01 (Site 9101), B Interceptor

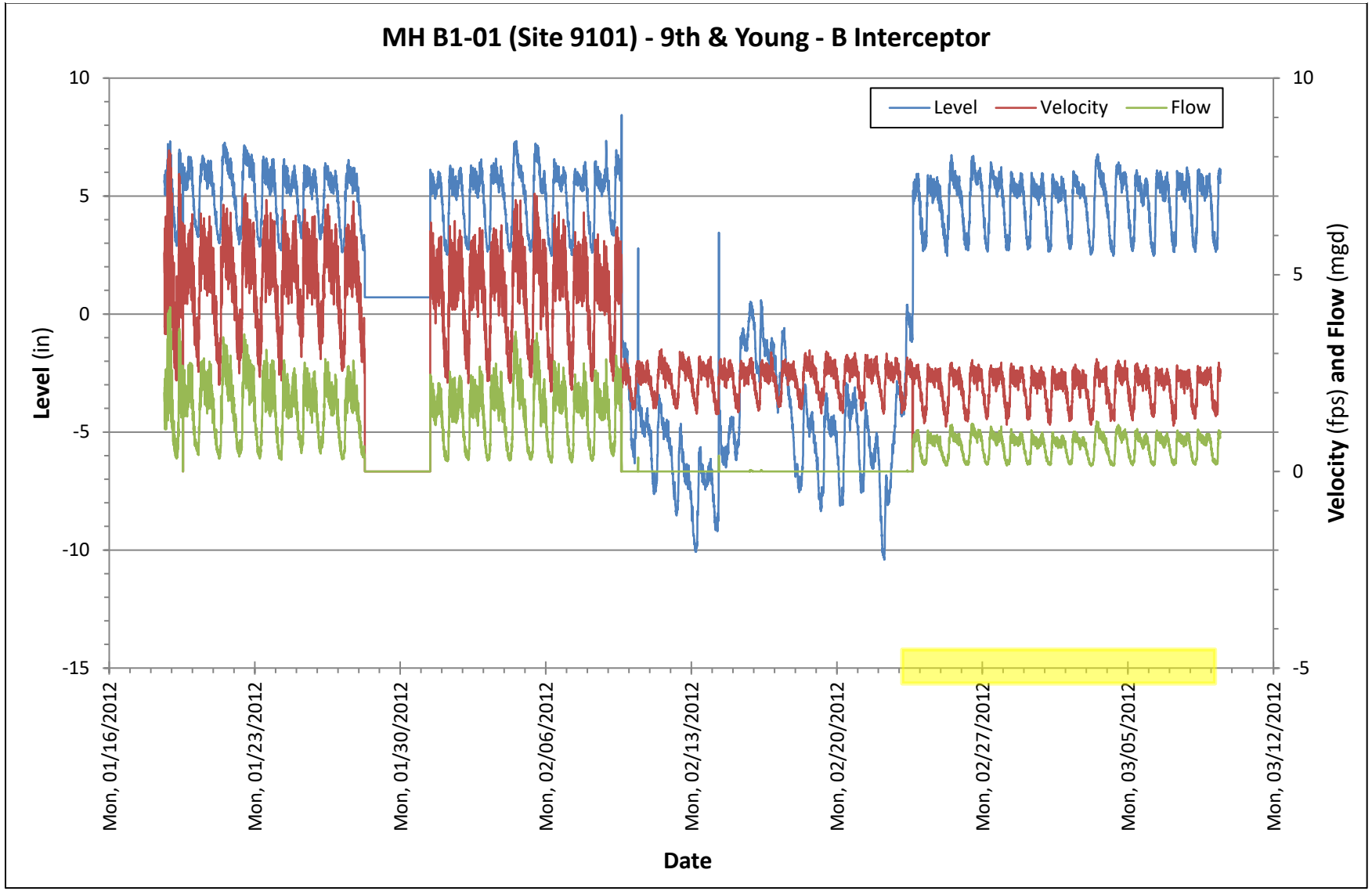
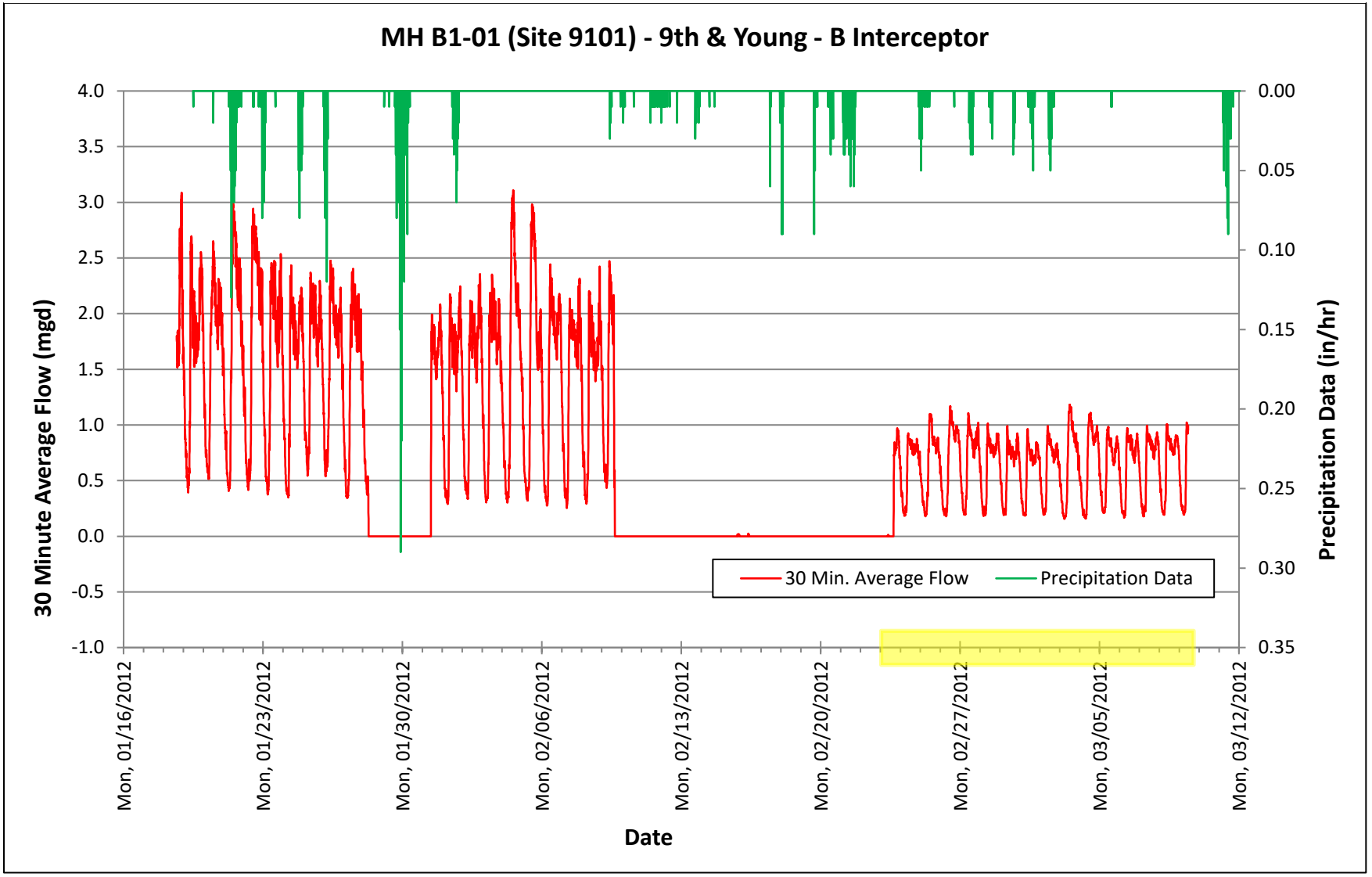


Figure B-34 – 30 Minute Average Flow and Precipitation Data for MH B1-01 (Site 9101), B Interceptor



B.2.3 2015 Flow Monitoring

In 2015, J-U-B and City of Coeur d' Alene Wastewater Staff completed flow monitoring and an inflow assessment as part of the agreement for the 2014/2015 Wastewater Collection System Capital Improvement Projects. The purpose of this effort was to assist the City with estimating the magnitude of inflow into the wastewater collection system from the following basins:

- Lincoln Way (L1)
- Business District (BUS)
- Central District (CEN)
- Fort Grounds (FG)

The flow monitoring data was analyzed to refine the inflow assumptions utilized in the City's 2013 Collection System Master Planning. The refined impervious acreage values were incorporated in the 2022 Master Plan Update.

J-U-B finalized the 2015 Flow Monitoring and Inflow Assessment Technical Memorandum in July of 2021. The final Technical Memorandum (J-U-B, 2021) is located at the end of **Appendix B** for reference.

B.2.4 2021 Flow Monitoring

Spring 2021

In 2021, eight locations were selected to flow monitor in the Spring of 2021 by City Staff and J-U-B prior to the 2021 Collection System Master Plan Update. These locations included five trunk lines and three 8-inch collectors. The eight locations are shown above on **Figure B2** and listed below:

- A1-05
- B1-02
- M1-14
- RIV1-04
- RAM1-01
- RAM1-43 (8-inch)
- RAM1-38C (8-inch)
- RX1-42 (8-inch)

These flow monitoring locations were selected to obtain accurate flow measurements for large areas of the system (trunk lines) and to confirm flow in three 8-inch collector lines have the potential to be impacted by large developments.

The flow monitoring was completed by ADS Environmental Services. ADS's final flow monitoring report, including flow and d/D analysis for all eight sites is located at the end of **Appendix B** for reference.

No significant rainfall event occurred during the 2021 spring flow monitoring period of March 4, 2021 to April 20, 2021. Therefore, no adjustments to the impervious areas previously defined in the 2013 Master Plan or modified by the 2015 Flow Monitoring Update were made after the 2021 flow monitoring efforts. The 2021 spring flow monitoring data was used for dry weather calibration of the hydraulic model as shown in **Appendix D.**

Upon review of the 2021 Spring flow monitoring data, a belly was identified immediately upstream of the RAM 1-43 flow monitoring site. The irregular channel and flow condition was anticipated to have affected the accuracy of the flow monitor and therefore it was selected by City staff to re-flow monitor in Fall of 2021.

Fall 2021

RAM 1-43B, two reaches upstream of the previously flow monitored RAM 1-43 site, was selected as the Fall 2021 flow monitoring location. The more uniform channel and flow conditions delivered more reliable and accurate flow monitoring results. The flow monitoring was also completed by ADS Environmental Services. ADS's final report, including flow and d/D analysis for RAM1-43B is located at the end of **Appendix B** for reference.

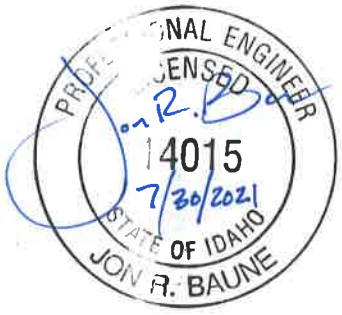
No significant rainfall event occurred during the fall flow monitoring period. Therefore, no adjustments to the impervious areas previously defined in the 2013 Master Plan or modified by the 2015 Flow Monitoring Update were made. The 2021 flow monitoring data for RAM 1-43B 2 was used as the basis for dry weather calibration of the hydraulic model in that area in lieu of RAM1-43 as shown in **Appendix D.**

TECHNICAL MEMORANDUM

J-U-B ENGINEERS, INC.

City of Coeur d'Alene
Wastewater Utility

2015 Flow Monitoring and Inflow Assessment



July 2021

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Contents

TM – 2015 Flow Monitoring and Inflow Assessment

1 Background and Purpose

Flow monitoring and inflow assessment was completed as part of the agreement between the City of Coeur d'Alene (City) and J-U-B ENGINEERS, Inc. (J-U-B) for City of Coeur d'Alene Wastewater Utility 2014/2015 Wastewater Collection System Capital Improvement Projects. The purpose of this effort is to assist the City with estimating the magnitude of inflow into the wastewater collection system from the following basins:

- Lincoln Way (L1)
- Business District (BUS)
- Central District (CEN)
- Fort Grounds (FG)

The flow monitoring data is analyzed to refine the inflow assumptions utilized in the City's Collection System Master Planning.

This technical memorandum includes the following:

1. Summary of the City's historical flow monitoring efforts.
2. Summary of the 2015 flow monitoring effort, including locations, equipment, process, and results.
3. Summary of the amount of inflow captured during 2015 flow monitoring and how that compares to previous studies.

2 Historic Flow Monitoring

Previous flow monitoring efforts conducted by the City includes the following:

- 1998 – City of Coeur d'Alene Wastewater Flow Monitoring
- 2004 – City of Coeur d'Alene 2004 Inflow Source Identification
- 2005 – City of Coeur d'Alene 2005 Inflow Source Identification
- 2005 – City of Coeur d'Alene 2005 Northwest Quadrant Sewer Master Plan
- 2012 – City of Coeur d'Alene 2013 Collection System Master Plan

Figure 1 shows flow basins and the historical flow monitoring locations for the City of Coeur d'Alene. Flow monitoring data from each project is summarized in **Appendix A**. Additional information on

historical flow monitoring efforts are can be found in the City's March 2013 Wastewater Collection System Master Plan Update.

3 2015 Flow Monitoring

Flow monitoring was undertaken in the spring of 2015; monitors were installed February 10 and 11, 2015. Flow monitoring was initially planned to be performed for a two-week period. At the City's request, flow monitoring was extended an additional four weeks due to a lack of precipitation events in the first two weeks. The monitors were removed on March 25, 2015.

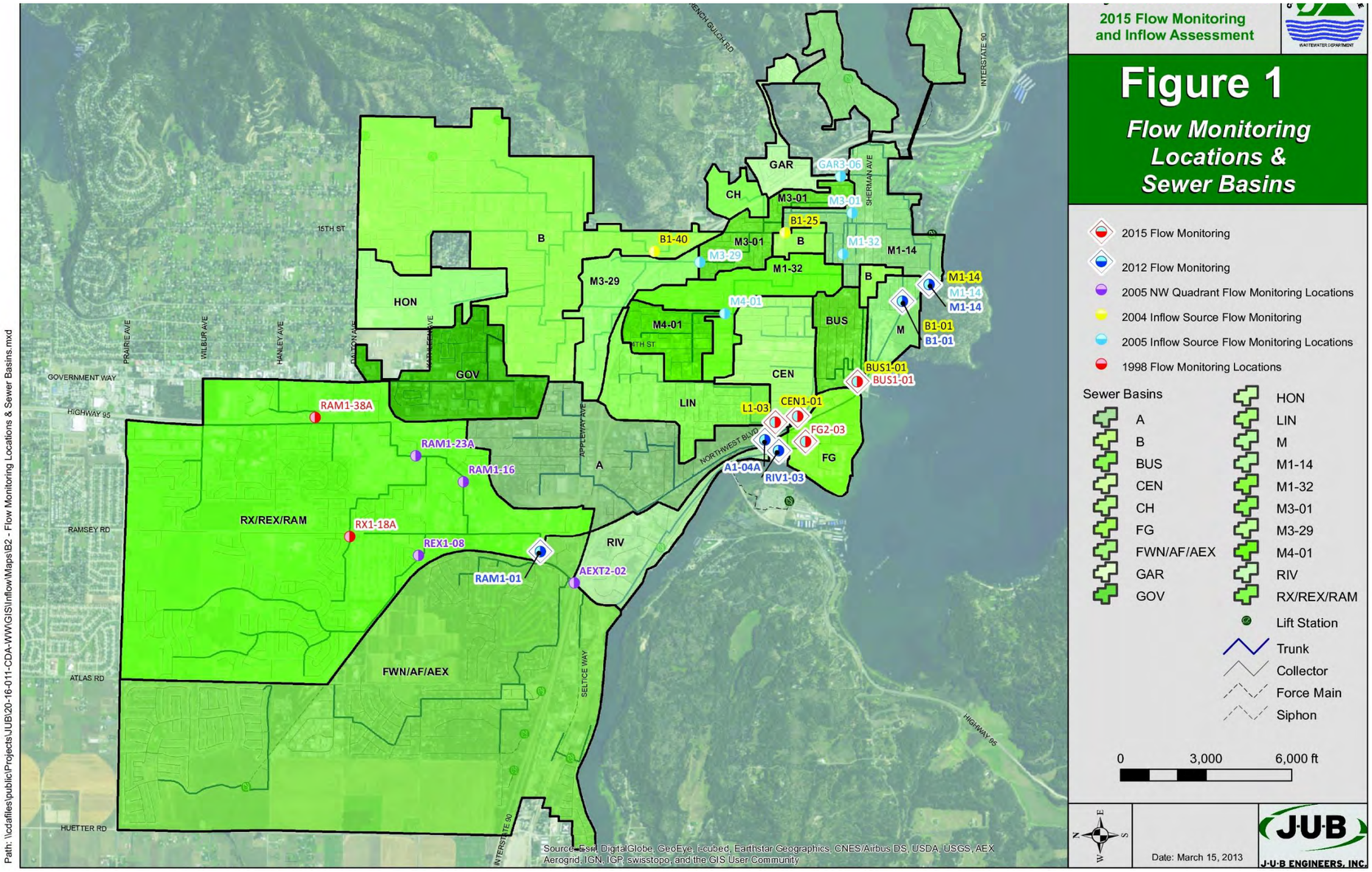
Sites selected for monitoring in 2015 are summarized in **Table 1** and are shown in **Figure 1**.

Table 1 – Flow Monitoring Summary for 2015

Manhole Name	Location	Basin / Interceptor	Nominal Pipe Diameter
BUS1-01AA1[(a)]	Lakeside Ave. west of 1st St.	BUS	15"
CEN1-01	Intersection of Milwaukee Dr. & Browne Ave.	CEN	15"
FG2-02	Intersection of Hubbard Ave. & College Dr.	FG	12"
L1-03	Lincoln Way north of Virginia Ave.	LIN	12"

(a) Previous flow monitoring locations for the BUS basin consisted of flow monitors located at BUS1-01, the reach was modified with the construction of the CDA Chamber Building resulting in the manhole name revisions.

Figure 1 – Sewer Basins and Flow Monitoring Locations



3.1 Flow Monitoring Equipment

ADS Flow Shark monitors were used for this study. All sites had acceptable uniformity of flow through the manholes, increasing the likelihood of obtaining reliable data. Flow monitor installation required measurement of horizontal and vertical pipe diameters. Stainless steel bands were placed in the manhole's upstream pipe far enough to be in the near-uniform flow condition before flow enters the manhole. The bands support the following devices:

- Pressure transducer to measure flow depth if the pipe has full-depth flow.
- Ultrasonic level sensor to measure flow depth during open-channel flow.
- Velocity sensor.

A Hach FH950 Handheld Flow Meter was used to take independent velocity measurements at each monitoring site. Velocity measurements were taken upstream from the flow monitoring bands.

3.2 Flow Monitoring Programming

Flow monitors were programmed to record level and velocity at 5-minute intervals. Flow was calculated by the monitor based on the level and velocity measurements in conjunction with user-programmed pipe geometry information. Depth and velocity measurements were manually measured immediately after installation and throughout the flow monitoring process to provide additional confirmation for the instrument's recorded values. This additional confirmation step provides the additional information necessary to shift the measurements during final data processing. Data was periodically downloaded from the monitors and processed in the office.

3.3 Flow Monitoring Data Processing and Results

Table 2 summarizes 2015 flow monitoring correlation summary at all sites, which is a product of the manual correlation measurements taken during the installation and removal process. All data appears valid with the following exception:

- BUS1-01AA1– February 14, 2015 to February 15, 2015 - On 2/14 at approximately 05:25 the velocity data sporadically goes to zero. The data is un-usable until 2/15 at 08:00 where the data resumes. The reason the velocity data goes to zero is unknown.
- BUS1-01AA1 – March 18, 2015 to March 20, 2015 - On 3/18 at approximately 23:25 the velocity data goes to zero. The data is un-usable until 3/20 at 6:30 where the data resumes. The reason the velocity data goes to zero is unknown.
- BUS1-01AA1 – March 23, 2015 to March 25, 2015 debris was blocking the line, the data is un-usable.
- CEN1-01 – February 25, 2015 - Level values increased 3x from 02:10 to 05:10, this data was eliminated from the data set.

Table 2 – 2015 Flow Monitoring Data Correlation Summary

Site	Date Range	Acceptable Level Data?	Acceptable Velocity Data?	Shift in Depth Measurement and Notes
BUS1-01AA1	February 10 – March 23	Yes	Yes	No shift in Velocity or Level
	February 14 – February 15	Yes	No	On 2/14 at approximately 05:25 the velocity data sporadically goes to zero. The data is un-usable until 2/15 at 08:00 where the data resumes. The reason the velocity data goes to zero is unknown.
	March 18 – March 20	Yes	No	On 3/18 at approximately 23:25 the velocity data goes to zero. The data is un-usable until 3/20 at 06:30 where the data resumes. The reason the velocity data goes to zero is unknown.
	March 23 – March 25	No	No	On 3/23 at approximately 10:30 the level data rises substantially and the velocity data goes to zero. The data is un-usable due to blockage in the line. Debris, best described as a 3-inch by 5-inch rock was removed from this location. The rock was resting directly on the velocity sensor.
CEN1-01	February 10 – March 25	No	Yes	Level correlation of +0.629-inches for all data points obtained.
	February 26	No	Yes	Level values increased 3x from 02:10 to 05:10, this data was eliminated from the data set.
FG2-02	February 10 – March 25	Yes	No	Velocity correlation of -0.242 fps for all data points obtained.
L1-03	February 10 – March 25	No	Yes	Level correlation of -0.487-inches for all data points obtained.

Note: Level and velocity correlations are based on actual field measurements that "shift" the electronic data to calibrate with the physical measurements. The result is the "Calibrated Flow" on Figures 2 through 5.

Graphs of flow data at each site are shown in **Figure 2** through **Figure 5**. The figures evidence consistent daily diurnal flow patterns over a majority of the flow period.

Figure 2 – Observed Flow – BUS1-01AA1

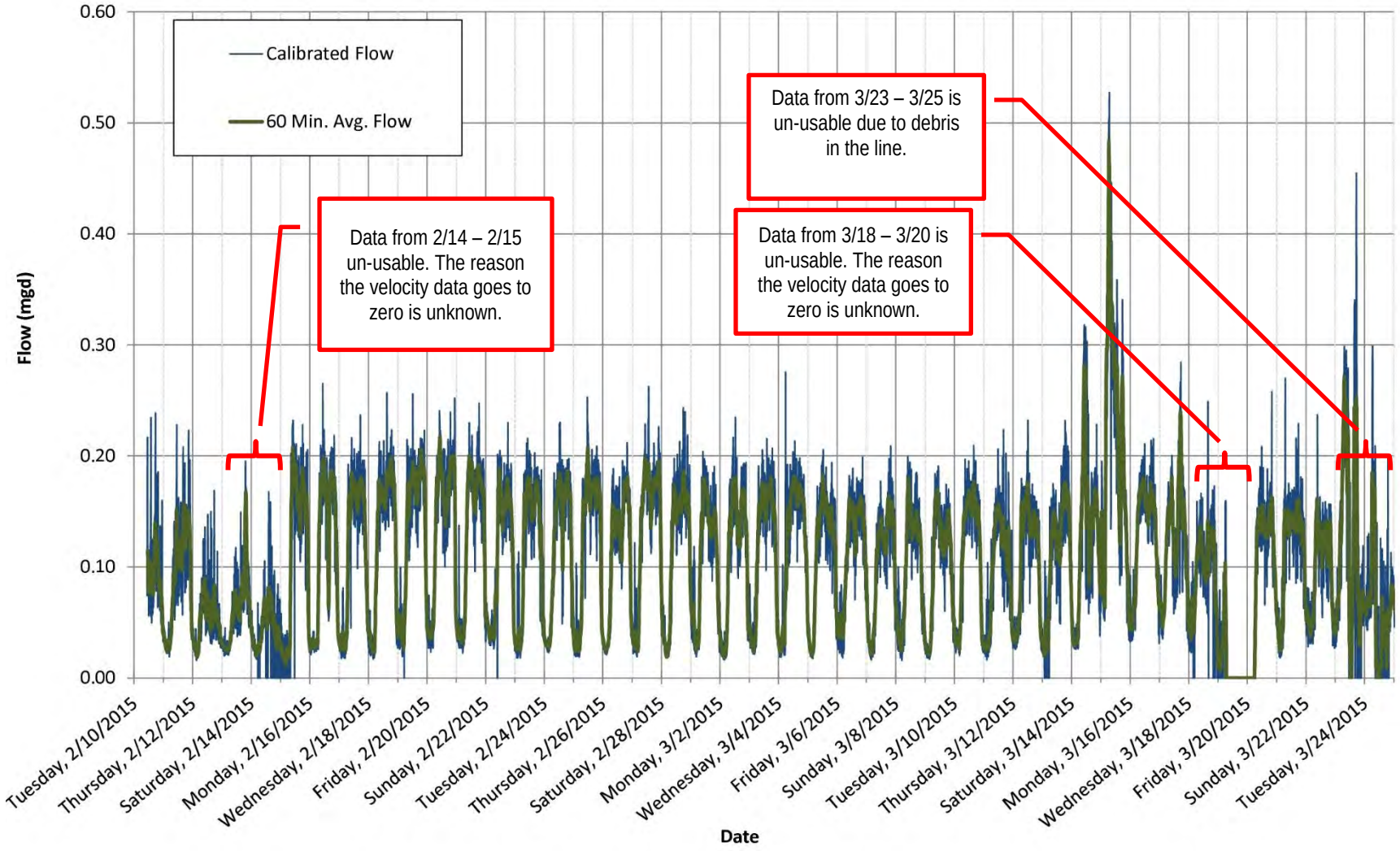


Figure 3 – Observed Flow – CEN1-01

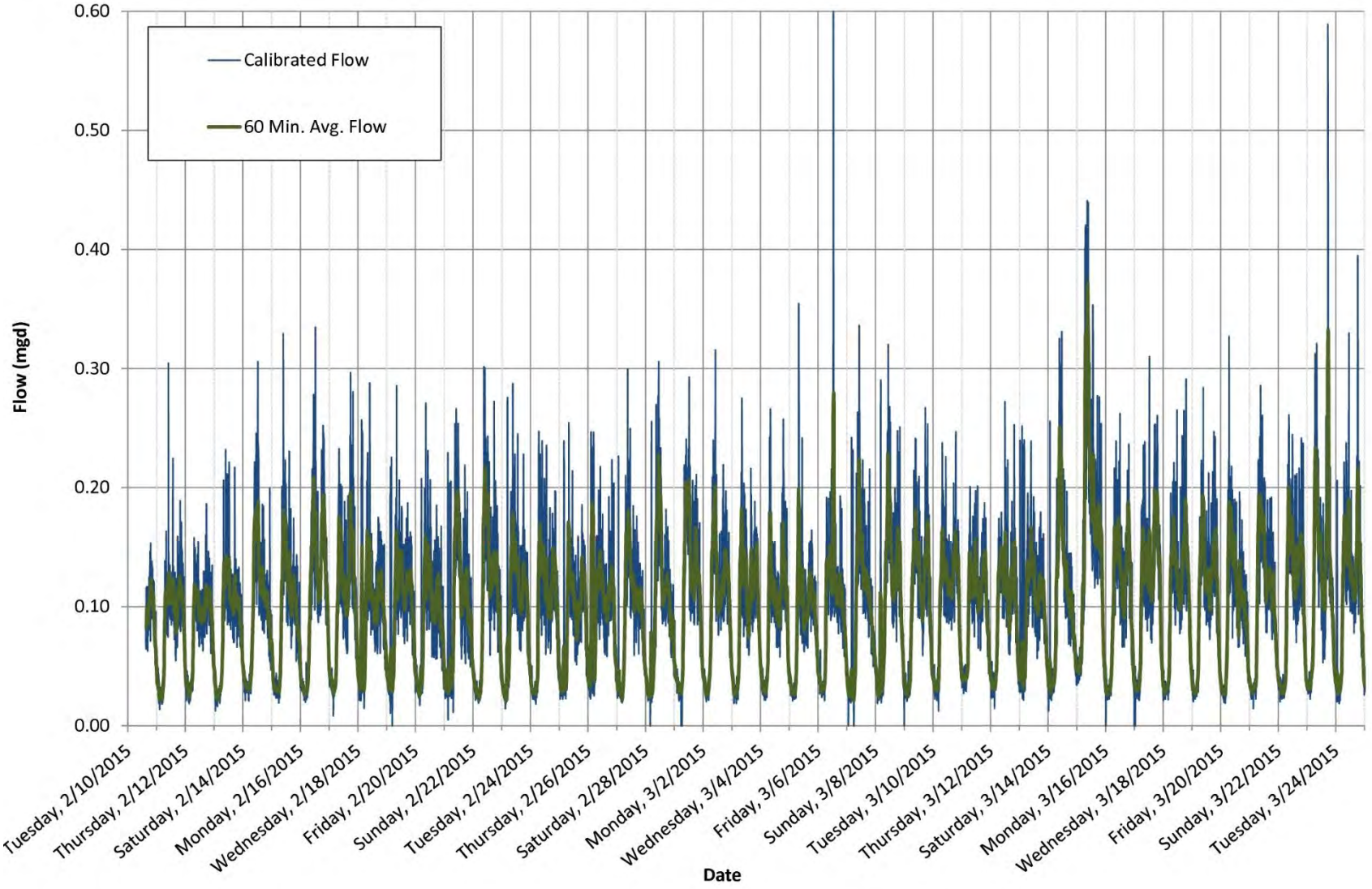


Figure 4 – Observed Flow – FG2-02

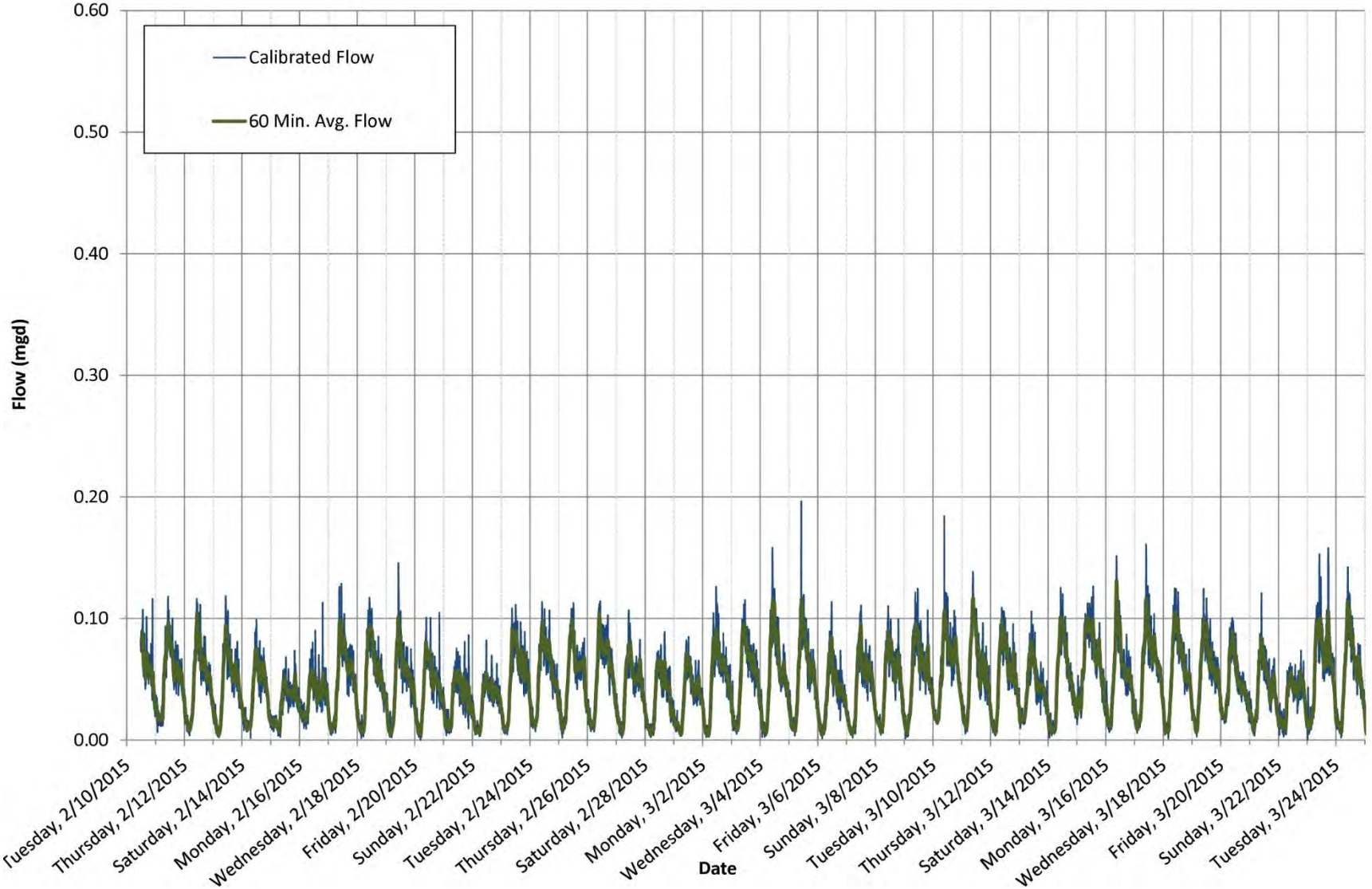
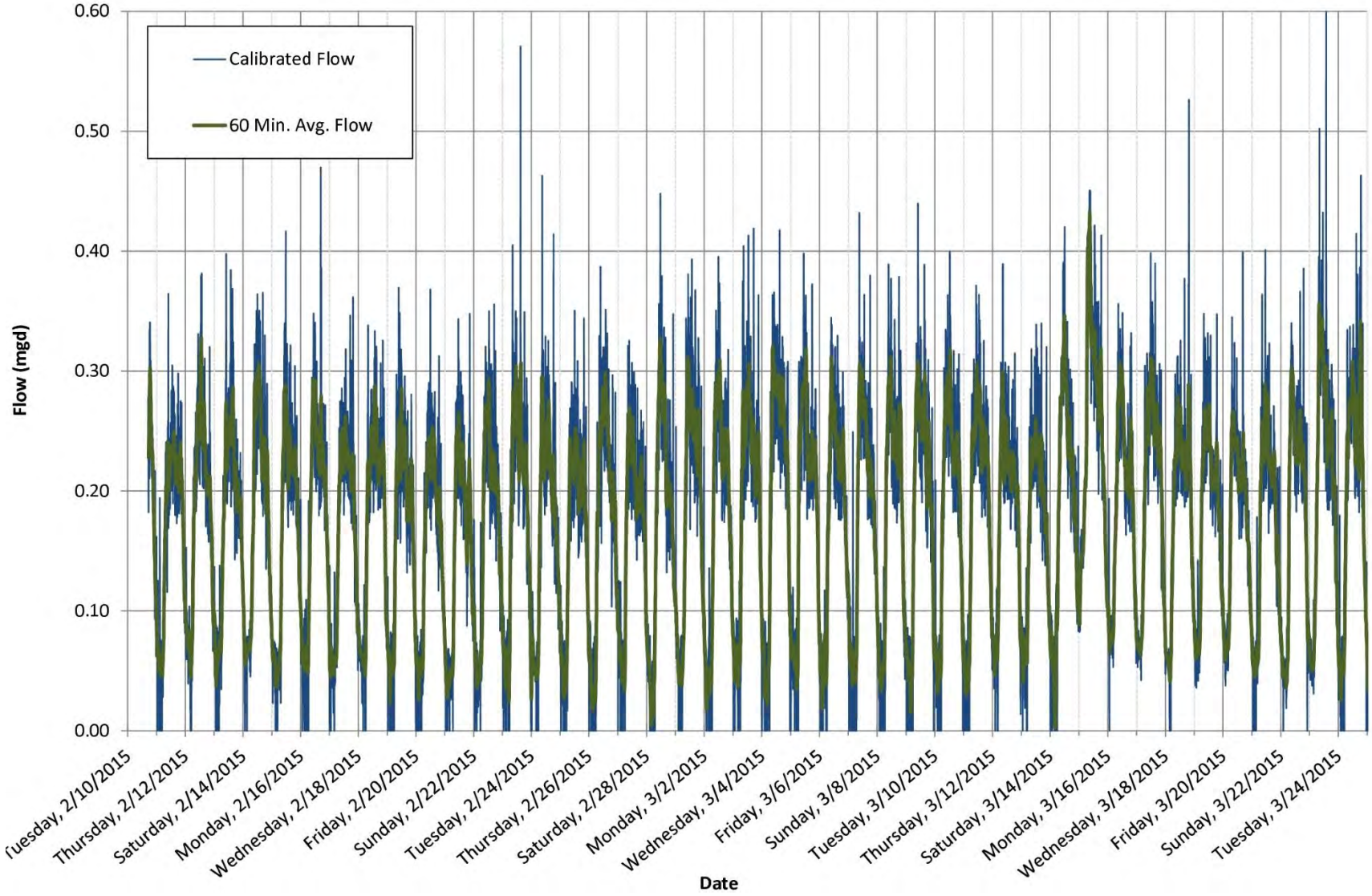


Figure 5 – Observed Flow – L1-03



3.4 Precipitation Data

Precipitation data was collected from a tipping bucket rain gauge installed at the City of Coeur d'Alene Wastewater Treatment Plant. The site was chosen because it was secure and in close proximity to all four flow monitoring locations. The tipping bucket rain gauge counts the number of tips per a programmable time interval. The rain gauge was programmed to collect data on a 5-minute interval, consistent with the flow monitoring data recording frequency. The rain gauge data is presented in **Figure 6** and **Figure 7** below.

The majority of the flow data captured is representative of the Dry-Weather Average Flow, since there was no snowpack and very little to no precipitation until the last week of flow monitoring.

Three precipitation events occurred during the last week of flow monitoring as follows:

- Saturday March 14, 2015 - The first precipitation event consisted of relatively consistent rainfall from 5:00 am to 2:00 pm. Rainfall over the 24-hour period totaled 0.36 inches.
- Sunday March 15, 2015 - Rainfall resumed the following day beginning at midnight and continuing over the 24-hour period totaling 1.52 inches of precipitation.
- Monday March 23, 2015 – The third precipitation event consisted of two short duration precipitation events over the 24-hour period. Steady rainfall occurred from 1:15 am to 10:30 am (0.45 inches) and again from 2:50 pm to 5:20 pm (0.17 inches) for a 24-hour period totaling 0.64 inches of precipitation

Precipitation impacted the collection system the most on Sunday March 15th and Monday March 23rd, and therefore, are used as the basis of calculating inflow into the collection system. Although precipitation did occur on Saturday March 14, 2015, the intensity and overall depth of rain did not influence the collection system flow as much as the other precipitation events. During the 2015 precipitation events, there was no snowpack on the ground during the entire flow monitoring period.

Table 3 compares the 2015 precipitation events to a 2013 precipitation event and wet weather calibration. Most notably, the March 15, 2015 precipitation event is a similar event to the January 29-30, 2013 precipitation event, minus the snowpack and precipitation equivalent impact.

Table 3 – Precipitation Event Comparison

Date	24-Hour Precipitation (inches)	Snowpack Precipitation Equivalent	Total Precipitation (inches)
1/29/2013 to 1/30/2013	1.30	3 to 6 inches of snowpack with an estimated water equivalent of 0.3 to 1 inch	1.6 to 2.3
3/14/2015	0.36	None	0.36
3/15/2015	1.52	None	1.52
3/23/2015	0.62	None	0.62

Figure 6 – Rain Gauge Data – Raw Data

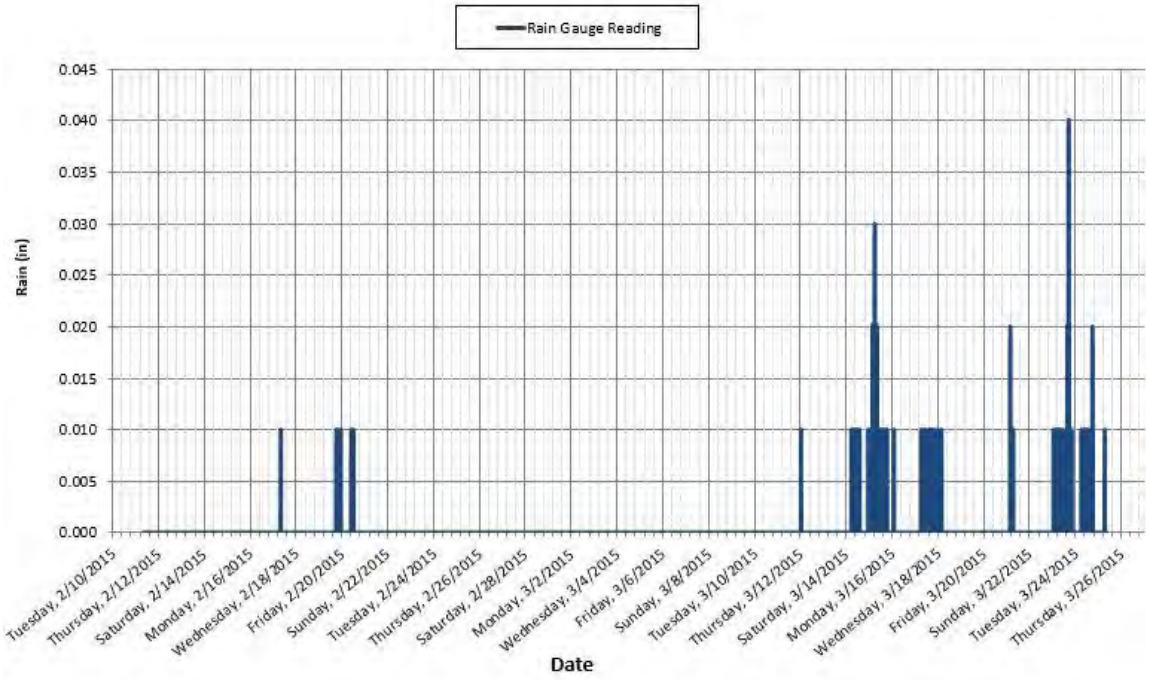
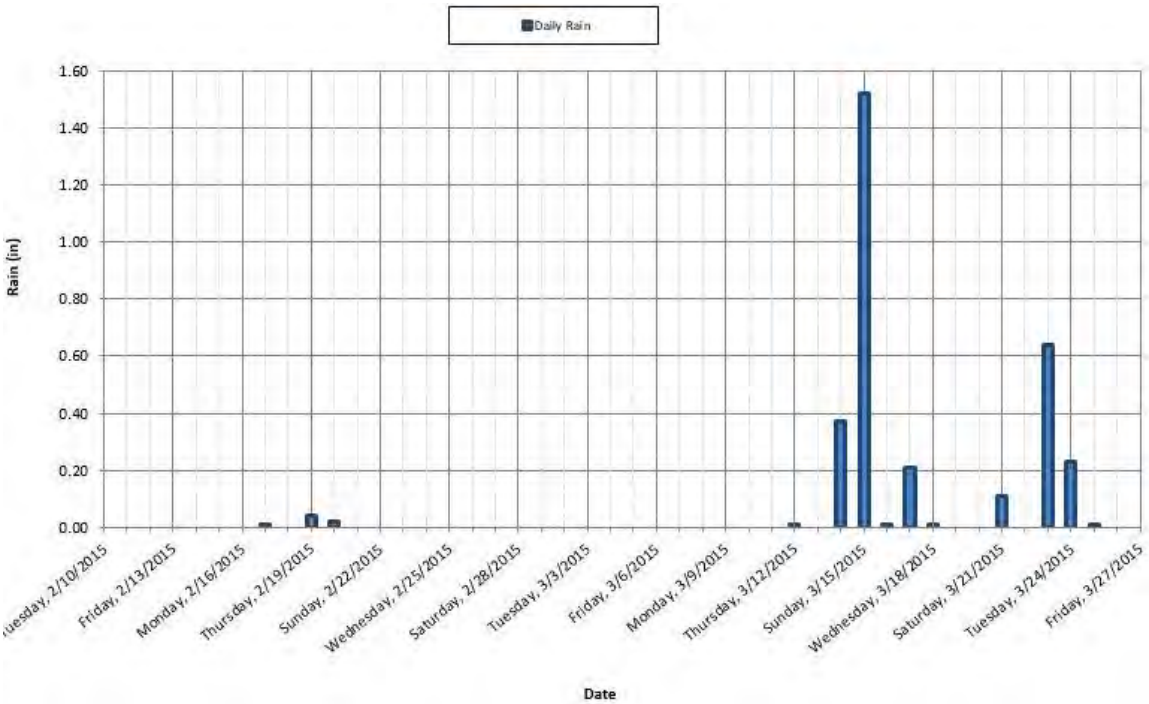


Figure 7 – Rain Gauge Data – Daily Total



4 Inflow Analysis

The inflow analysis may be performed when the flow monitoring data is presented day-over-day to illustrate the daily diurnal flow, and the system's response to precipitation events. It is important to note that the diurnal pattern from the weekday is different than weekend flow, thus the data for each site are presented on two different figures. Precipitation data is also presented on the figures and emphasis is assigned to the days influenced by the precipitation (inflow observed).

Inflow for each site is analyzed and inflow in gallons is calculated by subtracting the average dry weather flow from the flow during each precipitation/inflow event. Dividing the total gallons of inflow by the total depth of rain produces the approximate contributing inflow area upstream of each monitoring location. The results are presented in acres for each site below.

4.1 Business District – BUS1-01AA1 Inflow

- 3/15/2015: Inflow was calculated for the entire 24-hour period for this precipitation day.
- 3/23/2015: Inflow was not calculated for this precipitation/Inflow event (for this location only) since the flow monitoring data is unusable (as described in Part 3).

Table 4 – BUS1-01AA1 Inflow Results Summary

Date	Inches of Rain	Gallons of Inflow	Approximate Impervious Area (AC)
3/15/2015	1.52	99,971	2.25
3/23/2015	0.64	NA [1]	NA[(a)]
		Average	2.25

(a) Debris blocked the line during this precipitation and inflow event; therefore, inflow was not calculated.

Figure 8 – Weekend Diurnal Flow Pattern - Site BUS1-01AA1

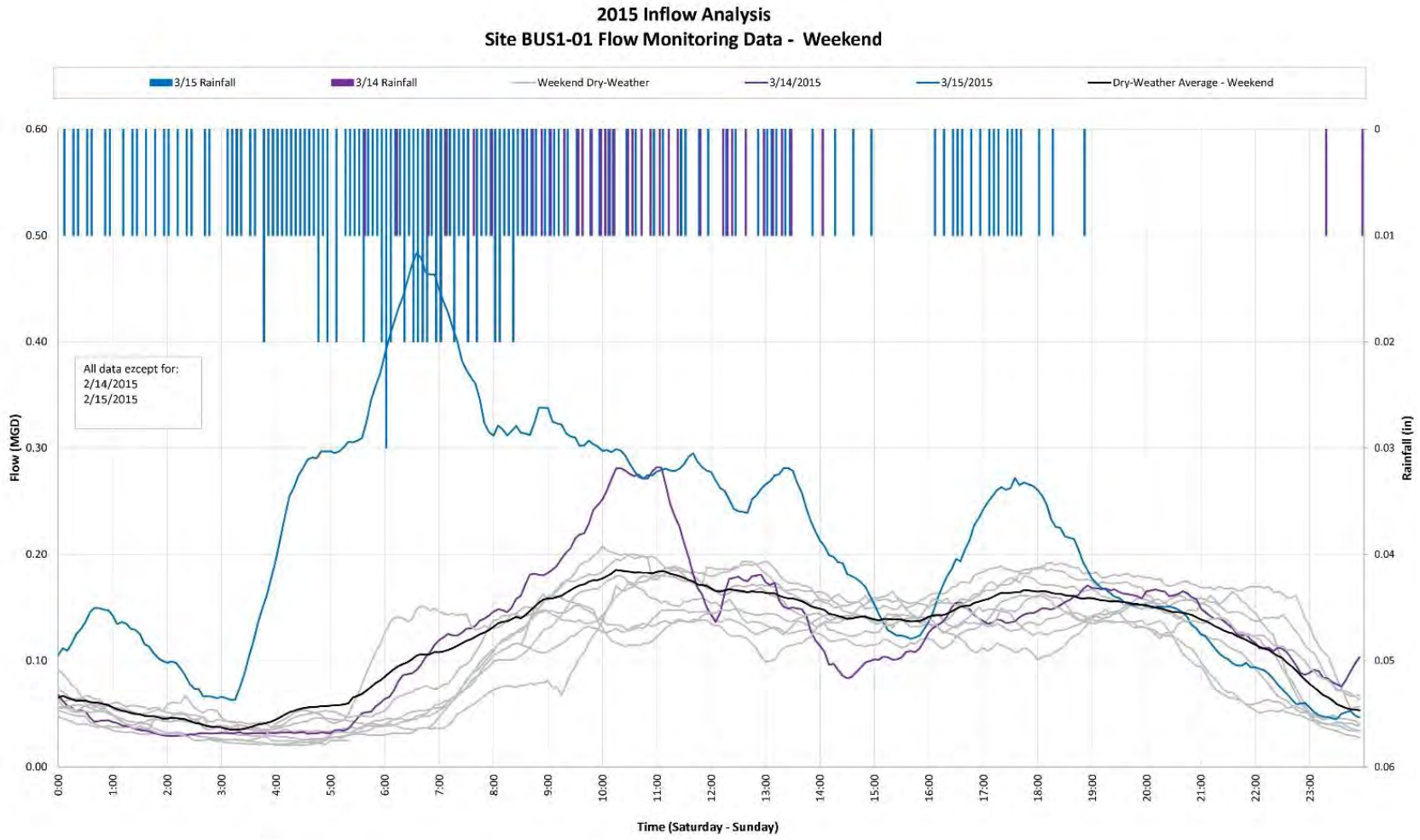
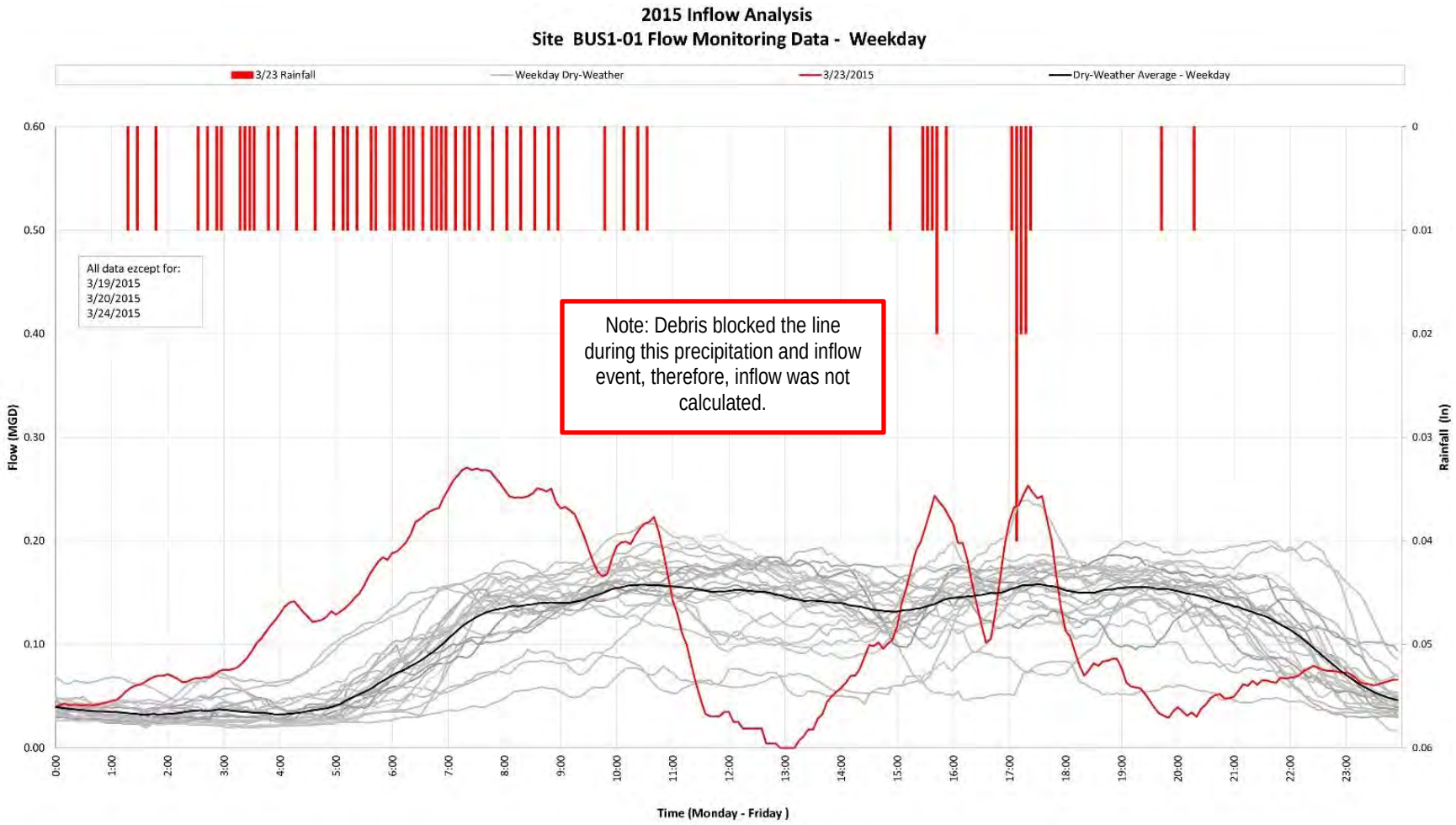


Figure 9 – Weekday Diurnal Flow Pattern - Site BUS1-01



4.2 Central Business District – CEN1-01 Inflow

- 3/15/2015: Inflow was calculated for the entire 24-hour period
- 3/23/2015: Inflow was calculated for the entire 24-hour period

Table 5 – CEN1-01 Inflow Results Summary

Date	Inches of Rain	Gallons of Inflow	Approximate Impervious Area (AC)
3/15/2015	1.52	57,755	1.31
3/23/2015	0.64	23,773	1.35
		Average	1.33

Figure 10 – Weekend Diurnal Flow Pattern - Site CEN1-01

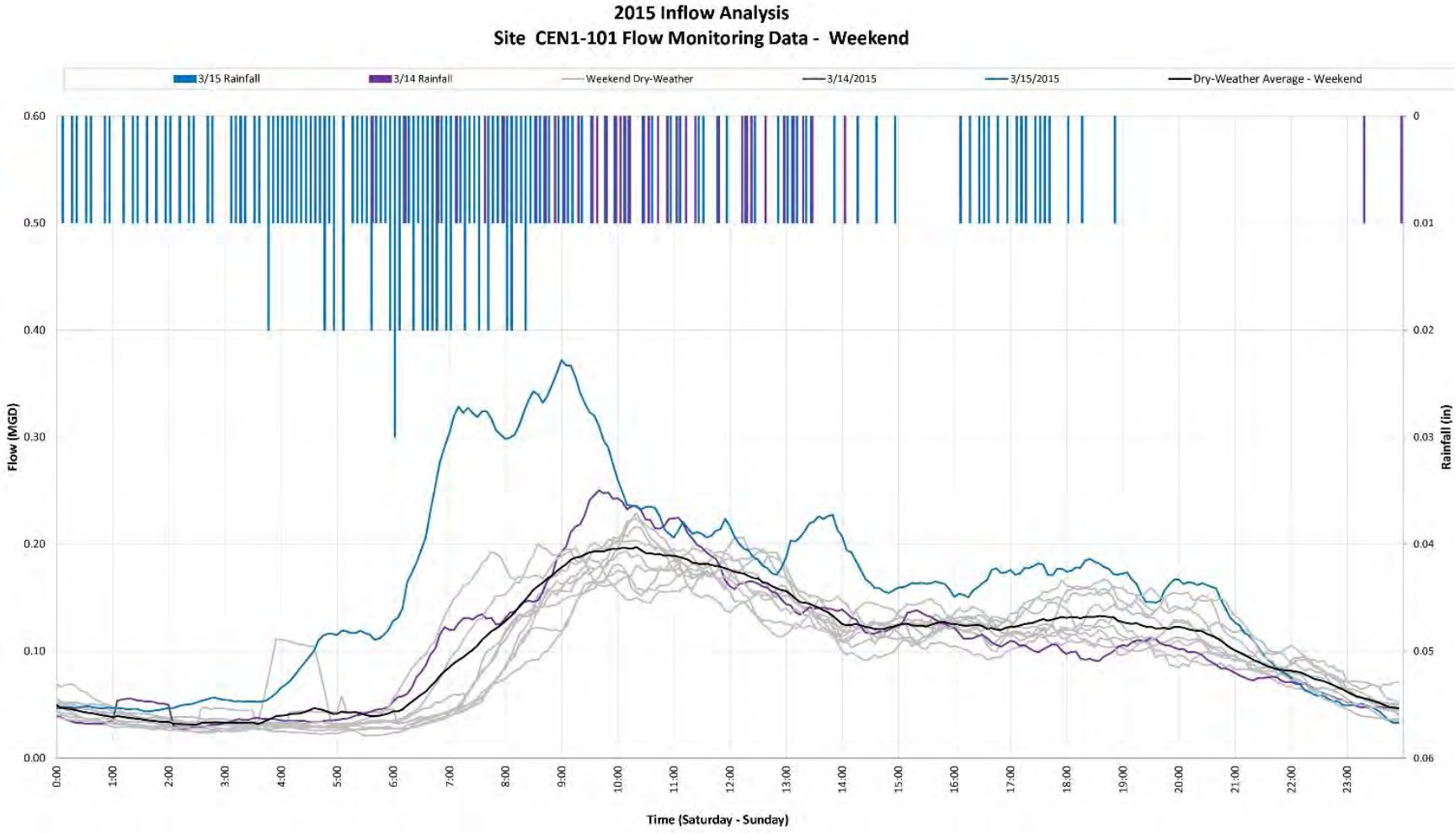
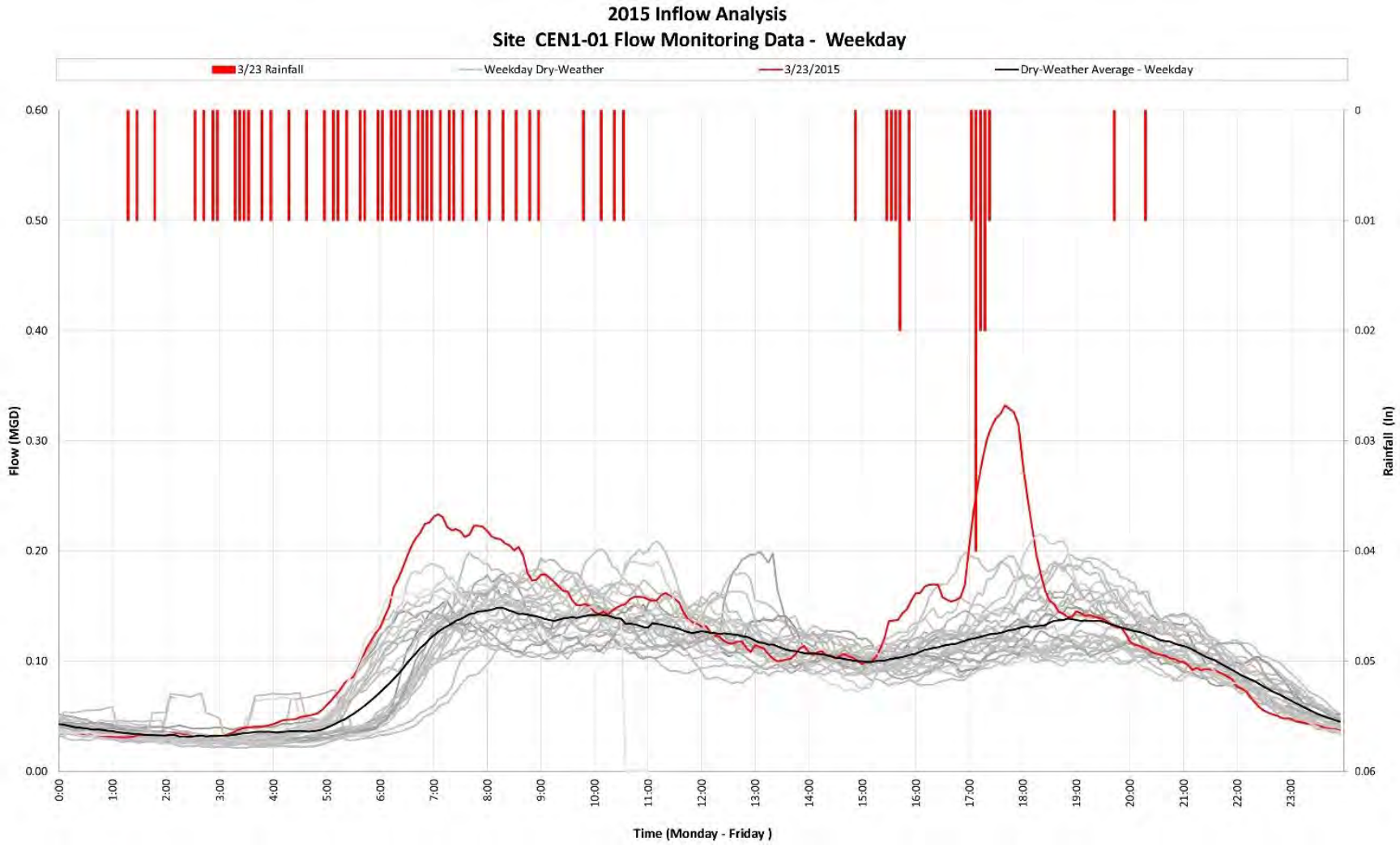


Figure 11 – Weekday Diurnal Flow Pattern - Site CEN1-01



4.3 Fort Grounds District – FG2-02 Inflow

- 3/15/2015: Inflow was calculated for the entire 24-hour period
- 3/23/2015: Inflow was calculated for the entire 24-hour period

Table 6 – FG2-02 Inflow Results Summary

Date	Inches of Rain	Gallons of Inflow	Approximate Impervious Area (AC)
3/15/2015	1.52	24,060	0.58
3/23/2015	0.64	10,283	0.66
		Average	0.62

Figure 12 – Weekend Diurnal Flow Pattern - Site FG2-02

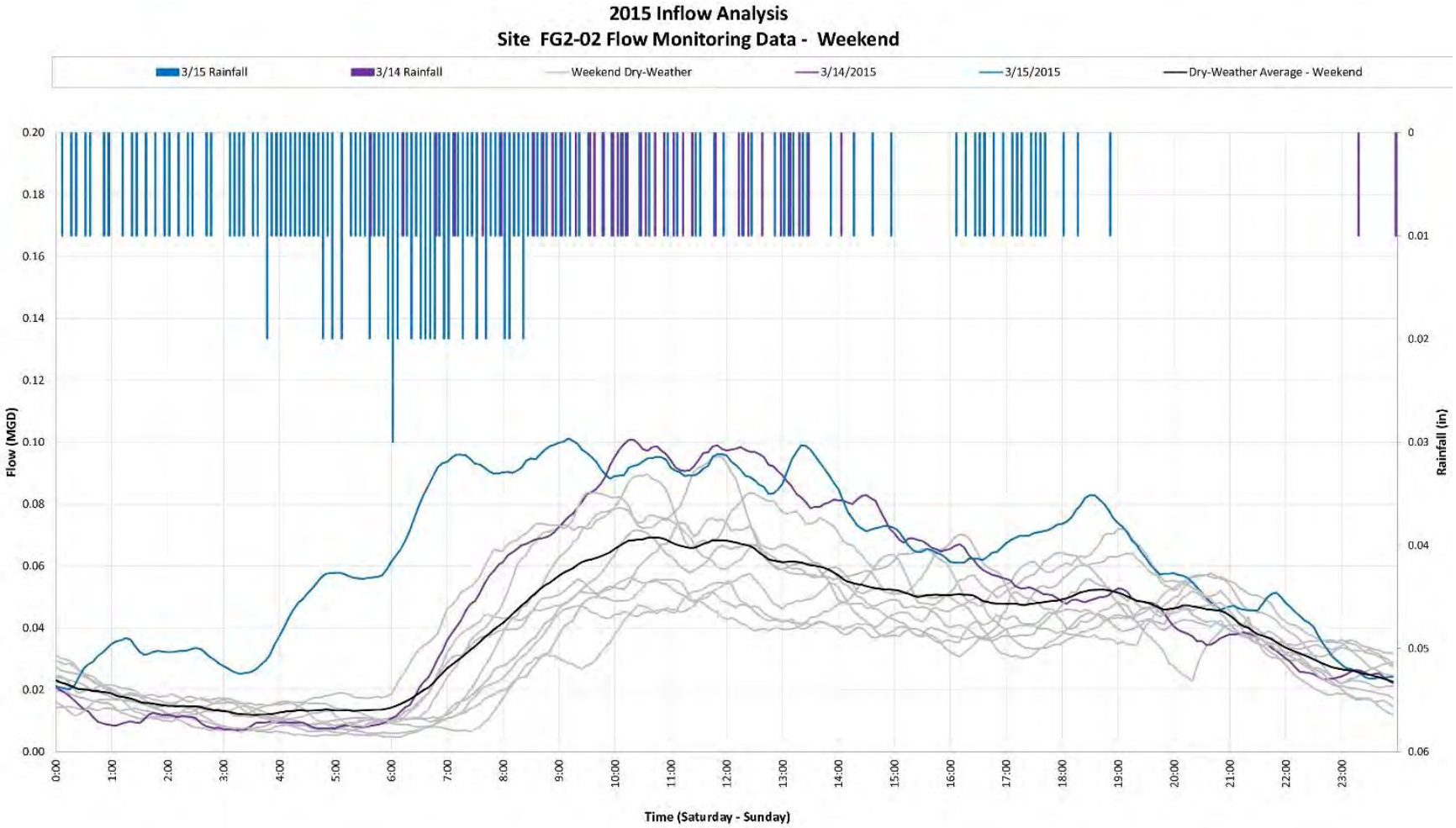
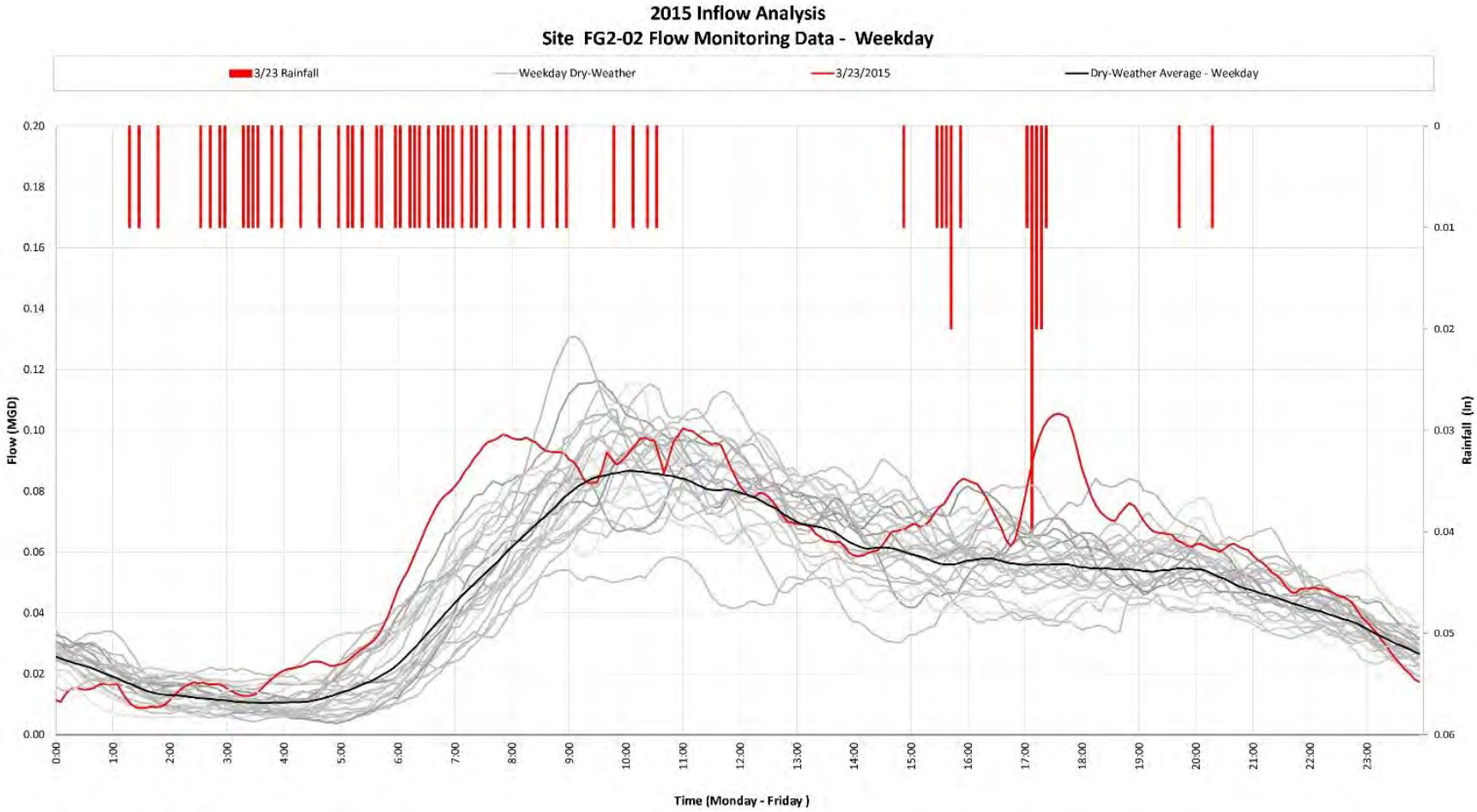


Figure 13 – Weekday Diurnal Flow Pattern - Site FG2-02



4.4 Lincoln District – L1-03 Inflow

- 3/15/2015: Inflow was calculated for the entire 24-hour period
- 3/23/2015: Inflow was calculated for the entire 24-hour period

Table 7 – L1-03 Inflow Results Summary

Date	Inches of Rain	Gallons of Inflow	Approximate Impervious Area (AC)
3/15/2015	1.52	72,575	1.78
3/23/2015	0.64	28,612	1.58
		Average	1.68

Figure 14 – Weekend Diurnal Flow Pattern - Site L1-03

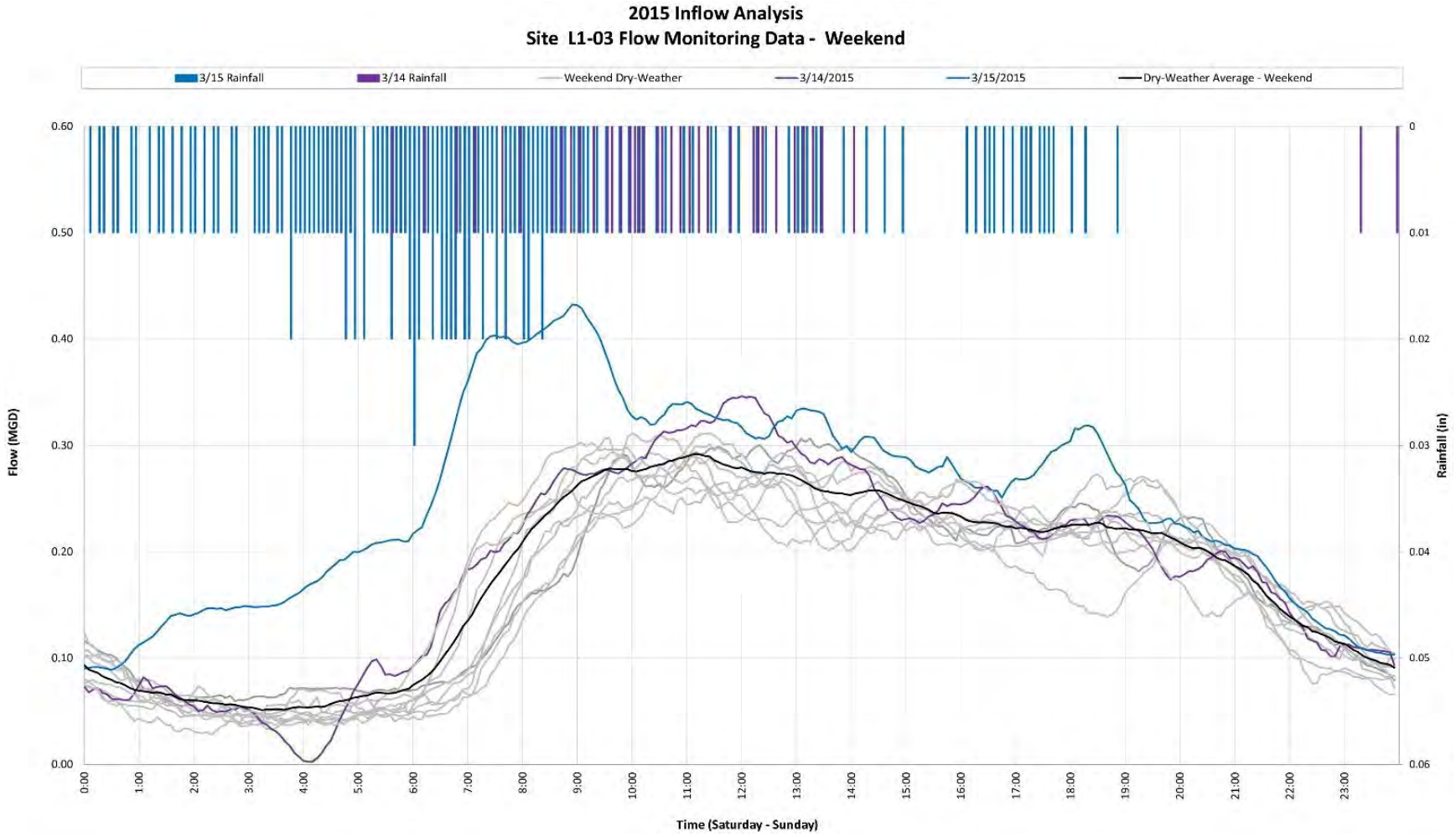
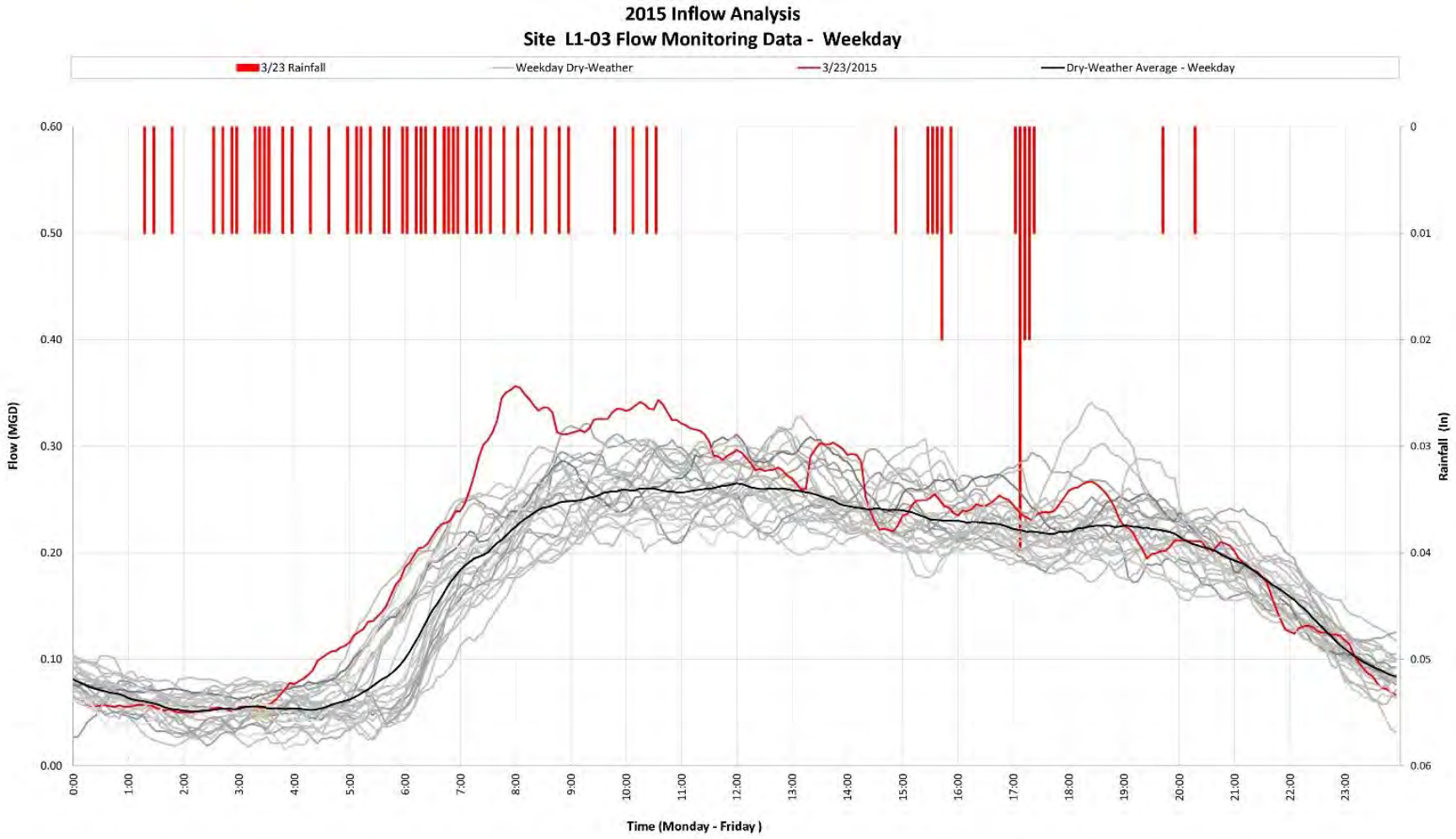


Figure 15 – Weekday Diurnal Flow Pattern - Site L1-03



5 Summary and Conclusions

The 2013 Sewer Master Plan summarized basin specific impervious area calculations from several past inflow identification studies since 2002. **Table 8** of this report reproduces the inflow conclusions listed in Table 3-3 of the 2013 Master Plan. This inflow analysis expands on the historical information for the BUS, CEN, FG, and LIN sub-basins (**Table 9**). The data is presented visually in **Figure 16** with an overlay of the area covered with historical smoke testing.

Key conclusions are as follows:

- Two precipitation events occurred during the 2015 flow monitoring period.
- Impervious area estimates from this study varied from the 2013 Master Plan model assumptions.
- Inflow estimates from this study are likely more accurate and up-to-date than estimates used in the 2013 Master Plan for the BUS, CEN, FG, and LIN sub-basins because all four basins were monitored at the same time and significant inflow source reduction improvements have been completed since the time of the last comparable flow monitoring data (2004).
- The Lincoln (LIN) sub-basin appears to have nearly 2.8 times as much inflow as previously estimated. This basin has also not been smoke tested.
- The Central (CEN) sub-basin appears to have nearly 3.2 times less inflow than previously estimated.
- The Business (BUS) sub-basin appears to have the highest total impervious area.

Table 8 – Copy of Table 3-3 from 2013 Master Plan - Impervious Area

Major Basin	Sub-Basin	Previously Estimated Impervious Area [a] (AC)	Historically Identified Impervious Area [b] (AC)	Removed Impervious Area [e] (AC)	Impervious Area Added in Model for Calibration (AC)	Total Impervious Area in Model (AC)
A	Basin Total	-	0.00	0.00	1.16	1.16
B	B	2.10	1.65	1.56	4.22	4.31
	GOV	0.35	0.00	0.00	0.99	0.99
	HON	0.30	0.00	0.00	0.83	0.83
	Basin Total	2.75	1.65	1.56	6.04	6.13
BUS	Basin Total	4.10	3.23	0.32	1.26	4.17
CEN	Basin Total	3.50	1.00	0.00	3.25	4.25
FG	Basin Total	-	4.10	2.17 [c]	0.35	2.28
LIN	Basin Total	0.00	0.00	0.00	0.64	0.64
M	CH	-	0.00	0.00	0.30	0.30
	GAR	0.64	0.29	0.00	0.76	1.05
	M1-14	1.24	2.14	0.00	1.55	3.69
	M1-32	0.41	0.52	0.00	0.82	1.34
	M3-01	0.54	0.00	0.00	1.11	1.11
	M3-29	0.86	0.00	0.00	1.56	1.56
	M4-01	1.71	0.85	0.71	1.31	1.45
	M	-	0.37	0.00	0.30	0.67
	Basin Total	5.40	4.17	0.71	7.71	11.17
RIV	FWN/AF/AEX	0.80	0.00	0.00	1.60	1.60
	RIV	0.11	0.00	0.00	0.22	0.22
	RX/REX/RAM	3.71	0.00	0.00	3.71	3.71
	Basin Total	4.62	0.00	0.00	5.53	5.53
WWTP [d]	Basin Total	-	-	-	3.67	3.67
TOTAL	-	-	14.15	4.76	29.61	39.00

(a) Estimates from flow monitoring performed from 1998 to 2012.

(b) Areas identified in previous inflow studies from 2002 to 2005. See Table 3 in the 2005 Inflow Source Identification Technical Memorandum #2 by J-U-B ENGINEERS (April 2006).

(c) 1.55 AC Four Corners connection included in Existing Model. Removed for Committed and Master Plan Models.

(d) All rain water collected at the WWTP site is returned to the head works. The Committed and Master Plan Models include an additional 0.50 AC for future expansion of the WWTP.

(e) Following identification of inflow sources, several have been corrected and therefore "removed" from the wastewater collection system.

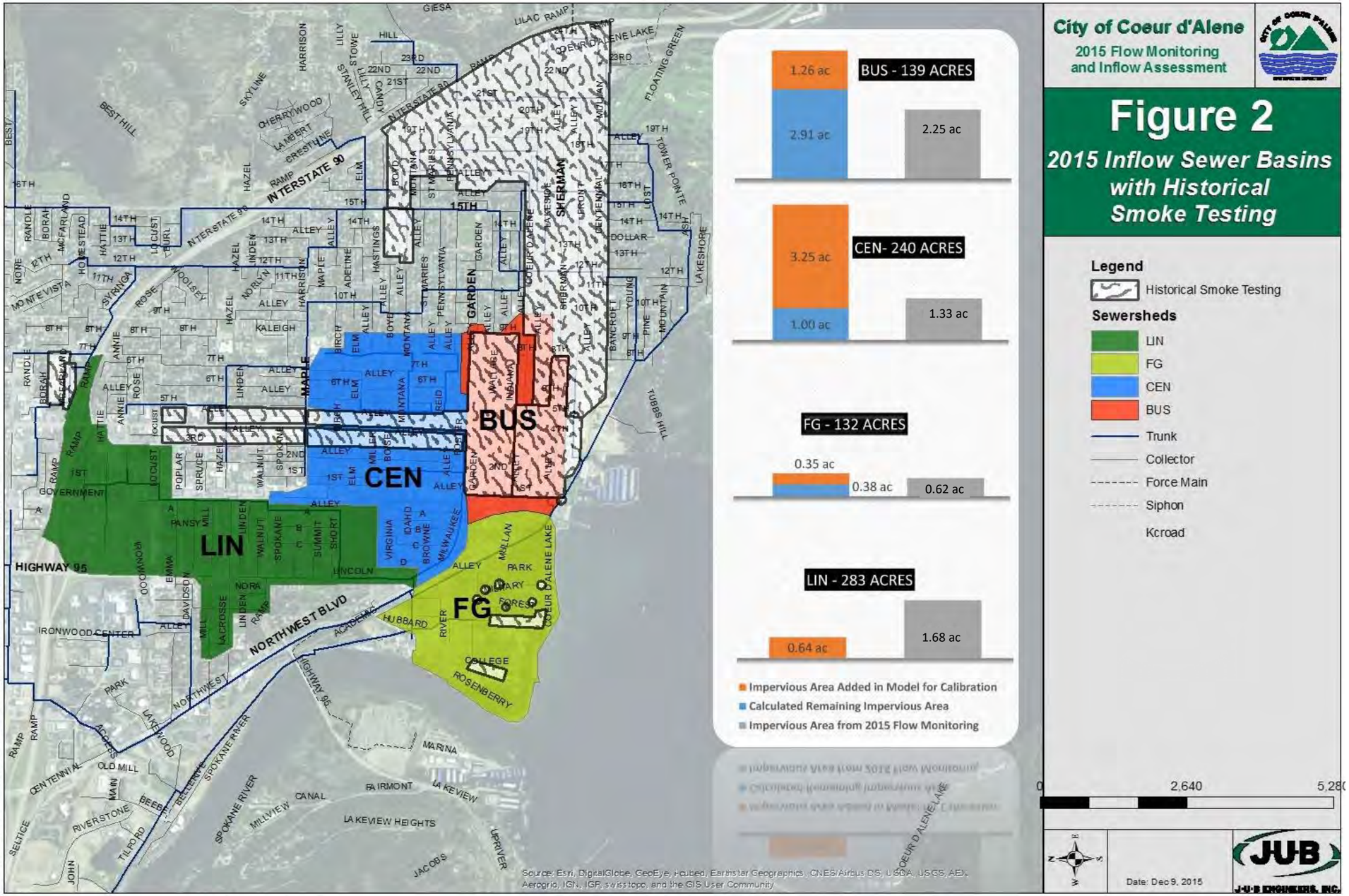
Table 9 – Inflow by Basin Flow Monitored - Impervious Area

Sewer Basin	Basin Area		Remaining Impervious Area[a]	Impervious Area Added in 2013 Model for Calibration		Total Impervious Area in 2013 Model		Impervious Area from 2015 Flow Monitoring	
	(AC)	(AC)	(%)	(AC)	(%)	(AC)	(%)	(AC)	(%)
BUS	139	2.91	2.09%	1.26	0.91%	4.17	3.00%	2.25	1.62%
CEN	240	1	0.42%	3.25	1.35%	4.25	1.31%	1.33	0.55%
FG	162	0.38	0.23%	0.35	0.22%	0.73[b]	0.45%	0.62	0.38%
LIN	283	0	0.00%	0.64	0.23%	0.64	0.23%	1.68	0.59%

(a) This column is the "Historically identified Impervious Area" minus the "Removed Impervious Area" values from the 2013 Master Plan Table 3-3.

(b) 1.55 acres Four Corners connection was removed from the system after the 2013 Master Plan calibration. The impervious area values listed in this table are adjusted accordingly.

Figure 16 – Sewer Basins and Flow Monitoring Locations



Appendix A

Historical Flow Monitoring Summary

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Table A-10 – Flow Monitoring Summary for 1998

Project	Manhole	Basin/ Interceptor	Date Monitored	Location
1998 Flow Monitoring	BUS1-01; Site 01	BUS	May 21 – May 30	1st St. between Sherman Avenue and Lakeside Avenue
	FG2-03; Site 02	FG	May 21 – May 30	Alley between Smylie Street and Hubbard Street (Note: This manhole was removed and the name given to a new manhole as part of the 2011 Education Corridor Project)
	RX1-18A; Site 03	RX/REX/RAM	May 21 – May 30; May 31 – June 6	Dalton Avenue just west of intersection with Ramsey Road
	RAM1-38A; Site 04	RX/REX/RAM	May 21 – May 30; June 18 – June 25	Adjacent to bike path along U.S. Highway 95 southwest of Silver Lake Motel

Table A-11 – Flow Monitoring Summary for 2004

Project	Manhole	Basin/ Interceptor	Dates Monitored	Location
2004 Inflow Source Flow Monitoring	M1-14	M	May 28 – July 6; November 22 – November 29	East Lakeshore Drive across from the Tubbs Hill parking lot
	B1-01	B	June 1 – July 6	Intersection of 9th Street and Young Avenue
	B1-25	B	June 1 – June 16	15th Street north of Montana Avenue
	B1-40	B	May 28 – July 9	Intersection of Locust Avenue and 13th Street
	CEN1-01	CEN	Jun 15 – July 9	Intersection of Milwaukee Drive and Browne Avenue
	BUS1-01	BUS	May 28 – July 9	In the alley between Sherman Avenue and Lakeside Avenue on 1st Street
	L1-03	LIN	June 1 – July 9	Lincoln Way, north of Virginia Avenue

Table A-12 – Flow Monitoring Summary for 2005

Project	Manhole	Basin / Interceptor	Dates Monitored	Location
2005 Inflow Source Flow Monitoring	M3-29	M	May 16 – July 18	Intersection of 12th Street and Hazel Avenue
	M4-01	M	May 16 – July 18	Intersection of 7th Street and Spokane Street
	GAR3-06	GAR	May 16 – July 18	21st Street between Garden Avenue and Coeur d'Alene Avenue
	M3-01	M	May 16 – July 18	Intersection of 17th Street and Coeur d'Alene Avenue
	M1-32	M	May 16 – July 18	Intersection of 13th Street and Indiana Avenue
	M1-14	M	May 16 – July 18	East Lakeshore Drive across from the Tubbs Hill parking lot

Table A-13 – Flow Monitoring Summary for 2005, Northwest Quadrant

Project	Manhole	Basin / Interceptor	Dates Monitored	Location
2005 NW Quadrant Flow Monitoring	AEXT2-02	FWN/AF/AEX	November 12 – November 23	I-90 downstream of Fairway Interceptor tie-in and upstream of Mill River Interceptor tie -in
	RAM1-16	RX/REX/RAM	November 12 – November 22	Southeast Schreiber Way
	RAM1-23A	RX/REX/RAM	November 11 – November 23	Building Center Drive across from Interstate Asphalt pit entrance
	REX1-08	RX/REX/RAM	November 11 – November 23	Daly Drive between Couples Drive and Player Drivve, east of intersection with Player Drive

Table A-14 – Flow Monitoring Summary for 2012

Project	Manhole	Basin / Interceptor	Dates Monitored	Location
2012 Inflow Source Flow Monitoring	RAM1-01	RX/REX/RAM	January 18 – March 9	Kroc Center
	RIV1-04	RIV	January 18 – March 9	Wastewater Treatment Plant
	A1-05	A	January 20 – March 9	Northwest Boulevard
	M1-14	M	January 18 – March 9	Tubbs Hill
	B1-01	B	January 18 – March 9	Intersection of 9th & Young

Table A-15 -Flow Monitoring Summary for All Years Monitored

Project	Manhole	Basin/ Interceptor	Dates Monitored	Location
1998 Flow Monitoring	BUS1-01; Site 01	BUS	May 21 – May 30	1st St. between Sherman Avenue and Lakeside Avenue
	FG2-03; Site 02	FG	May 21 – May 30	Alley between Smylie Street and Hubbard Street (Note: This manhole was removed and the name given to a new manhole as part of the 2011 Education Corridor Project)
	RX1-18A; Site 03	RX/REX/RAM	May 21 – May 30; May 31 – June 6	Dalton Avenue just west of intersection with Ramsey Road
	RAM1-38A; Site 04	RX/REX/RAM	May 21 – May 30; June 18 – June 25	Adjacent to bike path along U.S. Highway 95 southwest of Silver Lake Motel
2004 Inflow Source Flow Monitoring	M1-14	M	May 28 – July 6; November 22 – November 29	East Lakeshore Drive across from the Tubbs Hill parking lot
	B1-01	B	June 1 – July 6	Intersection of 9th Street and Young Avenue
	B1-25	B	June 1 – June 16	15th Street north of Montana Avenue
	B1-40	B	May 28 – July 9	Intersection of Locust Avenue and 13th Street

	CEN1-01	CEN	Jun 15 – July 9	Intersection of Milwaukee Drive and Browne Avenue
	BUS1-01	BUS	May 28 – July 9	In the alley between Sherman Avenue and Lakeside Avenue on 1st Street
	L1-03	LIN	June 1 – July 9	Lincoln Way, north of Virginia Avenue
2005 Inflow Source Flow Monitoring	M3-29	M	May 16 – July 18	Intersection of 12th Street and Hazel Avenue
	M4-01	M	May 16 – July 18	Intersection of 7th Street and Spokane Street
	GAR3-06	GAR	May 16 – July 18	21st Street between Garden Avenue and Coeur d'Alene Avenue
	M3-01	M	May 16 – July 18	Intersection of 17th Street and Coeur d'Alene Avenue
	M1-32	M	May 16 – July 18	Intersection of 13th Street and Indiana Avenue
	M1-14	M	May 16 – July 18	East Lakeshore Drive across from the Tubbs Hill parking lot
2005 NW Quadrant Flow Monitoring	AEXT2-02	FWN/AF/AEX	November 12 – November 23	I-90 downstream of Fairway Interceptor tie-in and upstream of Mill River Interceptor tie -in
	RAM1-16	RX/REX/RAM	November 12 – November 22	Southeast Schreiber Way
	RAM1-23A	RX/REX/RAM	November 11 – November 23	Building Center Drive across from Interstate Asphalt pit entrance
	REX1-08	RX/REX/RAM	November 11 – November 23	Daly Drive between Couples Drive and Player Drivve, east of intersection with Player Drive
2012 Inflow Source Flow Monitoring	RAM1-01	RX/REX/RAM	January 18 – March 9	Kroc Center
	RIV1-04	RIV	January 18 – March 9	Wastewater Treatment Plant
	A1-05	A	January 20 – March 9	Northwest Boulevard
	M1-14	M	January 18 – March 9	Tubbs Hill
	B1-01	B	January 18 – March 9	Intersection of 9th & Young

City of Coeur d'Alene, ID

Final Report Submitted to **Coeur d'Alene, ID**
May 14, 2021

ADS ENVIRONMENTAL SERVICES

4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

May 14, 2021

Jessica Waller
J-U-B Engineers, Inc.
7825 Meadowlark Way
Coeur d'Alene, ID 83815

SUBJECT: Coeur d'Alene Temporarily Flow Monitoring Report

Dear Jessica,

ADS is pleased to submit this temporary flow monitoring report for the city of Coeur d'Alene, ID. The metering was conducted at eight (8) locations. The study was conducted during the period of Thursday, March 4, 2021 to Tuesday, April 20, 2021.

The report contains depth, velocity, and quantity hydrographs as well as daily long tables for the metering period. All data can easily be exported from the PRISM data hosting website.

In addition, we would be happy to further explain any details about the report that may seem unclear. Should you have any questions or comments, you may contact the Project Manager, Shawn Hoglan at 206-571-0130.

It has been our pleasure to be of service to you in the performance of this project. Thank you for choosing ADS products and services to meet your flow monitoring needs.

Sincerely,
ADS ENVIRONMENTAL SERVICES

Tony Locke
Data Analyst III, ADS LLC Huntsville, AL

City of Coeur d'Alene, ID
Temporary Flow Monitoring Report
March – April 2021

Prepared For:

Jessica Waller
J-U-B Engineers, Inc.
7825 Meadowlark Way
Coeur d'Alene, ID 83815

Prepared By:

ADS, LLC
4455 S. 134th Place
Tukwila, WA 98168

CDL_A1-05

Site Commentary

SITE INFORMATION

Pipe	Elliptical (20.88 in H x 21 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	5.15	2.04	0.621
Minimum	3.78	1.36	0.263
Maximum	6.86	2.80	1.193
Min Time	04/01/2021 02:40:00	03/30/2021 02:35:00	03/24/2021 03:05:00
Max Time	04/15/2021 13:55:00	04/07/2021 10:20:00	04/04/2021 22:30:00

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the none average.

DATA UPTIME

Data uptime observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021** is provided in the following table:

Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

Hydrograph Report

CDL_A1-05

Flow Monitor

CDL_A1-05

Pipe Height
20.88
in

Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

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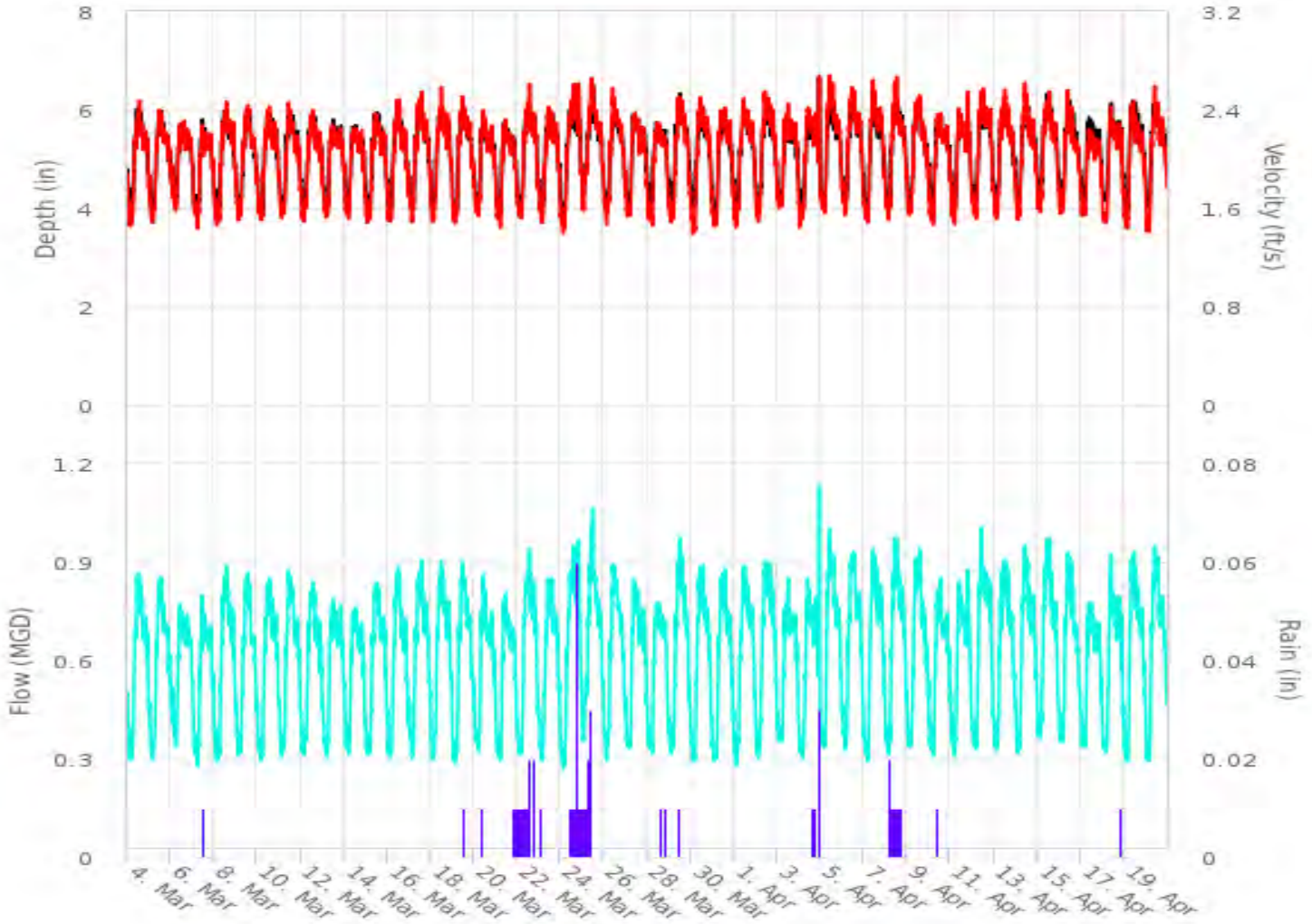

4455 S. 134th Place
Tukwila, WA 98168

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Scattergraph Report

CDL_A1-05

Flow Monitor

CDL_A1-05

Pipe Height
20.88
in

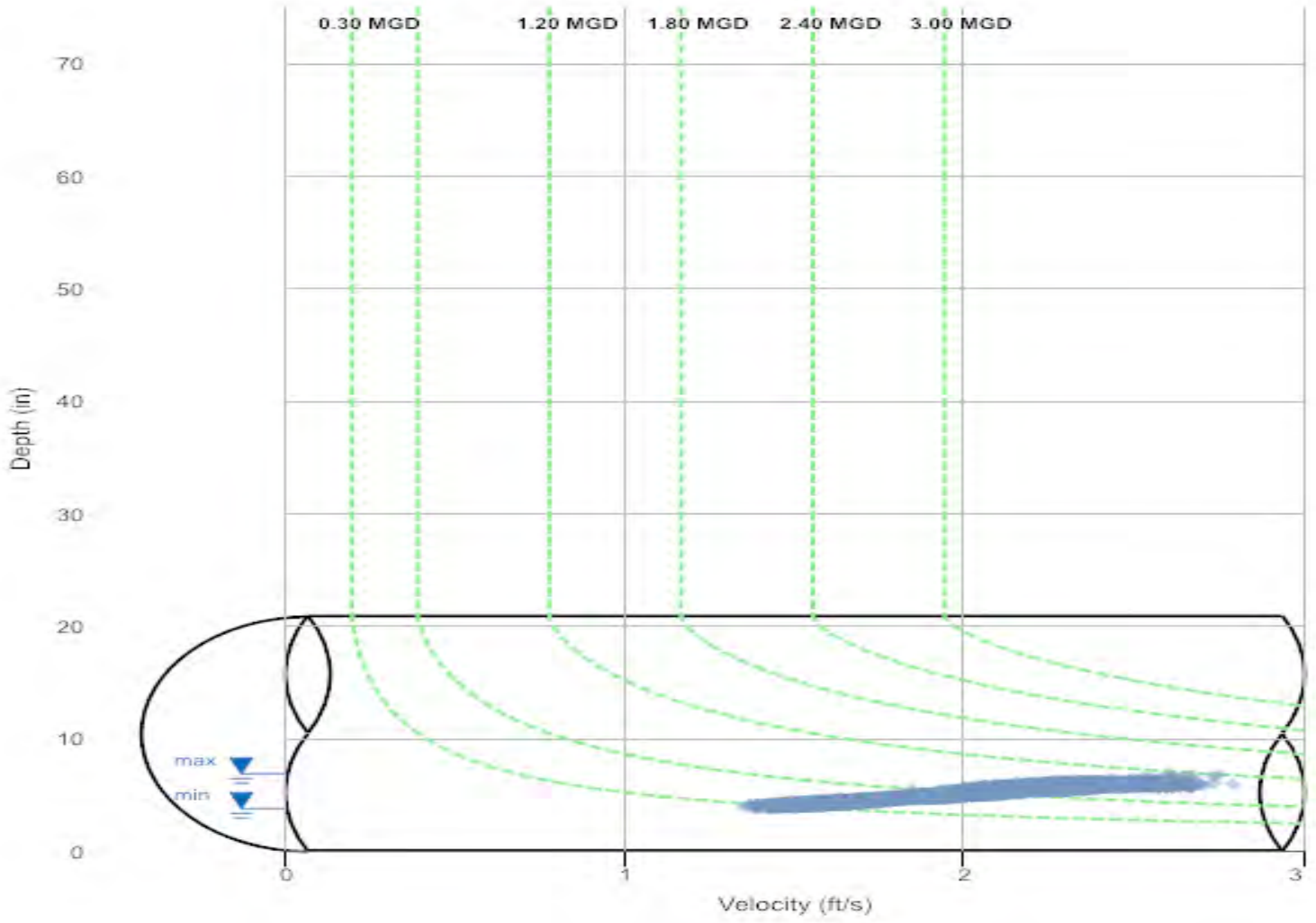
Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth

ADS ENVIRONMENTAL SERVICES



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Tukwila, WA 98168

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Daily Tabular Report

03/04/2021 00:00 - 04/20/2021 23:55
CDL_A1-05Pipe: Elliptical (20.88 in H x 21 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/04/2021	03:05	3.96	10:45	6.06	5.15	03:55	1.41	13:30	2.54	1.99	03:05	0.291	11:10	0.905	0.606	0.606	-
03/05/2021	03:05	3.89	14:00	6.02	5.11	04:00	1.42	13:40	2.49	2.00	03:05	0.294	10:55	0.896	0.604	0.604	-
03/06/2021	05:45	4.10	10:25	5.80	5.05	06:00	1.55	15:15	2.35	2.02	06:00	0.333	10:25	0.805	0.590	0.590	-
03/07/2021	06:20	3.81	11:25	5.84	4.94	04:55	1.42	12:05	2.33	1.94	06:25	0.275	11:25	0.804	0.557	0.557	0.02
03/08/2021	03:05	3.87	13:25	6.01	5.09	03:05	1.45	13:30	2.56	2.01	03:05	0.286	13:30	0.932	0.607	0.607	-
03/09/2021	03:20	3.96	16:05	6.02	5.04	02:35	1.49	13:50	2.54	2.01	02:35	0.305	13:50	0.903	0.594	0.594	-
03/10/2021	04:10	3.84	13:50	5.94	5.06	04:00	1.50	12:55	2.49	2.01	04:05	0.294	12:55	0.865	0.600	0.600	-
03/11/2021	03:05	3.93	11:50	5.99	5.13	03:05	1.51	10:55	2.52	2.00	03:05	0.304	10:50	0.883	0.607	0.607	-
03/12/2021	04:10	4.00	13:50	5.95	5.10	01:40	1.43	13:05	2.46	1.99	04:15	0.306	13:05	0.867	0.598	0.598	-
03/13/2021	05:45	3.87	11:45	5.83	5.02	03:55	1.52	11:05	2.32	1.98	05:45	0.300	11:40	0.813	0.580	0.580	-
03/14/2021	04:55	3.99	12:00	5.78	5.01	04:55	1.49	10:40	2.30	1.97	04:55	0.308	12:00	0.784	0.574	0.574	-
03/15/2021	04:15	4.02	11:30	5.95	5.12	01:55	1.40	10:50	2.47	1.99	01:55	0.294	12:35	0.864	0.601	0.601	-
03/16/2021	02:50	3.94	12:10	6.02	5.11	01:30	1.46	10:25	2.56	2.00	02:50	0.300	12:10	0.898	0.606	0.606	-
03/17/2021	03:40	3.94	10:50	5.98	5.16	03:00	1.47	14:40	2.61	2.05	03:40	0.299	14:35	0.917	0.627	0.627	-
03/18/2021	01:55	3.91	12:30	6.00	5.16	01:55	1.46	11:50	2.68	2.05	01:55	0.292	11:50	0.938	0.628	0.628	-
03/19/2021	03:10	3.81	11:50	6.06	5.11	03:10	1.46	12:05	2.57	2.04	03:10	0.283	11:50	0.933	0.618	0.618	0.01
03/20/2021	05:35	4.04	10:30	5.96	5.09	05:25	1.51	11:15	2.47	2.01	05:25	0.318	10:45	0.881	0.598	0.598	0.01
03/21/2021	03:00	3.93	11:05	5.83	5.01	05:00	1.43	10:50	2.33	1.96	05:10	0.292	09:20	0.818	0.572	0.572	0.03
03/22/2021	02:40	3.95	11:50	6.03	5.19	04:50	1.51	13:35	2.67	2.05	02:45	0.308	13:35	0.983	0.633	0.633	0.14
03/23/2021	03:10	3.87	10:25	6.03	5.10	03:00	1.47	10:40	2.52	2.02	04:10	0.293	09:40	0.888	0.607	0.607	0.01
03/24/2021	03:05	3.78	20:15	6.29	5.19	03:05	1.38	14:45	2.67	2.08	03:05	0.263	20:15	1.039	0.651	0.651	0.34
03/25/2021	01:15	4.17	11:50	6.66	5.36	01:45	1.53	10:35	2.74	2.17	01:45	0.338	11:50	1.129	0.696	0.696	0.24
03/26/2021	03:00	3.91	13:50	5.98	5.14	02:55	1.45	09:55	2.64	2.06	02:55	0.291	10:10	0.910	0.627	0.627	-
03/27/2021	04:20	4.04	08:55	5.97	5.16	01:45	1.51	10:50	2.48	2.02	04:05	0.329	09:40	0.863	0.616	0.616	-
03/28/2021	04:05	4.11	10:15	5.78	5.09	05:35	1.39	11:00	2.33	1.96	05:35	0.300	10:15	0.801	0.584	0.584	0.04
03/29/2021	03:00	4.06	12:45	6.60	5.27	03:00	1.44	09:40	2.58	2.04	03:00	0.305	12:45	1.070	0.643	0.643	0.01
03/30/2021	02:35	3.99	14:15	6.10	5.13	02:35	1.36	10:10	2.59	2.02	02:35	0.280	14:15	0.918	0.615	0.615	-
03/31/2021	01:30	3.92	10:40	6.03	5.06	02:15	1.44	11:10	2.45	2.02	02:20	0.290	14:15	0.880	0.605	0.605	-
04/01/2021	02:40	3.78	10:45	6.05	5.14	02:40	1.39	10:30	2.54	2.06	02:40	0.265	12:10	0.909	0.627	0.627	-
04/02/2021	03:10	3.92	15:40	6.16	5.17	03:05	1.48	10:35	2.64	2.10	03:10	0.297	15:40	0.960	0.646	0.646	-
04/03/2021	02:10	4.14	12:05	5.80	5.03	01:50	1.58	11:45	2.47	2.05	02:10	0.345	12:10	0.862	0.600	0.600	-
04/04/2021	04:30	3.93	22:30	6.77	5.07	00:50	1.41	22:30	2.75	2.05	04:45	0.298	22:30	1.193	0.612	0.612	0.11
04/05/2021	02:40	4.08	10:10	6.41	5.22	04:15	1.54	10:30	2.70	2.15	04:15	0.333	10:10	1.048	0.671	0.671	-
04/06/2021	03:15	4.02	12:30	6.11	5.24	02:55	1.53	10:25	2.63	2.12	03:15	0.321	09:25	0.961	0.662	0.662	-
04/07/2021	04:10	3.84	11:40	6.15	5.17	04:10	1.45	10:20	2.80	2.09	04:10	0.282	10:20	0.998	0.646	0.646	-
04/08/2021	03:55	3.99	09:45	6.13	5.27	03:50	1.48	12:15	2.70	2.09	03:50	0.308	12:25	0.995	0.661	0.661	0.11
04/09/2021	04:05	4.13	13:55	6.33	5.25	00:55	1.51	13:45	2.61	2.07	04:55	0.330	13:55	0.998	0.649	0.649	-
04/10/2021	04:15	4.01	14:00	5.98	5.12	04:45	1.41	08:45	2.42	2.02	04:45	0.294	13:55	0.875	0.607	0.607	0.02
04/11/2021	04:45	4.01	10:15	5.96	5.11	04:50	1.46	19:20	2.57	2.02	04:50	0.304	19:10	0.910	0.609	0.609	-
04/12/2021	04:20	4.13	10:15	6.40	5.28	04:20	1.50	11:55	2.62	2.10	04:20	0.324	10:15	1.048	0.666	0.666	-
04/13/2021	02:55	4.10	11:25	6.14	5.25	02:55	1.50	12:25	2.61	2.09	03:00	0.321	10:50	0.948	0.653	0.653	-
04/14/2021	01:50	4.02	10:55	6.19	5.27	03:15	1.46	10:50	2.67	2.08	03:15	0.305	10:55	0.989	0.655	0.655	-
04/15/2021	01:50	4.30	13:55	6.86	5.38	04:10	1.55	13:35	2.64	2.10	04:00	0.362	13:55	1.157	0.680	0.680	-
04/16/2021	04:30	4.15	11:05	6.23	5.27	03:10	1.53	09:35	2.64	2.04	04:30	0.338	09:35	0.970	0.640	0.640	-
04/17/2021	05:05	4.13	09:40	5.88	5.18	01:35	1.52	09:20	2.33	1.95	01:35	0.331	09:20	0.814	0.595	0.595	-
04/18/2021	04:20	4.12	10:20	6.18	5.16	04:15	1.45	09:00	2.46	1.99	04:15	0.315	10:20	0.935	0.606	0.606	0.02
04/19/2021	02:35	3.93	09:45	6.26	5.30	02:35	1.42	10:15	2.57	2.02	02:35	0.287	11:40	0.950	0.643	0.643	-
04/20/2021	04:35	4.00	11:45	6.25	5.31	04:35	1.37	10:10	2.68	2.04	04:35	0.284	10:10	0.990	0.653	0.650	-

03/04/2021 00:00 - 04/20/2021 23:55

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			29.822	1.11
Average	5.15	2.04	0.621	

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Coeur d'Alene		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	CDL_A1-05

Site Address /Location:	Northwest Blvd			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Drive on dirt access road NE of treatment plant	Latitude:	47.683758	Pipe Size (H x W): 20.88x20.00	Pipe Shape: Circular
		Longitude:	-116.79488		

Manhole #	System Characteristics
A1-05	Residential
Access	Traffic
Drive	None

ADS Project Name:	CoA.JUB.TFM.ID21 PSS
ADS Project Number:	22641.11.325

Installation Information

Installation Date:	Installation Type:
Wednesday, March 03, 2021	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
12:02:00 PM	
Depth of Flow (Wet DOF) (in)	
6.13	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
2.73	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Vitrified Clay Pipe	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

check conditions of road before driving into site

CDL_B1-02

Site Commentary

SITE INFORMATION

Pipe	Elliptical (24 in H x 24 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	7.95	1.57	0.981
Minimum	5.01	0.74	0.256
Maximum	10.92	2.09	1.830
Min Time	04/10/2021 05:05:00	04/13/2021 03:50:00	04/10/2021 04:50:00
Max Time	03/13/2021 12:00:00	03/26/2021 15:00:00	03/13/2021 11:55:00

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the none average.

DATA UPTIME

Data uptime observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021** is provided in the following table:

Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

Hydrograph Report

CDL_B1-02

Flow Monitor

CDL_B1-02

Pipe Height
24.00
in

Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

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Scattergraph Report

CDL_B1-02

Flow Monitor

CDL_B1-02

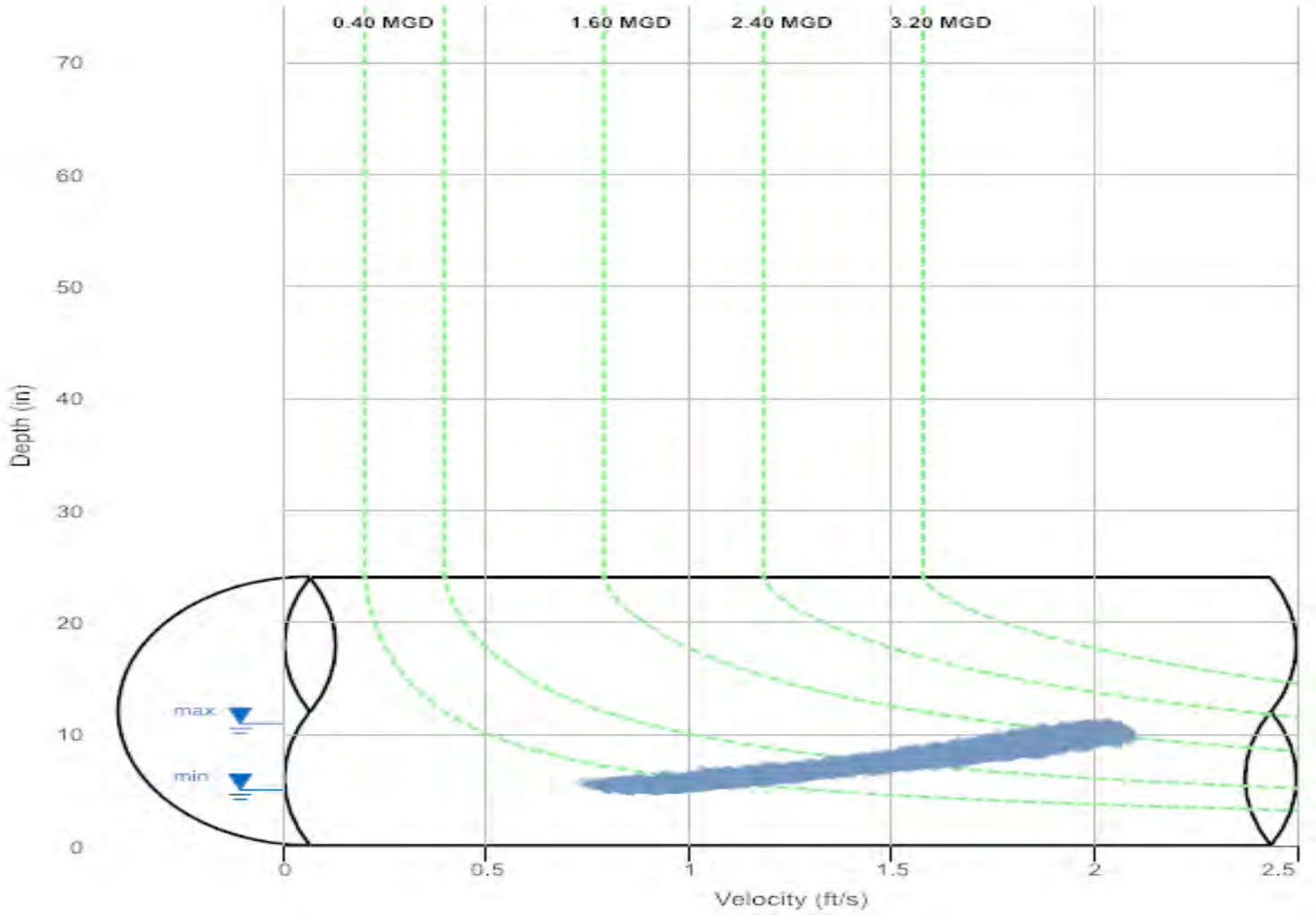
Pipe Height
24.00
in

Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



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Daily Tabular Report

03/04/2021 00:00 - 04/20/2021 23:55
CDL_B1-02Pipe: Elliptical (24 in H x 24 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/04/2021	06:00	5.23	13:20	9.34	7.86	05:50	0.82	12:05	1.98	1.54	05:50	0.269	12:05	1.431	0.947	0.947	-
03/05/2021	05:55	5.34	13:00	9.46	7.83	05:55	0.87	13:20	1.92	1.52	06:00	0.293	13:20	1.399	0.930	0.930	-
03/06/2021	06:45	5.30	12:30	9.71	7.83	06:50	0.85	17:50	1.99	1.51	06:50	0.285	15:10	1.463	0.931	0.931	-
03/07/2021	07:15	5.27	12:50	10.18	7.93	07:10	0.82	11:25	1.95	1.53	07:10	0.271	12:35	1.582	0.958	0.958	0.02
03/08/2021	05:00	5.55	20:25	9.62	8.01	05:55	0.93	12:05	1.94	1.55	06:40	0.336	20:20	1.431	0.970	0.970	-
03/09/2021	06:00	5.47	20:35	10.06	7.99	05:50	0.94	20:35	2.07	1.55	05:50	0.330	20:35	1.667	0.967	0.967	-
03/10/2021	05:00	5.31	20:00	10.02	8.16	04:55	0.90	20:55	1.97	1.58	05:00	0.301	20:55	1.574	1.028	1.028	-
03/11/2021	04:50	5.29	20:05	10.07	8.15	04:45	0.94	12:25	1.97	1.59	04:45	0.314	13:45	1.576	1.033	1.033	-
03/12/2021	06:25	5.24	11:45	9.40	7.79	05:45	0.91	11:35	1.99	1.55	06:10	0.301	11:40	1.447	0.936	0.936	-
03/13/2021	06:15	5.28	12:00	10.92	8.24	06:10	0.96	11:20	2.06	1.60	06:10	0.319	11:55	1.830	1.068	1.068	-
03/14/2021	06:15	5.18	13:05	10.74	8.23	06:25	0.87	12:15	2.05	1.59	06:25	0.280	12:15	1.784	1.068	1.068	-
03/15/2021	05:05	5.22	19:55	10.07	8.03	04:55	0.89	19:45	2.05	1.60	05:00	0.290	20:05	1.640	1.016	1.016	-
03/16/2021	04:40	5.16	19:25	9.96	8.11	04:25	0.90	17:50	2.02	1.60	04:25	0.291	18:30	1.559	1.035	1.035	-
03/17/2021	05:35	5.31	12:05	9.99	8.08	03:20	0.86	19:25	2.01	1.58	03:20	0.298	12:00	1.527	1.013	1.013	-
03/18/2021	04:05	5.19	13:05	9.94	8.03	04:30	0.89	14:20	1.99	1.60	04:30	0.290	13:10	1.532	1.015	1.015	-
03/19/2021	04:30	5.21	11:00	9.54	7.88	04:25	0.87	12:50	1.98	1.58	04:25	0.284	17:55	1.444	0.971	0.971	0.01
03/20/2021	06:50	5.33	12:15	10.32	8.03	06:50	0.94	13:35	2.01	1.58	06:50	0.317	12:55	1.658	1.017	1.017	0.01
03/21/2021	06:15	5.15	13:10	10.46	8.05	06:10	0.90	12:40	2.03	1.60	06:10	0.290	13:05	1.719	1.042	1.042	0.03
03/22/2021	04:20	5.35	18:30	9.65	7.71	05:25	0.93	17:25	1.98	1.58	05:25	0.317	18:30	1.508	0.935	0.935	0.14
03/23/2021	03:50	5.32	19:50	9.78	8.00	03:50	0.93	18:30	2.06	1.61	03:50	0.311	19:45	1.521	1.016	1.016	0.01
03/24/2021	04:35	5.19	11:30	9.60	7.77	04:10	0.92	11:25	1.95	1.59	04:35	0.302	11:25	1.472	0.954	0.954	0.34
03/25/2021	05:00	5.63	19:25	9.71	7.99	04:25	1.04	20:45	2.07	1.62	04:25	0.382	20:45	1.566	1.004	1.004	0.24
03/26/2021	05:50	5.21	11:20	10.08	8.11	05:35	0.92	15:00	2.09	1.61	05:55	0.298	12:55	1.610	1.043	1.043	-
03/27/2021	05:25	5.20	12:25	10.45	7.99	05:20	0.94	13:55	2.09	1.60	05:20	0.304	11:35	1.747	1.021	1.021	-
03/28/2021	04:55	5.18	11:25	10.07	7.78	04:50	0.93	13:10	2.05	1.57	04:50	0.299	13:45	1.616	0.963	0.963	0.04
03/29/2021	06:00	5.27	12:20	10.20	8.23	06:00	0.90	11:45	2.08	1.63	06:00	0.297	12:35	1.686	1.082	1.082	0.01
03/30/2021	05:10	5.30	11:35	10.13	8.14	05:05	0.93	19:15	2.09	1.64	05:05	0.309	12:25	1.618	1.062	1.062	-
03/31/2021	04:50	5.26	11:55	9.97	8.12	04:20	0.95	20:10	2.06	1.64	04:50	0.319	12:00	1.604	1.057	1.057	-
04/01/2021	04:35	5.15	12:20	10.03	8.01	05:30	0.92	18:00	2.04	1.62	05:30	0.296	12:35	1.561	1.028	1.028	-
04/02/2021	05:35	5.21	14:25	9.98	8.01	05:20	0.96	10:45	2.04	1.61	05:30	0.311	10:45	1.560	1.020	1.020	-
04/03/2021	05:30	5.17	10:55	10.56	8.05	05:10	0.94	16:05	2.09	1.61	05:10	0.307	10:55	1.759	1.043	1.043	-
04/04/2021	06:00	5.06	11:00	9.22	7.54	06:20	0.91	13:35	1.93	1.53	06:20	0.285	11:25	1.357	0.890	0.890	0.11
04/05/2021	05:00	5.11	11:25	10.13	8.17	04:35	0.88	12:10	2.00	1.61	04:35	0.279	12:10	1.621	1.049	1.049	-
04/06/2021	04:30	5.25	20:30	9.23	7.82	04:25	0.92	18:45	1.91	1.56	04:30	0.301	18:45	1.346	0.944	0.944	-
04/07/2021	04:15	5.20	11:05	9.15	7.67	03:55	0.90	11:10	1.97	1.54	04:00	0.294	11:10	1.399	0.908	0.908	-
04/08/2021	04:25	5.25	11:50	8.95	7.63	04:15	0.92	19:15	1.91	1.55	04:20	0.304	19:15	1.288	0.901	0.901	0.11
04/09/2021	05:05	5.14	11:05	9.48	7.74	05:00	0.92	11:05	1.94	1.57	05:00	0.295	11:05	1.446	0.938	0.938	-
04/10/2021	05:05	5.01	11:55	9.90	7.67	04:45	0.83	13:15	2.01	1.53	04:45	0.256	11:45	1.516	0.918	0.918	0.02
04/11/2021	06:20	5.28	11:45	10.22	7.99	05:20	0.87	11:30	2.01	1.55	05:20	0.289	11:30	1.642	0.984	0.984	-
04/12/2021	05:10	5.44	16:45	9.82	8.01	04:50	0.76	20:25	1.89	1.48	05:05	0.263	16:45	1.456	0.929	0.929	-
04/13/2021	04:30	5.49	11:40	9.37	7.97	03:50	0.74	11:25	1.92	1.47	03:50	0.263	11:25	1.377	0.918	0.918	-
04/14/2021	05:35	5.45	19:50	9.32	7.91	03:25	0.81	20:30	1.90	1.48	05:25	0.281	20:30	1.331	0.917	0.917	-
04/15/2021	04:10	5.43	11:20	9.32	7.95	04:00	0.83	11:45	1.91	1.51	04:05	0.288	20:25	1.351	0.932	0.932	-
04/16/2021	04:10	5.40	11:35	9.42	7.92	04:00	0.82	10:55	1.96	1.52	04:00	0.283	10:55	1.420	0.940	0.940	-
04/17/2021	04:55	5.36	10:35	9.98	7.88	04:45	0.83	12:35	1.96	1.51	04:45	0.281	12:35	1.502	0.934	0.934	-
04/18/2021	06:35	5.25	11:30	10.08	7.91	06:40	0.84	11:15	1.96	1.51	06:40	0.277	11:20	1.578	0.945	0.945	0.02
04/19/2021	05:35	5.32	11:45	9.50	7.94	05:20	0.82	20:35	1.90	1.53	05:20	0.277	11:15	1.391	0.954	0.954	-
04/20/2021	04:35	5.19	21:30	9.43	7.89	04:05	0.80	21:25	1.90	1.51	04:50	0.258	21:25	1.399	0.930	0.927	-

03/04/2021 00:00 - 04/20/2021 23:55

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			47.100	1.11
Average	7.95	1.57	0.981	

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Coeur d'Alene		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	CDL_B1-02

Site Address /Location:	500 S 10th St			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	create traffic circle in intersection	Latitude:	47.670011	Pipe Size (H x W): 24x24	Pipe Shape: Circular
		Longitude:	-116.7730661		

Manhole #	System Characteristics
B1-02	Residential
Access	Traffic
Drive	Light

ADS Project Name:	CoA_JUB.TFM.ID21 PSS
ADS Project Number:	22641.11.325

Installation Information

Installation Date:	Installation Type:
Tuesday, March 02, 2021	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
10:12:00 AM	
Depth of Flow (Wet DOF) (in)	
8.50	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.91	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Vitrified Clay Pipe	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

CDL_M1-14

Site Commentary

SITE INFORMATION

Pipe	Elliptical (24 in H x 24 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021**, along with observed minimum and maximum data, are provided in the following table.

Data is not available from March 22nd through April 20th due to a monitor problem.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	5.58	1.66	0.620
Minimum	3.75	1.02	0.207
Maximum	7.29	2.21	1.109
Min Time	03/21/2021 04:50:00	03/21/2021 03:55:00	03/21/2021 03:55:00
Max Time	03/13/2021 11:30:00	03/07/2021 13:35:00	03/13/2021 11:30:00

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the none average.

DATA UPTIME

Data uptime observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021** is provided in the following table:

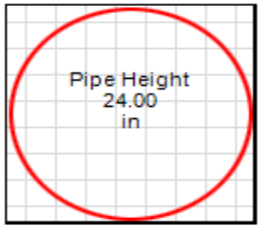
Percent Uptime	
DFINAL (in)	38.889
VFINAL (ft/s)	38.889
QFINAL (MGD - Total MG)	38.889

Hydrograph Report

CDL_M1-14

Flow Monitor

CDL_M1-14



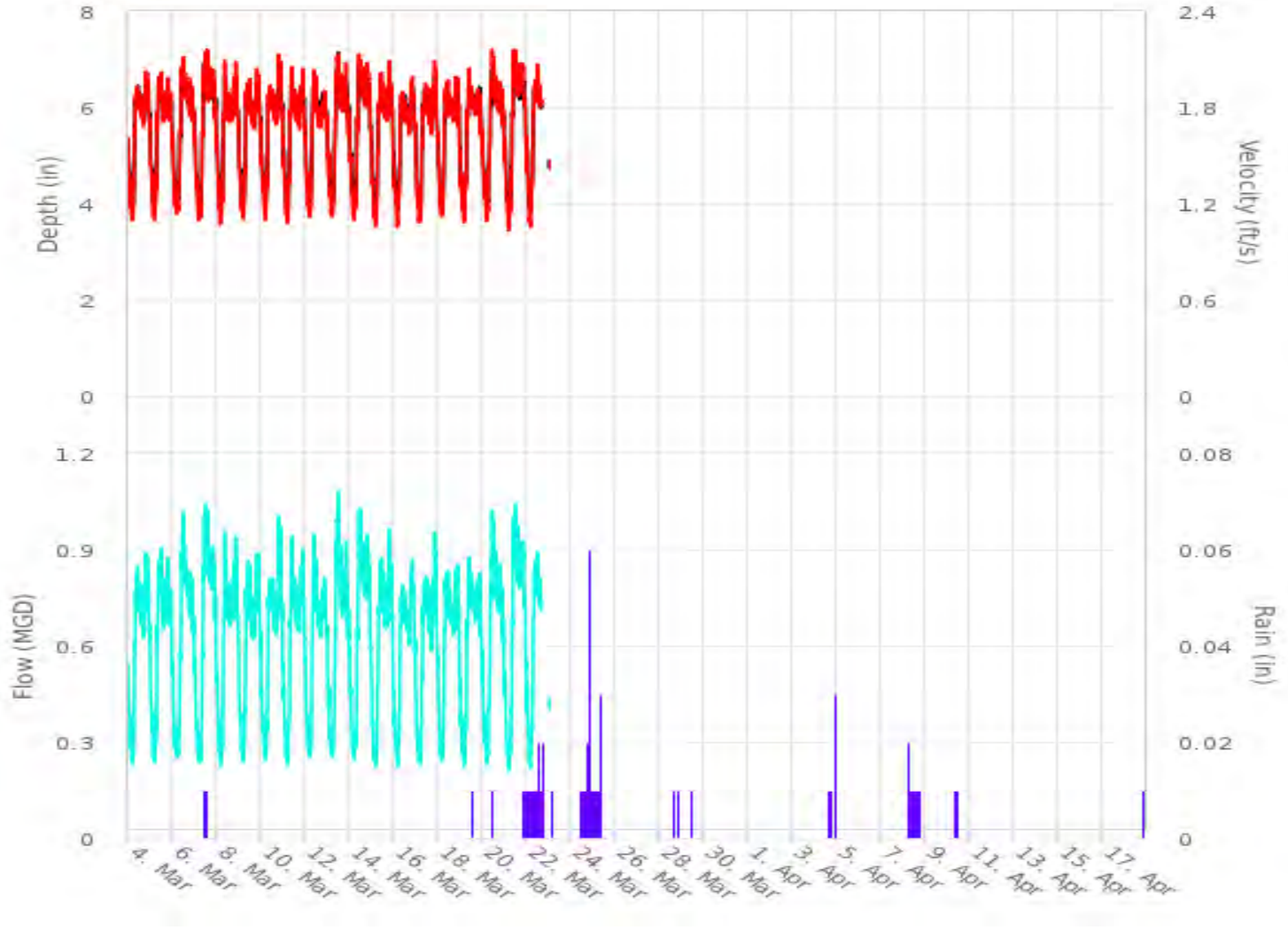
Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



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Scattergraph Report

CDL_M1-14

Flow Monitor

CDL_M1-14

Pipe Height
24.00
in

Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth

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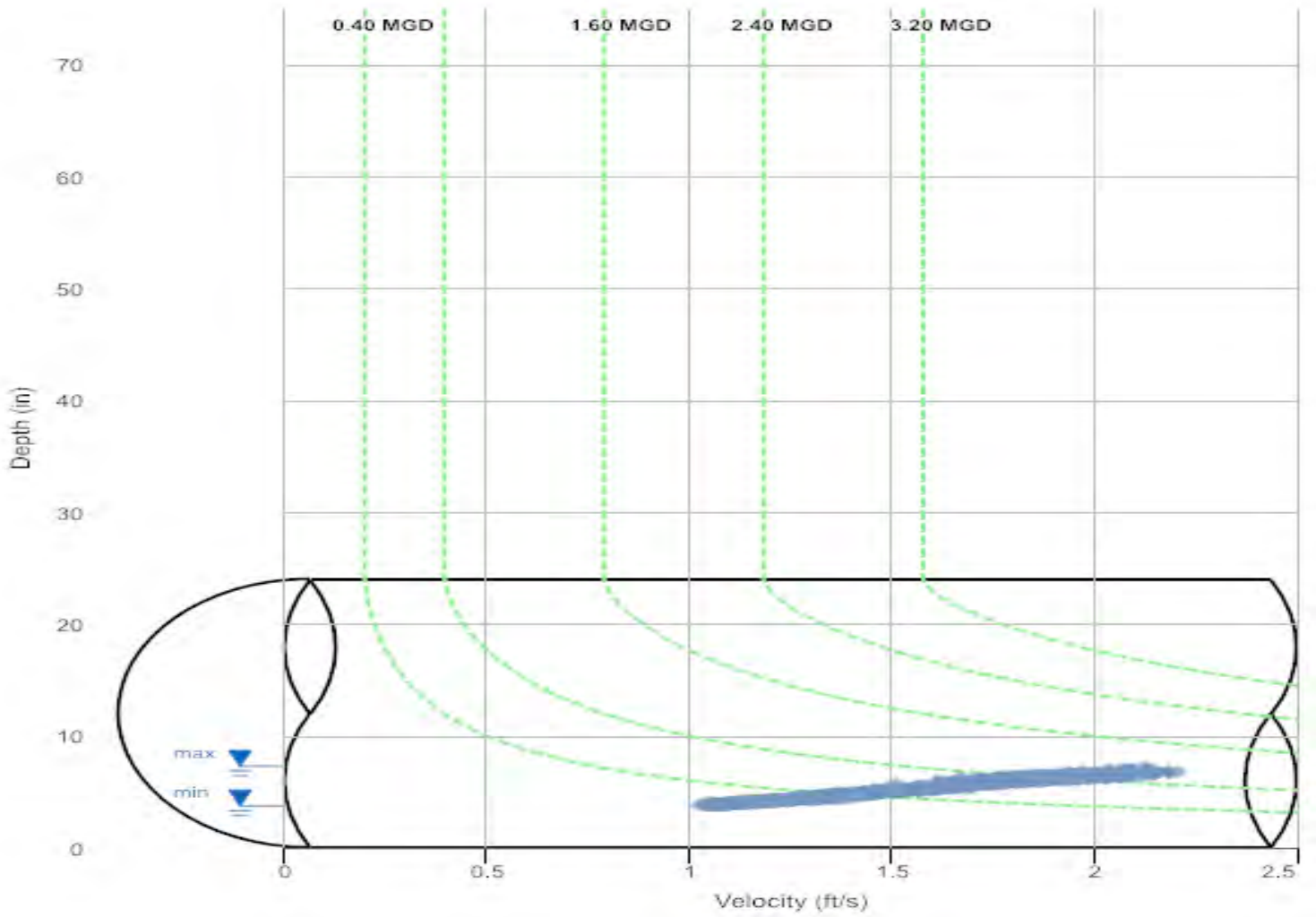

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Daily Tabular Report

03/04/2021 00:00 - 04/20/2021 23:55
CDL_M1-14Pipe: Elliptical (24 in H x 24 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/04/2021	04:55	3.83	19:10	6.53	5.56	04:55	1.09	20:45	2.15	1.65	05:05	0.228	20:45	0.950	0.613	0.613	-
03/05/2021	04:45	3.89	12:15	6.55	5.58	04:40	1.10	19:30	2.06	1.66	04:45	0.235	19:30	0.917	0.615	0.615	-
03/06/2021	05:30	3.99	11:50	6.91	5.57	05:30	1.11	10:55	2.19	1.67	05:30	0.247	11:50	1.032	0.625	0.625	-
03/07/2021	05:35	3.88	12:05	7.10	5.68	04:05	1.09	13:35	2.21	1.71	05:35	0.233	12:05	1.055	0.663	0.663	0.02
03/08/2021	04:25	3.82	20:25	6.69	5.61	03:10	1.06	08:30	2.12	1.66	04:20	0.225	08:30	0.969	0.624	0.624	-
03/09/2021	05:15	3.91	20:45	6.51	5.56	05:20	1.10	19:55	2.08	1.65	05:20	0.237	19:55	0.924	0.610	0.610	-
03/10/2021	04:00	3.99	19:35	6.82	5.58	04:25	1.09	21:10	2.18	1.66	04:25	0.244	19:30	1.020	0.615	0.615	-
03/11/2021	04:55	3.85	09:55	6.75	5.59	05:00	1.07	09:50	2.13	1.65	04:45	0.227	09:55	0.992	0.616	0.616	-
03/12/2021	04:50	4.04	09:30	6.76	5.60	04:40	1.11	09:30	2.10	1.64	04:50	0.251	09:30	0.984	0.613	0.613	-
03/13/2021	05:35	4.01	11:30	7.29	5.66	05:25	1.11	12:00	2.16	1.68	05:35	0.249	11:30	1.109	0.641	0.641	-
03/14/2021	05:10	4.00	11:30	7.03	5.69	05:00	1.09	10:10	2.15	1.69	05:10	0.245	11:30	1.043	0.653	0.653	-
03/15/2021	03:55	3.87	19:20	6.72	5.55	03:45	1.05	19:15	2.09	1.64	04:00	0.224	19:20	0.971	0.610	0.610	-
03/16/2021	04:25	3.85	19:55	6.47	5.51	03:10	1.03	20:10	2.05	1.63	04:20	0.226	20:10	0.892	0.593	0.593	-
03/17/2021	04:45	3.85	20:05	6.64	5.52	02:45	1.08	20:00	2.09	1.65	04:45	0.228	20:05	0.955	0.606	0.606	-
03/18/2021	03:30	3.89	21:20	6.42	5.53	04:20	1.10	18:15	2.08	1.66	03:30	0.237	18:15	0.875	0.609	0.609	-
03/19/2021	03:45	3.82	20:35	6.46	5.52	03:25	1.07	09:45	2.08	1.64	03:40	0.225	09:45	0.887	0.601	0.601	0.01
03/20/2021	04:35	3.87	11:20	6.94	5.58	04:35	1.08	10:20	2.21	1.67	04:35	0.229	10:20	1.052	0.628	0.628	0.01
03/21/2021	03:55	3.75	11:10	7.00	5.65	03:55	1.02	11:30	2.19	1.70	03:55	0.207	11:35	1.058	0.658	0.658	0.03
03/22/2021	04:00	3.80	09:10	6.47	5.37	03:40	1.04	11:00	2.09	1.61	03:40	0.217	11:05	0.905	0.578	0.372	0.14
03/23/2021	00:15	4.74	00:00	4.95	4.84	00:15	1.41	00:00	1.48	1.46	00:15	0.401	00:00	0.446	0.427	0.006	0.01
03/24/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.34
03/25/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.24
03/26/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/27/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/28/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04
03/29/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
03/30/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03/31/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/01/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/02/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/03/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/04/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11
04/05/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/06/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/07/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/08/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11
04/09/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/10/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
04/11/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/12/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/13/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/14/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/15/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/16/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/17/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/18/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.02
04/19/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04/20/2021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

03/04/2021 00:00 - 04/20/2021 23:55

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			11.572	1.11
Average	5.58	1.66	0.620	

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Coeur d'Alene	ADS ENVIRONMENTAL SERVICES	Site Name
Flow Monitoring Site Report		CDL_M1-14

Site Address /Location:	1098 S 10th St			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	park on road	Latitude:	47.6675692	Pipe Size (H x W): 24.00x24.00	Pipe Shape: Circular
		Longitude:	-116.7718765		

Manhole #	System Characteristics
M1-14	Residential
Access	Traffic
Drive	Medium

ADS Project Name:	CoAJUB.TFM.ID21 PSS
ADS Project Number:	22641.11.325

Installation Information

Installation Date:	Installation Type:
Tuesday, March 02, 2021	Doppler Special Installation
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
11:57:00 AM	
Depth of Flow (Wet DOF) (in)	
6.00	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.91	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Vitrified Clay Pipe	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

CDL_RAM1-01

Site Commentary

SITE INFORMATION

Pipe	Elliptical (23.25 in H x 23.38 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	5.18	2.49	0.838
Minimum	2.97	1.57	0.232
Maximum	6.96	3.21	1.502
Min Time	04/20/2021 03:50:00	03/27/2021 04:40:00	04/20/2021 03:50:00
Max Time	03/21/2021 11:25:00	03/07/2021 11:25:00	03/07/2021 11:25:00

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the none average.

DATA UPTIME

Data uptime observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021** is provided in the following table:

Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

Hydrograph Report

CDL_RAM1-01

Flow Monitor

CDL_RAM1-01

Pipe Height
23.25
in

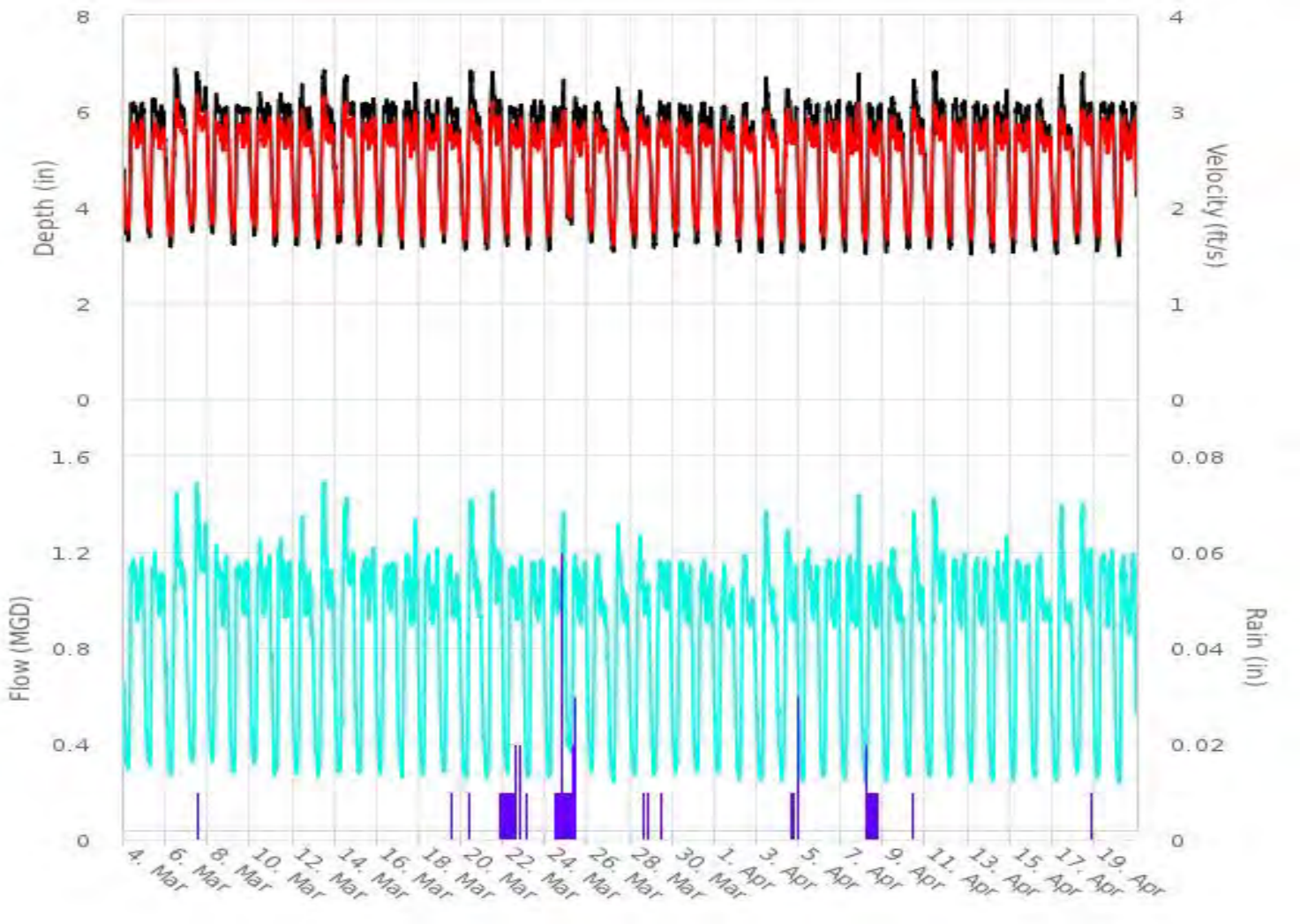
Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



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Scattergraph Report

CDL_RAM1-01

Flow Monitor

CDL_RAM1-01

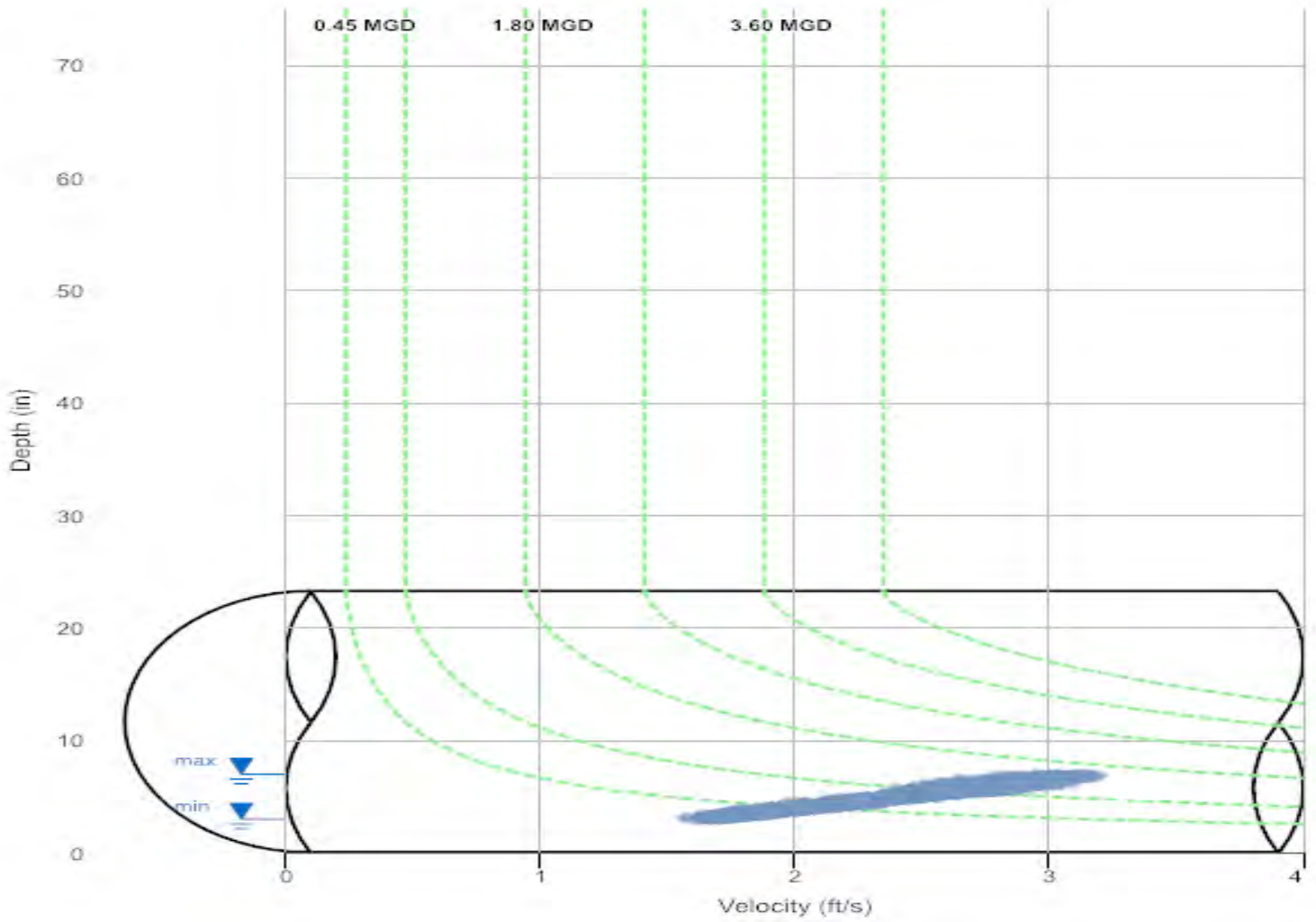
Pipe Height
23.25
in

Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



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Daily Tabular Report

03/04/2021 00:00 - 04/20/2021 23:55
CDL_RAM1-01Pipe: Elliptical (23.25 in H x 23.38 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/04/2021	04:35	3.27	08:25	6.21	5.26	03:25	1.74	20:10	2.94	2.52	04:35	0.289	21:00	1.184	0.860	0.860	-
03/05/2021	05:05	3.35	09:00	6.31	5.21	05:05	1.74	10:05	2.96	2.49	05:05	0.296	10:30	1.202	0.837	0.837	-
03/06/2021	05:15	3.15	10:50	6.94	5.23	05:10	1.63	11:35	3.16	2.51	05:10	0.257	11:40	1.463	0.866	0.866	-
03/07/2021	05:15	3.46	10:30	6.86	5.38	04:45	1.79	11:25	3.21	2.58	04:45	0.321	11:25	1.502	0.917	0.917	0.02
03/08/2021	05:05	3.44	08:30	6.44	5.30	05:20	1.78	20:40	2.99	2.54	05:20	0.323	08:25	1.266	0.871	0.871	-
03/09/2021	05:05	3.20	09:00	6.20	5.24	03:40	1.70	18:55	3.05	2.51	03:55	0.277	19:05	1.196	0.856	0.856	-
03/10/2021	04:00	3.39	10:25	6.46	5.30	03:55	1.75	08:30	3.01	2.53	04:00	0.302	10:20	1.267	0.873	0.873	-
03/11/2021	03:40	3.18	10:25	6.50	5.27	05:10	1.67	10:20	2.99	2.52	03:40	0.265	10:25	1.280	0.864	0.864	-
03/12/2021	04:55	3.19	10:15	6.66	5.16	05:00	1.69	10:10	3.16	2.48	05:00	0.269	10:10	1.425	0.828	0.828	-
03/13/2021	04:30	3.13	11:20	6.88	5.22	04:30	1.64	11:40	3.18	2.50	04:30	0.253	11:05	1.497	0.861	0.861	-
03/14/2021	03:35	3.23	12:15	6.80	5.27	03:35	1.70	12:55	3.19	2.52	03:35	0.275	12:55	1.465	0.879	0.879	-
03/15/2021	03:20	3.19	19:55	6.31	5.24	03:20	1.70	20:40	3.03	2.51	03:20	0.270	20:40	1.244	0.856	0.856	-
03/16/2021	03:50	3.18	17:25	6.36	5.27	03:50	1.70	20:05	2.92	2.50	03:50	0.269	17:25	1.235	0.856	0.856	-
03/17/2021	03:55	3.11	20:10	6.69	5.26	03:50	1.66	19:35	3.01	2.49	03:55	0.255	20:10	1.369	0.853	0.853	-
03/18/2021	03:55	3.15	10:40	6.34	5.24	03:40	1.69	08:25	3.01	2.49	04:00	0.262	19:35	1.230	0.846	0.846	-
03/19/2021	04:15	3.23	18:40	6.35	5.19	03:50	1.66	11:05	2.93	2.47	03:50	0.272	12:00	1.222	0.825	0.825	0.01
03/20/2021	04:10	3.08	10:10	6.91	5.15	04:15	1.63	11:40	3.08	2.46	04:15	0.247	11:40	1.455	0.832	0.832	0.01
03/21/2021	04:45	3.11	11:25	6.96	5.23	05:05	1.63	11:35	3.15	2.49	05:05	0.252	11:30	1.482	0.863	0.863	0.03
03/22/2021	03:55	3.17	18:30	6.18	5.20	03:00	1.70	18:55	2.97	2.50	03:55	0.268	18:55	1.181	0.842	0.842	0.14
03/23/2021	03:35	3.10	11:05	6.27	5.16	03:40	1.67	19:55	2.93	2.48	03:40	0.255	08:40	1.192	0.831	0.831	0.01
03/24/2021	03:05	3.07	20:15	6.87	5.19	03:30	1.70	20:15	3.05	2.49	03:05	0.256	20:15	1.443	0.837	0.837	0.34
03/25/2021	04:30	3.62	09:15	6.34	5.27	03:50	1.84	07:05	2.99	2.52	04:35	0.356	09:15	1.194	0.852	0.852	0.24
03/26/2021	02:55	3.24	09:00	6.25	5.11	02:55	1.71	08:55	2.97	2.48	02:55	0.278	08:55	1.222	0.810	0.810	-
03/27/2021	04:40	3.06	09:40	6.54	5.03	04:35	1.57	09:45	3.09	2.44	04:40	0.234	09:45	1.358	0.795	0.795	-
03/28/2021	04:50	3.14	10:35	6.48	5.02	04:40	1.69	10:25	3.02	2.45	04:40	0.264	10:35	1.305	0.792	0.792	0.04
03/29/2021	02:55	3.12	09:15	6.25	5.16	02:55	1.67	10:15	2.97	2.50	02:55	0.256	10:15	1.212	0.833	0.833	0.01
03/30/2021	03:45	3.18	08:30	6.22	5.13	03:30	1.73	09:30	3.05	2.49	03:55	0.274	09:30	1.201	0.820	0.820	-
03/31/2021	03:05	3.24	11:35	6.31	5.13	03:10	1.73	11:30	2.92	2.48	03:05	0.281	11:35	1.186	0.818	0.818	-
04/01/2021	03:45	3.19	10:00	6.27	5.08	02:55	1.69	10:55	2.95	2.45	03:45	0.276	10:55	1.177	0.794	0.794	-
04/02/2021	03:45	3.06	08:25	6.22	5.04	03:45	1.65	09:50	2.95	2.46	03:45	0.246	09:50	1.206	0.790	0.790	-
04/03/2021	03:55	3.05	10:15	6.77	5.06	03:35	1.66	11:45	3.09	2.46	04:00	0.248	10:15	1.429	0.807	0.807	-
04/04/2021	05:10	3.02	10:30	6.55	5.06	04:40	1.64	11:30	3.10	2.47	04:40	0.244	10:25	1.319	0.810	0.810	0.11
04/05/2021	03:50	3.06	11:00	6.28	5.20	03:50	1.63	10:10	2.97	2.49	03:50	0.244	11:00	1.226	0.846	0.846	-
04/06/2021	03:00	3.10	09:30	6.33	5.15	03:55	1.64	19:10	2.94	2.48	03:05	0.255	21:05	1.217	0.828	0.828	-
04/07/2021	03:45	3.06	20:00	6.90	5.19	03:50	1.67	19:25	3.11	2.49	03:55	0.249	20:00	1.471	0.839	0.839	-
04/08/2021	03:50	3.01	07:05	6.31	5.13	03:50	1.61	08:10	3.00	2.44	03:50	0.235	08:10	1.207	0.811	0.811	0.11
04/09/2021	03:05	3.04	10:20	6.32	5.13	03:00	1.63	11:10	3.05	2.47	03:00	0.242	11:10	1.262	0.820	0.820	-
04/10/2021	03:40	3.11	10:15	6.73	5.11	03:40	1.68	11:00	3.09	2.47	03:40	0.257	10:20	1.404	0.820	0.820	0.02
04/11/2021	03:55	3.12	09:40	6.90	5.24	04:20	1.66	09:40	3.14	2.50	04:55	0.257	09:40	1.495	0.866	0.866	-
04/12/2021	03:35	3.10	10:40	6.45	5.18	03:35	1.66	19:45	2.96	2.49	03:35	0.252	19:45	1.239	0.839	0.839	-
04/13/2021	04:10	3.00	10:00	6.23	5.17	03:50	1.65	07:40	2.94	2.48	04:00	0.241	20:10	1.196	0.832	0.832	-
04/14/2021	03:50	3.04	20:30	6.57	5.17	03:45	1.62	09:45	3.05	2.48	03:45	0.242	20:30	1.325	0.835	0.835	-
04/15/2021	03:45	3.03	12:05	6.25	5.21	03:45	1.64	09:35	2.94	2.49	03:45	0.240	07:50	1.176	0.846	0.846	-
04/16/2021	04:05	3.08	10:30	6.28	5.11	03:00	1.68	07:45	2.95	2.48	04:05	0.254	10:30	1.206	0.813	0.813	-
04/17/2021	04:45	3.00	10:20	6.79	5.07	03:30	1.62	10:20	3.05	2.45	04:50	0.242	10:20	1.420	0.805	0.805	-
04/18/2021	04:00	3.24	10:35	6.82	5.20	04:00	1.69	10:30	3.05	2.50	04:00	0.273	10:30	1.420	0.853	0.853	0.02
04/19/2021	03:20	3.07	19:40	6.28	5.21	03:40	1.59	18:20	3.00	2.51	03:40	0.245	19:40	1.247	0.852	0.852	-
04/20/2021	03:45	2.97	08:40	6.37	5.15	03:50	1.62	09:10	2.97	2.47	03:50	0.232	08:40	1.226	0.825	0.822	-

03/04/2021 00:00 - 04/20/2021 23:55

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			40.199	1.11
Average	5.18	2.49	0.838	

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Coeur d'Alene	ADS ENVIRONMENTAL SERVICES®	Site Name
Flow Monitoring Site Report		CDL_RAM1-01

Site Address /Location:	1820 Legends Pkwy			Monitor Series	Location Type
				TRITON+	Temporary
Site Access Details:	Site located in middle of road	Latitude:	47.704435	Pipe Size (H x W)	Pipe Shape
		Longitude:	-116.810727	23.25x23.38	Circular

Manhole #	System Characteristics
RAM1-01	Residential
Access	Traffic
Drive	Heavy

ADS Project Name:	CoA.JUB.TFM.ID21 PSS
ADS Project Number:	22641.11.325

Installation Information

Installation Date:	Installation Type:
Wednesday, March 03, 2021	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
8:44:00 AM	
Depth of Flow (Wet DOF) (in)	
6.13	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
3.08	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Single
Manhole Material:	Manhole Condition:
PVC	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Vitrified Clay Pipe	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

City traffic required/contact Darrell Castleberry for Access 2086512716

CDL_RAM1-38C

Site Commentary

SITE INFORMATION

Pipe	Elliptical (7.88 in H x 8 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	1.86	0.98	0.043
Minimum	1.10	0.29	0.007
Maximum	3.89	2.15	0.233
Min Time	04/05/2021 05:35:00	03/13/2021 03:20:00	04/19/2021 02:00:00
Max Time	03/29/2021 14:05:00	03/29/2021 14:00:00	03/29/2021 14:05:00

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the none average.

DATA UPTIME

Data uptime observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021** is provided in the following table:

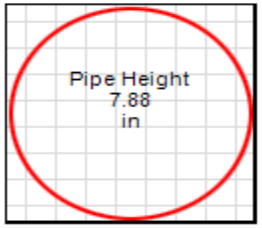
Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

Hydrograph Report

CDL_RAM1-38C

Flow Monitor

CDL_RAM1-38C



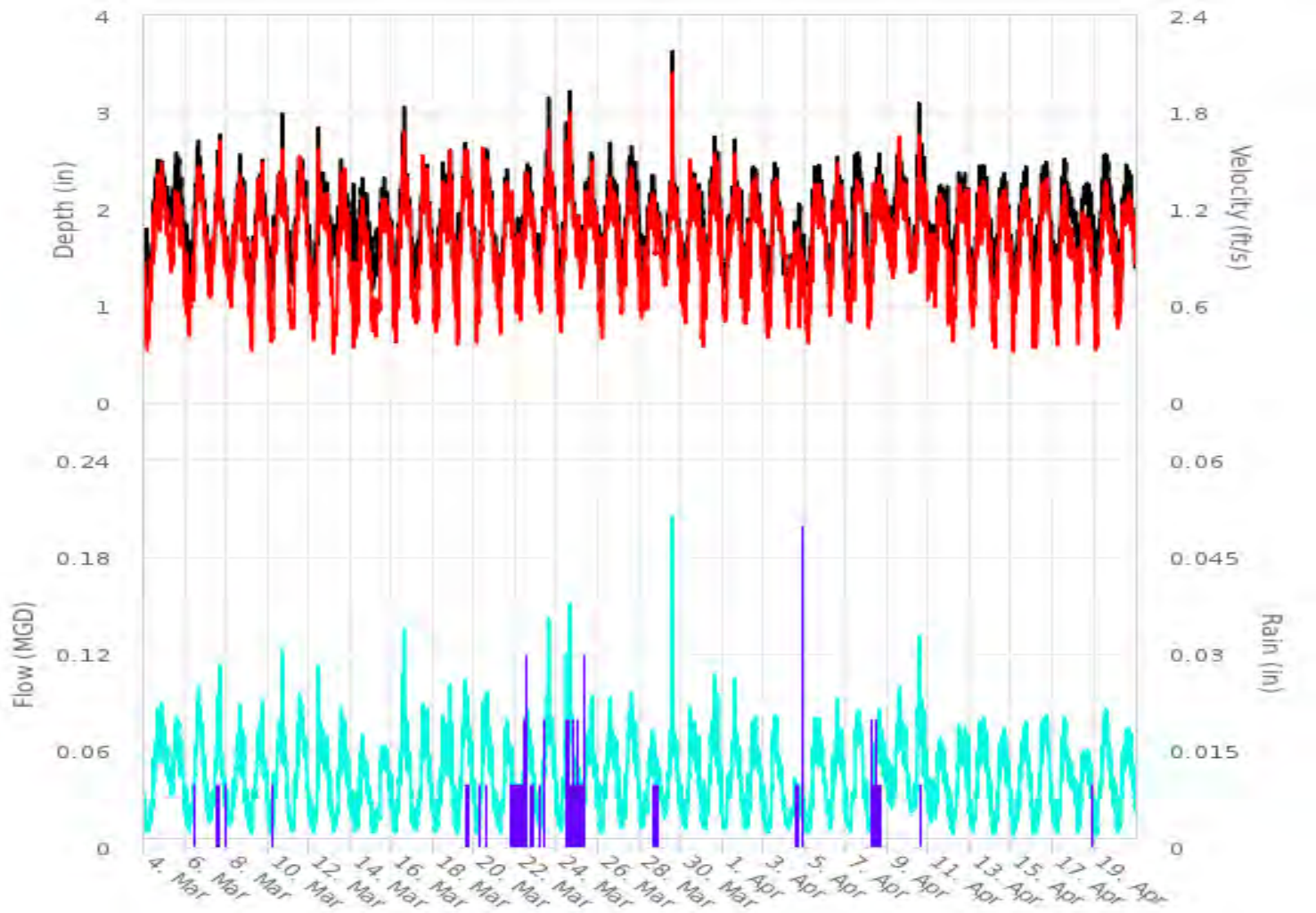
Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



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Scattergraph Report

CDL_RAM1-38C

Flow Monitor

CDL_RAM1-38C

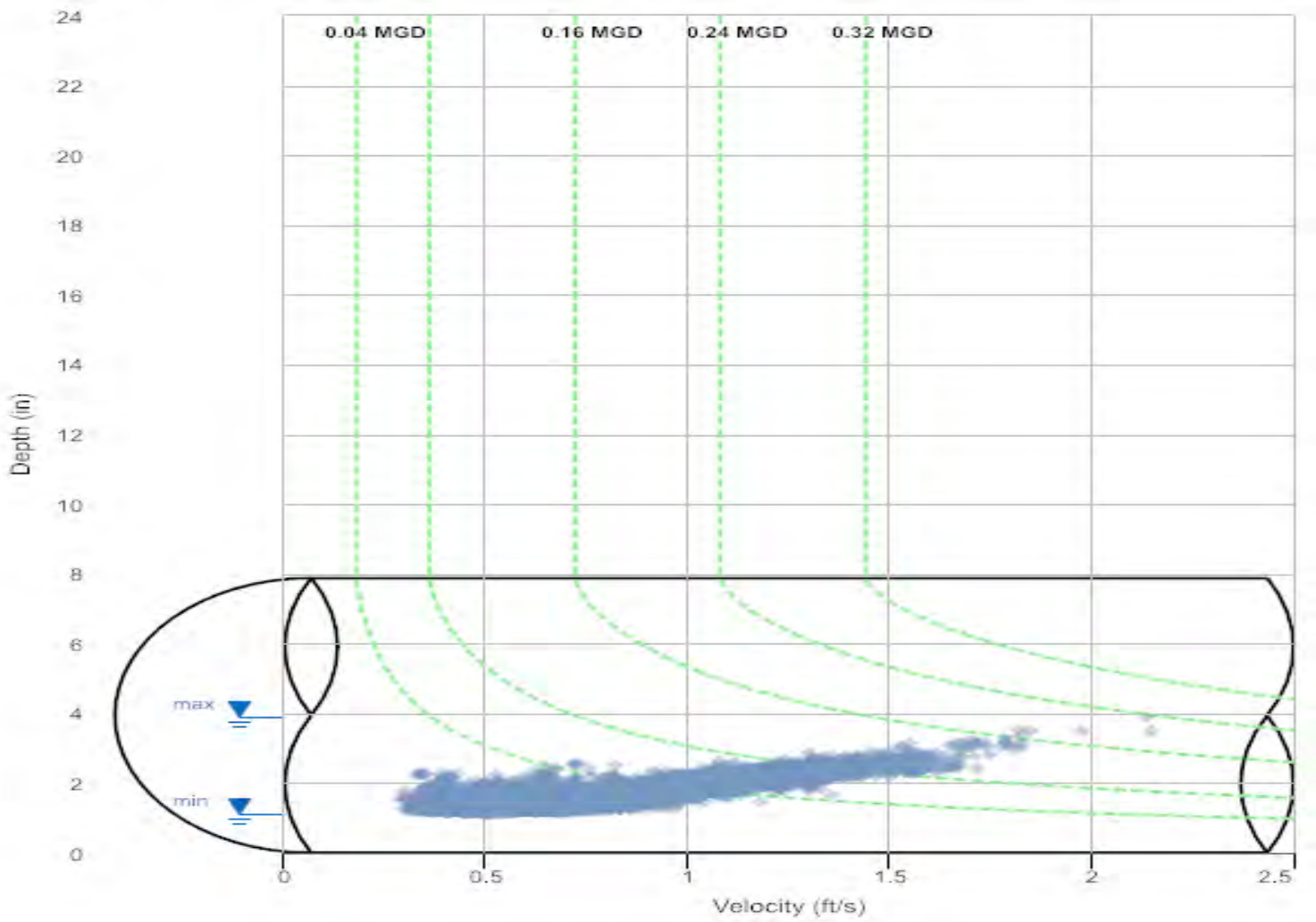
Pipe Height
7.88
in

Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



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Daily Tabular Report

03/04/2021 00:00 - 04/20/2021 23:55
CDL_RAM1-38CPipe: Elliptical (7.88 in H x 8 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/04/2021	02:20	1.17	15:15	2.59	1.92	03:35	0.32	19:30	1.52	0.98	02:15	0.009	15:15	0.094	0.045	0.045	-
03/05/2021	23:50	1.61	13:15	2.64	2.09	23:55	0.59	15:45	1.40	1.04	23:55	0.019	13:15	0.089	0.050	0.050	-
03/06/2021	04:15	1.22	15:10	2.76	1.93	04:30	0.35	15:10	1.53	0.98	04:20	0.010	15:10	0.106	0.045	0.045	0.01
03/07/2021	03:35	1.21	16:15	2.80	1.81	05:45	0.62	16:15	1.71	1.01	03:35	0.014	16:15	0.121	0.041	0.041	0.04
03/08/2021	02:20	1.22	14:45	2.61	1.78	04:40	0.40	14:45	1.42	0.99	02:15	0.014	14:45	0.091	0.040	0.040	-
03/09/2021	03:05	1.16	17:30	2.66	1.81	04:55	0.31	17:25	1.61	0.98	04:55	0.007	17:30	0.105	0.041	0.041	-
03/10/2021	03:40	1.15	16:00	3.15	1.86	04:05	0.36	16:05	1.70	0.98	03:35	0.008	16:00	0.137	0.043	0.043	0.01
03/11/2021	04:00	1.21	12:15	2.66	1.90	04:50	0.44	12:10	1.56	1.00	03:30	0.010	12:10	0.102	0.045	0.045	-
03/12/2021	03:50	1.20	10:30	2.93	1.84	04:35	0.38	10:40	1.75	0.97	04:35	0.008	10:40	0.126	0.042	0.042	-
03/13/2021	09:05	1.38	12:55	2.58	1.89	03:20	0.29	16:25	1.58	0.88	03:20	0.009	12:55	0.092	0.038	0.038	-
03/14/2021	04:30	1.21	13:00	2.39	1.84	03:00	0.33	14:05	1.34	0.84	04:30	0.009	13:00	0.075	0.035	0.035	-
03/15/2021	01:20	1.16	14:35	2.35	1.76	04:35	0.39	16:35	1.32	0.86	01:10	0.009	12:50	0.071	0.035	0.035	-
03/16/2021	03:05	1.15	13:45	3.50	1.86	04:45	0.34	13:45	1.98	0.98	04:45	0.008	13:45	0.188	0.043	0.043	-
03/17/2021	02:25	1.17	11:45	2.59	1.80	05:25	0.45	11:45	1.59	0.97	03:55	0.010	11:45	0.101	0.040	0.040	-
03/18/2021	01:55	1.17	19:30	2.76	1.83	02:05	0.40	19:30	1.64	0.99	02:05	0.008	19:30	0.114	0.042	0.042	-
03/19/2021	02:10	1.19	12:40	2.75	1.93	03:45	0.35	12:40	1.67	1.07	03:30	0.008	12:40	0.115	0.049	0.049	0.02
03/20/2021	03:20	1.11	13:20	2.75	1.85	02:35	0.36	09:10	1.72	1.03	02:30	0.008	13:20	0.104	0.045	0.045	0.03
03/21/2021	05:30	1.18	13:00	2.50	1.72	05:35	0.40	12:00	1.41	0.96	05:35	0.008	13:00	0.084	0.037	0.037	0.11
03/22/2021	00:50	1.22	13:35	2.52	1.86	04:40	0.49	13:25	1.49	1.01	04:30	0.011	13:35	0.088	0.043	0.043	0.29
03/23/2021	04:20	1.18	13:55	3.56	1.95	04:25	0.51	13:40	1.83	1.07	04:05	0.011	13:55	0.178	0.050	0.050	0.04
03/24/2021	02:45	1.22	15:05	3.28	1.98	05:20	0.38	14:25	1.83	1.07	05:20	0.009	15:05	0.156	0.052	0.052	0.46
03/25/2021	03:30	1.20	15:00	2.70	1.87	03:35	0.67	17:00	1.55	1.07	03:30	0.015	17:00	0.101	0.045	0.045	0.24
03/26/2021	02:00	1.16	13:50	2.85	1.90	03:45	0.38	13:50	1.48	1.02	03:50	0.008	13:50	0.107	0.046	0.046	-
03/27/2021	00:45	1.20	13:50	2.77	1.98	02:25	0.54	14:00	1.52	1.02	02:25	0.012	13:50	0.103	0.048	0.048	-
03/28/2021	02:55	1.17	14:20	2.50	1.79	02:25	0.49	14:20	1.34	0.98	02:55	0.010	14:20	0.081	0.039	0.039	0.04
03/29/2021	04:25	1.29	14:05	3.89	1.88	04:30	0.59	14:00	2.15	1.06	04:25	0.017	14:05	0.233	0.046	0.046	-
03/30/2021	02:15	1.23	10:20	2.46	1.84	23:50	0.38	10:15	1.59	0.99	04:35	0.011	10:15	0.091	0.042	0.042	-
03/31/2021	04:20	1.21	14:45	2.99	1.90	01:50	0.34	14:45	1.68	0.99	01:15	0.011	14:45	0.130	0.043	0.043	-
04/01/2021	02:30	1.15	14:30	2.76	1.85	03:35	0.46	14:35	1.55	0.97	02:25	0.010	14:30	0.106	0.042	0.042	-
04/02/2021	04:45	1.19	11:55	2.54	1.81	01:35	0.43	11:55	1.53	1.00	01:35	0.010	11:55	0.095	0.041	0.041	-
04/03/2021	04:30	1.19	12:15	2.53	1.75	07:45	0.35	10:55	1.43	0.96	04:30	0.008	14:40	0.086	0.039	0.039	-
04/04/2021	02:20	1.13	18:25	2.09	1.49	17:25	0.43	15:50	1.23	0.78	05:10	0.010	11:40	0.052	0.023	0.023	0.14
04/05/2021	05:35	1.10	11:00	2.51	1.85	03:50	0.36	15:45	1.53	0.99	02:00	0.009	15:45	0.090	0.043	0.043	-
04/06/2021	04:30	1.19	13:45	2.56	1.83	04:40	0.52	13:45	1.50	1.02	04:30	0.011	13:45	0.094	0.043	0.043	-
04/07/2021	04:40	1.14	13:25	2.74	1.90	03:50	0.44	11:40	1.46	0.95	04:30	0.009	11:40	0.091	0.043	0.043	-
04/08/2021	04:15	1.17	14:10	2.65	1.88	02:20	0.42	14:20	1.50	1.04	02:20	0.009	14:20	0.095	0.046	0.046	0.14
04/09/2021	04:35	1.50	11:00	2.63	2.06	06:10	0.71	14:20	1.68	1.13	04:10	0.023	14:20	0.104	0.054	0.054	-
04/10/2021	03:50	1.40	12:15	3.14	1.93	22:25	0.60	12:10	1.72	1.10	22:25	0.019	12:10	0.141	0.050	0.050	0.01
04/11/2021	02:15	1.22	21:15	2.52	1.82	22:00	0.48	12:05	1.35	0.99	02:05	0.015	12:05	0.072	0.040	0.040	-
04/12/2021	01:50	1.16	21:40	2.67	1.83	04:30	0.36	21:40	1.51	0.96	03:15	0.008	21:40	0.100	0.041	0.041	-
04/13/2021	02:05	1.14	10:25	2.58	1.87	02:45	0.45	14:35	1.44	0.99	02:05	0.010	10:25	0.087	0.043	0.043	-
04/14/2021	02:35	1.17	15:30	2.47	1.77	04:20	0.32	16:35	1.44	0.94	02:35	0.008	16:35	0.080	0.038	0.038	-
04/15/2021	04:25	1.20	16:30	2.46	1.81	02:20	0.30	16:40	1.37	0.95	02:20	0.007	16:40	0.080	0.040	0.040	-
04/16/2021	00:45	1.19	15:55	2.83	1.85	00:50	0.31	10:20	1.45	0.98	00:45	0.007	15:55	0.102	0.043	0.043	-
04/17/2021	01:50	1.21	13:25	2.60	1.87	05:20	0.30	13:25	1.45	0.91	04:40	0.008	13:25	0.092	0.040	0.040	-
04/18/2021	04:10	1.20	15:55	2.30	1.86	05:40	0.34	09:25	1.26	0.89	05:35	0.008	11:35	0.063	0.038	0.038	0.01
04/19/2021	01:30	1.19	13:35	2.70	1.97	01:55	0.31	13:35	1.45	0.94	01:30	0.007	13:35	0.098	0.044	0.044	-
04/20/2021	02:40	1.14	15:55	2.69	1.82	03:45	0.43	11:30	1.38	0.98	02:40	0.009	15:55	0.088	0.041	0.041	-

03/04/2021 00:00 - 04/20/2021 23:55

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			2.045	1.59
Average	1.86	0.98	0.043	

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Coeur d'Alene		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	CDL_RAM1-38C

Site Address /Location:	3959 N Government Way			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	park on road	Latitude:	47.7263698	Pipe Size (H x W): 7.88x8.00	Pipe Shape: Circular
		Longitude:	-116.7910124		

Manhole #	System Characteristics
RAM1-38C	Residential
Access	Traffic
Drive	Light

ADS Project Name:	CoA_JUB.TFM.ID21 PSS
ADS Project Number:	22641.11.325

Installation Information

Installation Date:	Installation Type:
Tuesday, March 02, 2021	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
2:46:00 PM	
Depth of Flow (Wet DOF) (in)	
2.38	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.48	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Single
Manhole Material:	Manhole Condition:
PVC	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Vitrified Clay Pipe	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

city traffic control not needed

CDL_RAM1-43

Site Commentary

SITE INFORMATION

Pipe	Elliptical (8 in H x 8 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021**, along with observed minimum and maximum data, are provided in the following table.

This site experienced a few flow changes during the monitoring period.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	3.23	1.49	0.136
Minimum	1.68	0.59	0.025
Maximum	5.05	3.82	0.335
Min Time	04/04/2021 04:20:00	04/16/2021 03:25:00	04/12/2021 03:10:00
Max Time	04/15/2021 07:50:00	03/25/2021 14:30:00	04/19/2021 11:30:00

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the none average.

DATA UPTIME

Data uptime observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021** is provided in the following table:

Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

Hydrograph Report

CDL_RAM1-43

Flow Monitor

CDL_RAM1-43

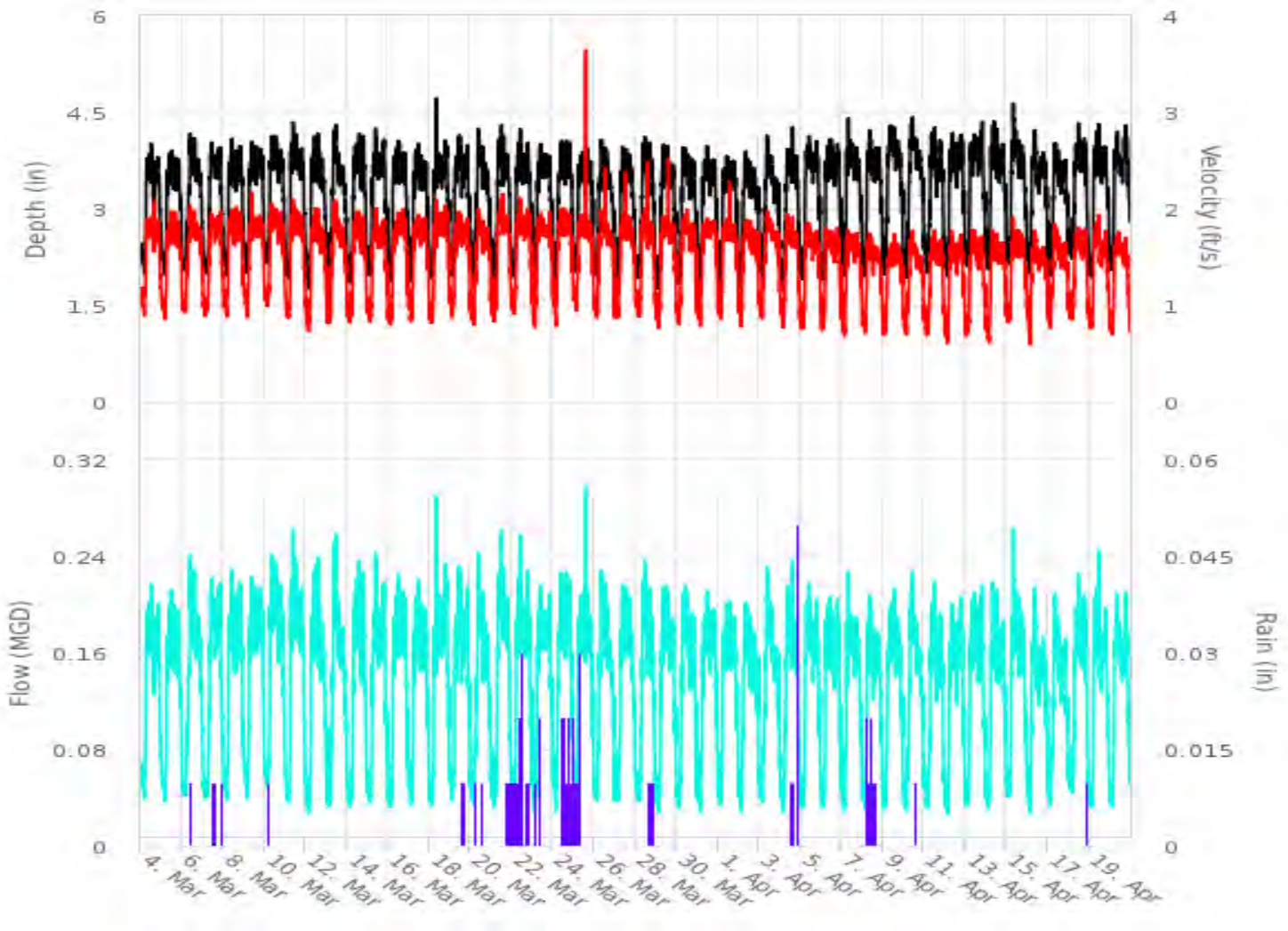
Pipe Height
8.00
in

Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL



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Scattergraph Report

CDL_RAM1-43

Flow Monitor

CDL_RAM1-43

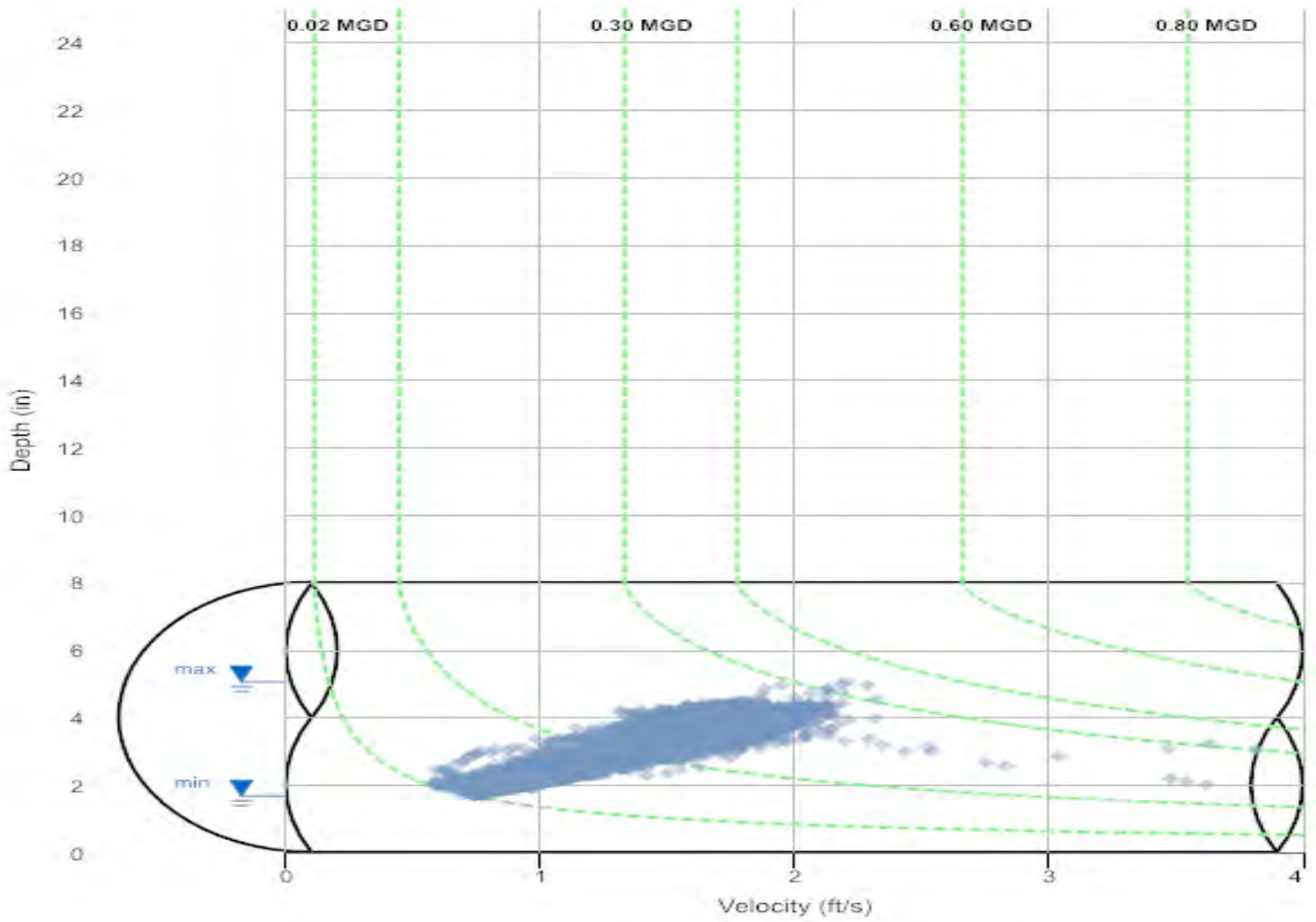
Pipe Height
8.00
in

Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



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Daily Tabular Report

03/04/2021 00:00 - 04/20/2021 23:55
CDL_RAM1-43Pipe: Elliptical (8 in H x 8 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/04/2021	04:05	1.97	12:00	4.23	3.16	04:05	0.88	16:15	2.76	1.55	04:05	0.038	12:00	0.243	0.136	0.136	-
03/05/2021	04:25	1.97	11:10	3.99	3.16	04:10	0.85	16:20	2.10	1.54	04:20	0.037	11:10	0.226	0.134	0.134	-
03/06/2021	03:40	2.01	10:40	4.26	3.19	04:45	0.91	14:40	2.17	1.56	03:40	0.041	09:45	0.250	0.140	0.140	0.01
03/07/2021	03:05	1.98	19:30	4.14	3.14	03:00	0.88	21:00	2.06	1.53	03:00	0.039	21:00	0.237	0.135	0.135	0.04
03/08/2021	04:25	1.96	10:05	4.34	3.22	04:25	0.85	15:55	2.14	1.58	04:25	0.037	10:05	0.238	0.142	0.142	-
03/09/2021	03:55	1.98	09:35	4.15	3.25	03:45	0.86	09:45	2.32	1.60	03:45	0.038	09:45	0.260	0.145	0.145	-
03/10/2021	03:55	2.13	13:05	4.60	3.33	03:55	0.95	09:20	2.15	1.61	03:55	0.046	13:05	0.269	0.151	0.151	0.01
03/11/2021	04:30	1.85	09:45	4.46	3.28	04:30	0.82	09:15	2.14	1.57	04:30	0.033	09:15	0.272	0.148	0.148	-
03/12/2021	03:45	1.74	14:20	4.34	3.15	03:15	0.69	15:50	2.15	1.49	03:15	0.025	14:20	0.254	0.133	0.133	-
03/13/2021	04:35	1.82	11:05	4.37	3.17	01:55	0.78	11:00	2.17	1.52	01:55	0.032	11:00	0.271	0.136	0.136	-
03/14/2021	03:55	1.82	14:40	4.74	3.10	03:55	0.80	14:35	2.16	1.47	03:55	0.031	14:40	0.288	0.129	0.129	-
03/15/2021	04:05	1.91	09:20	4.40	3.25	03:25	0.81	18:25	2.13	1.50	03:25	0.035	09:20	0.258	0.138	0.138	-
03/16/2021	02:30	1.85	12:35	4.17	3.21	02:25	0.78	11:20	2.07	1.54	02:25	0.031	11:20	0.241	0.139	0.139	-
03/17/2021	02:20	1.85	11:30	4.11	3.19	02:55	0.81	11:30	2.03	1.56	02:15	0.033	11:30	0.237	0.138	0.138	-
03/18/2021	03:10	1.89	08:30	5.01	3.24	03:10	0.76	08:25	2.19	1.58	03:10	0.031	08:30	0.326	0.145	0.145	-
03/19/2021	02:30	1.92	11:55	4.31	3.25	02:30	0.85	11:55	2.04	1.56	02:30	0.036	11:55	0.253	0.141	0.141	0.02
03/20/2021	04:25	1.91	08:55	4.40	3.16	04:15	0.78	08:50	2.03	1.51	04:15	0.032	08:55	0.254	0.133	0.133	0.03
03/21/2021	03:20	1.77	14:55	4.88	3.15	03:30	0.81	13:45	2.35	1.55	03:20	0.030	14:55	0.308	0.139	0.139	0.11
03/22/2021	03:05	1.93	09:45	4.44	3.26	03:10	0.90	09:45	2.19	1.62	03:05	0.038	09:45	0.281	0.149	0.149	0.29
03/23/2021	03:15	1.68	16:30	4.22	3.19	03:10	0.74	13:05	2.05	1.58	03:10	0.026	10:10	0.236	0.141	0.141	0.04
03/24/2021	03:30	1.71	10:15	4.18	3.24	03:30	0.76	09:00	2.08	1.61	03:30	0.027	09:00	0.242	0.146	0.146	0.46
03/25/2021	03:00	2.00	14:25	4.52	3.22	03:35	0.91	14:30	3.82	1.62	03:35	0.040	14:40	0.310	0.144	0.144	0.24
03/26/2021	03:35	1.95	08:25	4.16	3.15	01:35	0.86	13:25	3.54	1.55	01:35	0.037	09:10	0.239	0.136	0.136	-
03/27/2021	03:30	1.83	12:55	4.13	3.12	03:30	0.80	13:00	2.84	1.55	03:30	0.031	12:55	0.226	0.135	0.135	-
03/28/2021	05:10	1.86	14:00	4.37	3.08	03:05	0.87	14:05	3.48	1.52	05:10	0.035	14:00	0.260	0.132	0.132	0.04
03/29/2021	03:35	1.74	14:35	4.19	3.12	03:35	0.75	14:40	3.62	1.54	03:35	0.027	14:35	0.249	0.134	0.134	-
03/30/2021	03:05	1.79	10:15	4.09	3.12	03:05	0.78	11:50	2.22	1.53	03:05	0.029	11:50	0.244	0.133	0.133	-
03/31/2021	03:20	1.70	12:15	4.29	3.14	03:20	0.75	12:15	2.01	1.56	03:20	0.026	12:15	0.247	0.137	0.137	-
04/01/2021	03:05	1.83	13:20	4.00	3.10	03:05	0.83	13:25	3.04	1.56	03:05	0.032	13:20	0.225	0.133	0.133	-
04/02/2021	03:20	1.74	08:50	4.02	3.11	03:10	0.76	13:10	1.95	1.55	03:15	0.028	08:50	0.210	0.133	0.133	-
04/03/2021	03:45	1.87	09:05	4.30	3.14	03:45	0.81	10:55	2.05	1.54	03:45	0.032	09:05	0.252	0.134	0.134	-
04/04/2021	04:20	1.68	15:10	4.63	3.05	03:30	0.73	15:10	2.13	1.44	03:30	0.026	15:10	0.289	0.123	0.123	0.14
04/05/2021	03:05	1.88	10:00	4.16	3.28	01:40	0.71	10:10	1.92	1.46	01:40	0.029	10:10	0.223	0.136	0.136	-
04/06/2021	01:20	1.84	12:10	4.22	3.26	01:20	0.71	19:20	1.85	1.44	01:20	0.028	08:35	0.217	0.133	0.133	-
04/07/2021	03:25	1.95	08:05	4.45	3.34	03:15	0.68	12:35	1.83	1.40	03:15	0.029	08:00	0.231	0.133	0.133	-
04/08/2021	03:15	1.90	09:30	4.47	3.34	03:10	0.69	09:30	1.78	1.36	03:15	0.028	09:30	0.231	0.129	0.129	0.14
04/09/2021	01:30	1.90	13:30	4.38	3.45	00:25	0.65	13:40	1.85	1.33	01:30	0.027	13:40	0.226	0.131	0.131	-
04/10/2021	03:50	1.92	11:00	4.50	3.39	03:50	0.68	10:55	1.83	1.32	03:50	0.028	10:55	0.237	0.128	0.128	0.01
04/11/2021	04:10	1.97	12:50	4.53	3.25	02:50	0.67	12:55	1.87	1.30	03:10	0.029	12:50	0.246	0.121	0.121	-
04/12/2021	03:15	1.92	19:25	4.42	3.37	03:10	0.59	07:55	1.87	1.34	03:10	0.025	19:25	0.231	0.130	0.130	-
04/13/2021	02:15	2.07	18:40	4.50	3.43	01:25	0.65	18:40	1.83	1.35	01:25	0.031	18:40	0.239	0.134	0.134	-
04/14/2021	03:15	2.03	09:30	4.42	3.42	03:55	0.60	08:25	1.81	1.35	03:10	0.029	08:10	0.230	0.133	0.133	-
04/15/2021	02:50	2.09	07:50	5.05	3.43	03:10	0.78	07:50	2.21	1.43	03:10	0.037	07:50	0.331	0.140	0.140	-
04/16/2021	02:15	1.99	08:50	4.42	3.31	03:15	0.59	08:50	1.84	1.37	03:15	0.026	08:50	0.235	0.127	0.127	-
04/17/2021	03:10	1.92	07:55	4.14	3.21	03:35	0.74	08:40	1.89	1.40	03:10	0.031	09:10	0.216	0.125	0.125	-
04/18/2021	04:30	2.20	11:35	4.47	3.28	04:00	0.84	11:35	1.88	1.39	04:00	0.043	11:35	0.243	0.129	0.129	0.01
04/19/2021	02:35	1.88	11:30	4.94	3.29	02:20	0.73	11:30	2.29	1.41	02:20	0.031	11:30	0.335	0.132	0.132	-
04/20/2021	03:35	2.02	18:50	4.41	3.41	23:55	0.67	09:15	1.77	1.34	03:35	0.031	18:50	0.221	0.131	0.130	-

03/04/2021 00:00 - 04/20/2021 23:55

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			6.506	1.59
Average	3.23	1.49	0.136	

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Coeur d'Alene		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	CDL_RAM1-43

Site Address /Location:	435 W Hanley Ave			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	park on grass off hwy 95 or in lot and walk	Latitude:	47.730621	Pipe Size (H x W): 8.00x8.00	Pipe Shape: Circular
		Longitude:	-116.793001		

Manhole #	System Characteristics
RAM1-43	Residential
Access	Traffic
Drive	Medium

ADS Project Name:	CoA.JUB.TFM.ID21 PSS
ADS Project Number:	22641.11.325

Installation Information

Installation Date:	Installation Type:
Wednesday, March 03, 2021	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
9:53:00 AM	
Depth of Flow (Wet DOF) (in)	
3.75	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
1.87	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Vitrified Clay Pipe	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

assess ground condition before driving on

CDL_RIV-04

Site Commentary

SITE INFORMATION

Pipe	Elliptical (23.5 in H x 23.5 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	10.17	1.97	1.657
Minimum	5.92	1.17	0.489
Maximum	14.19	2.49	2.897
Min Time	04/11/2021 05:00:00	03/07/2021 05:20:00	04/15/2021 04:35:00
Max Time	03/13/2021 12:15:00	03/12/2021 10:55:00	03/13/2021 12:15:00

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the none average.

DATA UPTIME

Data uptime observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021** is provided in the following table:

Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

Hydrograph Report

CDL_RIV-04

Flow Monitor

CDL_RIV-04

Pipe Height
23.50
in

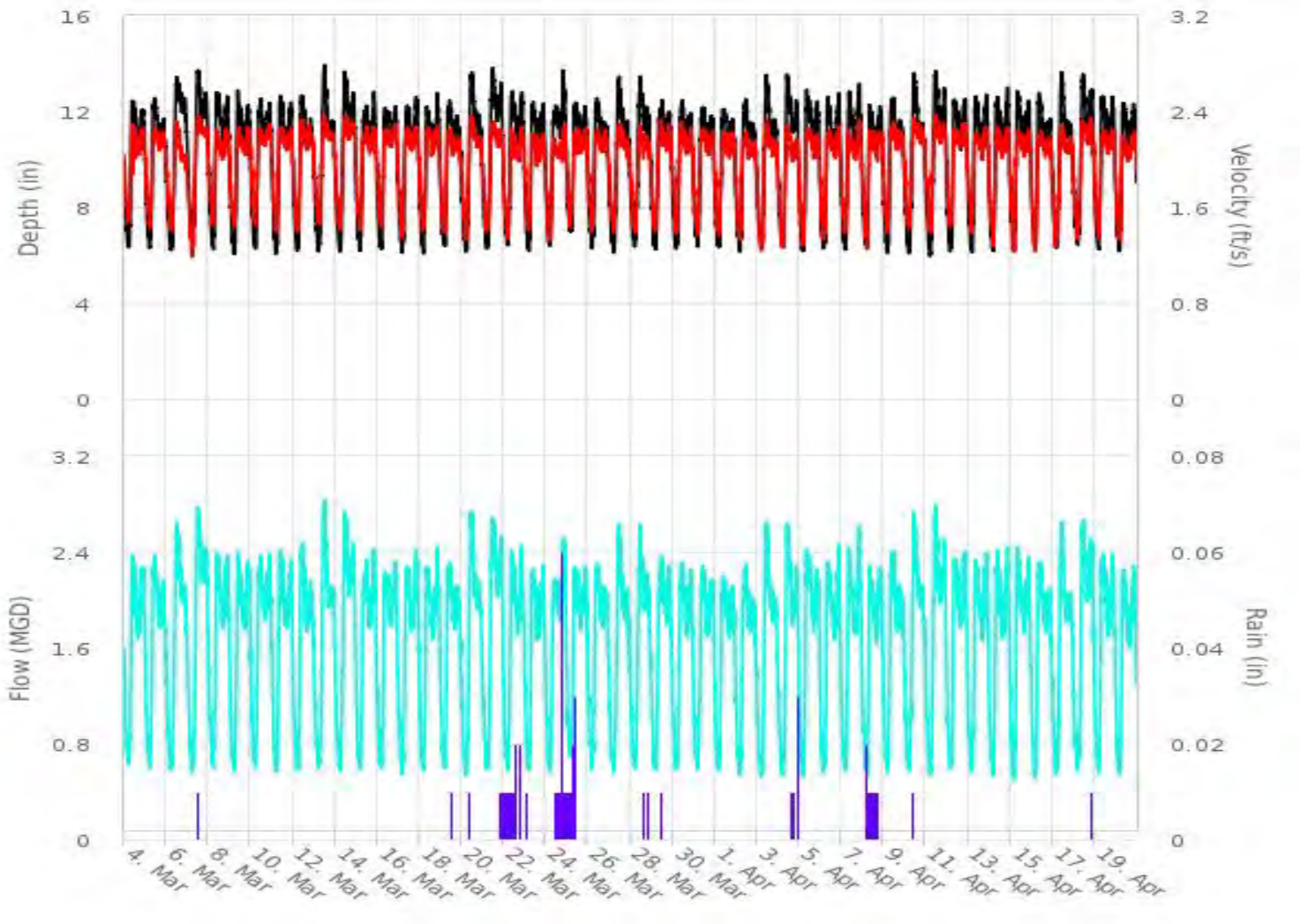
Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



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Scattergraph Report

CDL_RIV-04

Flow Monitor

CDL_RIV-04

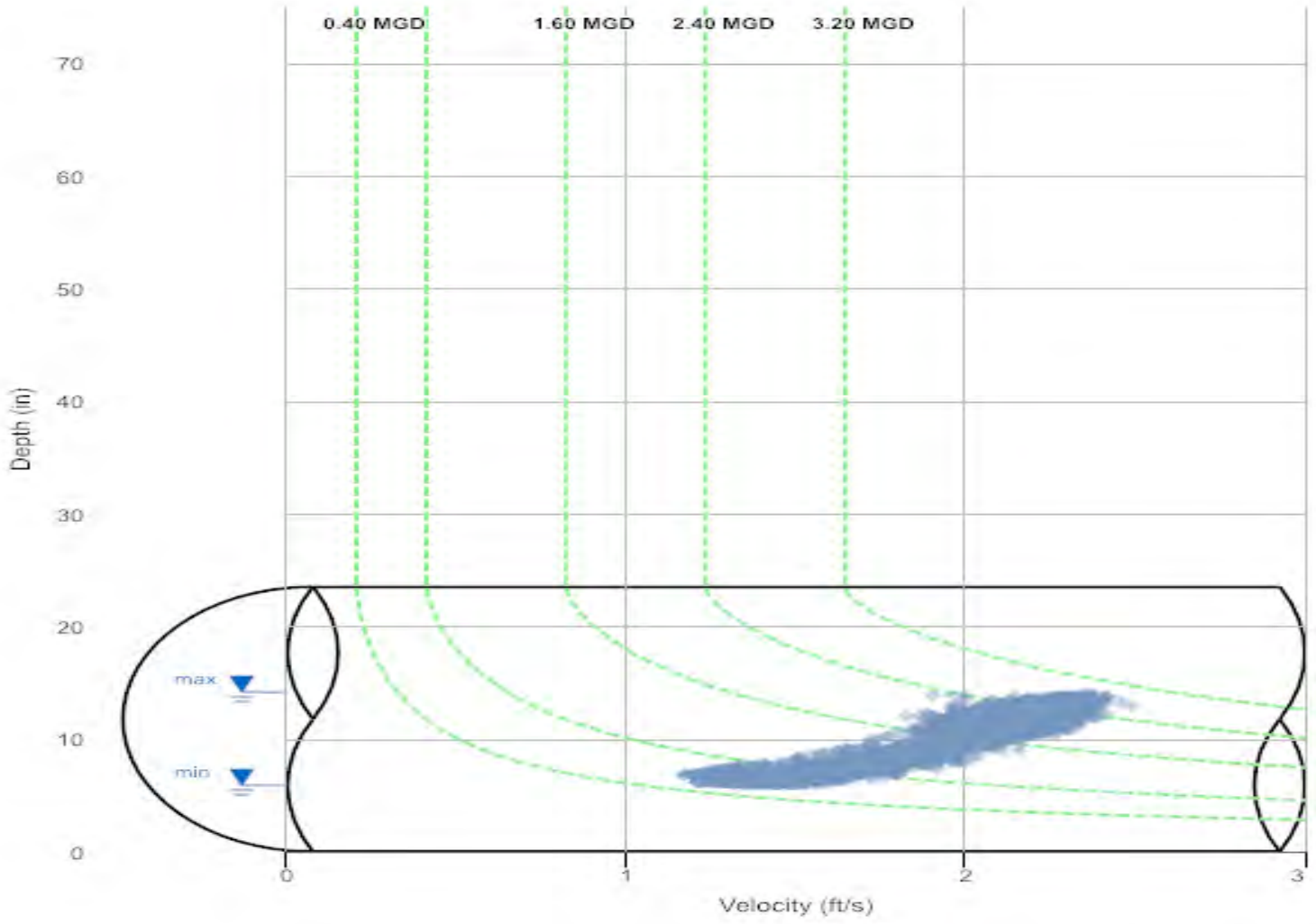
Pipe Height
23.50
in

Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



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Daily Tabular Report

03/04/2021 00:00 - 04/20/2021 23:55
CDL_RIV-04Pipe: Elliptical (23.5 in H x 23.5 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/04/2021	05:05	6.22	11:00	12.81	10.10	05:00	1.46	09:20	2.33	1.99	05:05	0.601	11:40	2.437	1.647	1.647	-
03/05/2021	04:45	6.28	10:10	12.66	10.00	05:20	1.41	13:00	2.28	1.99	04:50	0.593	11:20	2.411	1.628	1.628	-
03/06/2021	06:10	6.17	11:55	13.79	10.41	05:25	1.35	12:00	2.38	1.92	05:25	0.557	12:00	2.798	1.669	1.669	-
03/07/2021	05:35	6.77	12:15	13.87	10.65	05:20	1.17	11:50	2.41	1.95	05:20	0.546	11:50	2.836	1.762	1.762	0.02
03/08/2021	05:45	6.18	10:30	12.98	10.34	05:55	1.37	19:35	2.31	1.98	05:55	0.576	21:20	2.458	1.690	1.690	-
03/09/2021	05:25	6.01	09:20	13.01	10.12	05:05	1.38	11:30	2.32	1.98	05:05	0.550	09:20	2.438	1.652	1.652	-
03/10/2021	05:20	6.24	12:15	12.62	10.14	05:05	1.39	21:40	2.40	2.02	05:20	0.591	21:40	2.509	1.686	1.686	-
03/11/2021	04:40	6.00	09:30	12.81	10.10	05:20	1.28	12:00	2.31	2.01	05:20	0.516	10:05	2.456	1.668	1.668	-
03/12/2021	04:55	6.13	10:55	12.91	9.97	04:50	1.35	10:55	2.49	2.00	04:50	0.553	10:55	2.725	1.639	1.639	-
03/13/2021	05:25	6.12	12:15	14.19	10.21	05:35	1.33	11:50	2.42	2.02	05:35	0.544	12:15	2.897	1.712	1.712	-
03/14/2021	05:35	6.11	11:00	13.78	10.38	05:05	1.35	13:10	2.46	2.01	05:30	0.562	13:10	2.811	1.753	1.753	-
03/15/2021	04:20	6.16	20:15	12.86	10.16	04:00	1.39	19:40	2.37	2.00	04:15	0.570	20:15	2.476	1.676	1.676	-
03/16/2021	04:40	6.16	21:10	12.38	10.03	04:30	1.38	20:00	2.39	2.02	04:35	0.582	21:10	2.425	1.657	1.657	-
03/17/2021	04:15	6.04	21:00	12.81	10.07	04:00	1.29	10:35	2.34	1.99	04:00	0.527	20:15	2.505	1.647	1.647	-
03/18/2021	04:30	6.01	20:25	12.87	10.08	04:35	1.33	13:30	2.34	2.00	04:35	0.532	20:20	2.468	1.658	1.658	-
03/19/2021	04:30	6.27	10:15	12.49	10.06	05:10	1.33	08:15	2.32	1.96	05:10	0.572	10:30	2.393	1.621	1.621	0.01
03/20/2021	04:30	6.03	11:30	13.90	10.16	04:20	1.30	10:30	2.41	1.97	04:25	0.524	11:30	2.798	1.669	1.669	0.01
03/21/2021	04:45	6.19	11:35	13.89	10.46	04:15	1.35	12:40	2.39	1.98	04:15	0.564	12:40	2.782	1.740	1.740	0.03
03/22/2021	03:55	6.35	20:40	13.09	10.35	04:00	1.31	20:35	2.33	1.95	03:50	0.565	20:35	2.518	1.671	1.671	0.14
03/23/2021	04:40	6.12	21:05	12.54	10.14	03:45	1.30	09:20	2.31	1.96	03:45	0.544	21:05	2.417	1.632	1.632	0.01
03/24/2021	04:25	6.31	19:15	13.94	10.39	04:05	1.29	20:20	2.30	1.93	04:05	0.553	20:20	2.593	1.664	1.664	0.34
03/25/2021	04:25	6.87	09:35	12.59	10.33	03:20	1.40	21:35	2.35	1.99	03:20	0.663	12:10	2.368	1.684	1.684	0.24
03/26/2021	03:55	6.23	10:05	12.70	10.05	03:40	1.36	11:05	2.33	1.98	03:40	0.578	11:05	2.367	1.630	1.630	-
03/27/2021	04:40	6.03	10:55	13.67	10.04	05:55	1.34	11:20	2.35	1.96	04:35	0.548	10:25	2.714	1.621	1.621	-
03/28/2021	05:30	6.22	11:30	13.54	10.14	05:30	1.34	11:40	2.35	1.94	05:30	0.553	11:35	2.676	1.628	1.628	0.04
03/29/2021	04:45	6.11	12:10	12.62	10.06	03:45	1.37	10:45	2.34	1.99	04:45	0.570	12:05	2.403	1.644	1.644	0.01
03/30/2021	04:30	6.19	11:20	12.63	9.97	04:50	1.31	10:05	2.32	1.98	04:55	0.560	11:20	2.399	1.616	1.616	-
03/31/2021	04:15	6.28	10:15	12.31	9.96	04:05	1.34	21:25	2.33	1.97	04:10	0.563	10:15	2.345	1.606	1.606	-
04/01/2021	04:30	6.25	09:20	12.29	9.93	04:20	1.33	19:10	2.31	1.96	04:25	0.567	12:00	2.269	1.585	1.585	-
04/02/2021	04:45	6.08	11:45	12.65	9.92	04:55	1.30	11:40	2.28	1.93	04:55	0.531	11:45	2.430	1.567	1.567	-
04/03/2021	04:30	6.21	11:00	13.54	10.14	04:30	1.21	11:30	2.33	1.91	04:30	0.498	11:10	2.677	1.613	1.613	-
04/04/2021	05:35	6.21	10:00	13.70	10.33	05:15	1.24	10:00	2.37	1.90	05:35	0.516	10:00	2.795	1.644	1.644	0.11
04/05/2021	04:25	6.13	08:30	13.12	10.26	04:50	1.22	10:55	2.30	1.95	04:50	0.514	08:30	2.474	1.667	1.667	-
04/06/2021	03:40	6.24	21:05	13.05	10.12	04:05	1.30	20:25	2.34	1.96	03:30	0.553	21:05	2.549	1.632	1.632	-
04/07/2021	03:40	6.19	20:30	13.27	10.24	04:20	1.34	20:30	2.36	1.97	04:50	0.555	20:30	2.670	1.665	1.665	-
04/08/2021	04:45	6.16	07:55	12.50	10.04	05:05	1.24	11:40	2.29	1.96	05:05	0.516	19:45	2.357	1.619	1.619	0.11
04/09/2021	04:45	6.00	11:20	12.68	9.99	03:45	1.34	11:30	2.42	2.01	03:45	0.543	11:20	2.493	1.643	1.643	-
04/10/2021	04:45	5.99	10:50	13.84	10.09	04:35	1.36	10:50	2.37	2.01	04:35	0.555	10:50	2.828	1.682	1.682	0.02
04/11/2021	05:00	5.92	11:05	13.80	10.33	05:00	1.35	11:00	2.42	2.02	05:00	0.521	11:00	2.855	1.750	1.750	-
04/12/2021	03:35	6.11	21:15	12.87	10.16	03:25	1.39	18:45	2.35	2.01	03:25	0.576	21:10	2.543	1.684	1.684	-
04/13/2021	04:45	6.09	08:55	12.84	10.20	04:05	1.35	20:15	2.30	1.99	04:35	0.555	20:55	2.448	1.671	1.671	-
04/14/2021	04:45	6.14	21:00	13.22	10.18	04:40	1.23	20:55	2.38	1.96	04:40	0.506	20:55	2.605	1.648	1.648	-
04/15/2021	04:35	6.10	08:00	12.97	10.29	04:40	1.21	17:20	2.30	1.95	04:35	0.489	08:00	2.517	1.663	1.663	-
04/16/2021	04:20	6.22	08:35	12.87	10.12	04:20	1.22	10:50	2.28	1.93	04:20	0.505	10:50	2.425	1.617	1.617	-
04/17/2021	04:30	6.26	10:45	13.90	10.15	03:50	1.26	10:15	2.36	1.93	04:25	0.532	10:45	2.756	1.625	1.625	-
04/18/2021	05:10	6.41	10:45	13.72	10.37	04:45	1.29	20:10	2.41	1.99	05:05	0.562	11:25	2.744	1.728	1.728	0.02
04/19/2021	04:40	6.21	08:25	12.89	10.20	03:55	1.30	20:55	2.33	1.98	04:45	0.537	09:35	2.450	1.670	1.670	-
04/20/2021	04:20	6.13	09:55	12.58	10.08	04:30	1.30	08:40	2.26	1.95	04:15	0.532	08:40	2.386	1.611	1.605	-

03/04/2021 00:00 - 04/20/2021 23:55

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			79.552	1.11
Average	10.17	1.97	1.657	

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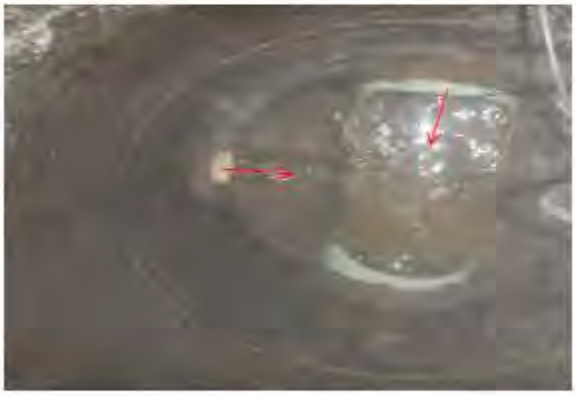
Coeur d'Alene		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	CDL_RIV-04

Site Address /Location:	WWTP gate 3			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Drive	Latitude:	47.682325	Pipe Size (H x W): 23.50x23.50	Pipe Shape: Circular
		Longitude:	-116.796026		

Manhole #	System Characteristics
RIV-04	Industrial
Access	Traffic
Drive	Light



ADS Project Name:	CoA.JUB.TPM.ID21 PSS
ADS Project Number:	22641.11.325

Installation Information

Installation Date:	Installation Type:
Wednesday, March 03, 2021	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
1:12:00 PM	
Depth of Flow (Wet DOF) (in)	
11.63	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
2.22	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Single
Manhole Material:	Manhole Condition:
PVC	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Vitrified Clay Pipe	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

contact Darrell Castleberry for Access 2086512716

CDL_RX1-12

Site Commentary

SITE INFORMATION

Pipe	Elliptical (8 in H x 8 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021**, along with observed minimum and maximum data, are provided in the following table.

This site experienced backwater conditions from March 13th to March 14th.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	2.83	2.75	0.201
Minimum	1.86	0.62	0.036
Maximum	6.32	3.99	0.473
Min Time	03/24/2021 02:20:00	04/09/2021 04:25:00	03/06/2021 04:05:00
Max Time	03/14/2021 11:35:00	04/10/2021 09:00:00	04/18/2021 10:10:00

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the none average.

DATA UPTIME

Data uptime observed during **Thursday, March 4, 2021 to Tuesday, April 20, 2021** is provided in the following table:

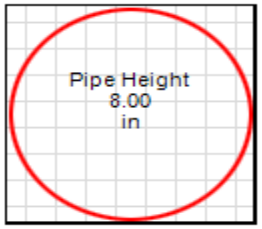
Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

Hydrograph Report

CDL_RX1-12

Flow Monitor

CDL_RX1-12



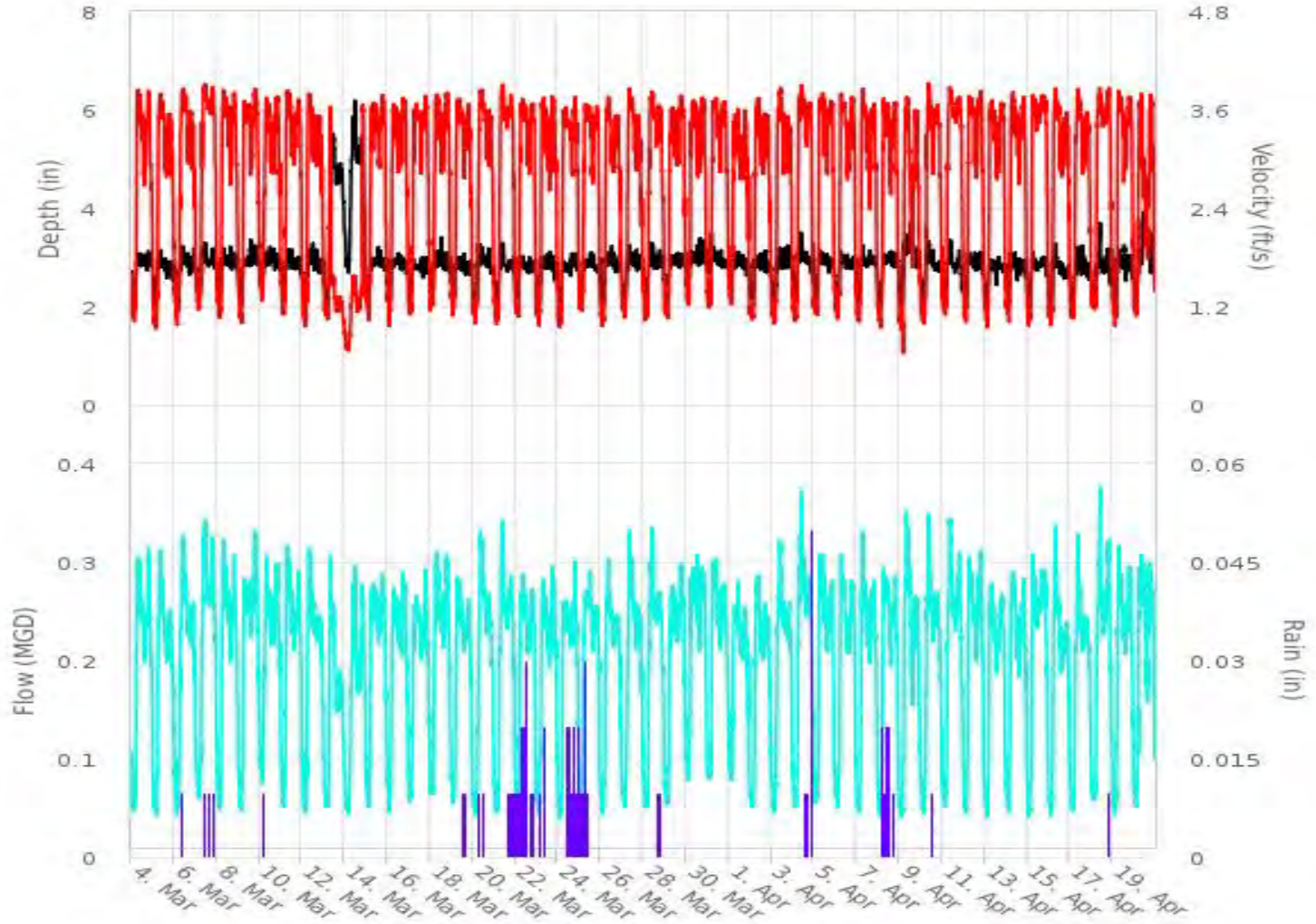
Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL
- VFINAL
- QFINAL
- RAIN FINAL

ADS ENVIRONMENTAL SERVICES



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Scattergraph Report

CDL_RX1-12

Flow Monitor

CDL_RX1-12

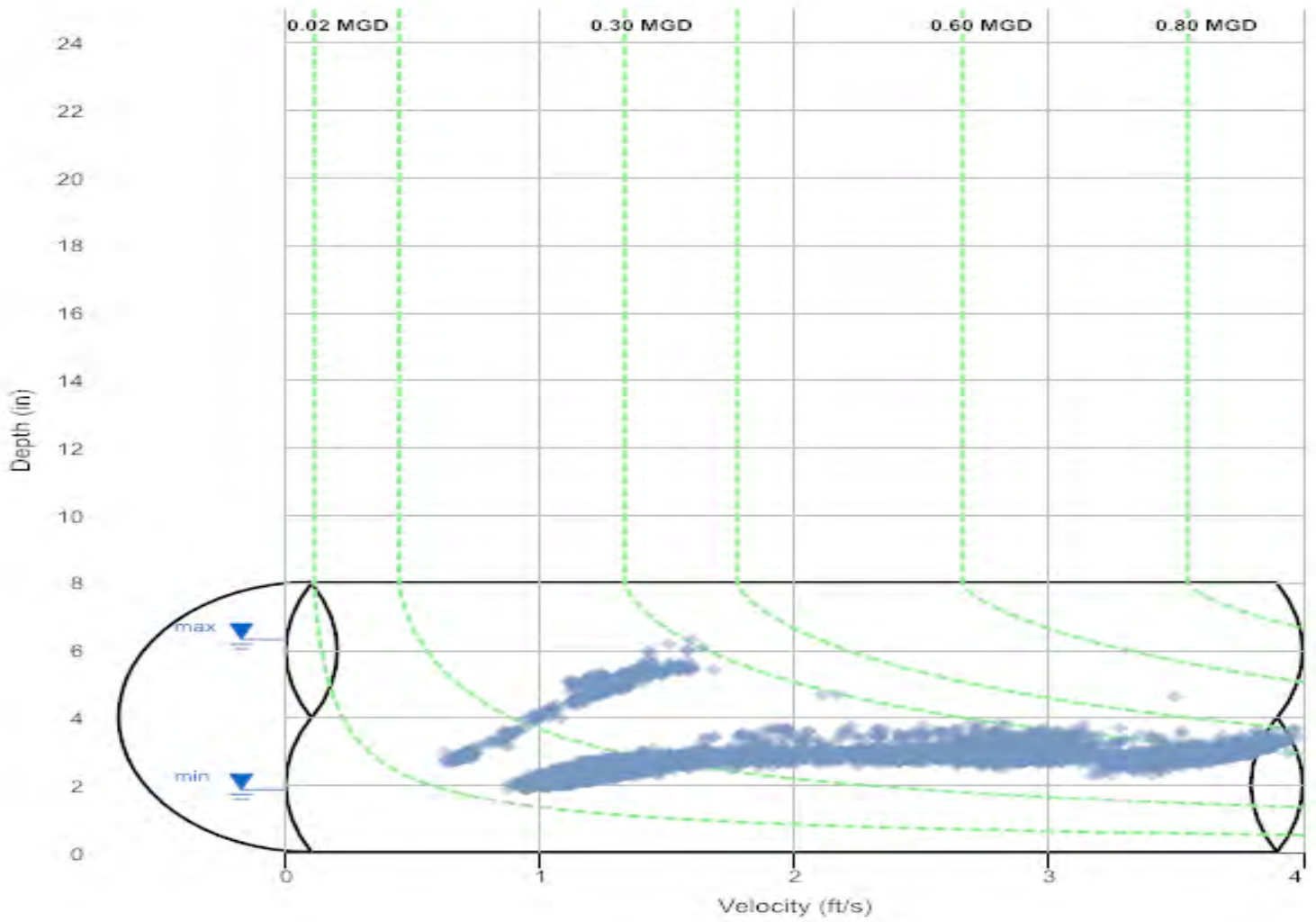
Pipe Height
8.00
in

Report Period

03/04/2021
To
04/20/2021

Legend

- DFINAL - VFINAL
- Iso-Q™
- Min-Max Depth



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Daily Tabular Report

03/04/2021 00:00 - 04/20/2021 23:55
CDL_RX1-12Pipe: Elliptical (8 in H x 8 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total
03/04/2021	04:05	2.02	12:35	3.15	2.78	03:45	1.00	20:40	3.87	2.79	03:50	0.046	19:15	0.315	0.202	0.202	-
03/05/2021	03:50	2.03	09:35	3.27	2.70	03:50	0.91	09:45	3.83	2.73	03:50	0.041	09:45	0.332	0.190	0.190	-
03/06/2021	04:05	1.88	22:25	3.41	2.74	04:05	0.88	10:05	3.89	2.82	04:05	0.036	11:20	0.329	0.202	0.202	0.01
03/07/2021	05:35	2.21	11:30	3.38	2.85	05:35	1.11	09:50	3.93	2.94	05:35	0.056	11:30	0.356	0.220	0.220	0.04
03/08/2021	04:10	2.01	15:30	3.36	2.78	03:00	1.01	07:50	3.85	2.88	04:10	0.046	19:55	0.328	0.208	0.208	-
03/09/2021	03:55	2.07	14:30	3.53	2.82	04:15	0.96	19:25	3.91	2.89	04:15	0.046	19:20	0.345	0.214	0.214	-
03/10/2021	03:00	2.44	12:10	3.49	2.87	03:10	1.23	18:55	3.81	2.90	03:10	0.073	08:05	0.328	0.215	0.215	0.01
03/11/2021	04:25	2.06	12:50	3.52	2.77	02:35	1.01	08:15	3.87	2.90	02:35	0.050	08:15	0.334	0.208	0.208	-
03/12/2021	04:25	2.06	12:55	3.44	2.75	04:05	0.93	08:10	3.82	2.78	04:05	0.044	08:10	0.329	0.198	0.198	-
03/13/2021	03:20	2.09	09:35	5.56	3.94	23:55	0.89	09:05	3.73	1.48	05:10	0.049	09:05	0.327	0.159	0.159	-
03/14/2021	23:55	2.56	11:35	6.32	4.25	04:50	0.64	20:45	3.70	1.38	04:50	0.042	11:35	0.306	0.164	0.164	-
03/15/2021	03:50	2.12	14:20	3.48	2.80	03:45	0.99	19:10	3.83	2.89	03:45	0.048	19:10	0.303	0.209	0.209	-
03/16/2021	03:05	2.07	13:10	3.23	2.77	02:40	0.92	18:15	3.79	2.82	02:40	0.044	18:15	0.295	0.201	0.201	-
03/17/2021	01:35	2.20	15:20	3.12	2.72	01:35	1.05	19:35	3.81	2.87	01:35	0.053	19:35	0.301	0.199	0.199	-
03/18/2021	01:30	2.21	16:00	3.47	2.79	01:30	1.08	19:45	3.83	2.90	01:30	0.055	08:35	0.316	0.209	0.209	-
03/19/2021	03:15	2.16	10:10	3.36	2.73	02:05	1.07	06:55	3.75	2.85	02:15	0.053	06:55	0.295	0.198	0.198	0.02
03/20/2021	03:15	1.93	09:20	3.29	2.73	03:50	0.96	10:10	3.86	2.77	03:15	0.041	09:10	0.335	0.199	0.199	0.03
03/21/2021	03:55	2.05	10:45	3.47	2.74	03:25	0.96	10:45	3.94	2.82	03:20	0.044	10:45	0.370	0.202	0.202	0.11
03/22/2021	03:55	2.16	16:20	3.18	2.72	03:05	1.06	08:45	3.79	2.88	03:05	0.053	08:45	0.297	0.201	0.201	0.29
03/23/2021	03:30	1.98	10:20	3.53	2.73	03:20	0.96	18:05	3.81	2.77	03:25	0.042	18:05	0.306	0.196	0.196	0.04
03/24/2021	02:20	1.86	16:45	3.34	2.69	02:10	0.94	19:35	3.77	2.79	02:20	0.037	19:35	0.309	0.194	0.194	0.46
03/25/2021	03:35	2.21	12:45	3.28	2.76	03:25	1.11	06:50	3.73	2.85	03:05	0.058	12:20	0.297	0.202	0.202	0.24
03/26/2021	02:20	2.03	12:55	3.28	2.77	02:15	0.95	08:45	3.76	2.71	02:15	0.043	08:45	0.307	0.195	0.195	-
03/27/2021	03:50	2.05	09:00	3.44	2.78	03:45	0.94	09:00	3.88	2.72	03:45	0.043	09:00	0.359	0.198	0.198	-
03/28/2021	04:10	2.07	14:25	3.40	2.76	02:10	1.02	11:20	3.85	2.76	04:15	0.048	11:20	0.348	0.199	0.199	0.04
03/29/2021	03:25	2.12	13:25	3.19	2.79	03:50	1.01	18:10	3.81	2.82	03:50	0.051	18:10	0.308	0.205	0.205	-
03/30/2021	03:55	2.58	16:55	3.66	2.96	02:45	1.20	19:10	3.77	2.87	03:15	0.077	12:55	0.350	0.220	0.220	-
03/31/2021	02:50	2.63	05:10	3.55	2.91	03:40	1.15	09:40	3.78	2.90	02:05	0.077	10:45	0.310	0.217	0.217	-
04/01/2021	23:55	2.52	11:55	3.49	2.83	23:55	1.07	10:55	3.70	2.74	23:55	0.065	11:55	0.286	0.196	0.196	-
04/02/2021	02:00	2.11	10:55	3.41	2.72	02:40	1.01	08:35	3.78	2.71	02:40	0.048	08:35	0.300	0.190	0.190	-
04/03/2021	03:00	2.03	15:25	3.62	2.79	03:00	0.94	10:30	3.88	2.68	03:00	0.042	09:50	0.329	0.197	0.197	-
04/04/2021	03:50	2.08	09:40	3.70	2.82	03:20	1.01	09:40	3.97	2.78	03:50	0.049	09:40	0.405	0.207	0.207	0.14
04/05/2021	02:05	2.15	11:05	3.19	2.79	04:15	1.05	10:15	3.81	2.84	01:50	0.055	06:45	0.314	0.206	0.206	-
04/06/2021	02:05	2.08	05:25	3.25	2.77	03:05	0.99	06:55	3.84	2.80	02:05	0.047	06:50	0.318	0.201	0.201	-
04/07/2021	03:15	1.99	05:45	3.39	2.78	03:20	0.98	07:25	3.93	2.74	03:20	0.043	07:25	0.343	0.199	0.199	-
04/08/2021	03:00	2.00	05:45	3.38	2.79	02:50	0.93	07:05	3.77	2.74	02:55	0.041	07:00	0.302	0.201	0.201	0.14
04/09/2021	02:40	2.00	13:35	3.73	2.99	04:25	0.62	08:40	3.82	2.48	02:45	0.039	08:40	0.379	0.199	0.199	-
04/10/2021	03:35	1.97	07:30	3.45	2.75	03:45	0.96	09:00	3.99	2.77	03:45	0.042	09:00	0.368	0.200	0.200	0.01
04/11/2021	04:05	2.08	09:30	3.49	2.76	04:00	1.07	09:10	3.90	2.92	04:05	0.050	09:30	0.362	0.211	0.211	-
04/12/2021	03:25	1.97	05:55	3.27	2.75	03:30	0.96	19:50	3.86	2.85	03:25	0.042	19:50	0.320	0.204	0.204	-
04/13/2021	03:00	1.97	05:45	3.21	2.69	03:05	0.92	08:45	3.73	2.77	03:05	0.040	09:05	0.283	0.191	0.191	-
04/14/2021	03:35	2.04	10:40	3.41	2.71	03:30	0.95	08:20	3.94	2.85	03:30	0.043	10:40	0.312	0.198	0.198	-
04/15/2021	02:00	1.92	07:05	3.14	2.72	02:00	0.95	06:55	3.80	2.96	02:00	0.040	07:05	0.310	0.209	0.209	-
04/16/2021	03:15	1.88	08:35	3.36	2.66	03:10	0.95	08:35	3.89	2.82	03:15	0.038	08:35	0.350	0.192	0.192	-
04/17/2021	04:00	1.99	14:15	3.32	2.67	03:05	1.02	09:00	3.86	2.77	04:00	0.045	09:35	0.331	0.191	0.191	-
04/18/2021	01:45	2.14	10:10	4.62	2.75	03:10	1.11	09:45	3.88	2.86	01:45	0.056	10:10	0.473	0.205	0.205	0.01
04/19/2021	00:50	1.96	12:05	3.44	2.74	03:10	0.95	06:55	3.85	2.87	03:10	0.042	07:00	0.324	0.204	0.204	-
04/20/2021	02:45	2.06	11:25	4.66	2.99	03:20	1.03	08:35	3.84	2.59	02:40	0.048	17:35	0.331	0.207	0.206	-

03/04/2021 00:00 - 04/20/2021 23:55

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			9.633	1.59
Average	2.83	2.75	0.201	

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Coeur d'Alene		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	CDL_RX1-12

Site Address /Location:	3699-3471 N Atlantic Dr			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Drive	Latitude:	47.7212908	Pipe Size (H x W): 8.00x8.00	Pipe Shape: Circular
		Longitude:	-116.8034045		

Manhole #	System Characteristics
RX1-12	Residential
Access	Traffic
Drive	Light

Installation Information

Installation Date:	Installation Type:
Tuesday, March 02, 2021	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
4:53:00 PM	
Depth of Flow (Wet DOF) (in)	
2.50	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
3.7	N/A
Silt (in)	Silt Type
0	

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Vitrified Clay Pipe	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

park on road

ADS Project Name:	CoA.JUB.TFM.ID21 PSS
ADS Project Number:	22641.11.325

City of Coeur d'Alene, ID

Final Report Submitted to **Coeur d'Alene, ID**
December 3, 2021

ADS ENVIRONMENTAL SERVICES

4455 S. 134th Place
Tukwila, WA 98168

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December 3, 2021

Jon Baune
J-U-B Engineers, Inc.
7825 Meadowlark Way
Coeur d'Alene, ID 83815

SUBJECT: Coeur d'Alene, ID

Dear Jon,

ADS is pleased to submit this temporary flow monitoring report for the city of Coeur d'Alene, ID. The metering was conducted at one (1) location. The study was conducted during the period of Wednesday, 20 October 2021 to Tuesday, 16 November 2021.

The report contains depth, velocity, and quantity hydrographs as well as daily long tables for the metering period. All data can easily be exported from the PRISM data hosting website.

In addition, we would be happy to further explain any details about the report that may seem unclear. Should you have any questions or comments, you may contact the Project Manager, Shawn Hoglan at 206-571-0130.

It has been our pleasure to be of service to you in the performance of this project. Thank you for choosing ADS products and services to meet your flow monitoring needs.

Sincerely,
ADS ENVIRONMENTAL SERVICES

Tony Locke
Data Analyst III, ADS LLC Huntsville, AL

Coeur d'Alene, ID

Prepared For:

Jon Baune
J-U-B Engineers, Inc.
7825 Meadowlark Way
Coeur d'Alene, ID 83815

Prepared By:

ADS, LLC
4455 S. 134th Place
Tukwila, WA 98168

CDL_RAM143B

Site Commentary

SITE INFORMATION

Pipe	Elliptical (7.88 in H x 7.88 in W)
Silt	0.00 (in)

OBSERVATIONS

Average flow depth, velocity, and quantity data observed during **Wednesday, 20 October 2021 to Tuesday, 16 November 2021**, along with observed minimum and maximum data, are provided in the following table.

Observed Flow Conditions			
Item	**DFINAL (in)**	**VFINAL (ft/s)**	**QFINAL (MGD - Total MG)**
Average	3.20	2.16	0.189
Minimum	1.56	1.01	0.033
Maximum	5.00	3.74	0.405
Min Time	11/08/2021 04:05:00	10/29/2021 01:20:00	10/26/2021 02:25:00
Max Time	11/11/2021 09:05:00	10/24/2021 07:25:00	11/11/2021 09:05:00

Based upon the quality and consistency of the observed flow depth and velocity data, the Continuity equation was used to calculate flow rate and quantities during the monitoring period.

Values in the Observed Flow Conditions and data on the graphical reports are based on the five minutes average.

DATA UPTIME

Data uptime observed during **Wednesday, 20 October 2021 to Tuesday, 16 November 2021** is provided in the following table:

Percent Uptime	
DFINAL (in)	100
VFINAL (ft/s)	100
QFINAL (MGD - Total MG)	100

Hydrograph Report

CDL_RAM143B

Flow Monitor

CDL_RAM143B

Pipe Height
7.88
in

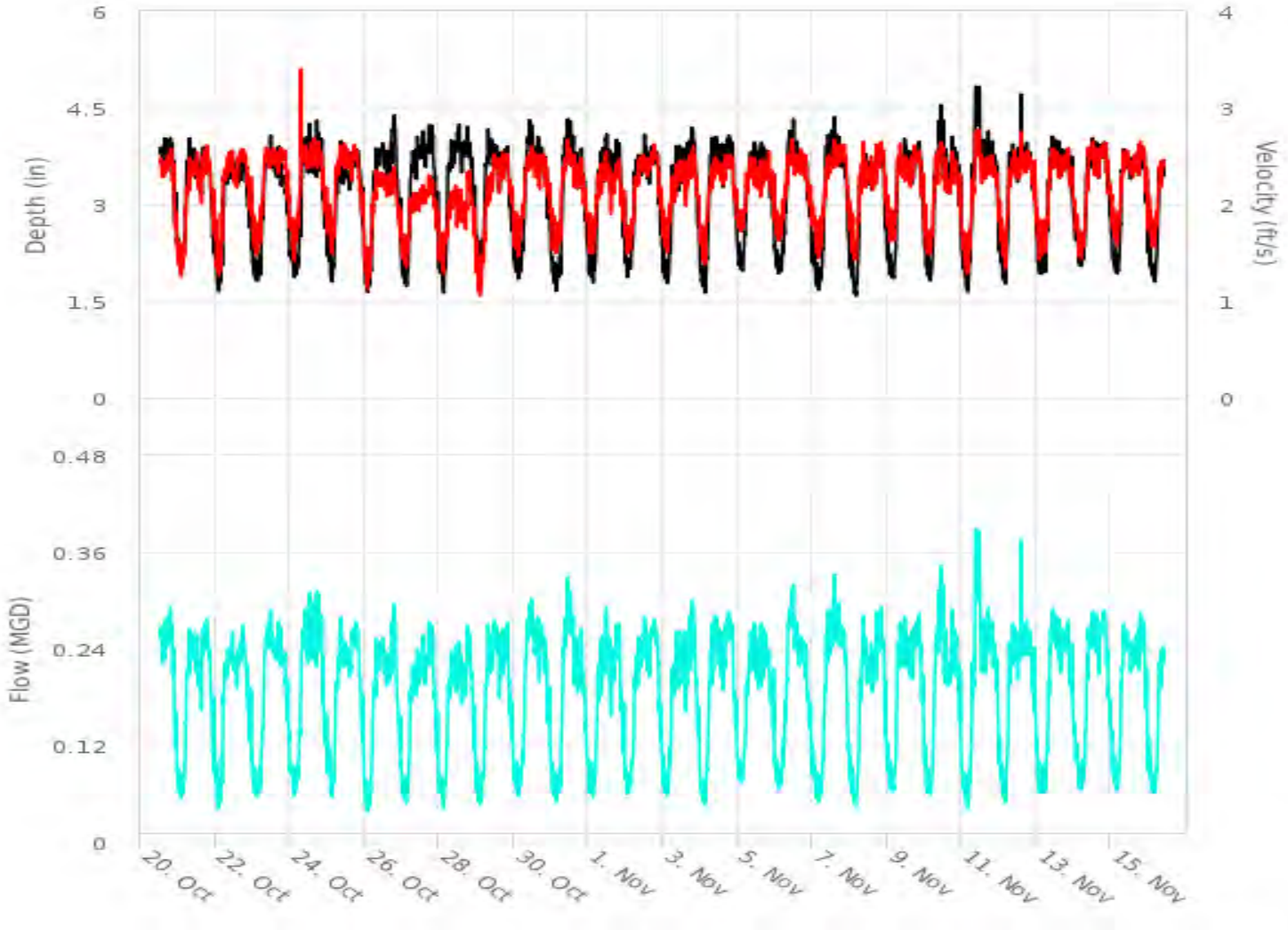
Report Period

10/20/2021
To
11/16/2021

Legend

- DFINAL
- VFINAL
- QFINAL

ADS ENVIRONMENTAL SERVICES



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Scattergraph Report

CDL_RAM143B

Flow Monitor

CDL_RAM143B

Pipe Height
7.88
in

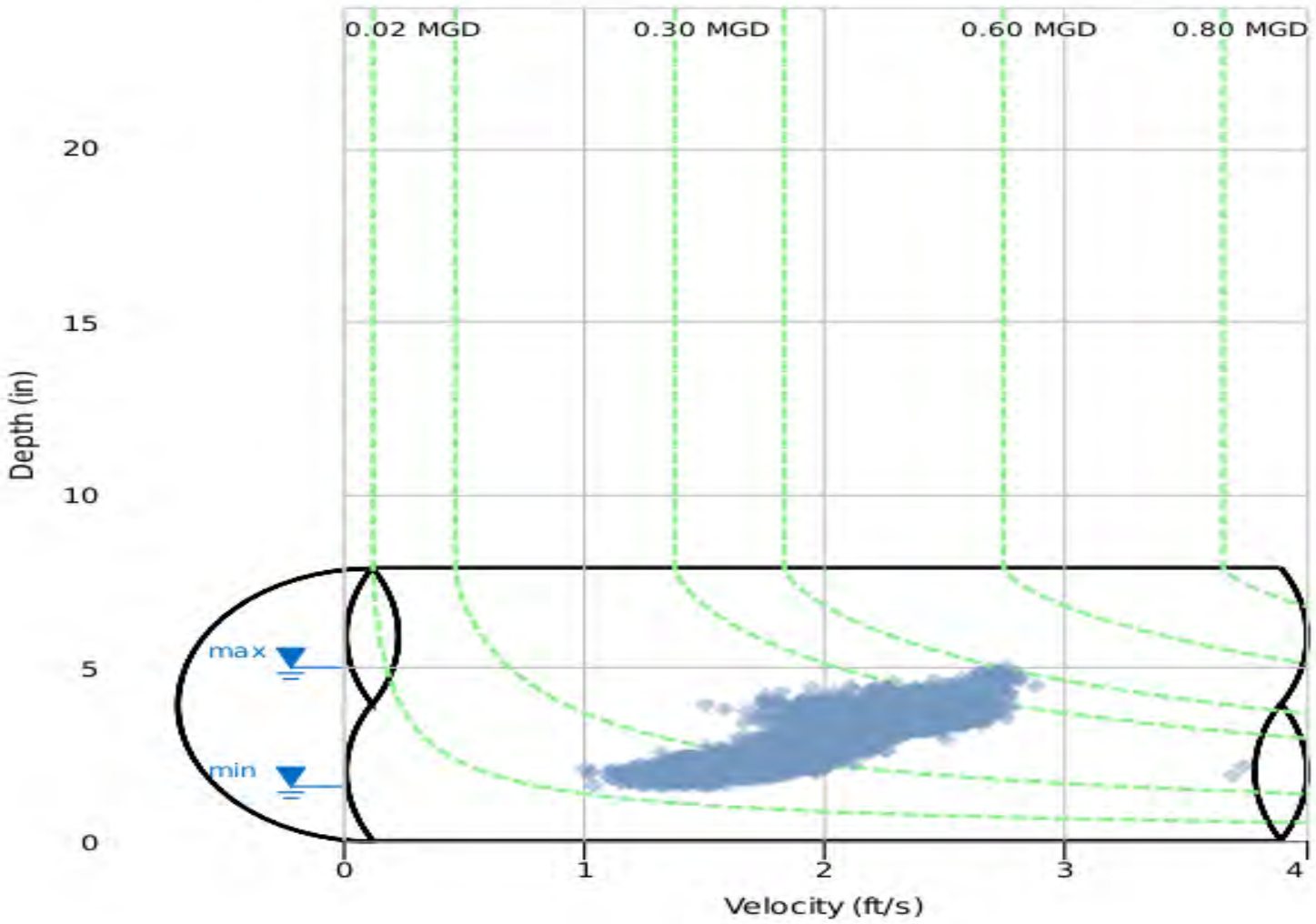
Report Period

10/20/2021
To
11/16/2021

Legend

DFINAL - VFINAL
Iso-Q™
Min-Max Depth

ADS ENVIRONMENTAL SERVICES



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Daily Tabular Report

10/20/2021 00:00 - 11/16/2021 23:59
CDL_RAM143BPipe: Elliptical (7.88 in H x 7.88 in W), Silt0.00 in

	DFINAL (in)					VFINAL (ft/s)					QFINAL (MGD - Total MG)						Rain (in)					
Date	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Time	Min	Time	Max	Avg	Total	Total					
10/20/2021	23:35	2.34	15:45	4.16	3.60	23:30	1.38	19:40	2.64	2.28	23:30	0.077	15:45	0.300	0.227	0.106	-	-	-	-	-	
10/21/2021	02:25	1.94	07:35	4.16	3.22	02:25	1.20	18:30	2.68	2.12	02:25	0.050	17:50	0.298	0.187	0.187	-	-	-	-	-	
10/22/2021	02:30	1.65	17:15	4.15	3.09	03:20	1.23	17:00	2.77	2.18	02:30	0.042	17:15	0.292	0.182	0.182	-	-	-	-	-	
10/23/2021	03:15	1.76	11:50	4.19	3.09	03:20	1.36	12:10	2.70	2.23	03:20	0.050	11:50	0.298	0.187	0.187	-	-	-	-	-	
10/24/2021	03:05	1.85	15:40	4.47	3.17	03:00	1.31	07:25	3.74	2.26	03:00	0.054	15:40	0.369	0.194	0.194	-	-	-	-	-	
10/25/2021	03:25	1.76	09:05	4.16	3.16	02:40	1.36	17:30	2.73	2.24	02:40	0.052	09:20	0.298	0.191	0.191	-	-	-	-	-	
10/26/2021	02:25	1.58	19:20	4.44	3.24	02:25	1.04	08:25	2.45	2.00	02:25	0.033	18:55	0.300	0.179	0.179	-	-	-	-	-	
10/27/2021	03:00	1.72	13:55	4.59	3.31	03:00	1.32	20:00	2.40	1.93	03:00	0.047	13:55	0.302	0.176	0.176	-	-	-	-	-	
10/28/2021	03:00	1.61	13:05	4.48	3.32	03:05	1.23	19:40	2.45	1.89	03:05	0.039	19:40	0.285	0.173	0.173	-	-	-	-	-	
10/29/2021	02:25	1.93	07:40	4.39	3.28	01:20	1.01	16:50	2.61	2.06	02:25	0.043	07:40	0.303	0.187	0.187	-	-	-	-	-	
10/30/2021	02:55	1.81	10:20	4.39	3.21	02:45	1.43	14:45	2.64	2.19	02:55	0.055	11:25	0.310	0.193	0.193	-	-	-	-	-	
10/31/2021	03:20	1.62	11:05	4.39	3.10	02:50	1.39	10:55	2.77	2.14	03:20	0.048	10:55	0.338	0.182	0.182	-	-	-	-	-	
11/01/2021	03:05	1.77	08:15	4.28	3.18	01:10	1.38	11:25	2.65	2.12	03:00	0.053	11:25	0.315	0.183	0.183	-	-	-	-	-	
11/02/2021	01:05	1.82	12:10	4.29	3.23	00:45	1.44	18:30	2.69	2.19	01:05	0.055	12:10	0.290	0.193	0.193	-	-	-	-	-	
11/03/2021	03:05	1.71	18:35	4.40	3.18	03:05	1.41	19:35	2.64	2.16	03:05	0.050	18:30	0.323	0.187	0.187	-	-	-	-	-	
11/04/2021	02:55	1.60	07:20	4.17	3.24	02:25	1.19	20:30	2.60	2.18	02:25	0.041	09:35	0.298	0.194	0.194	-	-	-	-	-	
11/05/2021	03:05	1.93	15:25	4.14	3.21	00:20	1.68	18:25	2.57	2.20	02:55	0.072	15:25	0.297	0.190	0.190	-	-	-	-	-	
11/06/2021	04:15	1.88	11:50	4.46	3.19	00:55	1.53	11:10	2.77	2.22	01:55	0.063	11:50	0.332	0.192	0.192	-	-	-	-	-	
11/07/2021	04:05	1.64	14:05	4.51	3.13	03:05	1.38	19:40	2.71	2.19	04:05	0.047	14:05	0.348	0.189	0.189	-	-	-	-	-	
11/08/2021	04:05	1.56	18:55	4.12	3.09	04:00	1.32	20:10	2.72	2.18	04:00	0.041	18:55	0.303	0.183	0.183	-	-	-	-	-	
11/09/2021	03:25	1.83	20:50	4.28	3.19	04:15	1.49	17:35	2.67	2.23	04:15	0.058	20:50	0.315	0.193	0.193	-	-	-	-	-	
11/10/2021	03:55	1.79	12:00	4.68	3.25	01:20	1.36	11:50	2.81	2.16	03:55	0.053	11:50	0.376	0.193	0.193	-	-	-	-	-	
11/11/2021	04:05	1.61	09:05	5.00	3.34	04:00	1.19	10:45	2.80	2.17	04:00	0.039	09:05	0.405	0.206	0.206	-	-	-	-	-	
11/12/2021	04:05	1.76	14:00	4.74	3.27	04:05	1.19	14:10	2.81	2.20	04:05	0.043	14:10	0.380	0.198	0.198	-	-	-	-	-	
11/13/2021	03:00	1.89	10:50	4.16	3.21	04:15	1.40	12:40	2.68	2.16	03:00	0.057	11:00	0.298	0.191	0.191	-	-	-	-	-	
11/14/2021	05:15	2.01	12:15	4.17	3.25	05:20	1.37	20:25	2.77	2.20	05:20	0.061	19:45	0.316	0.196	0.196	-	-	-	-	-	
11/15/2021	04:15	1.90	19:15	4.19	3.20	04:05	1.52	18:50	2.68	2.25	04:05	0.063	21:10	0.308	0.195	0.195	-	-	-	-	-	
11/16/2021	04:20	1.79	09:45	4.01	2.60	02:00	1.42	09:45	2.62	1.99	03:50	0.058	09:45	0.294	0.133	0.056	-	-	-	-	-	

10/20/2021 00:00 - 11/16/2021 23:59

	DFINAL (in)	VFINAL (ft/s)	QFINAL (MGD - Total MG)	Rain (in)
Total			5.076	
Average	3.20	2.16	0.189	

4455 S. 134th Place
Tukwila, WA 98168

206-762-5070
www.adsenv.com

Everett.SOF.WA20-21		Site Name
Flow Monitoring Site Report	ADS ENVIRONMENTAL SERVICES®	CDL_RAM143B

Site Address /Location:	Route 95 South of W Canfield Ave			Monitor Series: TRITON+	Location Type: Temporary
Site Access Details:	Park On Grass	Latitude:	47.732483	Pipe Size (H x W): 7.88 X 7.88	Pipe Shape: Circular
		Longitude:	-116.793045		

Manhole #	System Characteristics
RAM143B	Commercial
Access	Traffic
Drive	Medium

ADS Project Name:	Coeur d'Alene, ID. JUB 21
ADS Project Number:	22720.11.325

Installation Information

Installation Date:	Installation Type:
Wednesday, October 20, 2021	Doppler Standard Ring and Crank
Monitoring Location (Sensors):	Monitor Location:
Upstream 0-5 FT	Manhole
Sensors / Devices:	Pressure Sensor Range (psi)
Peak Combo (CS4), Smart Depth (CS5)	0 - 5 psi

Installation Confirmation:

Time	
12:48:00 PM	
Depth of Flow (Wet DOF) (in)	
3.50	
CS5 Physical Offset (in)	Measurement Confidence (in)
1.38	0.25"
Peak Velocity (fps)	Velocity Sensor Offset (in)
2.72	N/A
Silt (in)	Silt Type
0	

Hydraulic Comments:

Manhole / Pipe Information:

Manhole Depth (Approx. FT):	Manhole Configuration
9	Single
Manhole Material:	Manhole Condition:
Concrete	Good
Manhole Opening Diameter (in)	Manhole Diameter (Approx.):
24	26
Manhole Cover	Manhole Frame
Steel	Normal
Active Connections	Air Quality:
No	Normal
Pipe Material	Pipe Condition:
Concrete	Good

Communication Information:

Communication Type	Antenna Location
Wireless	Manhole Pick / Vent Hole

Additional Site Info. / Comments:

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Appendix C

Model Assumptions

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Contents

Tables

Appendix C Model Assumptions

C.1 Introduction

An important part of the City's update to the sewer master plan was to update the City's sewer model. It is important to understand that there are many acceptable ways to develop a sewer model. A hydraulic model of a sewer system is based on assumptions that characterize the area and system under study. The assumptions used in a model are typically based on flow monitoring, learned characteristics of the system, and a general knowledge of sewer flow characteristics gained through past experience with monitoring flows and modeling other sewer systems. Our review and updates to the existing model assumptions were based on discussions with City staff as well as our modeling philosophy, and past experience. Many of the modeling assumptions for parameters applying to future modeling scenarios were established and/or confirmed during the calibration process.

C.2 Model Assumptions and Changes

This section summarizes the assumptions used for the updated model analysis and criteria for deficiencies. It is assumed that any violation of the criteria is reviewed with the City to determine on a case-by-case basis if something should be changed and what improvements should be recommended.

C.2.1 System Layer

Parameter: Manning's "n"

Discussion: The roughness factor used in the Manning's formula $Q = (1.49/n)AR^{2/3}S_o^{1/2}$. The Manning's formula relates flow in a pipe with the depth of flow, diameter of the pipe and the slope of the pipe. Typical "n" values range from 0.009 for very smooth glass or plastic to greater than 0.016 for unfinished concrete. For sewer pipes, however, a slime layer develops on any sewer material in contact with sewage and provides relatively consistent roughness regardless of material.

ASCE Manual No. 60 "Gravity Sanitary Sewer: Design and Construction" provides a table of recommended Manning's "n" values based on size and condition. For pipes installed and maintained with 'extra care' they suggest a Manning's "n" range from 0.0092 to 0.0107 for sizes six inches to 60 inches respectively. For 'typical' installations Manning's "n" range from 0.0106 to 0.0123 for sizes six inches to 60 inches respectively. For 'substandard' installations Manning's "n" range from 0.0120 to 0.0139 for sizes six inches to 60 inches respectively.

2013 MP Assumption: *Use a Manning's "n" of 0.012 regardless of material, size and age.*

Updated Parameter: **No change**

Parameter: Sizing Methodology (for existing pipes)

Discussion: Defining the capacity criteria for existing gravity pipes sets the threshold for when improvements are necessary. The amount of risk a municipality takes on is governed in part by this criterion. The maximum depth of flow/diameter of pipe (d/D) is an indicator of how much of the pipe capacity is being used. When the flow in a pipe reaches the point where the d/D ratio is greater than the maximum d/D ratio as determined by City Staff, the pipe diameter will increase to the next size. Flows from each model scenario will be used to determine when an existing line requires an upsize. These flows will include a storm event.

We have used a graduated scale for maximum d/D dependent on the size of the pipe. The scale originated with the ASCE Manual of Practice No. 60 "Gravity Sanitary Sewers: Design and Construction," which recommended master planning sewer systems at a d/D of less than 0.5 for sewers less than 18 inches in diameter and 0.75 for larger sewers. This allows for a larger safety factor for smaller sewers where variations in land use and extensions of the service area can have large impacts on the available capacity of the sewer. The larger sewer lines have a smaller safety factor because variations in land use tend to balance out over the larger area served by the large sewer.

2013 MP Assumption: *Not specifically addressed*

Updated Parameter: **Use a graduated scale for the maximum d/D as listed in Table C-2:**

Table C-1 – Depth Over Diameter Ratios for Existing Pipes

Size	d/D	Resultant Safety Factor
8"	0.50	2.00
10"	0.55	1.71
12"	0.60	1.49
15"	0.65	1.32
≥18	0.75	1.10

Parameter: Design Pipe Sizing Methodology (for future pipes)

Discussion: This parameter is used to size future pipes. When the flow in a pipe reaches the point where the d/D ratio is greater than the maximum d/D ratio, the pipe diameter will increase to the next size. Flows from the Master Plan will be used to size future sewer lines. These flows will include a storm event.

We have used a graduated scale for maximum d/D dependent on the size of the pipe, similar to the above sizing methodology for existing pipes.

2013 MP Assumption:

Use a graduated scale for the maximum d/D as listed in Table C-2:

Table C-2 – Depth Over Diameter Ratios for Design Pipes

Size	d/D	Resultant Safety Factor
8"	0.50	2.00
10"	0.55	1.71
12"	0.60	1.49
15"	0.65	1.32
≥18	0.75	1.10

Updated Parameter **No change**

Parameter: Design Pipe Slope Determination

Discussion: The State of Idaho DEQ has adopted the minimum pipe slopes of the "Ten State Standards" (GLUMRB, 2014) rather than velocity. The use of a minimum velocity may result in Master Plan slopes that differ from the slopes used in final design and construction of the Master Plan line. We suggest that minimum slopes for pipes larger than 21 inches be held to a 0.10 percent. For slopes smaller than 0.10 percent constructability becomes difficult.

2013 MP Assumption: *Use Ten State Standards minimum slopes as modified and shown in* ***Table C-3****.*

Table C-3 – Minimum Slopes for Design Pipes

Size	Slope
8"	0.40%
10"	0.28%
12"	0.22%
15"	0.15%
18"	0.12%
≥21	0.10%

Updated Parameter: **No change**

Parameter: Design Pipe Sewer Match Point

Discussion: When two sewer lines of different sizes meet the match point can affect pipe hydraulics. Convention and some sewer standards require the design to match the crowns or to match the design depths of the sewers to keep from surcharging the smaller line.

2013 MP Assumption: *Match crown for simplicity during design and construction and to reduce the potential of surcharging laterals.*

Updated Parameter: **No change**

Parameter: Allowable Decreases

Discussion: This allows for smaller pipes to be constructed downstream of larger pipes where additional capacity is gained in the smaller lines due to increased pipe slope.

Decreases are not recommended in smaller lines (< 24 inches) due to the tendency of obstructions to lodge at locations where trunk lines decrease in size. Decreases may be necessary when tying a master planned line into an existing trunk line. The existing system includes several decreases; however, this should be avoided for future lines.

2013 MP Assumption: *Decreases in diameter not allowed.*

Updated Parameter: **Decreases in diameter not allowed for any pipe size.**

Parameter: Design Pipe Distance Between Manholes

Discussion: The distances between manholes may vary, but according to the Ten State Standards, should be limited to 400 feet for lines less than 18 inches in diameter and 500 feet for lines 18 inches and larger. The average distance between manholes in an existing system tends to be around 300 feet.

2013 MP Assumption: *Typically, use 300 feet to allow for manholes at intersections and on curves.*

Updated Parameter: **No change**

Parameter: Design Pipe Depths

Discussion: While the minimum depth of the trunk line may be set in the model, care must be taken to check that the trunk line has sufficient depth to serve to the boundary of its service area. This can be accomplished by using check lines that are added to the model. Check lines are 8-inch model lines extended at a slope of 0.45 percent (0.05 percent greater than minimum slope to account for manhole drops) to locations within a service area that may be difficult to reach. Check lines force the trunk line down, if necessary, to serve a service area.

2013 MP Assumption: *Set the minimum cover at five feet and use check lines as needed to ensure sufficient depth. Check results for excessive depth (>20 feet).*

Updated Parameter: **No change**

Parameter: Maximum Velocity

Discussion: Typically, the surcharge depth will control velocity through a pipe, but in a few cases where this does not occur, velocity should still be limited through the system to help preserve the longevity of the pipe system. Drop lines may have a higher velocity with specific designs. A minimum scouring velocity of two feet per second (fps) is a common design point.

2013 MP Assumption: *Not specifically addressed*

Updated Parameter: **Gravity Pipes: minimum = 2 fps, maximum = 10 fps**
Force Mains: minimum = 2 fps, maximum = 6 fps

Parameter: MH Drop and Meander Factor

Discussion: The standard invert drop through manholes is 0.10 feet and allows for head loss in manholes. The additional drop is added to the manholes to account for lengthened pipe and construction on curved roads that differ slightly from the master planned alignments. This meander factor will allow the installed pipe length between manholes to be up to 20 percent longer than the master planned pipe.

2013 MP Assumption: *Varies depending on the length and slope of upstream pipe. Total drop included in the master planned manholes consists of two parts:*
1) 0.10 feet for every 300 feet of pipe.
*2) Drop for an additional 20 percent of length of the upstream pipe at the minimum slope (see **Table C-3**).*

Updated Parameter: **No change**

Parameter: MH losses

Discussion: Headloss occurs in most manholes unless the manhole is built over an existing pipe with the top of the pipe cut out. The loss comes from the change in geometry as flow enters the manhole and exits to the next pipe. This headloss is approximated by a percentage of the velocity's head in the upstream pipe.

The Federal Highway Administration published a methodology in Hydraulic Engineering Circular 22 based on research on these loss coefficients, which includes initial estimates and a more elaborate and iterative process to determine loss. As a first initial estimate for outlet control conditions, 0.2 is recommended for a pipe entrance loss, and 0.4 for pipe exit loss under inlet or outlet conditions.

2013 MP Assumption: *MH headloss will be approximated as 10% of the velocity head of the upstream pipe.*

Updated Parameter: **Entrance Loss: 0.2**
Exit Loss: 0.4

Parameter: Constant Speed Pump Cycle Volume

Discussion: The cycle volume of a pump station is the volume of the wet well between the pump off and pump on settings.

The model performs its calculations in discrete time increments. The results can be provided in time increments down to one second or less. A lift station with a cycle time less than the analysis time increment will result in a peak flow that has been reduced.

2013 MP Assumption: *Model cycle volume according to the current set points. Set calculation time increment to one minute or less.*

Updated Parameter: **No change**

Parameter: Future Pump Station Capacity

Discussion: The capacity of each lift station in the model is set individually. Lift stations tend to be designed based on assumptions that are more conservative and yield peak flows higher than a system wide model. A safety factor for the lift station is desirable to reduce the chance of overloading the lift station.

2013 MP Assumption: *Set the lift station capacity at least 10% higher than the incoming flow.*

Updated Parameter: **Set the lift station capacity according to Table C-4 below as established by City Staff.**

Table C-4 – Future Pump Station Safety Factor

Peak Flow (GPM)	SF
0 – 500	10%
501 – 1000	15%
1001 – 1500	20%
1501 – 2000	25%
≥ 2001	30%

C.2.2 Flow Generation Layers

Parameter: Existing Flows

Discussion: Water meters are used as the flow generation method for the existing model. Winter water meter data is a good approximation of sanitary sewer

flows generated by an individual parcel. Water meter usage is averaged over the winter months to provide an average daily flow for each water meter. This average is then adjusted (using factors refined during model calibration) to represent average weekday or weekend flows.

2013 MP Assumption: *Average usage data for the winter months of December, January, February and March will be used to generate existing flows.*

Updated Parameter: **Average usage data for the winter months of November 2020, December 2020, January 2021, and February 2021 will be used to generate existing flows.**

Parameter: Committed Flows

Discussion: The committed flows represent everything for which the City has committed to provide sewer service. This includes anything within the City limits and any development approved by the City.

2013 MP Assumption: *All annexed parcels at zero percent vacancy and any permitted flows at their permitted amounts.*

Updated Parameter: **No change**

Parameter: Master Plan Flows

Discussion: Master plan flows represent the maximum flows anticipated in the system when the entire impact area is fully developed.

2013 MP Assumption: *Master plan flows are generated by the unit flows for each land use type in the comprehensive plan. The latest comprehensive map will be used to establish master plan flows.*

Updated Parameter: **No change**

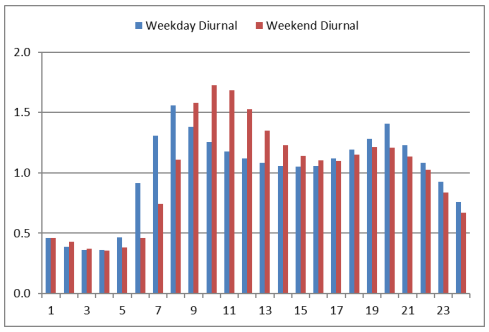
Parameter: Diurnal Curves

Discussion: A diurnal curve is the shape of a type of sanitary flow contribution to the collection system over a 24-hour period. Diurnal curves differ for each type of land use. Weekday diurnal curves can also differ from weekend diurnals for the same type of land use. Diurnal curves are modified and refined during the calibration process by comparison to flow monitoring data.

2013 MP Assumption: *Diurnal curves were calibrated to system wide flow monitoring.*

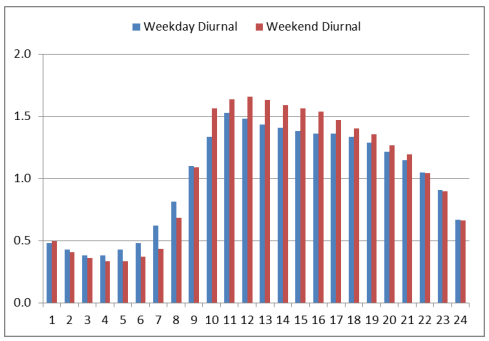
Model Assumption: **The following diurnal curves were updated to be calibrated to recent flow monitoring and will be used for the land use types listed below:**

Residential



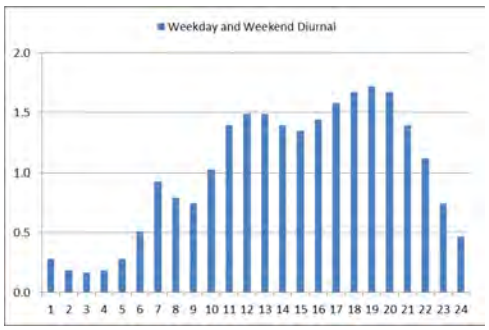
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Assisted Living

Commercial



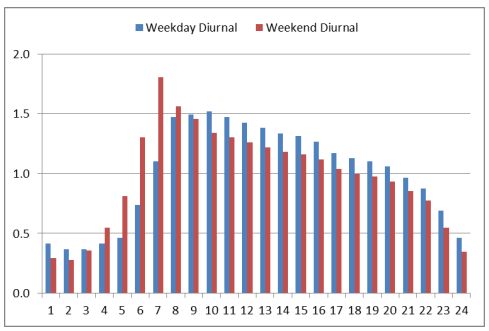
- Commercial

Restaurant



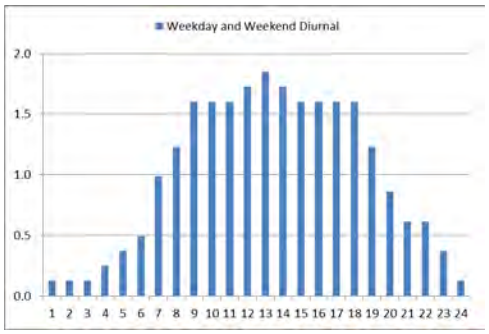
- Restaurant
- Entertainment

Hotel



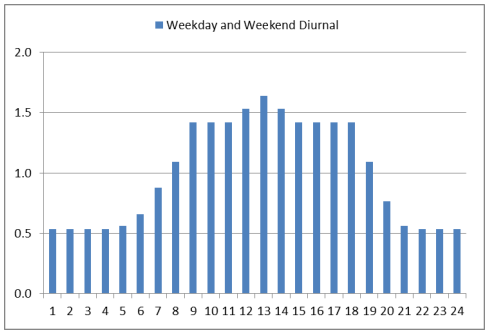
- Hotel

Office



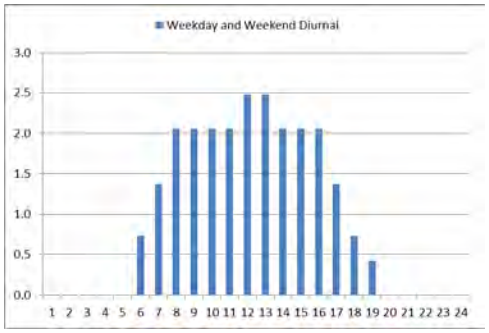
- Office
- Public
- Industrial

Hospital



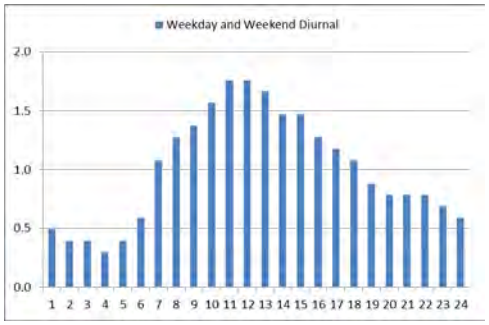
- Hospital

School



- School
- Church

Parks



- Open Space

Parameter: Residential Unit Flows (GPDU)

Discussion: Residential unit flows are measured in gallons per dwelling unit (GPDU). The GPDU for each residential density is estimated from the winter water meter data.

2013 MP Assumption: *Residential unit flows utilized for the 2013 MP are listed below.*

Updated Parameter:

	2013	**2022**
Low Density Residential	*155 GPDU*	**150 GPDU**
Medium Density Residential	*131 GPDU*	**130 GPDU**
High Density Residential	*131 GPDU*	**110 GPDU**

Parameter: Non-Residential Unit Flows (GPAD)

Discussion: Non-residential unit flows are measured in gallons per acre per day (GPAD). The GPAD for each non-residential land use type is estimated from the winter water meter data and net parcel area. Commercial unit flows were set to 12.2 ERU's based on previous studies.

2013 MP Assumption: *Non-residential unit flows utilized for the 2013 MP are listed below.*

Updated Parameter:

	2013		**2022**	
Assisted Living	*1700*	*GPAD*	**1720**	**GPAD**
Church	*170*	*GPAD*	**170**	**GPAD**
Commercial (composite)	*N/A*		**850**	**GPAD**
Commercial (mixed use)	*1830*	*GPAD*	**1830**	**GPAD**
Hospital	*820*	*GPAD*	**4960**	**GPAD**
Hotel	*4160*	*GPAD*	**4980**	**GPAD**
Industrial	*150*	*GPAD*	**220**	**GPAD**
Office	*1080*	*GPAD*	**420**	**GPAD**
Open Space	*N/A*		**20**	**GPAD**
Public	*270*	*GPAD*	**290**	**GPAD**
Restaurant	*2500*	*GPAD*	**2500**	**GPAD**
School	*230*	*GPAD*	**230**	**GPAD**

C.2.3 Flow Injection Methods

Parameter: Water Meter Connection Point

Discussion: Each water meter has a point where it connects to the system. The connection point can affect the sizing of the trunk lines. To ensure the line is large enough for all the connections between manholes, all flow injections should be added at the upstream manhole.

2013 MP Assumption: *Inject flow at the manhole upstream of the connection point for each water meter.*

Updated Parameter: **No change**

Parameter: Service Area Size

Discussion: Service areas are used to direct flow generated in a specific area to the trunk line where they flows are injected. The area and shape of each service area is determined by the existing sewer and or topography. Service areas are used in the master plan model to direct flow injections.

The service area size should be small enough to provide reasonable incremental increases in flow along a trunk line but not be so small to unnecessarily increase the complexity of the model. In addition, they should correspond to the diurnal curve passing through the service area. Large service areas would have diurnal curves with less pronounced peaks due to attenuation.

2013 MP Assumption: *Undeveloped service areas approximately 40 AC. Developed service areas will be defined by the existing system and size will vary (usually less than 10 AC).*

Updated Parameter: **No change**

Parameter: Service Area Connection Point

Discussion: Each service area has a point where it connects to the system. The service area connection point can affect the sizing of the trunk lines. If service areas are small, the connection point is not as critical.

2013 MP Assumption: *At locations where a given service area will tie into the system at one point, connect the service area at that point. At locations where the service may tie into the system along the length of the bordering trunk line, connect at the upper two thirds of the trunk line.*

Updated Parameter: **No change**

C.2.4 Infiltration and Inflow

Parameter: Inflow and Design Storm

Discussion: Inflow describes the flow that enters the sewer collection system as a direct result of a storm event. Typical sources of inflow to the sanitary sewer

include illegal connections such as sump pumps, roof drains, yard drains, and storm drains. Inflow can also enter directly through manhole lids and wet well lids.

Accounting for inflow in a model increases the conservative nature of the model. If no assumptions are made for inflow, a municipality assumes more risk, but can account for that risk by establishing a more conservative capacity criterion.

A design storm will be used to simulate a rainfall event. The typical storm pattern for northern Idaho is a Type II SCS design storm. The storm peak will be aligned with the sanitary peak to evaluate the worst case scenario. Aligning these peaks significantly increases the return period for the storm.

2013 MP Assumption: *24-hr Type II SCS design storm with total precipitation equal to that of the Jan 29th-30th storm event of 2012. (1.7 inches)*

Updated Parameter: **24-hr Type II SCS design storm with total precipitation equal to a five-year storm event. (2.0 inches)**

Parameter: Infiltration

Discussion: Infiltration describes the groundwater or rainfall that enters the sewer system through imperfections in the pipes and manholes. Areas of shallow ground water and areas near streams or water bodies typically have higher seasonal infiltration rates. Older pipes often have higher infiltration. Even new construction can experience infiltration through imperfections in pipe joints and manhole connections. Infiltration values are estimated for large basins from flow monitoring data. It is described in gallons per acre per day (GPAD).

Coeur d'Alene rests on well-draining soils and past flow monitoring has shown that infiltration due to ground water is insignificant

2013 MP Assumption: *No infiltration will be assigned in the model.*

Updated Parameter: **No change**

C.2.5 Elevation and Datum Assumptions

Parameter: Vertical Datum

Discussion: A vertical datum defines where a point in space is located vertically. There have been multiple vertical data used in the Coeur d'Alene vicinity. A different vertical datum can cause differences in elevations at the same point by many feet. The City uses the National Geodetic Vertical Datum of 1929 (NGVD 29).

2013 MP Assumption: *NGVD 29*

Updated Parameter: **No change**

Parameter: Coordinate System

Discussion: A coordinate system defines where a point in space is located. The same X,Y coordinates in different coordinate systems can be in different locations. The North American Datum of 1983 (NAD 83) is the base for many coordinate systems. The NAD 83 State Plane system consists of several coordinate systems for each state. The City uses the NAD 1983 State Plane Idaho West Feet coordinate system.

2013 MP Assumption: *NAD 1983 State Plane Idaho West Feet*

Updated Parameter: **No change**

Parameter: Elevation Data for Master Planned Area

Discussion: 10-meter United States Geological Survey (USGS) contours are available for the entire study area. The USGS contours were last updated in 2001. The USGS contours are available with the NAVD 88 vertical datum. Metadata contained with the contours show that the shift from NAVD 88 to NGVD 29 is 3.77 feet.

Avista collected elevation points from flights of the area between 1998 and 2001. This data does not cover the entire future wastewater service area and there are uncertainties about the vertical datum and resolution.

2013 MP Assumption: *Use USGS contours shifted to the NGVD 29 datum. Reference Avista contours for relative elevation change in specific areas as needed.*

Updated Parameter: **No change**

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Appendix D

Model Calibration

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Appendix D Model Calibration

D.1 Introduction

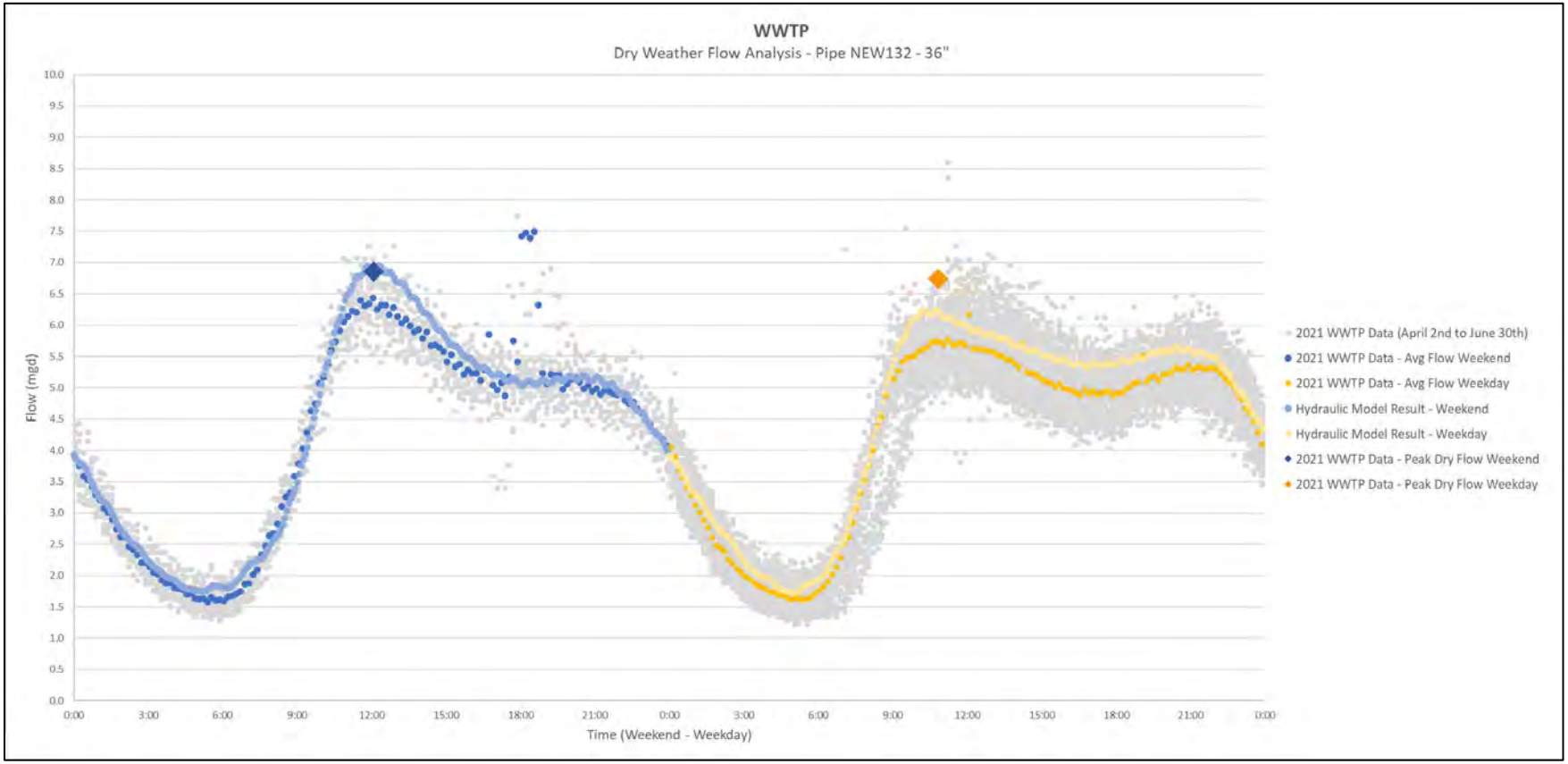
Calibration of a hydraulic model is necessary to provide confidence in the results of the model. This model was dry weather calibrated to seven locations in the system where flow monitoring was performed between March 4 and April 20, 2021 and one location in the system where flow monitoring occurred between October 20 and November 16, 2021. An excel sheet documenting daily influent flow at the WWTP was provided by the City of Coeur d'Alene (the City) staff. The data included monthly minimum, maximum, total and average flows from May 2011 to April 2021. City staff also provided an excel sheet with daily influent peak flow values from May 2011 to April 2021.

The City's WWTP influent flume is oversized and low flows may contain large errors, so influent data were only used to calibrate the storm peak. Additionally, when the WWTP influent pumps experience an outage and the wet well volume rises, the level in the influent flume increases but remains stagnant therefore, the system reports a high and inaccurate flow value.

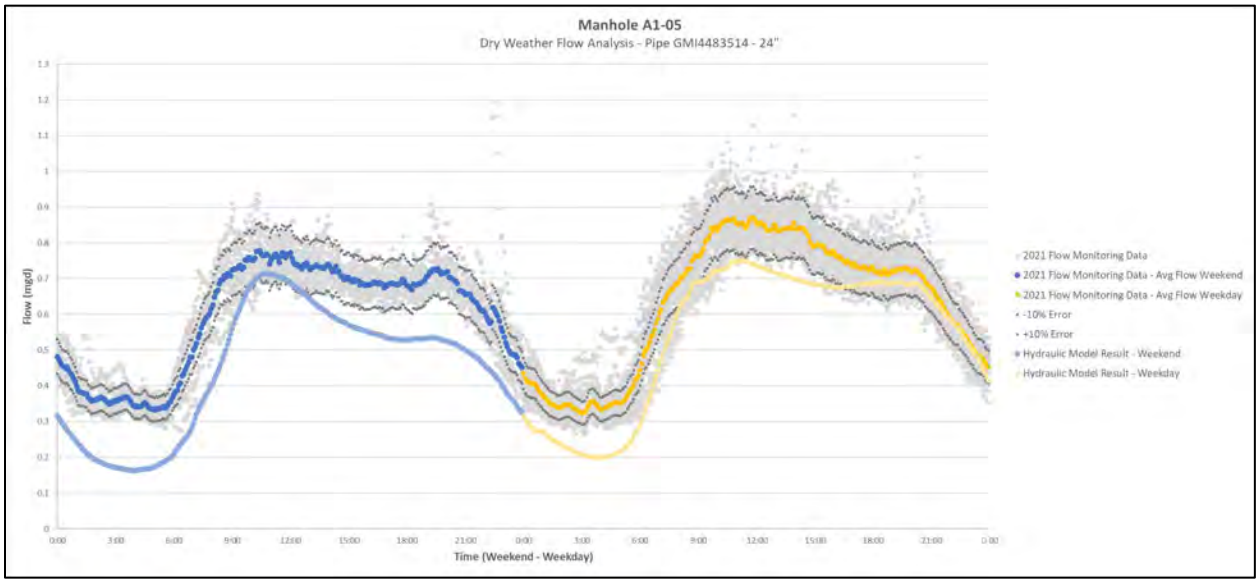
This appendix provides graphs comparing the 2021 flow monitoring data with the current hydraulic model outputs for each of the eight flow locations under dry weather conditions. Because no wet weather occurred during the 2021 flow monitoring efforts, no wet weather calibration was completed during this master plan update. However, graphs showing the impacts of the design storm at each of the eight flow monitoring locations are shown in subsequent sections.

D.2 Dry Weather Calibration

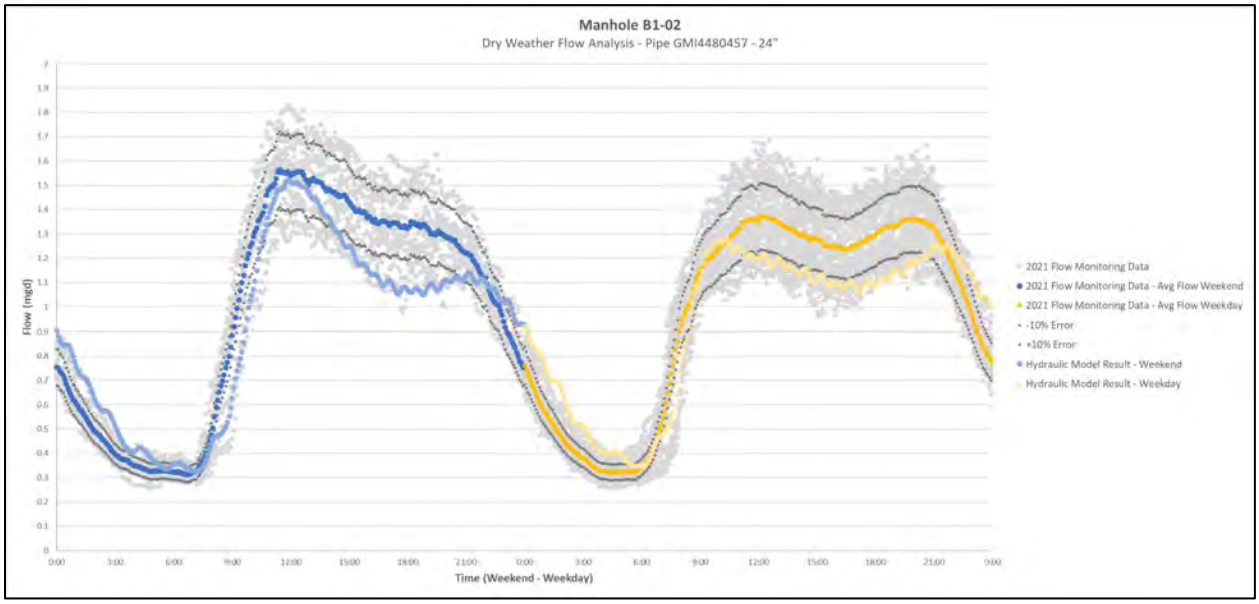
D.2.1 WWTP



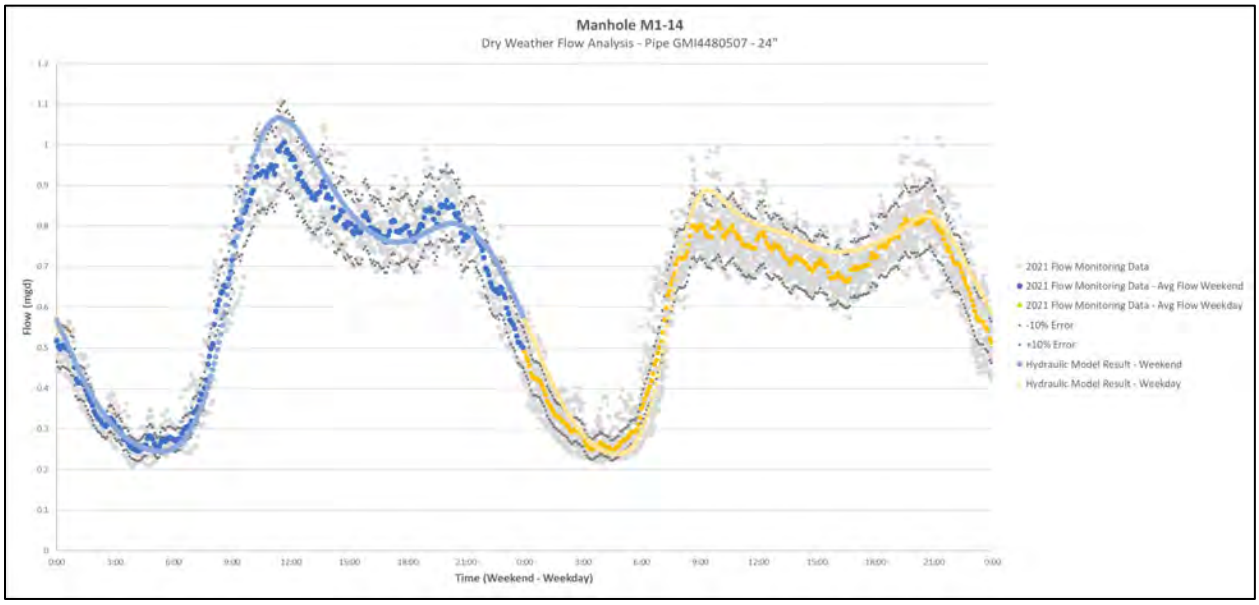
D.2.2 Manhole A1-05



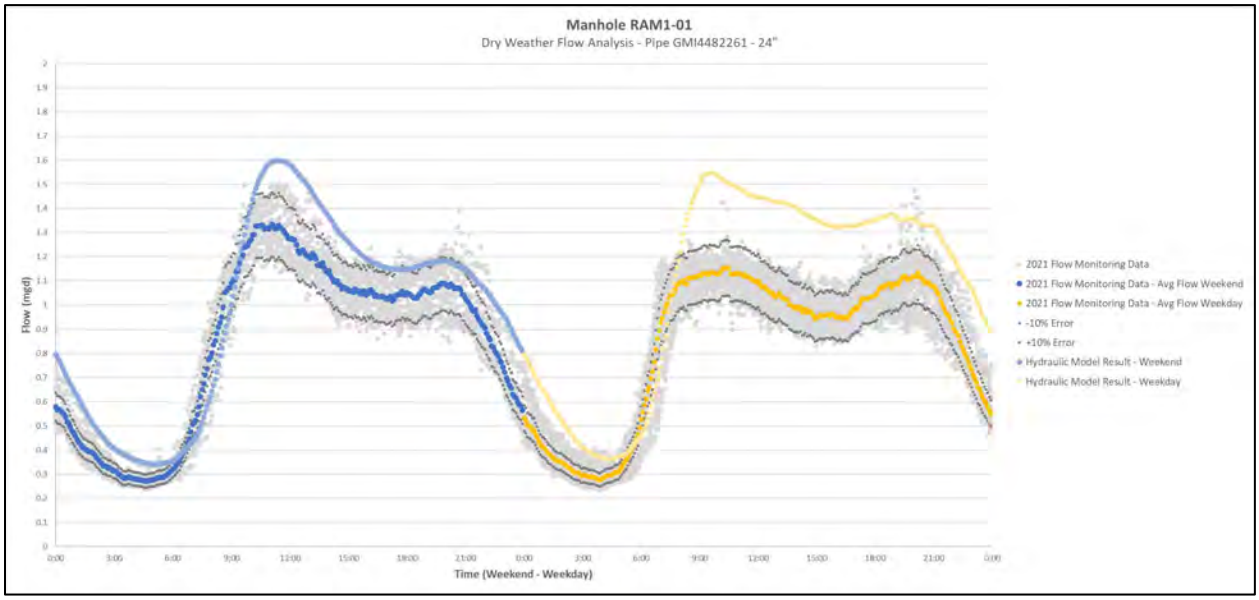
D.2.3 Manhole B1-02



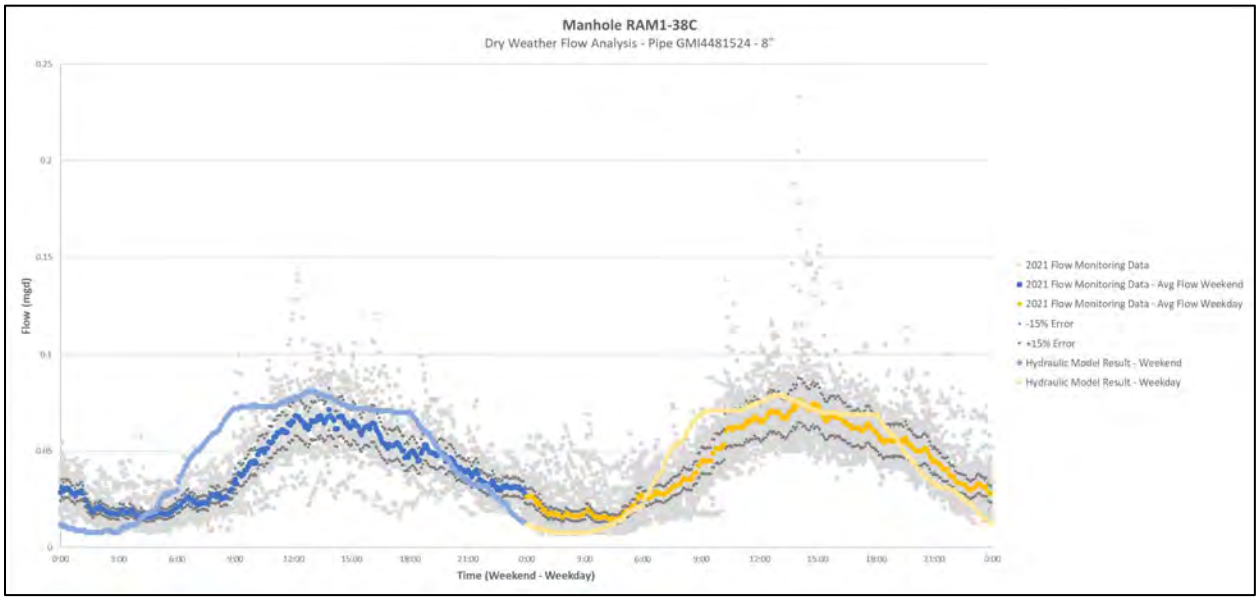
D.2.4 Manhole M1-14



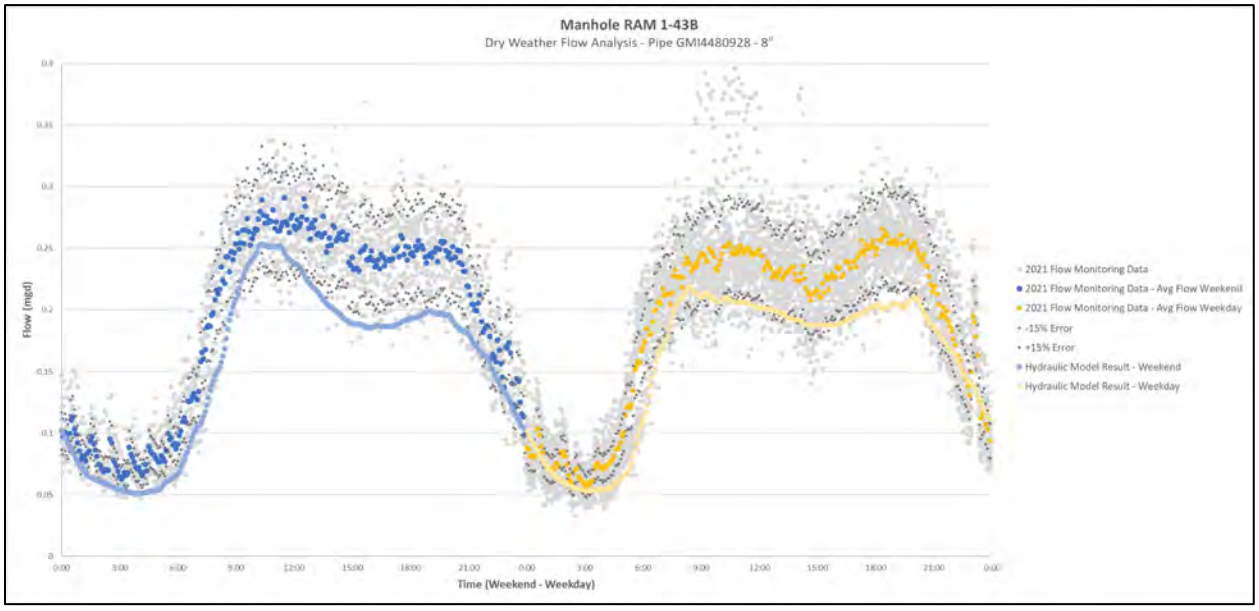
D.2.5 Manhole RAM1-01



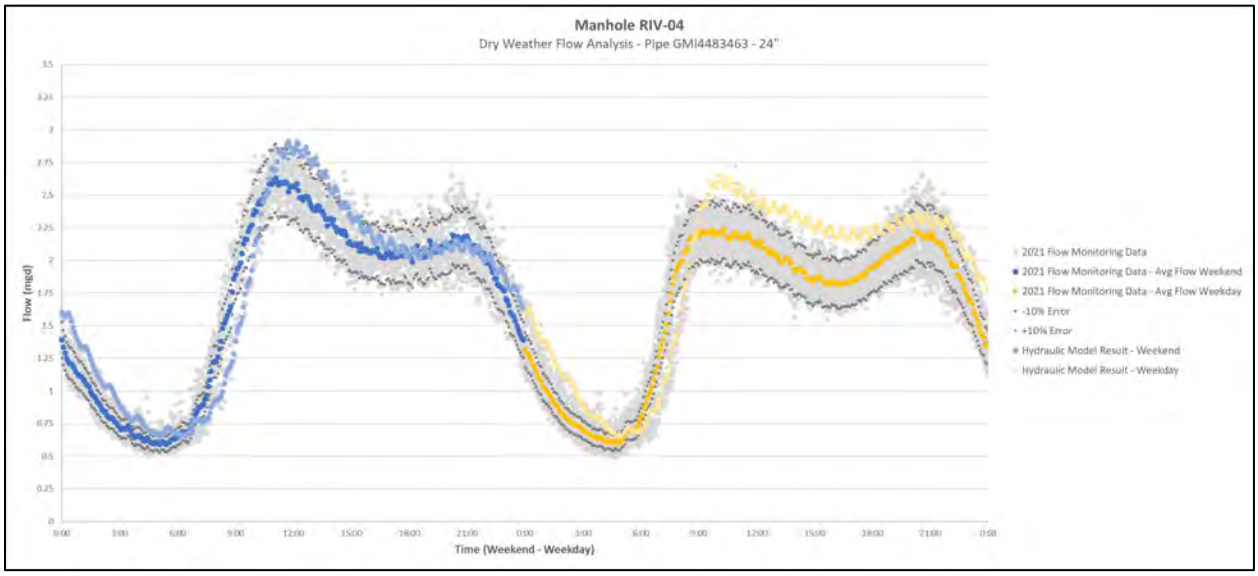
D.2.6 Manhole RAM1-38C



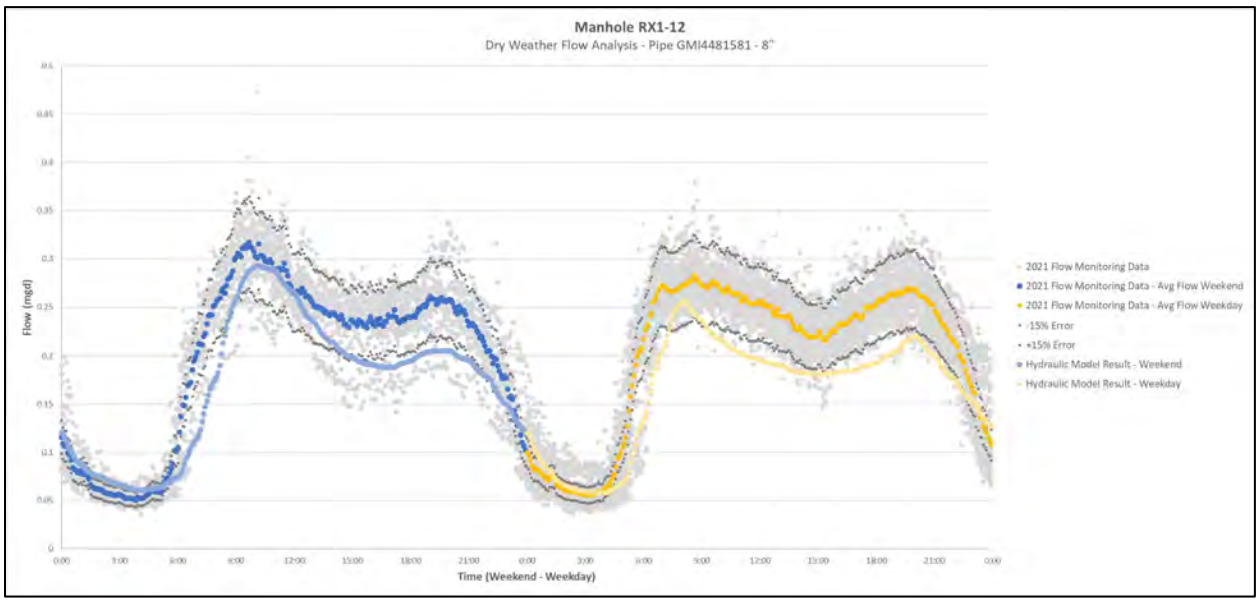
D.2.7 Manhole RAM1-43B



D.2.8 Manhole RIV1-04

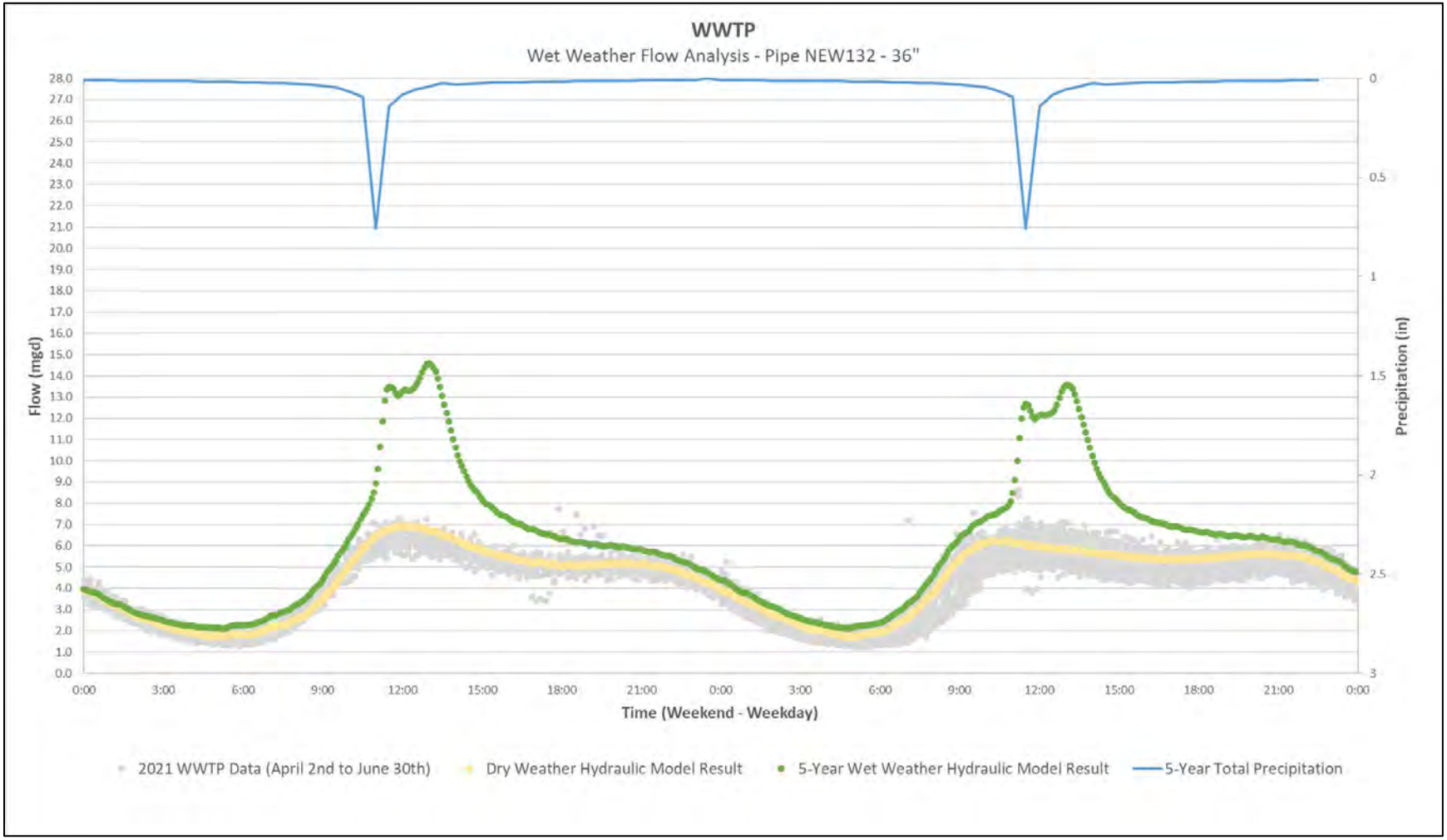


D.2.9 Manhole RX1-12

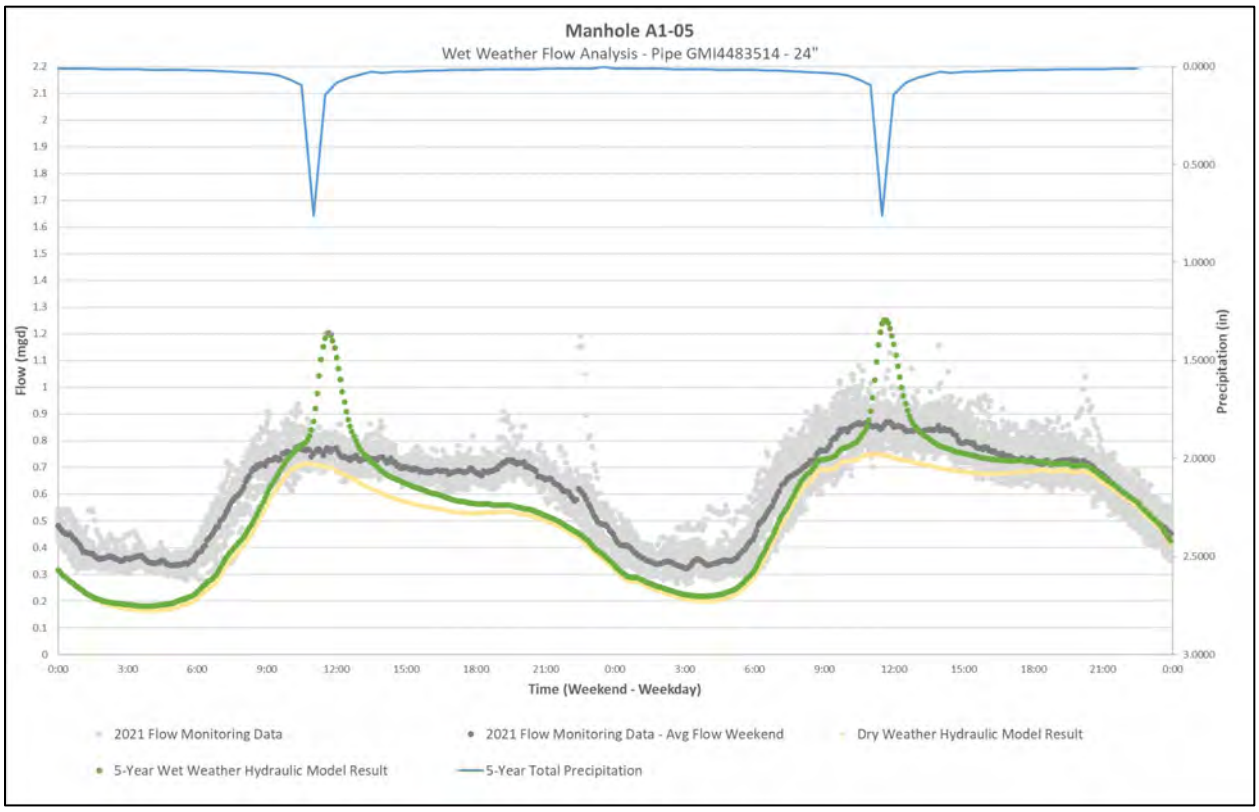


D.3 Wet Weather Impacts

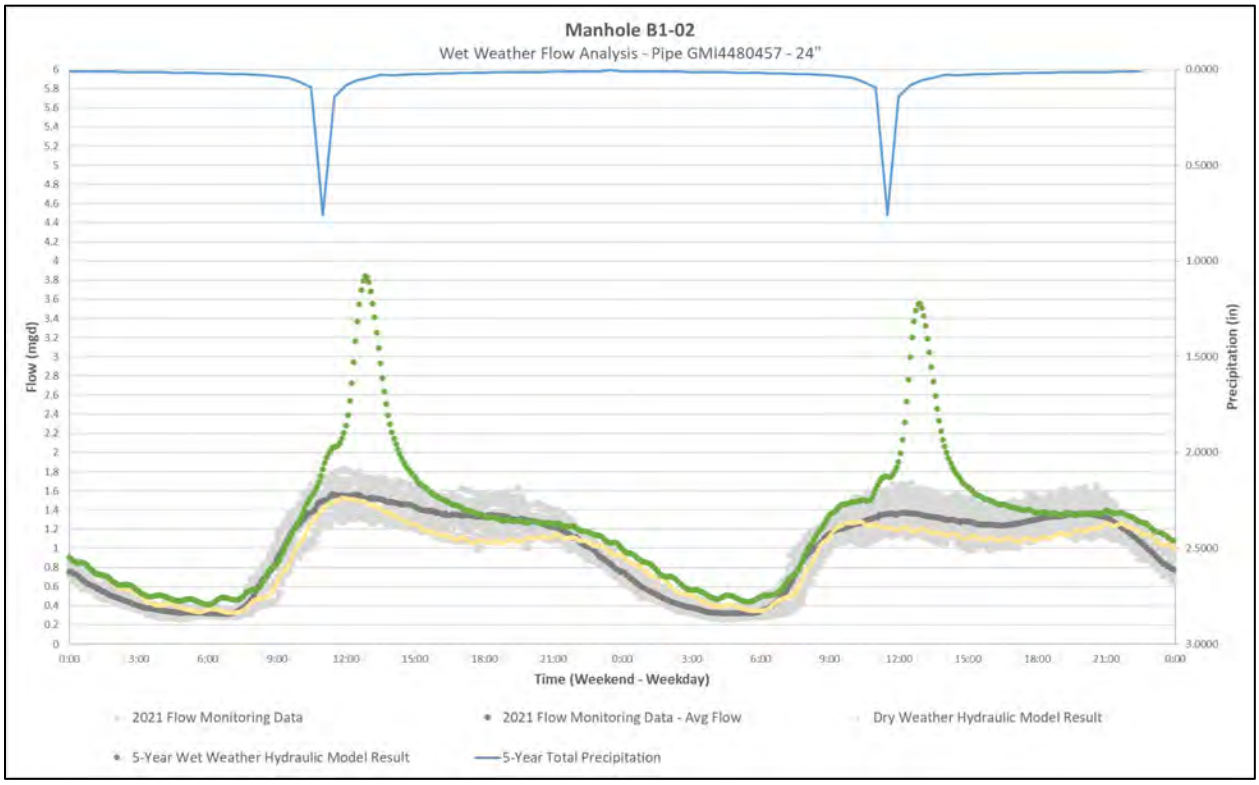
D.3.1 WWTP



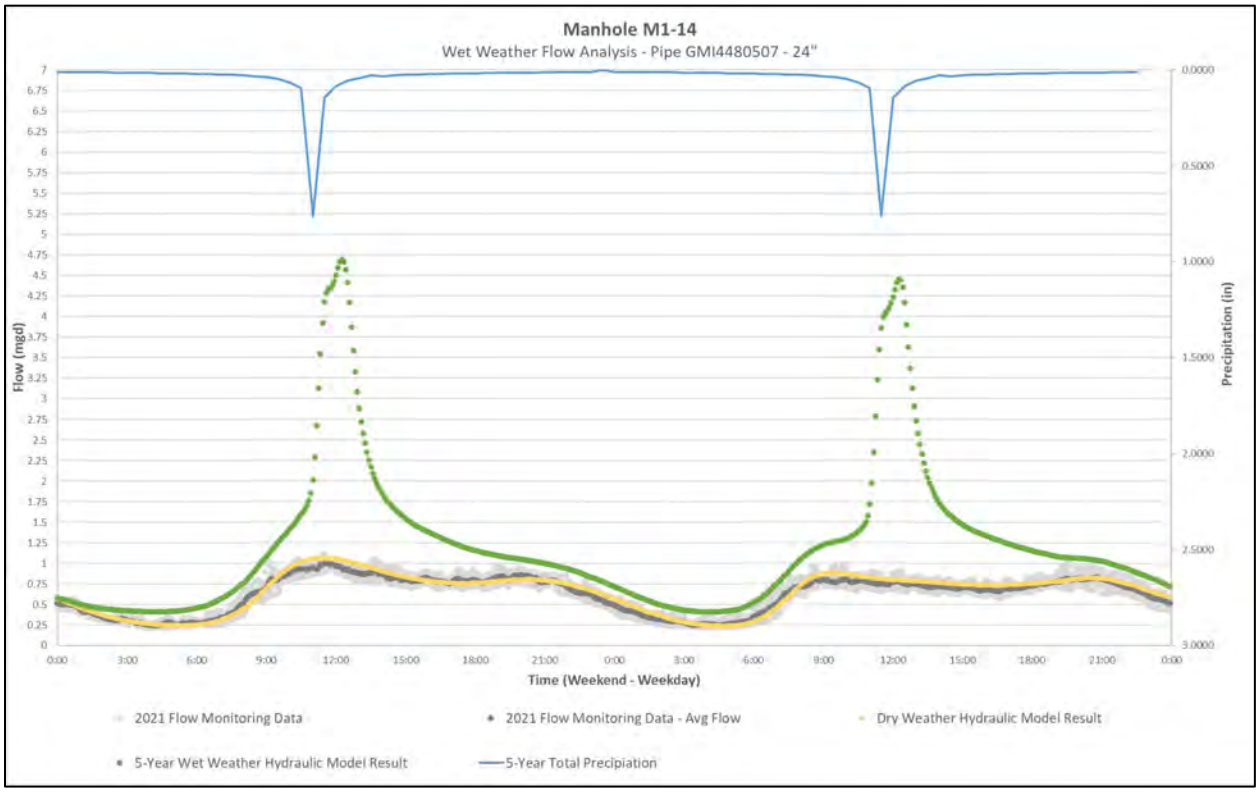
D.3.2 Manhole A1-05



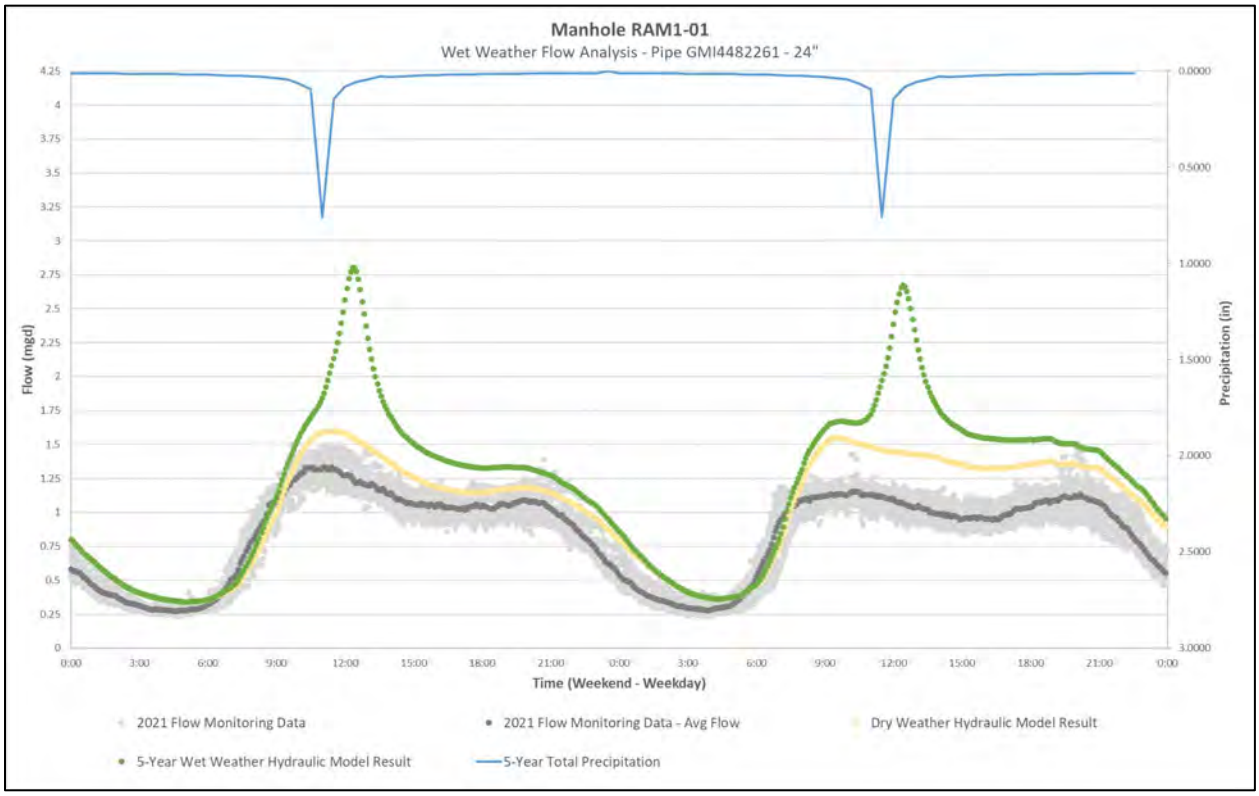
D.3.3 Manhole B1-02



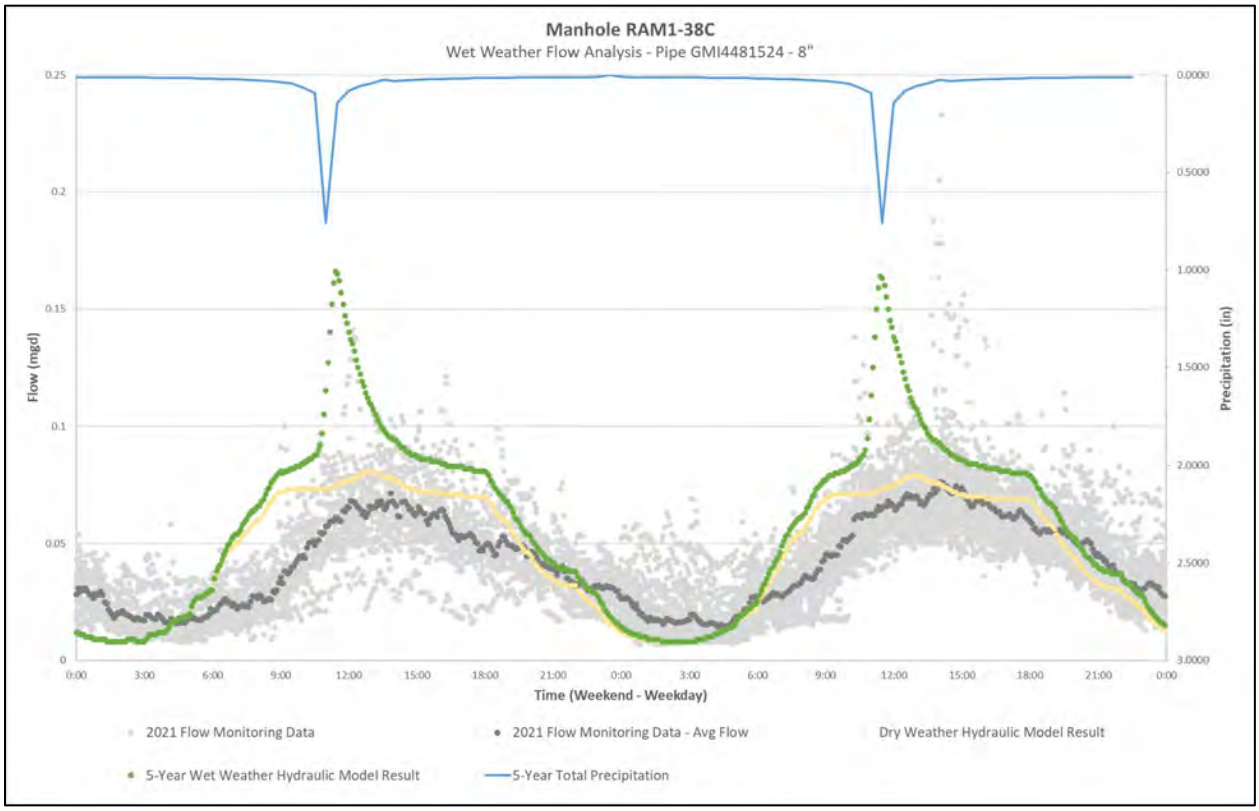
D.3.4 Manhole M1-14



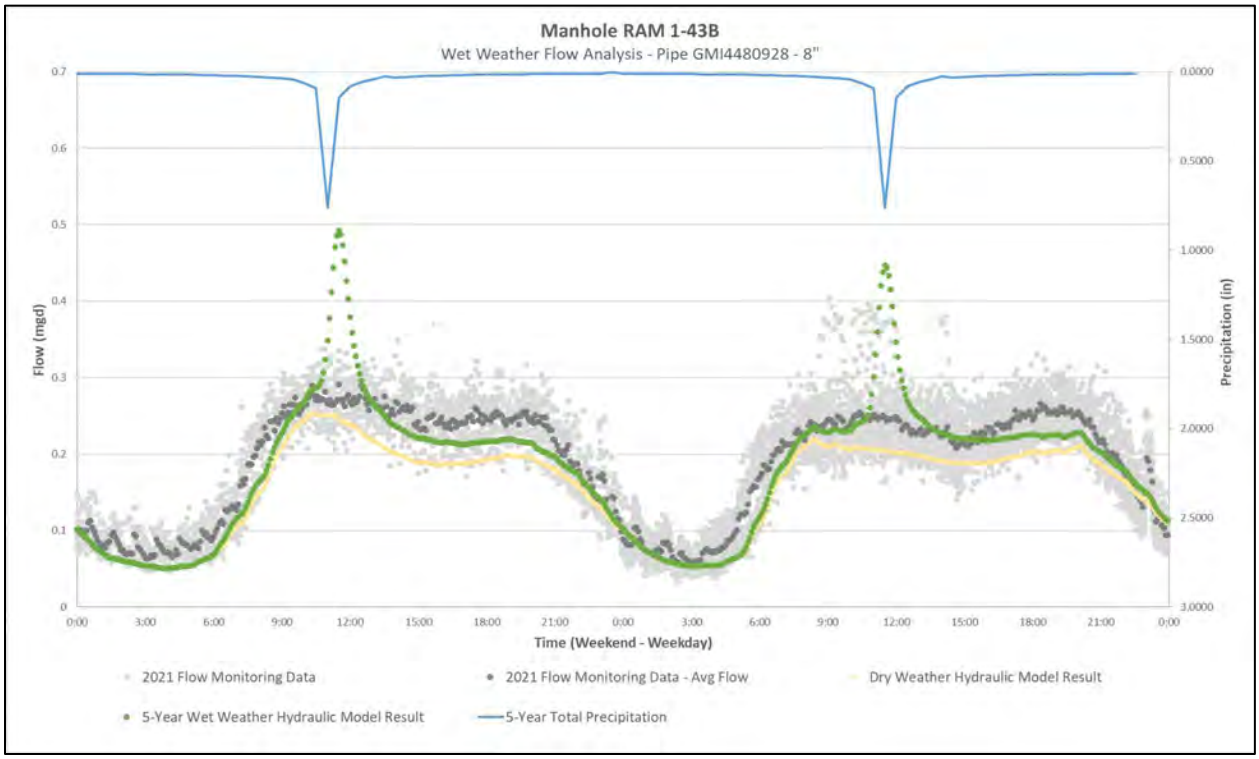
D.3.5 Manhole RAM1-01



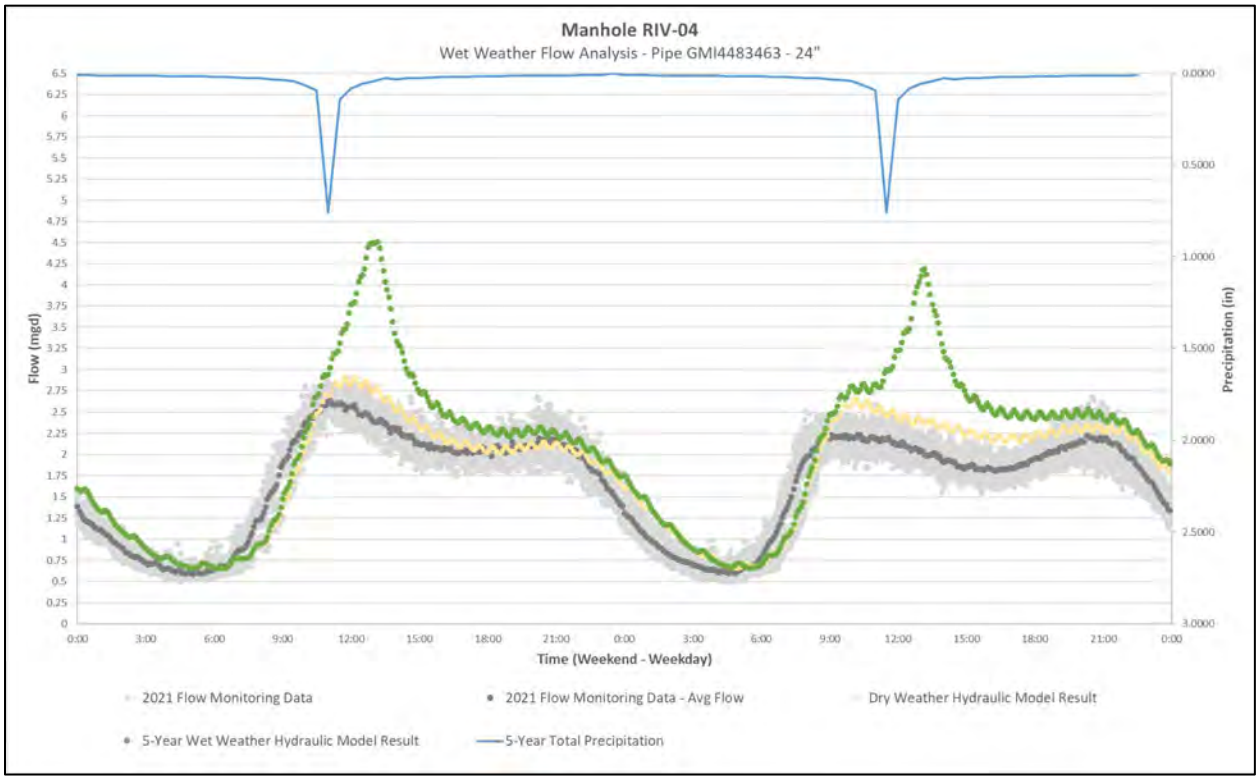
D.3.6 Manhole RAM1-38C



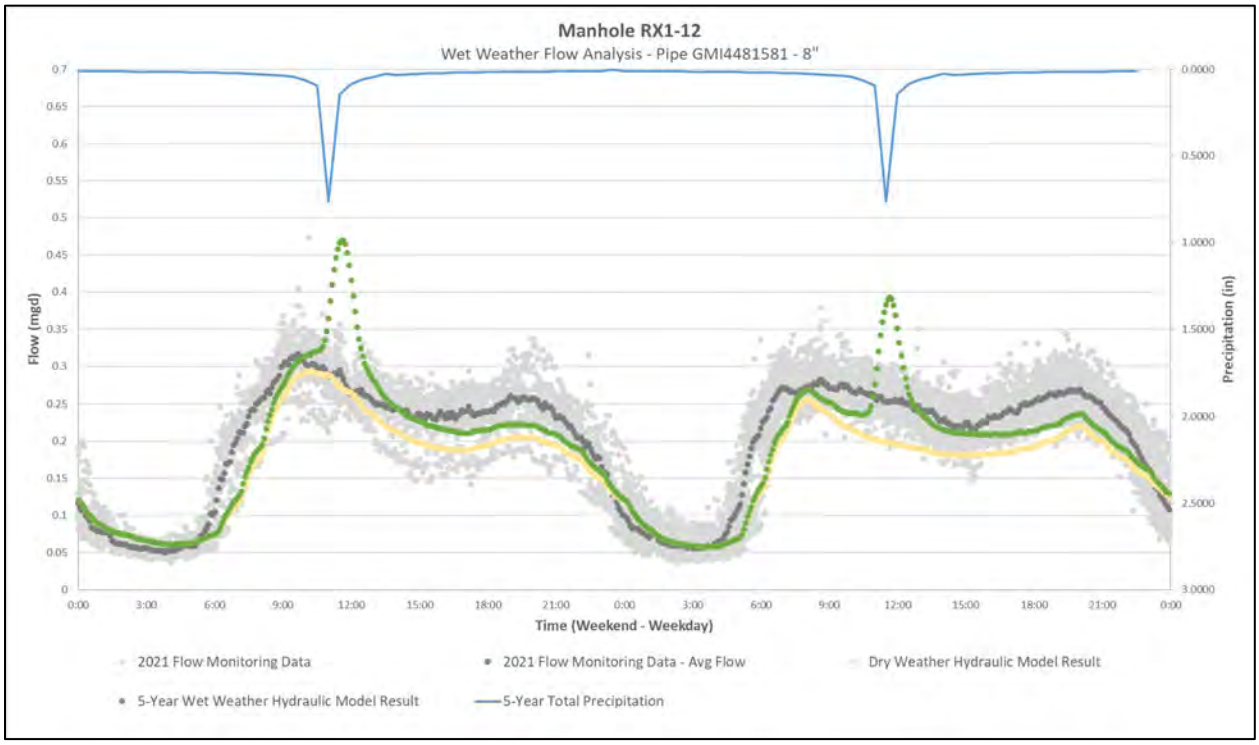
D.3.7 Manhole RAM1-43B



D.3.8 Manhole RIV1-04



D.3.9 Manhole RX1-12



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Appendix E

System Issues

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Appendix E System Issues

E.1 Introduction

This appendix provides more details for each of the capacity issues identified throughout the 2022 Wastewater Collection System Master Plan. A short narrative discussing the issue is included with a hydraulic grade line (HGL) plot showing the maximum water surface profile. The appendix is divided into three sections:

- E.2 – Existing Model
- E.3 – Committed Model
- E.4 – Master Plan Model

Each section contains an entry for each issue identified by the downstream manhole of the reach. These manhole identifiers correspond to the tables in the text (3-4, 4-3 and 6-3) and to the summary map showing the CIP projects (A17).

System issues were identified based on the following three criteria:

- Pipe slope below minimum requirements as defined in **Appendix C, Table C-3.**
- Capacity near or exceeding maximum values as calculated by the Manning's equation for each reach.
- Depth exceeding the d/D criteria as defined in **Appendix C, Table C-2.**

E.2 Existing Model – System Issues

E.2.1 BUS1-01AA

Background

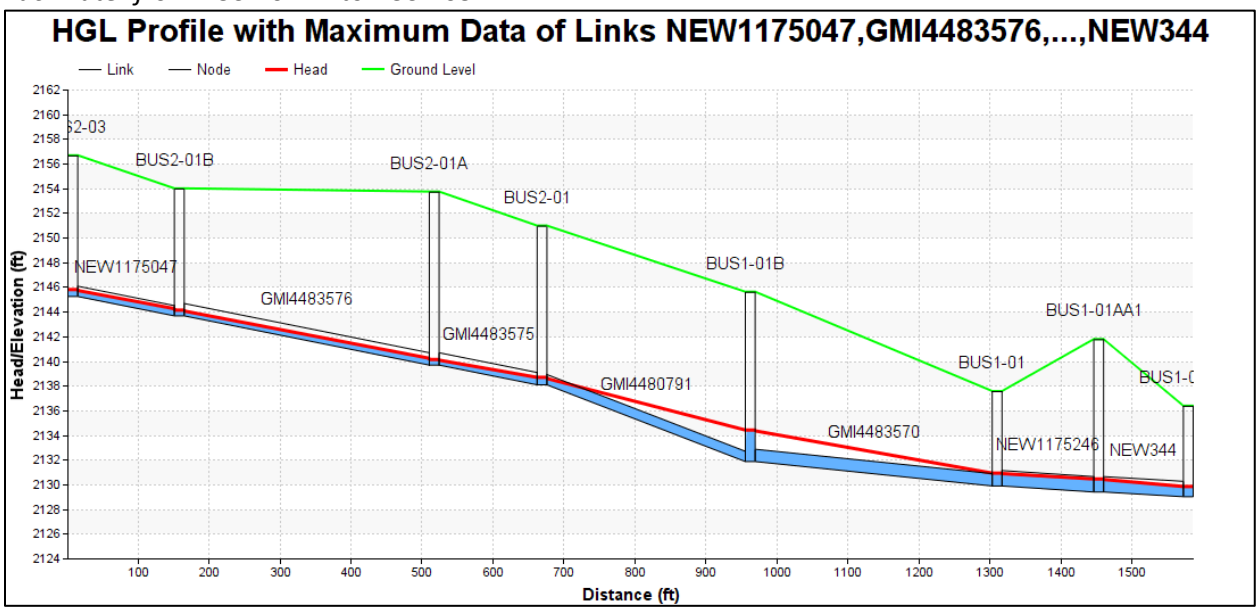
- The Business District sewer shed has many roof drains, parking lots and catch basins that are connected directly to the sewer. The total impervious inflow area in the sewer shed is about 2.9 Acres.
- The 10-inch pipe between BUS1-01B and BUS2-01 is connected to a 12-inch pipe upstream and downstream.
- Inverts were straight graded for BUS3-01 to BUS2-01.

Issues

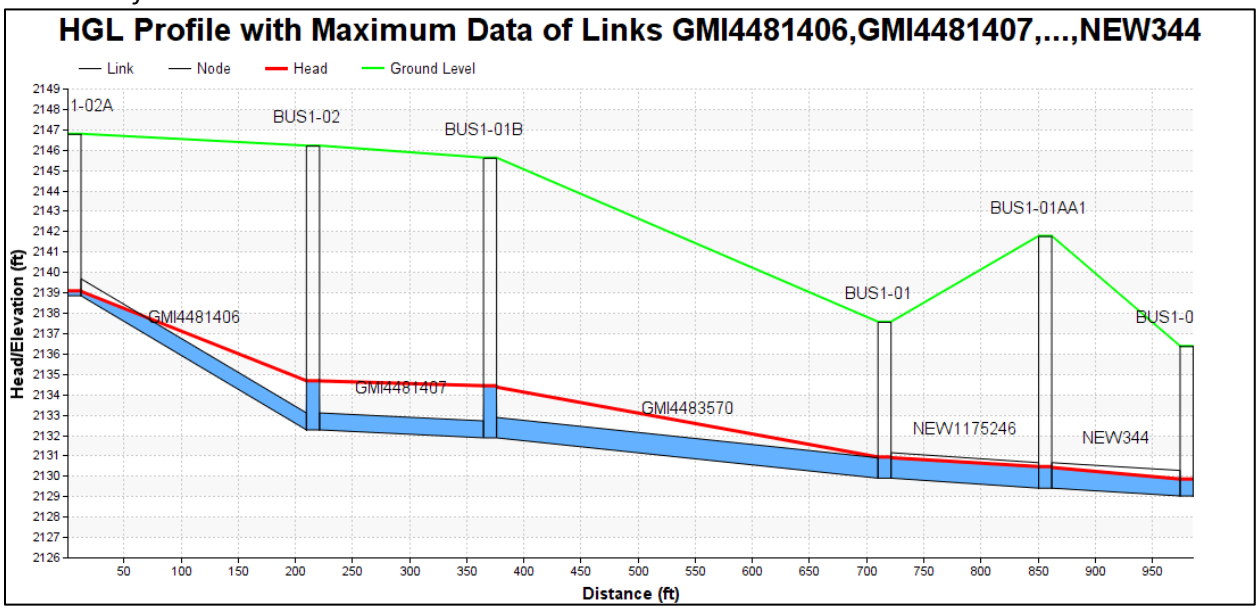
- The following pipe has a slope below the 0.28% minimum slope for a 10-inch pipe: BUS1-01B to BUS1-02 (0.21%).
- Surcharging occurs at BUS1-01B (1.56 feet) and BUS1-02 (1.58 feet).
- The following pipes are over capacity and contribute to the surcharges: BUS1-01 to BUS1-01B (12-inch), and BUS1-01B to BUS1-02 (10-inch).
- The following pipes are at or near capacity: BUS1-01A to BUS1-01 (15-inch).
- The following pipes are at or above the d/D criteria: BUS1-01AA to BUS1-02A, BUS1-01B to BUS2-01 and BUS2-01B to BUS2-03.

HGL Profile

Backwater from BUS1-01AA to BUS2-03



Backwater from BUS1-01AA to BUS1-02A



E.2.2 M1-16

Background

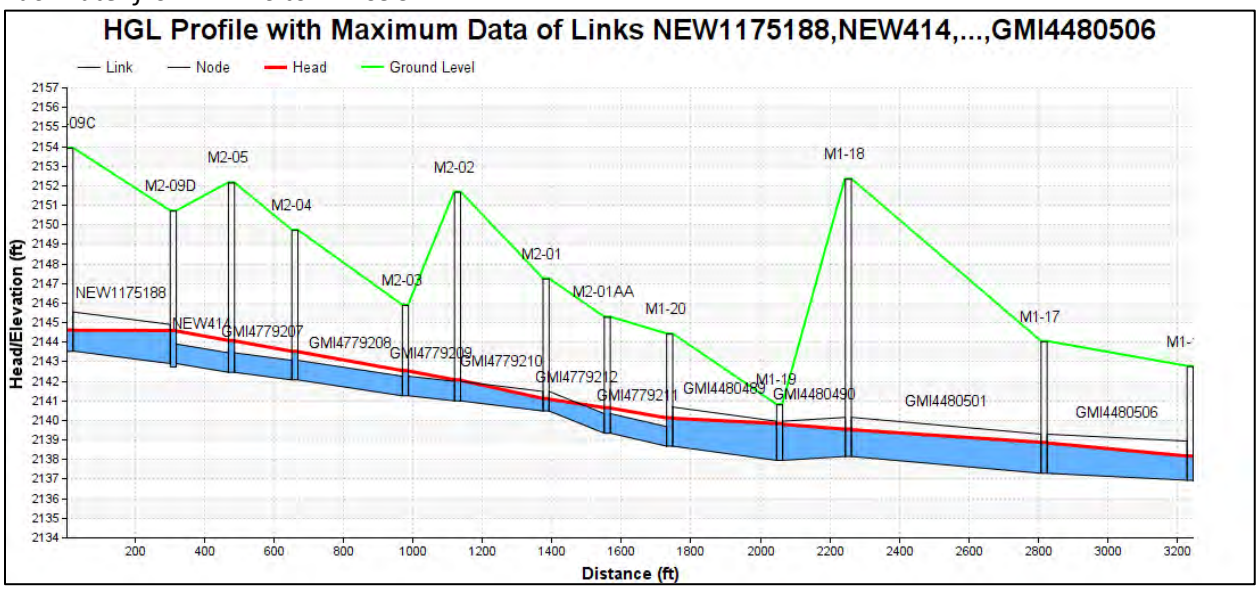
- This is a section of 12-inch and 24-inch pipe beginning at the intersection of Taylor Street and Ash Avenue and continues to the intersection of 19th Street and Young Avenue. There is also a single 24-inch pipe segment beginning at the intersection of Lost Avenue and the Alley between 15th and 16th Street.
- The 12-inch pipe between M1-20 and M2-09D has 24-inch pipes upstream and downstream.
- A section of this trunk has been rehabilitated with CIPP from M2-03 to M2-09D.
- An invert from the 2002 Hydra Model and 2013 Master Plan Model was used for M2-02. The manhole is believed to be buried. J-U-B and City Staff were unable to locate the manhole during 2022 surveying efforts.

Issues

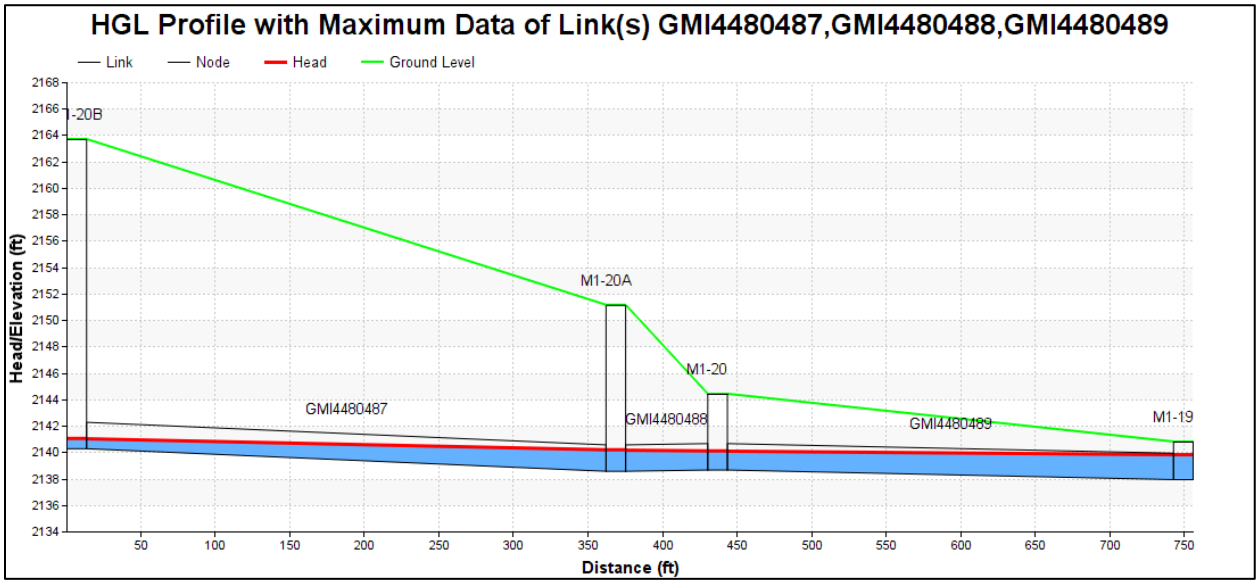
- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: M2-02 to M2-03 (0.14%), and M2-04 to M2-05 (0.16%).
- Surcharging occurs at M1-20 (0.45 feet), M2-01AA (0.31 feet), M2-02 (0.08 feet), M2-03 (0.29 feet), M2-04 (0.46 feet), M2-05 (0.63 feet), and M2-09D (0.87 feet).
- The following pipes are over capacity and contribute to the surcharges: M2-01 to M2-09D (12-inch) and M1-16 to M1-17 (24-inch).
- The following pipes are at or above the d/D criteria: M1-18 to M2-09D and M1-19 to M1-20A

HGL Profile

Backwater from M1-16 to M2-09C



Backwater from M1-19 to M1-20B



E.2.3 M3-01

Background

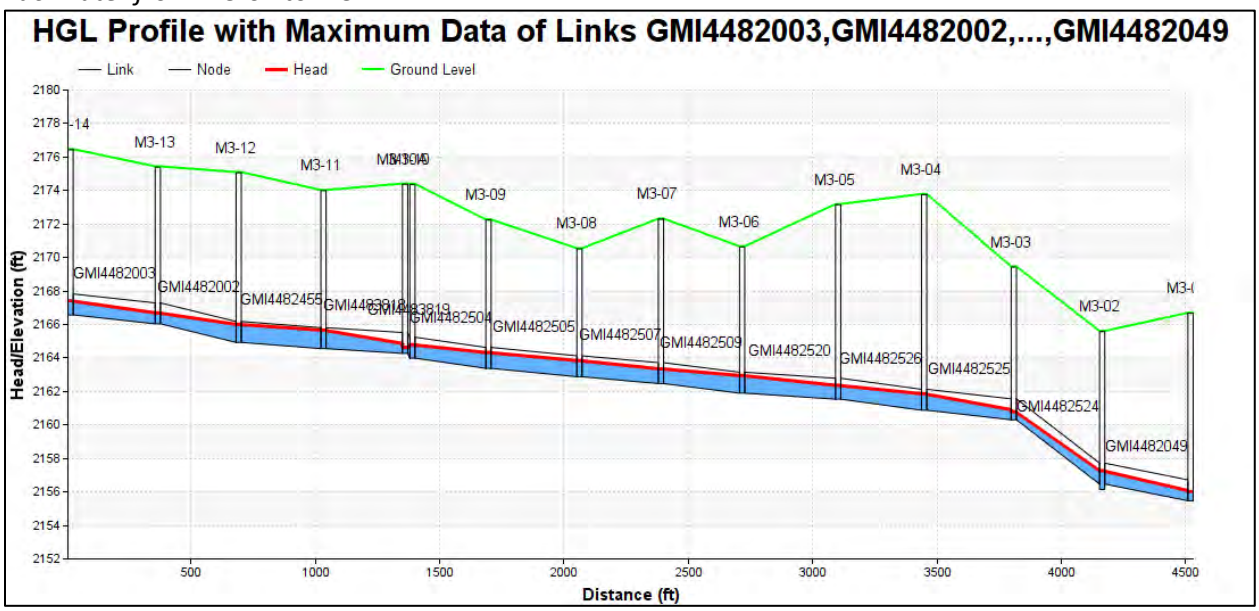
- This reach includes a section of 15-inch pipe beginning at the intersection of Coeur d'Alene Avenue and 18th Street, continuing east to 15th Street between Maple Avenue and Birch Avenue, a 12-inch pipe in the alley between Maple Avenue and Birch Avenue to the intersection of Locust Avenue and 12th Street, and a 10-inch pipe from the intersection of Locust Avenue and 12th Street to the south west of McFarland Avenue and 7th Street.
- A section of trunk has been rehabilitated with CIPP from M3-18 to D1-03.

Issues

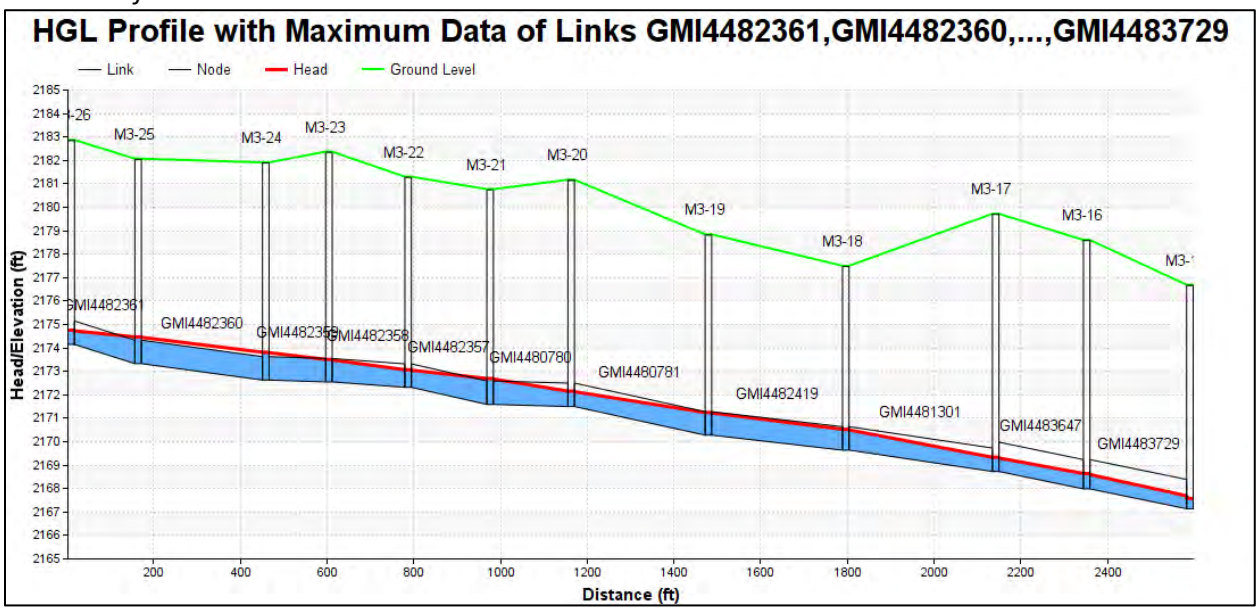
- The following pipes have slopes below the 0.28% minimum slope for a 10-inch pipe: M3-40 to M3-41 (0.15%), D1-01 to D1-02 (0.01%)
- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: M3-17 to M3-18 (0.18%), M3-18 to M3-19 (0.19%), M3-20 to M3-21 (0.04%), M3-22 to M3-23 (0.12%), M3-23 to M3-24 (0.10%), and M3-24 to M3-25 (0.18%).
- The following pipes have slopes below the 0.15% minimum slope for a 15-inch pipe: M3-05 to M3-06 (.09%), M3-07 to M3-09 (0.12%), M3-10A to M3-11 (0.09%), and M3-11 to M3-12 (0.11%).
- Surcharging occurs at M3-21 (0.11 feet), M3-24 (0.19 feet), M3-25 (0.14 feet), and D1-02 (0.02 feet).
- The following pipes are over capacity and contribute to the surcharges: M3-05 to M3-06 (15-inch), M3-10 to M3-11 (15-inch), M3-18 to M3-19 (12-inch), M3-20 to M3-25 (12-inch), and D1-01 to D1-02 (10-inch).
- The following pipes are at or above the d/D criteria: M3-41B to D1-03, M3-40 to M3-41, M3-32A to M3-33, M3-27 to M3-31, M3-17 to M3-26, M3-11 to M3-13, M3-04 to M3-10, and M3-01 to M3-02.

HGL Profile

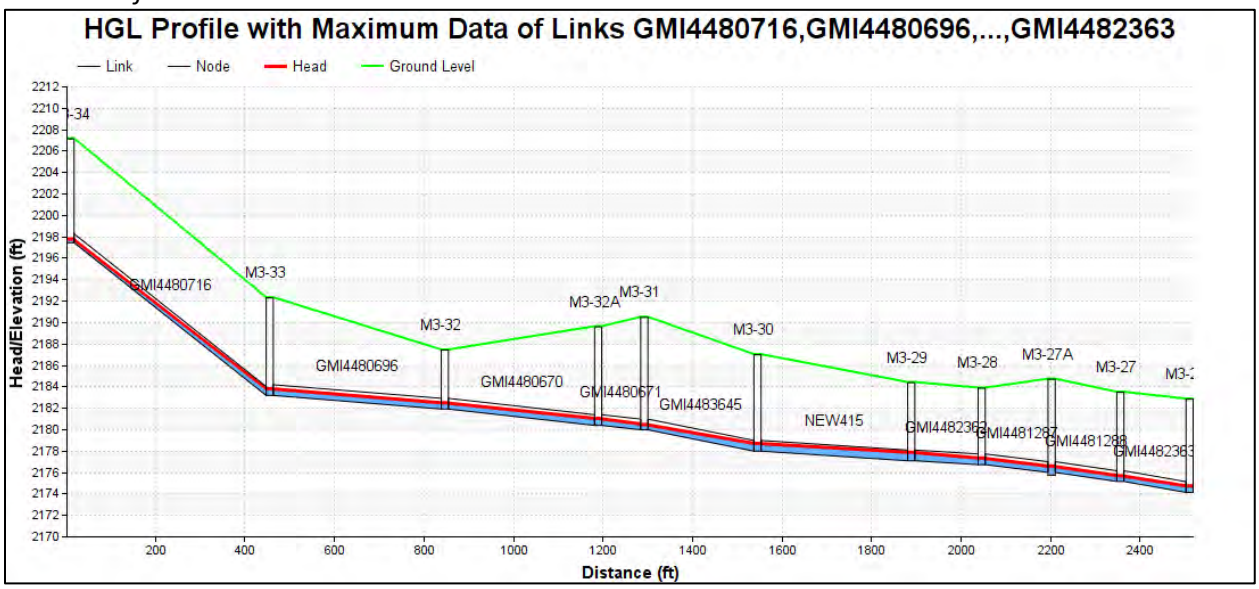
Backwater from M3-01 to M3-14



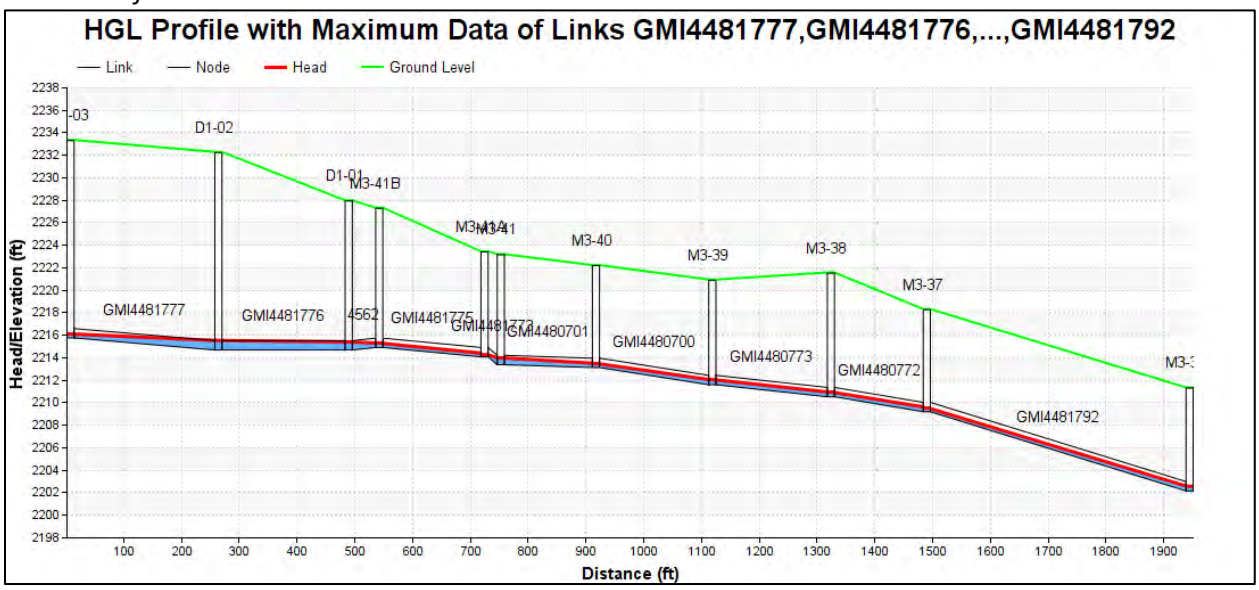
Backwater from M3-15 to M3-26



Backwater from M3-26 to M3-34



Backwater from M3-37 to D1-03



E.2.4 GAR1-01

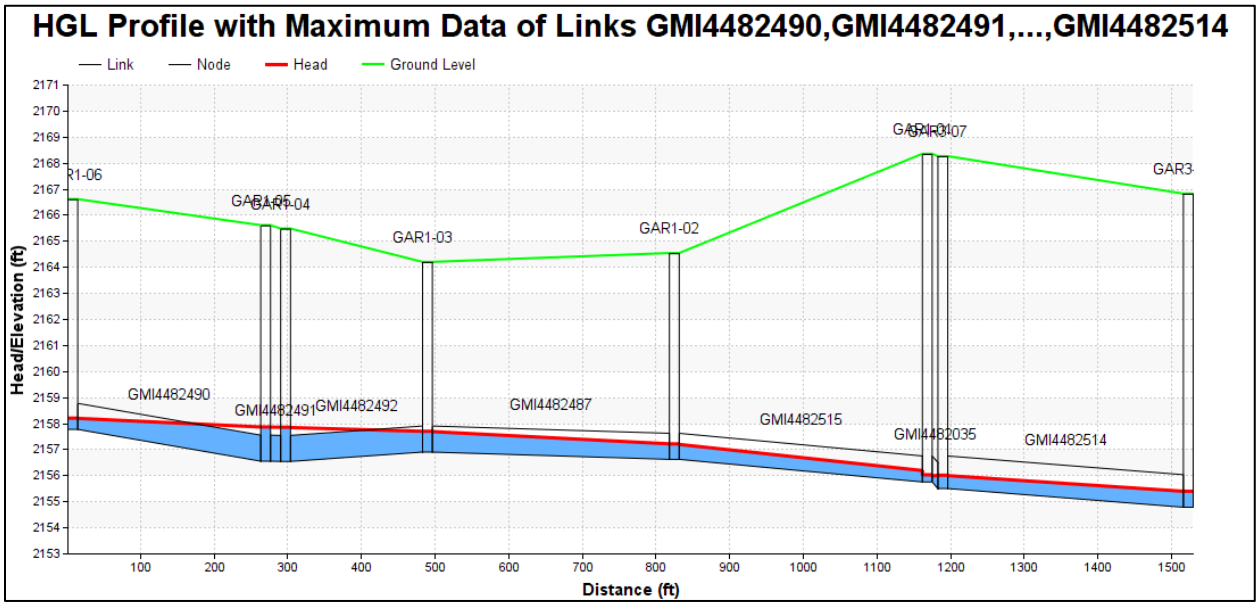
Background

- This reach includes a section of 12-inch pipe in 21st Street from the intersection of Garden Avenue and 21st Street to Pennsylvania Avenue just after the Interstate 90 underpass.

Issues

- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: GAR3-06 to GAR3-07 (0.21%), GAR1-02 to GAR1-03 (0.08%), GAR1-03 to GAR1-04 (-0.20%), and GAR1-04 to GAR1-05 (0.06%).
- Surcharging occurs at GAR1-04 (0.31 feet) and GAR1-05 (0.31 feet).
- The following pipes are over capacity and contribute to the surcharges: GAR1-02 to GAR1-03 (12-inch) and GAR1-04 to GAR1-05 (12-inch).
- The following pipes are at or above the d/D criteria: GAR1-02 to GAR1-06.

HGL Profile



E.2.5 BEXT2-20

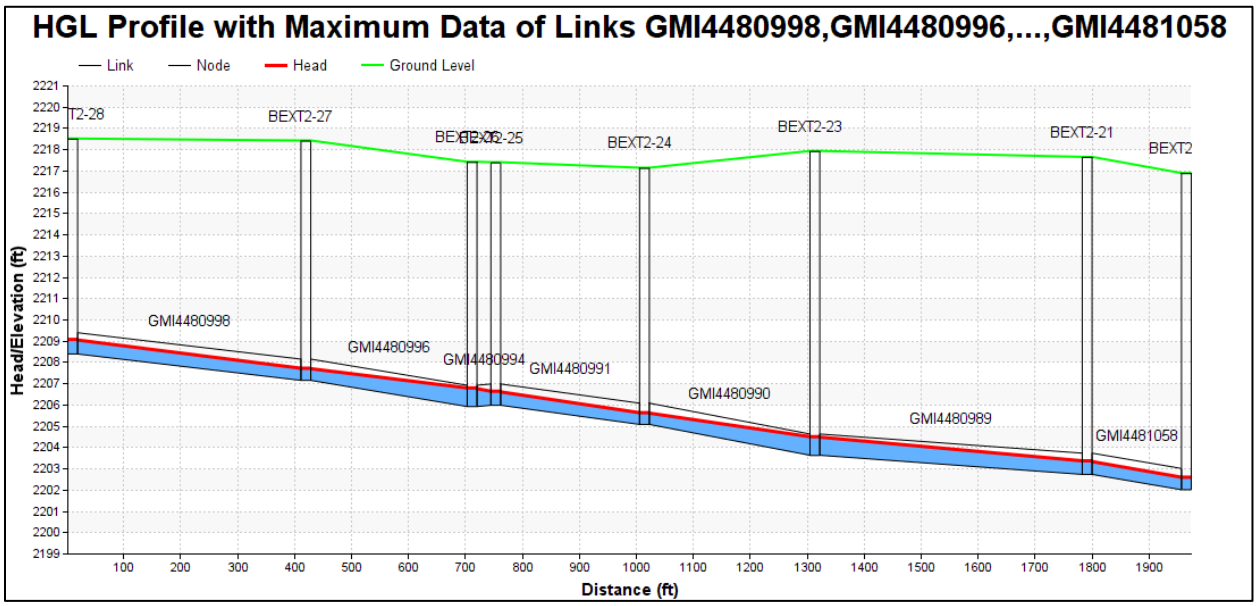
Background

- This reach includes a section of 12-inch pipe from the intersection of Ichabod Lane and 7th Street to the intersection of Lunceford Lane and 4th Street.
- This 12-inch pipe reach has 15-inch pipes upstream and downstream.

Issues

- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: BEXT2-21 to BEXT2-23 (0.18%) and BEXT2-25 to BEXT2-26 (-0.20%).
- The following pipes are at or above the d/D criteria: BEXT2-20 to BEXT2-28.

HGL Profile



E.2.6 BEXT2-07I

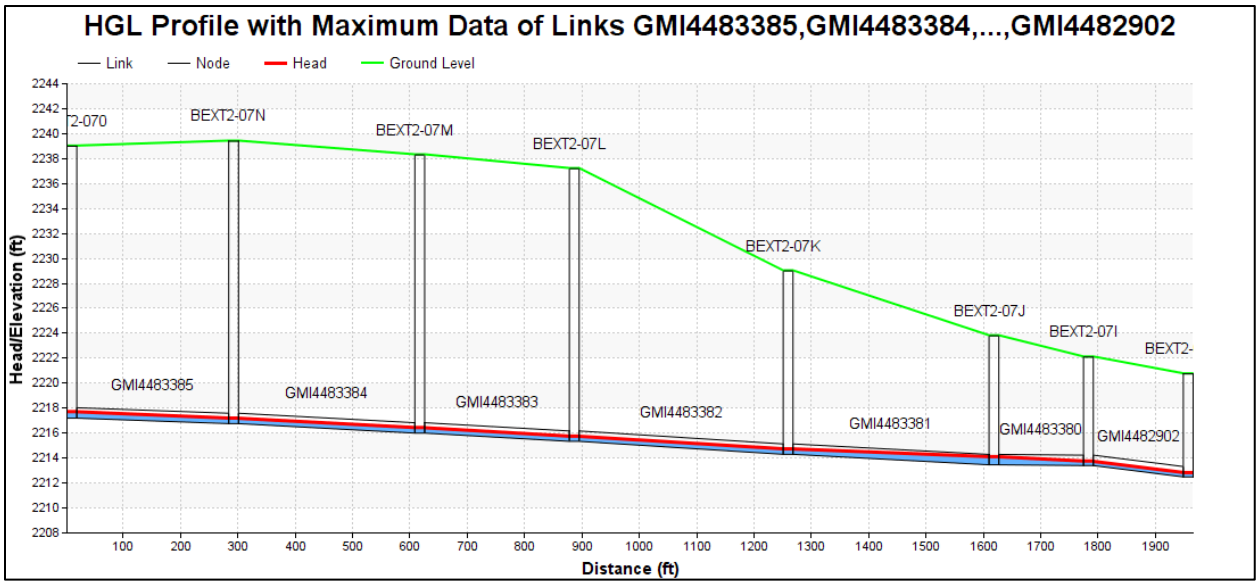
Background

- This reach includes a section of 10-inch pipe in 15th Street from just south of the intersection of 15th Street and Mary Lane to the intersection of 15th Street and Timber Lane.

Issues

- The following pipes have slopes below the 0.28% minimum slope for a 10-inch pipe: BEXT2-07I to BEXT2-07J (0.04%), BEXT2-07J to BEXT2-07K (0.22%), BEXT2-07L to BEXT2-07M (0.20%), BEXT2-07M to BEXT2-07N (0.23%), and BEXT2-07N to BEXT2-07O (0.15%).
- The following pipes are at or above the d/D criteria: BEXT2-07I to BEXT2-07K and BEXT2-07N to BEXT2-07O.

HGL Profile



E.2.7 BEXT1-22A

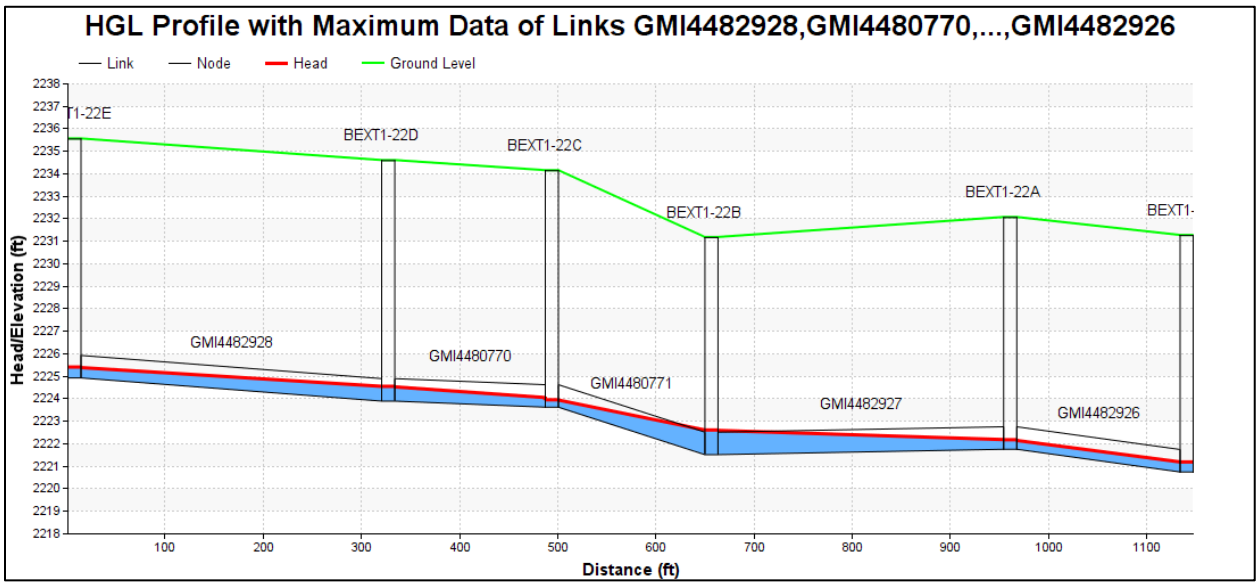
Background

- This reach includes a section of 12-inch pipe in 19th Street from the alley between Lunceford Lane and Mary Lane to Pine Hill Court.

Issues

- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: BEXT1-22A to BEXT1-22B (-0.07%) and BEXT1-22C to BEXT1-22D (0.16%).
- Surcharging occurs at BEXT1-22B (0.09 feet).
- The following pipes are at or above the d/D criteria: BEXT1-22A to BEXT1-22C

HGL Profile



E.2.8 RX1-11

Background

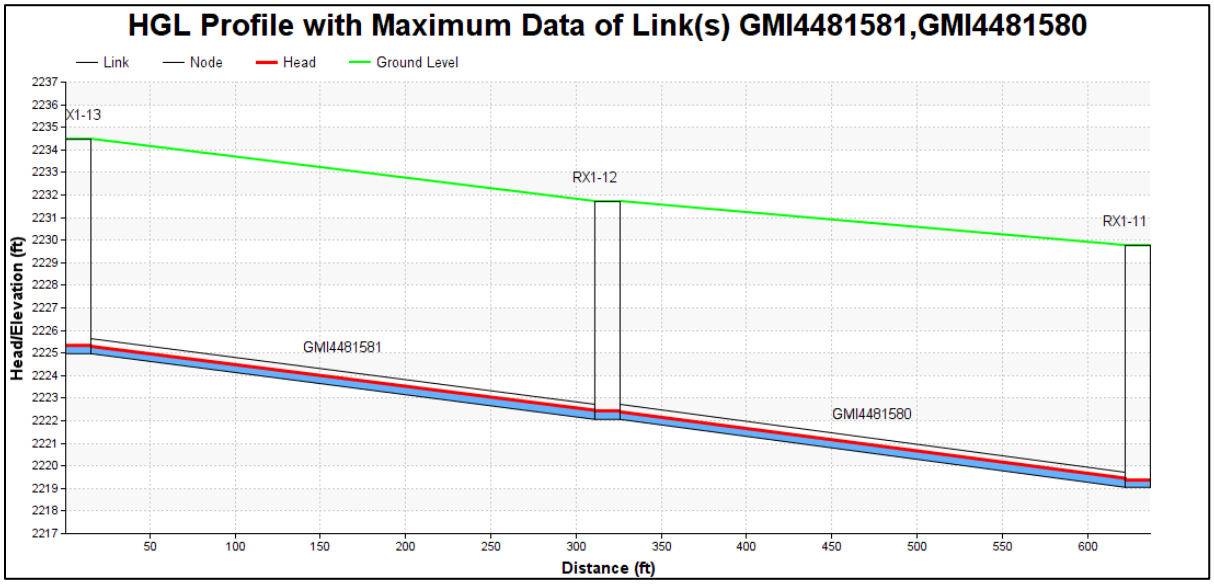
- This reach includes a section of 8-inch pipe from the intersection of Westminster Avenue and Atlantic Drive to the intersection of Dalton Avenue and Ramsey Road.

Issues

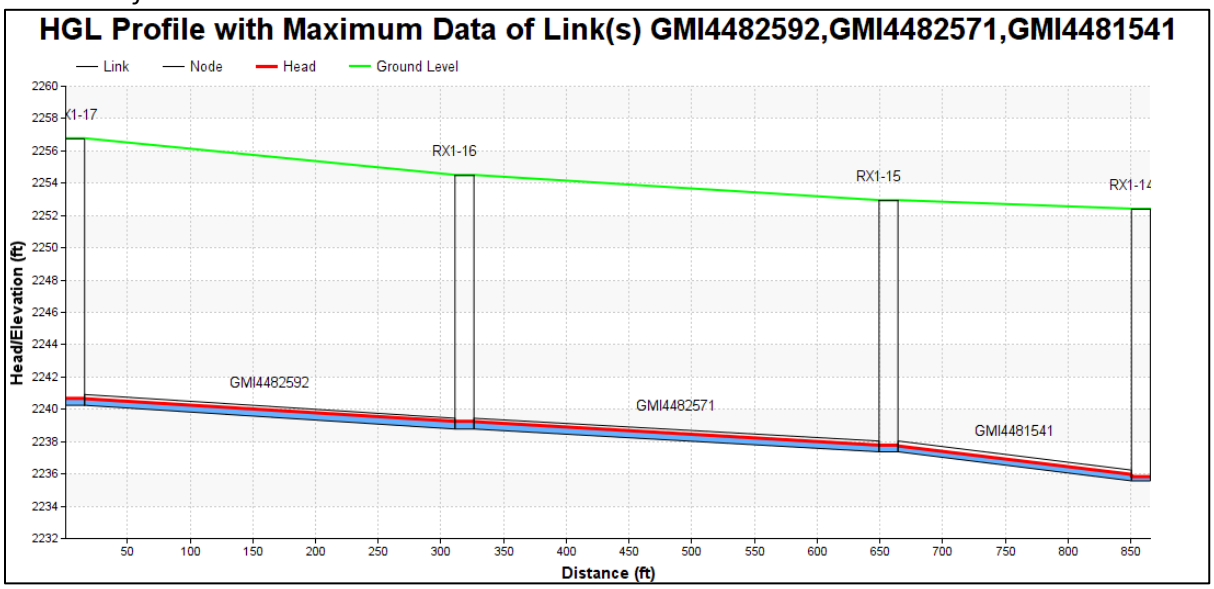
- The following pipes have slopes below the 0.40% minimum slope for an 8-inch pipe: RX1-17 to RX1-18 (0.35%) and RX1-18 to RX1-19 (0.38%)
- The following pipes are at or above the d/D criteria: RX1-11 to RX1-13 and RX1-14 to RX1-19

HGL Profile

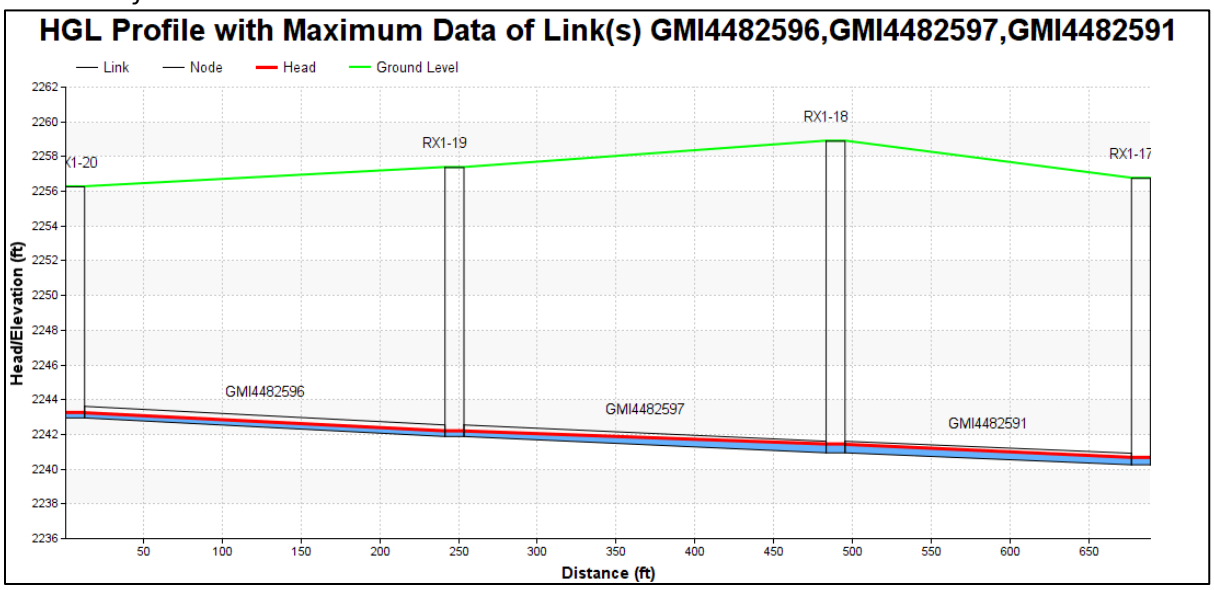
Backwater from RX1-11 to RX1-13



Backwater from RX1-14 to RX1-17



Backwater from RX1-17 to RX1-20



E.2.9 RAM1-39

Background

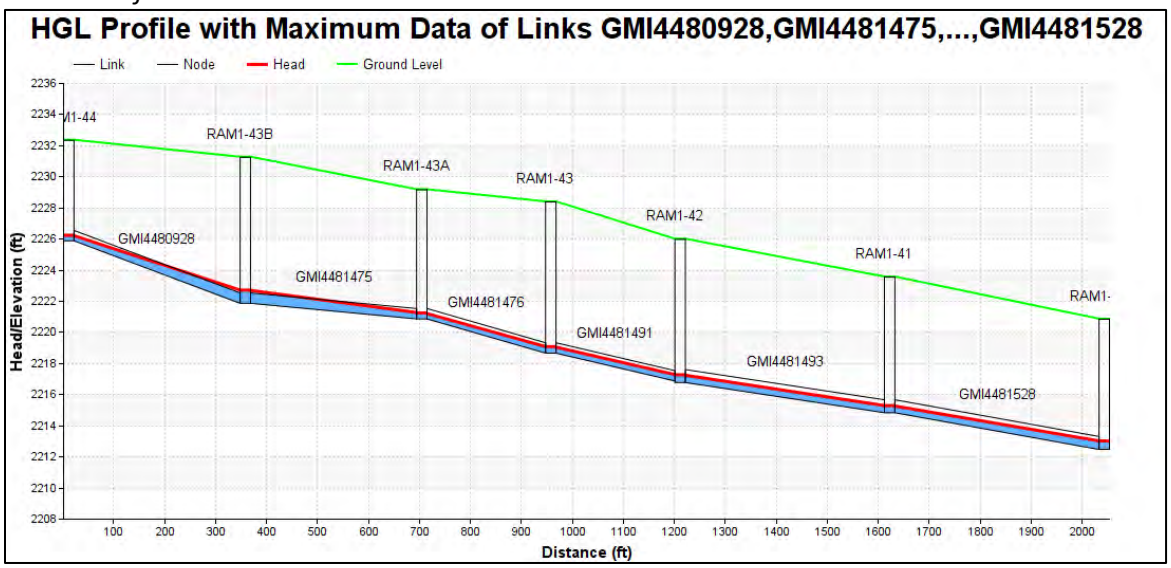
- This reach includes a section of 10-inch pipe to the west of Highway 95 from north of Park Avenue to Hanley Avenue, and an 8-inch pipe from Hanley Avenue to Wilbur Avenue.
- Inverts were straight graded for RAM1-43B and RAM1-46B1.

Issues

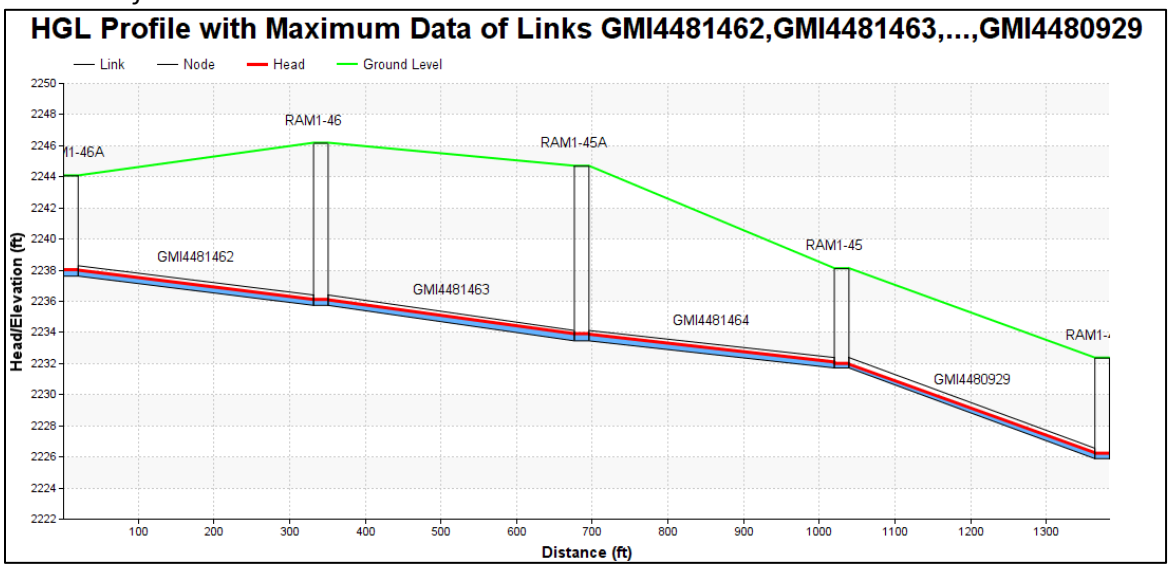
- Surcharging occurs at RAM1-43B (0.19 feet)
- The following pipes are over capacity and contribute to the surcharges: RAM1-43A to RAM1-43B
- The following pipes are at or above the d/D criteria: RAM1-40 to RAM1-44 and RAM1-45 to RAM1-46B1

HGL Profile

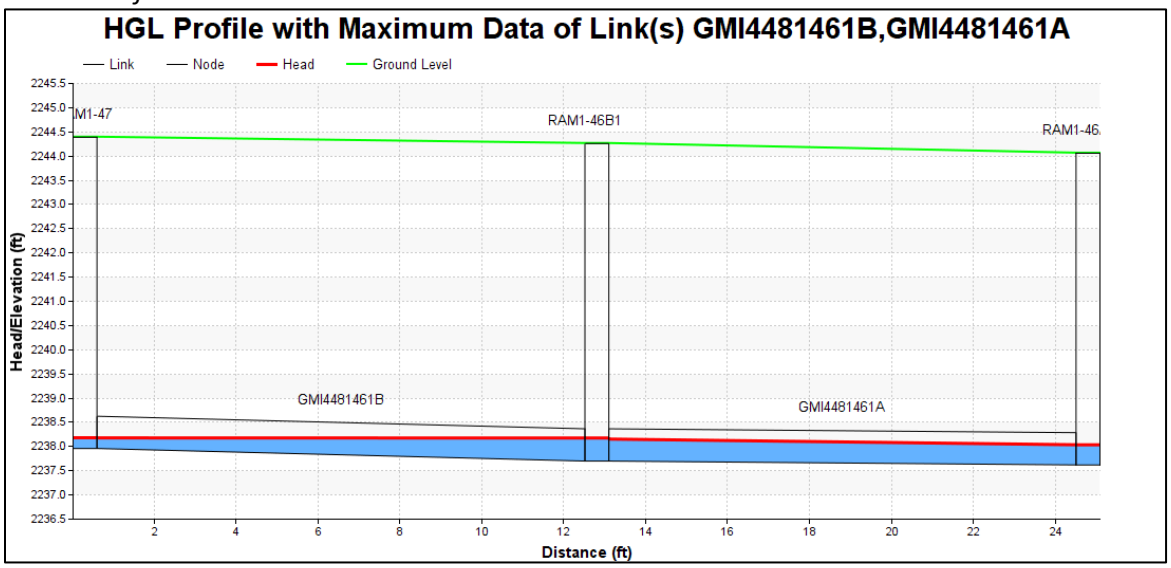
Backwater from RAM1-40 to RAM1-44



Backwater from RAM1-44 to RAM1-46A



Backwater from RAM1-46A to RAM1-47



E.3 Committed Model - System Issues

E.3.1 BUS1-01AA

Background

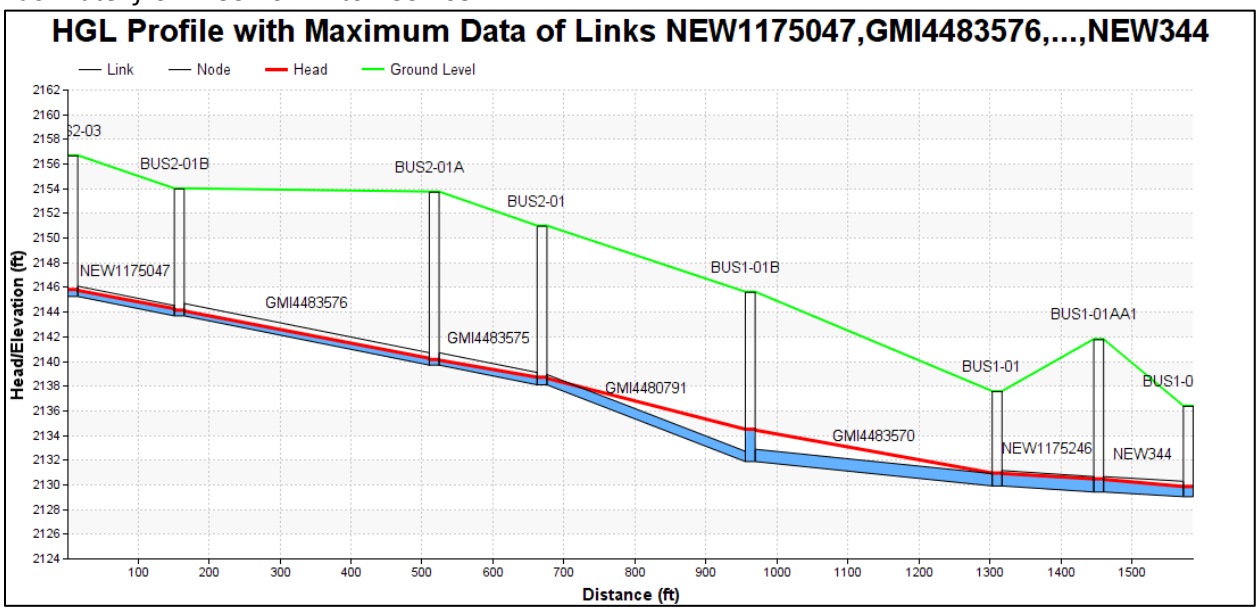
- The Business District sewershed has many roof drains, parking lots and catch basins that are connected directly to the sewer. The total impervious inflow area in the sewer shed is about 2.9 Acres.
- The 10-inch pipe between BUS1-01B and BUS2-01 is connected to a 12-inch pipe upstream and downstream.
- Inverts were straight graded for BUS3-01 to BUS2-01.

Issues

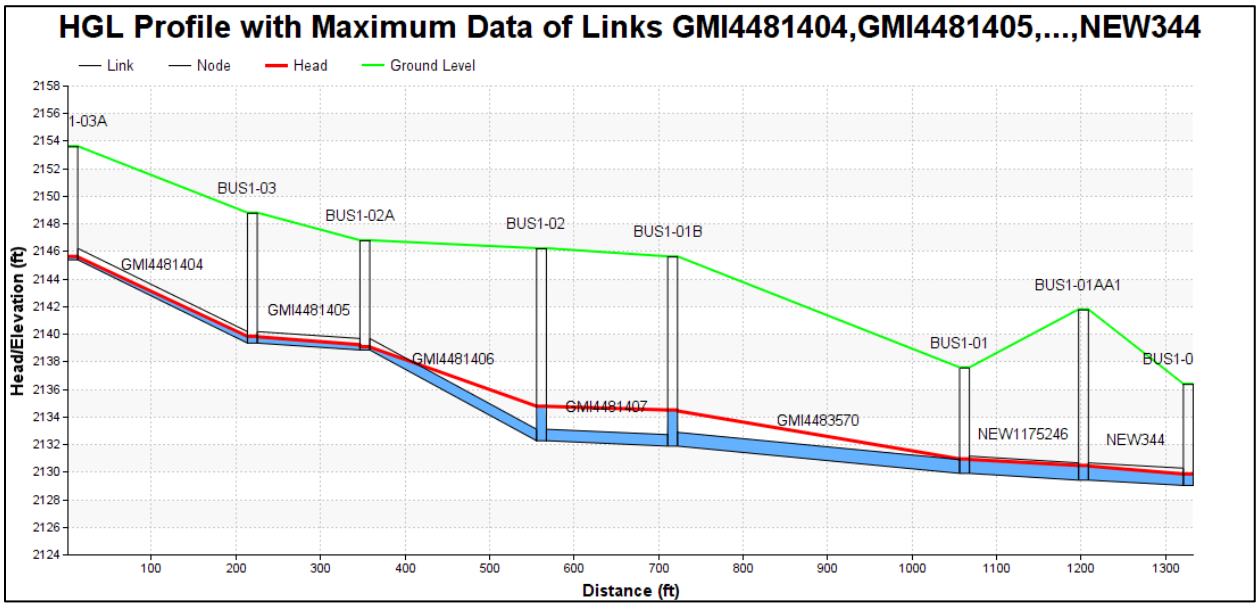
- The following pipes have slopes below the 0.28% minimum slope for a 10-inch pipe: BUS1-01B to BUS1-02 (0.21%).
- Surcharging occurs at BUS1-01B (1.62 feet) and BUS1-02 (1.67 feet).
- The following pipes are over capacity and contribute to the surcharges: BUS1-01 to BUS1-01B (12-inch), and BUS1-01B to BUS1-02 (10-inch).
- The following pipes are at or near capacity: BUS1-01A to BUS1-01 (15-inch) and BUS1-01B to BUS2-01 (10-inch).
- The following pipes are at or above the d/D criteria: BUS1-01AA to BUS1-02A, BUS1-01B to BUS2-01 and BUS2-01B to BUS2-03.

HGL Profile

Backwater from BUS1-01AA to BUS2-03



Backwater from BUS1-01AA to BUS1-03A



E.3.2 M1-16

Background

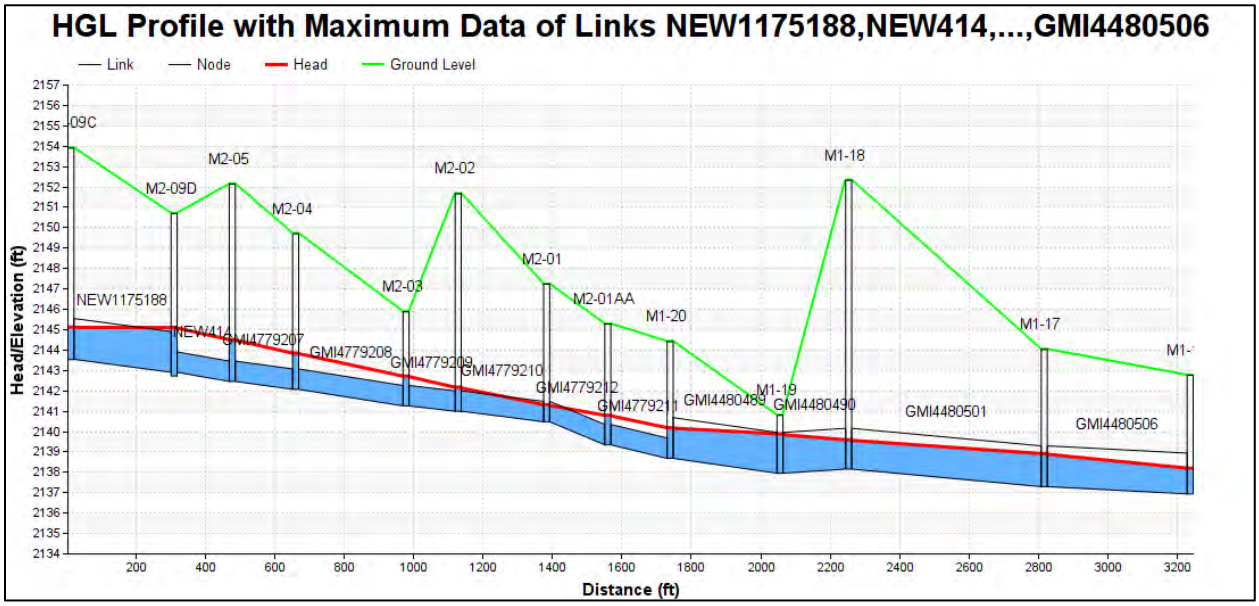
- This is a section of 12-inch and 24-inch pipe beginning at the intersection of Taylor Street and Ash Avenue and continues to the intersection of 19th Street and Young Avenue. There is also a single 24-inch pipe segment beginning at the intersection of Lost Avenue and the Alley between 15th and 16th Street.
- The 12-inch pipe between M1-20 and M2-09D has 24-inch pipes upstream and downstream.
- A section of this trunk has been rehabilitated with CIPP from M2-03 to M2-09D.
- An invert from the 2002 Hydra Model and 2013 Master Plan Model was used for M2-02. The manhole is believed to be buried. J-U-B and City Staff were unable to locate the manhole during 2022 surveying efforts.

Issues

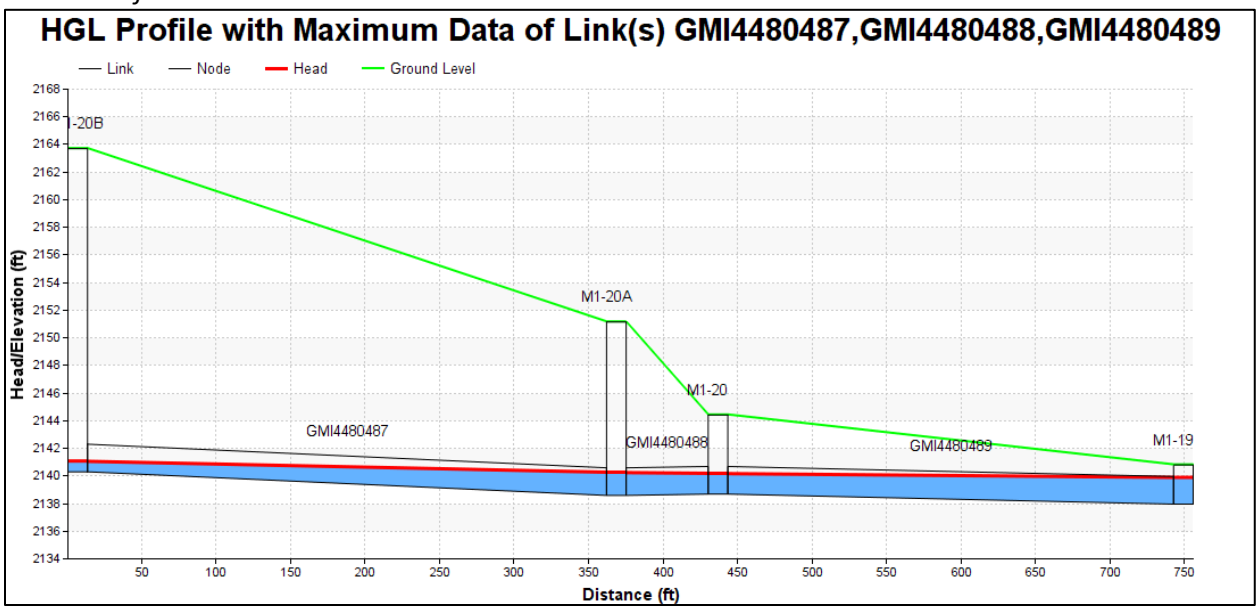
- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: M2-02 to M2-03 (0.14%), and M2-04 to M2-05 (0.16%).
- Surcharging occurs at M1-20 (0.50 feet), M2-01AA (0.45 feet), M2-02 (0.17 feet), M2-03 (0.46 feet), M2-04 (0.77 feet), M2-05 (1.05 feet), and M2-09D (1.37 feet).
- The following pipes are over capacity and contribute to the surcharges: M2-01 to M2-09D (12-inch) and M1-16 to M1-17 (24-inch).
- The following pipes are at or above the d/D criteria: M1-18 to M2-09C and M1-19 to M1-20A.

HGL Profile

Backwater from M1-16 to M2-09C



Backwater from M1-19 to M1-20B



E.3.3 M3-01

Background

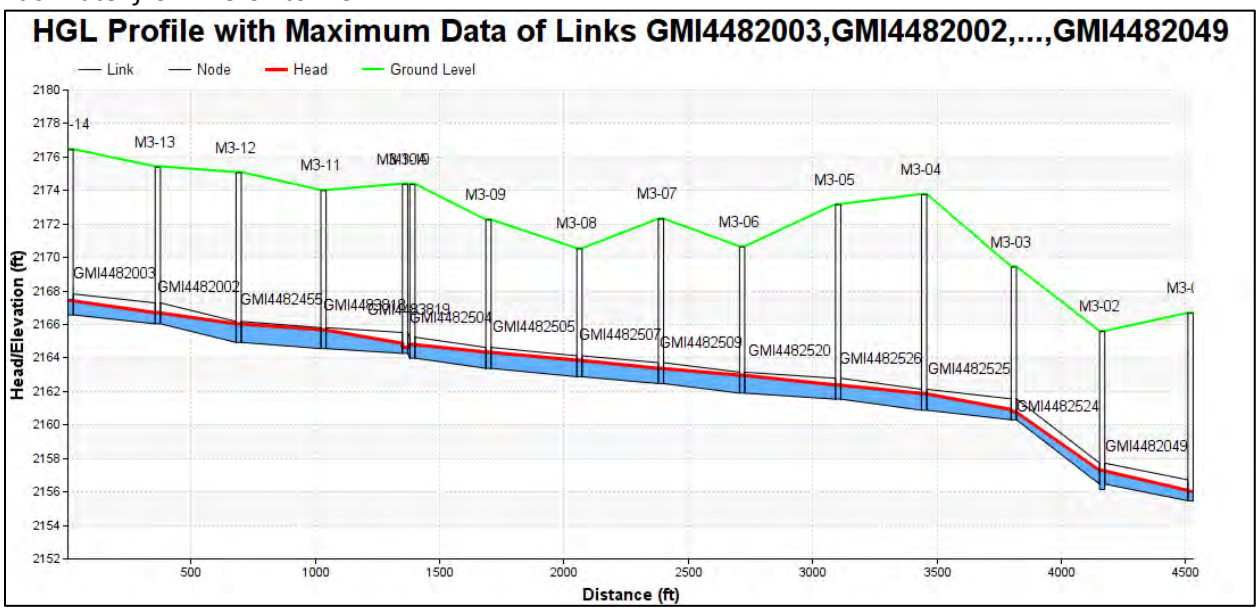
- This reach includes a section of 15-inch pipe beginning at the intersection of Coeur d'Alene Avenue and 18th Street, continuing east to 15th Street between Maple Avenue and Birch Avenue, a 12-inch pipe in the alley between Maple Avenue and Birch Avenue to the intersection of Locust Avenue and 12th Street, and a 10-inch pipe from the intersection of Locust Avenue and 12th Street to the south west of McFarland Avenue and 7th Street.
- This section of trunk has been rehabilitated with CIPP from M3-18 to D1-03.

Issues

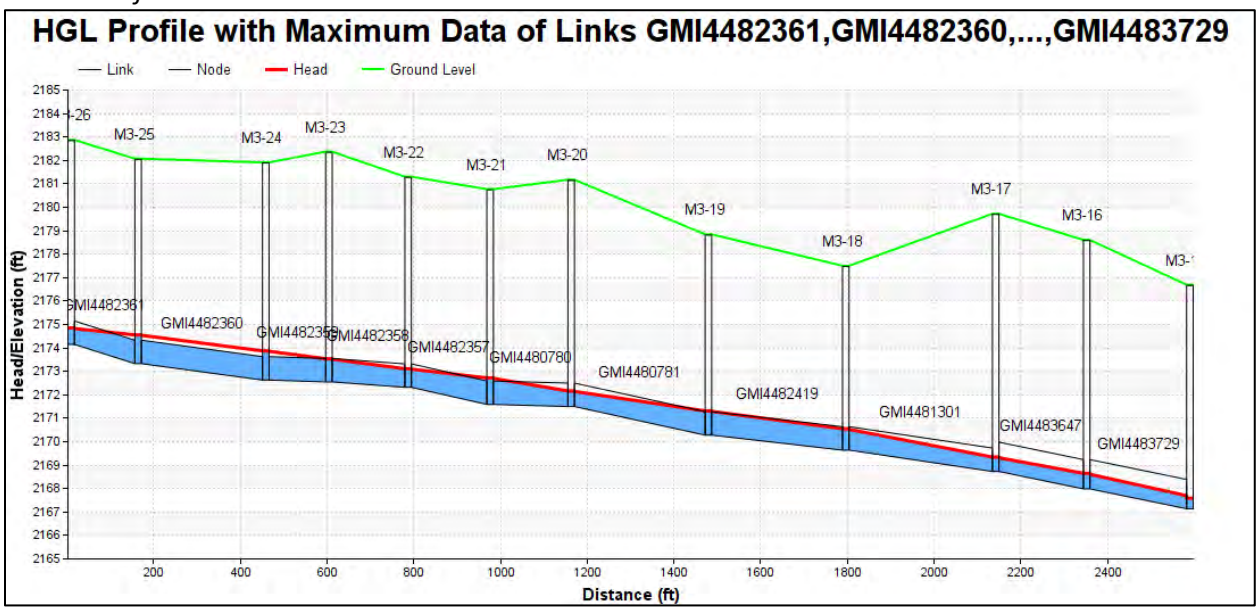
- The following pipes have slopes below the 0.28% minimum slope for a 10-inch pipe: M3-40 to M3-41 (0.15%), D1-01 to D1-02 (0.01%)
- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: M3-17 to M3-18 (0.18%), M3-18 to M3-19 (0.19%), M3-20 to M3-21 (0.04%), M3-22 to M3-23 (0.12%), M3-23 to M3-24 (0.10%), and M3-24 to M3-25 (0.18%).
- The following pipes have slopes below the 0.15% minimum slope for a 15-inch pipe: M3-05 to M3-06 (.09%), M3-07 to M3-09 (0.12%), M3-10A to M3-11 (0.09%), and M3-11 to M3-12 (0.11%).
- Surcharging occurs at M3-19 (0.03 feet), M3-21 (0.13 feet), M3-24 (0.24 feet), M3-25 (0.23 feet), and D1-02 (0.03 feet).
- The following pipes are over capacity and contribute to the surcharges: M3-05 to M3-06 (15-inch), M3-10 to M3-12 (15-inch), M3-17 to M3-19 (12-inch), M3-20 to M3-24 (12-inch), and D1-01 to D1-02 (10-inch).
- The following pipes are at or above the d/D criteria: M3-41B to D1-03, M3-40 to M3-41, M3-32A to M3-34, M3-17 to M3-31, M3-11 to M3-14, M3-04 to M3-10, and M3-01 to M3-03.

HGL Profile

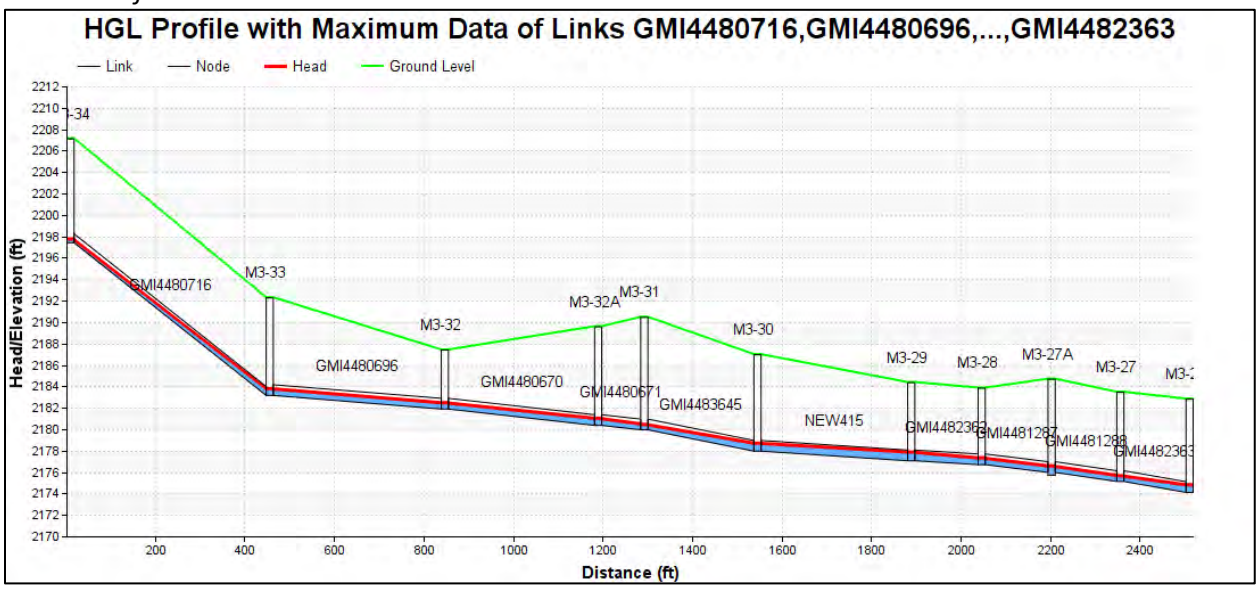
Backwater from M3-01 to M3-14



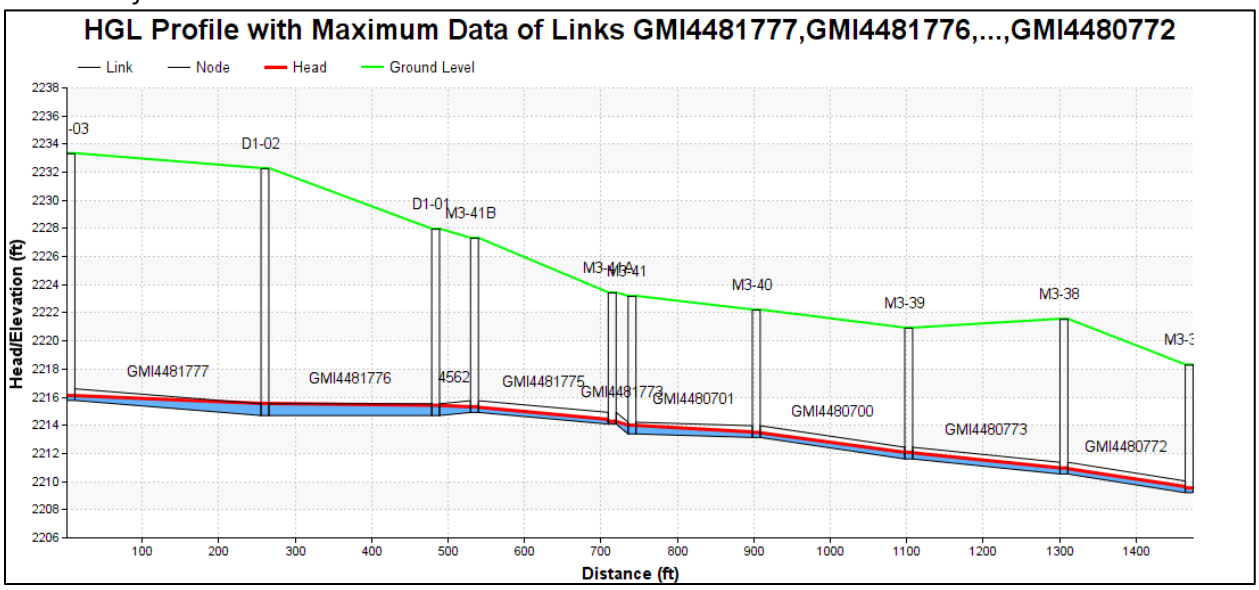
Backwater from M3-15 to M3-26



Backwater from M3-26 to M3-34



Backwater from M3-37 to D1-03



E.3.4 GAR1-01

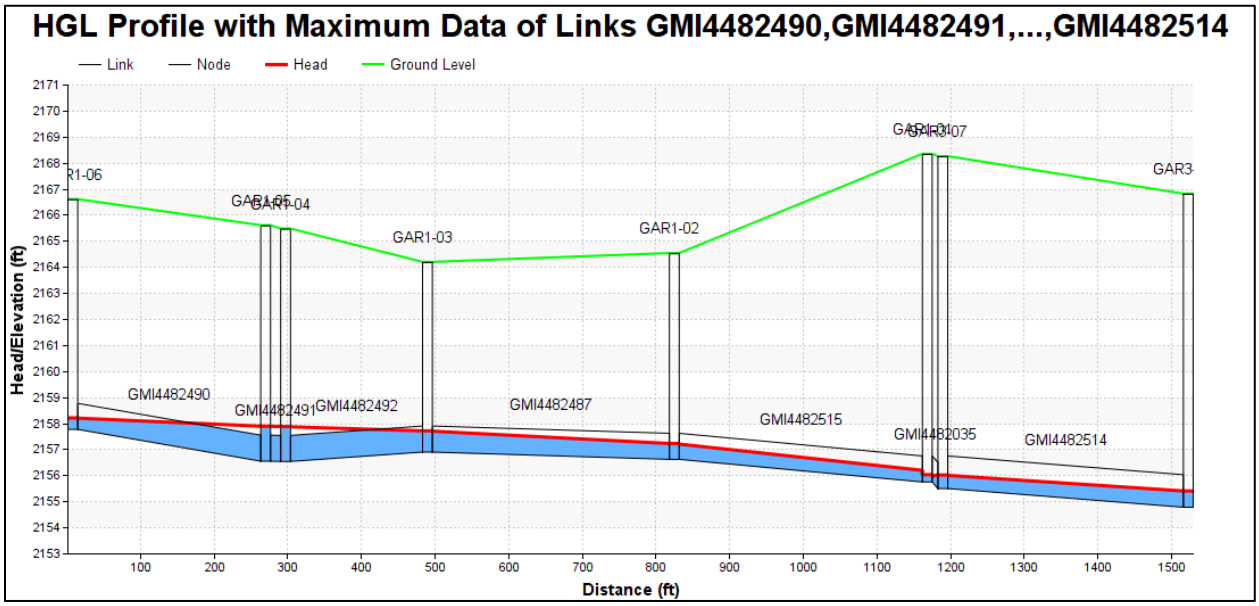
Background

- This reach includes a section of 12-inch pipe in 21st Street from the intersection of Garden Avenue and 21st Street to Pennsylvania Avenue just after the Interstate 90 underpass.

Issues

- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: GAR3-06 to GAR3-07 (0.21%), GAR1-02 to GAR1-03 (0.08%), GAR1-03 to GAR1-04 (-0.20%), and GAR1-04 to GAR1-05 (0.06%).
- Surcharging occurs at GAR1-04 (0.34 feet) and GAR1-05 (0.34 feet).
- The following pipes are over capacity and contribute to the surcharges: GAR1-02 to GAR1-03 (12-inch) and GAR1-04 to GAR1-05 (12-inch).
- The following pipes are at or above the d/D criteria: GAR1-02 to GAR1-06.

HGL Profile



E.3.5 BEXT2-20

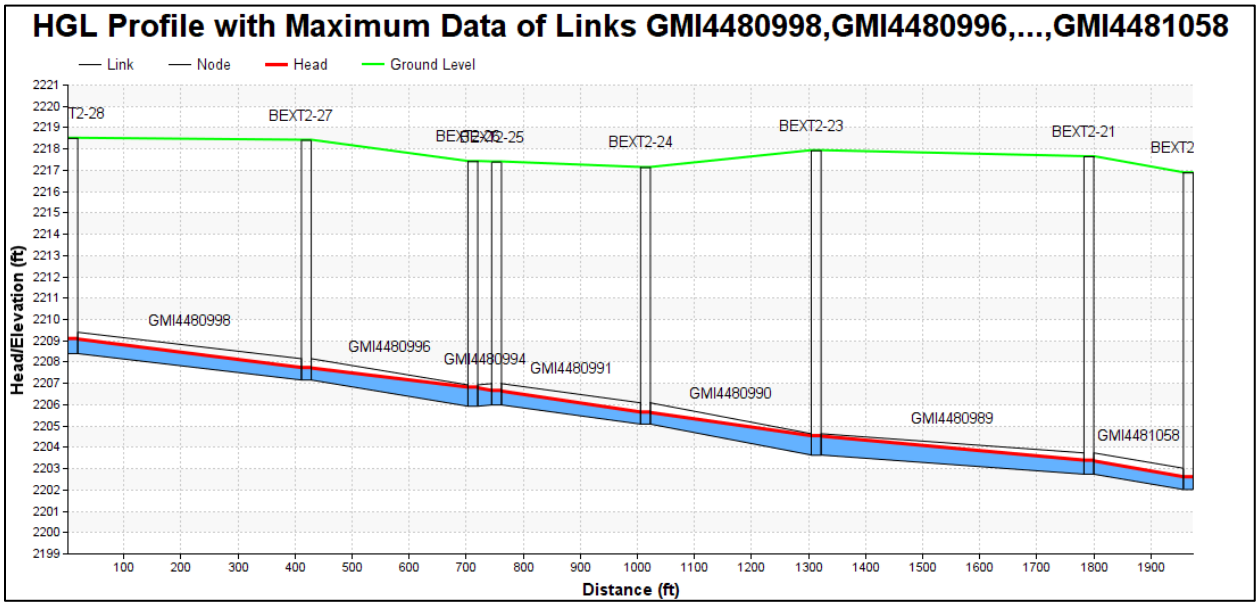
Background

- This reach includes a section of 12-inch pipe from the intersection of Ichabod Lane and 7th Street to the intersection of Lunceford Lane and 4th Street.
- This 12-inch pipe reach has 15-inch pipes upstream and downstream.

Issues

- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: BEXT2-21 to BEXT2-23 (0.18%) and BEXT2-25 to BEXT2-26 (-0.20%).
- The following pipes are at or above the d/D criteria: BEXT2-20 to BEXT2-24, BEXT2-25 to BEXT2-28.

HGL Profile



E.3.6 BEXT2-07I

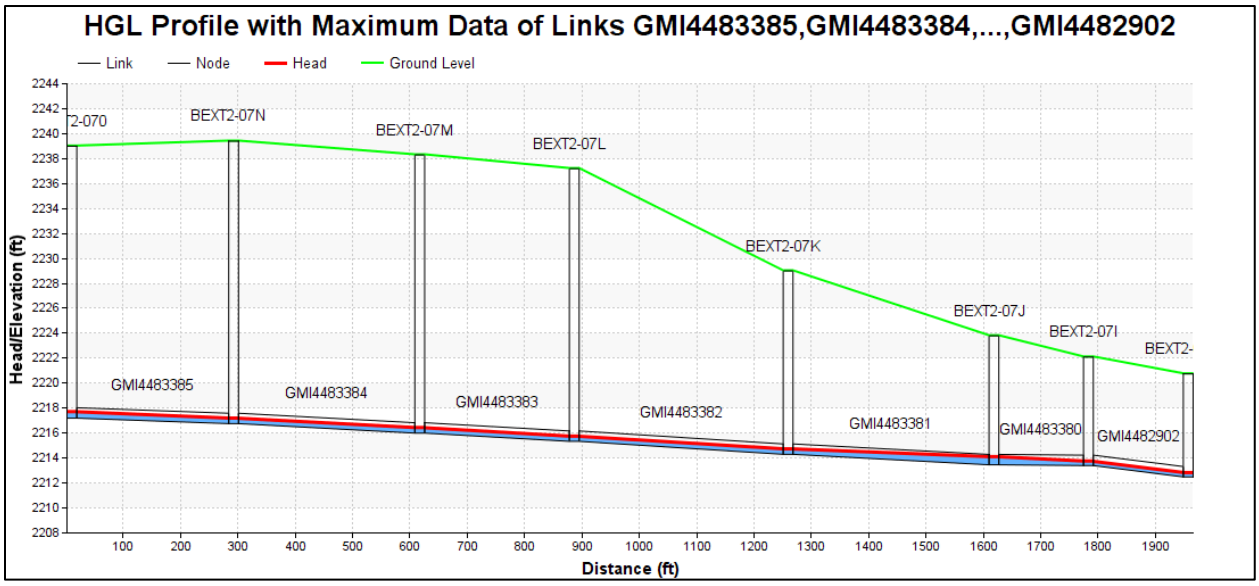
Background

- This reach includes a section of 10-inch pipe in 15th Street from just south of the intersection of 15th Street and Mary Lane to the intersection of 15th Street and Timber Lane.

Issues

- The following pipes have slopes below the 0.28% minimum slope for a 10-inch pipe: BEXT2-07I to BEXT2-07J (0.04%), BEXT2-07J to BEXT2-07K (0.22%), BEXT2-07L to BEXT2-07M (0.20%), BEXT2-07M to BEXT2-07N (0.23%), and BEXT2-07N to BEXT2-07O (0.15%).
- The following pipes are at or above the d/D criteria: BEXT2-07I to BEXT2-07K and BEXT2-07N to BEXT2-07O.

HGL Profile



E.3.7 BEXT1-22A

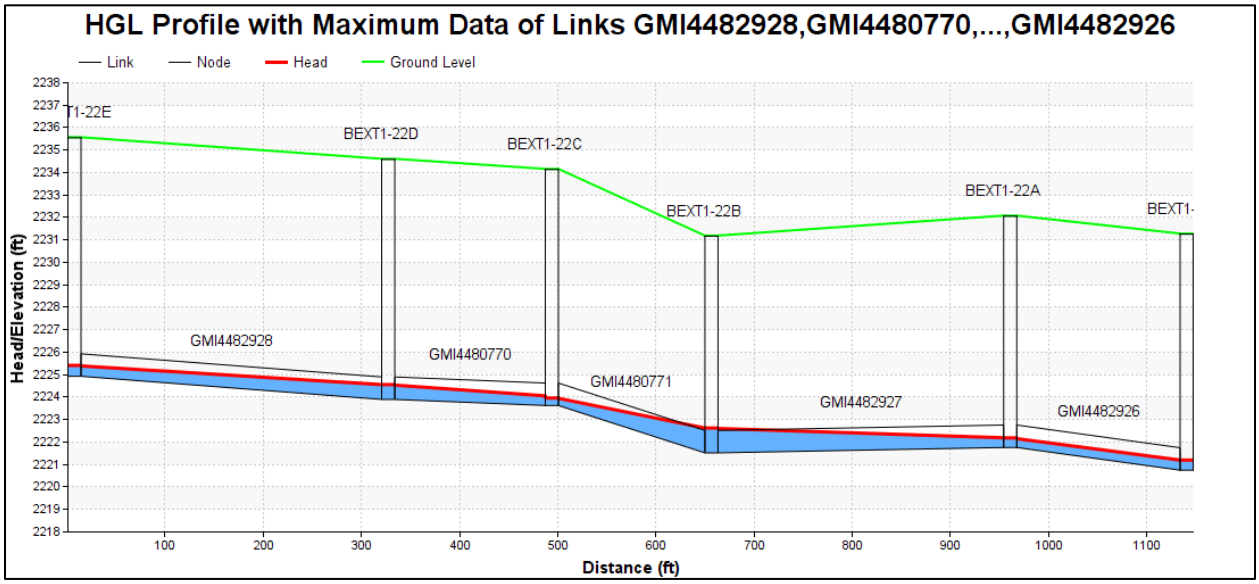
Background

- This reach includes a section of 12-inch pipe in 19th Street from the alley between Lunceford Lane and Mary Lane to Pine Hill Court.

Issues

- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: BEXT1-22A to BEXT1-22B (-0.07%) and BEXT1-22C to BEXT1-22D (0.16%).
- Surcharging occurs at BEXT1-22B (0.11 feet).
- The following pipes are at or near capacity: BEXT1-22A to BEXT1-22B (12-inch).
- The following pipes are at or above the d/D criteria: BEXT1-22A to BEXT1-22C

HGL Profile



E.3.8 RX1-11

Background

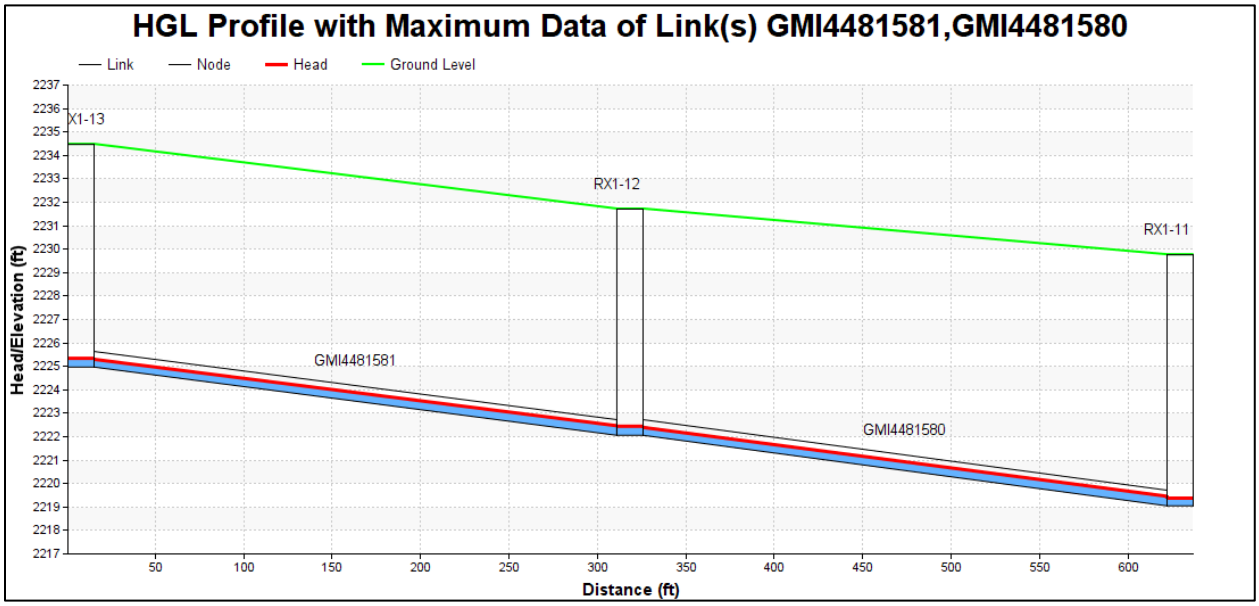
- This reach includes a section of 8-inch pipe from the intersection of Westminster Avenue and Atlantic Drive to the intersection of Dalton Avenue and Ramsey Road.

Issues

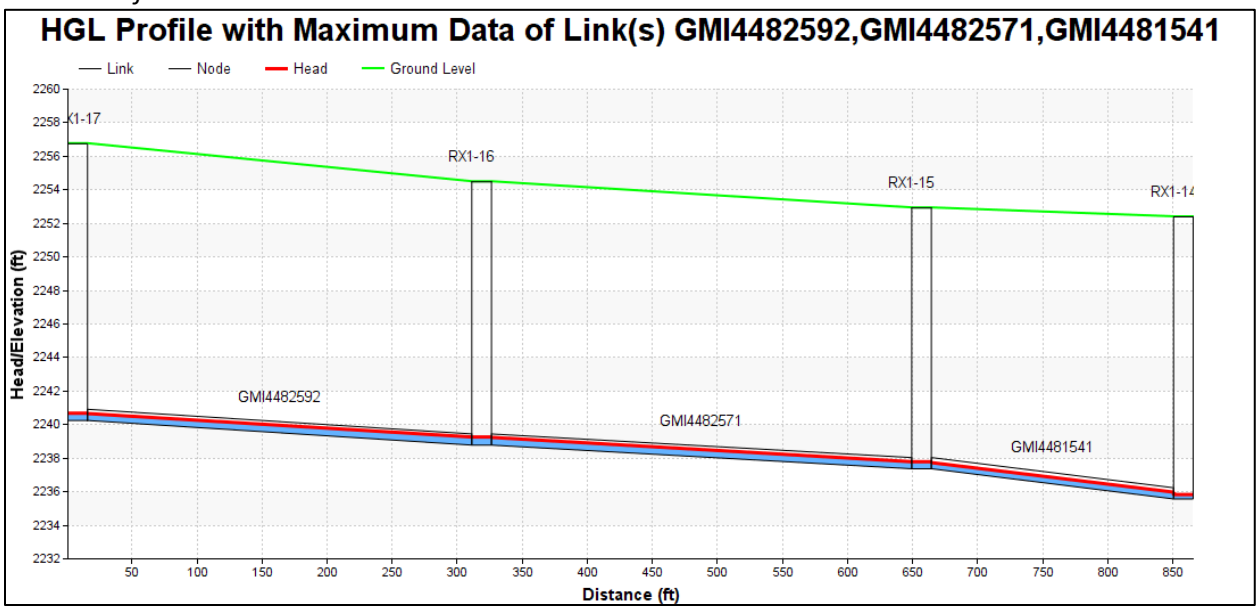
- The following pipes have slopes below the 0.40% minimum slope for an 8-inch pipe: RX1-17 to RX1-18 (0.35%) and RX1-18 to RX1-19 (0.38%)
- The following pipes are at or above the d/D criteria: RX1-11 to RX1-13 and RX1-14 to RX1-19

HGL Profile

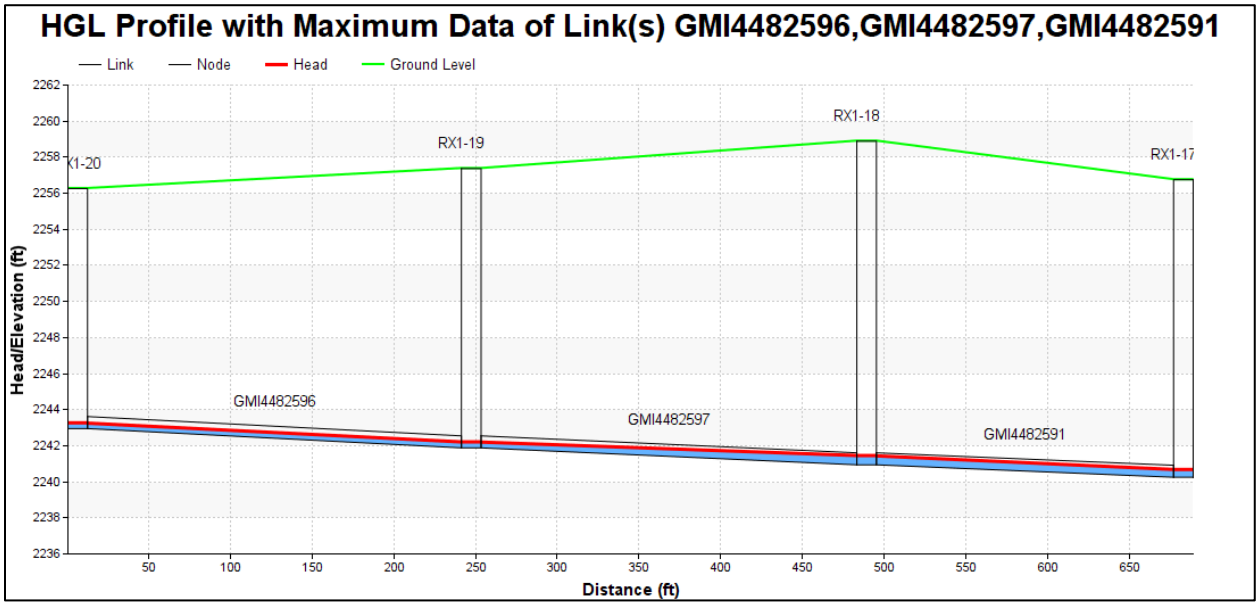
Backwater from RX1-11 to RX1-13



Backwater from RX1-14 to RX1-17



Backwater from RX1-17 to RX1-20



E.3.9 RAM1-39

Background

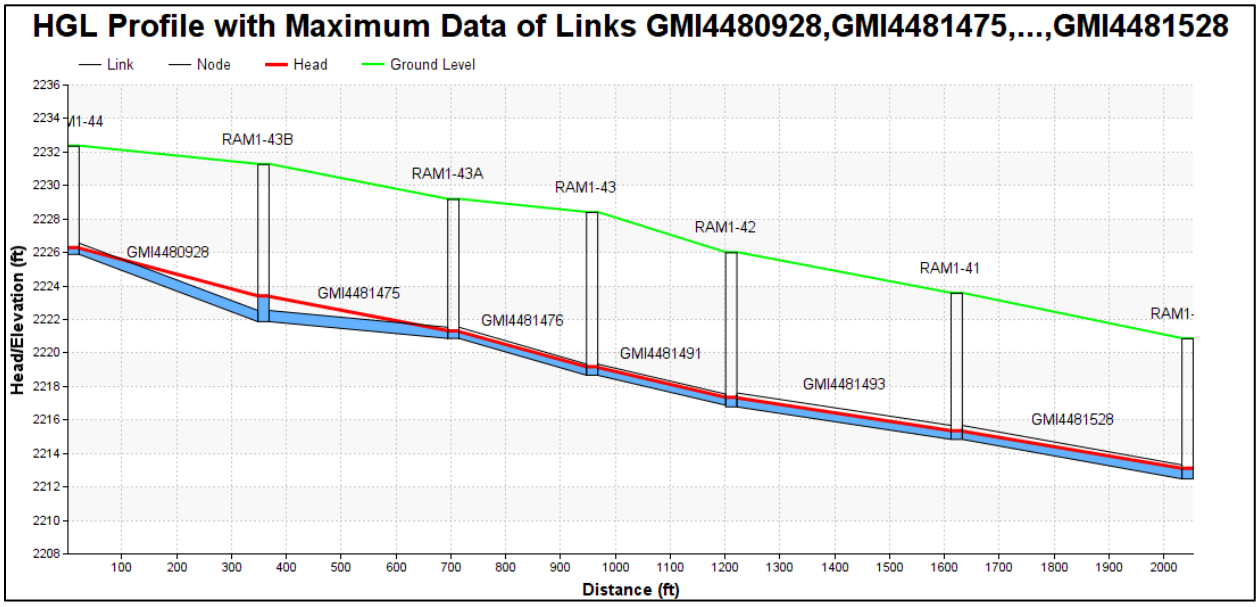
- This reach includes a section of 10-inch pipe to the west of Highway 95 from north of Park Avenue to Hanley Avenue, and an 8-inch pipe from Hanley Avenue to Wilbur Avenue.
- Inverts were straight graded for RAM1-43B and RAM1-46B1.

Issues

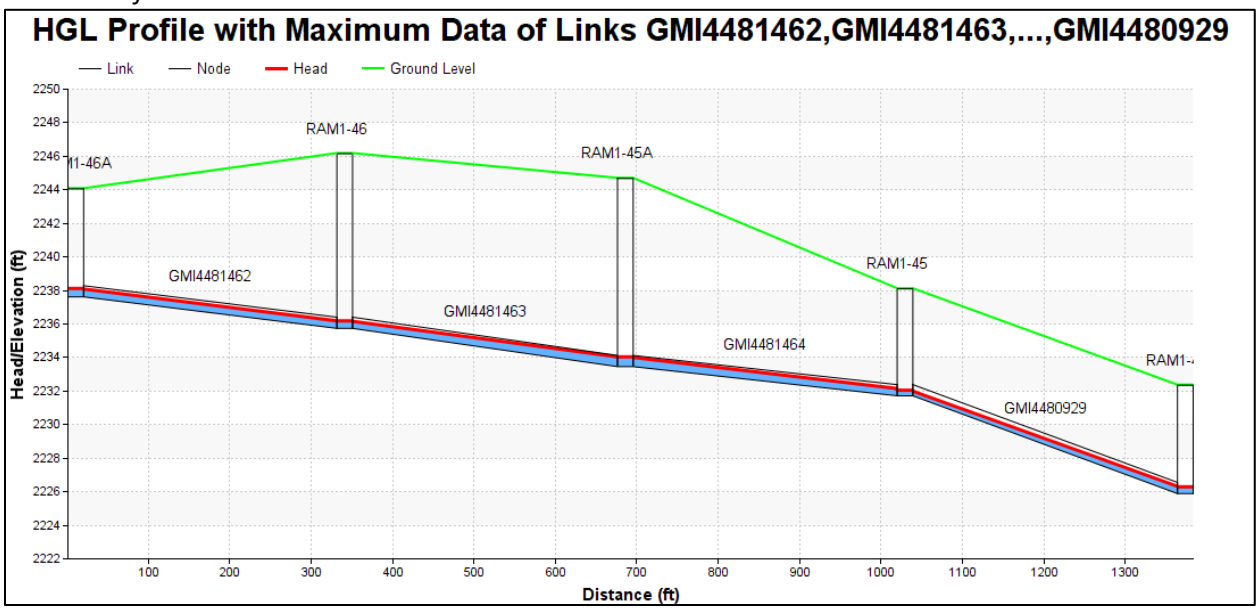
- Surcharging occurs at RAM1-43B (0.87 feet)
- The following pipes are over capacity and contribute to the surcharges: RAM1-43A to RAM1-43B
- The following pipes are at or above the d/D criteria: RAM1-40 to RAM1-46B1

HGL Profile

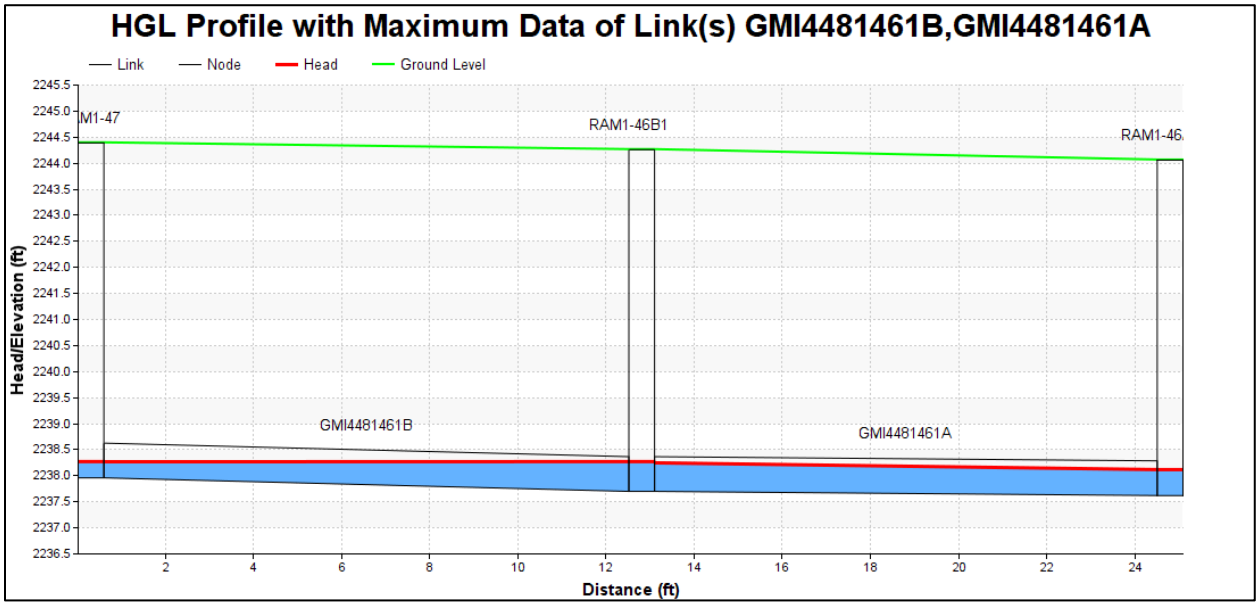
Backwater from RAM1-40 to RAM1-44



Backwater from RAM1-44 to RAM1-46A



Backwater from RAM1-46A to RAM1-47



E.4 Master Plan Model - System Issues

E.4.1 BUS1-01AA

Background

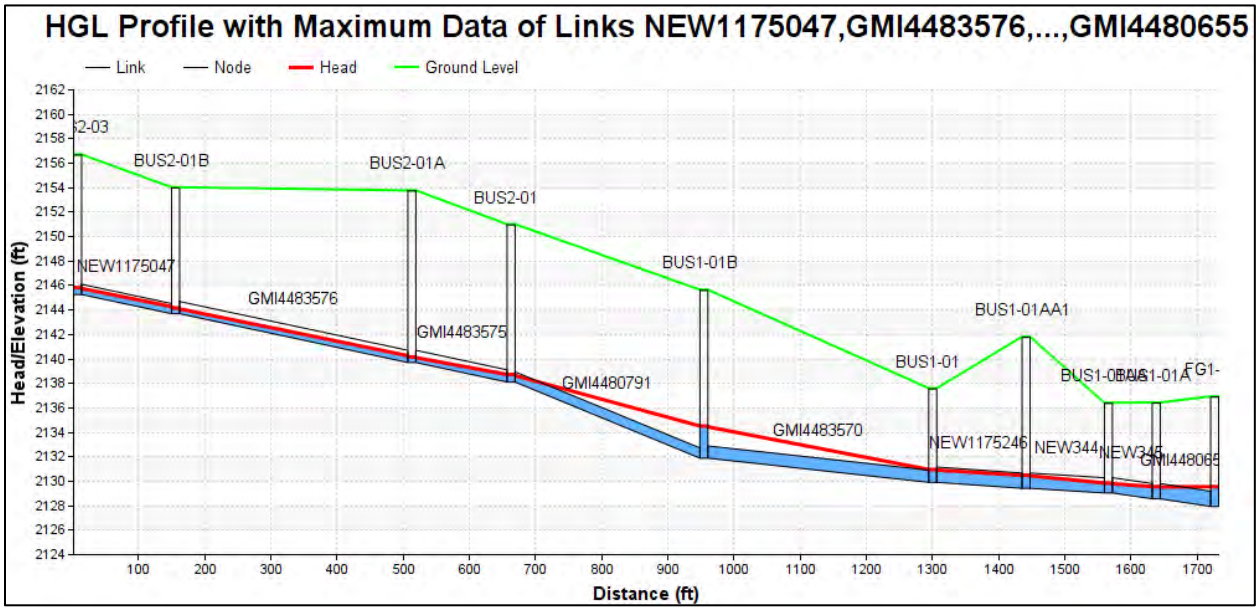
- The Business District sewershed has many roof drains, parking lots and catch basins that are connected directly to the sewer. The total impervious inflow area in the sewer shed is about 126,500 SF (2.9 AC).
- The 10-inch pipe between BUS1-01B and BUS2-01 has 12-inch pipes upstream and downstream.
- Inverts were straight graded for BUS3-01 to BUS2-01.

Issues

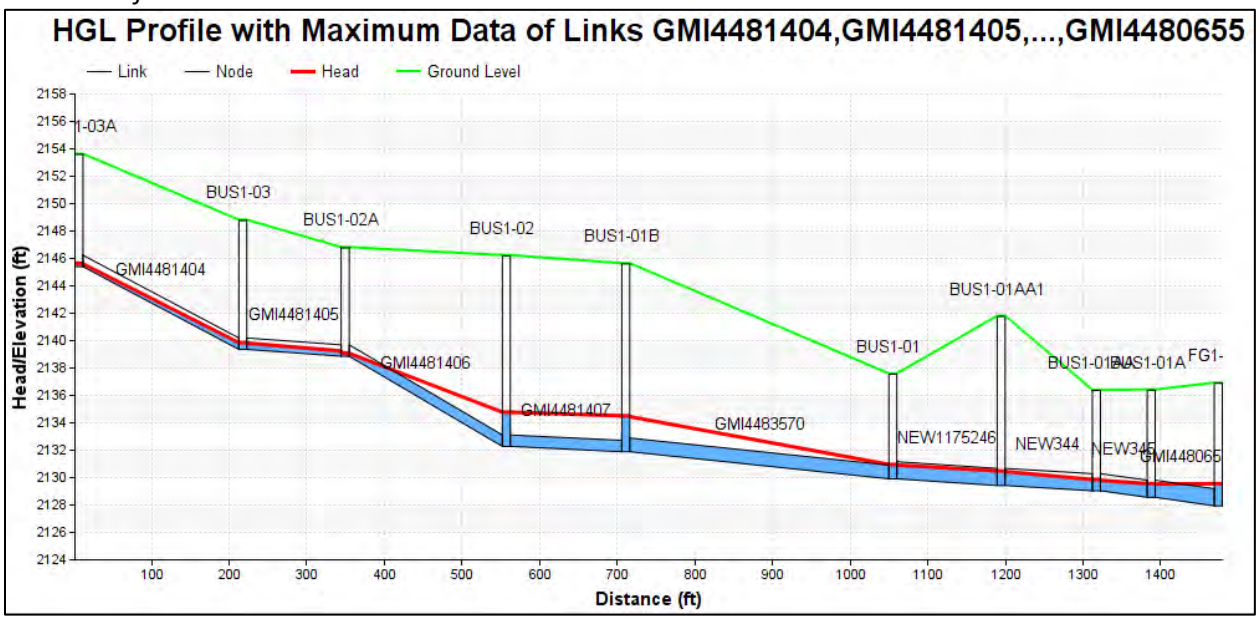
- The following pipes have slopes below the 0.28% minimum slope for a 10-inch pipe: BUS1-01B to BUS1-02 (0.21%).
- Surcharging occurs at BUS1-01B (1.62 feet), and BUS1-02 (1.67 feet).
- The following pipes are over capacity and contribute to the surcharges: BUS1-01 to BUS1-01B (12-inch), and BUS1-01B to BUS2-01 (10-inch).
- The following pipes are at or near capacity: BUS1-01AA1 to BUS1-01 (15-inch), BUS1-01B to BUS1-02 (10-inch), and BUS1-02A to BUS1-03.
- The following pipes are at or above the d/D criteria: FG1-13 to BUS1-01A, BUS1-01AA to BUS1-02A, BUS1-01B to BUS2-01, and BUS2-01B to BUS2-03.

HGL Profile

Backwater from FG1-13 to BUS2-03



Backwater from FG1-13 to BUS1-03A



E.4.2 M1-16

Background

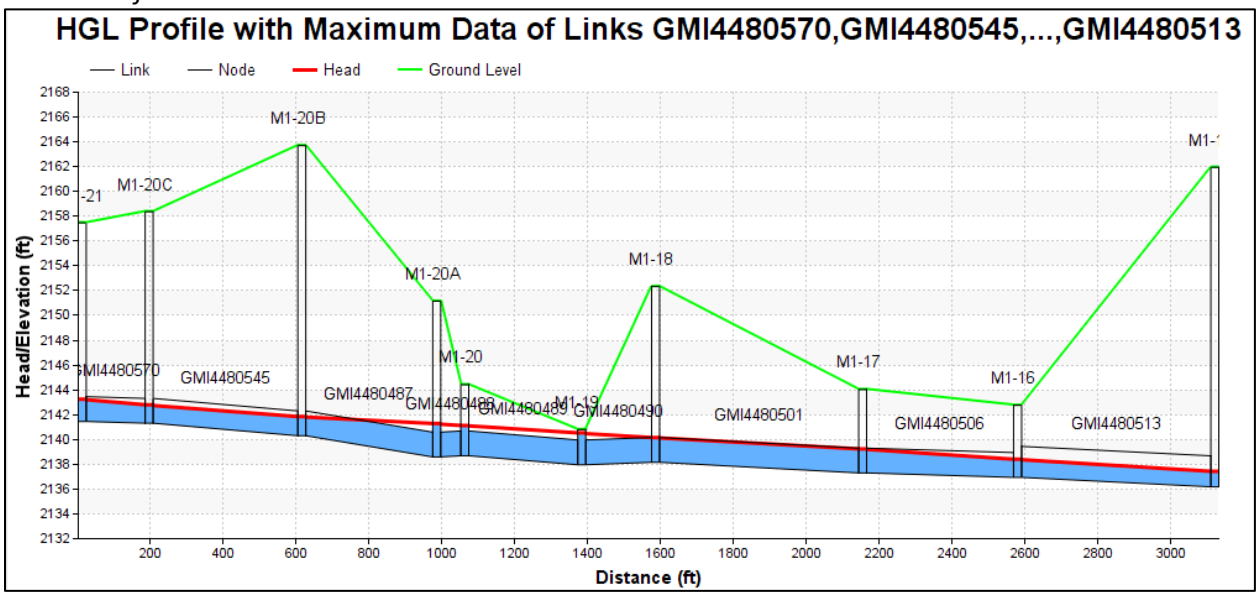
- The 2013 Master Plan C.2 Project is currently in the preliminary design phase. As such, the piping in this area was updated to include the preliminary design piping in order to confirm pipe size with the 2022 criteria. The preliminary design abandons the existing 24-inch pipe in 19th Street from Mullan Avenue to Young Avenue in favor of gravity sewer extension to the West in Mullan Avenue, connecting to the existing 24-inch pipe at the intersection of Mullan Avenue and 16th Street.
- This is a section of 12-inch and 24-inch pipe beginning at the intersection of Taylor Street and Ash Avenue and continues to the intersection of Lost Avenue and the Alley between 16th and 17th Street. There is also a section of 24-inch pipe beginning at the intersection of Lost Avenue and the Alley between 15th and 16th Street and continues to the intersection of Mullan Avenue and 16th Street.

Issues

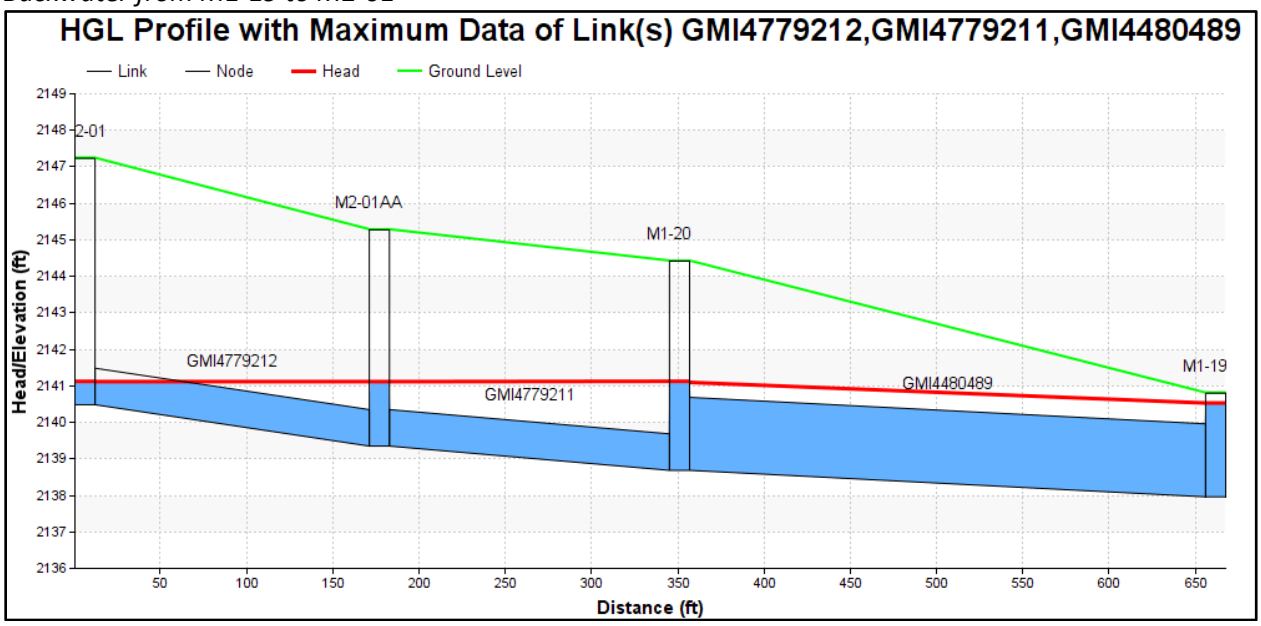
- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: M2-02 to M2-03 (0.14%), and M2-04 to M2-05 (0.16%).
- Surcharging occurs at M1-18 (0.06 feet), M1-19 (0.57 feet), M1-20 (0.44 feet), M1-20A (0.70 feet), and M2-01AA (0.77 feet).
- The following pipes are over capacity and contribute to the surcharges: M1-16 to M1-20 (24-inch), and M1-20C to M1-21.
- The following pipes are at or above the d/D criteria: M1-16 to M1-20B, M2-20C to M1-21, and M1-20 to M2-01.

HGL Profile

Backwater from M1-16 to M1-21



Backwater from M1-19 to M2-01



E.4.3 M3-01

Background

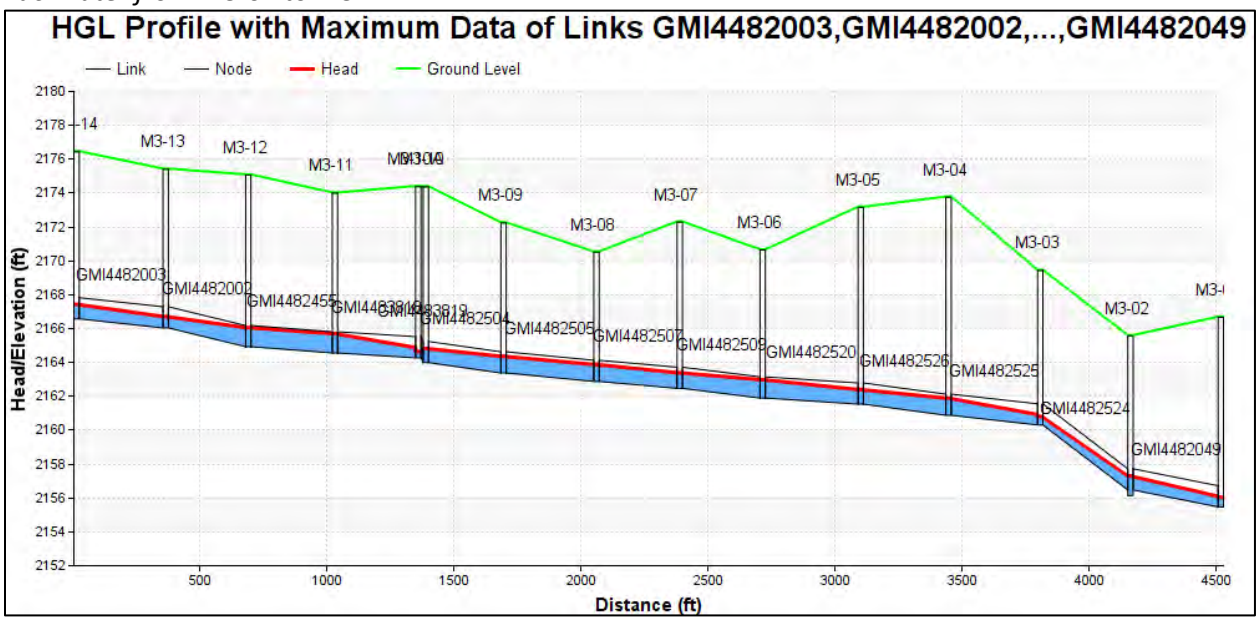
- This reach includes a section of 15-inch pipe beginning at the intersection of Coeur d'Alene Avenue and 18th Street, continuing east to 15th Street between Maple Avenue and Birch Avenue, a 12-inch pipe in the alley between Maple Avenue and Birch Avenue to the intersection of Locust Avenue and 12th Street, and a 10-inch pipe from the intersection of Locust Avenue and 12th Street to the south west side of McFarland Avenue and 7th Street.
- This section of trunk has been rehabilitated with CIPP from M3-18 to D1-03.

Issues

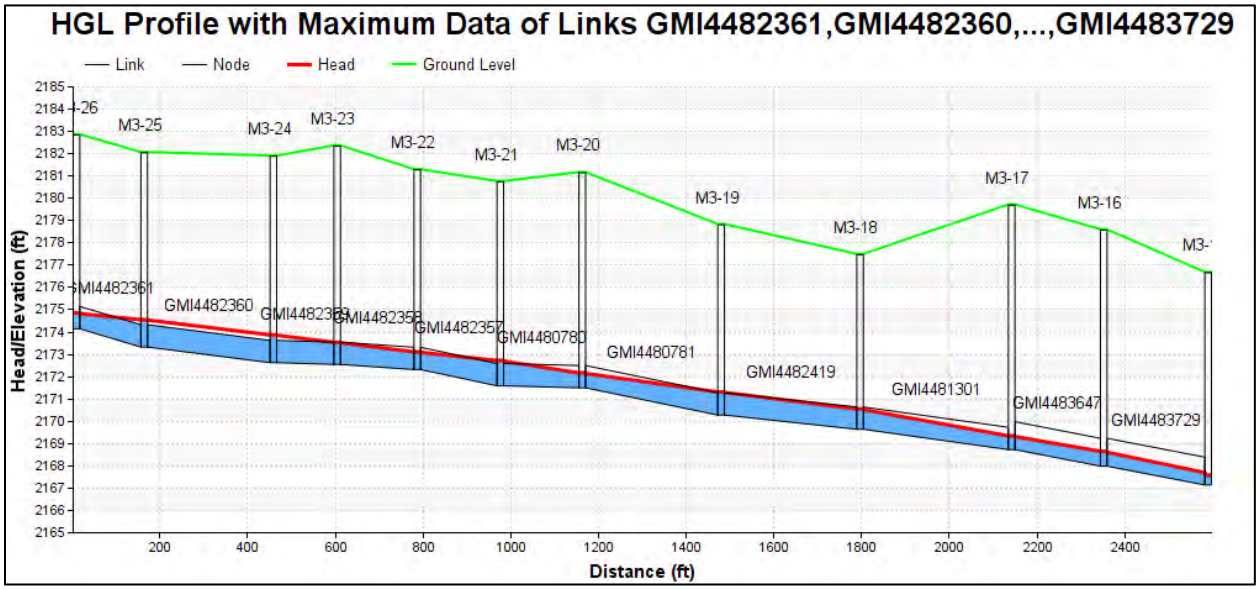
- The following pipes have slopes below the 0.28% minimum slope for a 10-inch pipe: M3-40 to M3-41 (0.15%) and D1-01 to D1-02 (0.01%).
- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: M3-17 to M3-18 (0.18%), M3-18 to M3-19 (0.19%), M3-20 to M3-21 (0.04%), M3-22 to M3-23 (0.12%), M3-23 to M3-24 (0.10%), and M3-24 to M3-25 (0.18%).
- The following pipes have slopes below the 0.15% minimum slope for a 15-inch pipe: M3-05 to M3096 (0.09%), M3-07 to M3-09 (0.12%), M3-10A to M3-11 (0.09%), and M3-11 to M3-12 (0.11%).
- Surcharging occurs at M3-19 (0.03 feet), M3-21 (0.13 feet), M3-24 (0.25 feet), M3-25 (0.23 feet), and D1-02 (0.03 feet).
- The following pipes are over capacity and contribute to the surcharges: M3-05 to M3-06 (15-inch), M3-10 to M3-12 (15-inch), M3-17 to M3-19 (12-inch), M3-20 to M3-24 (12-inch), and D1-01 to D1-02 (10-inch).
- The following pipes are at or above the d/D criteria: M3-41B to D1-03, M3-40 to M3-41, M3-32A to M3-33, M3-17 to M3-31, M3-11 to M3-13, M3-04 to M3-10, and M3-01 to M3-03.

HGL Profile

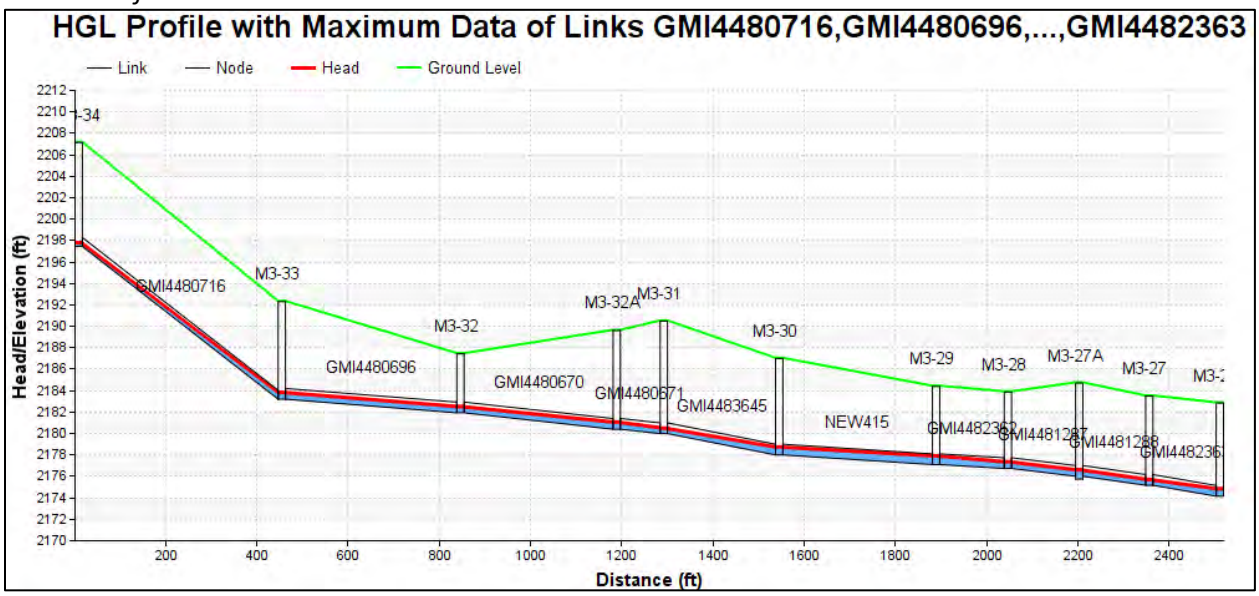
Backwater from M3-01 to M3-14



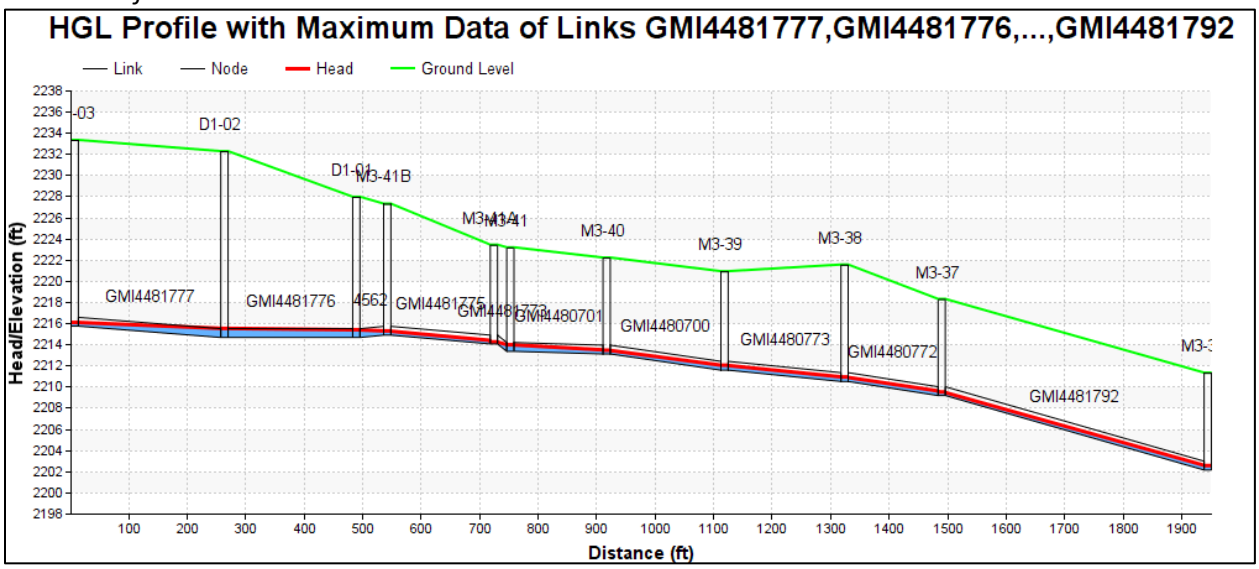
Backwater from M3-15 to M3-26



Backwater from M3-36 to M3-34



Backwater from M3-37 to D1-03



E.4.4 GAR3-02

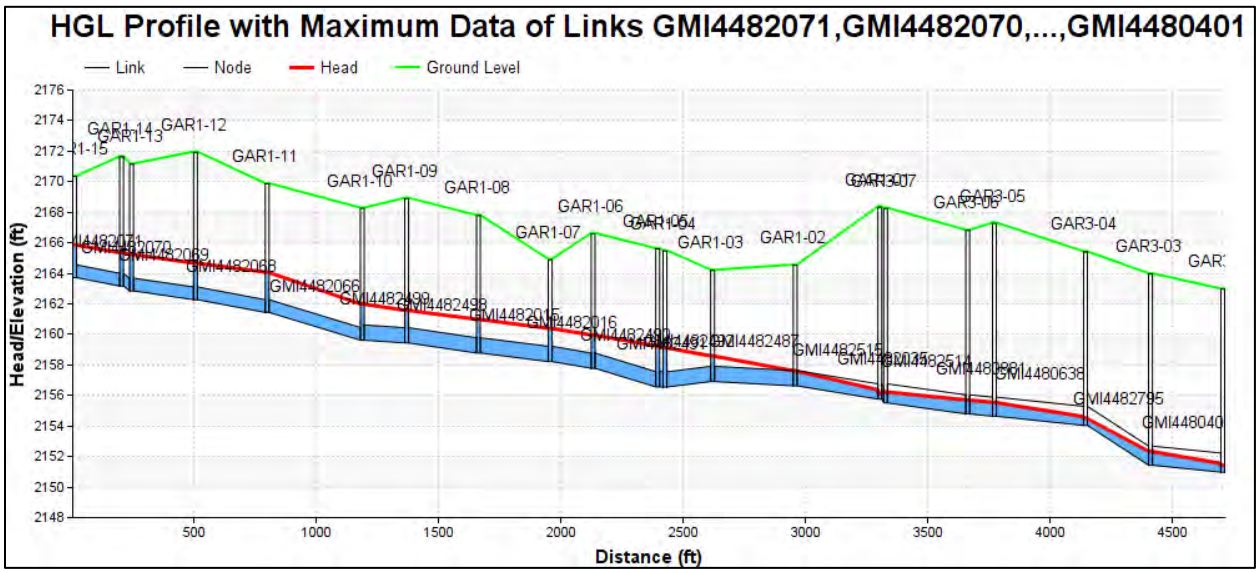
Background

- This reach includes a section of 10-inch trunk beginning on Hill Drive just north of the intersection with Hastings Avenue and continuing south and west to the intersection of 23rd Street and Fernan Gulch Road. The reach continues as a 12-inch trunk south down 23rd Street, west on Pennsylvania Avenue and south on 21st Street, upsizing to a 15-inch pipe ending at the intersection of 21st Street and Sherman Avenue.
- The invert for GAR1-12 is from the old Hydra model and the 2013 Master Plan Model.
- There is a siphon on Pennsylvania Avenue between GAR1-04 and GAR1-05.
- A catch basin is directly connected to the sewer just upstream of this reach at GAR1-15 that contributes about 12,500 SF (0.3 AC) of impervious area during storm events.

Issues

- The following pipes have slopes below the 0.28% minimum slope for a 10-inch pipe: GAR1-11 to GAR1-12 (0.18%).
- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: GAR1-09 to GAR1-10 (0.10%), GAR1-08 to GAR1-09 (0.21%), GAR1-07 to GAR1-08 (0.19%), GAR1-05 to GAR1-06 (0.16%), GAR1-04 to GAR1-05 (0.06%), GAR1-03 to GAR1-04 (-0.20%), GAR1-02 to GAR1-03 (0.08%), and GAR3-06 to GAR3-07 (0.21%).
- Surcharging occurs at GAR1-15 (1.16 feet), GAR1-14 (1.19 feet), GAR1-13 (1.39 feet), GAR1-12 (1.40 feet), GAR1-11 (1.64 feet), GAR1-10 (1.37 feet), GAR1-09 (1.15 feet), GAR1-08 (1.21 feet), GAR1-07 (1.18 feet), GAR1-06 (1.86 feet), GAR1-05 (1.68 feet), GAR1-04 (1.60 feet), and GAR1-03 (0.68 feet).
- The following pipes are over capacity and contribute to the surcharges: GAR1-01 to GAR1-05 (12-inch), GAR1-07 to GAR1-08 (12-inch), GAR1-09 to GAR1-10 (12-inch) and GAR1-10 to GAR1-11 (10-inch), GAR1-12 to GAR1-13 (10-inch), GAR1-14 to GAR1-15 (10-inch).
- The following pipes are at or near capacity: GAR1-06 to GAR1-07 (12-inch), GAR1-08 to GAR1-09 (12-inch), GAR1-11 to GAR1-12 (10-inch).
- The following pipes are at or above the d/D criteria: GAR3-05 to GAR3-07, GAR1-01 to GAR1-15

HGL Profile


HGL Profile with Maximum Data of Links GMI4482071,GMI4482070,...,GMI4480401
Link
Node
Head
Ground Level
Head/Elevation (ft)
Distance (ft)
GAR1-14
GAR1-13
GAR1-12
GAR1-11
GAR1-10
GAR1-09
GAR1-08
GAR1-07
GAR1-06
GAR1-05
GAR1-04
GAR1-03
GAR1-02
GAR3-07
GAR3-06
GAR3-05
GAR3-04
GAR3-03
GMI4482068
GMI4482066
GMI4482498
GMI4482015
GMI4482016
GMI4482487
GMI4482515
GMI4480638
GMI4482795
GMI448040

E.4.5 BEXT2-20

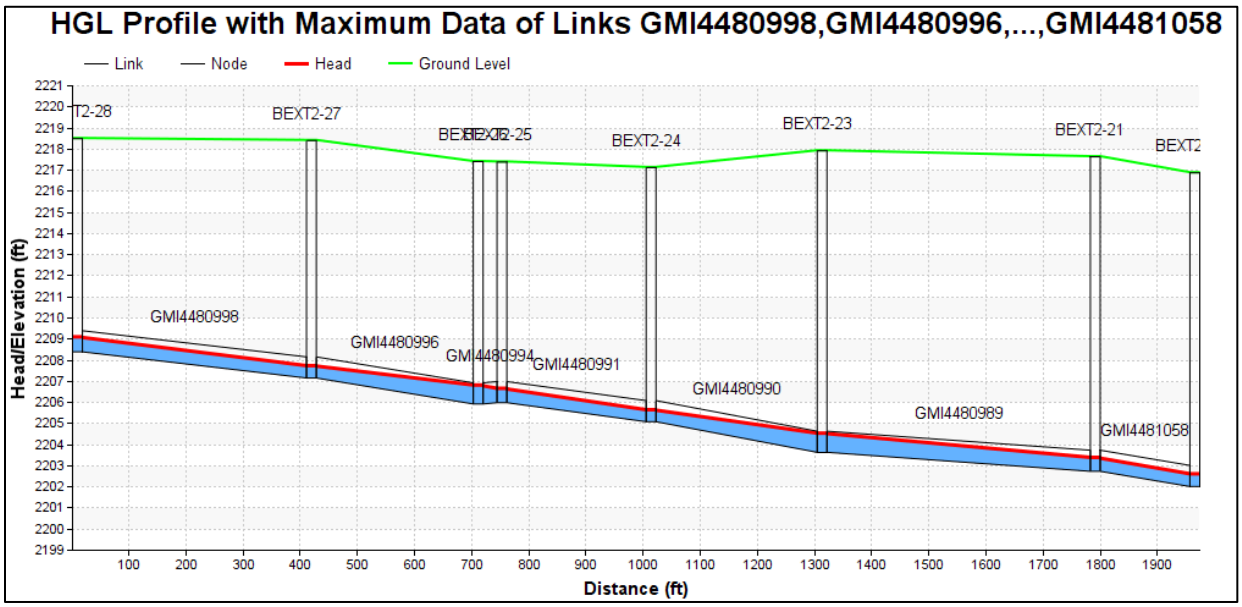
Background

- This reach includes a section of 12-inch pipe from the intersection of Ichabod Lane and 7th Street to the intersection of Lunceford Lane and 4th Street.
- This 12-inch pipe reach has 15-inch pipes upstream and downstream.

Issues

- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: BEXT2-21 to BEXT2-23 (0.18%) and BEXT2-25 to BEXT2-26 (-0.20%).
- The following pipes are at or above the d/D criteria: BEXT2-20 to BEXT2-28.

HGL Profile



E.4.6 BEXT2-07I

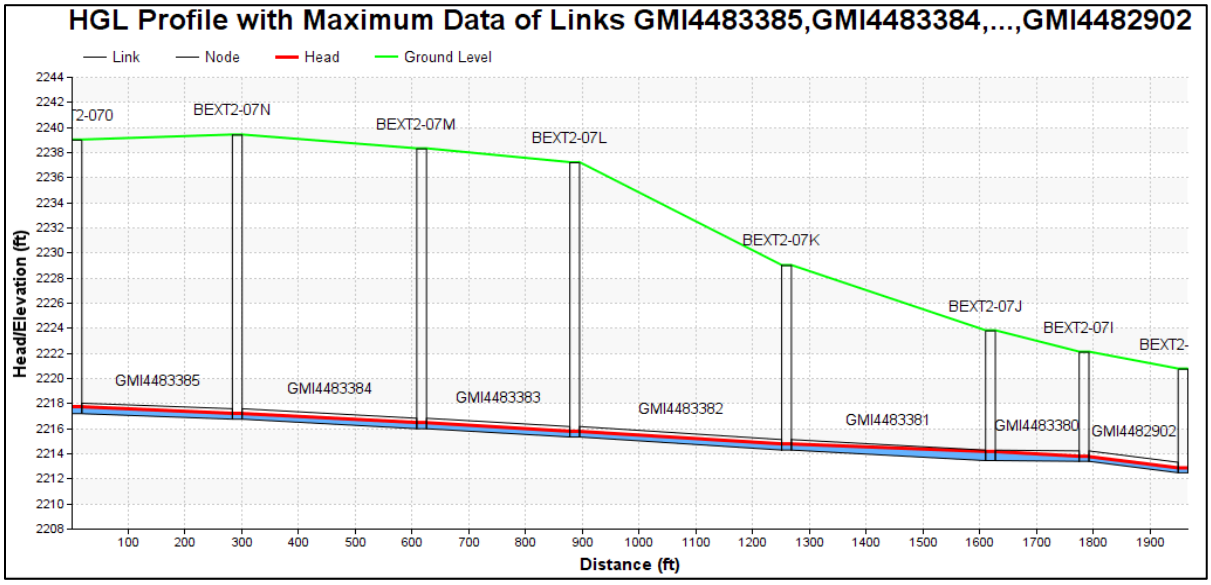
Background

- This reach includes a section of 10-inch pipe in 15th Street from just south of the intersection of 15th Street and Mary Lane to the intersection of 15th Street and Timber Lane.

Issues

- The following pipes have slopes below the 0.28% minimum slope for a 10-inch pipe: BEXT2-07I to BEXT2-07J (0.04%), BEXT2-07J to BEXT2-07K (0.22%), BEXT2-07L to BEXT2-07M (0.20%), BEXT2-07M to BEXT2-07N (0.23%), and BEXT2-07N to BEXT2-07O (0.15%).
- The following pipes are at or above the d/D criteria: BEXT2-07I to BEXT2-07O.

HGL Profile



E.4.7 BEXT1-22A

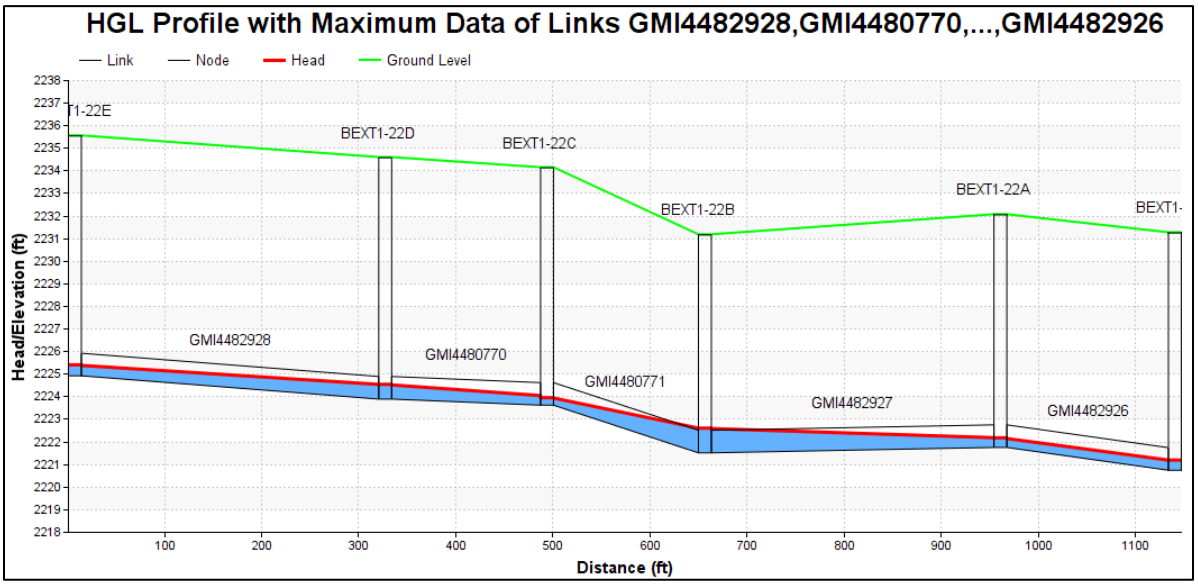
Background

- This reach includes a section of 12-inch pipe in 19th Street from the alley between Lunceford Lane and Mary Lane to Pine Hill Court.

Issues

- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: BEXT1-22A to BEXT1-22B (-0.07%) and BEXT1-22C to BEXT1-22D (0.16%).
- Surcharging occurs at BEXT1-22B (0.11 feet).
- The following pipes are at or near capacity: BEXT1-22A to BEXT1-22B (12-inch).
- The following pipes are at or above the d/D criteria: BEXT1-22A to BEXT1-22C

HGL Profile



E.4.8 RX1-08

Background

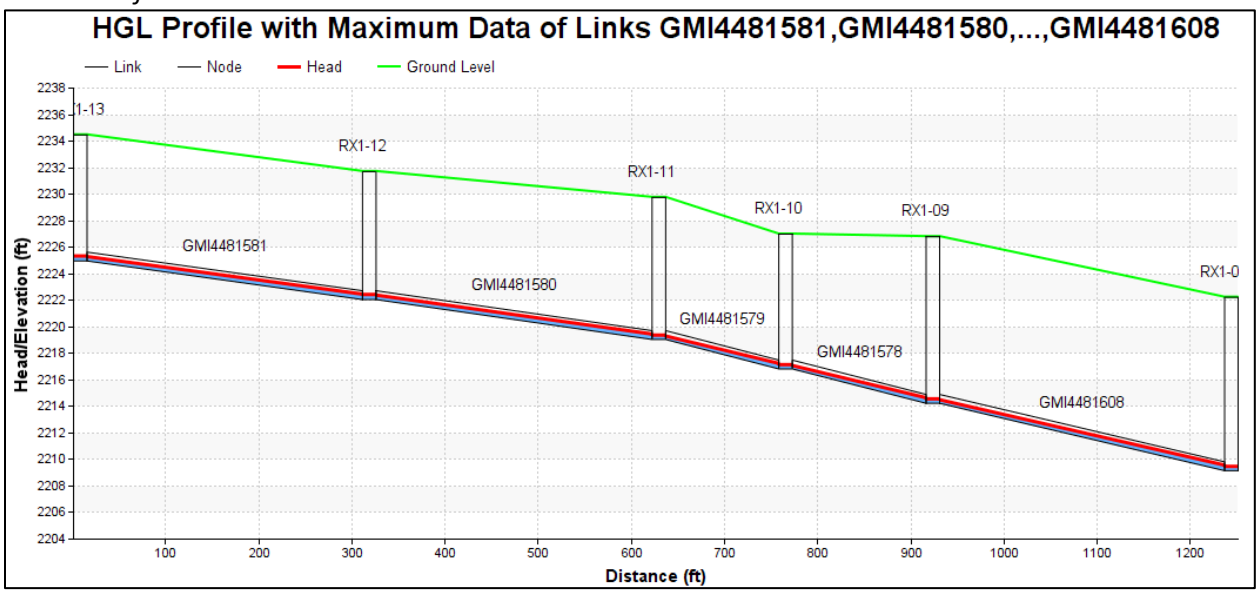
- This reach includes a section of 8-inch pipe from the intersection of Westminster Avenue and Atlantic Drive to the intersection of Dalton Avenue and Ramsey Road.

Issues

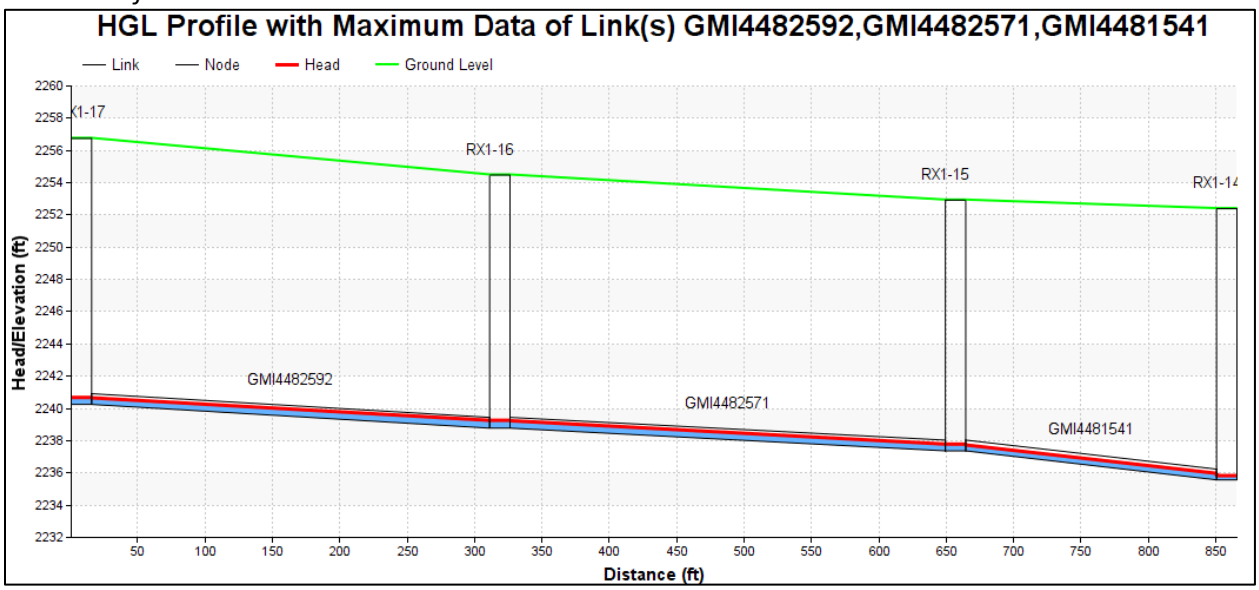
- The following pipes have slopes below the 0.40% minimum slope for an 8-inch pipe: RX1-17 to RX1-18 (0.35%) and RX1-18 to RX1-19 (0.38%)
- The following pipes are at or above the d/D criteria: RX1-08 to RX1-09, RX1-11 to RX1-13, and RX1-14 to RX1-18

HGL Profile

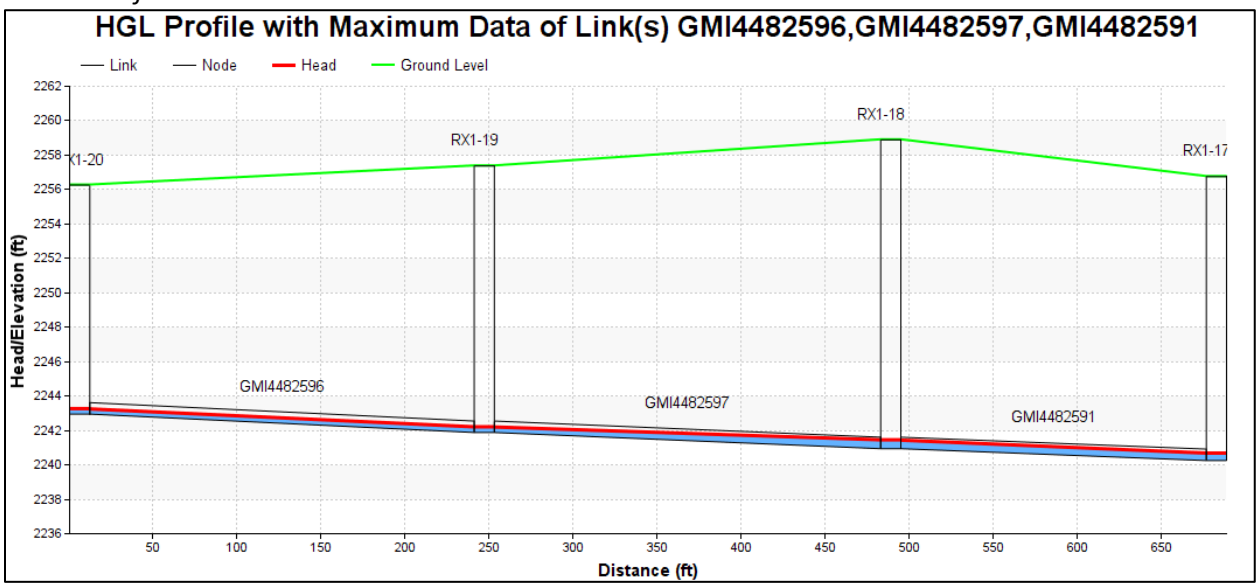
Backwater from RX1-08 to RX1-13



Backwater from RX1-14 to RX1-17



Backwater from RX1-17 to RX1-20



E.4.9 RAM1-39

Background

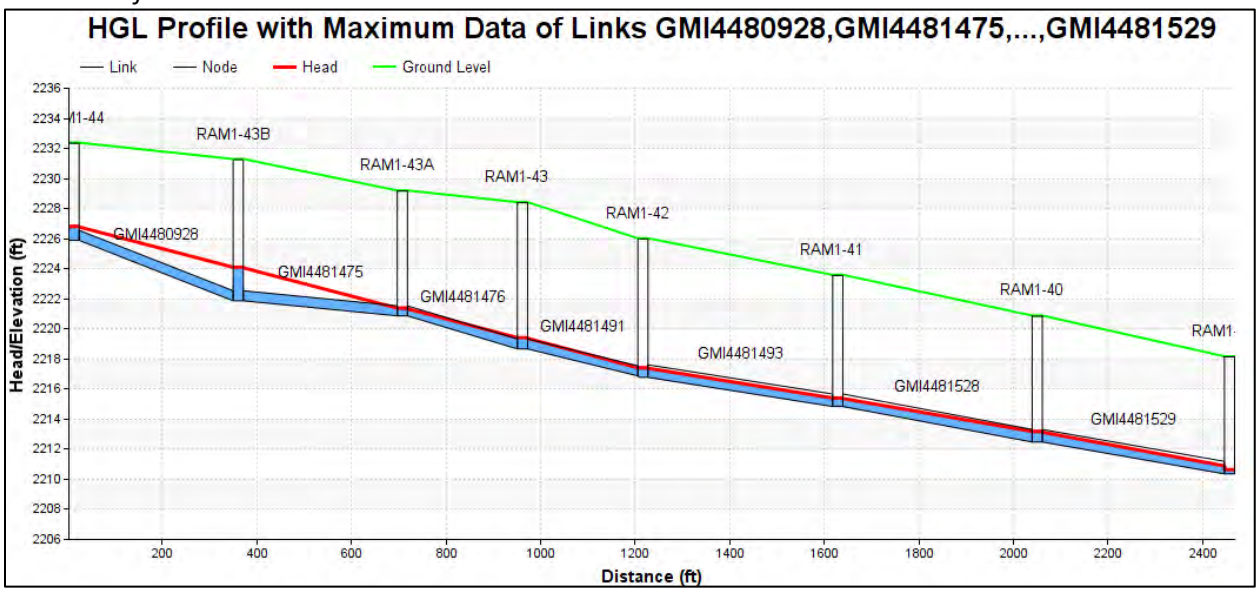
- This reach includes a section of 10-inch pipe to the west of Highway 95 from north of Park Avenue to Hanley Avenue, and an 8-inch pipe from Hanley Avenue to Wilbur Avenue.
- Inverts were straight graded for RAM1-43B and RAM1-46B1.

Issues

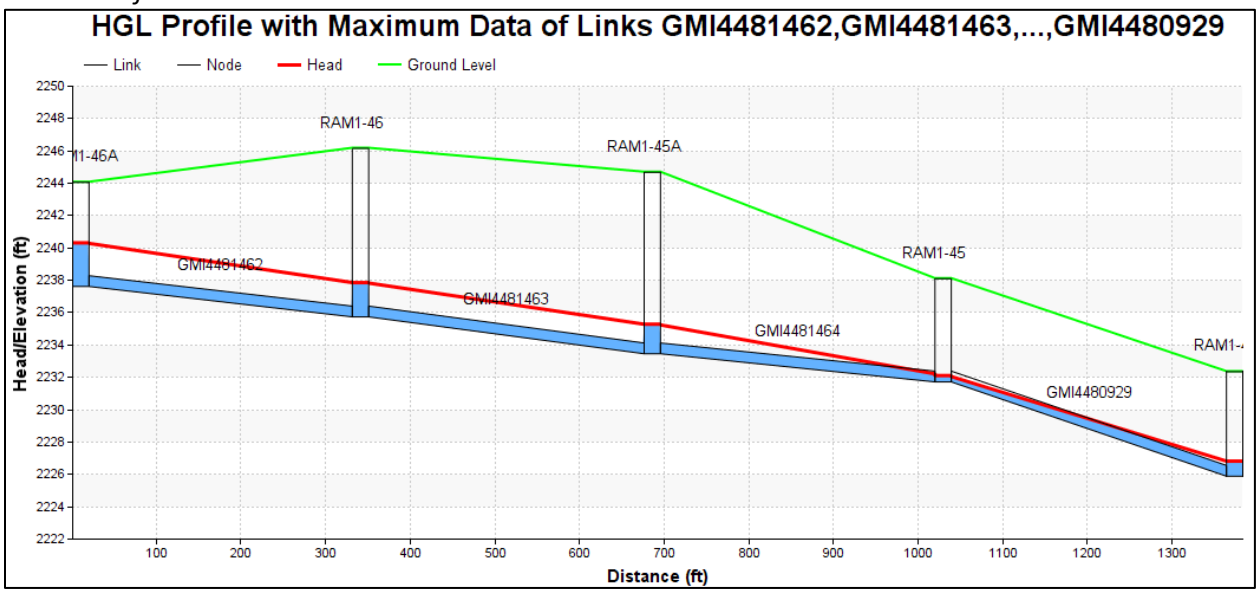
- Surcharging occurs at RAM1-43 (0.08 feet), RAM1-43B (1.56 feet), RAM1-44 (0.26 feet), RAM1-45A (1.16 feet), RAM1-46 (1.46 feet), RAM1-46A (2.03 feet), RAM1-46B1 (2.13 feet), and RAM1-47 (1.87 feet).
- The following pipes are over capacity and contribute to the surcharges: RAM1-42 to RAM1-43, RAM1-43A to RAM1-43B, RAM1-45 to RAM1-46B1
- The following pipes are at or above the d/D criteria: RAM1-39 to RAM1-48

HGL Profile

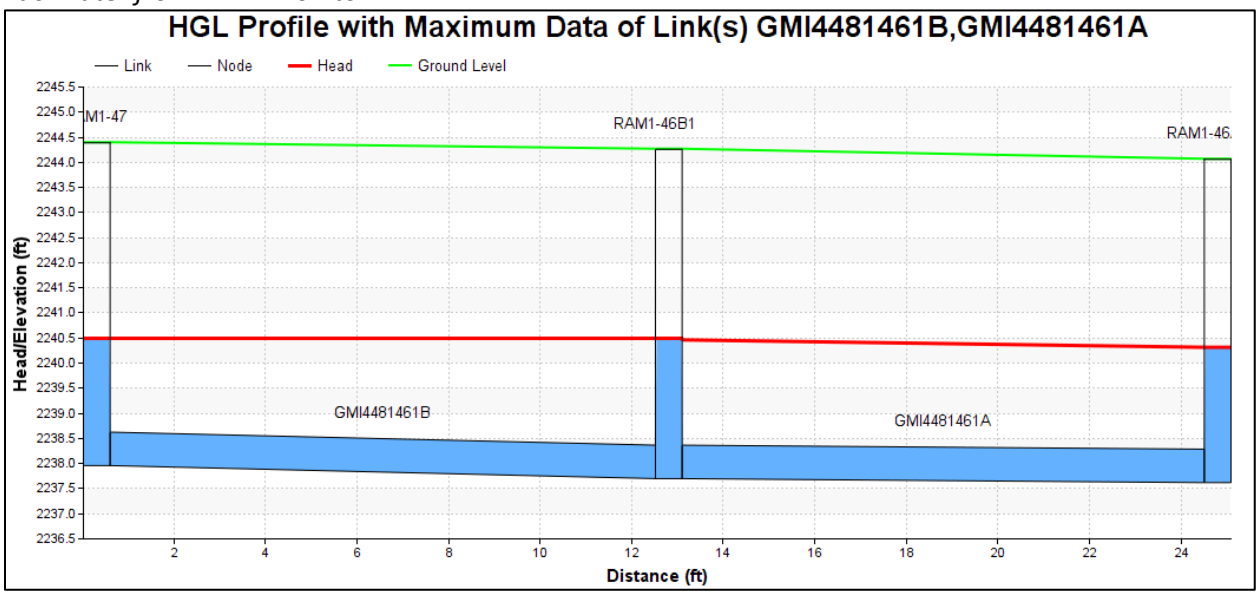
Backwater from RAM1-39 to RAM1-44



Backwater from RAM1-44 to RAM1-46A



Backwater from RAM1-46A to RAM1-47



E.4.10 M1-04

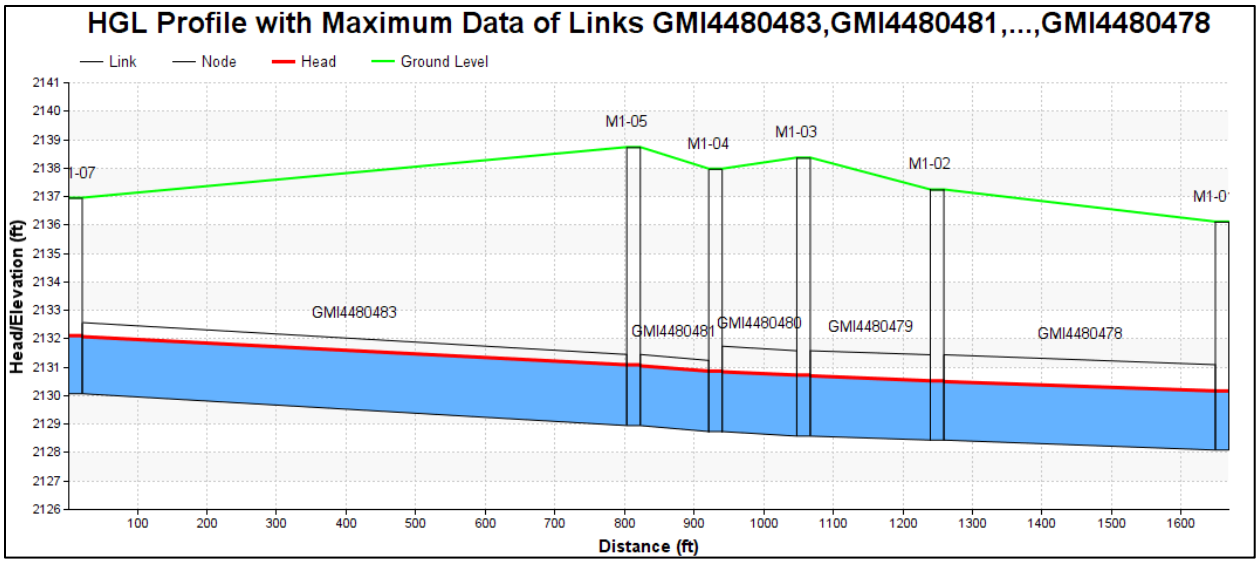
Background

- This reach includes a section of 30-inch and 36-inch pipe from the intersection of 3rd Street and Front Avenue to the manhole in the center of McEuen Park.
- The 30-inch and 36-inch are concrete pipe.

Issues

- The following pipes are at or above the d/D criteria: M1-04 to M1-07.

HGL Profile



E.4.11 M1-57

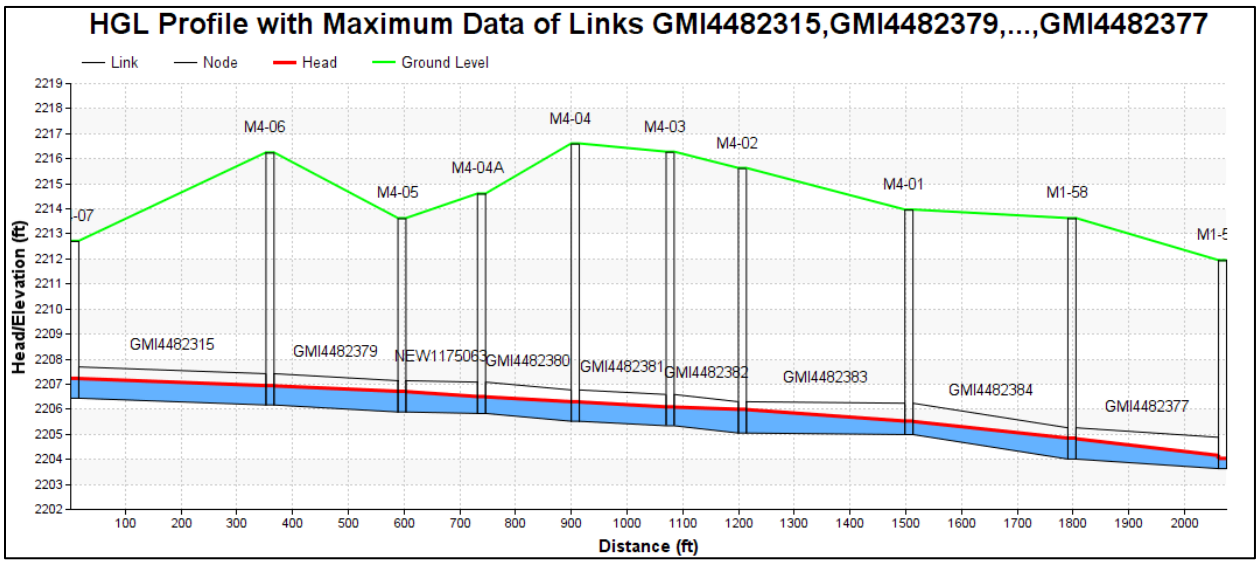
Background

- This reach includes a section of 15-inch pipe from the intersection of Harrison Avenue and 7th Street to the intersection of Hazel Avenue and 6th Street.
- This section of trunk has been rehabilitated with CIPP from M1-57 to M4-07.

Issues

- The following pipes have slopes below the 0.15% minimum slope for a 15-inch pipe: M4-01 to M4-02 (0.00%), M4-03 to M4-04 (0.11%), M4-04A to M4-05 (0.04%), M4-05 to M4-06 (0.11%), and M4-06 to M4-07 (0.07%).
- The following pipes are over capacity: M4-01 to M4-02 (15-inch) and M4-04A to M4-05 (15-inch).
- The following pipes are at or above the d/D criteria: M1-57 to M1-58, M4-01 to M4-02, and M4-04A to M4-05.

HGL Profile



E.4.12 BEXT1-04

Background

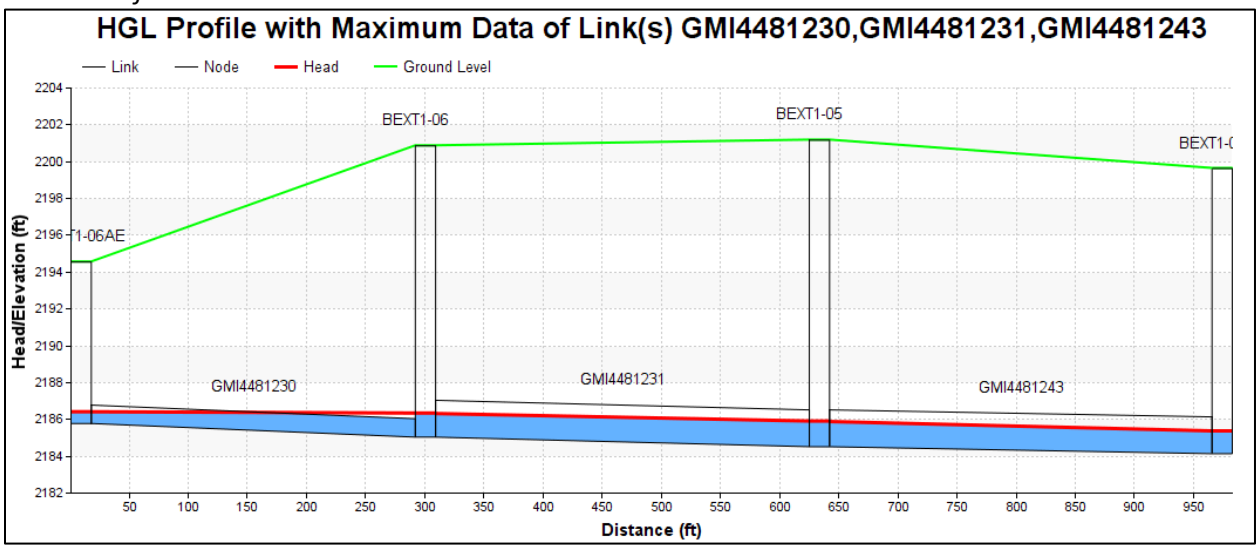
- This reach includes a section of 24-inch pipe from the intersection of 15th Street and Borah Avenue to the intersection of 15th Street and Best Avenue, 18-inch pipe from 15th Street and Best Avenue to the intersection of 13th Street and Stiner Avenue. There is also a single section of 12-inch pipe going east in Best Avenue from the intersection with 15th Street.
- This section of trunk includes both concrete and PVC pipe.

Issues

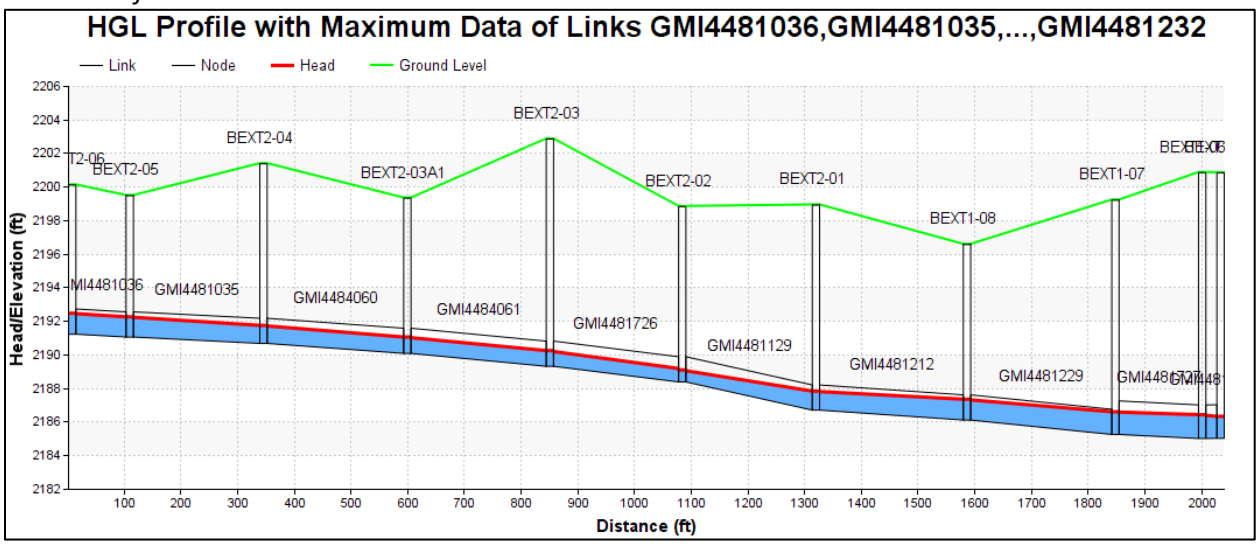
- The following pipes are over capacity: BEXT1-06 to BEXT1-06A (24-inch).
- The following pipes are at or above the d/D criteria: BEXT1-06 to BEXT1-06AE, BEXT1-07 to BEXT2-01, and BEXT2-04 to BEXT2-06.

HGL Profile

Backwater from BEXT1-04 to BEXT1-06AE



Backwater from BEXT1-06 to BEXT2-06



E.4.13 DEP1-01

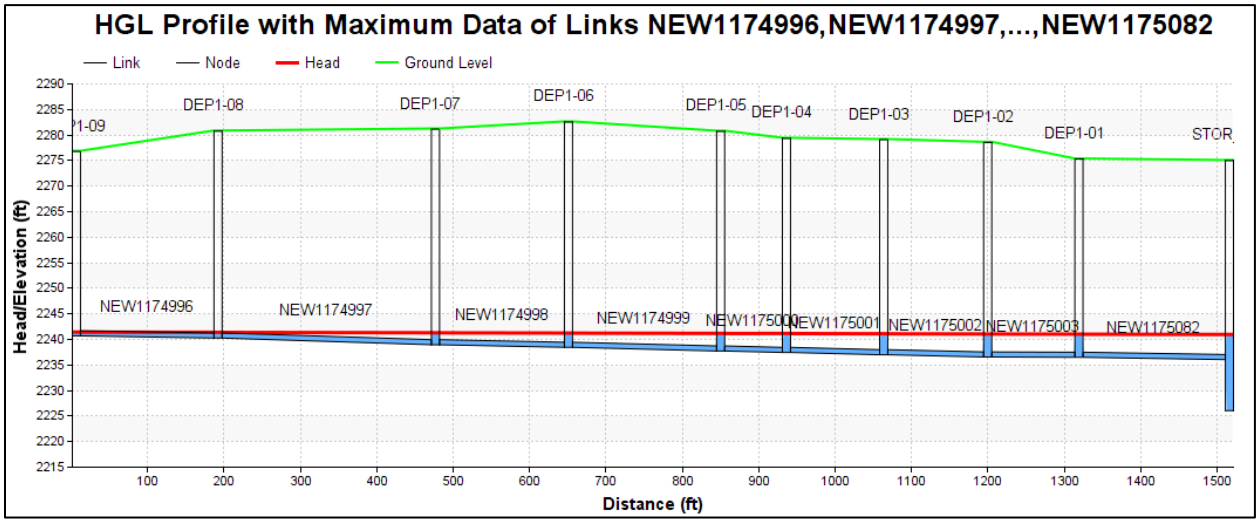
Background

- This reach includes a section of 12-inch pipe from the Hawks Nest Lift Station, north in Downing Lane to the intersection with West Andesite Way.
- The Hawks Nest Lift Station does not have sufficient capacity for the additional Master Plan flows. This may be impacting the capacity of this pipe reach and the lift station should be upgraded prior to upsizing the upstream pipe.

Issues

- The following pipes have slopes below the 0.22% minimum slope for a 12-inch pipe: DEP1-01 to DEP1-02 (0.05%).
- Surcharging occurs at DEP1-01 (3.54 feet), DEP1-02 (3.51 feet), DEP1-03 (3.11 feet), DEP1-04 (2.72 feet), DEP1-05 (2.45 feet), DEP1-06 (1.8 feet), DEP1-07 (1.35 feet), and DEP1-08 (0.13 feet).
- The following pipes are at or near capacity: DEP1-01 to DEP1-02 (12-inch).
- The following pipes are at or above the d/D criteria: DEP1-01 to DEP1-09.

HGL Profile



E.4.14 FWN1-03

Background

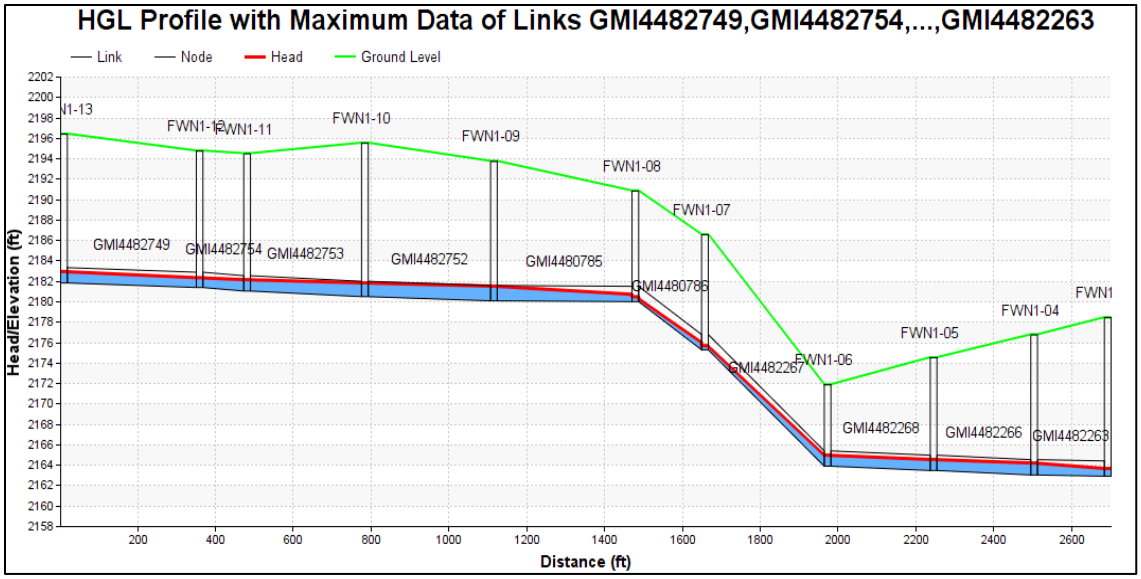
- This reach includes a section of 18-inch pipe from the intersection of Appleway Avenue and Fairway Drive north and west to Atlas Road and a 12-inch pipe that extends north on Atlas Road to the intersection with Appaloosa Road.

Issues

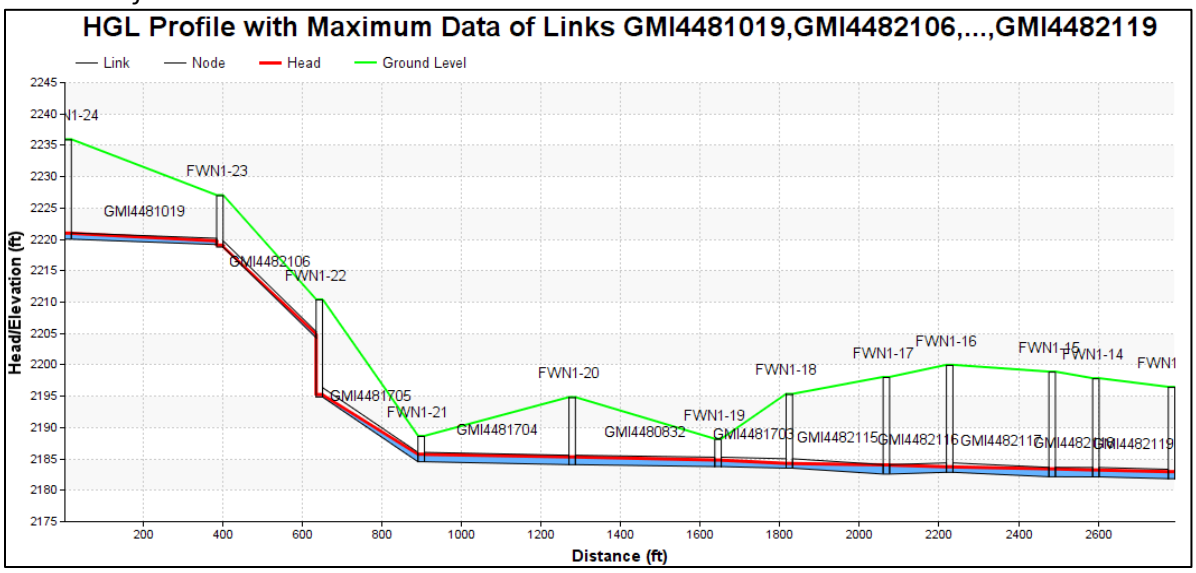
- The following pipes have slopes below the 0.12% minimum slope for an 18-inch pipe: FWN1-03 to FWN1-04 (0.07%), FWN1-08 to FWN1-09 (0.02%), FWN1-09 to FWN1-10 (0.00%), FWN1-14 to FWN1-15 (0.02%), and FWN1-19 to FWN1-20 (0.08%).
- The following pipes are over capacity: FWN1-03 to FWN1-04 (18-inch), FWN1-08 to FWN1-09 (18-inch), FWN1-14 to FWN1-15 (18-inch), FWN1-19 to FWN1-20 (18-inch), and FWN1-23 to FWN1-24 (12-inch).
- The following pipes are at or above the d/D criteria: FWN1-03 to FWN1-04, FWN1-08 to FWN1-10, FWN1-14 to FWN1-15, FWN1-16 to FWN1-17, FWN1-19 to FWN1-21, and FWN1-23 to FWN1-24.

HGL Profile

Backwater from FWN1-03 to FWN1-13



Backwater from FWN1-13 to FWN1-24



E.4.15 RIV1-02

Background

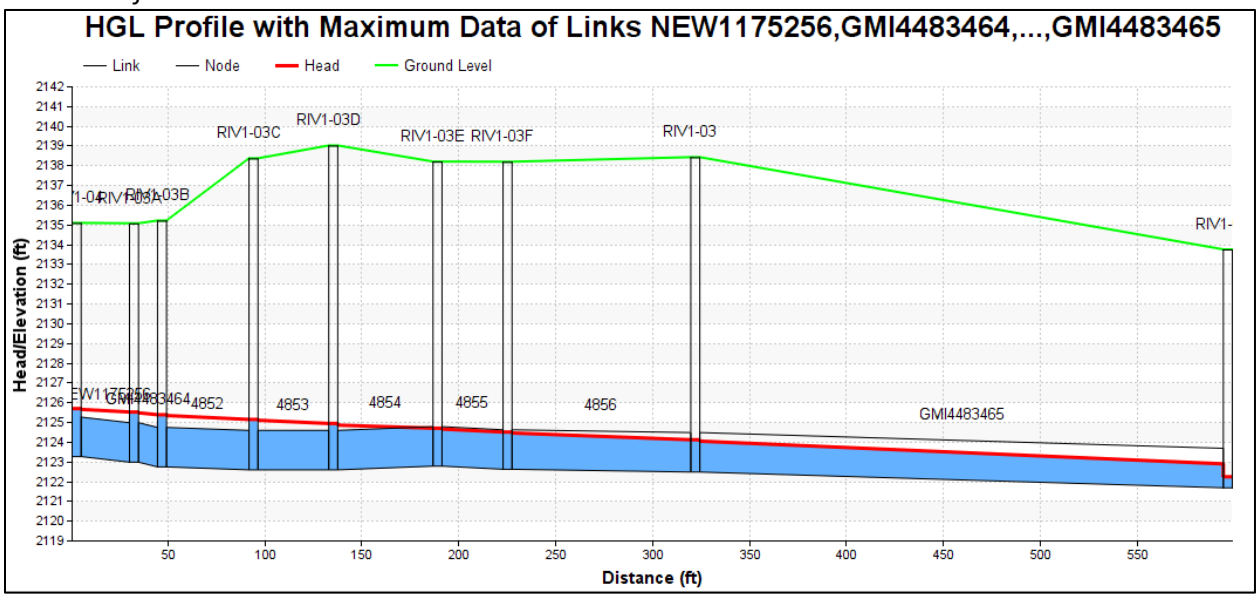
- This reach includes the section of the 24-inch Riverside Interceptor from Hubbard Avenue and continues north and west in the Centennial Trail to the intersection with Seltice Way.
- Manhole RIV1-10 is approximately 23 feet deep with high flows in the trunk line, making an accurate dip difficult to obtain. Inverts for the reach from RIV1-09 to RIV1-13 were surveyed in 2021 to correct a flat pipe run previously in the model.

Issues

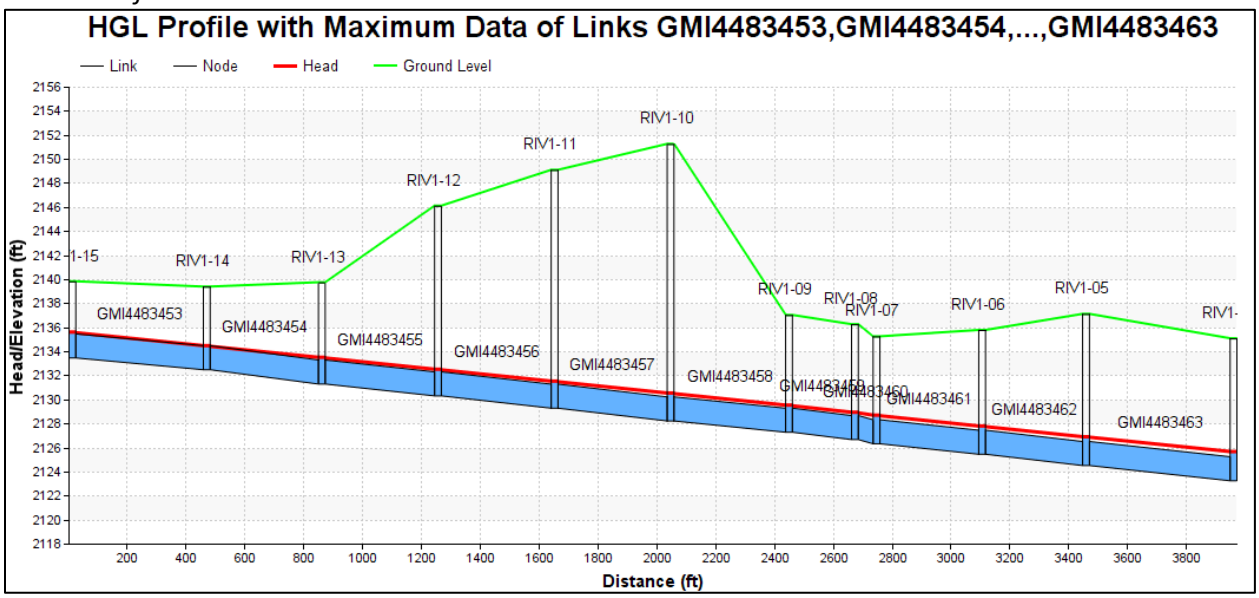
- The following pipes have slopes below the 0.10% minimum slope for a 24-inch pipe: RIV1-03D to RIV1-03C (0.00%).
- Surcharging occurs at RIV1-03D (0.35 feet), RIV1-03C (0.55 feet), RIV1-03B (0.64 feet), RIV1-03A (0.54 feet), RIV1-04 (0.44 feet), RIV1-05 (0.40 feet), RIV1-06 (0.35 feet), RIV1-07 (0.39 feet), RIV1-08 (0.27 feet), RIV1-09 (0.26 feet), RIV1-10 (0.32 feet), RIV1-11 (0.25 feet), RIV1-12 (0.22 feet), RIV1-13 (0.22 feet), RIV1-15 (0.15 feet), RIV1-16 (0.13 feet), RIV1-17A (0.13 feet), RIV1-18 (0.07 feet), RIV1-25A (0.08 feet), RIV1-26 (0.08 feet), RIV1-29 (0.06 feet), RIV1-30 (0.13 feet), and RIV1-31 (0.30 feet).
- The following pipes are over capacity and contribute to the surcharges: RIV1-03 to RIV1-03F (24-inch), RIV1-03D to RIV1-03C (24-inch), RIV1-14 to RIV1-15 (24-inch), RIV1-24 to RIV1-25 (24-inch), RIV1-28A to RIV1-28B (24-inch), and RIV1-30 to RIV1-31 (24-inch).
- The following pipes are at or above the d/D criteria: RIV1-03 to RIV1-32

HGL Profile

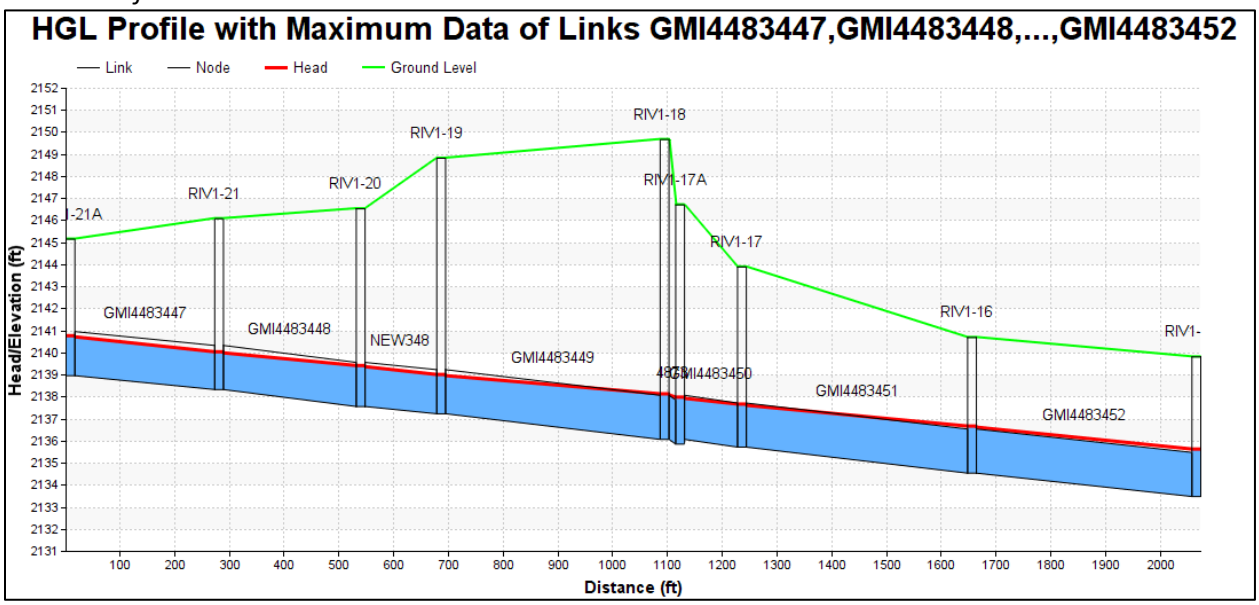
Backwater from RIV1-02 to RIV1-04



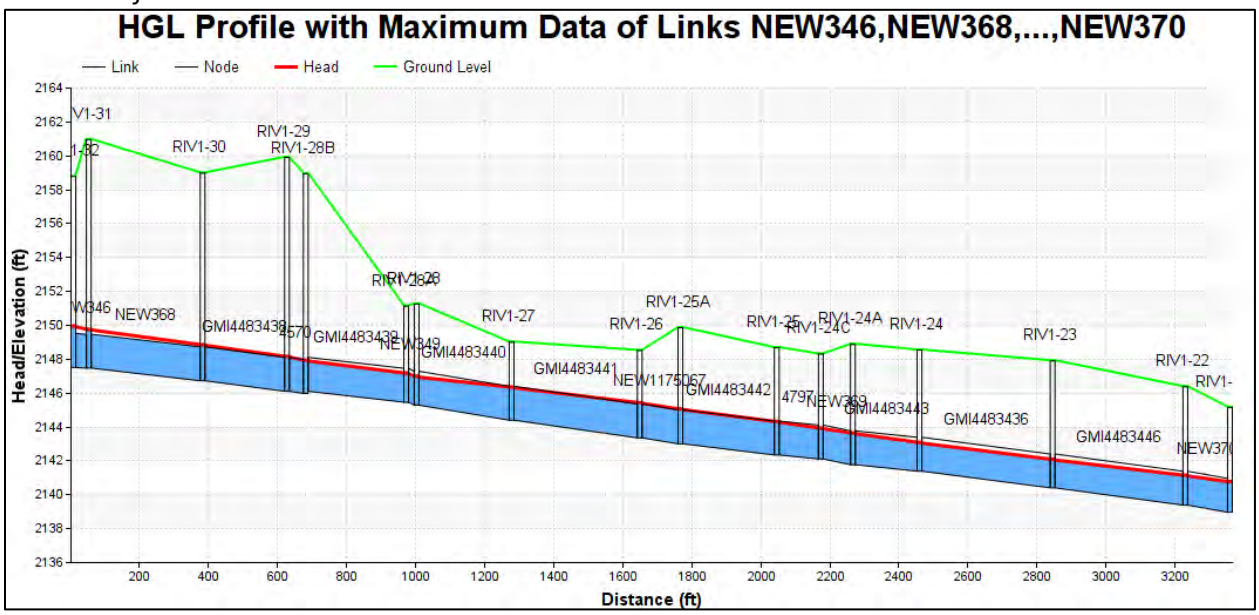
Backwater from RIV1-04 to RIV1-15



Backwater from RIV1-15 to RIV1-21A



Backwater from RIV1-21A to RIV1-32



E.4.16 M1-10

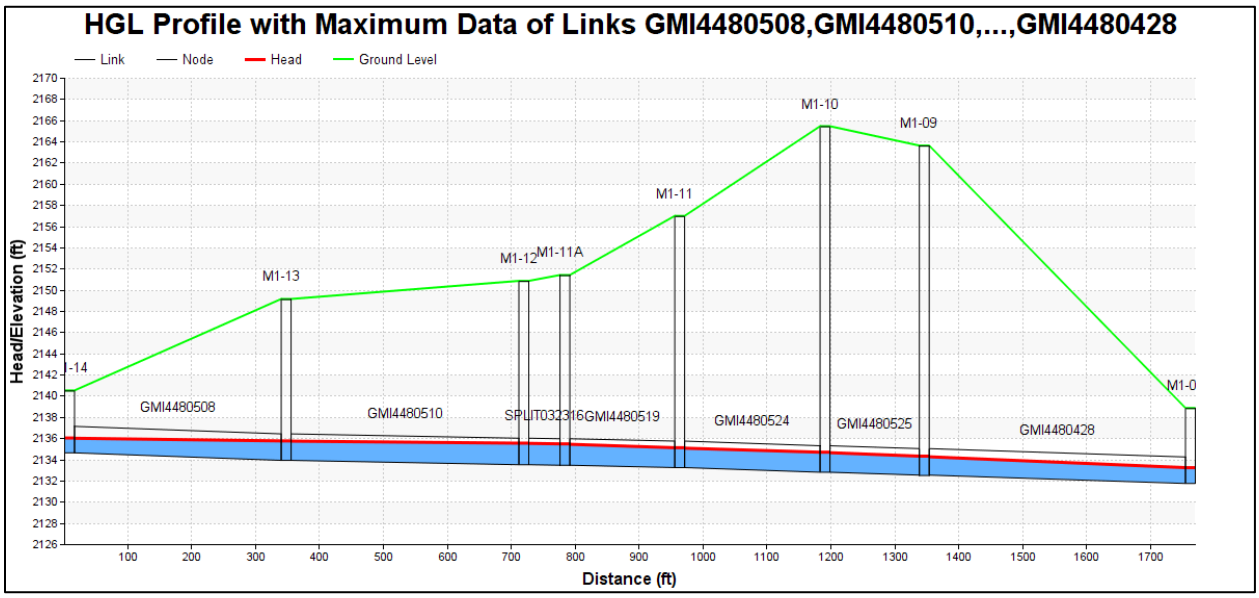
Background

- This reach includes the section of 30-inch pipe from the intersection of 8th Street and Young Avenue to the intersection of 9th Street and the Alley between Pine Avenue and Mountain Avenue.
- The 24-inch B-Interceptor connects into the 30-inch M-Interceptor between Manholes M1-12 and M1-11.

Issues

- The following pipes have slopes below the 0.10% minimum slope for a 30-inch pipe: M1-11A to M1-12 (0.00%).
- The following pipes are at or above the d/D criteria: M1-10 to M1-13.

HGL Profile



Appendix F

Existing Model Results

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Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4480657	A1-01	FG1-03	116.43	21.0	2145.91	2134.70	2121.13	11.21	11.65%	3.325	4.98	0.20	34.68
GMI4480913	A1-01A	A1-01	75.01	24.0	2145.32	2136.08	2134.70	9.24	1.84%	2.192	6.30	0.28	19.29
GMI4480912	A1-02	A1-01	255.39	24.0	2147.05	2138.41	2134.70	8.64	1.45%	1.263	5.52	0.19	17.82
GMI4480911	A1-03	A1-02	272.83	24.0	2147.53	2139.46	2138.41	8.07	0.39%	1.263	3.26	0.25	8.59
GMI4480910	A1-04	A1-03	266.60	24.0	2148.41	2140.85	2139.46	7.56	0.52%	1.260	3.43	0.22	10.18
GMI4480909	A1-04A	A1-04	50.75	24.0	2148.64	2140.98	2140.85	7.66	0.25%	1.260	2.95	0.30	6.76
GMI4480908	A1-05	A1-04A	288.97	24.0	2148.67	2143.15	2140.98	5.52	0.75%	1.253	3.10	0.21	12.49
GMI4483514	A1-05A	A1-05	294.38	24.0	2154.85	2144.93	2143.15	9.92	0.60%	1.252	3.83	0.22	11.05
NEW1175257	A1-06	A1-05A	356.89	24.0	2162.77	2152.86	2144.93	9.91	2.22%	1.252	4.71	0.16	22.36
GMI4483513	A1-08	A1-06	445.00	24.0	2166.75	2155.40	2152.86	11.35	0.57%	1.228	4.34	0.24	10.74
GMI4482409	A1-09	A1-08	226.78	24.0	2168.15	2156.27	2155.40	11.88	0.38%	1.223	3.22	0.25	8.59
GMI4482408	A1-10	A1-09	240.24	24.0	2169.79	2156.95	2156.27	12.84	0.28%	1.222	2.93	0.27	7.21
GMI4482407	A1-11	A1-10	241.52	24.0	2170.31	2157.51	2156.95	12.80	0.23%	1.222	2.68	0.28	6.41
GMI4482406	A1-12	A1-11	382.48	24.0	2169.65	2158.50	2157.51	11.15	0.26%	1.221	2.73	0.26	6.84
GMI4482405	A1-13	A1-12	378.74	24.0	2168.47	2159.52	2158.50	8.95	0.27%	1.220	2.84	0.27	7.00
GMI4482344	A1-13A	A1-13	71.89	12.0	2168.50	2161.65	2159.52	6.85	2.96%	0.013	0.32	0.04	4.28
GMI4482347	A1-14	A1-13	404.99	24.0	2169.95	2160.50	2159.52	9.45	0.24%	1.214	2.74	0.27	6.58
GMI4482346	A1-15	A1-14	396.43	24.0	2173.39	2161.39	2160.50	12.00	0.22%	1.196	2.64	0.28	6.31
GMI4482345	A1-16	A1-15	281.24	24.0	2174.65	2162.15	2161.39	12.50	0.27%	0.883	2.30	0.22	7.35
GMI4480685	A1-17	A1-16	133.86	24.0	2174.70	2164.10	2162.15	10.60	1.46%	0.881	3.45	0.15	18.24
GMI4480683	A1-18	A1-17	388.30	24.0	2176.11	2163.19	2164.10	12.92	-0.23%	0.802	1.01	0.68	6.87
GMI4480726	A1-19	A1-18	367.50	24.0	2179.63	2164.11	2163.19	15.52	0.25%	0.802	0.89	0.24	7.12
GMI4480725	A1-20	A1-19	340.94	24.0	2183.09	2165.10	2164.11	18.00	0.29%	0.805	2.43	0.26	7.71
GMI4483600	A2-01	A1-20	18.94	24.0	2181.51	2165.14	2165.10	16.37	0.24%	0.804	2.32	0.25	6.92
NEW1175254	A2-02	A2-01	130.24	24.0	2194.11	2177.56	2165.14	16.55	9.54%	0.803	3.57	0.09	48.22
GMI4481841	A2-03	A2-02	94.66	18.0	2192.88	2178.93	2177.56	13.95	1.45%	0.770	5.18	0.26	8.08
GMI4481840	A2-04	A2-03	367.59	18.0	2195.39	2184.49	2178.93	10.90	1.51%	0.769	3.95	0.20	8.28
GMI4481839	A2-05	A2-04	226.85	18.0	2198.43	2190.27	2184.49	8.16	2.55%	0.768	5.27	0.17	10.97
GMI4481838	A2-06	A2-05	66.41	18.0	2219.12	2191.00	2190.27	28.12	1.10%	0.767	4.28	0.25	6.94
GMI4481837	A2-07	A2-06	154.77	18.0	2205.52	2192.68	2191.00	12.84	1.09%	0.766	3.76	0.21	6.90
GMI4483618	A2-08	A2-07	321.91	18.0	2206.42	2199.56	2192.68	6.86	2.14%	0.758	4.77	0.18	10.00

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483617	A2-09	A2-08	196.43	18.0	2211.23	2203.68	2199.56	7.55	2.10%	0.756	5.32	0.18	9.90
GMI4483619	A2-10	A2-09	32.62	18.0	2214.56	2204.34	2203.68	10.22	2.03%	0.755	4.68	0.21	9.68
GMI4483742	A2-11	A2-10	268.00	18.0	2231.20	2209.77	2204.34	21.43	2.03%	0.754	4.72	0.18	9.72
GMI4481765	A2-12	A2-11	298.47	18.0	2234.51	2221.19	2209.77	13.32	3.83%	0.749	5.90	0.16	13.64
GMI4483616	A2-13	A2-12	237.98	18.0	2231.00	2221.38	2221.19	9.62	0.08%	0.748	2.08	0.44	1.32
GMI4483615	A2-14	A2-13	235.00	18.0	2231.64	2222.18	2221.38	9.46	0.34%	0.748	2.02	0.28	3.55
GMI4481256	A2-15	A2-14	73.07	18.0	2232.19	2222.28	2222.18	9.91	0.14%	0.746	2.31	0.37	2.02
GMI4483713	A2-15A	A2-15	78.00	12.0	2232.43	2222.61	2222.28	9.82	0.42%	0.225	1.21	0.25	1.39
GMI4483712	A2-15B	A2-15A	210.83	12.0	2232.93	2223.49	2222.61	9.44	0.42%	0.222	2.19	0.25	1.39
GMI4481186	A2-15C	A2-15B	263.86	12.0	2233.98	2224.04	2223.49	9.94	0.21%	0.219	1.81	0.32	0.92
GMI4481182	A2-15D	A2-15C	426.57	12.0	2236.85	2225.59	2224.04	11.26	0.36%	0.168	1.50	0.23	1.34
GMI4481108	A2-15E	A2-15D	423.60	12.0	2238.97	2227.63	2225.59	11.34	0.48%	0.162	2.02	0.21	1.57
GMI4482260	A2-15E1	A2-15E	187.95	10.0	2239.29	2228.55	2227.63	10.74	0.49%	0.101	1.70	0.21	0.97
GMI4481112	A2-15E2	A2-15E1	166.08	10.0	2240.07	2229.13	2228.55	10.94	0.35%	0.072	1.48	0.19	0.83
GMI4480764	A2-15E3	A2-15E2	386.23	10.0	2241.97	2230.88	2229.13	11.09	0.45%	0.061	1.46	0.16	0.97
GMI4481255	A2-16	A2-15	335.39	18.0	2234.27	2222.49	2222.28	11.78	0.06%	0.531	1.39	0.38	1.29
GMI4481254	A2-17	A2-16	253.03	18.0	2236.00	2222.84	2222.49	13.16	0.14%	0.529	1.56	0.30	2.21
GMI4481253	A2-17A	A2-17	32.90	10.0	2235.15	2223.20	2222.84	11.95	1.09%	0.111	1.01	0.18	1.49
GMI4480647	A2-18	A2-17	263.63	18.0	2237.24	2223.75	2222.84	13.49	0.35%	0.428	1.86	0.21	3.89
GMI4480646	A2-19	A2-18	411.00	12.0	2238.83	2224.99	2223.75	13.84	0.30%	0.410	2.50	0.40	0.96
GMI4481249	A2-19A	A2-19	373.09	12.0	2239.19	2226.11	2224.99	13.08	0.30%	0.212	1.47	0.27	1.16
GMI4481180	A2-19B	A2-19A	287.03	12.0	2240.94	2226.98	2226.11	13.96	0.30%	0.174	1.72	0.24	1.20
GMI4481174	A2-19C	A2-19B	324.10	10.0	2242.50	2228.00	2226.98	14.50	0.31%	0.157	1.84	0.29	0.70
GMI4481093	A2-19D	A2-19C	324.72	10.0	2242.45	2228.71	2228.00	13.74	0.22%	0.153	1.64	0.33	0.56
GMI4481092	A2-19E	A2-19D	207.39	10.0	2242.80	2229.28	2228.71	13.52	0.27%	0.148	1.60	0.29	0.66
GMI4481091	A2-19F	A2-19E	287.33	10.0	2244.56	2230.11	2229.28	14.45	0.29%	0.132	1.63	0.27	0.69
GMI4481090	A2-19G	A2-19F	132.45	10.0	2245.14	2230.43	2230.11	14.71	0.24%	0.124	1.56	0.28	0.63
GMI4481089	A2-19H	A2-19G	157.00	10.0	2245.91	2231.06	2230.43	14.85	0.40%	0.112	1.57	0.23	0.86
GMI4481001	A2-19HA	A2-19H	287.03	10.0	2247.22	2232.09	2231.06	15.13	0.36%	0.109	1.75	0.24	0.81
NEW9737666	A2-19I	A2-19HA	9.08	10.0	2247.03	2231.83	2232.09	15.20	-2.90%	0.090	0.66	0.58	2.52
GMI4481252	A2-20	A2-19	343.05	12.0	2238.21	2225.90	2224.99	12.31	0.27%	0.206	1.38	0.27	1.08
GMI4481251	A2-21	A2-20	144.48	12.0	2237.89	2226.57	2225.90	11.32	0.46%	0.159	1.71	0.21	1.54
GMI4481250	A2-22	A2-21	294.91	12.0	2237.71	2227.40	2226.57	10.31	0.28%	0.156	1.82	0.24	1.17
GMI4481248	A2-23	A2-22	437.88	12.0	2236.78	2228.64	2227.40	8.14	0.28%	0.034	0.63	0.11	1.29
GMI4481246	A2-24	A2-23	404.80	10.0	2236.05	2229.88	2228.64	6.17	0.31%	0.014	0.65	0.09	0.84
GMI4481172	A3-01	A2-22	660.69	12.0	2240.61	2229.47	2227.40	11.14	0.31%	0.121	1.45	0.20	1.28

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481171	A3-02	A3-01	377.73	12.0	2237.94	2230.68	2229.47	7.26	0.32%	0.118	1.67	0.20	1.29
GMI4481169	A3-04	A3-02	468.23	12.0	2238.29	2232.03	2230.68	6.26	0.29%	0.083	1.33	0.17	1.26
GMI4483806	AEXT1-01A	AEXT1-13	135.64	18.0	2158.92	2150.57	2147.97	8.35	1.91%	3.466	7.21	0.40	6.71
GMI4483805	AEXT1-02	AEXT1-01A	292.47	18.0	2160.14	2154.14	2150.57	6.00	1.22%	3.464	6.91	0.50	4.67
GMI4483813	AEXT1-13	RIV1-33	19.05	24.0	2159.19	2147.97	2147.65	11.21	1.67%	3.464	3.89	0.49	16.94
GMI4481734	AEXT2-03	AEXT1-02	272.01	18.0	2163.92	2157.04	2154.14	6.88	1.07%	3.464	6.14	0.49	4.13
GMI4481733	AEXT2-04	AEXT2-03	178.82	18.0	2164.99	2159.39	2157.04	5.60	1.31%	2.991	6.00	0.41	5.44
GMI4481732	AEXT2-05	AEXT2-04	367.29	18.0	2171.24	2164.77	2159.39	6.47	1.47%	2.988	6.79	0.41	5.92
GMI4481730	AEXT2-06	AEXT2-05	234.92	18.0	2172.81	2166.13	2164.77	6.68	0.58%	2.972	4.77	0.55	2.62
GMI4481729	AEXT2-07	AEXT2-06	364.90	18.0	2179.46	2167.91	2166.13	11.55	0.49%	2.973	4.51	0.57	2.16
GMI4481190	AEXT2-08	AEXT2-07	55.93	24.0	2180.04	2168.41	2167.91	11.63	0.89%	2.816	4.28	0.29	12.16
GMI4480693	AF1-01	AF1-01AA	66.72	10.0	2178.59	2170.96	2168.92	7.63	3.06%	0.145	3.17	0.16	2.54
GMI4480694	AF1-01A	AF1-01	52.05	10.0	2178.86	2172.12	2170.96	6.74	2.23%	0.145	3.65	0.18	2.15
GMI4481191	AF1-01AA	AEXT2-07	76.15	18.0	2178.45	2168.92	2167.91	9.53	1.33%	0.262	1.13	0.12	8.21
GMI4480695	AF1-02	AF1-01A	124.22	10.0	2179.83	2173.86	2172.12	5.97	1.40%	0.144	3.12	0.20	1.67
GMI4481116	AF1-03	AF1-02	187.45	10.0	2185.09	2177.16	2173.86	7.93	1.76%	0.143	3.12	0.18	1.89
GMI4481115	AF1-04	AF1-03	341.09	10.0	2190.92	2182.79	2177.16	8.13	1.65%	0.143	3.27	0.18	1.83
GMI4481114	AF1-05	AF1-04	269.42	10.0	2194.37	2185.43	2182.79	8.94	0.98%	0.142	2.85	0.21	1.38
GMI4481113	AF1-06	AF1-05	190.24	10.0	2195.51	2186.26	2185.43	9.25	0.44%	0.137	2.15	0.26	0.88
GMI4481005	AF1-07	AF1-06	334.36	10.0	2197.60	2188.08	2186.26	9.52	0.54%	0.130	1.95	0.23	1.00
GMI4481007	AF1-07A	AF1-07	216.30	10.0	2198.41	2190.19	2188.08	8.22	0.98%	0.006	0.35	0.05	1.51
GMI4481006	AF1-08	AF1-07	324.86	10.0	2200.55	2191.25	2188.08	9.30	0.98%	0.121	2.25	0.19	1.40
GMI4480963	AF1-09	AF1-08	365.02	10.0	2203.04	2194.04	2191.25	9.00	0.76%	0.119	2.40	0.20	1.22
GMI4480964	AF1-09A	AF1-09	305.50	10.0	2208.11	2199.02	2194.04	9.09	1.63%	0.077	1.94	0.14	1.88
GMI4480965	AF1-09B	AF1-09A	296.29	10.0	2213.70	2203.69	2199.02	10.01	1.58%	0.075	2.63	0.14	1.85
GMI4480831	AF1-09B1	AF1-09B	345.78	10.0	2219.15	2209.53	2203.69	9.62	1.69%	0.061	2.33	0.12	1.93
GMI4480946	AF1-09B2	AF1-09B1	323.02	10.0	2224.08	2212.86	2209.53	11.22	1.03%	0.022	1.17	0.08	1.54
GMI4480941	AF1-09B2A	AF1-09B2	402.35	10.0	2232.61	2221.95	2212.86	10.66	2.26%	0.011	1.13	0.05	2.30
GMI4480955	AF1-15	AF1-14	320.82	10.0	2231.69	2216.29	2215.31	15.40	0.31%	0.022	1.35	0.12	0.83
GMI4480796	AF1-15A1	AF1-15	277.00	10.0	2228.83	2217.14	2216.29	11.69	0.31%	0.003	0.31	0.04	0.85
CDT-1021	ATL-5	REL-12	127.47	10.0	2143.00	2123.00	2121.93	20.00	0.84%	0.000	0.00	0.00	1.41
NEW-032316B	B1-01	M1-11B	406.98	24.0	2164.28	2151.08	2139.06	13.20	2.95%	3.837	12.39	0.79	28.84
GMI4480458	B1-02	B1-01	315.17	24.0	2169.15	2151.48	2151.08	17.67	0.13%	3.837	3.48	0.64	1.81
GMI4480457	B1-03	B1-02	591.26	24.0	2174.54	2152.04	2151.48	22.50	0.09%	3.842	2.69	0.69	1.03
GMI4480456	B1-04	B1-03	141.81	24.0	2171.39	2152.36	2152.04	19.03	0.23%	3.845	2.74	0.62	3.68
GMI4480455	B1-05	B1-04	141.96	24.0	2171.03	2152.58	2152.36	18.45	0.15%	3.844	2.88	0.63	2.39

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GMI4480454	B1-06	B1-05	301.14	24.0	2171.01	2152.87	2152.58	18.14	0.10%	3.847	2.72	0.68	1.07
GMI4480453	B1-07	B1-06	310.21	24.0	2170.29	2153.33	2152.87	16.96	0.15%	3.851	2.73	0.63	2.25
GMI4480448	B1-08	B1-07	77.93	24.0	2169.61	2153.44	2153.33	16.17	0.14%	3.853	2.79	0.66	2.10
GMI4480447	B1-09	B1-08	140.44	24.0	2169.09	2153.87	2153.44	15.22	0.31%	3.854	3.02	0.55	4.91
GMI4480435	B1-10	B1-09	299.75	24.0	2166.34	2154.22	2153.87	12.12	0.12%	3.841	3.06	0.64	1.57
GMI4480449	B1-11	B1-10	301.84	24.0	2165.13	2154.72	2154.22	10.41	0.17%	3.833	2.90	0.60	2.61
GMI4480402	B1-12	B1-11	447.98	24.0	2166.67	2155.21	2154.72	11.46	0.11%	3.826	2.93	0.63	1.81
GMI4481397	B1-13	B1-12	305.86	24.0	2167.74	2156.15	2155.21	11.59	0.31%	3.828	3.38	0.46	5.00
GMI4481396	B1-14	B1-13	353.46	24.0	2172.34	2162.62	2156.15	9.72	1.83%	3.828	5.55	0.28	17.81
GMI4481395	B1-15	B1-14	357.91	24.0	2177.40	2163.06	2162.62	14.34	0.12%	3.827	3.93	0.68	1.27
GMI4481394	B1-16	B1-15	369.66	24.0	2172.78	2163.64	2163.06	9.14	0.16%	3.828	2.63	0.66	1.61
GMI4481393	B1-17	B1-16	350.41	24.0	2171.27	2164.12	2163.64	7.15	0.14%	3.833	2.76	0.63	2.03
GMI4481373	B1-18	B1-17	240.13	24.0	2180.07	2164.47	2164.12	15.60	0.15%	3.836	2.85	0.63	2.21
GMI4481374	B1-19	B1-18	299.50	24.0	2180.09	2164.91	2164.47	15.18	0.15%	3.835	2.89	0.62	2.24
GMI4481375	B1-20	B1-19	240.11	24.0	2179.43	2165.07	2164.91	14.36	0.07%	3.837	2.69	0.71	0.25
GMI4481323	B1-21	B1-20	297.67	24.0	2178.59	2165.68	2165.07	12.91	0.20%	3.838	2.82	0.57	3.33
GMI4481320	B1-22	B1-21	300.12	24.0	2177.11	2166.02	2165.68	11.09	0.11%	3.838	2.98	0.65	1.49
GMI4481317	B1-23	B1-22	74.52	24.0	2176.94	2166.22	2166.02	10.72	0.27%	3.832	2.83	0.62	4.37
GMI4481295	B1-25	B1-23	229.78	24.0	2175.72	2166.40	2166.22	9.32	0.08%	3.834	2.72	0.69	0.60
GMI4481294	B1-26	B1-25	461.01	24.0	2176.15	2167.25	2166.40	8.89	0.18%	3.835	2.92	0.54	2.97
GMI4481300	B1-27	B1-26	289.44	24.0	2176.34	2168.08	2167.25	8.26	0.29%	3.837	3.65	0.49	4.65
GMI4481299	B1-28	B1-27	341.63	24.0	2178.60	2168.38	2168.08	10.22	0.09%	3.835	3.13	0.68	0.88
GMI4483728	B1-29	B1-28	315.69	24.0	2182.78	2168.60	2168.38	14.18	0.07%	3.835	2.50	0.74	0.32
GMI4483727	B1-30	B1-29	340.74	24.0	2183.47	2169.13	2168.60	14.34	0.16%	3.836	2.59	0.64	2.41
GMI4481946	B1-31	B1-30	506.38	24.0	2184.36	2169.66	2169.13	14.70	0.10%	3.846	2.75	0.67	1.28
GMI4481945	B1-32	B1-31	498.12	24.0	2185.75	2170.32	2169.66	15.43	0.13%	3.853	2.78	0.63	1.91
GMI4481944	B1-33	B1-32	446.42	24.0	2187.31	2171.12	2170.32	16.19	0.18%	3.861	3.09	0.56	2.85
GMI4481286	B1-34	B1-33	438.62	24.0	2186.91	2171.52	2171.12	15.39	0.09%	3.863	2.90	0.69	0.92
GMI4481285	B1-35	B1-34	421.83	24.0	2185.38	2172.06	2171.52	13.32	0.13%	3.866	2.68	0.65	1.80
GMI4481284	B1-36	B1-35	280.09	24.0	2186.26	2172.55	2172.06	13.71	0.17%	3.871	2.93	0.60	2.75
GMI4481844	B1-37	B1-36	56.97	24.0	2186.01	2172.71	2172.55	13.30	0.28%	3.868	3.07	0.60	4.53
GMI4481843	B1-38	B1-37	348.77	24.0	2183.65	2173.06	2172.71	10.59	0.10%	3.871	2.85	0.67	1.15
GMI4483752	B1-39	B1-38	251.55	24.0	2196.05	2173.51	2173.06	22.54	0.18%	3.872	2.83	0.61	2.83
GMI4483753	B1-40	B1-39	114.60	24.0	2185.01	2173.73	2173.51	11.28	0.19%	3.868	3.00	0.61	3.07
GMI4481276	B1-41	B1-40	453.26	24.0	2183.63	2174.72	2173.73	8.91	0.22%	3.867	3.30	0.51	3.54
GMI4481273	B1-42	B1-41	359.58	24.0	2184.18	2174.81	2174.72	9.37	0.03%	3.860	2.82	0.76	-1.35

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481257	B1-43	B1-42	466.89	24.0	2186.75	2175.50	2174.81	11.25	0.15%	3.829	2.55	0.62	2.26
GMI4481271	B1-44	B1-43	174.85	24.0	2184.55	2175.88	2175.50	8.67	0.22%	3.823	3.04	0.58	3.56
GMI4481270	B1-45	B1-44	153.48	24.0	2185.57	2176.12	2175.88	9.45	0.16%	3.825	3.06	0.61	2.44
4804	BEL-2A10	BEL-2A9	390.56	10.0	2134.14	2128.89	2127.53	5.25	0.35%	0.010	0.83	0.07	0.90
4803	BEL-2A11	BEL-2A10	319.21	10.0	2133.34	2129.89	2128.89	3.45	0.31%	0.009	0.80	0.07	0.85
4808	BEL-2A12	BEL-2A11	389.74	10.0	2140.88	2131.28	2129.89	9.60	0.36%	0.009	0.81	0.07	0.91
4800	BEL-2A9	BEL-2A8	389.62	10.0	2135.33	2127.53	2126.49	7.80	0.27%	0.010	0.28	0.08	0.78
GMI4481260	BEXT1-01	B1-45	80.07	24.0	2185.70	2176.19	2176.12	9.51	0.08%	3.823	2.78	0.67	0.69
GMI4481261	BEXT1-02	BEXT1-01	302.36	24.0	2187.69	2177.11	2176.19	10.58	0.31%	3.824	3.23	0.46	4.94
GMI4481258	BEXT1-03	BEXT1-02	328.18	24.0	2197.78	2183.53	2177.11	14.25	1.96%	3.813	5.55	0.28	18.34
GMI4481237	BEXT1-04	BEXT1-03	296.45	24.0	2199.63	2184.14	2183.53	15.49	0.21%	3.811	4.56	0.58	3.38
GMI4481243	BEXT1-05	BEXT1-04	347.96	24.0	2201.17	2184.52	2184.14	16.65	0.11%	3.792	2.89	0.65	1.44
GMI4481231	BEXT1-06	BEXT1-05	339.99	24.0	2200.86	2185.04	2184.52	15.82	0.15%	3.787	2.82	0.61	2.41
GMI4481232	BEXT1-06A	BEXT1-06	21.00	24.0	2200.87	2185.03	2185.04	15.84	-0.05%	3.697	2.72	0.67	-0.24
GMI4481230	BEXT1-06AE	BEXT1-06	294.81	12.0	2194.55	2185.78	2185.04	8.77	0.25%	0.156	0.51	0.48	1.09
GMI4481227	BEXT1-06BE	BEXT1-06AE	385.28	12.0	2192.58	2187.76	2185.78	4.82	0.51%	0.159	1.91	0.20	1.63
GMI4481226	BEXT1-06CE	BEXT1-06BE	405.56	12.0	2197.40	2188.88	2187.76	8.52	0.28%	0.139	1.73	0.23	1.17
GMI4481225	BEXT1-06DE	BEXT1-06CE	239.15	12.0	2196.69	2189.50	2188.88	7.19	0.26%	0.135	1.59	0.22	1.14
GMI4481217	BEXT1-06DE1	BEXT1-06DE	171.61	12.0	2195.61	2190.04	2189.50	5.57	0.31%	0.106	1.44	0.19	1.29
GMI4481216	BEXT1-06DE2	BEXT1-06DE1	230.48	12.0	2195.70	2190.73	2190.04	4.97	0.30%	0.095	1.50	0.18	1.27
GMI4481215	BEXT1-06DE3	BEXT1-06DE2	378.78	12.0	2197.57	2191.50	2190.73	6.07	0.20%	0.092	1.36	0.20	1.03
GMI4481727	BEXT1-07	BEXT1-06A	150.75	24.0	2199.23	2185.27	2185.03	13.96	0.16%	3.692	2.62	0.65	2.63
GMI4481229	BEXT1-08	BEXT1-07	267.78	18.0	2196.59	2186.13	2185.27	10.46	0.32%	3.693	3.66	0.79	0.48
GMI4481228	BEXT1-09	BEXT1-08	359.99	18.0	2193.56	2187.08	2186.13	6.48	0.26%	1.132	1.66	0.38	2.65
GMI4481214	BEXT1-10	BEXT1-09	301.50	18.0	2195.22	2187.78	2187.08	7.44	0.23%	1.133	2.74	0.41	2.41
GMI4481209	BEXT1-11	BEXT1-10	247.64	18.0	2197.22	2188.87	2187.78	8.35	0.44%	1.129	2.98	0.33	3.75
GMI4480649	BEXT1-12	BEXT1-11	381.58	18.0	2200.54	2190.42	2188.87	10.12	0.41%	1.123	3.37	0.34	3.56
GMI4482891	BEXT1-13	BEXT1-12	270.08	15.0	2209.53	2200.66	2190.42	8.87	3.79%	1.118	5.03	0.24	7.69
GMI4482910	BEXT1-14	BEXT1-13	303.01	15.0	2213.55	2203.99	2200.66	9.56	1.10%	1.079	5.37	0.36	3.66
GMI4482909	BEXT1-15	BEXT1-14	370.23	15.0	2215.94	2206.62	2203.99	9.32	0.71%	1.080	4.11	0.37	2.73
GMI4482908	BEXT1-16	BEXT1-15	284.92	15.0	2218.29	2208.32	2206.62	9.97	0.60%	1.077	3.85	0.39	2.42
GMI4480904	BEXT1-17	BEXT1-16	47.34	15.0	2219.11	2208.64	2208.32	10.47	0.68%	1.073	3.54	0.42	2.65
GMI4480903	BEXT1-18	BEXT1-17	202.81	15.0	2222.46	2209.66	2208.64	12.80	0.50%	1.069	3.45	0.41	2.14
GMI4482918	BEXT1-19	BEXT1-18	120.80	15.0	2224.36	2209.92	2209.66	14.44	0.22%	1.064	2.84	0.55	1.03
GMI4483680	BEXT1-19E1	BEXT1-19	141.94	10.0	2221.84	2210.61	2209.92	11.23	0.49%	0.367	1.89	0.40	0.70
GMI4483679	BEXT1-19E2	BEXT1-19E1	187.00	10.0	2221.00	2211.00	2210.61	10.00	0.21%	0.363	2.15	0.56	0.34

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483678	BEXT1-19E3	BEXT1-19E2	198.00	10.0	2226.77	2211.54	2211.00	15.23	0.27%	0.361	1.97	0.47	0.44
GMI4483677	BEXT1-19E4	BEXT1-19E3	170.57	10.0	2218.51	2211.84	2211.54	6.67	0.17%	0.359	1.94	0.57	0.28
GMI4482870	BEXT1-19E4AE	BEXT1-19E4	133.65	10.0	2218.89	2212.26	2211.84	6.63	0.31%	0.320	1.83	0.42	0.54
GMI4480895	BEXT1-19E4BE	BEXT1-19E4AE	323.39	10.0	2220.45	2212.95	2212.26	7.50	0.21%	0.285	1.90	0.46	0.42
GMI4480894	BEXT1-19E4CE	BEXT1-19E4BE	307.87	10.0	2220.84	2213.84	2212.95	7.00	0.29%	0.288	1.99	0.41	0.54
GMI4482871	BEXT1-19E4DE	BEXT1-19E4CE	255.96	10.0	2221.58	2214.71	2213.84	6.87	0.34%	0.289	2.20	0.39	0.61
GMI4482872	BEXT1-19E4DE1	BEXT1-19E4DE	254.65	10.0	2222.98	2215.39	2214.71	7.59	0.27%	0.265	2.02	0.41	0.53
GMI4482875	BEXT1-19E4DE3	BEXT1-19E4DE1	136.74	10.0	2224.01	2215.84	2215.39	8.17	0.33%	0.267	2.09	0.38	0.61
GMI4482921	BEXT1-20	BEXT1-19	323.38	15.0	2228.93	2217.98	2209.92	10.95	2.49%	0.695	2.83	0.21	6.45
GMI4482923	BEXT1-21	BEXT1-20	181.05	15.0	2230.30	2219.78	2217.98	10.52	0.99%	0.689	4.43	0.29	3.82
GMI4482925	BEXT1-22	BEXT1-21	170.29	12.0	2231.26	2220.75	2219.78	10.51	0.57%	0.679	3.53	0.45	1.20
GMI4482926	BEXT1-22A	BEXT1-22	179.02	12.0	2232.06	2221.76	2220.75	10.30	0.56%	0.677	3.20	0.42	1.20
GMI4482927	BEXT1-22B	BEXT1-22A	313.13	12.0	2231.17	2221.52	2221.76	9.65	-0.08%	0.676	1.77	1.11	0.01
GMI4480771	BEXT1-22C	BEXT1-22B	160.57	12.0	2234.14	2223.63	2221.52	10.51	1.31%	0.673	1.97	0.33	2.19
GMI4480770	BEXT1-22D	BEXT1-22C	165.02	12.0	2234.59	2223.90	2223.63	10.69	0.16%	0.670	2.69	0.66	0.34
GMI4482928	BEXT1-22E	BEXT1-22D	329.53	12.0	2235.55	2224.93	2223.90	10.62	0.31%	0.663	2.85	0.49	0.73
GMI4482932	BEXT1-22F	BEXT1-22E	164.73	12.0	2235.68	2225.67	2224.93	10.01	0.45%	0.622	3.72	0.49	1.05
GMI4482935	BEXT1-22G	STOR_16	122.48	10.0	2229.33	2213.56	2213.19	15.77	0.30%	0.392	2.44	0.52	0.45
GMI4481212	BEXT2-01	BEXT1-08	272.70	18.0	2198.94	2186.72	2186.13	12.22	0.22%	2.591	2.98	0.70	0.83
GMI4481129	BEXT2-02	BEXT2-01	239.78	18.0	2198.85	2188.40	2186.72	10.45	0.70%	2.589	3.84	0.45	3.57
GMI4481726	BEXT2-03	BEXT2-02	237.23	18.0	2202.87	2189.33	2188.40	13.54	0.39%	2.577	4.29	0.59	2.03
GMI4481130	BEXT2-03A	BEXT2-03	247.07	10.0	2203.45	2193.94	2189.33	9.51	1.87%	0.067	0.87	0.12	2.03
GMI4484061	BEXT2-03A1	BEXT2-03	256.62	18.0	2199.35	2190.10	2189.33	9.25	0.30%	2.544	3.55	0.61	1.48
GMI4484060	BEXT2-04	BEXT2-03A1	259.08	18.0	2201.40	2190.69	2190.10	10.71	0.23%	2.544	3.28	0.68	0.98
GMI4481035	BEXT2-05	BEXT2-04	239.90	18.0	2199.50	2191.07	2190.69	8.43	0.16%	2.532	2.91	0.75	0.40
GMI4481036	BEXT2-06	BEXT2-05	95.24	18.0	2200.13	2191.24	2191.07	8.89	0.18%	2.525	2.70	0.78	0.58
GMI4481037	BEXT2-06A	BEXT2-06	145.12	10.0	2203.13	2193.49	2191.24	9.64	1.55%	0.051	0.55	0.11	1.86
GMI4481038	BEXT2-06C	BEXT2-06A	236.73	10.0	2204.11	2194.76	2193.49	9.35	0.54%	0.033	1.45	0.12	1.09
GMI4481039	BEXT2-07	BEXT2-06	128.22	18.0	2201.51	2191.81	2191.24	9.70	0.44%	2.498	3.11	0.55	2.39
GMI4483385	BEXT2-070	BEXT2-07N	285.16	10.0	2239.00	2217.20	2216.76	21.80	0.15%	0.396	1.87	0.63	0.21
GMI4481043	BEXT2-07A	BEXT2-07	136.39	12.0	2202.20	2193.37	2191.81	8.83	1.15%	0.490	1.75	0.29	2.18
GMI4481040	BEXT2-07B	BEXT2-07A	306.44	12.0	2211.78	2203.22	2193.37	8.56	3.21%	0.489	4.75	0.22	3.99
GMI4480648	BEXT2-07C	BEXT2-07B	350.71	12.0	2213.72	2204.69	2203.22	9.03	0.42%	0.484	3.41	0.42	1.13
GMI4482852	BEXT2-07D	BEXT2-07C	235.50	12.0	2214.13	2205.59	2204.69	8.54	0.38%	0.474	2.49	0.38	1.07
4782	BEXT2-07DAA	BEXT2-07D	24.00	12.0	2214.13	2205.64	2205.59	8.49	0.22%	0.464	2.25	0.47	0.71
GMI4482853	BEXT2-07E	BEXT2-07DAA	414.94	12.0	2214.29	2206.23	2205.64	8.06	0.14%	0.453	1.83	0.51	0.49

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482904	BEXT2-07F	BEXT2-07E	328.10	12.0	2217.99	2207.60	2206.23	10.39	0.42%	0.444	2.12	0.36	1.17
GMI4482903	BEXT2-07G	BEXT2-07F	323.78	10.0	2220.50	2212.22	2207.60	8.28	1.43%	0.430	3.51	0.33	1.40
GMI4483817	BEXT2-07H	BEXT2-07G	20.10	10.0	2220.75	2212.49	2212.22	8.26	1.34%	0.416	3.50	0.41	1.36
GMI4482902	BEXT2-07I	BEXT2-07H	168.94	10.0	2222.10	2213.40	2212.49	8.70	0.54%	0.415	2.92	0.44	0.71
GMI4483380	BEXT2-07J	BEXT2-07I	158.84	10.0	2223.80	2213.46	2213.40	10.34	0.04%	0.415	1.84	0.79	-0.12
GMI4483381	BEXT2-07K	BEXT2-07J	367.84	10.0	2229.00	2214.30	2213.46	14.70	0.23%	0.403	1.64	0.53	0.33
GMI4483382	BEXT2-07L	BEXT2-07K	382.94	10.0	2237.20	2215.34	2214.30	21.86	0.27%	0.402	2.21	0.50	0.40
GMI4483383	BEXT2-07M	BEXT2-07L	271.44	10.0	2238.30	2216.00	2215.34	22.30	0.24%	0.399	2.16	0.54	0.36
GMI4483384	BEXT2-07N	BEXT2-07M	330.87	10.0	2239.40	2216.76	2216.00	22.64	0.23%	0.398	2.08	0.53	0.34
GMI4482953	BEXT2-07Q1	BEXT2-07Q	82.65	10.0	2240.20	2225.20	2224.09	15.00	1.34%	0.121	1.39	0.18	1.66
GMI4482954	BEXT2-07Q2	BEXT2-07Q1	193.24	10.0	2240.71	2225.99	2225.20	14.72	0.41%	0.118	2.14	0.25	0.87
GMI4482955	BEXT2-07Q3	BEXT2-07Q2	358.91	10.0	2239.11	2227.47	2225.99	11.64	0.41%	0.094	1.54	0.21	0.89
GMI4482956	BEXT2-07Q4	BEXT2-07Q3	332.21	10.0	2238.26	2229.16	2227.47	9.10	0.51%	0.091	1.79	0.19	1.00
GMI4482961	BEXT2-07Q4A	BEXT2-07Q4	119.54	10.0	2238.38	2229.76	2229.16	8.62	0.50%	0.006	0.35	0.05	1.08
GMI4482962	BEXT2-07Q5	BEXT2-07Q4	263.39	10.0	2239.30	2230.26	2229.16	9.04	0.42%	0.041	1.09	0.14	0.95
GMI4482963	BEXT2-07Q6	BEXT2-07Q5	278.42	10.0	2240.64	2231.52	2230.26	9.12	0.45%	0.027	1.05	0.11	1.01
GMI4482964	BEXT2-07Q7	BEXT2-07Q6	279.02	10.0	2242.06	2232.78	2231.52	9.28	0.45%	0.017	0.93	0.09	1.01
GMI4482965	BEXT2-07Q8	BEXT2-07Q7	234.76	10.0	2243.55	2233.69	2232.78	9.86	0.39%	0.005	0.48	0.05	0.95
GMI4482978	BEXT2-07U5	BEXT2-07U4	303.40	10.0	2245.50	2235.10	2233.78	10.40	0.44%	0.005	0.49	0.05	1.01
GMI4481044	BEXT2-08	BEXT2-07	119.94	18.0	2200.98	2193.03	2191.81	7.95	1.02%	2.050	4.17	0.36	5.37
GMI4481045	BEXT2-09	BEXT2-08	261.23	18.0	2203.99	2195.28	2193.03	8.71	0.86%	2.029	5.16	0.39	4.80
GMI4481046	BEXT2-10	BEXT2-09	259.45	18.0	2206.07	2195.91	2195.28	10.16	0.24%	1.936	3.52	0.58	1.69
GMI4481051	BEXT2-11	BEXT2-10	258.20	18.0	2205.19	2196.83	2195.91	8.36	0.36%	1.916	3.20	0.46	2.47
NEW416	BEXT2-12A	BEXT2-11	115.80	18.0	2208.00	2197.76	2196.83	10.24	0.80%	1.898	4.23	0.37	4.68
NEW418	BEXT2-13	BEXT2-12A	42.00	15.0	2207.28	2198.09	2197.76	9.19	0.80%	1.897	4.43	0.62	2.14
GMI4481052	BEXT2-14	BEXT2-13	158.55	15.0	2208.07	2198.66	2198.09	9.41	0.36%	1.351	2.96	0.51	1.36
GMI4481062	BEXT2-15	BEXT2-14	105.50	15.0	2208.93	2198.87	2198.66	10.06	0.20%	1.304	2.82	0.62	0.71
GMI4481065	BEXT2-16	BEXT2-15	247.78	15.0	2210.98	2199.48	2198.87	11.50	0.25%	1.297	2.67	0.55	0.95
NEW209	BEXT2-16C	BEXT2-16	126.39	15.0	2211.55	2199.77	2199.48	11.78	0.23%	1.289	2.73	0.60	0.88
GMI4481066	BEXT2-17	BEXT2-16C	129.86	15.0	2211.53	2200.12	2199.77	11.41	0.27%	1.277	2.67	0.56	1.07
GMI4481067	BEXT2-18	BEXT2-17	87.25	15.0	2210.42	2200.39	2200.12	10.03	0.31%	1.277	2.79	0.56	1.24
GMI4480880	BEXT2-19B2A10	BEXT2-19B2A9	342.57	12.0	2237.88	2233.16	2232.44	4.72	0.21%	0.052	0.89	0.15	1.09
GMI4481082	BEXT2-19B2A11	BEXT2-19B2A10	412.48	12.0	2239.22	2235.73	2233.16	3.49	0.62%	0.032	1.00	0.09	1.94
GMI4481081	BEXT2-19B2A12	BEXT2-19B2A11	252.00	12.0	2238.51	2236.46	2235.73	2.05	0.29%	0.022	0.97	1.44	1.32
GMI4481162	BEXT2-19B2A8	BEXT2-19B2A6	285.17	12.0	2237.91	2232.04	2231.30	5.87	0.26%	0.069	1.18	0.16	1.20
GMI4480879	BEXT2-19B2A9	BEXT2-19B2A8	315.40	12.0	2237.46	2232.44	2232.04	5.02	0.13%	0.065	1.05	0.20	0.82

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483698	BEXT2-20	BEXT2-18	547.46	15.0	2216.88	2202.02	2200.39	14.86	0.30%	1.105	2.71	0.47	1.36
GMI4481058	BEXT2-21	BEXT2-20	168.92	12.0	2217.64	2202.74	2202.02	14.90	0.43%	1.085	3.33	0.64	0.54
GMI4480989	BEXT2-23	BEXT2-21	495.85	12.0	2217.92	2203.64	2202.74	14.28	0.18%	1.038	2.52	0.88	0.02
GMI4480990	BEXT2-24	BEXT2-23	303.46	12.0	2217.13	2205.09	2203.64	12.04	0.48%	1.016	2.64	0.55	0.71
GMI4480991	BEXT2-25	BEXT2-24	262.30	12.0	2217.39	2205.99	2205.09	11.40	0.34%	1.012	3.15	0.66	0.45
GMI4480994	BEXT2-26	BEXT2-25	26.17	12.0	2217.41	2205.93	2205.99	11.48	-0.23%	1.000	2.40	0.87	0.19
GMI4480996	BEXT2-27	BEXT2-26	295.52	12.0	2218.41	2207.16	2205.93	11.25	0.42%	0.997	2.54	0.57	0.61
GMI4480998	BEXT2-28	BEXT2-27	421.92	12.0	2218.50	2208.40	2207.16	10.10	0.29%	0.994	2.97	0.69	0.36
NEW1175246	BUS1-01	BUS1-01AA1	138.96	15.0	2137.56	2129.91	2129.42	7.65	0.35%	2.382	3.39	0.83	0.30
GMI4480655	BUS1-01A	FG1-13	81.93	15.0	2136.39	2128.56	2127.94	7.83	0.77%	2.377	3.66	0.65	1.57
NEW345	BUS1-01AA	BUS1-01A	64.89	15.0	2136.37	2129.04	2128.56	7.33	0.73%	2.380	4.47	0.66	1.49
NEW344	BUS1-01AA1	BUS1-01AA	120.89	15.0	2141.77	2129.42	2129.04	12.35	0.32%	2.380	3.71	0.85	0.16
GMI4483570	BUS1-01B	BUS1-01	359.17	12.0	2145.61	2131.89	2129.91	13.72	0.55%	2.385	4.70	2.56	-0.53
GMI4481407	BUS1-02	BUS1-01B	154.45	10.0	2146.20	2132.28	2131.89	13.92	0.25%	0.615	1.75	2.92	0.16
GMI4481406	BUS1-02A	BUS1-02	212.29	10.0	2146.78	2138.86	2132.28	7.92	3.10%	0.492	2.74	0.29	2.21
GMI4481405	BUS1-03	BUS1-02A	130.75	10.0	2148.78	2139.36	2138.86	9.42	0.38%	0.491	3.28	0.59	0.46
GMI4481404	BUS1-03A	BUS1-03	216.05	10.0	2153.60	2145.40	2139.36	8.20	2.80%	0.492	3.26	0.30	2.07
GMI4481403	BUS1-04	BUS1-03A	359.44	10.0	2160.86	2152.28	2145.40	8.58	1.91%	0.440	4.81	0.32	1.68
GMI4779204	BUS1-05	BUS1-04	370.11	10.0	2167.95	2158.89	2152.28	9.06	1.79%	0.259	3.25	0.24	1.79
GMI4480918	BUS1-05A	BUS1-05	357.52	10.0	2174.68	2165.62	2158.89	9.06	1.88%	0.238	3.81	0.23	1.87
GMI4480917	BUS1-05B	BUS1-05A	327.60	10.0	2178.66	2171.40	2165.62	7.26	1.76%	0.085	1.93	0.14	1.95
GMI4480791	BUS2-01	BUS1-01B	300.67	10.0	2150.97	2138.11	2131.89	12.86	2.07%	1.738	5.38	0.73	0.47
GMI4483575	BUS2-01A	BUS2-01	148.51	12.0	2153.73	2139.71	2138.11	14.02	1.07%	1.096	4.29	0.45	1.49
GMI4483576	BUS2-01B	BUS2-01A	371.33	12.0	2153.99	2143.70	2139.71	10.29	1.07%	1.095	4.82	0.46	1.49
GMI4481410	BUS2-02	BUS2-01	258.89	12.0	2151.75	2140.73	2138.11	11.02	1.01%	0.562	2.85	0.32	1.95
MSTR1175260	BUS2-02A	BUS2-02A1	76.55	10.0	2150.50	2141.60	2140.87	8.90	0.95%	0.191	2.20	0.24	1.31
MSTR1175261	BUS2-02A1	BUS2-02	50.12	10.0	2150.00	2140.87	2140.73	9.13	0.28%	0.191	1.66	0.35	0.62
NEW1175047	BUS2-03	BUS2-01B	146.41	10.0	2156.67	2145.27	2143.70	11.40	1.07%	1.094	4.82	0.67	0.50
GMI4481413	BUS2-04	BUS2-03	363.84	10.0	2154.86	2147.86	2145.27	7.00	0.71%	0.500	2.51	0.43	0.79
GMI4483691	BUS2-04A	BUS2-04	328.35	10.0	2159.14	2148.50	2147.86	10.64	0.19%	0.002	0.13	0.03	1.46
GMI4779191	BUS2-05	BUS2-04	300.78	10.0	2159.99	2151.69	2147.86	8.30	1.27%	0.381	3.16	0.32	1.35
GMI4779190	BUS2-06	BUS2-05	361.51	10.0	2162.60	2153.84	2151.69	8.76	0.59%	0.251	2.63	0.31	0.93
GMI4779166	BUS2-07	BUS2-06	299.62	10.0	2167.06	2156.32	2153.84	10.74	0.83%	0.047	1.59	0.13	1.35
GMI4482020	BUS9-04B	CEN9-09A	317.76	10.0	2205.61	2196.14	2194.77	9.47	0.43%	0.020	1.08	0.10	0.99
GMI4482023	BUS9-04C	BUS9-04B	53.54	10.0	2205.59	2196.37	2196.14	9.22	0.43%	0.017	1.03	0.09	0.99
GMI4481366	CEN1-01	L1-01	381.37	15.0	2155.84	2150.14	2146.92	5.70	0.84%	1.172	4.71	0.38	2.98

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481368	CEN1-02	CEN1-01	313.69	15.0	2158.64	2152.00	2150.14	6.64	0.59%	1.158	3.94	0.41	2.33
GMI4481369	CEN1-03	CEN1-02	253.61	15.0	2163.75	2156.73	2152.00	7.02	1.87%	1.157	4.64	0.29	5.02
GMI4481363	CEN1-04	CEN1-03	301.84	15.0	2171.90	2162.02	2156.73	9.88	1.75%	1.142	5.76	0.30	4.85
GMI4481362	CEN1-05	CEN1-04	301.93	15.0	2176.49	2164.91	2162.02	11.58	0.96%	1.121	4.84	0.36	3.30
GMI4481361	CEN1-06	CEN1-05	189.44	15.0	2175.59	2166.27	2164.91	9.32	0.72%	1.114	4.10	0.39	2.72
GMI4481360	CEN1-06A1	CEN1-06	169.19	15.0	2174.42	2168.00	2166.27	6.42	1.02%	1.081	4.57	0.29	4.76
NEW206	CEN1-07	CEN1-06A1	360.47	15.0	2182.14	2171.74	2168.00	10.40	1.04%	1.079	4.53	0.39	2.80
GMI4481359	CEN1-08	CEN1-07	552.90	15.0	2188.14	2179.84	2171.74	8.30	1.47%	1.004	4.25	0.29	4.47
GMI4481358	CEN1-09	CEN1-08	233.29	15.0	2190.72	2182.47	2179.84	8.25	1.13%	0.748	4.15	0.27	4.05
GMI4481380	CEN1-10	CEN1-09	301.26	15.0	2192.31	2183.91	2182.47	8.40	0.48%	0.746	3.53	0.36	2.38
GMI4481338	CEN1-11	CEN1-10	375.00	15.0	2193.72	2185.34	2183.91	8.38	0.38%	0.742	2.92	0.36	2.05
GMI4481344	CEN1-12	CEN1-11	245.43	15.0	2197.52	2188.14	2185.34	9.38	1.14%	0.493	2.63	0.22	4.34
GMI4481341	CEN1-12E1	CEN1-12	160.47	10.0	2198.50	2190.92	2188.14	7.58	1.73%	0.006	0.38	0.04	2.01
GMI4481343	CEN1-13	CEN1-12	66.60	15.0	2198.26	2188.86	2188.14	9.40	1.08%	0.486	3.66	0.23	4.22
GMI4481342	CEN1-14	CEN1-13	344.16	15.0	2202.69	2192.51	2188.86	10.18	1.06%	0.484	3.62	0.22	4.17
GMI4481336	CEN1-15	CEN1-14	347.07	12.0	2214.32	2195.54	2192.51	18.78	0.87%	0.047	1.11	0.10	2.28
GMI4481335	CEN1-16	CEN1-15	353.17	12.0	2207.46	2198.62	2195.54	8.84	0.87%	0.044	1.75	0.10	2.29
GMI4481334	CEN1-17	CEN1-16	150.89	12.0	2208.46	2200.00	2198.62	8.46	0.91%	0.041	1.71	0.09	2.35
GMI4481312	CEN1-18	CEN1-17	194.13	12.0	2209.37	2200.39	2200.00	8.98	0.20%	0.039	1.14	0.15	1.08
GMI4481347	CEN6-01	CEN1-07	195.67	10.0	2183.22	2174.12	2171.74	9.10	1.22%	0.077	1.12	0.15	1.62
GMI4482511	CEN6-02	CEN6-01	482.59	10.0	2187.12	2179.28	2174.12	7.84	1.07%	0.055	1.91	0.13	1.53
GMI4482510	CEN6-03	CEN6-02	407.27	10.0	2194.83	2183.93	2179.28	10.90	1.14%	0.050	2.00	0.12	1.59
GMI4482477	CEN6-04	CEN6-03	441.89	10.0	2197.73	2187.43	2183.93	10.30	0.79%	0.047	1.86	0.13	1.32
GMI4779162	CEN7-03B	CEN7-03A	320.92	10.0	2209.89	2199.29	2198.02	10.60	0.40%	0.033	1.18	0.13	0.93
GMI4482012	CEN7-03C	CEN7-03B	152.90	10.0	2209.74	2199.48	2199.29	10.26	0.12%	0.032	0.89	0.19	0.51
GMI4482011	CEN7-03D	CEN7-03C	292.04	10.0	2210.19	2200.19	2199.48	10.00	0.24%	0.027	0.75	0.13	0.73
GMI4482010	CEN7-03E	CEN7-03D	304.52	10.0	2210.02	2200.86	2200.19	9.16	0.22%	0.021	0.87	0.12	0.70
GMI4482009	CEN7-03F	CEN7-03E	237.09	10.0	2209.04	2201.44	2200.86	7.60	0.24%	0.017	0.80	0.10	0.74
GMI4481987	CEN7-03G	CEN7-03F	94.84	10.0	2208.40	2201.60	2201.44	6.80	0.17%	0.014	0.73	0.11	0.62
GMI4481985	CEN7-03H	CEN7-03G	208.53	10.0	2208.09	2202.07	2201.60	6.02	0.23%	0.008	0.52	0.07	0.72
GMI4481984	CEN7-03I	CEN7-03H	302.44	10.0	2211.68	2202.74	2202.07	8.94	0.22%	0.006	0.58	0.07	0.72
GMI4481983	CEN7-03J	CEN7-03I	10.07	10.0	2212.06	2202.92	2202.74	9.14	1.79%	0.004	0.65	0.03	2.05
GMI4481346	CEN9-01	CEN1-11	160.54	10.0	2194.69	2186.64	2185.34	8.05	0.81%	0.091	0.81	0.17	1.29
GMI4482756	CEN9-02	CEN9-01	294.18	10.0	2200.13	2191.73	2186.64	8.40	1.73%	0.089	2.48	0.14	1.93
GMI4482758	CEN9-03	CEN9-02	275.05	10.0	2203.79	2193.89	2191.73	9.90	0.79%	0.081	2.28	0.17	1.28
GMI4482022	CEN9-04D	BUS9-04C	299.55	10.0	2206.76	2197.66	2196.37	9.10	0.43%	0.012	0.86	0.08	0.99

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482018	CEN9-04E	CEN9-04D	298.46	10.0	2209.15	2198.99	2197.66	10.16	0.45%	0.005	0.56	0.05	1.02
GMI4482757	CEN9-09A	CEN9-03	203.72	10.0	2208.88	2194.77	2193.89	14.11	0.43%	0.023	0.93	0.10	0.99
GMI4482084	CH11-01	M3-13	326.15	12.0	2172.17	2167.22	2166.04	4.95	0.36%	0.249	1.20	0.28	1.25
GMI4482090	CH11-02	CH11-01	203.64	12.0	2174.44	2168.22	2167.22	6.22	0.49%	0.245	2.29	0.25	1.50
GMI4482001	CH11-02A	CH11-02	187.09	12.0	2176.17	2171.29	2168.22	4.88	1.64%	0.227	2.81	0.18	2.97
GMI4482000	CH11-03	CH11-02A	248.86	12.0	2181.47	2175.37	2171.29	6.10	1.64%	0.222	3.58	0.18	2.97
GMI4481999	CH11-04	CH11-03	111.46	12.0	2187.26	2179.94	2175.37	7.32	4.10%	0.219	4.14	0.14	4.84
GMI4481998	CH11-05	CH11-04	196.63	12.0	2231.70	2227.35	2179.94	4.35	24.11%	0.215	6.49	0.09	12.22
GMI4481976	CH11-06	CH11-05	262.01	12.0	2249.74	2244.80	2227.35	4.94	6.66%	0.211	6.72	0.13	6.23
GMI4481971	CH11-06A	CH11-06	201.50	12.0	2259.78	2255.68	2244.80	4.10	5.40%	0.194	5.03	0.13	5.61
GMI4481972	CH11-07	CH11-06A	214.12	12.0	2264.02	2257.97	2255.68	6.05	1.07%	0.150	3.13	0.18	2.43
GMI4481973	CH11-07A	CH11-07	130.24	12.0	2273.64	2258.26	2257.97	15.38	0.22%	0.146	1.76	0.26	1.03
4562	D1-01	M3-41B	43.63	10.0	2227.95	2214.70	2214.09	13.25	1.40%	0.367	1.45	0.87	0.72
GMI4481776	D1-02	D1-01	229.27	10.0	2232.26	2214.70	2214.70	17.56	0.00%	0.363	1.06	1.02	-0.33
GMI4481777	D1-03	D1-02	262.05	10.0	2233.32	2215.77	2214.70	17.55	0.41%	0.358	1.34	0.42	0.62
GMI4481778	D1-04	D1-03	337.59	10.0	2235.60	2216.76	2215.77	18.84	0.29%	0.353	2.31	0.48	0.48
GMI4481779	D1-05	D1-04	306.67	10.0	2235.17	2217.77	2216.76	17.40	0.33%	0.349	2.22	0.44	0.53
GMI4481780	D1-06	D1-05	352.29	10.0	2237.27	2218.77	2217.77	18.50	0.28%	0.344	2.22	0.47	0.47
GMI4482275	D1-07	D1-06	83.71	10.0	2236.98	2218.98	2218.77	18.00	0.25%	0.299	1.88	0.45	0.47
GMI4481752	D1-08	D1-07	259.67	10.0	2237.21	2219.61	2218.98	17.60	0.24%	0.293	1.94	0.43	0.46
GMI4482280	D1-09	D1-08	269.56	10.0	2236.47	2220.58	2219.61	15.89	0.36%	0.262	2.00	0.36	0.66
GMI4482281	D1-10	D1-09	284.56	10.0	2237.11	2221.17	2220.58	15.94	0.21%	0.256	1.89	0.45	0.44
GMI4482282	D1-11	D1-10	41.58	10.0	2237.04	2221.62	2221.17	15.42	1.08%	0.240	2.12	0.26	1.36
GMI4481753	D1-12	D1-11	257.51	10.0	2232.47	2222.37	2221.62	10.10	0.29%	0.211	2.18	0.38	0.62
GMI4481758	D1-13	D1-12	408.94	10.0	2233.72	2223.60	2222.37	10.12	0.30%	0.171	1.63	0.31	0.67
GMI4481760	D1-13A	D1-13	199.46	10.0	2236.24	2224.18	2223.60	12.06	0.29%	0.074	1.05	0.20	0.75
GMI4482201	DAV1-01	A1-15	377.29	15.0	2188.60	2180.06	2161.39	8.54	4.95%	0.385	2.11	0.13	9.68
GMI4482200	DAV1-02	DAV1-01	218.00	15.0	2209.70	2198.12	2180.06	11.58	8.28%	0.382	6.63	0.12	12.66
GMI4482199	DAV1-03	DAV1-02	205.65	15.0	2222.68	2211.02	2198.12	11.66	6.27%	0.379	6.77	0.13	10.96
GMI4482198	DAV1-03A	DAV1-03	43.33	15.0	2223.73	2211.18	2211.02	12.55	0.37%	0.374	2.93	0.31	2.39
GMI1654596	DAV1-03B	DAV1-03A	164.24	15.0	2225.20	2212.04	2211.18	13.16	0.52%	0.369	2.17	0.23	2.90
GMI1654595	DAV1-04	DAV1-03B	46.88	15.0	2224.89	2212.13	2212.04	12.76	0.20%	0.361	2.11	0.31	1.62
GMI4482197	DAV1-05	DAV1-04	303.54	15.0	2224.13	2212.93	2212.13	11.20	0.26%	0.359	1.90	0.27	1.96
GMI4482196	DAV1-06	DAV1-05	148.88	15.0	2225.04	2213.40	2212.93	11.64	0.32%	0.323	2.05	0.24	2.22
GMI4482195	DAV1-06A	DAV1-06	151.67	12.0	2225.72	2213.94	2213.40	11.78	0.36%	0.044	0.64	0.12	1.45
GMI4482191	DAV1-07	DAV1-06	300.94	15.0	2227.40	2214.50	2213.40	12.90	0.37%	0.277	2.04	0.22	2.46

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481898	DAV1-08	DAV1-07	300.23	15.0	2228.22	2215.18	2214.50	13.04	0.23%	0.273	1.92	0.26	1.88
GMI4481899	DAV1-09	DAV1-08	46.19	15.0	2228.05	2215.45	2215.18	12.60	0.58%	0.270	2.06	0.19	3.19
GMI4481821	DAV1-10	DAV1-09	311.37	12.0	2227.20	2216.37	2215.45	10.83	0.30%	0.267	2.29	0.33	1.09
GMI4481823	DAV1-10A	DAV1-10	210.46	12.0	2227.84	2216.99	2216.37	10.85	0.30%	0.165	1.53	0.24	1.19
GMI4481822	DAV1-10B	DAV1-10A	211.12	12.0	2229.86	2217.62	2216.99	12.24	0.30%	0.129	1.56	0.21	1.23
GMI4481824	DAV1-11	DAV1-10	242.22	12.0	2227.12	2216.90	2216.37	10.22	0.22%	0.104	0.98	0.20	1.07
GMI4481826	DAV1-12	DAV1-11	297.24	12.0	2228.81	2217.93	2216.90	10.88	0.35%	0.101	1.51	0.18	1.37
GMI4481825	DAV1-13	DAV1-12	269.09	12.0	2231.28	2218.78	2217.93	12.50	0.31%	0.097	1.58	0.18	1.30
GMI4480763	DAV1-13A	DAV1-13	205.77	12.0	2232.17	2219.43	2218.78	12.75	0.31%	0.023	0.60	0.31	1.37
NEW417	DAV1-13B	DAV1-13A	75.60	12.0	2232.46	2219.66	2219.43	12.80	0.32%	0.004	0.35	0.04	1.40
GMI4481828	DAV1-14	DAV1-13	113.79	12.0	2230.77	2219.08	2218.78	11.69	0.26%	0.071	1.24	0.16	1.21
NEW351	DAV1-15	DAV1-15A	48.91	12.0	2230.71	2219.94	2219.81	10.77	0.26%	0.048	1.17	0.14	1.23
GMI4481829	DAV1-15A	DAV1-14	236.54	12.0	2230.87	2219.81	2219.08	11.06	0.31%	0.052	1.15	0.13	1.33
GMI4481831	DAV1-16	DAV1-15	170.30	12.0	2229.79	2221.78	2219.94	8.01	1.08%	0.035	1.18	0.08	2.56
GMI4779484	DAV1-16A	DAV1-16	81.50	12.0	2229.61	2222.26	2221.78	7.35	0.59%	0.011	0.84	0.05	1.91
NEW1175082	DEP1-01	STOR_14	200.59	12.0	2275.30	2236.50	2236.05	38.80	0.22%	0.501	2.38	0.50	0.68
NEW1175003	DEP1-02	DEP1-01	117.10	12.0	2278.56	2236.56	2236.50	42.00	0.05%	0.501	1.72	0.62	0.06
NEW1175002	DEP1-03	DEP1-02	135.06	12.0	2279.10	2237.00	2236.56	42.10	0.33%	0.501	1.90	0.41	0.92
NEW1175001	DEP1-04	DEP1-03	125.53	12.0	2279.35	2237.45	2237.00	41.90	0.36%	0.501	2.53	0.42	0.99
NEW1175000	DEP1-05	DEP1-04	81.29	12.0	2280.73	2237.73	2237.45	43.00	0.34%	0.500	2.45	0.43	0.96
NEW1174999	DEP1-06	DEP1-05	202.97	12.0	2282.55	2238.46	2237.73	44.10	0.36%	0.500	2.51	0.41	0.99
NEW1174998	DEP1-07	DEP1-06	175.91	12.0	2281.16	2238.96	2238.46	42.20	0.29%	0.500	2.44	0.45	0.84
NEW1174997	DEP1-08	DEP1-07	294.83	12.0	2280.77	2240.27	2238.96	40.50	0.44%	0.500	2.54	0.38	1.16
NEW1174996	DEP1-09	DEP1-08	188.11	12.0	2276.80	2240.70	2240.27	36.11	0.23%	0.495	2.36	0.49	0.70
NEW1174995	DEP1-10	DEP1-09	161.79	12.0	2275.71	2241.11	2240.70	34.60	0.26%	0.495	2.15	0.44	0.76
NEW1174994	DEP1-11	DEP1-10	108.17	12.0	2274.62	2241.52	2241.11	33.10	0.38%	0.495	2.45	0.40	1.04
NEW1174993	DEP1-12	DEP1-11	111.64	12.0	2273.22	2241.62	2241.52	31.60	0.09%	0.486	1.99	0.57	0.26
NEW1174992	DEP1-13	DEP1-12	87.50	12.0	2272.52	2241.81	2241.62	30.71	0.22%	0.485	1.76	0.50	0.68
NEW1174991	DEP1-14	DEP1-13	79.05	12.0	2271.36	2242.56	2241.81	28.81	0.94%	0.485	2.55	0.31	1.93
NEW1174990	DEP1-15	DEP1-14	86.10	12.0	2270.68	2242.88	2242.56	27.80	0.38%	0.484	2.65	0.42	1.05
NEW1174989	DEP1-16	DEP1-15	60.56	12.0	2270.71	2243.11	2242.88	27.60	0.38%	0.483	2.42	0.42	1.05
NEW1174988	DEP1-17	DEP1-16	212.91	12.0	2272.54	2243.68	2243.11	28.86	0.27%	0.435	2.22	0.41	0.86
NEW1174987	DEP1-18	DEP1-17	179.67	12.0	2273.01	2244.30	2243.68	28.71	0.35%	0.434	2.37	0.37	1.03
NEW1174986	DEP1-19	DEP1-18	166.19	12.0	2271.45	2244.65	2244.30	26.80	0.21%	0.433	2.16	0.46	0.71
NEW1174985	DEP1-20	DEP1-19	190.51	12.0	2269.61	2245.12	2244.65	24.49	0.25%	0.428	2.03	0.41	0.81
NEW1174984	DEP1-21	DEP1-20	260.57	12.0	2267.07	2245.86	2245.12	21.21	0.28%	0.406	2.20	0.38	0.92

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
NEW1174983	DEP1-22	DEP1-21	122.70	12.0	2266.47	2246.27	2245.86	20.20	0.34%	0.405	2.31	0.37	1.04
GMI4482029	FG1-01	FG1-01A	150.09	36.0	2133.42	2119.31	2119.00	14.11	0.21%	14.391	4.72	0.68	6.83
NEW132	FG1-01A	OFALL_10	39.60	36.0	2133.54	2119.00	2118.50	14.54	1.26%	14.394	6.78	0.59	38.09
GMI4482028	FG1-02	FG2-01	255.18	36.0	2132.26	2120.03	2119.59	12.23	0.17%	9.930	3.59	0.58	9.46
GMI4482027	FG1-03	FG1-02	309.49	36.0	2139.91	2121.13	2120.03	18.78	0.36%	9.940	4.44	0.41	17.94
GMI4480686	FG1-04	FG1-03	400.32	36.0	2134.26	2121.83	2121.13	12.43	0.17%	8.366	4.17	0.50	11.13
GMI4480687	FG1-05	FG1-04	538.09	36.0	2133.25	2122.90	2121.83	10.35	0.20%	8.370	3.92	0.45	12.45
GMI4482026	FG1-06	FG1-05	360.50	36.0	2138.95	2123.70	2122.90	15.25	0.22%	8.371	4.15	0.46	13.63
NEW082719	FG1-07	FG1-07A	76.80	36.0	2136.35	2124.59	2124.59	11.76	0.01%	0.013	0.13	0.38	3.36
GMI4482041	FG1-07A	FG1-06	222.18	36.0	2137.00	2124.59	2123.70	12.41	0.40%	8.371	4.63	0.38	21.12
GMI4482040	FG1-08	FG1-07A	304.45	36.0	2135.24	2125.22	2124.59	10.02	0.21%	8.371	4.47	0.48	13.01
GMI4482039	FG1-09	FG1-08	196.11	36.0	2132.97	2125.82	2125.22	7.15	0.30%	8.362	4.14	0.43	17.41
GMI4482054	FG1-10	FG1-09	210.05	36.0	2132.36	2126.21	2125.82	6.15	0.18%	8.362	4.05	0.49	11.74
GMI4483608	FG1-11	FG1-10	290.74	36.0	2136.03	2127.02	2126.21	9.01	0.28%	8.363	4.11	0.42	16.29
GMI4482056	FG1-12	FG1-11	187.83	36.0	2136.03	2127.36	2127.02	8.67	0.18%	8.363	4.10	0.50	11.62
GMI4483605	FG1-13	FG1-12	267.92	36.0	2136.89	2127.94	2127.36	8.95	0.21%	8.362	3.83	0.47	13.29
GMI4483567	FG1-14	FG1-13	216.13	36.0	2135.77	2128.11	2127.94	7.66	0.08%	7.948	3.39	0.55	5.15
NEW1175064	FG2-01	FG1-01	43.10	36.0	2134.36	2119.59	2119.31	14.77	0.64%	10.231	3.43	0.62	27.41
NEW1175237	FG2-02	FG2-01	239.26	12.0	2134.59	2122.28	2119.59	12.31	1.13%	0.325	0.99	0.24	2.32
NEW1175236	FG2-03	FG2-02	137.79	12.0	2133.40	2122.70	2122.28	10.70	0.30%	0.324	2.28	0.36	1.05
NEW1175235	FG2-04	FG2-03	168.99	12.0	2131.48	2123.33	2122.70	8.15	0.37%	0.324	2.19	0.32	1.20
NEW1175065	FG2-04A	FG2-04	104.22	10.0	2131.97	2123.65	2123.33	8.32	0.30%	0.013	0.29	0.09	0.83
NEW1175234	FG2-05	FG2-04	76.39	12.0	2130.26	2123.60	2123.33	6.66	0.35%	0.312	2.21	0.33	1.16
NEW1175233	FG2-06	FG2-05	74.90	12.0	2131.14	2123.91	2123.60	7.23	0.41%	0.311	2.23	0.31	1.29
NEW1175232	FG2-07	FG2-06	192.92	12.0	2130.03	2124.63	2123.91	5.41	0.37%	0.307	2.30	0.32	1.21
GMI4779175	FG2-08	FG2-07	249.70	10.0	2130.06	2125.73	2125.26	4.33	0.19%	0.290	1.98	0.52	0.38
GMI4779178	FG2-09	FG2-08	71.83	10.0	2129.76	2125.75	2125.73	4.01	0.03%	0.273	1.43	0.60	-0.02
GMI4481731	FWN1-01	AEXT2-03	64.84	15.0	2173.20	2158.83	2157.04	14.37	2.76%	0.473	1.82	0.17	7.04
GMI4481735	FWN1-02	FWN1-01	49.95	15.0	2172.40	2161.03	2158.83	11.37	4.41%	0.473	5.73	0.15	9.03
GMI4481736	FWN1-03	FWN1-02	301.75	15.0	2178.45	2162.93	2161.03	15.52	0.63%	0.473	3.10	0.25	3.12
GMI4482263	FWN1-04	FWN1-03	185.11	18.0	2176.77	2163.05	2162.93	13.72	0.07%	0.473	1.80	0.35	1.40
GMI4482266	FWN1-05	FWN1-04	259.48	18.0	2174.53	2163.49	2163.05	11.04	0.17%	0.470	1.56	0.27	2.56
GMI4482268	FWN1-06	FWN1-05	274.65	18.0	2171.88	2163.91	2163.49	7.97	0.15%	0.468	1.84	0.28	2.41
GMI4482267	FWN1-07	FWN1-06	320.60	18.0	2186.57	2175.30	2163.91	11.27	3.55%	0.467	2.79	0.13	13.40
GMI4480786	FWN1-08	FWN1-07	174.16	18.0	2190.85	2180.02	2175.30	10.83	2.71%	0.464	5.19	0.14	11.65
GMI4480785	FWN1-09	FWN1-08	372.47	18.0	2193.75	2180.10	2180.02	13.65	0.02%	0.463	1.62	0.46	0.62

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GMI4482752	FWN1-10	FWN1-09	338.25	18.0	2195.53	2180.51	2180.10	15.02	0.12%	0.461	1.19	0.29	2.10
GMI4482753	FWN1-11	FWN1-10	307.18	18.0	2194.50	2181.06	2180.51	13.44	0.18%	0.460	1.82	0.26	2.65
GMI4482754	FWN1-12	FWN1-11	112.85	18.0	2194.76	2181.40	2181.06	13.36	0.30%	0.459	2.12	0.23	3.58
GMI4482749	FWN1-13	FWN1-12	356.59	18.0	2196.41	2181.85	2181.40	14.56	0.13%	0.445	1.81	0.31	2.17
GMI4482119	FWN1-14	FWN1-13	187.14	18.0	2197.79	2182.14	2181.85	15.65	0.15%	0.439	1.64	0.26	2.46
GMI4482118	FWN1-15	FWN1-14	100.87	18.0	2198.84	2182.16	2182.14	16.68	0.02%	0.438	1.50	0.34	0.60
GMI4482117	FWN1-16	FWN1-15	259.71	18.0	2199.92	2182.87	2182.16	17.05	0.27%	0.438	1.63	0.23	3.41
GMI4482116	FWN1-17	FWN1-16	153.89	18.0	2197.99	2182.59	2182.87	15.40	-0.18%	0.438	1.16	0.50	2.70
GMI4482115	FWN1-18	FWN1-17	244.90	18.0	2195.29	2183.53	2182.59	11.76	0.38%	0.433	1.20	0.21	4.12
GMI4481703	FWN1-19	FWN1-18	175.44	18.0	2188.13	2183.78	2183.53	4.35	0.14%	0.415	1.90	0.28	2.36
GMI4480832	FWN1-20	FWN1-19	377.23	18.0	2194.77	2184.09	2183.78	10.68	0.08%	0.416	1.46	0.31	1.69
GMI4481704	FWN1-21	FWN1-20	390.82	18.0	2188.59	2184.55	2184.09	4.04	0.12%	0.416	1.49	0.27	2.11
GMI4481705	FWN1-22	FWN1-21	258.18	18.0	2210.36	2194.87	2184.55	15.49	4.00%	0.416	2.66	0.12	14.29
GMI4481706	FWN1-22A	FWN1-22	183.47	12.0	2198.94	2196.02	2194.87	2.92	0.63%	0.153	2.41	0.20	1.82
GMI4779372	FWN1-22B	FWN1-22A	171.73	12.0	2202.52	2196.52	2196.02	6.00	0.29%	0.153	1.86	0.25	1.20
GMI4779371	FWN1-22C	FWN1-22B	129.05	12.0	2203.46	2196.91	2196.52	6.55	0.30%	0.149	1.67	0.22	1.22
GMI4779370	FWN1-22D	FWN1-22C	235.47	12.0	2211.95	2199.45	2196.91	12.50	1.08%	0.149	2.19	0.16	2.44
GMI4779362	FWN1-22E	FWN1-22D	107.62	12.0	2203.39	2200.19	2199.45	3.20	0.69%	0.146	2.44	0.19	1.92
GMI4779361	FWN1-22F	FWN1-22E	98.56	12.0	2211.11	2199.47	2200.19	11.64	-0.73%	0.131	0.45	0.93	2.00
GMI4481710	FWN1-22G	FWN1-22F	253.95	12.0	2217.24	2206.49	2199.47	10.75	2.76%	0.131	0.49	0.12	4.02
GMI4482106	FWN1-23	FWN1-22	251.49	12.0	2226.98	2219.68	2194.87	7.30	9.87%	0.286	5.90	0.13	7.57
GMI4482108	FWN1-23A	FWN1-22G	250.15	12.0	2224.45	2213.95	2206.49	10.50	2.98%	0.129	3.73	0.12	4.18
NEW400	FWN1-23AS	STOR_12	48.37	24.0	2221.04	2206.19	2206.14	14.85	0.11%	0.268	1.52	0.21	4.98
GMI4482109	FWN1-23B	FWN1-23A	350.01	12.0	2230.51	2215.01	2213.95	15.50	0.30%	0.129	2.18	0.23	1.24
GMI4482744	FWN1-23C	FWN1-23B	334.19	12.0	2232.51	2215.92	2215.01	16.59	0.27%	0.132	1.61	0.22	1.17
GMI4482252	FWN1-23D	FWN1-23C	333.56	12.0	2227.91	2216.81	2215.92	11.10	0.27%	0.135	1.67	0.23	1.15
GMI4482253	FWN1-23E	FWN1-23D	354.73	12.0	2228.86	2217.65	2216.81	11.21	0.24%	0.139	1.60	0.24	1.08
GMI4482254	FWN1-23F	FWN1-23E	250.99	12.0	2231.64	2218.38	2217.65	13.26	0.29%	0.137	1.67	0.22	1.21
GMI4482255	FWN1-23G	FWN1-23F	262.27	12.0	2230.10	2219.27	2218.38	10.83	0.34%	0.136	1.82	0.21	1.32
GMI4482251	FWN1-23H	FWN1-23G	337.71	12.0	2230.32	2220.02	2219.27	10.30	0.22%	0.160	1.82	0.28	1.02
GMI4481019	FWN1-24	FWN1-23	393.07	12.0	2235.88	2224.19	2219.68	11.69	1.15%	0.285	4.27	0.25	2.39
GMI4481018	FWN1-25	FWN1-24	205.53	12.0	2234.13	2224.78	2224.19	9.35	0.29%	0.285	2.29	0.34	1.05
GMI4482738	FWN1-26	FWN1-25	314.11	12.0	2233.31	2225.52	2224.78	7.79	0.24%	0.266	1.83	0.32	0.95
GMI4482742	FWN1-27	FWN1-26	339.94	12.0	2236.57	2228.47	2225.52	8.10	0.87%	0.266	2.37	0.23	2.06
GMI4482741	FWN1-28	FWN1-27	348.72	12.0	2241.40	2230.64	2228.47	10.76	0.62%	0.265	2.80	0.26	1.70
GMI4482730	FWN1-29	FWN1-28	345.61	12.0	2243.69	2231.42	2230.64	12.27	0.23%	0.262	2.02	0.35	0.92

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GMI4482733	FWN1-30	FWN1-29	345.40	12.0	2245.84	2232.24	2231.42	13.60	0.24%	0.261	1.77	0.32	0.95
GMI4482731	FWN1-31	FWN1-30	349.77	12.0	2247.69	2233.00	2232.24	14.69	0.22%	0.256	1.83	0.33	0.91
GMI4482717	FWN1-32	FWN1-31	347.63	12.0	2250.10	2234.07	2233.00	16.03	0.31%	0.255	1.92	0.29	1.13
GMI4482716	FWN1-33	FWN1-32	347.99	12.0	2251.98	2235.08	2234.07	16.90	0.29%	0.254	2.03	0.30	1.09
GMI4482712	FWN1-34	FWN1-33	374.20	12.0	2253.47	2235.62	2235.08	17.85	0.14%	0.252	1.64	0.39	0.70
GMI4482686	FWN1-35	FWN1-34	290.42	12.0	2254.09	2236.34	2235.62	17.75	0.25%	0.251	1.62	0.31	0.99
GMI4482687	FWN1-36	FWN1-35	319.61	12.0	2252.61	2237.36	2236.34	15.25	0.32%	0.227	1.88	0.27	1.18
GMI4482702	FWN1-37	FWN1-36	344.96	12.0	2252.18	2238.21	2237.36	13.97	0.25%	0.204	1.79	0.28	1.04
GMI4482703	FWN1-38	FWN1-37	145.24	12.0	2252.67	2238.64	2238.21	14.03	0.30%	0.202	1.83	0.26	1.16
GMI4482704	FWN1-39	FWN1-38	95.00	12.0	2252.97	2238.98	2238.64	13.99	0.35%	0.200	1.94	0.25	1.29
GMI4482705	FWN1-40	FWN1-39	329.34	12.0	2256.42	2239.67	2238.98	16.75	0.21%	0.199	1.74	0.30	0.94
GMI4482706	FWN1-41	FWN1-40	298.67	12.0	2254.42	2240.48	2239.67	13.94	0.27%	0.124	1.24	0.21	1.18
GMI4482707	FWN1-42	FWN1-41	368.85	12.0	2254.53	2241.47	2240.48	13.06	0.27%	0.123	1.60	0.21	1.17
GMI4482677	FWN1-43	FWN1-42	118.82	10.0	2254.65	2241.81	2241.47	12.84	0.29%	0.110	1.59	0.25	0.71
GMI4482653	FWN1-44	FWN1-43	115.92	10.0	2254.76	2242.32	2241.81	12.44	0.44%	0.110	1.72	0.22	0.91
GMI4482652	FWN1-45	FWN1-44	191.08	10.0	2255.58	2242.90	2242.32	12.68	0.30%	0.109	1.70	0.25	0.74
GMI4482651	FWN1-46	FWN1-45	354.73	10.0	2259.28	2243.86	2242.90	15.42	0.27%	0.107	1.55	0.25	0.69
GMI4482650	FWN1-47	FWN1-46	328.77	10.0	2262.09	2245.24	2243.86	16.85	0.42%	0.090	1.51	0.20	0.90
GMI4482649	FWN1-48	FWN1-47	225.05	10.0	2262.68	2245.86	2245.24	16.82	0.28%	0.076	1.43	0.21	0.73
GMI4481589	FWN1-49	FWN1-48	115.99	10.0	2263.59	2246.49	2245.86	17.10	0.54%	0.075	1.57	0.17	1.06
GMI4481590	FWN1-49A	FWN1-49	222.19	10.0	2262.73	2246.88	2246.49	15.85	0.18%	0.074	1.31	0.26	0.57
GMI4481591	FWN1-50	FWN1-49A	51.58	10.0	2262.41	2247.03	2246.88	15.38	0.29%	0.072	1.18	0.20	0.76
GMI4480747	FWN1-51	FWN1-50	164.18	10.0	2261.25	2247.59	2247.03	13.66	0.34%	0.072	1.48	0.19	0.82
GMI4480692	FWN1-52	FWN1-51	337.74	10.0	2261.82	2248.59	2247.59	13.23	0.30%	0.071	1.45	0.20	0.76
GMI4480691	FWN1-53	FWN1-52	336.81	10.0	2265.03	2249.77	2248.59	15.26	0.35%	0.071	1.46	0.19	0.84
GMI4482618	FWN1-54	FWN1-53	266.78	10.0	2265.33	2250.56	2249.77	14.77	0.30%	0.028	0.84	0.12	0.81
GMI4482603	FWN1-55	FWN1-54	313.76	10.0	2263.97	2251.49	2250.56	12.48	0.30%	0.027	1.07	0.12	0.81
GMI4482602	FWN1-56	FWN1-55	231.13	10.0	2262.62	2252.22	2251.49	10.40	0.32%	0.022	0.98	0.11	0.84
GMI4482601	FWN1-57	FWN1-56	342.52	10.0	2260.91	2253.41	2252.22	7.50	0.35%	0.021	1.02	0.11	0.88
GMI4482035	GAR1-01	GAR3-07	8.37	12.0	2168.34	2155.76	2155.51	12.58	3.00%	0.722	3.90	0.28	3.60
GMI4482515	GAR1-02	GAR1-01	355.29	12.0	2164.53	2156.63	2155.76	7.90	0.24%	0.711	2.66	0.60	0.52
GMI4482487	GAR1-03	GAR1-02	346.35	12.0	2164.19	2156.91	2156.63	7.28	0.08%	0.714	1.91	0.80	-0.01
GMI4482492	GAR1-04	GAR1-03	192.88	12.0	2165.47	2156.55	2156.91	8.92	-0.19%	0.667	1.39	1.32	0.41
GMI4482491	GAR1-05	GAR1-04	14.87	12.0	2165.60	2156.56	2156.55	9.04	0.07%	0.663	1.31	1.33	-0.02
GMI4482490	GAR1-06	GAR1-05	267.34	12.0	2166.60	2157.78	2156.56	8.82	0.46%	0.658	1.69	0.43	1.03
GMI4482016	GAR1-07	GAR1-06	171.69	12.0	2164.90	2158.22	2157.78	6.68	0.26%	0.493	2.27	0.45	0.77

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482015	GAR1-08	GAR1-07	299.03	12.0	2167.78	2158.78	2158.22	9.00	0.19%	0.474	2.04	0.48	0.61
GMI4482498	GAR1-09	GAR1-08	298.85	12.0	2168.90	2159.44	2158.78	9.46	0.22%	0.470	2.06	0.44	0.70
GMI4482499	GAR1-10	GAR1-09	177.92	12.0	2168.26	2159.62	2159.44	8.64	0.10%	0.463	1.82	0.57	0.33
GMI4482066	GAR1-11	GAR1-10	401.65	10.0	2169.86	2161.44	2159.62	8.42	0.45%	0.422	2.07	0.45	0.61
GMI4482068	GAR1-12	GAR1-11	298.28	10.0	2171.93	2162.28	2161.44	9.65	0.28%	0.260	1.99	0.39	0.55
GMI4482069	GAR1-13	GAR1-12	264.32	10.0	2171.15	2162.85	2162.28	8.30	0.22%	0.254	1.87	0.43	0.46
GMI4482070	GAR1-14	GAR1-13	27.18	10.0	2171.63	2163.17	2162.85	8.46	1.18%	0.247	2.31	0.26	1.42
GMI4482071	GAR1-15	GAR1-14	189.28	10.0	2170.34	2163.72	2163.17	6.62	0.29%	0.239	2.33	0.41	0.59
GMI4480556	GAR3-01	M2-10	309.33	15.0	2159.23	2146.63	2145.81	12.60	0.27%	0.732	1.72	0.38	1.60
GMI4480469	GAR3-02	GAR3-01	297.84	15.0	2162.96	2150.98	2146.63	11.98	1.46%	0.733	3.42	0.25	4.73
GMI4480401	GAR3-03	GAR3-02	300.68	15.0	2163.96	2151.43	2150.98	12.53	0.15%	0.723	2.62	0.51	1.03
GMI4482795	GAR3-04	GAR3-03	269.21	15.0	2165.40	2154.04	2151.43	11.36	0.97%	0.724	2.53	0.27	3.73
GMI4480638	GAR3-05	GAR3-04	383.61	15.0	2167.28	2154.64	2154.04	12.64	0.16%	0.722	2.52	0.51	1.07
GMI4480881	GAR3-06	GAR3-05	100.72	15.0	2166.81	2154.79	2154.64	12.02	0.15%	0.722	1.83	0.49	1.03
GMI4482514	GAR3-07	GAR3-06	344.25	15.0	2168.25	2155.51	2154.79	12.74	0.21%	0.724	2.12	0.41	1.34
GMI4480907	GOV1-01	BEXT2-28	385.45	15.0	2219.26	2209.91	2208.40	9.35	0.39%	0.874	2.48	0.38	1.96
GMI4480662	GOV1-02	GOV1-01	349.39	15.0	2221.05	2210.47	2209.91	10.58	0.16%	0.864	2.43	0.54	0.95
GMI4480925	GOV1-03	GOV1-02	21.12	15.0	2220.95	2210.75	2210.47	10.20	1.33%	0.813	2.73	0.27	4.40
GMI4483674	GOV1-04	GOV1-03	236.20	15.0	2223.00	2211.10	2210.75	11.90	0.15%	0.810	2.72	0.54	0.94
GMI4483675	GOV1-05	GOV1-04	390.97	15.0	2221.77	2211.62	2211.10	10.15	0.13%	0.591	1.60	0.41	1.05
GMI4480885	GOV1-06	GOV1-05	328.57	15.0	2223.70	2212.37	2211.62	11.33	0.23%	0.550	1.99	0.34	1.61
GMI4480886	GOV1-07	GOV1-06	37.97	15.0	2223.76	2212.70	2212.37	11.06	0.89%	0.536	2.78	0.24	3.70
GMI4480887	GOV1-08	GOV1-07	332.26	15.0	2224.45	2213.21	2212.70	11.24	0.15%	0.534	2.13	0.42	1.23
GMI4482142	GOV1-09	GOV1-08	346.03	15.0	2229.10	2213.90	2213.21	15.20	0.20%	0.536	1.91	0.35	1.48
GMI4482143	GOV1-09A	GOV1-09	229.13	12.0	2228.02	2216.07	2213.90	11.95	0.95%	0.226	1.72	0.21	2.20
GMI4482144	GOV1-09B	GOV1-09A	343.00	12.0	2229.85	2217.95	2216.07	11.90	0.55%	0.221	2.60	0.24	1.63
GMI4482145	GOV1-09C	GOV1-09B	354.19	12.0	2238.95	2224.80	2217.95	14.15	1.93%	0.216	2.87	0.17	3.25
GMI4482141	GOV1-10	GOV1-09	399.09	12.0	2228.95	2214.78	2213.90	14.17	0.22%	0.322	1.71	0.36	0.85
GMI4482236	GOV1-11	GOV1-10	388.51	12.0	2230.57	2215.68	2214.78	14.89	0.23%	0.321	1.97	0.36	0.88
GMI4482237	GOV1-12	GOV1-11	354.44	12.0	2232.28	2216.69	2215.68	15.59	0.28%	0.236	1.68	0.29	1.10
GMI4482238	GOV1-13	GOV1-12	224.67	12.0	2232.98	2217.32	2216.69	15.66	0.28%	0.220	1.88	0.28	1.10
GMI4482239	GOV1-14	GOV1-13	384.60	12.0	2232.78	2218.21	2217.32	14.57	0.23%	0.210	1.77	0.29	0.99
GMI4482213	GOV1-15	GOV1-14	295.86	12.0	2235.93	2218.79	2218.21	17.14	0.20%	0.207	1.65	0.30	0.90
GMI4482217	GOV1-15N1	GOV1-15	10.24	10.0	2236.03	2218.82	2218.79	17.21	0.28%	0.103	0.99	0.34	0.71
GMI4482215	GOV1-16	GOV1-15N1	361.68	10.0	2237.85	2220.06	2218.82	17.79	0.34%	0.097	1.21	0.22	0.80
GMI4482214	GOV1-17	GOV1-16	308.74	10.0	2237.14	2221.09	2220.06	16.05	0.33%	0.088	1.58	0.21	0.80

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GMI4482218	GOV1-18	GOV1-17	425.95	10.0	2237.06	2222.58	2221.09	14.48	0.35%	0.082	1.55	0.20	0.83
GMI4482219	GOV1-19	GOV1-18	295.38	10.0	2235.56	2223.40	2222.58	12.16	0.28%	0.049	1.11	0.17	0.76
GMI4481601	GOV1-20	GOV1-19	292.47	10.0	2234.72	2224.30	2223.40	10.42	0.31%	0.043	1.18	0.15	0.81
GMI4481600	GOV1-21	GOV1-20	358.41	10.0	2234.63	2225.61	2224.30	9.02	0.37%	0.037	1.19	0.14	0.89
GMI4481599	GOV1-22	GOV1-21	79.47	10.0	2233.55	2225.98	2225.61	7.57	0.47%	0.030	1.18	0.12	1.02
GMI4481057	HON1-01	BEXT2-13	325.40	12.0	2211.06	2199.98	2198.09	11.08	0.58%	0.548	1.84	0.37	1.35
GMI4481700	HON1-02	HON1-01	327.01	12.0	2213.73	2200.88	2199.98	12.85	0.28%	0.546	2.63	0.49	0.76
GMI4481699	HON1-03	HON1-02	322.10	12.0	2213.95	2202.79	2200.88	11.16	0.59%	0.545	2.64	0.36	1.38
GMI4481672	HON1-04	HON1-03	357.66	12.0	2213.12	2205.08	2202.79	8.04	0.64%	0.543	3.28	0.36	1.45
GMI4481671	HON1-04A	HON1-04	148.15	12.0	2211.72	2205.83	2205.08	5.88	0.51%	0.540	3.07	0.40	1.24
NEW1175253	HON1-05	HON1-04A	11.27	12.0	2211.69	2205.89	2205.83	5.80	0.51%	0.537	2.53	0.47	1.24
GMI4483036	HON1-06	HON1-05	397.29	12.0	2217.82	2207.32	2205.89	10.50	0.36%	0.469	2.26	0.39	1.03
GMI4483037	HON1-07	HON1-06	336.57	12.0	2220.82	2208.29	2207.32	12.53	0.29%	0.468	2.43	0.43	0.87
GMI4483038	HON1-08	HON1-07	235.02	12.0	2222.51	2209.09	2208.29	13.42	0.34%	0.466	2.40	0.39	0.99
GMI4483043	HON1-09	HON1-08	220.31	12.0	2225.43	2210.08	2209.09	15.35	0.45%	0.436	2.57	0.35	1.24
GMI4483050	HON1-09A	HON1-09	22.12	12.0	2225.37	2214.07	2210.08	11.30	18.04%	0.433	4.54	0.14	10.25
GMI4483049	HON1-10	HON1-09A	303.45	12.0	2228.51	2216.65	2214.07	11.86	0.85%	0.408	4.40	0.34	1.89
GMI4483025	HON1-11	HON1-10	353.00	12.0	2231.28	2218.72	2216.65	12.56	0.59%	0.382	2.71	0.30	1.53
GMI4483020	HON1-12	HON1-11	22.14	12.0	2230.96	2218.92	2218.72	12.04	0.90%	0.351	2.79	0.29	2.02
GMI4483009	HON1-18D	HON1-18C	304.01	10.0	2248.14	2235.98	2234.86	12.16	0.37%	0.132	1.71	0.25	0.80
GMI4483008	HON1-18E	HON1-18D	300.20	10.0	2246.42	2236.93	2235.98	9.49	0.32%	0.127	1.76	0.27	0.74
GMI4482992	HON1-18E1	HON1-18E	186.15	10.0	2246.62	2237.51	2236.93	9.11	0.31%	0.122	1.68	0.26	0.73
GMI4482991	HON1-18E2	HON1-18E1	150.64	10.0	2247.00	2238.06	2237.51	8.94	0.37%	0.110	1.65	0.23	0.82
GMI4482980	HON1-18E2A	HON1-18E2	303.89	10.0	2248.04	2239.09	2238.06	8.95	0.34%	0.037	0.85	0.14	0.86
GMI4482981	HON1-18E2B	HON1-18E2A	50.42	10.0	2247.98	2239.27	2239.09	8.71	0.36%	0.029	1.09	0.12	0.89
GMI4482982	HON1-18E2C	HON1-18E2B	174.09	10.0	2248.96	2239.95	2239.27	9.01	0.39%	0.023	1.03	0.11	0.94
GMI4482983	HON1-18E2D	HON1-18E2C	350.37	10.0	2248.93	2241.11	2239.95	7.82	0.33%	0.016	0.86	0.09	0.87
GMI4482984	HON1-18E2E	HON1-18E2D	215.02	10.0	2247.83	2241.57	2241.11	6.26	0.21%	0.008	0.58	0.07	0.70
GMI4482990	HON1-18E3	HON1-18E2	167.85	10.0	2245.93	2238.34	2238.06	7.59	0.17%	0.071	1.16	0.23	0.56
GMI4482989	HON1-18E4	HON1-18E3	315.37	10.0	2245.67	2239.22	2238.34	6.45	0.28%	0.060	1.15	0.18	0.75
GMI4482987	HON1-18E4A	HON1-18E4	248.10	10.0	2245.16	2239.35	2239.22	5.81	0.05%	0.028	0.61	0.20	0.32
GMI4482988	HON1-18E5	HON1-18E4	324.62	10.0	2247.58	2240.38	2239.22	7.20	0.36%	0.027	0.82	0.12	0.89
GMI4482986	HON1-18E5A	HON1-18E5	227.72	10.0	2247.66	2240.11	2240.38	7.55	-0.12%	0.014	0.17	0.45	0.51
GMI4482985	HON1-18E5B	HON1-18E5	312.70	10.0	2247.70	2241.25	2240.38	6.45	0.28%	0.007	0.49	0.07	0.80
NEW253	HUT-1	RIV1-31	74.40	18.0	2167.13	2148.37	2147.41	18.76	1.28%	0.340	0.90	0.15	8.00
NEW252	HUT-2	HUT-1	336.33	18.0	2179.89	2165.73	2148.37	14.16	5.16%	0.343	4.54	0.10	16.35

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
NEW251	HUT-3	HUT-2	90.36	18.0	2186.18	2169.82	2165.73	16.36	4.52%	0.344	5.50	0.10	15.31
NEW250	HUT-4	HUT-3	288.14	18.0	2185.67	2172.11	2169.82	13.56	0.80%	0.346	3.61	0.17	6.21
NEW249	HUT-5	HUT-4	47.44	18.0	2186.03	2172.66	2172.11	13.37	1.15%	0.349	3.03	0.14	7.56
NEW248	HUT-6	HUT-5	399.76	18.0	2192.23	2175.88	2172.66	16.35	0.81%	0.355	3.23	0.16	6.25
NEW247	HUT-7	HUT-6	399.68	18.0	2195.65	2179.22	2175.88	16.43	0.84%	0.370	3.13	0.16	6.35
NEW246	HUT-8	HUT-7	311.58	18.0	2193.99	2181.64	2179.22	12.35	0.78%	0.400	3.22	0.17	6.08
NEW347	HWK-01	RIV1-32	35.28	36.0	2159.37	2149.55	2147.50	9.82	5.79%	0.797	0.92	0.09	111.38
NEW1175081	HWK1-01	STOR_14	109.19	10.0	2276.11	2242.81	2242.55	33.30	0.24%	0.311	2.17	0.49	0.44
NEW1175015	HWK1-02	HWK1-01	124.57	10.0	2276.79	2243.49	2242.81	33.30	0.55%	0.311	2.19	0.36	0.83
NEW1175014	HWK1-03	HWK1-02	79.87	10.0	2277.47	2243.67	2243.49	33.80	0.22%	0.310	2.14	0.50	0.41
NEW1175013	HWK1-04	HWK1-03	301.05	10.0	2278.95	2244.65	2243.67	34.30	0.32%	0.310	2.00	0.41	0.56
NEW1175012	HWK1-05	HWK1-04	230.46	10.0	2276.54	2245.44	2244.65	31.10	0.34%	0.310	2.27	0.41	0.59
NEW1175011	HWK1-06	HWK1-05	285.71	10.0	2275.64	2246.44	2245.44	29.20	0.35%	0.310	2.28	0.41	0.60
NEW1175010	HWK1-07	HWK1-06	382.24	10.0	2275.56	2247.76	2246.44	27.80	0.34%	0.310	2.29	0.41	0.59
NEW1174971	HWK1-07A	HWK1-07	254.19	12.0	2277.56	2248.70	2247.76	28.86	0.37%	0.068	0.77	0.18	1.45
4535	HWK1-07A1	HWK1-07A	30.62	12.0	2276.92	2248.83	2248.76	28.09	0.22%	0.002	0.29	0.03	1.17
NEW1175009	HWK1-08	HWK1-07	198.82	10.0	2277.05	2248.45	2247.76	28.60	0.35%	0.252	2.02	0.49	0.65
NEW1175008	HWK1-09	HWK1-08	385.66	10.0	2272.38	2249.49	2248.45	22.89	0.27%	0.252	2.03	0.40	0.54
NEW1175007	HWK1-10	HWK1-09	151.07	10.0	2270.35	2250.00	2249.49	20.35	0.34%	0.252	2.05	0.36	0.68
NEW1175006	HWK1-11	HWK1-10	310.44	10.0	2272.34	2251.02	2250.00	21.32	0.33%	0.252	2.42	0.32	0.90
NEW1175005	HWK1-12	HWK1-11	313.09	10.0	2274.41	2252.32	2251.02	22.09	0.42%	0.252	1.96	0.47	0.44
NEW1175004	HWK1-13	HWK1-12	184.58	10.0	2274.46	2252.89	2252.32	21.57	0.31%	0.067	0.65	0.35	0.69
NEW391	HWK1-14	HWK1-13	391.57	10.0	2273.40	2254.25	2252.89	19.15	0.35%	0.067	1.41	0.18	0.84
NEW178	HWK1-15	HWK1-14	277.00	10.0	2274.39	2255.11	2254.25	19.28	0.31%	0.066	1.45	0.20	0.79
NEW179	HWK1-16	HWK1-15	338.89	10.0	2271.68	2256.16	2255.11	15.52	0.31%	0.065	1.41	0.19	0.79
NEW180	HWK1-17	HWK1-16	334.92	10.0	2269.02	2257.18	2256.16	11.84	0.30%	0.065	1.41	0.19	0.78
NEW181	HWK1-18	HWK1-17	92.71	10.0	2268.01	2257.58	2257.18	10.43	0.43%	0.064	1.48	0.17	0.94
NEW175	HWK1-19	HWK1-18	159.05	10.0	2268.59	2258.14	2257.58	10.45	0.36%	0.063	1.49	0.18	0.85
NEW174	HWK1-20	HWK1-19	179.75	10.0	2268.84	2258.71	2258.14	10.13	0.32%	0.061	1.40	0.18	0.80
GMI4480656	L1-01	A1-01A	226.82	15.0	2155.84	2146.92	2136.08	8.92	4.78%	2.190	7.79	0.32	7.70
GMI4482764	L1-02	L1-01	101.47	12.0	2157.87	2152.45	2146.92	5.42	5.45%	1.020	6.85	0.28	4.81
GMI4482480	L1-02A	L1-02	243.14	12.0	2166.02	2158.78	2152.45	7.24	2.60%	1.016	7.02	0.37	3.01
MSTR1175284	L1-03	L1-02A	123.82	12.0	2167.68	2162.10	2158.78	5.58	2.68%	1.002	6.20	0.34	3.08
GMI4482481	L1-04	L1-03	370.01	12.0	2178.88	2171.98	2162.10	6.90	2.67%	0.998	6.56	0.34	3.08
GMI4480718	L1-05	L1-04	263.34	12.0	2180.82	2174.83	2171.98	5.99	1.08%	0.994	5.12	0.47	1.60
GMI4480717	L1-06	L1-05	245.96	12.0	2186.78	2181.32	2174.83	5.46	2.64%	0.985	5.12	0.34	3.07

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482443	L1-07	L1-06	310.36	12.0	2193.50	2188.52	2181.32	4.98	2.32%	0.647	5.03	0.28	3.15
GMI4482444	L1-08	L1-07	319.02	12.0	2201.09	2189.94	2188.52	11.15	0.45%	0.645	3.62	0.48	1.02
GMI4482445	L1-09	L1-08	292.08	12.0	2199.17	2191.24	2189.94	7.93	0.45%	0.617	2.77	0.42	1.06
GMI4482448	L1-10	L1-09	296.66	12.0	2200.29	2192.45	2191.24	7.84	0.41%	0.594	2.87	0.44	0.99
GMI4482447	L1-11	L1-10	329.51	12.0	2210.26	2205.58	2192.45	4.68	3.98%	0.593	3.99	0.23	4.39
GMI4482446	L1-12	L1-11	348.30	12.0	2215.11	2207.09	2205.58	8.02	0.43%	0.590	3.67	0.48	1.05
GMI4482402	L1-13	L1-12	351.75	12.0	2218.36	2207.90	2207.09	10.46	0.23%	0.588	2.34	0.52	0.61
GMI4482401	L1-14	L1-13	282.35	12.0	2219.82	2208.66	2207.90	11.16	0.27%	0.585	2.34	0.47	0.71
GMI4483768	L1-15	L1-14	144.80	12.0	2220.26	2209.38	2208.66	10.88	0.50%	0.578	2.75	0.39	1.18
GMI4483767	L1-16	L1-15	334.34	12.0	2220.82	2210.18	2209.38	10.64	0.24%	0.575	2.51	0.53	0.65
GMI4481914	L1-17	L1-16	327.89	12.0	2221.11	2211.02	2210.18	10.09	0.26%	0.558	2.22	0.47	0.70
GMI4481913	L1-18	L1-17	329.33	12.0	2221.97	2211.48	2211.02	10.49	0.14%	0.514	1.95	0.57	0.42
GMI4481912	L1-19	L1-18	331.22	12.0	2221.91	2212.37	2211.48	9.54	0.27%	0.466	1.89	0.42	0.83
GMI4481889	L1-20	L1-19	314.78	12.0	2221.73	2213.01	2212.37	8.72	0.20%	0.423	2.05	0.44	0.70
GMI4481890	L1-21	L1-20	323.59	12.0	2222.71	2213.84	2213.01	8.87	0.26%	0.327	1.76	0.35	0.94
GMI4481880	L1-22	L1-21	280.24	12.0	2221.81	2214.52	2213.84	7.29	0.24%	0.313	1.99	0.35	0.92
GMI4480767	L1-23	L1-22	253.83	10.0	2223.06	2215.88	2214.52	7.18	0.54%	0.285	2.30	0.34	0.84
GMI4480721	L1-24	L1-23	305.18	10.0	2225.92	2216.46	2215.88	9.46	0.19%	0.277	1.95	0.51	0.39
GMI4483802	L1-24A	L1-24	17.53	10.0	2225.92	2216.51	2216.46	9.41	0.26%	0.269	1.52	0.50	0.52
GMI4480720	L1-24C	L1-24A	174.04	10.0	2225.27	2216.84	2216.51	8.43	0.19%	0.251	1.58	0.42	0.42
GMI4480719	L1-24D	L1-24C	225.15	10.0	2223.47	2217.27	2216.84	6.20	0.19%	0.242	1.71	0.42	0.43
GMI4482298	L1-24E	L1-24D	142.17	10.0	2224.51	2217.77	2217.27	6.74	0.35%	0.085	0.96	0.21	0.82
GMI4484069	L1-24E1	L1-24E	153.48	10.0	2225.35	2219.56	2217.77	5.79	1.16%	0.074	1.78	0.52	1.58
GMI4481266	L1-24H	L1-24D	396.61	10.0	2225.59	2218.39	2217.27	7.20	0.28%	0.127	1.18	0.27	0.69
GMI4482301	L1-24I	L1-24H	102.12	10.0	2226.58	2218.80	2218.39	7.78	0.40%	0.055	0.99	0.16	0.92
GMI4482300	L1-24O	L1-24I	299.00	10.0	2227.91	2219.59	2218.80	8.32	0.26%	0.033	1.00	0.14	0.76
NEW06162016	L1-24P	L1-24O	404.88	10.0	2227.91	2219.59	2218.80	8.32	0.20%	0.023	0.44	0.27	0.00
GMI4483572	M1-01	FG1-14	74.73	36.0	2136.10	2128.09	2128.11	8.01	-0.03%	7.948	2.88	0.61	-0.31
GMI4480478	M1-02	M1-01	419.73	36.0	2137.23	2128.44	2128.09	8.79	0.08%	7.950	2.74	0.60	5.54
GMI4480479	M1-03	M1-02	185.65	36.0	2138.35	2128.58	2128.44	9.77	0.08%	7.955	2.72	0.62	4.87
GMI4480480	M1-04	M1-03	115.27	36.0	2137.96	2128.74	2128.58	9.22	0.14%	7.826	2.66	0.61	9.57
GMI4480481	M1-05	M1-04	105.81	30.0	2138.72	2128.95	2128.74	9.77	0.20%	7.775	3.15	0.72	5.02
GMI4480483	M1-07	M1-05	841.83	30.0	2136.94	2130.07	2128.95	6.87	0.13%	7.788	3.33	0.66	2.69
GMI4480429	M1-08	M1-07	679.66	30.0	2138.84	2131.77	2130.07	7.07	0.25%	7.804	3.98	0.53	6.56
GMI4480428	M1-09	M1-08	431.24	30.0	2163.61	2132.56	2131.77	31.05	0.18%	7.808	4.14	0.64	4.48
GMI4480525	M1-10	M1-09	150.37	30.0	2165.43	2132.83	2132.56	32.60	0.18%	7.774	3.63	0.65	4.40

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GMI4480524	M1-11	M1-10	227.88	30.0	2156.97	2133.27	2132.83	23.70	0.19%	7.731	3.56	0.64	4.89
GMI4480519	M1-11A	M1-11	176.63	30.0	2151.39	2133.49	2133.27	17.90	0.13%	7.731	3.45	0.69	2.43
NEW032316A	M1-11B	M1-11A	12.53	24.0	2151.30	2136.00	2133.49	15.30	19.98%	3.838	4.15	0.13	107.73
SPLIT032316	M1-12	M1-11A	52.50	30.0	2150.84	2133.54	2133.49	17.30	0.09%	4.622	2.14	0.69	4.15
GMI4480510	M1-13	M1-12	383.39	30.0	2149.13	2133.95	2133.54	15.18	0.11%	4.653	2.28	0.60	4.74
GMI4480508	M1-14	M1-13	347.75	30.0	2140.50	2134.66	2133.95	5.84	0.20%	4.687	2.94	0.43	8.29
GMI4480507	M1-15	M1-14	447.04	24.0	2161.95	2136.18	2134.66	25.77	0.34%	4.696	4.30	0.52	4.54
GMI4480513	M1-16	M1-15	558.58	30.0	2142.76	2136.94	2136.18	5.82	0.14%	4.682	3.33	0.50	5.93
GMI4480506	M1-17	M1-16	433.85	24.0	2144.03	2137.30	2136.94	6.73	0.08%	4.682	3.06	0.79	-0.14
GMI4480501	M1-18	M1-17	587.80	24.0	2152.33	2138.16	2137.30	14.17	0.15%	4.669	2.89	0.70	1.39
GMI4480490	M1-19	M1-18	194.43	24.0	2140.80	2137.96	2138.16	2.84	-0.10%	4.673	2.63	0.94	0.41
GMI4480489	M1-20	M1-19	321.81	24.0	2144.42	2138.33	2137.96	6.09	0.11%	4.671	2.59	0.72	2.85
GMI4480488	M1-20A	M1-20	59.25	24.0	2151.15	2138.59	2138.33	12.56	0.44%	3.393	2.20	0.81	2.98
GMI4480487	M1-20B	M1-20A	374.70	24.0	2163.70	2140.30	2138.59	23.40	0.46%	3.396	2.78	0.39	7.31
GMI4480545	M1-20C	M1-20B	427.11	24.0	2158.37	2141.31	2140.30	17.06	0.24%	3.396	3.87	0.51	4.31
GMI4480570	M1-21	M1-20C	173.98	24.0	2157.47	2141.45	2141.31	16.02	0.08%	3.366	2.88	0.61	1.16
GMI4480544	M1-22	M1-21	159.90	24.0	2155.70	2141.73	2141.45	13.97	0.17%	3.360	2.66	0.58	3.24
GMI4480574	M1-23	M1-22	298.04	24.0	2156.21	2145.61	2141.73	10.60	1.30%	3.351	3.95	0.29	14.72
GMI4480543	M1-24	M1-23	303.69	24.0	2158.88	2148.82	2145.61	10.06	1.06%	3.300	6.23	0.32	12.99
GMI4480404	M1-25	M1-24	298.93	24.0	2162.37	2151.31	2148.82	11.06	0.83%	3.142	5.48	0.33	11.32
GMI4482799	M1-26	M1-25	155.77	24.0	2164.40	2152.98	2151.31	11.42	1.07%	3.081	5.64	0.30	13.32
GMI4482801	M1-26AW	M1-25	359.80	10.0	2162.24	2153.64	2151.31	8.60	0.65%	0.130	0.93	0.22	1.10
GMI4482802	M1-26BW	M1-26AW	359.90	10.0	2163.36	2154.54	2153.64	8.82	0.25%	0.128	1.75	0.30	0.64
GMI4482803	M1-26CW	M1-26BW	359.81	10.0	2164.73	2156.57	2154.54	8.16	0.56%	0.124	1.70	0.22	1.03
GMI4482800	M1-27	M1-26	142.65	24.0	2165.07	2154.75	2152.98	10.32	1.24%	1.568	3.92	0.20	16.08
GMI4483654	M1-28	M1-27	149.00	18.0	2167.68	2157.11	2154.75	10.57	1.58%	1.503	5.79	0.29	7.75
GMI4482551	M1-28A	M1-27	359.43	10.0	2164.48	2156.96	2154.75	7.52	0.61%	0.076	0.92	0.17	1.13
GMI4482552	M1-28B	M1-28A	359.41	10.0	2165.50	2158.36	2156.96	7.14	0.39%	0.070	1.64	0.19	0.89
GMI4483778	M1-29	M1-28	331.39	18.0	2165.28	2157.64	2157.11	7.64	0.16%	1.497	3.19	0.57	1.43
GMI4483777	M1-30	M1-29	37.97	18.0	2165.25	2157.70	2157.64	7.55	0.16%	1.498	2.19	0.59	1.52
GMI4482548	M1-31	M1-30	367.95	18.0	2167.66	2158.12	2157.70	9.54	0.12%	1.500	2.18	0.58	1.00
GMI4482549	M1-32	M1-31	362.11	18.0	2166.02	2158.92	2158.12	7.10	0.22%	1.506	2.66	0.42	2.57
GMI4482550	M1-33	M1-32	349.38	18.0	2167.70	2159.52	2158.92	8.18	0.17%	1.508	2.79	0.54	1.54
GMI4482052	M1-34	M1-33	350.67	18.0	2167.51	2160.40	2159.52	7.11	0.25%	1.510	2.56	0.49	1.67
GMI4482051	M1-35	M1-34	148.15	18.0	2167.18	2160.58	2160.49	6.60	0.06%	1.509	2.32	0.62	0.27
GMI4482774	M1-36	M1-35	302.74	18.0	2168.43	2161.53	2160.58	6.90	0.31%	1.476	2.49	0.41	2.65

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GMI4482780	M1-37	M1-36	46.59	18.0	2168.84	2161.56	2161.53	7.28	0.06%	1.468	2.72	0.55	0.40
GMI4482781	M1-38	M1-37	252.80	18.0	2171.05	2162.87	2161.56	8.18	0.52%	1.460	2.92	0.36	3.83
GMI4482782	M1-39	M1-38	151.86	18.0	2172.12	2163.12	2162.87	9.00	0.16%	1.457	2.97	0.53	1.53
GMI4482127	M1-40	M1-39	241.18	18.0	2173.86	2164.56	2163.12	9.30	0.60%	1.450	3.03	0.34	4.23
GMI4482128	M1-41	M1-40	302.74	18.0	2175.57	2165.79	2164.56	9.78	0.41%	1.441	3.71	0.40	3.25
GMI4482129	M1-42	M1-41	298.75	18.0	2177.49	2167.01	2165.79	10.48	0.41%	1.433	3.44	0.39	3.27
GMI4482125	M1-43	M1-42	207.25	18.0	2176.28	2167.26	2167.01	9.02	0.12%	1.372	2.63	0.55	1.18
GMI4482126	M1-44	M1-43	218.16	18.0	2179.00	2169.10	2167.26	9.90	0.84%	1.371	2.95	0.31	5.39
GMI4482470	M1-45	M1-44	300.42	18.0	2179.27	2170.47	2169.10	8.80	0.46%	1.368	3.92	0.38	3.60
GMI4482469	M1-46	M1-45	295.39	18.0	2180.72	2171.52	2170.47	9.20	0.36%	1.361	3.30	0.40	3.02
GMI4482468	M1-47	M1-46	139.27	18.0	2181.91	2172.01	2171.52	9.90	0.35%	1.346	3.15	0.41	3.02
GMI4482467	M1-48	M1-47	197.80	18.0	2180.76	2172.92	2172.01	7.84	0.46%	1.345	3.37	0.36	3.64
GMI4482466	M1-49	M1-48	163.18	18.0	2181.81	2173.91	2172.92	7.90	0.61%	1.343	3.80	0.34	4.39
GMI4482424	M1-50	M1-49	330.09	18.0	2183.53	2175.81	2173.91	7.72	0.58%	1.335	3.91	0.34	4.25
GMI4482425	M1-51	M1-50	329.35	18.0	2186.84	2178.38	2175.81	8.46	0.78%	1.329	4.16	0.31	5.17
GMI4482421	M1-52	M1-51	166.19	18.0	2189.83	2179.69	2178.38	10.14	0.79%	1.303	4.29	0.32	5.23
GMI4481303	M1-53	M1-52	332.02	18.0	2191.68	2182.28	2179.69	9.40	0.78%	1.302	4.28	0.31	5.19
GMI4779199	M1-54	M1-53	167.61	15.0	2192.58	2183.51	2182.28	9.07	0.73%	1.301	4.39	0.43	2.57
GMI4482153	M1-55	M1-54	178.43	15.0	2205.25	2196.67	2183.51	8.58	7.38%	1.152	5.29	0.21	11.15
GMI4482154	M1-56	M1-55	280.41	15.0	2208.24	2200.29	2196.67	7.95	1.29%	1.139	5.99	0.37	4.00
GMI4482376	M1-57	M1-56	280.71	15.0	2211.93	2203.63	2200.29	8.30	1.19%	1.138	4.62	0.33	3.80
GMI4482377	M1-58	M1-57	275.17	15.0	2213.61	2204.01	2203.63	9.60	0.14%	1.136	2.88	0.67	0.55
GMI4482378	M1-59	M1-58	343.72	12.0	2214.71	2205.53	2204.01	9.18	0.44%	0.152	0.72	0.21	1.51
GMI4483624	M1-59A	M1-59	206.84	12.0	2215.24	2205.91	2205.53	9.33	0.18%	0.133	1.49	0.26	0.93
GMI4483626	M1-60	M1-59A	143.19	12.0	2215.77	2206.18	2205.91	9.59	0.19%	0.116	1.24	0.22	0.97
GMI4482390	M1-61	M1-60	181.84	12.0	2215.87	2206.51	2206.18	9.36	0.18%	0.106	1.30	0.21	0.96
GMI4779198	M1-62	M1-61	223.08	12.0	2216.40	2207.00	2206.51	9.40	0.22%	0.083	1.18	0.18	1.09
GMI4779197	M1-63	M1-62	315.65	12.0	2215.36	2207.76	2207.00	7.60	0.24%	0.080	1.33	0.17	1.14
GMI4779196	M1-64	M1-63	280.43	12.0	2216.23	2208.39	2207.76	7.84	0.22%	0.053	1.02	0.14	1.13
GMI4779195	M1-65	M1-64	271.83	12.0	2217.15	2210.57	2208.39	6.58	0.80%	0.033	1.02	0.08	2.20
GMI4779212	M2-01	M2-01AA	171.09	12.0	2147.23	2140.39	2139.35	6.84	0.61%	1.332	3.46	0.64	0.70
GMI4779211	M2-01AA	M1-20	174.67	12.0	2145.27	2139.35	2138.33	5.92	0.58%	1.335	2.63	1.31	0.20
GMI4779210	M2-02	M2-01	255.40	12.0	2151.67	2141.00	2140.39	10.67	0.24%	1.338	3.06	1.08	-0.22
GMI4779209	M2-03	M2-02	143.19	12.0	2145.88	2141.02	2141.00	4.86	0.01%	1.335	2.63	1.30	-0.27
GMI4779208	M2-04	M2-03	323.56	12.0	2149.71	2141.94	2141.02	7.77	0.28%	1.326	2.61	1.48	-0.08
GMI4779207	M2-05	M2-04	177.78	12.0	2152.14	2142.22	2141.94	9.92	0.16%	1.325	2.67	1.65	-0.16

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483580	M2-09	M2-09A	294.58	21.0	2155.85	2145.75	2145.23	10.10	0.18%	1.529	2.60	0.41	3.12
NEW1175186	M2-09A	M2-09B	303.47	21.0	2155.13	2145.23	2144.54	9.90	0.23%	1.529	3.07	0.40	3.79
NEW1175187	M2-09B	M2-09C	304.88	24.0	2156.00	2144.54	2143.55	11.46	0.32%	1.529	3.05	0.46	7.49
NEW1175188	M2-09C	M2-09D	301.16	24.0	2153.91	2143.55	2142.91	10.36	0.21%	1.455	2.08	0.55	5.84
NEW414	M2-09D	M2-05	161.76	12.0	2150.70	2142.91	2142.22	7.79	0.43%	1.315	2.61	1.87	0.00
GMI4480555	M2-10	M2-09	64.10	18.0	2155.93	2145.81	2145.75	10.12	0.09%	1.515	2.52	0.57	0.74
GMI4483581	M2-12	M2-10	301.19	18.0	2156.64	2146.88	2145.81	9.76	0.36%	1.042	2.25	0.33	3.34
GMI4483582	M2-13	M2-12	309.93	18.0	2157.73	2147.79	2146.88	9.94	0.29%	1.046	2.95	0.37	2.94
GMI4483587	M2-13A	M2-13	19.52	18.0	2157.61	2147.81	2147.79	9.80	0.12%	0.896	2.21	0.41	1.63
GMI4483422	M2-13B	M2-13A	158.10	18.0	2158.50	2148.00	2147.81	10.50	0.12%	0.370	1.28	0.30	2.18
GMI4483423	M2-13C	M2-13B	147.26	18.0	2156.90	2148.18	2148.00	8.72	0.12%	0.352	1.47	0.26	2.19
GMI4483585	M2-13D	M2-13C	297.95	18.0	2159.20	2149.77	2148.18	9.43	0.53%	0.351	1.93	0.17	5.02
GMI4483424	M2-13E	M2-13D	254.26	18.0	2160.10	2150.07	2149.77	10.03	0.12%	0.350	1.78	0.28	2.19
GMI4483583	M2-13F	M2-13E	35.30	18.0	2160.10	2150.12	2150.07	9.99	0.12%	0.346	1.30	0.28	2.19
GMI4480560	M2-14	M2-13A	15.55	10.0	2157.38	2147.96	2147.81	9.42	0.95%	0.676	2.72	0.65	0.82
GMI4483425	M2-18	M2-13F	167.69	18.0	2160.42	2151.18	2150.12	9.24	0.64%	0.345	1.81	0.16	5.52
GMI4480563	M2-19	M2-18	21.23	18.0	2160.35	2151.33	2151.18	9.02	0.71%	0.343	2.57	0.18	5.84
GMI4480561	M2-20	M2-19	146.02	10.0	2160.20	2151.60	2151.33	8.60	0.18%	0.049	0.76	0.18	0.61
GMI4480405	M2-21	M2-20	141.58	10.0	2159.09	2151.93	2151.60	7.16	0.23%	0.045	1.09	0.17	0.70
GMI4482062	M2-22	M2-21	159.04	10.0	2159.09	2152.87	2151.93	6.22	0.59%	0.042	1.29	0.13	1.14
GMI4482061	M2-23	M2-22	170.37	10.0	2157.81	2152.95	2152.87	4.86	0.05%	0.024	0.65	0.20	0.31
GMI4482063	M2-24	M2-23	253.55	10.0	2162.53	2153.99	2152.95	8.54	0.41%	0.021	0.64	0.10	0.96
GMI4482050	M3-01	M1-26	359.86	15.0	2166.67	2155.47	2152.98	11.20	0.69%	1.513	4.25	0.44	2.25
GMI4482049	M3-02	M3-01	360.02	15.0	2165.58	2156.47	2155.47	9.11	0.28%	1.511	3.44	0.91	0.87
GMI4482524	M3-03	M3-02	359.75	15.0	2169.43	2160.31	2156.47	9.12	1.07%	1.474	3.59	0.39	3.20
GMI4482525	M3-04	M3-03	365.80	15.0	2173.76	2160.88	2160.31	12.88	0.16%	1.471	3.05	0.79	0.31
GMI4482526	M3-05	M3-04	349.50	15.0	2173.16	2161.54	2160.88	11.62	0.19%	1.468	2.39	0.66	0.50
GMI4482520	M3-06	M3-05	392.84	15.0	2170.64	2161.90	2161.54	8.74	0.09%	1.466	2.30	0.84	-0.10
GMI4482509	M3-07	M3-06	328.60	15.0	2172.29	2162.47	2161.90	9.82	0.17%	1.458	2.22	0.71	0.43
GMI4482507	M3-08	M3-07	330.19	15.0	2170.52	2162.88	2162.47	7.64	0.12%	1.453	2.34	0.77	0.14
GMI4482505	M3-09	M3-08	371.24	15.0	2172.24	2163.38	2162.88	8.86	0.13%	1.448	2.24	0.76	0.21
GMI4482504	M3-10	M3-09	306.48	15.0	2174.37	2163.99	2163.38	10.38	0.20%	1.447	2.46	0.64	0.57
GMI4483819	M3-10A	M3-10	9.22	15.0	2174.38	2164.27	2163.99	10.11	3.06%	1.436	3.99	0.29	6.48
GMI4483818	M3-11	M3-10A	330.47	15.0	2174.00	2164.56	2164.27	9.44	0.09%	1.428	2.96	0.88	-0.09
GMI4482455	M3-12	M3-11	344.48	15.0	2175.07	2164.93	2164.56	10.14	0.11%	1.424	1.94	0.86	0.06
GMI4482002	M3-13	M3-12	327.45	15.0	2175.41	2166.04	2164.93	9.38	0.34%	1.419	2.49	0.52	1.21

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482003	M3-14	M3-13	355.04	15.0	2176.44	2166.57	2166.04	9.87	0.15%	1.257	2.55	0.68	0.50
GMI4482004	M3-15	M3-14	51.69	15.0	2176.67	2167.14	2166.57	9.53	1.09%	1.253	3.07	0.35	3.48
GMI4483729	M3-16	M3-15	239.86	15.0	2178.58	2167.99	2167.14	10.60	0.35%	1.234	3.70	0.52	1.45
GMI4483647	M3-17	M3-16	209.72	15.0	2179.70	2168.73	2167.99	10.97	0.35%	1.231	3.08	0.48	1.46
GMI4481301	M3-18	M3-17	355.66	12.0	2177.48	2169.64	2168.73	7.84	0.26%	1.225	3.01	0.89	0.04
GMI4482419	M3-19	M3-18	324.82	12.0	2178.82	2170.28	2169.64	8.54	0.20%	1.203	2.45	0.97	-0.10
GMI4480781	M3-20	M3-19	324.34	12.0	2181.15	2171.50	2170.28	9.65	0.38%	1.172	2.70	0.66	0.36
GMI4480780	M3-21	M3-20	184.93	12.0	2180.75	2171.59	2171.50	9.16	0.05%	1.166	2.60	1.11	-0.62
GMI4482357	M3-22	M3-21	187.29	12.0	2181.28	2172.32	2171.59	8.96	0.39%	1.145	2.43	0.75	0.41
GMI4482358	M3-23	M3-22	180.34	12.0	2182.35	2172.55	2172.32	9.80	0.13%	1.131	2.55	0.96	-0.24
GMI4482359	M3-24	M3-23	140.40	12.0	2181.89	2172.63	2172.55	9.26	0.06%	1.130	2.25	1.19	-0.54
GMI4482360	M3-25	M3-24	300.63	12.0	2182.05	2173.33	2172.63	8.72	0.23%	1.122	2.21	1.14	0.08
GMI4482361	M3-26	M3-25	149.80	12.0	2182.85	2174.15	2173.33	8.70	0.55%	1.127	3.08	0.61	0.72
GMI4482363	M3-27	M3-26	149.17	12.0	2183.49	2175.17	2174.15	8.32	0.68%	1.114	3.84	0.54	0.95
GMI4481288	M3-27A	M3-27	148.10	12.0	2184.72	2176.01	2175.17	8.70	0.57%	1.108	3.77	0.85	0.78
GMI4481287	M3-28	M3-27A	151.00	12.0	2183.88	2176.74	2176.01	7.14	0.48%	1.101	3.44	0.62	0.63
GMI4482362	M3-29	M3-28	152.09	12.0	2184.40	2177.10	2176.74	7.30	0.24%	1.098	2.86	0.80	0.12
NEW415	M3-30	M3-29	352.55	12.0	2187.00	2178.00	2177.10	9.00	0.26%	1.090	2.63	0.73	0.17
GMI4483645	M3-31	M3-30	255.00	12.0	2190.49	2179.99	2178.00	10.50	0.78%	1.089	3.38	0.50	1.12
GMI4480670	M3-32	M3-32A	351.35	12.0	2187.44	2181.93	2180.40	5.51	0.44%	1.057	3.20	0.58	0.59
GMI4480671	M3-32A	M3-31	93.80	12.0	2189.61	2180.40	2179.99	9.21	0.44%	1.059	3.49	0.66	0.59
GMI4480696	M3-33	M3-32	403.89	12.0	2192.31	2183.20	2181.93	9.11	0.31%	0.954	2.95	0.63	0.45
GMI4480716	M3-34	M3-33	461.69	10.0	2207.15	2197.45	2183.20	9.70	3.09%	0.955	4.48	0.41	1.74
GMI4481790	M3-34A	M3-34	239.25	10.0	2209.43	2198.12	2197.45	11.31	0.28%	0.266	2.01	0.40	0.55
GMI4481789	M3-34B	M3-34A	231.33	10.0	2209.22	2198.89	2198.12	10.33	0.33%	0.258	2.07	0.37	0.63
GMI4480639	M3-34C	M3-34B	384.94	10.0	2209.80	2200.16	2198.89	9.64	0.33%	0.252	2.13	0.37	0.63
GMI4482285	M3-34C1	M3-34C	147.57	10.0	2206.13	2200.55	2200.16	5.58	0.26%	0.234	1.92	0.39	0.56
GMI4482286	M3-34C2	M3-34C1	142.58	10.0	2207.23	2201.12	2200.55	6.11	0.40%	0.224	1.98	0.33	0.75
GMI4482287	M3-34C4	M3-34C2	238.00	10.0	2208.95	2201.76	2201.12	7.19	0.27%	0.208	1.92	0.36	0.59
GMI4481793	M3-35	M3-34	236.67	10.0	2208.76	2200.09	2197.45	8.67	1.12%	0.691	4.54	0.48	0.93
GMI4481794	M3-36	M3-35	228.41	10.0	2211.32	2202.17	2200.09	9.15	0.91%	0.687	4.02	0.50	0.78
GMI4481792	M3-37	M3-36	475.98	10.0	2218.29	2209.21	2202.17	9.08	1.48%	0.632	4.13	0.40	1.23
GMI4480772	M3-38	M3-37	165.33	10.0	2221.54	2210.54	2209.21	11.00	0.80%	0.610	3.93	0.51	0.77
GMI4480773	M3-39	M3-38	207.43	10.0	2220.91	2211.61	2210.54	9.30	0.52%	0.607	3.20	0.55	0.49
GMI4480700	M3-40	M3-39	203.52	10.0	2222.20	2213.14	2211.61	9.06	0.75%	0.497	2.90	0.42	0.83
GMI4480701	M3-41	M3-40	163.82	10.0	2223.17	2213.39	2213.14	9.78	0.15%	0.489	2.30	0.74	0.11

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481773	M3-41A	M3-41	16.94	10.0	2223.42	2214.09	2213.39	9.33	4.13%	0.380	2.23	0.24	2.74
GMI4481775	M3-41B	M3-41A	182.79	10.0	2227.30	2214.70	2214.09	12.60	0.33%	0.370	3.27	0.48	0.66
GMI4481774	M3-42	M3-41	197.87	10.0	2227.36	2218.00	2213.39	9.36	2.33%	0.117	0.88	0.15	2.26
GMI4482271	M3-44	M3-43	338.04	10.0	2233.69	2223.49	2222.59	10.20	0.27%	0.101	1.65	0.26	0.69
GMI4482270	M3-45	M3-44	287.91	10.0	2232.82	2224.48	2223.49	8.34	0.34%	0.079	1.30	0.20	0.82
GMI4481749	M3-46	M3-45	385.66	10.0	2230.92	2225.48	2224.48	5.44	0.26%	0.060	1.25	0.19	0.72
GMI4482384	M4-01	M1-58	299.04	15.0	2213.95	2204.99	2204.01	8.96	0.33%	1.001	2.24	0.43	1.59
GMI4482383	M4-02	M4-01	305.91	15.0	2215.61	2205.05	2204.99	10.56	0.02%	0.999	2.03	0.76	-0.37
GMI4482382	M4-03	M4-02	123.89	15.0	2216.26	2205.34	2205.05	10.92	0.23%	0.995	1.73	0.60	1.19
GMI4482381	M4-04	M4-03	167.57	15.0	2216.59	2205.52	2205.34	11.08	0.11%	0.993	1.96	0.62	0.49
GMI4482380	M4-04A	M4-04	165.40	15.0	2214.59	2205.83	2205.52	8.76	0.19%	0.989	2.08	0.54	0.98
NEW1175063	M4-05	M4-04A	138.00	15.0	2213.61	2205.89	2205.83	7.72	0.04%	0.985	1.98	0.66	-0.07
GMI4482379	M4-06	M4-05	239.12	15.0	2216.23	2206.17	2205.89	10.06	0.12%	0.980	1.83	0.62	0.57
GMI4482315	M4-07	M4-06	361.37	15.0	2212.70	2206.44	2206.17	6.26	0.07%	0.874	1.68	0.64	0.36
GMI4482314	M4-08	M4-07	353.75	15.0	2213.28	2207.08	2206.44	6.20	0.18%	0.790	1.83	0.45	1.13
GMI4482316	M4-09	M4-08	184.22	12.0	2215.74	2209.22	2207.08	6.52	1.16%	0.466	2.39	0.28	2.22
GMI4482305	M4-09AN	M4-08	349.64	12.0	2219.07	2210.69	2207.08	8.38	1.03%	0.308	1.64	0.24	2.23
GMI4481873	M4-09BN	M4-09AN	362.54	12.0	2217.98	2211.26	2210.69	6.72	0.16%	0.300	1.98	0.44	0.69
GMI4481876	M4-09CN	M4-09BN	473.16	12.0	2219.10	2212.31	2211.26	6.79	0.22%	0.282	1.57	0.33	0.89
GMI4481812	M4-09DN	M4-09CN	301.71	12.0	2221.29	2213.05	2212.31	8.24	0.25%	0.239	1.75	0.30	1.00
GMI4481813	M4-09EN	M4-09DN	305.54	12.0	2225.32	2213.66	2213.05	11.66	0.20%	0.206	1.68	0.29	0.96
GMI4481814	M4-09EN1	M4-09EN	170.25	12.0	2223.85	2214.10	2213.66	9.75	0.26%	0.059	0.76	0.15	1.12
GMI4482317	M4-10	M4-09	359.13	12.0	2219.59	2210.77	2209.22	8.82	0.43%	0.420	2.96	0.37	1.22
GMI4482326	M4-11	M4-10	181.26	12.0	2219.90	2211.34	2210.77	8.56	0.31%	0.178	1.37	0.24	1.22
GMI4482324	M4-12	M4-11	290.51	12.0	2220.86	2211.68	2211.34	9.18	0.12%	0.131	1.24	0.28	0.72
GMI4482048	M6-02	M6-01	100.57	12.0	2167.77	2160.97	2159.91	6.80	1.05%	0.061	1.96	0.11	2.50
GMI4482530	M6-03	M6-02	324.34	12.0	2171.18	2163.06	2160.97	8.12	0.64%	0.058	1.83	0.12	1.95
GMI4482531	M6-04	M6-03	331.15	12.0	2175.61	2163.91	2163.06	11.70	0.26%	0.055	1.32	0.15	1.21
GMI4482529	M6-05	M6-04	305.56	12.0	2175.78	2164.40	2163.91	11.38	0.16%	0.039	0.87	0.14	0.96
GMI4482519	M6-05AN	M6-05	252.75	12.0	2174.30	2164.94	2164.40	9.36	0.21%	0.036	0.95	0.12	1.12
GMI4482502	M6-05BN	M6-05AN	334.64	12.0	2173.32	2165.76	2164.94	7.56	0.25%	0.032	0.99	0.11	1.20
GMI4482503	M6-05CN	M6-05BN	325.87	12.0	2172.28	2166.36	2165.76	5.92	0.18%	0.030	0.92	0.12	1.04
GMI4480562	M7-01	M2-19	54.94	10.0	2160.02	2152.02	2151.33	8.00	1.26%	0.270	3.03	0.27	1.45
NEW107	M7-01A	STOR_44	37.53	12.0	2137.84	2126.65	2126.55	11.19	0.26%	0.051	1.31	0.52	1.22
GMI4483118	M7-01B	M7-01A	30.76	12.0	2137.89	2126.72	2126.28	11.17	1.43%	0.036	0.36	0.08	2.95
GMI4779338	MIL1-01	STOR_10	263.35	10.0	2131.91	2108.66	2107.85	23.25	0.31%	0.107	1.73	0.25	0.74

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4779343	MIL1-01A	MIL1-01	90.82	10.0	2131.59	2108.84	2108.66	22.75	0.20%	0.012	0.30	0.09	0.67
GMI4779342	MIL1-01B	MIL1-01A	360.49	10.0	2130.71	2110.16	2108.84	20.55	0.37%	0.011	0.77	0.08	0.92
GMI4779341	MIL1-01C	MIL1-01B	349.55	10.0	2130.82	2111.27	2110.16	19.55	0.32%	0.009	0.78	0.08	0.86
NEW1175046	MIL1-01CO	MIL1-01E	92.70	10.0	2131.29	2113.53	2113.25	17.76	0.30%	0.002	0.37	0.03	0.86
GMI4779340	MIL1-01D	MIL1-01C	349.93	10.0	2131.00	2112.38	2111.27	18.62	0.32%	0.007	0.66	0.09	0.86
GMI4779339	MIL1-01E	MIL1-01D	272.97	10.0	2131.29	2113.25	2112.38	18.04	0.32%	0.005	0.58	0.05	0.90
GMI4481189	RAM1-01	AEXT2-08	298.83	24.0	2184.45	2169.32	2168.41	15.13	0.30%	2.809	4.24	0.43	5.93
GMI4482261	RAM1-02	RAM1-01	366.23	24.0	2184.43	2170.53	2169.32	13.90	0.33%	2.806	3.63	0.38	6.30
GMI4482262	RAM1-03	RAM1-02	276.22	24.0	2185.93	2171.38	2170.53	14.55	0.31%	2.805	3.74	0.41	5.98
GMI4483808	RAM1-04	RAM1-03	398.54	24.0	2185.57	2171.67	2171.38	13.90	0.07%	2.752	2.71	0.59	1.52
GMI4483807	RAM1-05	RAM1-04	280.95	24.0	2186.24	2173.53	2171.67	12.71	0.66%	2.753	3.10	0.31	10.14
GMI4481702	RAM1-06	RAM1-05	380.75	24.0	2186.32	2174.83	2173.53	11.49	0.34%	2.753	4.22	0.40	6.50
GMI4481677	RAM1-07	RAM1-06	395.40	24.0	2187.72	2175.63	2174.83	12.09	0.20%	2.753	3.29	0.46	4.37
GMI4481676	RAM1-08	RAM1-07	406.01	24.0	2190.86	2176.71	2175.63	14.15	0.27%	2.754	3.30	0.40	5.42
GMI4481675	RAM1-09	RAM1-08	288.41	24.0	2192.80	2179.87	2176.71	12.93	1.10%	2.754	4.56	0.28	13.83
GMI4481674	RAM1-10	RAM1-09	405.80	24.0	2203.95	2181.12	2179.87	22.83	0.31%	2.754	4.34	0.42	6.04
GMI4481661	RAM1-11	RAM1-10	370.82	18.0	2196.99	2182.33	2181.12	14.66	0.33%	1.714	3.04	0.44	2.49
GMI4481660	RAM1-12	RAM1-11	275.97	18.0	2191.11	2183.11	2182.33	8.00	0.28%	1.714	3.27	0.49	2.20
GMI4481659	RAM1-13	RAM1-12	161.17	18.0	2198.99	2183.74	2183.11	15.25	0.39%	1.714	3.32	0.43	2.89
GMI4481658	RAM1-14	RAM1-13	364.87	18.0	2197.26	2184.96	2183.74	12.30	0.33%	1.713	3.47	0.46	2.54
GMI4481656	RAM1-15	RAM1-14	400.68	18.0	2194.28	2185.82	2184.96	8.46	0.21%	1.699	3.01	0.53	1.71
GMI4481655	RAM1-15A	RAM1-15	263.90	18.0	2193.36	2186.54	2185.82	6.82	0.27%	1.698	2.97	0.47	2.15
MSTR1175352	RAM1-16	RAM1-15A	136.62	18.0	2193.52	2186.86	2186.54	6.66	0.23%	1.697	2.98	0.53	1.84
GMI4481654	RAM1-17	RAM1-16	180.61	18.0	2194.53	2187.53	2186.86	7.00	0.37%	1.697	3.15	0.43	2.78
GMI4481653	RAM1-18	RAM1-17	370.91	18.0	2194.61	2188.47	2187.53	6.14	0.25%	1.696	3.24	0.51	2.01
GMI4481649	RAM1-19	RAM1-18	400.37	18.0	2195.91	2189.47	2188.47	6.44	0.25%	1.680	2.99	0.48	2.00
GMI4481648	RAM1-20	RAM1-19	156.35	21.0	2203.84	2189.84	2189.47	14.00	0.24%	1.680	2.81	0.41	3.72
GMI4480758	RAM1-21	RAM1-20	308.96	21.0	2206.86	2190.53	2189.84	16.33	0.22%	1.636	2.82	0.39	3.59
GMI4480759	RAM1-21A	RAM1-21	368.94	18.0	2204.51	2191.35	2190.53	13.17	0.22%	1.636	2.98	0.51	1.83
GMI4482229	RAM1-22	RAM1-21A	29.12	18.0	2203.74	2191.41	2191.35	12.33	0.22%	1.635	2.64	0.56	1.84
GMI4482230	RAM1-23	RAM1-22	251.00	18.0	2203.46	2192.06	2191.41	11.40	0.26%	1.175	2.22	0.38	2.57
GMI4482232	RAM1-23A	RAM1-23	119.78	18.0	2203.74	2192.44	2192.06	11.30	0.32%	1.156	2.86	0.38	2.99
GMI4482231	RAM1-24	RAM1-23A	333.22	18.0	2204.67	2193.51	2192.44	11.16	0.32%	1.156	2.97	0.36	3.01
GMI4482225	RAM1-25	RAM1-24	328.68	18.0	2204.99	2194.45	2193.51	10.54	0.29%	1.156	2.96	0.39	2.78
GMI4482212	RAM1-26	RAM1-25	352.62	18.0	2208.33	2197.65	2194.45	10.68	0.91%	1.156	3.51	0.27	5.85
GMI4482211	RAM1-27	RAM1-26	248.54	18.0	2208.11	2198.52	2197.65	9.59	0.35%	1.156	3.54	0.38	3.20

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483815	RAM1-27A	RAM1-27	331.59	18.0	2209.75	2199.09	2198.52	10.66	0.17%	1.155	2.55	0.46	1.90
GMI4483814	RAM1-28	RAM1-27A	70.19	18.0	2211.44	2199.24	2199.09	12.20	0.21%	1.151	2.29	0.45	2.24
GMI4482164	RAM1-29	RAM1-28	404.76	18.0	2216.05	2199.86	2199.24	16.19	0.15%	1.151	2.31	0.45	1.73
GMI4482155	RAM1-30	RAM1-29	208.32	18.0	2214.40	2200.11	2199.86	14.29	0.12%	1.148	2.18	0.49	1.40
GMI4482156	RAM1-31	RAM1-30	209.59	18.0	2214.95	2200.67	2200.11	14.28	0.27%	1.148	2.42	0.38	2.65
GMI4482157	RAM1-31A	RAM1-31	18.23	18.0	2215.05	2200.70	2200.67	14.35	0.16%	1.146	2.57	0.45	1.84
GMI4482158	RAM1-32	RAM1-31A	363.28	18.0	2211.24	2201.10	2200.70	10.14	0.11%	0.990	2.01	0.46	1.45
GMI4481562	RAM1-33	RAM1-32	272.10	18.0	2211.40	2201.64	2201.10	9.76	0.20%	0.990	2.19	0.38	2.29
GMI4481561	RAM1-34	RAM1-33	300.66	18.0	2213.68	2201.75	2201.64	11.93	0.04%	0.990	1.90	0.55	0.42
GMI4481560	RAM1-35	RAM1-34	269.94	18.0	2215.47	2202.12	2201.75	13.35	0.14%	0.986	1.75	0.44	1.74
GMI4481555	RAM1-36	RAM1-35	366.11	18.0	2215.59	2202.73	2202.12	12.86	0.17%	0.988	2.20	0.39	2.01
GMI4481556	RAM1-36A	RAM1-36	352.85	10.0	2216.10	2210.34	2202.73	5.76	2.16%	0.170	1.19	0.19	2.08
GMI4481557	RAM1-36B	RAM1-36A	337.87	10.0	2217.55	2210.83	2210.34	6.72	0.15%	0.149	1.65	0.42	0.44
GMI4481558	RAM1-36C	RAM1-36B	315.16	10.0	2224.97	2211.70	2210.83	13.27	0.28%	0.149	1.33	0.29	0.66
GMI4480841	RAM1-36D	RAM1-36C	325.10	10.0	2231.53	2212.85	2211.70	18.68	0.35%	0.141	1.77	0.27	0.77
GMI4481527	RAM1-37	RAM1-36	373.17	18.0	2216.79	2203.42	2202.73	13.37	0.18%	0.854	2.19	0.35	2.31
GMI4480750	RAM1-38	RAM1-37	260.42	18.0	2217.55	2204.19	2203.42	13.36	0.30%	0.854	2.56	0.31	3.15
GMI4480751	RAM1-38A	RAM1-38	205.81	12.0	2215.11	2204.51	2204.19	10.60	0.16%	0.170	1.02	0.28	0.81
NEW398	RAM1-38B	RAM1-38A	243.00	12.0	2218.35	2206.16	2204.51	12.19	0.68%	0.170	1.84	0.19	1.89
GMI4481485	RAM1-38K1	RAM1-38K	88.02	10.0	2219.48	2211.65	2210.88	7.83	0.87%	0.056	1.21	0.12	1.71
GMI4481484	RAM1-38K2	RAM1-38K1	266.31	10.0	2220.40	2212.79	2211.65	7.61	0.43%	0.055	1.69	0.17	0.89
GMI4481483	RAM1-38K2A	RAM1-38K2	351.43	10.0	2220.64	2213.65	2212.79	6.99	0.24%	0.013	0.45	0.10	0.62
GMI4481482	RAM1-38K2B	RAM1-38K2A	347.06	10.0	2223.63	2214.75	2213.65	8.88	0.32%	0.009	0.64	0.07	0.86
GMI4481478	RAM1-38K3	RAM1-38K2	351.27	10.0	2221.03	2213.76	2212.79	7.27	0.28%	0.041	1.11	0.15	0.77
GMI4483797	RAM1-38K6	RAM1-38K4A	327.09	10.0	2223.00	2216.88	2216.18	6.12	0.21%	0.009	0.43	0.08	0.70
GMI4483795	RAM1-38K61	RAM1-38K5	351.34	10.0	2225.97	2217.37	2216.44	8.60	0.26%	0.020	0.26	0.17	0.77
GMI4483798	RAM1-38K7	RAM1-38K6	268.92	10.0	2221.27	2217.44	2216.88	3.83	0.21%	0.007	0.62	0.07	0.69
GMI4481489	RAM1-38L	RAM1-38K	144.00	12.0	2218.66	2211.26	2210.88	7.40	0.26%	0.067	1.11	0.16	1.22
GMI4481488	RAM1-38M	RAM1-38L	350.35	12.0	2221.76	2212.37	2211.26	9.39	0.32%	0.063	1.32	0.14	1.34
GMI4481487	RAM1-38N	RAM1-38M	349.39	12.0	2227.21	2213.50	2212.37	13.71	0.32%	0.059	1.35	0.14	1.36
GMI4481486	RAM1-38O	RAM1-38N	241.83	12.0	2227.35	2214.28	2213.50	13.07	0.32%	0.059	1.37	0.14	1.36
GMI4480752	RAM1-39	RAM1-38	105.85	10.0	2218.14	2210.36	2204.19	7.78	5.83%	0.685	4.76	0.29	3.02
GMI4481529	RAM1-40	RAM1-39	414.48	10.0	2220.85	2212.48	2210.36	8.37	0.51%	0.662	4.02	0.66	0.44
GMI4481528	RAM1-41	RAM1-40	430.90	10.0	2223.56	2214.84	2212.48	8.72	0.55%	0.664	2.99	0.55	0.47
GMI4481493	RAM1-42	RAM1-41	420.25	10.0	2225.99	2216.78	2214.84	9.21	0.46%	0.664	3.16	0.60	0.38
GMI4481491	RAM1-43	RAM1-42	251.00	8.0	2228.39	2218.67	2216.88	9.72	0.71%	0.497	3.37	0.63	0.22

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481476	RAM1-43A	RAM1-43	250.20	8.0	2229.17	2220.47	2218.67	8.70	0.72%	0.497	3.52	0.57	0.30
GMI4481475	RAM1-43B	RAM1-43A	350.51	8.0	2231.26	2221.87	2220.47	9.39	0.40%	0.492	2.58	1.28	-0.04
GMI4480928	RAM1-44	RAM1-43B	350.58	8.0	2232.35	2225.89	2221.87	6.46	1.15%	0.491	2.66	0.52	0.41
GMI4480929	RAM1-45	RAM1-44	349.74	8.0	2238.10	2231.72	2225.89	6.38	1.67%	0.428	4.01	0.43	0.66
GMI4481464	RAM1-45A	RAM1-45	348.92	8.0	2244.68	2233.46	2231.72	11.22	0.50%	0.428	3.27	0.69	0.17
GMI4481463	RAM1-46	RAM1-45A	350.15	8.0	2246.16	2235.74	2233.46	10.42	0.65%	0.429	2.86	0.57	0.25
GMI4481462	RAM1-46A	RAM1-46	334.68	8.0	2244.06	2237.62	2235.74	6.44	0.56%	0.431	3.05	0.63	0.20
GMI4480893	RAM1-46B	RAM1-46B1	287.00	10.0	2257.58	2245.87	2237.70	11.71	2.85%	0.383	2.80	0.26	2.21
GMI4480892	RAM1-46C	RAM1-46B	255.11	10.0	2267.32	2248.07	2245.87	19.25	0.86%	0.383	3.86	0.39	1.04
GMI4481465	RAM1-46D	RAM1-46C	242.13	10.0	2270.32	2249.62	2248.07	20.70	0.64%	0.381	3.01	0.39	0.85
GMI4481466	RAM1-46E	RAM1-46D	242.14	10.0	2271.49	2251.27	2249.62	20.22	0.68%	0.380	3.05	0.38	0.89
GMI4481467	RAM1-46F	RAM1-46E	243.32	10.0	2271.50	2252.48	2251.27	19.02	0.50%	0.378	2.86	0.42	0.70
GMI4483241	RAM1-46F1	RAM1-46F	277.09	10.0	2276.70	2253.80	2252.48	22.90	0.47%	0.201	1.84	0.30	0.86
GMI4483242	RAM1-46F2	RAM1-46F1	192.81	10.0	2277.60	2254.71	2253.80	22.89	0.48%	0.201	2.28	0.30	0.86
GMI4483243	RAM1-46F3	RAM1-46F2	280.63	10.0	2276.70	2256.04	2254.71	20.66	0.47%	0.195	2.23	0.29	0.86
GMI4483244	RAM1-46F4	RAM1-46F3	271.81	10.0	2275.90	2257.34	2256.04	18.57	0.47%	0.194	2.26	0.29	0.86
GMI4481438	RAM1-46G	RAM1-46F	161.19	10.0	2271.95	2253.17	2252.48	18.78	0.43%	0.175	1.62	0.28	0.83
GMI4481437	RAM1-46H	RAM1-46G	258.82	10.0	2272.08	2254.08	2253.17	18.00	0.35%	0.158	1.92	0.29	0.75
GMI4481434	RAM1-46I	RAM1-46H	140.32	10.0	2273.01	2254.91	2254.08	18.10	0.59%	0.137	1.90	0.23	1.04
GMI4481422	RAM1-46J	RAM1-46I	88.53	10.0	2273.43	2255.33	2254.91	18.10	0.47%	0.134	2.07	0.25	0.92
CDT-1051	REL-0	MIL1-01E	91.25	10.0	2133.41	2113.86	2113.40	19.55	0.51%	0.000	0.00	0.00	1.09
CDT-1049	REL-1	REL-0	100.48	10.0	2133.41	2116.71	2113.86	16.70	2.83%	0.000	0.00	0.00	2.58
CDT-1027	REL-10	REL-9	121.83	10.0	2140.02	2120.97	2120.50	19.05	0.39%	0.000	0.00	0.00	0.96
CDT-1025	REL-11	REL-10	47.67	10.0	2141.24	2121.19	2120.97	20.05	0.45%	0.000	0.00	0.00	1.03
CDT-1023	REL-12	REL-11	198.86	10.0	2143.48	2121.93	2121.19	21.55	0.37%	0.000	0.00	0.00	0.94
CDT-1047	REL-2	REL-1	216.75	10.0	2135.58	2117.33	2116.71	18.25	0.29%	0.000	0.00	0.00	0.82
CDT-1045	REL-3	REL-2	97.54	10.0	2134.50	2117.65	2117.33	16.85	0.33%	0.000	0.00	0.00	0.88
CDT-1043	REL-4	REL-3	111.96	10.0	2133.87	2118.17	2117.65	15.70	0.46%	0.000	0.00	0.00	1.05
CDT-1041	REL-5	REL-4	54.20	10.0	2133.93	2118.48	2118.17	15.45	0.58%	0.000	0.00	0.00	1.16
CDT-1039	REL-5A	REL-5	185.23	10.0	2133.01	2118.91	2118.48	14.10	0.23%	0.000	0.00	0.00	0.74
CDT-1037	REL-6	REL-5A	46.29	10.0	2133.68	2118.18	2118.91	15.50	-1.58%	0.000	0.00	0.00	1.93
CDT-1035	REL-7	REL-6	87.38	10.0	2134.76	2119.76	2118.18	15.00	1.81%	0.000	0.00	0.00	2.06
CDT-1033	REL-8	REL-7	56.41	10.0	2136.69	2119.69	2119.76	17.00	-0.13%	0.000	0.00	0.00	0.54
CDT-1031	REL-8A	REL-8	184.70	10.0	2138.21	2120.16	2119.69	18.05	0.25%	0.000	0.00	0.00	0.77
CDT-1029	REL-9	REL-8A	49.39	10.0	2138.50	2120.50	2120.16	18.00	0.69%	0.000	0.00	0.00	1.28
GMI4481665	REX1-01	RAM1-10	395.04	18.0	2209.40	2198.41	2181.12	10.99	4.38%	1.080	2.79	0.18	14.31

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481664	REX1-02	REX1-01	399.60	18.0	2211.70	2200.06	2198.41	11.64	0.41%	1.075	4.16	0.38	3.65
GMI4481663	REX1-03	REX1-02	369.71	18.0	2213.20	2201.10	2200.06	12.10	0.28%	1.049	2.78	0.36	2.85
GMI4481662	REX1-04	REX1-03	316.19	18.0	2213.78	2201.93	2201.10	11.85	0.26%	1.046	2.78	0.37	2.72
GMI4482135	REX1-04A	REX1-04	382.60	10.0	2217.14	2208.58	2201.93	8.56	1.74%	0.048	1.18	0.11	1.97
GMI4482136	REX1-04B	REX1-04A	192.02	10.0	2220.15	2209.46	2208.58	10.69	0.46%	0.046	1.72	0.15	0.99
GMI4482137	REX1-04C	REX1-04B	91.11	10.0	2221.59	2209.91	2209.46	11.68	0.49%	0.029	1.05	0.11	1.05
GMI4482138	REX1-04D	REX1-04C	117.44	10.0	2223.96	2215.68	2209.91	8.28	4.91%	0.013	1.09	0.05	3.39
GMI4482139	REX1-04E	REX1-04D	399.46	10.0	2240.52	2235.73	2215.68	4.79	5.02%	0.011	2.08	0.04	3.43
GMI4482140	REX1-04F	REX1-04E	222.78	10.0	2246.68	2239.63	2235.73	7.05	1.75%	0.009	1.56	0.05	2.02
NEW6755945	REX1-04G	REX1-04F	237.00	10.0	2250.48	2243.78	2239.63	6.70	1.75%	0.007	1.18	0.04	2.02
NEW8483931	REX1-04H	REX1-04G	259.00	10.0	2255.43	2248.31	2243.78	7.11	1.75%	0.005	1.05	0.04	2.03
NEW3250837	REX1-04I	REX1-04H	239.00	10.0	2257.91	2252.50	2248.31	5.41	1.75%	0.002	0.72	0.03	2.03
GMI4482659	REX1-05	REX1-04	341.41	15.0	2221.66	2210.30	2201.93	11.36	2.45%	1.009	4.06	0.26	6.07
GMI4482711	REX1-06	REX1-05	342.08	15.0	2234.09	2221.69	2210.30	12.40	3.33%	0.999	6.63	0.24	7.26
GMI4482673	REX1-07	REX1-06	184.38	15.0	2237.03	2227.51	2221.69	9.52	3.16%	0.995	6.81	0.24	7.04
GMI4482674	REX1-08	REX1-07	82.48	15.0	2239.16	2229.45	2227.51	9.71	2.35%	0.977	5.94	0.28	5.96
GMI4482675	REX1-09	REX1-08	209.57	15.0	2242.41	2230.69	2229.45	11.72	0.59%	0.977	4.10	0.40	2.50
GMI4482668	REX1-10	REX1-09	350.13	15.0	2246.21	2236.59	2230.69	9.63	1.68%	0.974	4.10	0.28	4.90
GMI4482667	REX1-11	REX1-10	351.59	15.0	2252.11	2239.51	2236.59	12.60	0.83%	0.972	4.20	0.34	3.15
GMI4482625	REX1-12	REX1-11	225.91	15.0	2251.49	2239.94	2239.51	11.55	0.19%	0.971	2.86	0.55	1.00
GMI4482663	REX1-13	REX1-12	300.07	15.0	2249.15	2240.65	2239.94	8.51	0.23%	0.970	2.40	0.47	1.22
GMI4482664	REX1-14	REX1-13	270.03	15.0	2251.47	2241.08	2240.65	10.39	0.16%	0.969	2.39	0.55	0.85
GMI4480745A	REX1-14A	REX1-14	99.79	15.0	2252.69	2241.29	2241.08	11.40	0.21%	0.968	2.22	0.53	1.11
GMI4480745	REX1-15	REX1-14A	135.22	15.0	2253.28	2241.70	2241.29	11.58	0.30%	0.967	2.54	0.44	1.52
GMI4480744	REX1-16	REX1-15	400.72	15.0	2255.81	2242.40	2241.70	13.41	0.17%	0.967	2.47	0.55	0.92
GMI4480743	REX1-17	REX1-16	400.01	15.0	2257.31	2242.99	2242.40	14.32	0.15%	0.968	2.18	0.55	0.77
GMI4480742	REX1-18	REX1-17	398.85	15.0	2255.14	2243.62	2242.99	11.52	0.16%	0.969	2.23	0.53	0.83
GMI4480741	REX1-19	REX1-18	286.21	15.0	2253.40	2244.13	2243.62	9.27	0.18%	0.969	2.30	0.52	0.94
GMI4480740	REX1-20	REX1-19	288.15	15.0	2254.01	2245.08	2244.13	8.93	0.33%	0.969	2.65	0.42	1.62
GMI4480739	REX1-21	REX1-20	399.42	15.0	2254.56	2245.33	2245.08	9.23	0.06%	0.965	2.08	0.71	0.17
GMI4480738	REX1-22	REX1-21	214.94	15.0	2255.89	2246.04	2245.33	9.85	0.33%	0.942	2.04	0.42	1.66
GMI4480819	REX1-23	REX1-22	279.77	15.0	2255.58	2246.68	2246.04	8.90	0.23%	0.926	2.66	0.49	1.24
GMI4480820	REX1-23A	REX1-23	133.26	12.0	2256.07	2247.05	2246.68	9.02	0.28%	0.474	1.81	0.42	0.84
GMI4480821	REX1-23B	REX1-23A	141.01	12.0	2257.12	2247.53	2247.05	9.59	0.34%	0.473	2.42	0.40	0.98
GMI4480822	REX1-23C	REX1-23B	117.53	12.0	2257.21	2247.96	2247.53	9.25	0.37%	0.461	2.45	0.39	1.05
GMI4480823	REX1-23D	REX1-23C	296.41	12.0	2260.05	2248.76	2247.96	11.29	0.27%	0.461	2.34	0.43	0.84

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4480824	REX1-23E	REX1-23D	312.82	12.0	2260.68	2249.55	2248.76	11.13	0.25%	0.455	2.21	0.42	0.80
GMI4483181	REX1-23F	REX1-23E	231.66	12.0	2258.70	2249.80	2249.55	8.90	0.11%	0.451	1.82	0.56	0.37
GMI4483182	REX1-23G	REX1-23F	161.10	12.0	2259.90	2250.20	2249.80	9.70	0.25%	0.450	1.83	0.42	0.79
GMI4483183	REX1-23H	REX1-23G	156.84	12.0	2261.10	2250.68	2250.20	10.42	0.31%	0.449	2.30	0.40	0.93
GMI4483184	REX1-23I	REX1-23H	261.89	12.0	2263.10	2251.22	2250.68	11.88	0.21%	0.431	2.09	0.45	0.70
GMI4483185	REX1-23J	REX1-23I	393.76	12.0	2263.10	2252.24	2251.22	10.86	0.26%	0.430	2.09	0.40	0.84
GMI4483195	REX1-23K	REX1-23J	398.97	12.0	2267.30	2253.10	2252.24	14.20	0.22%	0.430	2.12	0.44	0.73
GMI4483200	REX1-23K1	REX1-23K	241.86	12.0	2263.70	2253.94	2253.10	9.76	0.35%	0.404	2.14	0.36	1.07
NEW1175170	REX1-23K10	REX1-23K9	299.32	10.0	2276.14	2260.44	2259.34	15.70	0.37%	0.195	2.13	0.32	0.74
NEW1175169	REX1-23K11	REX1-23K10	207.27	10.0	2276.85	2261.33	2260.44	15.52	0.43%	0.194	2.09	0.64	0.81
GMI4483201	REX1-23K2	REX1-23K1	176.62	12.0	2264.60	2254.18	2253.94	10.42	0.14%	0.403	1.94	0.50	0.52
GMI4483435	REX1-23K3	REX1-23K2	252.44	12.0	2265.40	2254.88	2254.18	10.52	0.28%	0.388	1.83	0.37	0.93
GMI4483434	REX1-23K4	REX1-23K3	239.83	12.0	2267.30	2255.46	2254.88	11.84	0.24%	0.388	2.14	0.40	0.84
GMI4483202	REX1-23K5	REX1-23K4	278.78	12.0	2267.50	2256.10	2255.46	11.40	0.23%	0.376	2.02	0.39	0.82
GMI4483210	REX1-23K6	REX1-23K5	293.16	12.0	2268.40	2256.85	2256.10	11.55	0.26%	0.333	1.96	0.35	0.93
GMI4483211	REX1-23K7	REX1-23K6	307.28	12.0	2268.30	2257.42	2256.85	10.88	0.19%	0.333	1.90	0.41	0.74
GMI4483212	REX1-23K8	REX1-23K7	211.44	12.0	2269.90	2258.00	2257.42	11.90	0.27%	0.332	1.92	0.34	0.97
MSTR1175350	REX1-23K9	REX1-23KA	117.96	10.0	2275.99	2259.34	2258.77	16.65	0.48%	0.195	1.97	0.29	0.87
MSTR1175353	REX1-23KA	REX1-23K8	174.14	12.0	2272.73	2258.77	2258.00	13.96	0.44%	0.329	2.32	0.30	1.33
4666	REX1-23KN	REX1-23KM	209.72	10.0	2271.79	2260.96	2260.13	10.83	0.40%	0.031	0.82	0.12	0.93
4665	REX1-23KP	REX1-23KN	264.62	10.0	2274.56	2261.66	2260.96	12.90	0.26%	0.029	1.09	0.14	0.76
4664	REX1-23KQ	REX1-23KP	164.95	10.0	2275.98	2262.12	2261.66	13.86	0.28%	0.028	1.01	0.13	0.78
4663	REX1-23KR	REX1-23KQ	160.38	10.0	2276.78	2263.07	2262.12	13.71	0.59%	0.027	1.17	0.10	1.15
4662	REX1-23KS	REX1-23KR	309.57	10.0	2277.89	2263.99	2263.07	13.90	0.30%	0.025	1.11	0.13	0.81
4661	REX1-23KT	REX1-23KS	204.76	10.0	2278.71	2264.83	2263.99	13.88	0.41%	0.024	1.03	0.11	0.96
4659	REX1-23KV	REX1-23KY	183.01	10.0	2280.37	2266.60	2265.77	13.77	0.45%	0.020	1.13	0.10	1.01
4660	REX1-23KY	REX1-23KT	193.86	10.0	2278.97	2265.77	2264.83	13.20	0.48%	0.022	1.14	0.10	1.05
GMI4483427	REX1-24	REX1-23	175.38	15.0	2259.70	2247.00	2246.68	12.70	0.18%	0.457	1.54	0.33	1.48
GMI4483168	REX1-25	REX1-24	131.37	15.0	2258.80	2247.24	2247.00	11.56	0.18%	0.457	1.93	0.35	1.48
GMI4483169	REX1-26	REX1-25	246.71	15.0	2256.49	2247.69	2247.24	8.80	0.18%	0.445	1.89	0.33	1.49
GMI4483170	REX1-27	REX1-26	199.04	15.0	2261.40	2248.08	2247.69	13.32	0.19%	0.438	1.95	0.32	1.56
GMI4484044	REX1-28	REX1-27	143.40	15.0	2259.85	2248.36	2248.08	11.49	0.19%	0.437	1.94	0.33	1.56
GMI4484043	REX1-29	REX1-28	101.80	15.0	2261.21	2248.63	2248.36	12.58	0.26%	0.434	2.03	0.30	1.90
GMI4484042	REX1-29A	REX1-29	153.42	15.0	2264.25	2248.94	2248.63	15.31	0.20%	0.077	0.66	0.13	1.96
GMI4484041	REX1-29B	REX1-29A	170.24	12.0	2265.30	2249.39	2248.94	15.91	0.26%	0.075	1.36	0.17	1.21
GMI4484040	REX1-29C	REX1-29B	199.60	12.0	2263.53	2249.98	2249.39	13.55	0.30%	0.061	1.23	0.15	1.30

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4484039	REX1-29D	REX1-29C	290.03	12.0	2264.02	2250.93	2249.98	13.09	0.33%	0.035	0.95	0.11	1.39
GMI4484038	REX1-29E	REX1-29D	251.13	12.0	2261.43	2251.82	2250.93	9.61	0.35%	0.032	1.12	0.10	1.45
GMI4484052	REX1-30	REX1-29	284.90	12.0	2258.00	2249.30	2248.63	8.70	0.24%	0.376	2.09	0.40	0.83
GMI4484051	REX1-31	REX1-30	189.67	12.0	2257.15	2249.83	2249.30	7.32	0.28%	0.369	2.10	0.36	0.95
GMI4484050	REX1-32	REX1-31	323.21	12.0	2259.66	2250.55	2249.83	9.11	0.22%	0.368	2.07	0.40	0.81
GMI4484049	REX1-33	REX1-32	179.27	12.0	2259.34	2251.14	2250.55	8.20	0.33%	0.365	2.11	0.34	1.07
GMI4484046	REX1-34	REX1-33	294.54	12.0	2262.32	2251.86	2251.14	10.46	0.24%	0.355	2.12	0.39	0.88
GMI4484032	REX1-35	REX1-34	226.90	12.0	2262.17	2252.33	2251.86	9.84	0.20%	0.345	1.91	0.39	0.79
GMI4779229	REX1-36	REX1-35	95.56	12.0	2262.27	2252.92	2252.33	9.35	0.63%	0.344	2.31	0.29	1.62
GMI4779228	REX1-37	REX1-36	131.40	12.0	2263.34	2253.20	2252.92	10.15	0.21%	0.344	2.11	0.42	0.79
GMI4779227	REX1-38	REX1-37	305.40	12.0	2263.14	2253.94	2253.20	9.20	0.24%	0.330	1.85	0.35	0.90
NEW279	REX1-38B	REX1-38	185.04	12.0	2263.24	2254.48	2253.94	8.76	0.29%	0.070	0.73	0.16	1.28
NEW278	REX1-38C	REX1-38B	147.23	12.0	2264.34	2254.82	2254.48	9.52	0.23%	0.068	1.29	0.17	1.13
NEW282	REX1-38C4	REX1-38C	306.21	12.0	2266.63	2255.50	2254.82	11.13	0.22%	0.043	0.91	0.13	1.13
NEW1175048	REX1-38C4A	REX1-38C4	184.39	12.0	2268.28	2255.91	2255.50	12.36	0.22%	0.031	0.88	0.15	1.15
4617	REX1-38C4B	REX1-38C4A	99.77	12.0	2269.17	2256.34	2255.88	12.83	0.47%	0.028	0.84	0.09	1.67
4618	REX1-38C4C	REX1-38C4B	302.75	12.0	2271.62	2257.03	2256.34	14.59	0.23%	0.017	0.79	0.08	1.17
4619	REX1-38C4D	REX1-38C4C	248.70	12.0	2273.15	2257.69	2257.03	15.46	0.27%	0.014	0.76	0.07	1.27
GMI4779242	REX1-39	REX1-38	181.04	10.0	2261.27	2254.62	2253.94	6.65	0.38%	0.255	2.01	0.36	0.69
GMI4779241	REX1-40	REX1-39	178.43	10.0	2260.47	2255.07	2254.62	5.40	0.25%	0.254	2.00	0.42	0.52
GMI4779240	REX1-41	REX1-40	178.19	10.0	2262.23	2255.58	2255.07	6.65	0.29%	0.252	1.91	0.38	0.57
GMI4779239	REX1-42	REX1-41	106.99	10.0	2263.13	2255.93	2255.58	7.20	0.33%	0.248	2.04	0.37	0.63
GMI4779238	REX1-43	REX1-42	106.84	10.0	2264.08	2256.28	2255.93	7.80	0.33%	0.247	2.05	0.37	0.63
GMI4779237	REX1-44	REX1-43	112.41	10.0	2264.97	2256.47	2256.28	8.50	0.17%	0.246	1.76	0.46	0.39
NEW1175019	REX1-45	REX1-44	295.20	10.0	2263.24	2257.35	2256.47	5.89	0.30%	0.196	1.51	0.33	0.64
NEW1174981	REX1-46	REX1-45	365.01	10.0	2266.15	2258.13	2257.35	8.02	0.21%	0.156	1.59	0.32	0.56
NEW1174980	REX1-47	REX1-46	307.36	10.0	2265.75	2258.82	2258.13	6.93	0.22%	0.154	1.61	0.31	0.57
NEW1174979	REX1-48	REX1-47	237.11	10.0	2267.63	2259.39	2258.82	8.24	0.24%	0.151	1.63	0.31	0.60
NEW1174978	REX1-49	REX1-48	184.08	10.0	2269.10	2259.93	2259.39	9.17	0.29%	0.148	1.71	0.29	0.68
NEW1174977	REX1-50	REX1-49	185.95	10.0	2269.96	2260.53	2259.93	9.43	0.32%	0.135	1.70	0.27	0.74
NEW1174976	REX1-51	REX1-50	124.53	10.0	2268.63	2261.06	2260.53	7.57	0.43%	0.133	1.87	0.25	0.87
GMI4483466	RIV1-02	FG1-01	31.65	24.0	2133.74	2121.69	2119.31	12.05	7.53%	4.552	3.66	0.22	38.96
GMI4483465	RIV1-03	RIV1-02	290.65	24.0	2138.41	2122.49	2121.69	15.92	0.27%	4.552	4.22	0.58	3.75
GMI4483464	RIV1-03A	RIV1-03B	10.59	24.0	2135.06	2122.99	2122.49	12.07	4.73%	4.555	2.59	0.77	19.29
4852	RIV1-03B	RIV1-03C	45.77	24.0	2135.20	2122.75	2122.60	12.45	0.33%	4.554	2.41	0.86	4.51
4853	RIV1-03C	RIV1-03D	39.30	24.0	2138.35	2122.60	2122.60	15.75	0.00%	4.554	2.42	0.90	-3.76

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
4854	RIV1-03D	RIV1-03E	52.87	24.0	2139.00	2122.60	2122.79	16.40	-0.36%	4.554	2.77	0.85	4.94
4855	RIV1-03E	RIV1-03F	33.88	24.0	2138.19	2122.79	2122.63	15.40	0.47%	4.554	3.17	0.66	6.33
4856	RIV1-03F	RIV1-03	99.22	24.0	2138.18	2122.63	2122.49	15.55	0.14%	4.554	3.40	0.67	1.40
NEW1175256	RIV1-04	RIV1-03A	26.84	24.0	2135.08	2123.27	2122.99	11.81	1.06%	4.556	3.70	0.66	11.71
GMI4483463	RIV1-05	RIV1-04	514.27	24.0	2137.11	2124.54	2123.27	12.57	0.25%	4.562	3.62	0.55	3.30
GMI4483462	RIV1-06	RIV1-05	354.89	24.0	2135.77	2125.48	2124.54	10.29	0.26%	4.565	3.93	0.57	3.58
GMI4483461	RIV1-07	RIV1-06	361.36	24.0	2135.24	2126.35	2125.48	8.89	0.24%	4.566	3.78	0.58	3.21
GMI4483460	RIV1-08	RIV1-07	53.94	24.0	2136.25	2126.70	2126.35	9.55	0.64%	4.566	4.01	0.51	8.19
GMI4483459	RIV1-09	RIV1-08	216.12	24.0	2137.02	2127.31	2126.70	9.72	0.28%	4.567	4.04	0.57	3.85
GMI4483458	RIV1-10	RIV1-09	408.22	24.0	2151.25	2128.25	2127.31	23.00	0.23%	4.568	3.73	0.59	3.03
GMI4483457	RIV1-11	RIV1-10	398.99	24.0	2149.09	2129.31	2128.25	19.78	0.26%	4.570	3.83	0.55	3.59
GMI4483456	RIV1-12	RIV1-11	401.40	24.0	2146.11	2130.33	2129.31	15.78	0.26%	4.572	3.90	0.57	3.43
GMI4483455	RIV1-13	RIV1-12	399.80	24.0	2139.74	2131.32	2130.33	8.42	0.25%	4.574	3.81	0.57	3.29
GMI4483454	RIV1-14	RIV1-13	395.68	24.0	2139.38	2132.51	2131.32	6.87	0.30%	4.576	3.99	0.53	4.11
GMI4483453	RIV1-15	RIV1-14	466.24	24.0	2139.82	2133.49	2132.51	6.33	0.21%	4.577	3.81	0.62	2.69
GMI4483452	RIV1-16	RIV1-15	423.55	24.0	2140.70	2134.55	2133.49	6.15	0.25%	4.581	3.69	0.56	3.34
GMI4483451	RIV1-17	RIV1-16	434.68	24.0	2143.90	2135.73	2134.55	8.17	0.27%	4.584	3.96	0.55	3.67
GMI4483450	RIV1-17A	RIV1-17	104.19	24.0	2146.72	2136.08	2135.73	10.64	0.34%	4.554	3.87	0.68	4.64
4873	RIV1-18	RIV1-17A	13.29	24.0	2149.68	2136.08	2135.73	13.60	2.66%	4.554	3.29	0.61	15.55
GMI4483449	RIV1-19	RIV1-18	421.70	24.0	2148.83	2137.24	2136.08	11.59	0.28%	4.542	3.79	0.53	3.77
NEW348	RIV1-20	RIV1-19	140.88	24.0	2146.54	2137.57	2137.24	8.97	0.23%	4.541	3.78	0.61	3.11
GMI4483448	RIV1-21	RIV1-20	260.87	24.0	2146.09	2138.34	2137.57	7.75	0.29%	4.477	3.72	0.54	4.12
GMI4483447	RIV1-21A	RIV1-21	274.68	24.0	2145.16	2138.97	2138.34	6.19	0.23%	4.477	3.78	0.60	3.10
NEW370	RIV1-22	RIV1-21A	124.01	24.0	2146.38	2139.39	2138.97	6.99	0.34%	4.426	3.66	0.56	4.81
GMI4483446	RIV1-23	RIV1-22	398.65	24.0	2147.91	2140.41	2139.39	7.50	0.25%	4.429	3.83	0.56	3.58
GMI4483436	RIV1-24	RIV1-23	399.94	24.0	2148.54	2141.39	2140.41	7.15	0.25%	4.432	3.79	0.57	3.43
GMI4483443	RIV1-24A	RIV1-24	192.50	24.0	2148.88	2141.78	2141.39	7.11	0.20%	4.432	3.53	0.62	2.62
NEW369	RIV1-24C	RIV1-24A	85.17	24.0	2148.31	2142.12	2141.78	6.19	0.40%	4.427	3.52	0.57	5.60
4797	RIV1-25	RIV1-24C	122.34	24.0	2148.68	2142.35	2142.12	6.33	0.19%	4.429	3.48	0.63	2.50
GMI4483442	RIV1-25A	RIV1-25	285.33	24.0	2149.86	2143.01	2142.35	6.85	0.23%	4.431	3.43	0.58	3.19
NEW1175067	RIV1-26	RIV1-25A	111.96	24.0	2148.52	2143.36	2143.01	5.16	0.31%	4.411	3.64	0.57	4.45
GMI4483441	RIV1-27	RIV1-26	384.30	24.0	2149.01	2144.40	2143.36	4.61	0.27%	4.416	3.82	0.54	3.84
GMI4483440	RIV1-28	RIV1-27	281.08	24.0	2151.27	2145.29	2144.40	5.98	0.31%	4.417	4.04	0.53	4.48
NEW349	RIV1-28A	RIV1-28	17.42	24.0	2151.14	2145.46	2145.29	5.68	1.02%	4.417	4.00	0.55	11.41
GMI4483439	RIV1-28B	RIV1-28A	298.09	24.0	2158.95	2146.11	2145.46	12.84	0.22%	4.417	3.68	0.66	2.96
4570	RIV1-29	RIV1-28B	43.61	24.0	2159.91	2146.11	2145.46	13.80	1.48%	4.418	3.07	0.67	4.20

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483438	RIV1-30	RIV1-29	247.99	24.0	2158.99	2146.73	2146.11	12.26	0.25%	4.421	3.32	0.58	3.49
NEW368	RIV1-31	RIV1-30	339.80	24.0	2160.97	2147.41	2146.73	13.55	0.20%	4.428	3.61	0.59	2.99
NEW346	RIV1-32	RIV1-31	33.03	24.0	2158.78	2147.50	2147.41	11.28	0.27%	4.239	3.23	0.66	1.13
GMI4483437	RIV1-33	RIV1-32	26.94	24.0	2158.75	2147.65	2147.50	11.09	0.56%	3.463	2.57	0.62	8.04
GMI4481630	RX1-01	RAM1-22	335.57	12.0	2202.45	2193.70	2191.41	8.75	0.68%	0.564	1.93	0.36	1.50
GMI4481632	RX1-02	RX1-01	335.89	12.0	2202.80	2195.10	2193.70	7.70	0.42%	0.562	3.04	0.43	1.05
GMI4481633	RX1-03	RX1-02	335.53	12.0	2202.80	2196.51	2195.10	6.29	0.42%	0.562	2.80	0.41	1.06
GMI4481631	RX1-04	RX1-03	339.07	10.0	2206.73	2198.56	2196.51	8.17	0.60%	0.500	3.09	0.45	0.69
GMI4481611	RX1-05	RX1-04	349.87	10.0	2206.24	2200.41	2198.56	5.83	0.53%	0.500	3.10	0.48	0.62
GMI4481610	RX1-06	RX1-05	349.25	10.0	2208.01	2202.31	2200.41	5.70	0.54%	0.500	3.03	0.47	0.63
GMI4481609	RX1-07	RX1-06	269.27	10.0	2211.94	2203.67	2202.31	8.27	0.51%	0.499	3.00	0.49	0.59
GMI4481612	RX1-08	RX1-07	331.45	8.0	2222.23	2209.16	2203.67	13.07	1.66%	0.499	3.99	0.48	0.59
GMI4481608	RX1-09	RX1-08	329.10	8.0	2226.80	2214.24	2209.16	12.56	1.54%	0.498	4.60	0.49	0.55
GMI4481578	RX1-10	RX1-09	154.49	8.0	2226.99	2216.83	2214.24	10.16	1.68%	0.498	4.56	0.48	0.60
GMI4481579	RX1-11	RX1-10	130.66	8.0	2229.76	2219.05	2216.83	10.71	1.70%	0.497	4.61	0.48	0.61
GMI4481580	RX1-12	RX1-11	318.83	8.0	2231.71	2222.06	2219.05	9.65	0.94%	0.472	3.91	0.57	0.35
GMI4481581	RX1-13	RX1-12	318.09	8.0	2234.47	2224.97	2222.06	9.50	0.91%	0.471	3.62	0.55	0.34
GMI4481582	RX1-14	RX1-13	355.03	8.0	2252.39	2235.57	2224.97	16.82	2.99%	0.468	4.49	0.39	0.99
GMI4481541	RX1-15	RX1-14	200.30	8.0	2252.92	2237.37	2235.57	15.55	0.90%	0.466	4.09	0.62	0.34
GMI4482571	RX1-16	RX1-15	347.62	8.0	2254.48	2238.78	2237.37	15.70	0.41%	0.432	2.69	0.72	0.11
GMI4482592	RX1-17	RX1-16	317.79	8.0	2256.75	2240.25	2238.78	16.50	0.46%	0.429	2.63	0.64	0.15
GMI4482591	RX1-18	RX1-17	195.61	8.0	2258.89	2240.94	2240.25	17.95	0.35%	0.429	2.52	0.77	0.07
GMI4482590	RX1-18A	RX1-18	283.53	10.0	2259.96	2241.83	2240.94	18.13	0.31%	0.178	1.18	0.31	0.68
GMI4480753	RX1-18B	RX1-18A	253.33	10.0	2259.40	2242.95	2241.83	16.45	0.44%	0.178	2.04	0.28	0.84
GMI4480754	RX1-18C	RX1-18B	306.05	10.0	2260.31	2243.91	2242.95	16.40	0.31%	0.110	1.49	0.24	0.75
GMI4482176	RX1-18D	RX1-18C	166.63	10.0	2259.13	2244.23	2243.91	14.90	0.19%	0.110	1.45	0.29	0.56
GMI4482177	RX1-18E	RX1-18D	250.70	10.0	2257.00	2245.10	2244.23	11.90	0.35%	0.109	1.47	0.23	0.80
GMI4482178	RX1-18F	RX1-18E	252.03	10.0	2257.41	2245.98	2245.10	11.43	0.35%	0.107	1.71	0.23	0.80
GMI4482179	RX1-18F1	RX1-18F	401.62	10.0	2256.80	2247.18	2245.98	9.62	0.30%	0.089	1.48	0.22	0.75
GMI4482180	RX1-18F2	RX1-18F1	215.86	10.0	2256.09	2248.05	2247.18	8.04	0.40%	0.086	1.60	0.20	0.89
GMI4480829	RX1-18F3	RX1-18F2	349.27	10.0	2257.61	2249.21	2248.05	8.40	0.33%	0.079	1.55	0.21	0.81
GMI4481554	RX1-18F4	RX1-18F3	231.36	10.0	2259.32	2249.86	2249.21	9.46	0.28%	0.077	1.45	0.21	0.74
GMI4481553	RX1-18F5	RX1-18F4	235.83	10.0	2257.59	2250.83	2249.86	6.76	0.41%	0.074	1.48	0.18	0.91
GMI4482597	RX1-19	RX1-18	247.34	8.0	2257.37	2241.88	2240.94	15.49	0.38%	0.251	1.70	0.49	0.27
GMI4482596	RX1-20	RX1-19	246.12	8.0	2256.26	2242.95	2241.88	13.31	0.43%	0.251	2.34	0.47	0.31
GMI4482595	RX1-21	RX1-20	279.05	8.0	2259.42	2244.18	2242.95	15.24	0.44%	0.204	2.11	0.42	0.36

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482594	RX1-22	RX1-21	363.99	8.0	2261.25	2245.68	2244.18	15.57	0.41%	0.204	2.24	0.43	0.34
GMI4482570	RX1-23	RX1-22	402.34	8.0	2261.62	2247.42	2245.68	14.20	0.43%	0.203	2.23	0.42	0.35
GMI4482569	RX1-23A	RX1-23	400.66	8.0	2262.77	2249.19	2247.42	13.58	0.44%	0.203	2.27	0.42	0.36
GMI4482568	RX1-24	RX1-23A	402.07	8.0	2263.98	2250.81	2249.19	13.17	0.40%	0.203	2.21	0.43	0.33
GMI4481517	RX1-25	RX1-24	307.55	8.0	2265.04	2252.04	2250.81	13.00	0.40%	0.200	2.16	0.43	0.34
GMI4481460A	RX1-25A1	RX1-25	209.10	8.0	2265.84	2253.14	2252.04	12.70	0.53%	0.165	2.03	0.35	0.45
GMI4481460	RX1-26	RX1-25A1	92.13	8.0	2266.22	2253.35	2253.14	12.87	0.23%	0.165	1.83	0.48	0.24
GMI4481459	RX1-27	RX1-26	400.70	8.0	2267.94	2255.34	2253.35	12.60	0.50%	0.161	1.80	0.36	0.44
GMI4480690	RX1-27A	RX1-27	200.44	8.0	2268.44	2256.14	2255.34	12.30	0.40%	0.148	2.01	0.37	0.39
GMI4480689	RX1-28	RX1-27A	272.87	8.0	2271.36	2257.49	2256.14	13.87	0.50%	0.146	2.06	0.43	0.45
NEW384	SELT1-01	STOR_10	131.39	10.0	2131.61	2113.52	2107.85	18.08	4.32%	0.103	4.12	0.12	3.09
NEW380	SELT1-02	SELT1-01	334.87	10.0	2144.76	2127.96	2113.52	16.80	4.31%	0.098	3.96	0.12	3.09
NEW601661	SELT1-03	SELT1-02	86.11	10.0	2151.08	2129.83	2127.96	21.25	2.17%	0.096	3.39	0.15	2.17
NEW1175158	SELT1-03A	SELT1-03	352.82	10.0	2148.16	2131.46	2129.83	16.70	0.46%	0.017	0.71	0.09	1.03
NEW1175202	SELT1-03B	SELT1-03A	20.83	10.0	2149.91	2131.56	2131.46	18.35	0.50%	0.013	0.93	0.08	1.05
NEW1175161	SELT1-04	SELT1-03	348.76	10.0	2153.35	2130.85	2129.83	22.50	0.29%	0.046	1.33	0.17	0.78
NEW1175160	SELT1-05	SELT1-04	350.61	10.0	2154.21	2132.01	2130.85	22.20	0.33%	0.043	1.19	0.15	0.84
NEW1175159	SELT1-06	SELT1-05	46.97	10.0	2153.76	2132.16	2132.01	21.60	0.33%	0.036	1.15	0.14	0.83
GMI4480477	SHR1-01	M1-04	101.05	12.0	2139.92	2131.36	2128.74	8.56	2.59%	0.089	1.47	0.10	3.93
GMI4480476	SHR1-02	SHR1-01	117.57	12.0	2142.10	2132.27	2131.36	9.83	0.77%	0.085	2.36	0.15	2.11
GMI4480579	SHR1-03	SHR1-02	219.48	12.0	2147.18	2136.06	2132.27	11.12	1.73%	0.063	1.82	0.10	3.22
GMI4480578	SHR1-04	SHR1-03	150.69	12.0	2151.09	2144.35	2136.06	6.74	5.50%	0.059	2.93	0.07	5.80
GMI4480441	SHR1-05	SHR1-04	360.61	12.0	2155.52	2147.90	2144.35	7.62	0.98%	0.052	2.32	0.11	2.42
GMI4480440	SHR1-06	SHR1-05	233.05	10.0	2160.89	2148.82	2147.90	12.07	0.40%	0.035	1.30	0.13	0.93
GMI4480439	SHR1-07	SHR1-06	125.45	10.0	2161.78	2149.32	2148.82	12.46	0.40%	0.030	1.18	0.12	0.94
GMI4480438	SHR1-08	SHR1-07	359.97	10.0	2171.05	2160.85	2149.32	10.20	3.20%	0.027	1.57	0.07	2.72
NEW1174975	SUN1-01	REX1-51	179.66	10.0	2268.23	2261.82	2261.06	6.41	0.42%	0.122	1.86	0.34	0.87
GMI4779474	SUN1-02	SUN1-01	145.37	10.0	2269.87	2262.12	2261.82	7.75	0.21%	0.121	1.57	0.31	0.58
GMI4779473	SUN1-03	SUN1-02	323.04	10.0	2273.85	2262.82	2262.12	11.03	0.22%	0.105	1.30	0.26	0.62
GMI4779472	SUN1-04	SUN1-03	326.23	10.0	2275.73	2263.61	2262.82	12.12	0.24%	0.092	1.39	0.23	0.70
NEW1175168	SUN2-01	REX1-23K11	165.63	10.0	2278.98	2262.08	2261.33	16.90	0.45%	0.192	2.20	0.30	0.85
GMI4484015	SUN2-02	SUN2-01	184.58	10.0	2278.54	2262.80	2262.08	15.74	0.39%	0.191	2.10	0.34	0.75
GMI4484014	SUN2-03	SUN2-02	351.57	10.0	2281.26	2263.77	2262.80	17.49	0.27%	0.176	1.82	0.33	0.63
GMI4483998	SUN2-04	SUN2-03	325.12	10.0	2280.07	2264.68	2263.77	15.39	0.28%	0.164	1.74	0.30	0.65
GMI4483997	SUN2-05	SUN2-04	309.74	10.0	2281.86	2265.75	2264.68	16.11	0.35%	0.147	1.75	0.27	0.76
4677	VM1-01	REX1-23KV	269.97	10.0	2281.00	2267.36	2266.60	13.64	0.28%	0.019	0.97	0.11	0.79

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
4796	VM1-02	VM1-01	393.52	10.0	2282.50	2268.56	2267.46	13.94	0.28%	0.017	0.98	0.11	0.80
4795	VM1-03	VM1-02	235.18	10.0	2283.50	2269.32	2268.66	14.18	0.28%	0.015	0.95	0.10	0.80
4787	VM1-04	VM1-03	129.08	10.0	2283.75	2269.78	2269.42	13.97	0.28%	0.009	0.83	0.08	0.80
4788	VM1-05	VM1-04	383.24	10.0	2286.00	2270.95	2269.88	15.05	0.28%	0.006	0.75	0.07	0.81

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Appendix G

Committed Model Results

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Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4480657	A1-01	FG1-03	116.43	21.0	2145.91	2134.70	2121.13	11.21	11.65%	3.406	4.96	0.20	34.60
GMI4480913	A1-01A	A1-01	75.01	24.0	2145.32	2136.08	2134.70	9.24	1.84%	2.224	6.32	0.28	19.26
GMI4480912	A1-02	A1-01	255.39	24.0	2147.05	2138.41	2134.70	8.64	1.45%	1.325	5.61	0.19	17.76
GMI4480911	A1-03	A1-02	272.83	24.0	2147.53	2139.46	2138.41	8.07	0.39%	1.324	3.31	0.26	8.53
GMI4480910	A1-04	A1-03	266.60	24.0	2148.41	2140.85	2139.46	7.56	0.52%	1.322	3.47	0.23	10.12
GMI4480909	A1-04A	A1-04	50.75	24.0	2148.64	2140.98	2140.85	7.66	0.25%	1.321	2.99	0.31	6.70
GMI4480908	A1-05	A1-04A	288.97	24.0	2148.67	2143.15	2140.98	5.52	0.75%	1.315	3.15	0.21	12.43
GMI4483514	A1-05A	A1-05	294.38	24.0	2154.85	2144.93	2143.15	9.92	0.60%	1.314	3.88	0.23	10.99
NEW1175257	A1-06	A1-05A	356.89	24.0	2162.77	2152.86	2144.93	9.91	2.22%	1.313	4.77	0.16	22.30
GMI4483513	A1-08	A1-06	445.00	24.0	2166.75	2155.40	2152.86	11.35	0.57%	1.267	4.37	0.24	10.70
GMI4482409	A1-09	A1-08	226.78	24.0	2168.15	2156.27	2155.40	11.88	0.38%	1.262	3.25	0.25	8.55
GMI4482408	A1-10	A1-09	240.24	24.0	2169.79	2156.95	2156.27	12.84	0.28%	1.261	2.96	0.27	7.17
GMI4482407	A1-11	A1-10	241.52	24.0	2170.31	2157.51	2156.95	12.80	0.23%	1.259	2.70	0.29	6.37
GMI4482406	A1-12	A1-11	382.48	24.0	2169.65	2158.50	2157.51	11.15	0.26%	1.257	2.75	0.27	6.80
GMI4482405	A1-13	A1-12	378.74	24.0	2168.47	2159.52	2158.50	8.95	0.27%	1.255	2.86	0.27	6.97
GMI4482344	A1-13A	A1-13	71.89	12.0	2168.50	2161.65	2159.52	6.85	2.96%	0.013	0.32	0.04	4.28
GMI4482347	A1-14	A1-13	404.99	24.0	2169.95	2160.50	2159.52	9.45	0.24%	1.249	2.77	0.28	6.54
GMI4482346	A1-15	A1-14	396.43	24.0	2173.39	2161.39	2160.50	12.00	0.22%	1.231	2.66	0.28	6.27
GMI4482345	A1-16	A1-15	281.24	24.0	2174.65	2162.15	2161.39	12.50	0.27%	0.902	2.31	0.22	7.33
GMI4480685	A1-17	A1-16	133.86	24.0	2174.70	2164.10	2162.15	10.60	1.46%	0.901	3.47	0.15	18.22
GMI4480683	A1-18	A1-17	388.30	24.0	2176.11	2163.19	2164.10	12.92	-0.23%	0.819	1.03	0.68	6.85
GMI4480726	A1-19	A1-18	367.50	24.0	2179.63	2164.11	2163.19	15.52	0.25%	0.820	0.90	0.24	7.11
GMI4480725	A1-20	A1-19	340.94	24.0	2183.09	2165.10	2164.11	18.00	0.29%	0.822	2.44	0.26	7.69
GMI4483600	A2-01	A1-20	18.94	24.0	2181.51	2165.14	2165.10	16.37	0.24%	0.821	2.33	0.25	6.90
NEW1175254	A2-02	A2-01	130.24	24.0	2194.11	2177.56	2165.14	16.55	9.54%	0.820	3.59	0.09	48.21
GMI4481841	A2-03	A2-02	94.66	18.0	2192.88	2178.93	2177.56	13.95	1.45%	0.786	5.21	0.26	8.06
GMI4481840	A2-04	A2-03	367.59	18.0	2195.39	2184.49	2178.93	10.90	1.51%	0.785	3.97	0.20	8.26
GMI4481839	A2-05	A2-04	226.85	18.0	2198.43	2190.27	2184.49	8.16	2.55%	0.784	5.30	0.18	10.96
GMI4481838	A2-06	A2-05	66.41	18.0	2219.12	2191.00	2190.27	28.12	1.10%	0.783	4.30	0.26	6.93
GMI4481837	A2-07	A2-06	154.77	18.0	2205.52	2192.68	2191.00	12.84	1.09%	0.782	3.78	0.22	6.88
GMI4483618	A2-08	A2-07	321.91	18.0	2206.42	2199.56	2192.68	6.86	2.14%	0.774	4.81	0.18	9.98

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483617	A2-09	A2-08	196.43	18.0	2211.23	2203.68	2199.56	7.55	2.10%	0.772	5.35	0.19	9.88
GMI4483619	A2-10	A2-09	32.62	18.0	2214.56	2204.34	2203.68	10.22	2.03%	0.771	4.70	0.22	9.67
GMI4483742	A2-11	A2-10	268.00	18.0	2231.20	2209.77	2204.34	21.43	2.03%	0.770	4.74	0.18	9.70
GMI4481765	A2-12	A2-11	298.47	18.0	2234.51	2221.19	2209.77	13.32	3.83%	0.765	5.93	0.16	13.63
GMI4483616	A2-13	A2-12	237.98	18.0	2231.00	2221.38	2221.19	9.62	0.08%	0.763	2.09	0.44	1.30
GMI4483615	A2-14	A2-13	235.00	18.0	2231.64	2222.18	2221.38	9.46	0.34%	0.764	2.04	0.29	3.53
GMI4481256	A2-15	A2-14	73.07	18.0	2232.19	2222.28	2222.18	9.91	0.14%	0.762	2.32	0.38	2.00
GMI4483713	A2-15A	A2-15	78.00	12.0	2232.43	2222.61	2222.28	9.82	0.42%	0.228	1.21	0.26	1.38
GMI4483712	A2-15B	A2-15A	210.83	12.0	2232.93	2223.49	2222.61	9.44	0.42%	0.225	2.20	0.26	1.39
GMI4481186	A2-15C	A2-15B	263.86	12.0	2233.98	2224.04	2223.49	9.94	0.21%	0.222	1.82	0.32	0.92
GMI4481182	A2-15D	A2-15C	426.57	12.0	2236.85	2225.59	2224.04	11.26	0.36%	0.168	1.50	0.23	1.34
GMI4481108	A2-15E	A2-15D	423.60	12.0	2238.97	2227.63	2225.59	11.34	0.48%	0.162	2.02	0.21	1.57
GMI4482260	A2-15E1	A2-15E	187.95	10.0	2239.29	2228.55	2227.63	10.74	0.49%	0.101	1.69	0.21	0.97
GMI4481112	A2-15E2	A2-15E1	166.08	10.0	2240.07	2229.13	2228.55	10.94	0.35%	0.072	1.48	0.19	0.83
GMI4480764	A2-15E3	A2-15E2	386.23	10.0	2241.97	2230.88	2229.13	11.09	0.45%	0.061	1.46	0.16	0.97
GMI4481255	A2-16	A2-15	335.39	18.0	2234.27	2222.49	2222.28	11.78	0.06%	0.544	1.40	0.38	1.28
GMI4481254	A2-17	A2-16	253.03	18.0	2236.00	2222.84	2222.49	13.16	0.14%	0.542	1.57	0.30	2.19
GMI4481253	A2-17A	A2-17	32.90	10.0	2235.15	2223.20	2222.84	11.95	1.09%	0.118	1.05	0.18	1.49
GMI4480647	A2-18	A2-17	263.63	18.0	2237.24	2223.75	2222.84	13.49	0.35%	0.433	1.87	0.21	3.89
GMI4480646	A2-19	A2-18	411.00	12.0	2238.83	2224.99	2223.75	13.84	0.30%	0.414	2.50	0.40	0.96
GMI4481249	A2-19A	A2-19	373.09	12.0	2239.19	2226.11	2224.99	13.08	0.30%	0.217	1.48	0.27	1.15
GMI4481180	A2-19B	A2-19A	287.03	12.0	2240.94	2226.98	2226.11	13.96	0.30%	0.179	1.74	0.24	1.20
GMI4481174	A2-19C	A2-19B	324.10	10.0	2242.50	2228.00	2226.98	14.50	0.31%	0.162	1.86	0.30	0.70
GMI4481093	A2-19D	A2-19C	324.72	10.0	2242.45	2228.71	2228.00	13.74	0.22%	0.158	1.65	0.33	0.56
GMI4481092	A2-19E	A2-19D	207.39	10.0	2242.80	2229.28	2228.71	13.52	0.27%	0.153	1.61	0.30	0.65
GMI4481091	A2-19F	A2-19E	287.33	10.0	2244.56	2230.11	2229.28	14.45	0.29%	0.136	1.64	0.27	0.69
GMI4481090	A2-19G	A2-19F	132.45	10.0	2245.14	2230.43	2230.11	14.71	0.24%	0.129	1.58	0.29	0.63
GMI4481089	A2-19H	A2-19G	157.00	10.0	2245.91	2231.06	2230.43	14.85	0.40%	0.117	1.59	0.23	0.86
GMI4481001	A2-19HA	A2-19H	287.03	10.0	2247.22	2232.09	2231.06	15.13	0.36%	0.113	1.77	0.24	0.81
NEW9737666	A2-19I	A2-19HA	9.08	10.0	2247.03	2231.83	2232.09	15.20	-2.90%	0.094	0.68	0.59	2.52
GMI4481252	A2-20	A2-19	343.05	12.0	2238.21	2225.90	2224.99	12.31	0.27%	0.207	1.38	0.27	1.08
GMI4481251	A2-21	A2-20	144.48	12.0	2237.89	2226.57	2225.90	11.32	0.46%	0.159	1.71	0.21	1.54
GMI4481250	A2-22	A2-21	294.91	12.0	2237.71	2227.40	2226.57	10.31	0.28%	0.157	1.82	0.25	1.17
GMI4481248	A2-23	A2-22	437.88	12.0	2236.78	2228.64	2227.40	8.14	0.28%	0.034	0.63	0.11	1.29
GMI4481246	A2-24	A2-23	404.80	10.0	2236.05	2229.88	2228.64	6.17	0.31%	0.014	0.65	0.09	0.84
GMI4481172	A3-01	A2-22	660.69	12.0	2240.61	2229.47	2227.40	11.14	0.31%	0.121	1.45	0.20	1.28

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481171	A3-02	A3-01	377.73	12.0	2237.94	2230.68	2229.47	7.26	0.32%	0.119	1.68	0.20	1.29
GMI4481169	A3-04	A3-02	468.23	12.0	2238.29	2232.03	2230.68	6.26	0.29%	0.083	1.33	0.17	1.26
GMI4483806	AEXT1-01A	AEXT1-13	135.64	18.0	2158.92	2150.57	2147.97	8.35	1.91%	4.107	7.03	0.44	6.07
GMI4483805	AEXT1-02	AEXT1-01A	292.47	18.0	2160.14	2154.14	2150.57	6.00	1.22%	4.105	7.17	0.56	4.02
GMI4483813	AEXT1-13	RIV1-33	19.05	24.0	2159.19	2147.97	2147.65	11.21	1.67%	4.105	3.79	0.59	16.30
GMI4481734	AEXT2-03	AEXT1-02	272.01	18.0	2163.92	2157.04	2154.14	6.88	1.07%	4.105	6.37	0.54	3.49
GMI4481733	AEXT2-04	AEXT2-03	178.82	18.0	2164.99	2159.39	2157.04	5.60	1.31%	3.590	6.31	0.46	4.84
GMI4481732	AEXT2-05	AEXT2-04	367.29	18.0	2171.24	2164.77	2159.39	6.47	1.47%	3.585	7.11	0.45	5.32
GMI4481730	AEXT2-06	AEXT2-05	234.92	18.0	2172.81	2166.13	2164.77	6.68	0.58%	3.539	4.95	0.62	2.05
GMI4481729	AEXT2-07	AEXT2-06	364.90	18.0	2179.46	2167.91	2166.13	11.55	0.49%	3.540	4.67	0.64	1.60
GMI4481190	AEXT2-08	AEXT2-07	55.93	24.0	2180.04	2168.41	2167.91	11.63	0.89%	3.371	4.44	0.32	11.61
GMI4480693	AF1-01	AF1-01AA	66.72	10.0	2178.59	2170.96	2168.92	7.63	3.06%	0.154	3.27	0.16	2.53
GMI4480694	AF1-01A	AF1-01	52.05	10.0	2178.86	2172.12	2170.96	6.74	2.23%	0.154	3.71	0.19	2.14
GMI4481191	AF1-01AA	AEXT2-07	76.15	18.0	2178.45	2168.92	2167.91	9.53	1.33%	0.272	1.04	0.12	8.20
GMI4480695	AF1-02	AF1-01A	124.22	10.0	2179.83	2173.86	2172.12	5.97	1.40%	0.153	3.17	0.20	1.66
GMI4481116	AF1-03	AF1-02	187.45	10.0	2185.09	2177.16	2173.86	7.93	1.76%	0.153	3.18	0.18	1.88
GMI4481115	AF1-04	AF1-03	341.09	10.0	2190.92	2182.79	2177.16	8.13	1.65%	0.152	3.32	0.19	1.82
GMI4481114	AF1-05	AF1-04	269.42	10.0	2194.37	2185.43	2182.79	8.94	0.98%	0.151	2.90	0.22	1.37
GMI4481113	AF1-06	AF1-05	190.24	10.0	2195.51	2186.26	2185.43	9.25	0.44%	0.144	2.17	0.27	0.87
GMI4481005	AF1-07	AF1-06	334.36	10.0	2197.60	2188.08	2186.26	9.52	0.54%	0.134	1.96	0.23	1.00
GMI4481007	AF1-07A	AF1-07	216.30	10.0	2198.41	2190.19	2188.08	8.22	0.98%	0.006	0.28	0.05	1.51
GMI4481006	AF1-08	AF1-07	324.86	10.0	2200.55	2191.25	2188.08	9.30	0.98%	0.122	2.23	0.19	1.39
GMI4480963	AF1-09	AF1-08	365.02	10.0	2203.04	2194.04	2191.25	9.00	0.76%	0.119	2.41	0.21	1.22
GMI4480964	AF1-09A	AF1-09	305.50	10.0	2208.11	2199.02	2194.04	9.09	1.63%	0.078	1.95	0.14	1.88
GMI4480965	AF1-09B	AF1-09A	296.29	10.0	2213.70	2203.69	2199.02	10.01	1.58%	0.076	2.64	0.14	1.85
GMI4480831	AF1-09B1	AF1-09B	345.78	10.0	2219.15	2209.53	2203.69	9.62	1.69%	0.062	2.34	0.12	1.93
GMI4480946	AF1-09B2	AF1-09B1	323.02	10.0	2224.08	2212.86	2209.53	11.22	1.03%	0.022	1.16	0.08	1.54
GMI4480941	AF1-09B2A	AF1-09B2	402.35	10.0	2232.61	2221.95	2212.86	10.66	2.26%	0.011	1.13	0.05	2.30
GMI4480955	AF1-15	AF1-14	320.82	10.0	2231.69	2216.29	2215.31	15.40	0.31%	0.022	1.35	0.12	0.83
GMI4480796	AF1-15A1	AF1-15	277.00	10.0	2228.83	2217.14	2216.29	11.69	0.31%	0.003	0.31	0.04	0.85
CDT-1021	ATL-5	REL-12	127.47	10.0	2143.00	2123.00	2121.93	20.00	0.84%	0.022	1.03	0.09	1.38
NEW-032316B	B1-01	M1-11B	406.98	24.0	2164.28	2151.08	2139.06	13.20	2.95%	3.962	12.48	0.79	28.71
GMI4480458	B1-02	B1-01	315.17	24.0	2169.15	2151.48	2151.08	17.67	0.13%	3.962	3.51	0.65	1.68
GMI4480457	B1-03	B1-02	591.26	24.0	2174.54	2152.04	2151.48	22.50	0.09%	3.968	2.71	0.70	0.91
GMI4480456	B1-04	B1-03	141.81	24.0	2171.39	2152.36	2152.04	19.03	0.23%	3.970	2.75	0.64	3.55
GMI4480455	B1-05	B1-04	141.96	24.0	2171.03	2152.58	2152.36	18.45	0.15%	3.969	2.89	0.65	2.27

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GMI4480454	B1-06	B1-05	301.14	24.0	2171.01	2152.87	2152.58	18.14	0.10%	3.972	2.74	0.70	0.94
GMI4480453	B1-07	B1-06	310.21	24.0	2170.29	2153.33	2152.87	16.96	0.15%	3.976	2.74	0.65	2.12
GMI4480448	B1-08	B1-07	77.93	24.0	2169.61	2153.44	2153.33	16.17	0.14%	3.978	2.80	0.68	1.97
GMI4480447	B1-09	B1-08	140.44	24.0	2169.09	2153.87	2153.44	15.22	0.31%	3.979	3.03	0.56	4.79
GMI4480435	B1-10	B1-09	299.75	24.0	2166.34	2154.22	2153.87	12.12	0.12%	3.967	3.08	0.66	1.45
GMI4480449	B1-11	B1-10	301.84	24.0	2165.13	2154.72	2154.22	10.41	0.17%	3.959	2.92	0.61	2.49
GMI4480402	B1-12	B1-11	447.98	24.0	2166.67	2155.21	2154.72	11.46	0.11%	3.951	2.95	0.65	1.69
GMI4481397	B1-13	B1-12	305.86	24.0	2167.74	2156.15	2155.21	11.59	0.31%	3.953	3.40	0.47	4.88
GMI4481396	B1-14	B1-13	353.46	24.0	2172.34	2162.62	2156.15	9.72	1.83%	3.953	5.60	0.29	17.69
GMI4481395	B1-15	B1-14	357.91	24.0	2177.40	2163.06	2162.62	14.34	0.12%	3.952	3.97	0.70	1.14
GMI4481394	B1-16	B1-15	369.66	24.0	2172.78	2163.64	2163.06	9.14	0.16%	3.953	2.66	0.68	1.49
GMI4481393	B1-17	B1-16	350.41	24.0	2171.27	2164.12	2163.64	7.15	0.14%	3.958	2.77	0.65	1.90
GMI4481373	B1-18	B1-17	240.13	24.0	2180.07	2164.47	2164.12	15.60	0.15%	3.962	2.87	0.64	2.09
GMI4481374	B1-19	B1-18	299.50	24.0	2180.09	2164.91	2164.47	15.18	0.15%	3.962	2.90	0.63	2.11
GMI4481375	B1-20	B1-19	240.11	24.0	2179.43	2165.07	2164.91	14.36	0.07%	3.965	2.71	0.72	0.12
GMI4481323	B1-21	B1-20	297.67	24.0	2178.59	2165.68	2165.07	12.91	0.20%	3.965	2.83	0.58	3.21
GMI4481320	B1-22	B1-21	300.12	24.0	2177.11	2166.02	2165.68	11.09	0.11%	3.966	3.00	0.66	1.37
GMI4481317	B1-23	B1-22	74.52	24.0	2176.94	2166.22	2166.02	10.72	0.27%	3.961	2.85	0.63	4.25
GMI4481295	B1-25	B1-23	229.78	24.0	2175.72	2166.40	2166.22	9.32	0.08%	3.963	2.74	0.71	0.47
GMI4481294	B1-26	B1-25	461.01	24.0	2176.15	2167.25	2166.40	8.89	0.18%	3.964	2.93	0.56	2.84
GMI4481300	B1-27	B1-26	289.44	24.0	2176.34	2168.08	2167.25	8.26	0.29%	3.968	3.67	0.50	4.51
GMI4481299	B1-28	B1-27	341.63	24.0	2178.60	2168.38	2168.08	10.22	0.09%	3.965	3.16	0.69	0.75
GMI4483728	B1-29	B1-28	315.69	24.0	2182.78	2168.60	2168.38	14.18	0.07%	3.965	2.53	0.75	0.19
GMI4483727	B1-30	B1-29	340.74	24.0	2183.47	2169.13	2168.60	14.34	0.16%	3.967	2.61	0.65	2.28
GMI4481946	B1-31	B1-30	506.38	24.0	2184.36	2169.66	2169.13	14.70	0.10%	3.978	2.77	0.69	1.15
GMI4481945	B1-32	B1-31	498.12	24.0	2185.75	2170.32	2169.66	15.43	0.13%	3.987	2.80	0.64	1.78
GMI4481944	B1-33	B1-32	446.42	24.0	2187.31	2171.12	2170.32	16.19	0.18%	3.996	3.11	0.57	2.71
GMI4481286	B1-34	B1-33	438.62	24.0	2186.91	2171.52	2171.12	15.39	0.09%	3.999	2.93	0.70	0.79
GMI4481285	B1-35	B1-34	421.83	24.0	2185.38	2172.06	2171.52	13.32	0.13%	4.002	2.71	0.66	1.67
GMI4481284	B1-36	B1-35	280.09	24.0	2186.26	2172.55	2172.06	13.71	0.17%	4.008	2.95	0.61	2.62
GMI4481844	B1-37	B1-36	56.97	24.0	2186.01	2172.71	2172.55	13.30	0.28%	4.005	3.09	0.61	4.39
GMI4481843	B1-38	B1-37	348.77	24.0	2183.65	2173.06	2172.71	10.59	0.10%	4.009	2.87	0.69	1.01
GMI4483752	B1-39	B1-38	251.55	24.0	2196.05	2173.51	2173.06	22.54	0.18%	4.011	2.84	0.62	2.69
GMI4483753	B1-40	B1-39	114.60	24.0	2185.01	2173.73	2173.51	11.28	0.19%	4.005	3.01	0.63	2.94
GMI4481276	B1-41	B1-40	453.26	24.0	2183.63	2174.72	2173.73	8.91	0.22%	4.005	3.32	0.52	3.40
GMI4481273	B1-42	B1-41	359.58	24.0	2184.18	2174.81	2174.72	9.37	0.03%	3.995	2.86	0.78	-1.49

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481257	B1-43	B1-42	466.89	24.0	2186.75	2175.50	2174.81	11.25	0.15%	3.976	2.58	0.64	2.11
GMI4481271	B1-44	B1-43	174.85	24.0	2184.55	2175.88	2175.50	8.67	0.22%	3.969	3.06	0.59	3.42
GMI4481270	B1-45	B1-44	153.48	24.0	2185.57	2176.12	2175.88	9.45	0.16%	3.972	3.08	0.63	2.29
4804	BEL-2A10	BEL-2A9	390.56	10.0	2134.14	2128.89	2127.53	5.25	0.35%	0.061	1.39	0.18	0.84
4803	BEL-2A11	BEL-2A10	319.21	10.0	2133.34	2129.89	2128.89	3.45	0.31%	0.060	1.41	0.18	0.80
4808	BEL-2A12	BEL-2A11	389.74	10.0	2140.88	2131.28	2129.89	9.60	0.36%	0.059	1.41	0.17	0.86
4800	BEL-2A9	BEL-2A8	389.62	10.0	2135.33	2127.53	2126.49	7.80	0.27%	0.062	0.56	0.19	0.73
GMI4481260	BEXT1-01	B1-45	80.07	24.0	2185.70	2176.19	2176.12	9.51	0.08%	3.970	2.81	0.69	0.54
GMI4481261	BEXT1-02	BEXT1-01	302.36	24.0	2187.69	2177.11	2176.19	10.58	0.31%	3.971	3.26	0.47	4.79
GMI4481258	BEXT1-03	BEXT1-02	328.18	24.0	2197.78	2183.53	2177.11	14.25	1.96%	3.960	5.61	0.29	18.20
GMI4481237	BEXT1-04	BEXT1-03	296.45	24.0	2199.63	2184.14	2183.53	15.49	0.21%	3.957	4.60	0.59	3.23
GMI4481243	BEXT1-05	BEXT1-04	347.96	24.0	2201.17	2184.52	2184.14	16.65	0.11%	3.936	2.92	0.67	1.30
GMI4481231	BEXT1-06	BEXT1-05	339.99	24.0	2200.86	2185.04	2184.52	15.82	0.15%	3.929	2.85	0.62	2.27
GMI4481232	BEXT1-06A	BEXT1-06	21.00	24.0	2200.87	2185.03	2185.04	15.84	-0.05%	3.829	2.73	0.69	-0.37
GMI4481230	BEXT1-06AE	BEXT1-06	294.81	12.0	2194.55	2185.78	2185.04	8.77	0.25%	0.152	0.58	0.51	1.10
GMI4481227	BEXT1-06BE	BEXT1-06AE	385.28	12.0	2192.58	2187.76	2185.78	4.82	0.51%	0.162	1.90	0.20	1.63
GMI4481226	BEXT1-06CE	BEXT1-06BE	405.56	12.0	2197.40	2188.88	2187.76	8.52	0.28%	0.139	1.72	0.23	1.17
GMI4481225	BEXT1-06DE	BEXT1-06CE	239.15	12.0	2196.69	2189.50	2188.88	7.19	0.26%	0.135	1.59	0.22	1.14
GMI4481217	BEXT1-06DE1	BEXT1-06DE	171.61	12.0	2195.61	2190.04	2189.50	5.57	0.31%	0.106	1.44	0.19	1.29
GMI4481216	BEXT1-06DE2	BEXT1-06DE1	230.48	12.0	2195.70	2190.73	2190.04	4.97	0.30%	0.095	1.50	0.18	1.27
GMI4481215	BEXT1-06DE3	BEXT1-06DE2	378.78	12.0	2197.57	2191.50	2190.73	6.07	0.20%	0.092	1.36	0.20	1.03
GMI4481727	BEXT1-07	BEXT1-06A	150.75	24.0	2199.23	2185.27	2185.03	13.96	0.16%	3.821	2.64	0.66	2.50
GMI4481229	BEXT1-08	BEXT1-07	267.78	18.0	2196.59	2186.13	2185.27	10.46	0.32%	3.823	3.68	0.83	0.35
GMI4481228	BEXT1-09	BEXT1-08	359.99	18.0	2193.56	2187.08	2186.13	6.48	0.26%	1.167	1.68	0.38	2.61
GMI4481214	BEXT1-10	BEXT1-09	301.50	18.0	2195.22	2187.78	2187.08	7.44	0.23%	1.168	2.76	0.41	2.38
GMI4481209	BEXT1-11	BEXT1-10	247.64	18.0	2197.22	2188.87	2187.78	8.35	0.44%	1.163	3.01	0.33	3.72
GMI4480649	BEXT1-12	BEXT1-11	381.58	18.0	2200.54	2190.42	2188.87	10.12	0.41%	1.154	3.40	0.35	3.53
GMI4482891	BEXT1-13	BEXT1-12	270.08	15.0	2209.53	2200.66	2190.42	8.87	3.79%	1.146	5.07	0.24	7.66
GMI4482910	BEXT1-14	BEXT1-13	303.01	15.0	2213.55	2203.99	2200.66	9.56	1.10%	1.099	5.39	0.36	3.64
GMI4482909	BEXT1-15	BEXT1-14	370.23	15.0	2215.94	2206.62	2203.99	9.32	0.71%	1.099	4.12	0.38	2.71
GMI4482908	BEXT1-16	BEXT1-15	284.92	15.0	2218.29	2208.32	2206.62	9.97	0.60%	1.096	3.87	0.40	2.40
GMI4480904	BEXT1-17	BEXT1-16	47.34	15.0	2219.11	2208.64	2208.32	10.47	0.68%	1.090	3.55	0.42	2.63
GMI4480903	BEXT1-18	BEXT1-17	202.81	15.0	2222.46	2209.66	2208.64	12.80	0.50%	1.085	3.46	0.41	2.12
GMI4482918	BEXT1-19	BEXT1-18	120.80	15.0	2224.36	2209.92	2209.66	14.44	0.22%	1.078	2.85	0.55	1.02
GMI4483680	BEXT1-19E1	BEXT1-19	141.94	10.0	2221.84	2210.61	2209.92	11.23	0.49%	0.368	1.86	0.40	0.70
GMI4483679	BEXT1-19E2	BEXT1-19E1	187.00	10.0	2221.00	2211.00	2210.61	10.00	0.21%	0.364	2.16	0.56	0.34

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483678	BEXT1-19E3	BEXT1-19E2	198.00	10.0	2226.77	2211.54	2211.00	15.23	0.27%	0.362	1.97	0.47	0.44
GMI4483677	BEXT1-19E4	BEXT1-19E3	170.57	10.0	2218.51	2211.84	2211.54	6.67	0.17%	0.360	1.94	0.57	0.28
GMI4482870	BEXT1-19E4AE	BEXT1-19E4	133.65	10.0	2218.89	2212.26	2211.84	6.63	0.31%	0.319	1.83	0.42	0.54
GMI4480895	BEXT1-19E4BE	BEXT1-19E4AE	323.39	10.0	2220.45	2212.95	2212.26	7.50	0.21%	0.285	1.91	0.46	0.42
GMI4480894	BEXT1-19E4CE	BEXT1-19E4BE	307.87	10.0	2220.84	2213.84	2212.95	7.00	0.29%	0.287	2.00	0.41	0.54
GMI4482871	BEXT1-19E4DE	BEXT1-19E4CE	255.96	10.0	2221.58	2214.71	2213.84	6.87	0.34%	0.286	2.20	0.39	0.61
GMI4482872	BEXT1-19E4DE1	BEXT1-19E4DE	254.65	10.0	2222.98	2215.39	2214.71	7.59	0.27%	0.267	2.02	0.41	0.53
GMI4482875	BEXT1-19E4DE3	BEXT1-19E4DE1	136.74	10.0	2224.01	2215.84	2215.39	8.17	0.33%	0.272	2.10	0.39	0.61
GMI4482921	BEXT1-20	BEXT1-19	323.38	15.0	2228.93	2217.98	2209.92	10.95	2.49%	0.711	2.81	0.21	6.43
GMI4482923	BEXT1-21	BEXT1-20	181.05	15.0	2230.30	2219.78	2217.98	10.52	0.99%	0.702	4.45	0.29	3.81
GMI4482925	BEXT1-22	BEXT1-21	170.29	12.0	2231.26	2220.75	2219.78	10.51	0.57%	0.690	3.54	0.45	1.19
GMI4482926	BEXT1-22A	BEXT1-22	179.02	12.0	2232.06	2221.76	2220.75	10.30	0.56%	0.686	3.21	0.43	1.19
GMI4482927	BEXT1-22B	BEXT1-22A	313.13	12.0	2231.17	2221.52	2221.76	9.65	-0.08%	0.684	1.79	1.13	0.01
GMI4480771	BEXT1-22C	BEXT1-22B	160.57	12.0	2234.14	2223.63	2221.52	10.51	1.31%	0.681	1.97	0.33	2.18
GMI4480770	BEXT1-22D	BEXT1-22C	165.02	12.0	2234.59	2223.90	2223.63	10.69	0.16%	0.677	2.70	0.66	0.33
GMI4482928	BEXT1-22E	BEXT1-22D	329.53	12.0	2235.55	2224.93	2223.90	10.62	0.31%	0.665	2.85	0.49	0.73
GMI4482932	BEXT1-22F	BEXT1-22E	164.73	12.0	2235.68	2225.67	2224.93	10.01	0.45%	0.622	3.72	0.49	1.05
GMI4482935	BEXT1-22G	STOR_16	122.48	10.0	2229.33	2213.56	2213.19	15.77	0.30%	0.401	2.45	0.53	0.44
GMI4481212	BEXT2-01	BEXT1-08	272.70	18.0	2198.94	2186.72	2186.13	12.22	0.22%	2.709	2.99	0.73	0.71
GMI4481129	BEXT2-02	BEXT2-01	239.78	18.0	2198.85	2188.40	2186.72	10.45	0.70%	2.701	3.85	0.46	3.46
GMI4481726	BEXT2-03	BEXT2-02	237.23	18.0	2202.87	2189.33	2188.40	13.54	0.39%	2.690	4.32	0.61	1.92
GMI4481130	BEXT2-03A	BEXT2-03	247.07	10.0	2203.45	2193.94	2189.33	9.51	1.87%	0.068	0.89	0.12	2.03
GMI4484061	BEXT2-03A1	BEXT2-03	256.62	18.0	2199.35	2190.10	2189.33	9.25	0.30%	2.656	3.58	0.63	1.37
GMI4484060	BEXT2-04	BEXT2-03A1	259.08	18.0	2201.40	2190.69	2190.10	10.71	0.23%	2.655	3.31	0.70	0.86
GMI4481035	BEXT2-05	BEXT2-04	239.90	18.0	2199.50	2191.07	2190.69	8.43	0.16%	2.643	2.94	0.78	0.29
GMI4481036	BEXT2-06	BEXT2-05	95.24	18.0	2200.13	2191.24	2191.07	8.89	0.18%	2.637	2.73	0.80	0.47
GMI4481037	BEXT2-06A	BEXT2-06	145.12	10.0	2203.13	2193.49	2191.24	9.64	1.55%	0.052	0.56	0.11	1.86
GMI4481038	BEXT2-06C	BEXT2-06A	236.73	10.0	2204.11	2194.76	2193.49	9.35	0.54%	0.033	1.44	0.12	1.09
GMI4481039	BEXT2-07	BEXT2-06	128.22	18.0	2201.51	2191.81	2191.24	9.70	0.44%	2.608	3.12	0.58	2.28
GMI4483385	BEXT2-070	BEXT2-07N	285.16	10.0	2239.00	2217.20	2216.76	21.80	0.15%	0.397	1.87	0.63	0.21
GMI4481043	BEXT2-07A	BEXT2-07	136.39	12.0	2202.20	2193.37	2191.81	8.83	1.15%	0.493	1.70	0.29	2.18
GMI4481040	BEXT2-07B	BEXT2-07A	306.44	12.0	2211.78	2203.22	2193.37	8.56	3.21%	0.492	4.76	0.22	3.98
GMI4480648	BEXT2-07C	BEXT2-07B	350.71	12.0	2213.72	2204.69	2203.22	9.03	0.42%	0.487	3.41	0.43	1.13
GMI4482852	BEXT2-07D	BEXT2-07C	235.50	12.0	2214.13	2205.59	2204.69	8.54	0.38%	0.477	2.49	0.38	1.07
4782	BEXT2-07DAA	BEXT2-07D	24.00	12.0	2214.13	2205.64	2205.59	8.49	0.22%	0.466	2.26	0.47	0.71
GMI4482853	BEXT2-07E	BEXT2-07DAA	414.94	12.0	2214.29	2206.23	2205.64	8.06	0.14%	0.455	1.83	0.51	0.48

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482904	BEXT2-07F	BEXT2-07E	328.10	12.0	2217.99	2207.60	2206.23	10.39	0.42%	0.445	2.12	0.36	1.17
GMI4482903	BEXT2-07G	BEXT2-07F	323.78	10.0	2220.50	2212.22	2207.60	8.28	1.43%	0.432	3.51	0.33	1.40
GMI4483817	BEXT2-07H	BEXT2-07G	20.10	10.0	2220.75	2212.49	2212.22	8.26	1.34%	0.418	3.50	0.41	1.36
GMI4482902	BEXT2-07I	BEXT2-07H	168.94	10.0	2222.10	2213.40	2212.49	8.70	0.54%	0.417	2.92	0.44	0.71
GMI4483380	BEXT2-07J	BEXT2-07I	158.84	10.0	2223.80	2213.46	2213.40	10.34	0.04%	0.416	1.84	0.79	-0.12
GMI4483381	BEXT2-07K	BEXT2-07J	367.84	10.0	2229.00	2214.30	2213.46	14.70	0.23%	0.404	1.64	0.53	0.33
GMI4483382	BEXT2-07L	BEXT2-07K	382.94	10.0	2237.20	2215.34	2214.30	21.86	0.27%	0.402	2.21	0.50	0.40
GMI4483383	BEXT2-07M	BEXT2-07L	271.44	10.0	2238.30	2216.00	2215.34	22.30	0.24%	0.400	2.16	0.54	0.36
GMI4483384	BEXT2-07N	BEXT2-07M	330.87	10.0	2239.40	2216.76	2216.00	22.64	0.23%	0.399	2.08	0.53	0.34
GMI4482953	BEXT2-07Q1	BEXT2-07Q	82.65	10.0	2240.20	2225.20	2224.09	15.00	1.34%	0.121	1.39	0.18	1.66
GMI4482954	BEXT2-07Q2	BEXT2-07Q1	193.24	10.0	2240.71	2225.99	2225.20	14.72	0.41%	0.118	2.14	0.25	0.87
GMI4482955	BEXT2-07Q3	BEXT2-07Q2	358.91	10.0	2239.11	2227.47	2225.99	11.64	0.41%	0.094	1.54	0.21	0.89
GMI4482956	BEXT2-07Q4	BEXT2-07Q3	332.21	10.0	2238.26	2229.16	2227.47	9.10	0.51%	0.091	1.79	0.19	1.00
GMI4482961	BEXT2-07Q4A	BEXT2-07Q4	119.54	10.0	2238.38	2229.76	2229.16	8.62	0.50%	0.006	0.35	0.05	1.08
GMI4482962	BEXT2-07Q5	BEXT2-07Q4	263.39	10.0	2239.30	2230.26	2229.16	9.04	0.42%	0.041	1.09	0.14	0.95
GMI4482963	BEXT2-07Q6	BEXT2-07Q5	278.42	10.0	2240.64	2231.52	2230.26	9.12	0.45%	0.027	1.05	0.11	1.01
GMI4482964	BEXT2-07Q7	BEXT2-07Q6	279.02	10.0	2242.06	2232.78	2231.52	9.28	0.45%	0.017	0.93	0.09	1.01
GMI4482965	BEXT2-07Q8	BEXT2-07Q7	234.76	10.0	2243.55	2233.69	2232.78	9.86	0.39%	0.005	0.48	0.05	0.95
GMI4482978	BEXT2-07U5	BEXT2-07U4	303.40	10.0	2245.50	2235.10	2233.78	10.40	0.44%	0.005	0.49	0.05	1.01
GMI4481044	BEXT2-08	BEXT2-07	119.94	18.0	2200.98	2193.03	2191.81	7.95	1.02%	2.162	4.20	0.37	5.26
GMI4481045	BEXT2-09	BEXT2-08	261.23	18.0	2203.99	2195.28	2193.03	8.71	0.86%	2.140	5.23	0.41	4.69
GMI4481046	BEXT2-10	BEXT2-09	259.45	18.0	2206.07	2195.91	2195.28	10.16	0.24%	2.045	3.57	0.60	1.58
GMI4481051	BEXT2-11	BEXT2-10	258.20	18.0	2205.19	2196.83	2195.91	8.36	0.36%	2.025	3.24	0.48	2.37
NEW416	BEXT2-12A	BEXT2-11	115.80	18.0	2208.00	2197.76	2196.83	10.24	0.80%	2.007	4.30	0.38	4.57
NEW418	BEXT2-13	BEXT2-12A	42.00	15.0	2207.28	2198.09	2197.76	9.19	0.80%	2.005	4.49	0.64	2.03
GMI4481052	BEXT2-14	BEXT2-13	158.55	15.0	2208.07	2198.66	2198.09	9.41	0.36%	1.429	2.99	0.53	1.28
GMI4481062	BEXT2-15	BEXT2-14	105.50	15.0	2208.93	2198.87	2198.66	10.06	0.20%	1.379	2.86	0.65	0.64
GMI4481065	BEXT2-16	BEXT2-15	247.78	15.0	2210.98	2199.48	2198.87	11.50	0.25%	1.373	2.70	0.58	0.87
NEW209	BEXT2-16C	BEXT2-16	126.39	15.0	2211.55	2199.77	2199.48	11.78	0.23%	1.364	2.75	0.62	0.80
GMI4481066	BEXT2-17	BEXT2-16C	129.86	15.0	2211.53	2200.12	2199.77	11.41	0.27%	1.352	2.70	0.59	1.00
GMI4481067	BEXT2-18	BEXT2-17	87.25	15.0	2210.42	2200.39	2200.12	10.03	0.31%	1.351	2.82	0.58	1.17
GMI4480880	BEXT2-19B2A10	BEXT2-19B2A9	342.57	12.0	2237.88	2233.16	2232.44	4.72	0.21%	0.067	0.97	0.16	1.08
GMI4481082	BEXT2-19B2A11	BEXT2-19B2A10	412.48	12.0	2239.22	2235.73	2233.16	3.49	0.62%	0.043	1.10	0.10	1.93
GMI4481081	BEXT2-19B2A12	BEXT2-19B2A11	252.00	12.0	2238.51	2236.46	2235.73	2.05	0.29%	0.032	1.11	1.46	1.31
GMI4481162	BEXT2-19B2A8	BEXT2-19B2A6	285.17	12.0	2237.91	2232.04	2231.30	5.87	0.26%	0.083	1.25	0.17	1.19
GMI4480879	BEXT2-19B2A9	BEXT2-19B2A8	315.40	12.0	2237.46	2232.44	2232.04	5.02	0.13%	0.080	1.11	0.22	0.81

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483698	BEXT2-20	BEXT2-18	547.46	15.0	2216.88	2202.02	2200.39	14.86	0.30%	1.158	2.73	0.48	1.31
GMI4481058	BEXT2-21	BEXT2-20	168.92	12.0	2217.64	2202.74	2202.02	14.90	0.43%	1.138	3.37	0.66	0.49
GMI4480989	BEXT2-23	BEXT2-21	495.85	12.0	2217.92	2203.64	2202.74	14.28	0.18%	1.088	2.54	0.92	-0.03
GMI4480990	BEXT2-24	BEXT2-23	303.46	12.0	2217.13	2205.09	2203.64	12.04	0.48%	1.065	2.66	0.57	0.66
GMI4480991	BEXT2-25	BEXT2-24	262.30	12.0	2217.39	2205.99	2205.09	11.40	0.34%	1.060	3.18	0.68	0.40
GMI4480994	BEXT2-26	BEXT2-25	26.17	12.0	2217.41	2205.93	2205.99	11.48	-0.23%	1.048	2.44	0.90	0.15
GMI4480996	BEXT2-27	BEXT2-26	295.52	12.0	2218.41	2207.16	2205.93	11.25	0.42%	1.046	2.59	0.59	0.56
GMI4480998	BEXT2-28	BEXT2-27	421.92	12.0	2218.50	2208.40	2207.16	10.10	0.29%	1.042	2.99	0.71	0.31
NEW1175246	BUS1-01	BUS1-01AA1	138.96	15.0	2137.56	2129.91	2129.42	7.65	0.35%	2.404	3.39	0.84	0.28
GMI4480655	BUS1-01A	FG1-13	81.93	15.0	2136.39	2128.56	2127.94	7.83	0.77%	2.397	3.56	0.68	1.55
NEW345	BUS1-01AA	BUS1-01A	64.89	15.0	2136.37	2129.04	2128.56	7.33	0.73%	2.402	4.43	0.66	1.47
NEW344	BUS1-01AA1	BUS1-01AA	120.89	15.0	2141.77	2129.42	2129.04	12.35	0.32%	2.402	3.73	0.86	0.14
GMI4483570	BUS1-01B	BUS1-01	359.17	12.0	2145.61	2131.89	2129.91	13.72	0.55%	2.407	4.74	2.64	-0.56
GMI4481407	BUS1-02	BUS1-01B	154.45	10.0	2146.20	2132.28	2131.89	13.92	0.25%	0.612	1.74	3.01	0.16
GMI4481406	BUS1-02A	BUS1-02	212.29	10.0	2146.78	2138.86	2132.28	7.92	3.10%	0.494	2.74	0.29	2.21
GMI4481405	BUS1-03	BUS1-02A	130.75	10.0	2148.78	2139.36	2138.86	9.42	0.38%	0.493	3.29	0.59	0.46
GMI4481404	BUS1-03A	BUS1-03	216.05	10.0	2153.60	2145.40	2139.36	8.20	2.80%	0.494	3.26	0.30	2.07
GMI4481403	BUS1-04	BUS1-03A	359.44	10.0	2160.86	2152.28	2145.40	8.58	1.91%	0.443	4.82	0.32	1.68
GMI4779204	BUS1-05	BUS1-04	370.11	10.0	2167.95	2158.89	2152.28	9.06	1.79%	0.261	3.26	0.24	1.79
GMI4480918	BUS1-05A	BUS1-05	357.52	10.0	2174.68	2165.62	2158.89	9.06	1.88%	0.239	3.81	0.23	1.87
GMI4480917	BUS1-05B	BUS1-05A	327.60	10.0	2178.66	2171.40	2165.62	7.26	1.76%	0.085	1.93	0.14	1.95
GMI4480791	BUS2-01	BUS1-01B	300.67	10.0	2150.97	2138.11	2131.89	12.86	2.07%	1.758	5.40	0.74	0.45
GMI4483575	BUS2-01A	BUS2-01	148.51	12.0	2153.73	2139.71	2138.11	14.02	1.07%	1.106	4.28	0.46	1.48
GMI4483576	BUS2-01B	BUS2-01A	371.33	12.0	2153.99	2143.70	2139.71	10.29	1.07%	1.105	4.83	0.47	1.48
GMI4481410	BUS2-02	BUS2-01	258.89	12.0	2151.75	2140.73	2138.11	11.02	1.01%	0.562	2.83	0.32	1.95
MSTR1175260	BUS2-02A	BUS2-02A1	76.55	10.0	2150.50	2141.60	2140.87	8.90	0.95%	0.191	2.20	0.24	1.31
MSTR1175261	BUS2-02A1	BUS2-02	50.12	10.0	2150.00	2140.87	2140.73	9.13	0.28%	0.191	1.66	0.35	0.62
NEW1175047	BUS2-03	BUS2-01B	146.41	10.0	2156.67	2145.27	2143.70	11.40	1.07%	1.104	4.83	0.68	0.49
GMI4481413	BUS2-04	BUS2-03	363.84	10.0	2154.86	2147.86	2145.27	7.00	0.71%	0.509	2.53	0.44	0.79
GMI4483691	BUS2-04A	BUS2-04	328.35	10.0	2159.14	2148.50	2147.86	10.64	0.19%	0.002	0.13	0.03	1.46
GMI4779191	BUS2-05	BUS2-04	300.78	10.0	2159.99	2151.69	2147.86	8.30	1.27%	0.390	3.19	0.32	1.34
GMI4779190	BUS2-06	BUS2-05	361.51	10.0	2162.60	2153.84	2151.69	8.76	0.59%	0.256	2.65	0.32	0.93
GMI4779166	BUS2-07	BUS2-06	299.62	10.0	2167.06	2156.32	2153.84	10.74	0.83%	0.053	1.67	0.13	1.34
GMI4482020	BUS9-04B	CEN9-09A	317.76	10.0	2205.61	2196.14	2194.77	9.47	0.43%	0.020	1.06	0.10	0.99
GMI4482023	BUS9-04C	BUS9-04B	53.54	10.0	2205.59	2196.37	2196.14	9.22	0.43%	0.017	1.03	0.09	0.99
GMI4481366	CEN1-01	L1-01	381.37	15.0	2155.84	2150.14	2146.92	5.70	0.84%	1.187	4.72	0.39	2.97

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481368	CEN1-02	CEN1-01	313.69	15.0	2158.64	2152.00	2150.14	6.64	0.59%	1.172	3.96	0.41	2.31
GMI4481369	CEN1-03	CEN1-02	253.61	15.0	2163.75	2156.73	2152.00	7.02	1.87%	1.172	4.65	0.30	5.01
GMI4481363	CEN1-04	CEN1-03	301.84	15.0	2171.90	2162.02	2156.73	9.88	1.75%	1.156	5.78	0.30	4.83
GMI4481362	CEN1-05	CEN1-04	301.93	15.0	2176.49	2164.91	2162.02	11.58	0.96%	1.135	4.85	0.37	3.29
GMI4481361	CEN1-06	CEN1-05	189.44	15.0	2175.59	2166.27	2164.91	9.32	0.72%	1.128	4.11	0.39	2.70
GMI4481360	CEN1-06A1	CEN1-06	169.19	15.0	2174.42	2168.00	2166.27	6.42	1.02%	1.094	4.58	0.29	4.74
NEW206	CEN1-07	CEN1-06A1	360.47	15.0	2182.14	2171.74	2168.00	10.40	1.04%	1.092	4.54	0.39	2.79
GMI4481359	CEN1-08	CEN1-07	552.90	15.0	2188.14	2179.84	2171.74	8.30	1.47%	1.012	4.25	0.29	4.46
GMI4481358	CEN1-09	CEN1-08	233.29	15.0	2190.72	2182.47	2179.84	8.25	1.13%	0.752	4.15	0.27	4.05
GMI4481380	CEN1-10	CEN1-09	301.26	15.0	2192.31	2183.91	2182.47	8.40	0.48%	0.750	3.53	0.36	2.38
GMI4481338	CEN1-11	CEN1-10	375.00	15.0	2193.72	2185.34	2183.91	8.38	0.38%	0.746	2.92	0.36	2.05
GMI4481344	CEN1-12	CEN1-11	245.43	15.0	2197.52	2188.14	2185.34	9.38	1.14%	0.495	2.63	0.22	4.34
GMI4481341	CEN1-12E1	CEN1-12	160.47	10.0	2198.50	2190.92	2188.14	7.58	1.73%	0.006	0.36	0.04	2.01
GMI4481343	CEN1-13	CEN1-12	66.60	15.0	2198.26	2188.86	2188.14	9.40	1.08%	0.489	3.67	0.23	4.21
GMI4481342	CEN1-14	CEN1-13	344.16	15.0	2202.69	2192.51	2188.86	10.18	1.06%	0.486	3.62	0.22	4.17
GMI4481336	CEN1-15	CEN1-14	347.07	12.0	2214.32	2195.54	2192.51	18.78	0.87%	0.047	1.10	0.10	2.28
GMI4481335	CEN1-16	CEN1-15	353.17	12.0	2207.46	2198.62	2195.54	8.84	0.87%	0.044	1.75	0.10	2.29
GMI4481334	CEN1-17	CEN1-16	150.89	12.0	2208.46	2200.00	2198.62	8.46	0.91%	0.041	1.72	0.09	2.35
GMI4481312	CEN1-18	CEN1-17	194.13	12.0	2209.37	2200.39	2200.00	8.98	0.20%	0.039	1.14	0.15	1.08
GMI4481347	CEN6-01	CEN1-07	195.67	10.0	2183.22	2174.12	2171.74	9.10	1.22%	0.082	1.17	0.15	1.61
GMI4482511	CEN6-02	CEN6-01	482.59	10.0	2187.12	2179.28	2174.12	7.84	1.07%	0.058	1.94	0.13	1.53
GMI4482510	CEN6-03	CEN6-02	407.27	10.0	2194.83	2183.93	2179.28	10.90	1.14%	0.053	2.03	0.12	1.59
GMI4482477	CEN6-04	CEN6-03	441.89	10.0	2197.73	2187.43	2183.93	10.30	0.79%	0.049	1.89	0.13	1.32
GMI4779162	CEN7-03B	CEN7-03A	320.92	10.0	2209.89	2199.29	2198.02	10.60	0.40%	0.033	1.18	0.13	0.93
GMI4482012	CEN7-03C	CEN7-03B	152.90	10.0	2209.74	2199.48	2199.29	10.26	0.12%	0.032	0.89	0.19	0.51
GMI4482011	CEN7-03D	CEN7-03C	292.04	10.0	2210.19	2200.19	2199.48	10.00	0.24%	0.027	0.75	0.13	0.73
GMI4482010	CEN7-03E	CEN7-03D	304.52	10.0	2210.02	2200.86	2200.19	9.16	0.22%	0.021	0.87	0.12	0.70
GMI4482009	CEN7-03F	CEN7-03E	237.09	10.0	2209.04	2201.44	2200.86	7.60	0.24%	0.017	0.80	0.10	0.74
GMI4481987	CEN7-03G	CEN7-03F	94.84	10.0	2208.40	2201.60	2201.44	6.80	0.17%	0.014	0.73	0.11	0.62
GMI4481985	CEN7-03H	CEN7-03G	208.53	10.0	2208.09	2202.07	2201.60	6.02	0.23%	0.008	0.52	0.07	0.72
GMI4481984	CEN7-03I	CEN7-03H	302.44	10.0	2211.68	2202.74	2202.07	8.94	0.22%	0.006	0.58	0.07	0.72
GMI4481983	CEN7-03J	CEN7-03I	10.07	10.0	2212.06	2202.92	2202.74	9.14	1.79%	0.004	0.65	0.03	2.05
GMI4481346	CEN9-01	CEN1-11	160.54	10.0	2194.69	2186.64	2185.34	8.05	0.81%	0.093	0.82	0.18	1.29
GMI4482756	CEN9-02	CEN9-01	294.18	10.0	2200.13	2191.73	2186.64	8.40	1.73%	0.091	2.50	0.15	1.93
GMI4482758	CEN9-03	CEN9-02	275.05	10.0	2203.79	2193.89	2191.73	9.90	0.79%	0.083	2.29	0.17	1.28
GMI4482022	CEN9-04D	BUS9-04C	299.55	10.0	2206.76	2197.66	2196.37	9.10	0.43%	0.012	0.86	0.08	0.99

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482018	CEN9-04E	CEN9-04D	298.46	10.0	2209.15	2198.99	2197.66	10.16	0.45%	0.005	0.56	0.05	1.02
GMI4482757	CEN9-09A	CEN9-03	203.72	10.0	2208.88	2194.77	2193.89	14.11	0.43%	0.024	0.93	0.11	0.99
GMI4482084	CH11-01	M3-13	326.15	12.0	2172.17	2167.22	2166.04	4.95	0.36%	0.254	1.20	0.28	1.25
GMI4482090	CH11-02	CH11-01	203.64	12.0	2174.44	2168.22	2167.22	6.22	0.49%	0.248	2.30	0.26	1.50
GMI4482001	CH11-02A	CH11-02	187.09	12.0	2176.17	2171.29	2168.22	4.88	1.64%	0.230	2.82	0.18	2.97
GMI4482000	CH11-03	CH11-02A	248.86	12.0	2181.47	2175.37	2171.29	6.10	1.64%	0.226	3.60	0.18	2.97
GMI4481999	CH11-04	CH11-03	111.46	12.0	2187.26	2179.94	2175.37	7.32	4.10%	0.222	4.16	0.14	4.83
GMI4481998	CH11-05	CH11-04	196.63	12.0	2231.70	2227.35	2179.94	4.35	24.11%	0.218	6.52	0.09	12.22
GMI4481976	CH11-06	CH11-05	262.01	12.0	2249.74	2244.80	2227.35	4.94	6.66%	0.214	6.75	0.14	6.23
GMI4481971	CH11-06A	CH11-06	201.50	12.0	2259.78	2255.68	2244.80	4.10	5.40%	0.197	5.05	0.13	5.60
GMI4481972	CH11-07	CH11-06A	214.12	12.0	2264.02	2257.97	2255.68	6.05	1.07%	0.154	3.15	0.18	2.43
GMI4481973	CH11-07A	CH11-07	130.24	12.0	2273.64	2258.26	2257.97	15.38	0.22%	0.149	1.77	0.27	1.02
4562	D1-01	M3-41B	43.63	10.0	2227.95	2214.70	2214.09	13.25	1.40%	0.376	1.47	0.88	0.71
GMI4481776	D1-02	D1-01	229.27	10.0	2232.26	2214.70	2214.70	17.56	0.00%	0.372	1.08	1.03	-0.34
GMI4481777	D1-03	D1-02	262.05	10.0	2233.32	2215.77	2214.70	17.55	0.41%	0.365	1.36	0.42	0.62
GMI4481778	D1-04	D1-03	337.59	10.0	2235.60	2216.76	2215.77	18.84	0.29%	0.360	2.32	0.48	0.47
GMI4481779	D1-05	D1-04	306.67	10.0	2235.17	2217.77	2216.76	17.40	0.33%	0.355	2.23	0.44	0.53
GMI4481780	D1-06	D1-05	352.29	10.0	2237.27	2218.77	2217.77	18.50	0.28%	0.350	2.23	0.47	0.47
GMI4482275	D1-07	D1-06	83.71	10.0	2236.98	2218.98	2218.77	18.00	0.25%	0.305	1.89	0.46	0.46
GMI4481752	D1-08	D1-07	259.67	10.0	2237.21	2219.61	2218.98	17.60	0.24%	0.298	1.95	0.44	0.46
GMI4482280	D1-09	D1-08	269.56	10.0	2236.47	2220.58	2219.61	15.89	0.36%	0.268	2.01	0.37	0.65
GMI4482281	D1-10	D1-09	284.56	10.0	2237.11	2221.17	2220.58	15.94	0.21%	0.261	1.90	0.46	0.44
GMI4482282	D1-11	D1-10	41.58	10.0	2237.04	2221.62	2221.17	15.42	1.08%	0.245	2.14	0.27	1.35
GMI4481753	D1-12	D1-11	257.51	10.0	2232.47	2222.37	2221.62	10.10	0.29%	0.216	2.20	0.38	0.61
GMI4481758	D1-13	D1-12	408.94	10.0	2233.72	2223.60	2222.37	10.12	0.30%	0.174	1.63	0.31	0.67
GMI4481760	D1-13A	D1-13	199.46	10.0	2236.24	2224.18	2223.60	12.06	0.29%	0.076	1.06	0.20	0.75
GMI4482201	DAV1-01	A1-15	377.29	15.0	2188.60	2180.06	2161.39	8.54	4.95%	0.406	2.17	0.14	9.66
GMI4482200	DAV1-02	DAV1-01	218.00	15.0	2209.70	2198.12	2180.06	11.58	8.28%	0.403	6.73	0.12	12.64
GMI4482199	DAV1-03	DAV1-02	205.65	15.0	2222.68	2211.02	2198.12	11.66	6.27%	0.400	6.87	0.13	10.94
GMI4482198	DAV1-03A	DAV1-03	43.33	15.0	2223.73	2211.18	2211.02	12.55	0.37%	0.396	2.98	0.32	2.37
GMI1654596	DAV1-03B	DAV1-03A	164.24	15.0	2225.20	2212.04	2211.18	13.16	0.52%	0.390	2.20	0.23	2.88
GMI1654595	DAV1-04	DAV1-03B	46.88	15.0	2224.89	2212.13	2212.04	12.76	0.20%	0.382	2.14	0.32	1.60
GMI4482197	DAV1-05	DAV1-04	303.54	15.0	2224.13	2212.93	2212.13	11.20	0.26%	0.379	1.93	0.27	1.94
GMI4482196	DAV1-06	DAV1-05	148.88	15.0	2225.04	2213.40	2212.93	11.64	0.32%	0.342	2.08	0.25	2.20
GMI4482195	DAV1-06A	DAV1-06	151.67	12.0	2225.72	2213.94	2213.40	11.78	0.36%	0.049	0.66	0.13	1.44
GMI4482191	DAV1-07	DAV1-06	300.94	15.0	2227.40	2214.50	2213.40	12.90	0.37%	0.291	2.06	0.22	2.44

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481898	DAV1-08	DAV1-07	300.23	15.0	2228.22	2215.18	2214.50	13.04	0.23%	0.287	1.95	0.26	1.87
GMI4481899	DAV1-09	DAV1-08	46.19	15.0	2228.05	2215.45	2215.18	12.60	0.58%	0.282	2.08	0.19	3.18
GMI4481821	DAV1-10	DAV1-09	311.37	12.0	2227.20	2216.37	2215.45	10.83	0.30%	0.279	2.32	0.33	1.08
GMI4481823	DAV1-10A	DAV1-10	210.46	12.0	2227.84	2216.99	2216.37	10.85	0.30%	0.165	1.50	0.24	1.19
GMI4481822	DAV1-10B	DAV1-10A	211.12	12.0	2229.86	2217.62	2216.99	12.24	0.30%	0.129	1.56	0.21	1.23
GMI4481824	DAV1-11	DAV1-10	242.22	12.0	2227.12	2216.90	2216.37	10.22	0.22%	0.112	1.01	0.21	1.06
GMI4481826	DAV1-12	DAV1-11	297.24	12.0	2228.81	2217.93	2216.90	10.88	0.35%	0.109	1.55	0.18	1.36
GMI4481825	DAV1-13	DAV1-12	269.09	12.0	2231.28	2218.78	2217.93	12.50	0.31%	0.105	1.61	0.19	1.29
GMI4480763	DAV1-13A	DAV1-13	205.77	12.0	2232.17	2219.43	2218.78	12.75	0.31%	0.023	0.57	0.31	1.37
NEW417	DAV1-13B	DAV1-13A	75.60	12.0	2232.46	2219.66	2219.43	12.80	0.32%	0.004	0.35	0.04	1.40
GMI4481828	DAV1-14	DAV1-13	113.79	12.0	2230.77	2219.08	2218.78	11.69	0.26%	0.078	1.29	0.17	1.20
NEW351	DAV1-15	DAV1-15A	48.91	12.0	2230.71	2219.94	2219.81	10.77	0.26%	0.053	1.21	0.14	1.22
GMI4481829	DAV1-15A	DAV1-14	236.54	12.0	2230.87	2219.81	2219.08	11.06	0.31%	0.057	1.17	0.14	1.33
GMI4481831	DAV1-16	DAV1-15	170.30	12.0	2229.79	2221.78	2219.94	8.01	1.08%	0.041	1.24	0.09	2.55
GMI4779484	DAV1-16A	DAV1-16	81.50	12.0	2229.61	2222.26	2221.78	7.35	0.59%	0.011	0.84	0.05	1.91
NEW1175082	DEP1-01	STOR_14	200.59	12.0	2275.30	2236.50	2236.05	38.80	0.22%	0.527	2.42	0.51	0.66
NEW1175003	DEP1-02	DEP1-01	117.10	12.0	2278.56	2236.56	2236.50	42.00	0.05%	0.528	1.74	0.64	0.04
NEW1175002	DEP1-03	DEP1-02	135.06	12.0	2279.10	2237.00	2236.56	42.10	0.33%	0.527	1.93	0.42	0.90
NEW1175001	DEP1-04	DEP1-03	125.53	12.0	2279.35	2237.45	2237.00	41.90	0.36%	0.527	2.56	0.43	0.97
NEW1175000	DEP1-05	DEP1-04	81.29	12.0	2280.73	2237.73	2237.45	43.00	0.34%	0.526	2.48	0.44	0.94
NEW1174999	DEP1-06	DEP1-05	202.97	12.0	2282.55	2238.46	2237.73	44.10	0.36%	0.526	2.54	0.42	0.97
NEW1174998	DEP1-07	DEP1-06	175.91	12.0	2281.16	2238.96	2238.46	42.20	0.29%	0.526	2.47	0.46	0.81
NEW1174997	DEP1-08	DEP1-07	294.83	12.0	2280.77	2240.27	2238.96	40.50	0.44%	0.525	2.57	0.39	1.14
NEW1174996	DEP1-09	DEP1-08	188.11	12.0	2276.80	2240.70	2240.27	36.11	0.23%	0.505	2.35	0.49	0.69
NEW1174995	DEP1-10	DEP1-09	161.79	12.0	2275.71	2241.11	2240.70	34.60	0.26%	0.505	2.16	0.45	0.75
NEW1174994	DEP1-11	DEP1-10	108.17	12.0	2274.62	2241.52	2241.11	33.10	0.38%	0.504	2.46	0.40	1.03
NEW1174993	DEP1-12	DEP1-11	111.64	12.0	2273.22	2241.62	2241.52	31.60	0.09%	0.486	1.98	0.57	0.26
NEW1174992	DEP1-13	DEP1-12	87.50	12.0	2272.52	2241.81	2241.62	30.71	0.22%	0.485	1.76	0.50	0.68
NEW1174991	DEP1-14	DEP1-13	79.05	12.0	2271.36	2242.56	2241.81	28.81	0.94%	0.485	2.55	0.31	1.93
NEW1174990	DEP1-15	DEP1-14	86.10	12.0	2270.68	2242.88	2242.56	27.80	0.38%	0.484	2.65	0.42	1.05
NEW1174989	DEP1-16	DEP1-15	60.56	12.0	2270.71	2243.11	2242.88	27.60	0.38%	0.483	2.42	0.42	1.05
NEW1174988	DEP1-17	DEP1-16	212.91	12.0	2272.54	2243.68	2243.11	28.86	0.27%	0.435	2.22	0.41	0.86
NEW1174987	DEP1-18	DEP1-17	179.67	12.0	2273.01	2244.30	2243.68	28.71	0.35%	0.434	2.37	0.37	1.03
NEW1174986	DEP1-19	DEP1-18	166.19	12.0	2271.45	2244.65	2244.30	26.80	0.21%	0.433	2.16	0.46	0.71
NEW1174985	DEP1-20	DEP1-19	190.51	12.0	2269.61	2245.12	2244.65	24.49	0.25%	0.428	2.03	0.41	0.81
NEW1174984	DEP1-21	DEP1-20	260.57	12.0	2267.07	2245.86	2245.12	21.21	0.28%	0.406	2.20	0.38	0.92

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
NEW1174983	DEP1-22	DEP1-21	122.70	12.0	2266.47	2246.27	2245.86	20.20	0.34%	0.405	2.31	0.37	1.04
GMI4482029	FG1-01	FG1-01A	150.09	36.0	2133.42	2119.31	2119.00	14.11	0.21%	15.834	4.84	0.72	5.39
NEW132	FG1-01A	OFALL_10	39.60	36.0	2133.54	2119.00	2118.50	14.54	1.26%	15.845	6.93	0.62	36.64
GMI4482028	FG1-02	FG2-01	255.18	36.0	2132.26	2120.03	2119.59	12.23	0.17%	10.444	3.52	0.61	8.95
GMI4482027	FG1-03	FG1-02	309.49	36.0	2139.91	2121.13	2120.03	18.78	0.36%	10.458	4.43	0.43	17.42
GMI4480686	FG1-04	FG1-03	400.32	36.0	2134.26	2121.83	2121.13	12.43	0.17%	8.770	4.22	0.51	10.73
GMI4480687	FG1-05	FG1-04	538.09	36.0	2133.25	2122.90	2121.83	10.35	0.20%	8.773	3.97	0.47	12.04
GMI4482026	FG1-06	FG1-05	360.50	36.0	2138.95	2123.70	2122.90	15.25	0.22%	8.773	4.19	0.47	13.23
NEW082719	FG1-07	FG1-07A	76.80	36.0	2136.35	2124.59	2124.59	11.76	0.01%	0.014	0.14	0.39	3.36
GMI4482041	FG1-07A	FG1-06	222.18	36.0	2137.00	2124.59	2123.70	12.41	0.40%	8.773	4.67	0.39	20.72
GMI4482040	FG1-08	FG1-07A	304.45	36.0	2135.24	2125.22	2124.59	10.02	0.21%	8.773	4.52	0.49	12.61
GMI4482039	FG1-09	FG1-08	196.11	36.0	2132.97	2125.82	2125.22	7.15	0.30%	8.764	4.18	0.44	17.00
GMI4482054	FG1-10	FG1-09	210.05	36.0	2132.36	2126.21	2125.82	6.15	0.18%	8.764	4.09	0.51	11.33
GMI4483608	FG1-11	FG1-10	290.74	36.0	2136.03	2127.02	2126.21	9.01	0.28%	8.765	4.15	0.43	15.89
GMI4482056	FG1-12	FG1-11	187.83	36.0	2136.03	2127.36	2127.02	8.67	0.18%	8.765	4.14	0.51	11.22
GMI4483605	FG1-13	FG1-12	267.92	36.0	2136.89	2127.94	2127.36	8.95	0.21%	8.764	3.87	0.48	12.89
GMI4483567	FG1-14	FG1-13	216.13	36.0	2135.77	2128.11	2127.94	7.66	0.08%	8.335	3.43	0.57	4.76
NEW1175064	FG2-01	FG1-01	43.10	36.0	2134.36	2119.59	2119.31	14.77	0.64%	10.747	3.35	0.66	26.90
NEW1175237	FG2-02	FG2-01	239.26	12.0	2134.59	2122.28	2119.59	12.31	1.13%	0.327	0.99	0.24	2.32
NEW1175236	FG2-03	FG2-02	137.79	12.0	2133.40	2122.70	2122.28	10.70	0.30%	0.325	2.29	0.36	1.05
NEW1175235	FG2-04	FG2-03	168.99	12.0	2131.48	2123.33	2122.70	8.15	0.37%	0.325	2.20	0.32	1.20
NEW1175065	FG2-04A	FG2-04	104.22	10.0	2131.97	2123.65	2123.33	8.32	0.30%	0.013	0.29	0.09	0.83
NEW1175234	FG2-05	FG2-04	76.39	12.0	2130.26	2123.60	2123.33	6.66	0.35%	0.314	2.21	0.33	1.16
NEW1175233	FG2-06	FG2-05	74.90	12.0	2131.14	2123.91	2123.60	7.23	0.41%	0.313	2.23	0.31	1.29
NEW1175232	FG2-07	FG2-06	192.92	12.0	2130.03	2124.63	2123.91	5.41	0.37%	0.308	2.30	0.32	1.21
GMI4779175	FG2-08	FG2-07	249.70	10.0	2130.06	2125.73	2125.26	4.33	0.19%	0.290	1.98	0.52	0.38
GMI4779178	FG2-09	FG2-08	71.83	10.0	2129.76	2125.75	2125.73	4.01	0.03%	0.274	1.43	0.60	-0.02
GMI4481731	FWN1-01	AEXT2-03	64.84	15.0	2173.20	2158.83	2157.04	14.37	2.76%	0.515	1.75	0.18	7.00
GMI4481735	FWN1-02	FWN1-01	49.95	15.0	2172.40	2161.03	2158.83	11.37	4.41%	0.515	5.87	0.16	8.98
GMI4481736	FWN1-03	FWN1-02	301.75	15.0	2178.45	2162.93	2161.03	15.52	0.63%	0.515	3.18	0.26	3.07
GMI4482263	FWN1-04	FWN1-03	185.11	18.0	2176.77	2163.05	2162.93	13.72	0.07%	0.515	1.85	0.37	1.36
GMI4482266	FWN1-05	FWN1-04	259.48	18.0	2174.53	2163.49	2163.05	11.04	0.17%	0.509	1.60	0.28	2.52
GMI4482268	FWN1-06	FWN1-05	274.65	18.0	2171.88	2163.91	2163.49	7.97	0.15%	0.508	1.88	0.30	2.37
GMI4482267	FWN1-07	FWN1-06	320.60	18.0	2186.57	2175.30	2163.91	11.27	3.55%	0.506	2.85	0.13	13.36
GMI4480786	FWN1-08	FWN1-07	174.16	18.0	2190.85	2180.02	2175.30	10.83	2.71%	0.503	5.32	0.14	11.61
GMI4480785	FWN1-09	FWN1-08	372.47	18.0	2193.75	2180.10	2180.02	13.65	0.02%	0.502	1.67	0.47	0.58

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GMI4482752	FWN1-10	FWN1-09	338.25	18.0	2195.53	2180.51	2180.10	15.02	0.12%	0.499	1.23	0.30	2.06
GMI4482753	FWN1-11	FWN1-10	307.18	18.0	2194.50	2181.06	2180.51	13.44	0.18%	0.498	1.86	0.27	2.61
GMI4482754	FWN1-12	FWN1-11	112.85	18.0	2194.76	2181.40	2181.06	13.36	0.30%	0.497	2.17	0.24	3.54
GMI4482749	FWN1-13	FWN1-12	356.59	18.0	2196.41	2181.85	2181.40	14.56	0.13%	0.483	1.85	0.32	2.13
GMI4482119	FWN1-14	FWN1-13	187.14	18.0	2197.79	2182.14	2181.85	15.65	0.15%	0.477	1.68	0.27	2.42
GMI4482118	FWN1-15	FWN1-14	100.87	18.0	2198.84	2182.16	2182.14	16.68	0.02%	0.476	1.54	0.36	0.56
GMI4482117	FWN1-16	FWN1-15	259.71	18.0	2199.92	2182.87	2182.16	17.05	0.27%	0.476	1.68	0.24	3.37
GMI4482116	FWN1-17	FWN1-16	153.89	18.0	2197.99	2182.59	2182.87	15.40	-0.18%	0.476	1.21	0.51	2.66
GMI4482115	FWN1-18	FWN1-17	244.90	18.0	2195.29	2183.53	2182.59	11.76	0.38%	0.471	1.25	0.22	4.09
GMI4481703	FWN1-19	FWN1-18	175.44	18.0	2188.13	2183.78	2183.53	4.35	0.14%	0.453	1.96	0.30	2.32
GMI4480832	FWN1-20	FWN1-19	377.23	18.0	2194.77	2184.09	2183.78	10.68	0.08%	0.453	1.50	0.33	1.66
GMI4481704	FWN1-21	FWN1-20	390.82	18.0	2188.59	2184.55	2184.09	4.04	0.12%	0.454	1.53	0.29	2.07
GMI4481705	FWN1-22	FWN1-21	258.18	18.0	2210.36	2194.87	2184.55	15.49	4.00%	0.454	2.73	0.12	14.26
GMI4481706	FWN1-22A	FWN1-22	183.47	12.0	2198.94	2196.02	2194.87	2.92	0.63%	0.158	2.40	0.20	1.82
GMI4779372	FWN1-22B	FWN1-22A	171.73	12.0	2202.52	2196.52	2196.02	6.00	0.29%	0.158	1.89	0.25	1.19
GMI4779371	FWN1-22C	FWN1-22B	129.05	12.0	2203.46	2196.91	2196.52	6.55	0.30%	0.154	1.69	0.23	1.21
GMI4779370	FWN1-22D	FWN1-22C	235.47	12.0	2211.95	2199.45	2196.91	12.50	1.08%	0.154	2.21	0.17	2.44
GMI4779362	FWN1-22E	FWN1-22D	107.62	12.0	2203.39	2200.19	2199.45	3.20	0.69%	0.151	2.47	0.19	1.92
GMI4779361	FWN1-22F	FWN1-22E	98.56	12.0	2211.11	2199.47	2200.19	11.64	-0.73%	0.132	0.45	0.94	2.00
GMI4481710	FWN1-22G	FWN1-22F	253.95	12.0	2217.24	2206.49	2199.47	10.75	2.76%	0.133	0.49	0.12	4.02
GMI4482106	FWN1-23	FWN1-22	251.49	12.0	2226.98	2219.68	2194.87	7.30	9.87%	0.319	6.14	0.14	7.54
GMI4482108	FWN1-23A	FWN1-22G	250.15	12.0	2224.45	2213.95	2206.49	10.50	2.98%	0.131	3.75	0.12	4.18
NEW400	FWN1-23AS	STOR_12	48.37	24.0	2221.04	2206.19	2206.14	14.85	0.11%	0.270	1.50	0.21	4.97
GMI4482109	FWN1-23B	FWN1-23A	350.01	12.0	2230.51	2215.01	2213.95	15.50	0.30%	0.131	2.18	0.23	1.24
GMI4482744	FWN1-23C	FWN1-23B	334.19	12.0	2232.51	2215.92	2215.01	16.59	0.27%	0.134	1.62	0.22	1.17
GMI4482252	FWN1-23D	FWN1-23C	333.56	12.0	2227.91	2216.81	2215.92	11.10	0.27%	0.137	1.67	0.23	1.15
GMI4482253	FWN1-23E	FWN1-23D	354.73	12.0	2228.86	2217.65	2216.81	11.21	0.24%	0.140	1.61	0.24	1.07
GMI4482254	FWN1-23F	FWN1-23E	250.99	12.0	2231.64	2218.38	2217.65	13.26	0.29%	0.137	1.67	0.22	1.21
GMI4482255	FWN1-23G	FWN1-23F	262.27	12.0	2230.10	2219.27	2218.38	10.83	0.34%	0.136	1.81	0.21	1.32
GMI4482251	FWN1-23H	FWN1-23G	337.71	12.0	2230.32	2220.02	2219.27	10.30	0.22%	0.159	1.83	0.28	1.02
GMI4481019	FWN1-24	FWN1-23	393.07	12.0	2235.88	2224.19	2219.68	11.69	1.15%	0.318	4.40	0.26	2.35
GMI4481018	FWN1-25	FWN1-24	205.53	12.0	2234.13	2224.78	2224.19	9.35	0.29%	0.318	2.35	0.36	1.02
GMI4482738	FWN1-26	FWN1-25	314.11	12.0	2233.31	2225.52	2224.78	7.79	0.24%	0.298	1.89	0.34	0.91
GMI4482742	FWN1-27	FWN1-26	339.94	12.0	2236.57	2228.47	2225.52	8.10	0.87%	0.298	2.44	0.24	2.03
GMI4482741	FWN1-28	FWN1-27	348.72	12.0	2241.40	2230.64	2228.47	10.76	0.62%	0.296	2.89	0.27	1.67
GMI4482730	FWN1-29	FWN1-28	345.61	12.0	2243.69	2231.42	2230.64	12.27	0.23%	0.294	2.09	0.37	0.89

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GMI4482733	FWN1-30	FWN1-29	345.40	12.0	2245.84	2232.24	2231.42	13.60	0.24%	0.293	1.83	0.33	0.92
GMI4482731	FWN1-31	FWN1-30	349.77	12.0	2247.69	2233.00	2232.24	14.69	0.22%	0.288	1.89	0.35	0.88
GMI4482717	FWN1-32	FWN1-31	347.63	12.0	2250.10	2234.07	2233.00	16.03	0.31%	0.286	1.98	0.31	1.10
GMI4482716	FWN1-33	FWN1-32	347.99	12.0	2251.98	2235.08	2234.07	16.90	0.29%	0.285	2.09	0.32	1.06
GMI4482712	FWN1-34	FWN1-33	374.20	12.0	2253.47	2235.62	2235.08	17.85	0.14%	0.283	1.69	0.41	0.67
GMI4482686	FWN1-35	FWN1-34	290.42	12.0	2254.09	2236.34	2235.62	17.75	0.25%	0.282	1.67	0.32	0.96
GMI4482687	FWN1-36	FWN1-35	319.61	12.0	2252.61	2237.36	2236.34	15.25	0.32%	0.246	1.90	0.28	1.16
GMI4482702	FWN1-37	FWN1-36	344.96	12.0	2252.18	2238.21	2237.36	13.97	0.25%	0.223	1.84	0.29	1.02
GMI4482703	FWN1-38	FWN1-37	145.24	12.0	2252.67	2238.64	2238.21	14.03	0.30%	0.221	1.87	0.27	1.14
GMI4482704	FWN1-39	FWN1-38	95.00	12.0	2252.97	2238.98	2238.64	13.99	0.35%	0.219	1.99	0.27	1.27
GMI4482705	FWN1-40	FWN1-39	329.34	12.0	2256.42	2239.67	2238.98	16.75	0.21%	0.218	1.78	0.32	0.92
GMI4482706	FWN1-41	FWN1-40	298.67	12.0	2254.42	2240.48	2239.67	13.94	0.27%	0.153	1.37	0.23	1.15
GMI4482707	FWN1-42	FWN1-41	368.85	12.0	2254.53	2241.47	2240.48	13.06	0.27%	0.153	1.70	0.24	1.14
GMI4482677	FWN1-43	FWN1-42	118.82	10.0	2254.65	2241.81	2241.47	12.84	0.29%	0.142	1.71	0.29	0.68
GMI4482653	FWN1-44	FWN1-43	115.92	10.0	2254.76	2242.32	2241.81	12.44	0.44%	0.142	1.84	0.25	0.88
GMI4482652	FWN1-45	FWN1-44	191.08	10.0	2255.58	2242.90	2242.32	12.68	0.30%	0.141	1.83	0.29	0.70
GMI4482651	FWN1-46	FWN1-45	354.73	10.0	2259.28	2243.86	2242.90	15.42	0.27%	0.139	1.67	0.28	0.66
GMI4482650	FWN1-47	FWN1-46	328.77	10.0	2262.09	2245.24	2243.86	16.85	0.42%	0.122	1.67	0.24	0.87
GMI4482649	FWN1-48	FWN1-47	225.05	10.0	2262.68	2245.86	2245.24	16.82	0.28%	0.107	1.60	0.25	0.70
GMI4481589	FWN1-49	FWN1-48	115.99	10.0	2263.59	2246.49	2245.86	17.10	0.54%	0.106	1.73	0.21	1.03
GMI4481590	FWN1-49A	FWN1-49	222.19	10.0	2262.73	2246.88	2246.49	15.85	0.18%	0.105	1.46	0.31	0.54
GMI4481591	FWN1-50	FWN1-49A	51.58	10.0	2262.41	2247.03	2246.88	15.38	0.29%	0.103	1.31	0.24	0.72
GMI4480747	FWN1-51	FWN1-50	164.18	10.0	2261.25	2247.59	2247.03	13.66	0.34%	0.103	1.64	0.23	0.79
GMI4480692	FWN1-52	FWN1-51	337.74	10.0	2261.82	2248.59	2247.59	13.23	0.30%	0.102	1.62	0.24	0.73
GMI4480691	FWN1-53	FWN1-52	336.81	10.0	2265.03	2249.77	2248.59	15.26	0.35%	0.101	1.62	0.23	0.81
GMI4482618	FWN1-54	FWN1-53	266.78	10.0	2265.33	2250.56	2249.77	14.77	0.30%	0.057	1.14	0.18	0.78
GMI4482603	FWN1-55	FWN1-54	313.76	10.0	2263.97	2251.49	2250.56	12.48	0.30%	0.056	1.34	0.18	0.78
GMI4482602	FWN1-56	FWN1-55	231.13	10.0	2262.62	2252.22	2251.49	10.40	0.32%	0.051	1.28	0.16	0.81
GMI4482601	FWN1-57	FWN1-56	342.52	10.0	2260.91	2253.41	2252.22	7.50	0.35%	0.049	1.32	0.16	0.86
GMI4482035	GAR1-01	GAR3-07	8.37	12.0	2168.34	2155.76	2155.51	12.58	3.00%	0.746	3.94	0.28	3.58
GMI4482515	GAR1-02	GAR1-01	355.29	12.0	2164.53	2156.63	2155.76	7.90	0.24%	0.734	2.68	0.61	0.50
GMI4482487	GAR1-03	GAR1-02	346.35	12.0	2164.19	2156.91	2156.63	7.28	0.08%	0.737	1.93	0.81	-0.03
GMI4482492	GAR1-04	GAR1-03	192.88	12.0	2165.47	2156.55	2156.91	8.92	-0.19%	0.690	1.43	1.38	0.39
GMI4482491	GAR1-05	GAR1-04	14.87	12.0	2165.60	2156.56	2156.55	9.04	0.07%	0.690	1.36	1.40	-0.04
GMI4482490	GAR1-06	GAR1-05	267.34	12.0	2166.60	2157.78	2156.56	8.82	0.46%	0.681	1.74	0.44	1.00
GMI4482016	GAR1-07	GAR1-06	171.69	12.0	2164.90	2158.22	2157.78	6.68	0.26%	0.514	2.30	0.46	0.75

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482015	GAR1-08	GAR1-07	299.03	12.0	2167.78	2158.78	2158.22	9.00	0.19%	0.476	2.02	0.48	0.60
GMI4482498	GAR1-09	GAR1-08	298.85	12.0	2168.90	2159.44	2158.78	9.46	0.22%	0.471	2.08	0.44	0.70
GMI4482499	GAR1-10	GAR1-09	177.92	12.0	2168.26	2159.62	2159.44	8.64	0.10%	0.464	1.82	0.57	0.33
GMI4482066	GAR1-11	GAR1-10	401.65	10.0	2169.86	2161.44	2159.62	8.42	0.45%	0.422	2.08	0.45	0.61
GMI4482068	GAR1-12	GAR1-11	298.28	10.0	2171.93	2162.28	2161.44	9.65	0.28%	0.260	1.99	0.39	0.55
GMI4482069	GAR1-13	GAR1-12	264.32	10.0	2171.15	2162.85	2162.28	8.30	0.22%	0.254	1.87	0.43	0.46
GMI4482070	GAR1-14	GAR1-13	27.18	10.0	2171.63	2163.17	2162.85	8.46	1.18%	0.247	2.31	0.26	1.42
GMI4482071	GAR1-15	GAR1-14	189.28	10.0	2170.34	2163.72	2163.17	6.62	0.29%	0.239	2.33	0.41	0.59
GMI4480556	GAR3-01	M2-10	309.33	15.0	2159.23	2146.63	2145.81	12.60	0.27%	0.757	1.70	0.39	1.57
GMI4480469	GAR3-02	GAR3-01	297.84	15.0	2162.96	2150.98	2146.63	11.98	1.46%	0.757	3.45	0.25	4.71
GMI4480401	GAR3-03	GAR3-02	300.68	15.0	2163.96	2151.43	2150.98	12.53	0.15%	0.747	2.65	0.52	1.01
GMI4482795	GAR3-04	GAR3-03	269.21	15.0	2165.40	2154.04	2151.43	11.36	0.97%	0.748	2.55	0.28	3.71
GMI4480638	GAR3-05	GAR3-04	383.61	15.0	2167.28	2154.64	2154.04	12.64	0.16%	0.747	2.54	0.52	1.04
GMI4480881	GAR3-06	GAR3-05	100.72	15.0	2166.81	2154.79	2154.64	12.02	0.15%	0.746	1.85	0.50	1.01
GMI4482514	GAR3-07	GAR3-06	344.25	15.0	2168.25	2155.51	2154.79	12.74	0.21%	0.748	2.13	0.42	1.32
GMI4480907	GOV1-01	BEXT2-28	385.45	15.0	2219.26	2209.91	2208.40	9.35	0.39%	0.922	2.51	0.39	1.91
GMI4480662	GOV1-02	GOV1-01	349.39	15.0	2221.05	2210.47	2209.91	10.58	0.16%	0.911	2.47	0.55	0.90
GMI4480925	GOV1-03	GOV1-02	21.12	15.0	2220.95	2210.75	2210.47	10.20	1.33%	0.858	2.77	0.27	4.35
GMI4483674	GOV1-04	GOV1-03	236.20	15.0	2223.00	2211.10	2210.75	11.90	0.15%	0.855	2.77	0.55	0.90
GMI4483675	GOV1-05	GOV1-04	390.97	15.0	2221.77	2211.62	2211.10	10.15	0.13%	0.623	1.62	0.43	1.02
GMI4480885	GOV1-06	GOV1-05	328.57	15.0	2223.70	2212.37	2211.62	11.33	0.23%	0.577	2.02	0.35	1.58
GMI4480886	GOV1-07	GOV1-06	37.97	15.0	2223.76	2212.70	2212.37	11.06	0.89%	0.562	2.82	0.25	3.67
GMI4480887	GOV1-08	GOV1-07	332.26	15.0	2224.45	2213.21	2212.70	11.24	0.15%	0.559	2.16	0.43	1.21
GMI4482142	GOV1-09	GOV1-08	346.03	15.0	2229.10	2213.90	2213.21	15.20	0.20%	0.562	1.93	0.36	1.46
GMI4482143	GOV1-09A	GOV1-09	229.13	12.0	2228.02	2216.07	2213.90	11.95	0.95%	0.244	1.78	0.21	2.18
GMI4482144	GOV1-09B	GOV1-09A	343.00	12.0	2229.85	2217.95	2216.07	11.90	0.55%	0.230	2.61	0.25	1.62
GMI4482145	GOV1-09C	GOV1-09B	354.19	12.0	2238.95	2224.80	2217.95	14.15	1.93%	0.225	2.92	0.17	3.24
GMI4482141	GOV1-10	GOV1-09	399.09	12.0	2228.95	2214.78	2213.90	14.17	0.22%	0.329	1.70	0.36	0.84
GMI4482236	GOV1-11	GOV1-10	388.51	12.0	2230.57	2215.68	2214.78	14.89	0.23%	0.328	1.98	0.36	0.87
GMI4482237	GOV1-12	GOV1-11	354.44	12.0	2232.28	2216.69	2215.68	15.59	0.28%	0.240	1.69	0.29	1.09
GMI4482238	GOV1-13	GOV1-12	224.67	12.0	2232.98	2217.32	2216.69	15.66	0.28%	0.223	1.89	0.28	1.10
GMI4482239	GOV1-14	GOV1-13	384.60	12.0	2232.78	2218.21	2217.32	14.57	0.23%	0.214	1.78	0.29	0.99
GMI4482213	GOV1-15	GOV1-14	295.86	12.0	2235.93	2218.79	2218.21	17.14	0.20%	0.210	1.66	0.30	0.89
GMI4482217	GOV1-15N1	GOV1-15	10.24	10.0	2236.03	2218.82	2218.79	17.21	0.28%	0.106	1.00	0.34	0.71
GMI4482215	GOV1-16	GOV1-15N1	361.68	10.0	2237.85	2220.06	2218.82	17.79	0.34%	0.100	1.22	0.23	0.80
GMI4482214	GOV1-17	GOV1-16	308.74	10.0	2237.14	2221.09	2220.06	16.05	0.33%	0.091	1.60	0.22	0.80

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482218	GOV1-18	GOV1-17	425.95	10.0	2237.06	2222.58	2221.09	14.48	0.35%	0.085	1.56	0.21	0.82
GMI4482219	GOV1-19	GOV1-18	295.38	10.0	2235.56	2223.40	2222.58	12.16	0.28%	0.050	1.11	0.17	0.76
GMI4481601	GOV1-20	GOV1-19	292.47	10.0	2234.72	2224.30	2223.40	10.42	0.31%	0.044	1.19	0.15	0.81
GMI4481600	GOV1-21	GOV1-20	358.41	10.0	2234.63	2225.61	2224.30	9.02	0.37%	0.037	1.20	0.14	0.89
GMI4481599	GOV1-22	GOV1-21	79.47	10.0	2233.55	2225.98	2225.61	7.57	0.47%	0.030	1.17	0.12	1.02
GMI4481057	HON1-01	BEXT2-13	325.40	12.0	2211.06	2199.98	2198.09	11.08	0.58%	0.578	1.86	0.38	1.32
GMI4481700	HON1-02	HON1-01	327.01	12.0	2213.73	2200.88	2199.98	12.85	0.28%	0.576	2.66	0.51	0.73
GMI4481699	HON1-03	HON1-02	322.10	12.0	2213.95	2202.79	2200.88	11.16	0.59%	0.574	2.67	0.38	1.35
GMI4481672	HON1-04	HON1-03	357.66	12.0	2213.12	2205.08	2202.79	8.04	0.64%	0.572	3.32	0.37	1.42
GMI4481671	HON1-04A	HON1-04	148.15	12.0	2211.72	2205.83	2205.08	5.88	0.51%	0.569	3.11	0.41	1.21
NEW1175253	HON1-05	HON1-04A	11.27	12.0	2211.69	2205.89	2205.83	5.80	0.51%	0.566	2.57	0.49	1.21
GMI4483036	HON1-06	HON1-05	397.29	12.0	2217.82	2207.32	2205.89	10.50	0.36%	0.497	2.30	0.40	1.00
GMI4483037	HON1-07	HON1-06	336.57	12.0	2220.82	2208.29	2207.32	12.53	0.29%	0.495	2.46	0.44	0.84
GMI4483038	HON1-08	HON1-07	235.02	12.0	2222.51	2209.09	2208.29	13.42	0.34%	0.493	2.43	0.40	0.96
GMI4483043	HON1-09	HON1-08	220.31	12.0	2225.43	2210.08	2209.09	15.35	0.45%	0.464	2.61	0.36	1.21
GMI4483050	HON1-09A	HON1-09	22.12	12.0	2225.37	2214.07	2210.08	11.30	18.04%	0.459	4.61	0.14	10.22
GMI4483049	HON1-10	HON1-09A	303.45	12.0	2228.51	2216.65	2214.07	11.86	0.85%	0.435	4.47	0.35	1.87
GMI4483025	HON1-11	HON1-10	353.00	12.0	2231.28	2218.72	2216.65	12.56	0.59%	0.400	2.72	0.31	1.51
GMI4483020	HON1-12	HON1-11	22.14	12.0	2230.96	2218.92	2218.72	12.04	0.90%	0.369	2.83	0.30	2.00
GMI4483009	HON1-18D	HON1-18C	304.01	10.0	2248.14	2235.98	2234.86	12.16	0.37%	0.132	1.71	0.25	0.80
GMI4483008	HON1-18E	HON1-18D	300.20	10.0	2246.42	2236.93	2235.98	9.49	0.32%	0.127	1.76	0.27	0.74
GMI4482992	HON1-18E1	HON1-18E	186.15	10.0	2246.62	2237.51	2236.93	9.11	0.31%	0.122	1.68	0.26	0.73
GMI4482991	HON1-18E2	HON1-18E1	150.64	10.0	2247.00	2238.06	2237.51	8.94	0.37%	0.110	1.65	0.23	0.82
GMI4482980	HON1-18E2A	HON1-18E2	303.89	10.0	2248.04	2239.09	2238.06	8.95	0.34%	0.037	0.85	0.14	0.86
GMI4482981	HON1-18E2B	HON1-18E2A	50.42	10.0	2247.98	2239.27	2239.09	8.71	0.36%	0.029	1.09	0.12	0.89
GMI4482982	HON1-18E2C	HON1-18E2B	174.09	10.0	2248.96	2239.95	2239.27	9.01	0.39%	0.023	1.03	0.11	0.94
GMI4482983	HON1-18E2D	HON1-18E2C	350.37	10.0	2248.93	2241.11	2239.95	7.82	0.33%	0.016	0.86	0.09	0.87
GMI4482984	HON1-18E2E	HON1-18E2D	215.02	10.0	2247.83	2241.57	2241.11	6.26	0.21%	0.008	0.58	0.07	0.70
GMI4482990	HON1-18E3	HON1-18E2	167.85	10.0	2245.93	2238.34	2238.06	7.59	0.17%	0.071	1.16	0.23	0.56
GMI4482989	HON1-18E4	HON1-18E3	315.37	10.0	2245.67	2239.22	2238.34	6.45	0.28%	0.060	1.15	0.18	0.75
GMI4482987	HON1-18E4A	HON1-18E4	248.10	10.0	2245.16	2239.35	2239.22	5.81	0.05%	0.028	0.61	0.20	0.32
GMI4482988	HON1-18E5	HON1-18E4	324.62	10.0	2247.58	2240.38	2239.22	7.20	0.36%	0.027	0.82	0.12	0.89
GMI4482986	HON1-18E5A	HON1-18E5	227.72	10.0	2247.66	2240.11	2240.38	7.55	-0.12%	0.014	0.17	0.45	0.51
GMI4482985	HON1-18E5B	HON1-18E5	312.70	10.0	2247.70	2241.25	2240.38	6.45	0.28%	0.007	0.49	0.07	0.80
NEW253	HUT-1	RIV1-31	74.40	18.0	2167.13	2148.37	2147.41	18.76	1.28%	0.429	0.97	0.25	7.91
NEW252	HUT-2	HUT-1	336.33	18.0	2179.89	2165.73	2148.37	14.16	5.16%	0.430	4.81	0.11	16.26

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
NEW251	HUT-3	HUT-2	90.36	18.0	2186.18	2169.82	2165.73	16.36	4.52%	0.430	5.85	0.12	15.22
NEW250	HUT-4	HUT-3	288.14	18.0	2185.67	2172.11	2169.82	13.56	0.80%	0.431	3.83	0.19	6.13
NEW249	HUT-5	HUT-4	47.44	18.0	2186.03	2172.66	2172.11	13.37	1.15%	0.431	3.20	0.16	7.48
NEW248	HUT-6	HUT-5	399.76	18.0	2192.23	2175.88	2172.66	16.35	0.81%	0.433	3.40	0.18	6.17
NEW247	HUT-7	HUT-6	399.68	18.0	2195.65	2179.22	2175.88	16.43	0.84%	0.439	3.24	0.17	6.28
NEW246	HUT-8	HUT-7	311.58	18.0	2193.99	2181.64	2179.22	12.35	0.78%	0.441	3.24	0.18	6.04
NEW347	HWK-01	RIV1-32	35.28	36.0	2159.37	2149.55	2147.50	9.82	5.79%	0.898	0.90	0.09	111.27
NEW1175081	HWK1-01	STOR_14	109.19	10.0	2276.11	2242.81	2242.55	33.30	0.24%	0.382	2.29	0.55	0.37
NEW1175015	HWK1-02	HWK1-01	124.57	10.0	2276.79	2243.49	2242.81	33.30	0.55%	0.382	2.31	0.40	0.76
NEW1175014	HWK1-03	HWK1-02	79.87	10.0	2277.47	2243.67	2243.49	33.80	0.22%	0.382	2.28	0.56	0.34
NEW1175013	HWK1-04	HWK1-03	301.05	10.0	2278.95	2244.65	2243.67	34.30	0.32%	0.382	2.11	0.46	0.49
NEW1175012	HWK1-05	HWK1-04	230.46	10.0	2276.54	2245.44	2244.65	31.10	0.34%	0.382	2.39	0.47	0.52
NEW1175011	HWK1-06	HWK1-05	285.71	10.0	2275.64	2246.44	2245.44	29.20	0.35%	0.319	2.16	0.41	0.59
NEW1175010	HWK1-07	HWK1-06	382.24	10.0	2275.56	2247.76	2246.44	27.80	0.34%	0.319	2.32	0.42	0.58
NEW1174971	HWK1-07A	HWK1-07	254.19	12.0	2277.56	2248.70	2247.76	28.86	0.37%	0.079	0.84	0.19	1.44
4535	HWK1-07A1	HWK1-07A	30.62	12.0	2276.92	2248.83	2248.76	28.09	0.22%	0.002	0.22	0.03	1.17
NEW1175009	HWK1-08	HWK1-07	198.82	10.0	2277.05	2248.45	2247.76	28.60	0.35%	0.253	1.99	0.49	0.65
NEW1175008	HWK1-09	HWK1-08	385.66	10.0	2272.38	2249.49	2248.45	22.89	0.27%	0.252	2.03	0.40	0.54
NEW1175007	HWK1-10	HWK1-09	151.07	10.0	2270.35	2250.00	2249.49	20.35	0.34%	0.252	2.06	0.36	0.68
NEW1175006	HWK1-11	HWK1-10	310.44	10.0	2272.34	2251.02	2250.00	21.32	0.33%	0.252	2.42	0.32	0.90
NEW1175005	HWK1-12	HWK1-11	313.09	10.0	2274.41	2252.32	2251.02	22.09	0.42%	0.252	1.96	0.47	0.44
NEW1175004	HWK1-13	HWK1-12	184.58	10.0	2274.46	2252.89	2252.32	21.57	0.31%	0.067	0.65	0.35	0.69
NEW391	HWK1-14	HWK1-13	391.57	10.0	2273.40	2254.25	2252.89	19.15	0.35%	0.067	1.41	0.18	0.84
NEW178	HWK1-15	HWK1-14	277.00	10.0	2274.39	2255.11	2254.25	19.28	0.31%	0.066	1.45	0.20	0.79
NEW179	HWK1-16	HWK1-15	338.89	10.0	2271.68	2256.16	2255.11	15.52	0.31%	0.065	1.41	0.19	0.79
NEW180	HWK1-17	HWK1-16	334.92	10.0	2269.02	2257.18	2256.16	11.84	0.30%	0.065	1.41	0.19	0.78
NEW181	HWK1-18	HWK1-17	92.71	10.0	2268.01	2257.58	2257.18	10.43	0.43%	0.064	1.48	0.17	0.94
NEW175	HWK1-19	HWK1-18	159.05	10.0	2268.59	2258.14	2257.58	10.45	0.36%	0.063	1.49	0.18	0.85
NEW174	HWK1-20	HWK1-19	179.75	10.0	2268.84	2258.71	2258.14	10.13	0.32%	0.061	1.40	0.18	0.80
GMI4480656	L1-01	A1-01A	226.82	15.0	2155.84	2146.92	2136.08	8.92	4.78%	2.222	7.83	0.32	7.67
GMI4482764	L1-02	L1-01	101.47	12.0	2157.87	2152.45	2146.92	5.42	5.45%	1.038	6.88	0.29	4.79
GMI4482480	L1-02A	L1-02	243.14	12.0	2166.02	2158.78	2152.45	7.24	2.60%	1.034	7.05	0.38	2.99
MSTR1175284	L1-03	L1-02A	123.82	12.0	2167.68	2162.10	2158.78	5.58	2.68%	1.019	6.23	0.34	3.07
GMI4482481	L1-04	L1-03	370.01	12.0	2178.88	2171.98	2162.10	6.90	2.67%	1.015	6.59	0.35	3.06
GMI4480718	L1-05	L1-04	263.34	12.0	2180.82	2174.83	2171.98	5.99	1.08%	1.011	5.14	0.48	1.58
GMI4480717	L1-06	L1-05	245.96	12.0	2186.78	2181.32	2174.83	5.46	2.64%	0.999	5.13	0.34	3.05

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482443	L1-07	L1-06	310.36	12.0	2193.50	2188.52	2181.32	4.98	2.32%	0.652	5.03	0.28	3.15
GMI4482444	L1-08	L1-07	319.02	12.0	2201.09	2189.94	2188.52	11.15	0.45%	0.650	3.63	0.49	1.01
GMI4482445	L1-09	L1-08	292.08	12.0	2199.17	2191.24	2189.94	7.93	0.45%	0.622	2.77	0.42	1.05
GMI4482448	L1-10	L1-09	296.66	12.0	2200.29	2192.45	2191.24	7.84	0.41%	0.599	2.87	0.44	0.98
GMI4482447	L1-11	L1-10	329.51	12.0	2210.26	2205.58	2192.45	4.68	3.98%	0.597	4.00	0.23	4.38
GMI4482446	L1-12	L1-11	348.30	12.0	2215.11	2207.09	2205.58	8.02	0.43%	0.594	3.67	0.48	1.05
GMI4482402	L1-13	L1-12	351.75	12.0	2218.36	2207.90	2207.09	10.46	0.23%	0.592	2.35	0.52	0.61
GMI4482401	L1-14	L1-13	282.35	12.0	2219.82	2208.66	2207.90	11.16	0.27%	0.589	2.35	0.47	0.71
GMI4483768	L1-15	L1-14	144.80	12.0	2220.26	2209.38	2208.66	10.88	0.50%	0.582	2.75	0.40	1.18
GMI4483767	L1-16	L1-15	334.34	12.0	2220.82	2210.18	2209.38	10.64	0.24%	0.579	2.51	0.53	0.64
GMI4481914	L1-17	L1-16	327.89	12.0	2221.11	2211.02	2210.18	10.09	0.26%	0.562	2.23	0.47	0.70
GMI4481913	L1-18	L1-17	329.33	12.0	2221.97	2211.48	2211.02	10.49	0.14%	0.518	1.95	0.57	0.42
GMI4481912	L1-19	L1-18	331.22	12.0	2221.91	2212.37	2211.48	9.54	0.27%	0.468	1.89	0.42	0.83
GMI4481889	L1-20	L1-19	314.78	12.0	2221.73	2213.01	2212.37	8.72	0.20%	0.424	2.05	0.44	0.70
GMI4481890	L1-21	L1-20	323.59	12.0	2222.71	2213.84	2213.01	8.87	0.26%	0.328	1.77	0.35	0.94
GMI4481880	L1-22	L1-21	280.24	12.0	2221.81	2214.52	2213.84	7.29	0.24%	0.314	1.99	0.35	0.92
GMI4480767	L1-23	L1-22	253.83	10.0	2223.06	2215.88	2214.52	7.18	0.54%	0.287	2.31	0.34	0.84
GMI4480721	L1-24	L1-23	305.18	10.0	2225.92	2216.46	2215.88	9.46	0.19%	0.278	1.95	0.51	0.39
GMI4483802	L1-24A	L1-24	17.53	10.0	2225.92	2216.51	2216.46	9.41	0.26%	0.270	1.52	0.50	0.52
GMI4480720	L1-24C	L1-24A	174.04	10.0	2225.27	2216.84	2216.51	8.43	0.19%	0.252	1.58	0.42	0.42
GMI4480719	L1-24D	L1-24C	225.15	10.0	2223.47	2217.27	2216.84	6.20	0.19%	0.243	1.71	0.42	0.43
GMI4482298	L1-24E	L1-24D	142.17	10.0	2224.51	2217.77	2217.27	6.74	0.35%	0.085	0.95	0.21	0.82
GMI4484069	L1-24E1	L1-24E	153.48	10.0	2225.35	2219.56	2217.77	5.79	1.16%	0.074	1.78	0.52	1.58
GMI4481266	L1-24H	L1-24D	396.61	10.0	2225.59	2218.39	2217.27	7.20	0.28%	0.128	1.19	0.27	0.69
GMI4482301	L1-24I	L1-24H	102.12	10.0	2226.58	2218.80	2218.39	7.78	0.40%	0.055	0.99	0.16	0.92
GMI4482300	L1-24O	L1-24I	299.00	10.0	2227.91	2219.59	2218.80	8.32	0.26%	0.033	1.00	0.14	0.76
NEW06162016	L1-24P	L1-24O	404.88	10.0	2227.91	2219.59	2218.80	8.32	0.20%	0.023	0.44	0.27	0.00
GMI4483572	M1-01	FG1-14	74.73	36.0	2136.10	2128.09	2128.11	8.01	-0.03%	8.334	2.93	0.63	-0.69
GMI4480478	M1-02	M1-01	419.73	36.0	2137.23	2128.44	2128.09	8.79	0.08%	8.336	2.77	0.62	5.15
GMI4480479	M1-03	M1-02	185.65	36.0	2138.35	2128.58	2128.44	9.77	0.08%	8.339	2.75	0.64	4.49
GMI4480480	M1-04	M1-03	115.27	36.0	2137.96	2128.74	2128.58	9.22	0.14%	8.209	2.69	0.63	9.19
GMI4480481	M1-05	M1-04	105.81	30.0	2138.72	2128.95	2128.74	9.77	0.20%	8.155	3.19	0.75	4.64
GMI4480483	M1-07	M1-05	841.83	30.0	2136.94	2130.07	2128.95	6.87	0.13%	8.164	3.35	0.69	2.31
GMI4480429	M1-08	M1-07	679.66	30.0	2138.84	2131.77	2130.07	7.07	0.25%	8.174	4.01	0.54	6.19
GMI4480428	M1-09	M1-08	431.24	30.0	2163.61	2132.56	2131.77	31.05	0.18%	8.176	4.19	0.66	4.12
GMI4480525	M1-10	M1-09	150.37	30.0	2165.43	2132.83	2132.56	32.60	0.18%	8.134	3.67	0.68	4.04

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4480524	M1-11	M1-10	227.88	30.0	2156.97	2133.27	2132.83	23.70	0.19%	8.091	3.60	0.66	4.53
GMI4480519	M1-11A	M1-11	176.63	30.0	2151.39	2133.49	2133.27	17.90	0.13%	8.090	3.48	0.71	2.07
NEW032316A	M1-11B	M1-11A	12.53	24.0	2151.30	2136.00	2133.49	15.30	19.98%	3.963	4.12	0.13	107.61
SPLIT032316	M1-12	M1-11A	52.50	30.0	2150.84	2133.54	2133.49	17.30	0.09%	4.792	2.14	0.71	3.98
GMI4480510	M1-13	M1-12	383.39	30.0	2149.13	2133.95	2133.54	15.18	0.11%	4.822	2.29	0.62	4.57
GMI4480508	M1-14	M1-13	347.75	30.0	2140.50	2134.66	2133.95	5.84	0.20%	4.855	2.94	0.45	8.12
GMI4480507	M1-15	M1-14	447.04	24.0	2161.95	2136.18	2134.66	25.77	0.34%	4.869	4.32	0.53	4.37
GMI4480513	M1-16	M1-15	558.58	30.0	2142.76	2136.94	2136.18	5.82	0.14%	4.853	3.36	0.51	5.76
GMI4480506	M1-17	M1-16	433.85	24.0	2144.03	2137.30	2136.94	6.73	0.08%	4.852	3.10	0.81	-0.31
GMI4480501	M1-18	M1-17	587.80	24.0	2152.33	2138.16	2137.30	14.17	0.15%	4.839	2.91	0.72	1.22
GMI4480490	M1-19	M1-18	194.43	24.0	2140.80	2137.96	2138.16	2.84	-0.10%	4.842	2.66	0.97	0.24
GMI4480489	M1-20	M1-19	321.81	24.0	2144.42	2138.33	2137.96	6.09	0.11%	4.840	2.61	0.75	2.68
GMI4480488	M1-20A	M1-20	59.25	24.0	2151.15	2138.59	2138.33	12.56	0.44%	3.463	2.13	0.84	2.91
GMI4480487	M1-20B	M1-20A	374.70	24.0	2163.70	2140.30	2138.59	23.40	0.46%	3.466	2.75	0.39	7.24
GMI4480545	M1-20C	M1-20B	427.11	24.0	2158.37	2141.31	2140.30	17.06	0.24%	3.465	3.89	0.51	4.24
GMI4480570	M1-21	M1-20C	173.98	24.0	2157.47	2141.45	2141.31	16.02	0.08%	3.435	2.90	0.62	1.09
GMI4480544	M1-22	M1-21	159.90	24.0	2155.70	2141.73	2141.45	13.97	0.17%	3.429	2.68	0.59	3.18
GMI4480574	M1-23	M1-22	298.04	24.0	2156.21	2145.61	2141.73	10.60	1.30%	3.417	3.97	0.29	14.66
GMI4480543	M1-24	M1-23	303.69	24.0	2158.88	2148.82	2145.61	10.06	1.06%	3.365	6.26	0.33	12.92
GMI4480404	M1-25	M1-24	298.93	24.0	2162.37	2151.31	2148.82	11.06	0.83%	3.202	5.50	0.33	11.26
GMI4482799	M1-26	M1-25	155.77	24.0	2164.40	2152.98	2151.31	11.42	1.07%	3.140	5.66	0.30	13.26
GMI4482801	M1-26AW	M1-25	359.80	10.0	2162.24	2153.64	2151.31	8.60	0.65%	0.132	0.92	0.22	1.10
GMI4482802	M1-26BW	M1-26AW	359.90	10.0	2163.36	2154.54	2153.64	8.82	0.25%	0.129	1.75	0.30	0.64
GMI4482803	M1-26CW	M1-26BW	359.81	10.0	2164.73	2156.57	2154.54	8.16	0.56%	0.125	1.71	0.22	1.03
GMI4482800	M1-27	M1-26	142.65	24.0	2165.07	2154.75	2152.98	10.32	1.24%	1.585	3.92	0.20	16.06
GMI4483654	M1-28	M1-27	149.00	18.0	2167.68	2157.11	2154.75	10.57	1.58%	1.519	5.80	0.29	7.74
GMI4482551	M1-28A	M1-27	359.43	10.0	2164.48	2156.96	2154.75	7.52	0.61%	0.076	0.91	0.17	1.13
GMI4482552	M1-28B	M1-28A	359.41	10.0	2165.50	2158.36	2156.96	7.14	0.39%	0.070	1.64	0.19	0.89
GMI4483778	M1-29	M1-28	331.39	18.0	2165.28	2157.64	2157.11	7.64	0.16%	1.513	3.20	0.57	1.42
GMI4483777	M1-30	M1-29	37.97	18.0	2165.25	2157.70	2157.64	7.55	0.16%	1.514	2.19	0.59	1.51
GMI4482548	M1-31	M1-30	367.95	18.0	2167.66	2158.12	2157.70	9.54	0.12%	1.516	2.18	0.59	0.98
GMI4482549	M1-32	M1-31	362.11	18.0	2166.02	2158.92	2158.12	7.10	0.22%	1.522	2.66	0.42	2.55
GMI4482550	M1-33	M1-32	349.38	18.0	2167.70	2159.52	2158.92	8.18	0.17%	1.524	2.80	0.54	1.52
GMI4482052	M1-34	M1-33	350.67	18.0	2167.51	2160.40	2159.52	7.11	0.25%	1.526	2.56	0.49	1.66
GMI4482051	M1-35	M1-34	148.15	18.0	2167.18	2160.58	2160.49	6.60	0.06%	1.525	2.33	0.62	0.26
GMI4482774	M1-36	M1-35	302.74	18.0	2168.43	2161.53	2160.58	6.90	0.31%	1.492	2.50	0.42	2.64

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GMI4482780	M1-37	M1-36	46.59	18.0	2168.84	2161.56	2161.53	7.28	0.06%	1.484	2.73	0.55	0.38
GMI4482781	M1-38	M1-37	252.80	18.0	2171.05	2162.87	2161.56	8.18	0.52%	1.476	2.93	0.36	3.82
GMI4482782	M1-39	M1-38	151.86	18.0	2172.12	2163.12	2162.87	9.00	0.16%	1.472	2.98	0.53	1.51
GMI4482127	M1-40	M1-39	241.18	18.0	2173.86	2164.56	2163.12	9.30	0.60%	1.466	3.04	0.35	4.22
GMI4482128	M1-41	M1-40	302.74	18.0	2175.57	2165.79	2164.56	9.78	0.41%	1.457	3.72	0.40	3.23
GMI4482129	M1-42	M1-41	298.75	18.0	2177.49	2167.01	2165.79	10.48	0.41%	1.448	3.45	0.39	3.25
GMI4482125	M1-43	M1-42	207.25	18.0	2176.28	2167.26	2167.01	9.02	0.12%	1.387	2.63	0.55	1.16
GMI4482126	M1-44	M1-43	218.16	18.0	2179.00	2169.10	2167.26	9.90	0.84%	1.386	2.96	0.31	5.37
GMI4482470	M1-45	M1-44	300.42	18.0	2179.27	2170.47	2169.10	8.80	0.46%	1.383	3.93	0.39	3.58
GMI4482469	M1-46	M1-45	295.39	18.0	2180.72	2171.52	2170.47	9.20	0.36%	1.376	3.31	0.40	3.01
GMI4482468	M1-47	M1-46	139.27	18.0	2181.91	2172.01	2171.52	9.90	0.35%	1.361	3.16	0.41	3.00
GMI4482467	M1-48	M1-47	197.80	18.0	2180.76	2172.92	2172.01	7.84	0.46%	1.360	3.38	0.36	3.63
GMI4482466	M1-49	M1-48	163.18	18.0	2181.81	2173.91	2172.92	7.90	0.61%	1.358	3.81	0.34	4.37
GMI4482424	M1-50	M1-49	330.09	18.0	2183.53	2175.81	2173.91	7.72	0.58%	1.350	3.92	0.34	4.23
GMI4482425	M1-51	M1-50	329.35	18.0	2186.84	2178.38	2175.81	8.46	0.78%	1.344	4.17	0.31	5.15
GMI4482421	M1-52	M1-51	166.19	18.0	2189.83	2179.69	2178.38	10.14	0.79%	1.316	4.30	0.32	5.21
GMI4481303	M1-53	M1-52	332.02	18.0	2191.68	2182.28	2179.69	9.40	0.78%	1.314	4.29	0.31	5.18
GMI4779199	M1-54	M1-53	167.61	15.0	2192.58	2183.51	2182.28	9.07	0.73%	1.313	4.40	0.43	2.56
GMI4482153	M1-55	M1-54	178.43	15.0	2205.25	2196.67	2183.51	8.58	7.38%	1.157	5.28	0.21	11.14
GMI4482154	M1-56	M1-55	280.41	15.0	2208.24	2200.29	2196.67	7.95	1.29%	1.142	5.99	0.37	4.00
GMI4482376	M1-57	M1-56	280.71	15.0	2211.93	2203.63	2200.29	8.30	1.19%	1.141	4.62	0.33	3.79
GMI4482377	M1-58	M1-57	275.17	15.0	2213.61	2204.01	2203.63	9.60	0.14%	1.140	2.88	0.67	0.54
GMI4482378	M1-59	M1-58	343.72	12.0	2214.71	2205.53	2204.01	9.18	0.44%	0.153	0.72	0.21	1.51
GMI4483624	M1-59A	M1-59	206.84	12.0	2215.24	2205.91	2205.53	9.33	0.18%	0.134	1.50	0.26	0.93
GMI4483626	M1-60	M1-59A	143.19	12.0	2215.77	2206.18	2205.91	9.59	0.19%	0.117	1.25	0.22	0.97
GMI4482390	M1-61	M1-60	181.84	12.0	2215.87	2206.51	2206.18	9.36	0.18%	0.106	1.30	0.21	0.96
GMI4779198	M1-62	M1-61	223.08	12.0	2216.40	2207.00	2206.51	9.40	0.22%	0.084	1.18	0.18	1.09
GMI4779197	M1-63	M1-62	315.65	12.0	2215.36	2207.76	2207.00	7.60	0.24%	0.081	1.33	0.17	1.14
GMI4779196	M1-64	M1-63	280.43	12.0	2216.23	2208.39	2207.76	7.84	0.22%	0.053	1.03	0.15	1.13
GMI4779195	M1-65	M1-64	271.83	12.0	2217.15	2210.57	2208.39	6.58	0.80%	0.033	1.03	0.09	2.20
GMI4779212	M2-01	M2-01AA	171.09	12.0	2147.23	2140.39	2139.35	6.84	0.61%	1.436	3.52	0.84	0.60
GMI4779211	M2-01AA	M1-20	174.67	12.0	2145.27	2139.35	2138.33	5.92	0.58%	1.439	2.84	1.45	0.10
GMI4779210	M2-02	M2-01	255.40	12.0	2151.67	2141.00	2140.39	10.67	0.24%	1.445	3.12	1.17	-0.32
GMI4779209	M2-03	M2-02	143.19	12.0	2145.88	2141.02	2141.00	4.86	0.01%	1.440	2.84	1.47	-0.37
GMI4779208	M2-04	M2-03	323.56	12.0	2149.71	2141.94	2141.02	7.77	0.28%	1.430	2.82	1.81	-0.18
GMI4779207	M2-05	M2-04	177.78	12.0	2152.14	2142.22	2141.94	9.92	0.16%	1.429	2.82	2.07	-0.27

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GMI4483580	M2-09	M2-09A	294.58	21.0	2155.85	2145.75	2145.23	10.10	0.18%	1.684	2.67	0.43	2.96
NEW1175186	M2-09A	M2-09B	303.47	21.0	2155.13	2145.23	2144.54	9.90	0.23%	1.685	3.15	0.42	3.63
NEW1175187	M2-09B	M2-09C	304.88	24.0	2156.00	2144.54	2143.55	11.46	0.32%	1.685	3.08	0.50	7.33
NEW1175188	M2-09C	M2-09D	301.16	24.0	2153.91	2143.55	2142.91	10.36	0.21%	1.512	2.08	0.80	5.79
NEW414	M2-09D	M2-05	161.76	12.0	2150.70	2142.91	2142.22	7.79	0.43%	1.419	2.80	2.37	-0.11
GMI4480555	M2-10	M2-09	64.10	18.0	2155.93	2145.81	2145.75	10.12	0.09%	1.668	2.59	0.60	0.58
GMI4483581	M2-12	M2-10	301.19	18.0	2156.64	2146.88	2145.81	9.76	0.36%	1.184	2.33	0.36	3.20
GMI4483582	M2-13	M2-12	309.93	18.0	2157.73	2147.79	2146.88	9.94	0.29%	1.188	3.05	0.39	2.80
GMI4483587	M2-13A	M2-13	19.52	18.0	2157.61	2147.81	2147.79	9.80	0.12%	0.917	2.09	0.43	1.61
GMI4483422	M2-13B	M2-13A	158.10	18.0	2158.50	2148.00	2147.81	10.50	0.12%	0.396	1.26	0.32	2.15
GMI4483423	M2-13C	M2-13B	147.26	18.0	2156.90	2148.18	2148.00	8.72	0.12%	0.372	1.47	0.27	2.17
GMI4483585	M2-13D	M2-13C	297.95	18.0	2159.20	2149.77	2148.18	9.43	0.53%	0.370	1.96	0.18	5.00
GMI4483424	M2-13E	M2-13D	254.26	18.0	2160.10	2150.07	2149.77	10.03	0.12%	0.369	1.82	0.29	2.17
GMI4483583	M2-13F	M2-13E	35.30	18.0	2160.10	2150.12	2150.07	9.99	0.12%	0.365	1.33	0.29	2.17
GMI4480560	M2-14	M2-13A	15.55	10.0	2157.38	2147.96	2147.81	9.42	0.95%	0.676	2.65	0.67	0.82
GMI4483425	M2-18	M2-13F	167.69	18.0	2160.42	2151.18	2150.12	9.24	0.64%	0.364	1.84	0.17	5.50
GMI4480563	M2-19	M2-18	21.23	18.0	2160.35	2151.33	2151.18	9.02	0.71%	0.363	2.60	0.19	5.82
GMI4480561	M2-20	M2-19	146.02	10.0	2160.20	2151.60	2151.33	8.60	0.18%	0.049	0.73	0.18	0.61
GMI4480405	M2-21	M2-20	141.58	10.0	2159.09	2151.93	2151.60	7.16	0.23%	0.045	1.09	0.17	0.70
GMI4482062	M2-22	M2-21	159.04	10.0	2159.09	2152.87	2151.93	6.22	0.59%	0.042	1.29	0.13	1.14
GMI4482061	M2-23	M2-22	170.37	10.0	2157.81	2152.95	2152.87	4.86	0.05%	0.024	0.65	0.20	0.31
GMI4482063	M2-24	M2-23	253.55	10.0	2162.53	2153.99	2152.95	8.54	0.41%	0.021	0.64	0.10	0.96
GMI4482050	M3-01	M1-26	359.86	15.0	2166.67	2155.47	2152.98	11.20	0.69%	1.555	4.30	0.45	2.21
GMI4482049	M3-02	M3-01	360.02	15.0	2165.58	2156.47	2155.47	9.11	0.28%	1.553	3.46	0.92	0.83
GMI4482524	M3-03	M3-02	359.75	15.0	2169.43	2160.31	2156.47	9.12	1.07%	1.515	3.61	0.39	3.16
GMI4482525	M3-04	M3-03	365.80	15.0	2173.76	2160.88	2160.31	12.88	0.16%	1.512	3.07	0.80	0.27
GMI4482526	M3-05	M3-04	349.50	15.0	2173.16	2161.54	2160.88	11.62	0.19%	1.509	2.40	0.68	0.46
GMI4482520	M3-06	M3-05	392.84	15.0	2170.64	2161.90	2161.54	8.74	0.09%	1.507	2.31	0.86	-0.14
GMI4482509	M3-07	M3-06	328.60	15.0	2172.29	2162.47	2161.90	9.82	0.17%	1.500	2.23	0.73	0.38
GMI4482507	M3-08	M3-07	330.19	15.0	2170.52	2162.88	2162.47	7.64	0.12%	1.494	2.35	0.79	0.10
GMI4482505	M3-09	M3-08	371.24	15.0	2172.24	2163.38	2162.88	8.86	0.13%	1.489	2.25	0.78	0.17
GMI4482504	M3-10	M3-09	306.48	15.0	2174.37	2163.99	2163.38	10.38	0.20%	1.489	2.47	0.66	0.53
GMI4483819	M3-10A	M3-10	9.22	15.0	2174.38	2164.27	2163.99	10.11	3.06%	1.478	3.99	0.29	6.43
GMI4483818	M3-11	M3-10A	330.47	15.0	2174.00	2164.56	2164.27	9.44	0.09%	1.469	2.98	0.90	-0.13
GMI4482455	M3-12	M3-11	344.48	15.0	2175.07	2164.93	2164.56	10.14	0.11%	1.466	1.96	0.89	0.02
GMI4482002	M3-13	M3-12	327.45	15.0	2175.41	2166.04	2164.93	9.38	0.34%	1.460	2.50	0.53	1.17

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482003	M3-14	M3-13	355.04	15.0	2176.44	2166.57	2166.04	9.87	0.15%	1.292	2.57	0.69	0.46
GMI4482004	M3-15	M3-14	51.69	15.0	2176.67	2167.14	2166.57	9.53	1.09%	1.288	3.09	0.36	3.45
GMI4483729	M3-16	M3-15	239.86	15.0	2178.58	2167.99	2167.14	10.60	0.35%	1.268	3.72	0.53	1.42
GMI4483647	M3-17	M3-16	209.72	15.0	2179.70	2168.73	2167.99	10.97	0.35%	1.265	3.10	0.49	1.43
GMI4481301	M3-18	M3-17	355.66	12.0	2177.48	2169.64	2168.73	7.84	0.26%	1.259	3.02	0.91	0.00
GMI4482419	M3-19	M3-18	324.82	12.0	2178.82	2170.28	2169.64	8.54	0.20%	1.238	2.48	1.03	-0.13
GMI4480781	M3-20	M3-19	324.34	12.0	2181.15	2171.50	2170.28	9.65	0.38%	1.199	2.69	0.67	0.33
GMI4480780	M3-21	M3-20	184.93	12.0	2180.75	2171.59	2171.50	9.16	0.05%	1.193	2.64	1.13	-0.64
GMI4482357	M3-22	M3-21	187.29	12.0	2181.28	2172.32	2171.59	8.96	0.39%	1.172	2.44	0.79	0.39
GMI4482358	M3-23	M3-22	180.34	12.0	2182.35	2172.55	2172.32	9.80	0.13%	1.155	2.55	0.99	-0.26
GMI4482359	M3-24	M3-23	140.40	12.0	2181.89	2172.63	2172.55	9.26	0.06%	1.152	2.27	1.25	-0.56
GMI4482360	M3-25	M3-24	300.63	12.0	2182.05	2173.33	2172.63	8.72	0.23%	1.146	2.26	1.23	0.06
GMI4482361	M3-26	M3-25	149.80	12.0	2182.85	2174.15	2173.33	8.70	0.55%	1.144	3.08	0.71	0.70
GMI4482363	M3-27	M3-26	149.17	12.0	2183.49	2175.17	2174.15	8.32	0.68%	1.155	3.85	0.55	0.91
GMI4481288	M3-27A	M3-27	148.10	12.0	2184.72	2176.01	2175.17	8.70	0.57%	1.146	3.83	0.87	0.74
GMI4481287	M3-28	M3-27A	151.00	12.0	2183.88	2176.74	2176.01	7.14	0.48%	1.138	3.46	0.63	0.59
GMI4482362	M3-29	M3-28	152.09	12.0	2184.40	2177.10	2176.74	7.30	0.24%	1.136	2.89	0.82	0.08
NEW415	M3-30	M3-29	352.55	12.0	2187.00	2178.00	2177.10	9.00	0.26%	1.124	2.64	0.75	0.14
GMI4483645	M3-31	M3-30	255.00	12.0	2190.49	2179.99	2178.00	10.50	0.78%	1.113	3.37	0.50	1.09
GMI4480670	M3-32	M3-32A	351.35	12.0	2187.44	2181.93	2180.40	5.51	0.44%	1.080	3.21	0.59	0.57
GMI4480671	M3-32A	M3-31	93.80	12.0	2189.61	2180.40	2179.99	9.21	0.44%	1.082	3.50	0.67	0.57
GMI4480696	M3-33	M3-32	403.89	12.0	2192.31	2183.20	2181.93	9.11	0.31%	0.970	2.96	0.64	0.43
GMI4480716	M3-34	M3-33	461.69	10.0	2207.15	2197.45	2183.20	9.70	3.09%	0.971	4.51	0.42	1.72
GMI4481790	M3-34A	M3-34	239.25	10.0	2209.43	2198.12	2197.45	11.31	0.28%	0.266	2.01	0.40	0.55
GMI4481789	M3-34B	M3-34A	231.33	10.0	2209.22	2198.89	2198.12	10.33	0.33%	0.258	2.08	0.37	0.63
GMI4480639	M3-34C	M3-34B	384.94	10.0	2209.80	2200.16	2198.89	9.64	0.33%	0.252	2.13	0.37	0.63
GMI4482285	M3-34C1	M3-34C	147.57	10.0	2206.13	2200.55	2200.16	5.58	0.26%	0.234	1.92	0.39	0.55
GMI4482286	M3-34C2	M3-34C1	142.58	10.0	2207.23	2201.12	2200.55	6.11	0.40%	0.225	1.99	0.33	0.75
GMI4482287	M3-34C4	M3-34C2	238.00	10.0	2208.95	2201.76	2201.12	7.19	0.27%	0.208	1.92	0.37	0.59
GMI4481793	M3-35	M3-34	236.67	10.0	2208.76	2200.09	2197.45	8.67	1.12%	0.707	4.57	0.49	0.91
GMI4481794	M3-36	M3-35	228.41	10.0	2211.32	2202.17	2200.09	9.15	0.91%	0.703	4.03	0.50	0.76
GMI4481792	M3-37	M3-36	475.98	10.0	2218.29	2209.21	2202.17	9.08	1.48%	0.647	4.16	0.41	1.22
GMI4480772	M3-38	M3-37	165.33	10.0	2221.54	2210.54	2209.21	11.00	0.80%	0.627	3.96	0.52	0.75
GMI4480773	M3-39	M3-38	207.43	10.0	2220.91	2211.61	2210.54	9.30	0.52%	0.624	3.22	0.56	0.48
GMI4480700	M3-40	M3-39	203.52	10.0	2222.20	2213.14	2211.61	9.06	0.75%	0.511	2.92	0.43	0.82
GMI4480701	M3-41	M3-40	163.82	10.0	2223.17	2213.39	2213.14	9.78	0.15%	0.503	2.32	0.75	0.10

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481773	M3-41A	M3-41	16.94	10.0	2223.42	2214.09	2213.39	9.33	4.13%	0.391	2.24	0.24	2.73
GMI4481775	M3-41B	M3-41A	182.79	10.0	2227.30	2214.70	2214.09	12.60	0.33%	0.381	3.30	0.49	0.65
GMI4481774	M3-42	M3-41	197.87	10.0	2227.36	2218.00	2213.39	9.36	2.33%	0.119	0.88	0.15	2.26
GMI4482271	M3-44	M3-43	338.04	10.0	2233.69	2223.49	2222.59	10.20	0.27%	0.103	1.66	0.26	0.69
GMI4482270	M3-45	M3-44	287.91	10.0	2232.82	2224.48	2223.49	8.34	0.34%	0.081	1.31	0.20	0.82
GMI4481749	M3-46	M3-45	385.66	10.0	2230.92	2225.48	2224.48	5.44	0.26%	0.061	1.26	0.19	0.72
GMI4482384	M4-01	M1-58	299.04	15.0	2213.95	2204.99	2204.01	8.96	0.33%	1.004	2.25	0.43	1.59
GMI4482383	M4-02	M4-01	305.91	15.0	2215.61	2205.05	2204.99	10.56	0.02%	1.001	2.03	0.76	-0.37
GMI4482382	M4-03	M4-02	123.89	15.0	2216.26	2205.34	2205.05	10.92	0.23%	0.997	1.73	0.60	1.19
GMI4482381	M4-04	M4-03	167.57	15.0	2216.59	2205.52	2205.34	11.08	0.11%	0.995	1.96	0.63	0.49
GMI4482380	M4-04A	M4-04	165.40	15.0	2214.59	2205.83	2205.52	8.76	0.19%	0.991	2.08	0.54	0.98
NEW1175063	M4-05	M4-04A	138.00	15.0	2213.61	2205.89	2205.83	7.72	0.04%	0.987	1.98	0.66	-0.07
GMI4482379	M4-06	M4-05	239.12	15.0	2216.23	2206.17	2205.89	10.06	0.12%	0.982	1.83	0.62	0.57
GMI4482315	M4-07	M4-06	361.37	15.0	2212.70	2206.44	2206.17	6.26	0.07%	0.876	1.68	0.64	0.36
GMI4482314	M4-08	M4-07	353.75	15.0	2213.28	2207.08	2206.44	6.20	0.18%	0.791	1.83	0.45	1.13
GMI4482316	M4-09	M4-08	184.22	12.0	2215.74	2209.22	2207.08	6.52	1.16%	0.466	2.39	0.28	2.22
GMI4482305	M4-09AN	M4-08	349.64	12.0	2219.07	2210.69	2207.08	8.38	1.03%	0.308	1.64	0.24	2.23
GMI4481873	M4-09BN	M4-09AN	362.54	12.0	2217.98	2211.26	2210.69	6.72	0.16%	0.301	1.98	0.44	0.69
GMI4481876	M4-09CN	M4-09BN	473.16	12.0	2219.10	2212.31	2211.26	6.79	0.22%	0.282	1.57	0.33	0.89
GMI4481812	M4-09DN	M4-09CN	301.71	12.0	2221.29	2213.05	2212.31	8.24	0.25%	0.239	1.75	0.30	1.00
GMI4481813	M4-09EN	M4-09DN	305.54	12.0	2225.32	2213.66	2213.05	11.66	0.20%	0.207	1.68	0.29	0.96
GMI4481814	M4-09EN1	M4-09EN	170.25	12.0	2223.85	2214.10	2213.66	9.75	0.26%	0.059	0.76	0.15	1.12
GMI4482317	M4-10	M4-09	359.13	12.0	2219.59	2210.77	2209.22	8.82	0.43%	0.421	2.96	0.37	1.22
GMI4482326	M4-11	M4-10	181.26	12.0	2219.90	2211.34	2210.77	8.56	0.31%	0.179	1.37	0.24	1.22
GMI4482324	M4-12	M4-11	290.51	12.0	2220.86	2211.68	2211.34	9.18	0.12%	0.131	1.24	0.28	0.72
GMI4482048	M6-02	M6-01	100.57	12.0	2167.77	2160.97	2159.91	6.80	1.05%	0.062	1.97	0.11	2.50
GMI4482530	M6-03	M6-02	324.34	12.0	2171.18	2163.06	2160.97	8.12	0.64%	0.059	1.84	0.12	1.94
GMI4482531	M6-04	M6-03	331.15	12.0	2175.61	2163.91	2163.06	11.70	0.26%	0.056	1.33	0.15	1.21
GMI4482529	M6-05	M6-04	305.56	12.0	2175.78	2164.40	2163.91	11.38	0.16%	0.039	0.87	0.14	0.96
GMI4482519	M6-05AN	M6-05	252.75	12.0	2174.30	2164.94	2164.40	9.36	0.21%	0.036	0.95	0.12	1.12
GMI4482502	M6-05BN	M6-05AN	334.64	12.0	2173.32	2165.76	2164.94	7.56	0.25%	0.033	0.99	0.11	1.20
GMI4482503	M6-05CN	M6-05BN	325.87	12.0	2172.28	2166.36	2165.76	5.92	0.18%	0.030	0.93	0.12	1.04
GMI4480562	M7-01	M2-19	54.94	10.0	2160.02	2152.02	2151.33	8.00	1.26%	0.288	3.10	0.28	1.43
NEW107	M7-01A	STOR_44	37.53	12.0	2137.84	2126.65	2126.55	11.19	0.26%	0.051	1.31	0.52	1.22
GMI4483118	M7-01B	M7-01A	30.76	12.0	2137.89	2126.72	2126.28	11.17	1.43%	0.036	0.36	0.08	2.95
GMI4779338	MIL1-01	STOR_10	263.35	10.0	2131.91	2108.66	2107.85	23.25	0.31%	0.190	2.03	0.34	0.66

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4779343	MIL1-01A	MIL1-01	90.82	10.0	2131.59	2108.84	2108.66	22.75	0.20%	0.104	1.22	0.26	0.58
GMI4779342	MIL1-01B	MIL1-01A	360.49	10.0	2130.71	2110.16	2108.84	20.55	0.37%	0.102	1.54	0.23	0.83
GMI4779341	MIL1-01C	MIL1-01B	349.55	10.0	2130.82	2111.27	2110.16	19.55	0.32%	0.101	1.65	0.24	0.76
NEW1175046	MIL1-01CO	MIL1-01E	92.70	10.0	2131.29	2113.53	2113.25	17.76	0.30%	0.002	0.10	0.03	0.86
GMI4779340	MIL1-01D	MIL1-01C	349.93	10.0	2131.00	2112.38	2111.27	18.62	0.32%	0.098	1.59	0.26	0.77
GMI4779339	MIL1-01E	MIL1-01D	272.97	10.0	2131.29	2113.25	2112.38	18.04	0.32%	0.096	1.63	0.22	0.81
GMI4481189	RAM1-01	AEXT2-08	298.83	24.0	2184.45	2169.32	2168.41	15.13	0.30%	3.364	4.44	0.48	5.38
GMI4482261	RAM1-02	RAM1-01	366.23	24.0	2184.43	2170.53	2169.32	13.90	0.33%	3.361	3.80	0.42	5.74
GMI4482262	RAM1-03	RAM1-02	276.22	24.0	2185.93	2171.38	2170.53	14.55	0.31%	3.360	3.91	0.46	5.43
GMI4483808	RAM1-04	RAM1-03	398.54	24.0	2185.57	2171.67	2171.38	13.90	0.07%	3.304	2.86	0.65	0.97
GMI4483807	RAM1-05	RAM1-04	280.95	24.0	2186.24	2173.53	2171.67	12.71	0.66%	3.305	3.27	0.35	9.58
GMI4481702	RAM1-06	RAM1-05	380.75	24.0	2186.32	2174.83	2173.53	11.49	0.34%	3.305	4.42	0.45	5.95
GMI4481677	RAM1-07	RAM1-06	395.40	24.0	2187.72	2175.63	2174.83	12.09	0.20%	3.306	3.45	0.51	3.82
GMI4481676	RAM1-08	RAM1-07	406.01	24.0	2190.86	2176.71	2175.63	14.15	0.27%	3.306	3.46	0.44	4.86
GMI4481675	RAM1-09	RAM1-08	288.41	24.0	2192.80	2179.87	2176.71	12.93	1.10%	3.306	4.79	0.30	13.27
GMI4481674	RAM1-10	RAM1-09	405.80	24.0	2203.95	2181.12	2179.87	22.83	0.31%	3.278	4.54	0.47	5.51
GMI4481661	RAM1-11	RAM1-10	370.82	18.0	2196.99	2182.33	2181.12	14.66	0.33%	2.096	3.24	0.50	2.11
GMI4481660	RAM1-12	RAM1-11	275.97	18.0	2191.11	2183.11	2182.33	8.00	0.28%	2.096	3.43	0.56	1.81
GMI4481659	RAM1-13	RAM1-12	161.17	18.0	2198.99	2183.74	2183.11	15.25	0.39%	2.096	3.46	0.49	2.50
GMI4481658	RAM1-14	RAM1-13	364.87	18.0	2197.26	2184.96	2183.74	12.30	0.33%	2.096	3.63	0.52	2.16
GMI4481656	RAM1-15	RAM1-14	400.68	18.0	2194.28	2185.82	2184.96	8.46	0.21%	2.076	3.16	0.60	1.33
GMI4481655	RAM1-15A	RAM1-15	263.90	18.0	2193.36	2186.54	2185.82	6.82	0.27%	2.076	3.10	0.54	1.78
MSTR1175352	RAM1-16	RAM1-15A	136.62	18.0	2193.52	2186.86	2186.54	6.66	0.23%	2.074	3.12	0.60	1.46
GMI4481654	RAM1-17	RAM1-16	180.61	18.0	2194.53	2187.53	2186.86	7.00	0.37%	2.074	3.29	0.48	2.41
GMI4481653	RAM1-18	RAM1-17	370.91	18.0	2194.61	2188.47	2187.53	6.14	0.25%	2.074	3.38	0.57	1.63
GMI4481649	RAM1-19	RAM1-18	400.37	18.0	2195.91	2189.47	2188.47	6.44	0.25%	2.054	3.13	0.54	1.62
GMI4481648	RAM1-20	RAM1-19	156.35	21.0	2203.84	2189.84	2189.47	14.00	0.24%	2.054	2.93	0.46	3.34
GMI4480758	RAM1-21	RAM1-20	308.96	21.0	2206.86	2190.53	2189.84	16.33	0.22%	2.007	2.96	0.44	3.22
GMI4480759	RAM1-21A	RAM1-21	368.94	18.0	2204.51	2191.35	2190.53	13.17	0.22%	2.007	3.13	0.58	1.46
GMI4482229	RAM1-22	RAM1-21A	29.12	18.0	2203.74	2191.41	2191.35	12.33	0.22%	2.005	2.77	0.63	1.47
GMI4482230	RAM1-23	RAM1-22	251.00	18.0	2203.46	2192.06	2191.41	11.40	0.26%	1.531	2.44	0.45	2.21
GMI4482232	RAM1-23A	RAM1-23	119.78	18.0	2203.74	2192.44	2192.06	11.30	0.32%	1.512	3.06	0.45	2.63
GMI4482231	RAM1-24	RAM1-23A	333.22	18.0	2204.67	2193.51	2192.44	11.16	0.32%	1.511	3.17	0.42	2.66
GMI4482225	RAM1-25	RAM1-24	328.68	18.0	2204.99	2194.45	2193.51	10.54	0.29%	1.511	3.17	0.45	2.42
GMI4482212	RAM1-26	RAM1-25	352.62	18.0	2208.33	2197.65	2194.45	10.68	0.91%	1.511	3.76	0.32	5.50
GMI4482211	RAM1-27	RAM1-26	248.54	18.0	2208.11	2198.52	2197.65	9.59	0.35%	1.511	3.79	0.44	2.84

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483815	RAM1-27A	RAM1-27	331.59	18.0	2209.75	2199.09	2198.52	10.66	0.17%	1.511	2.73	0.53	1.54
GMI4483814	RAM1-28	RAM1-27A	70.19	18.0	2211.44	2199.24	2199.09	12.20	0.21%	1.506	2.44	0.53	1.88
GMI4482164	RAM1-29	RAM1-28	404.76	18.0	2216.05	2199.86	2199.24	16.19	0.15%	1.506	2.45	0.53	1.37
GMI4482155	RAM1-30	RAM1-29	208.32	18.0	2214.40	2200.11	2199.86	14.29	0.12%	1.503	2.33	0.57	1.05
GMI4482156	RAM1-31	RAM1-30	209.59	18.0	2214.95	2200.67	2200.11	14.28	0.27%	1.503	2.59	0.44	2.30
GMI4482157	RAM1-31A	RAM1-31	18.23	18.0	2215.05	2200.70	2200.67	14.35	0.16%	1.502	2.77	0.52	1.48
GMI4482158	RAM1-32	RAM1-31A	363.28	18.0	2211.24	2201.10	2200.70	10.14	0.11%	1.253	2.15	0.53	1.19
GMI4481562	RAM1-33	RAM1-32	272.10	18.0	2211.40	2201.64	2201.10	9.76	0.20%	1.254	2.34	0.43	2.02
GMI4481561	RAM1-34	RAM1-33	300.66	18.0	2213.68	2201.75	2201.64	11.93	0.04%	1.254	2.06	0.62	0.15
GMI4481560	RAM1-35	RAM1-34	269.94	18.0	2215.47	2202.12	2201.75	13.35	0.14%	1.249	1.86	0.52	1.47
GMI4481555	RAM1-36	RAM1-35	366.11	18.0	2215.59	2202.73	2202.12	12.86	0.17%	1.252	2.30	0.45	1.75
GMI4481556	RAM1-36A	RAM1-36	352.85	10.0	2216.10	2210.34	2202.73	5.76	2.16%	0.170	1.08	0.19	2.08
GMI4481557	RAM1-36B	RAM1-36A	337.87	10.0	2217.55	2210.83	2210.34	6.72	0.15%	0.149	1.65	0.42	0.44
GMI4481558	RAM1-36C	RAM1-36B	315.16	10.0	2224.97	2211.70	2210.83	13.27	0.28%	0.148	1.33	0.29	0.66
GMI4480841	RAM1-36D	RAM1-36C	325.10	10.0	2231.53	2212.85	2211.70	18.68	0.35%	0.140	1.77	0.27	0.77
GMI4481527	RAM1-37	RAM1-36	373.17	18.0	2216.79	2203.42	2202.73	13.37	0.18%	1.119	2.39	0.41	2.04
GMI4480750	RAM1-38	RAM1-37	260.42	18.0	2217.55	2204.19	2203.42	13.36	0.30%	1.119	2.75	0.36	2.88
GMI4480751	RAM1-38A	RAM1-38	205.81	12.0	2215.11	2204.51	2204.19	10.60	0.16%	0.370	1.55	0.43	0.61
NEW398	RAM1-38B	RAM1-38A	243.00	12.0	2218.35	2206.16	2204.51	12.19	0.68%	0.369	2.28	0.29	1.69
GMI4481485	RAM1-38K1	RAM1-38K	88.02	10.0	2219.48	2211.65	2210.88	7.83	0.87%	0.140	1.57	0.19	1.63
GMI4481484	RAM1-38K2	RAM1-38K1	266.31	10.0	2220.40	2212.79	2211.65	7.61	0.43%	0.138	2.21	0.28	0.81
GMI4481483	RAM1-38K2A	RAM1-38K2	351.43	10.0	2220.64	2213.65	2212.79	6.99	0.24%	0.018	0.39	0.12	0.61
GMI4481482	RAM1-38K2B	RAM1-38K2A	347.06	10.0	2223.63	2214.75	2213.65	8.88	0.32%	0.015	0.76	0.09	0.85
GMI4481478	RAM1-38K3	RAM1-38K2	351.27	10.0	2221.03	2213.76	2212.79	7.27	0.28%	0.118	1.56	0.26	0.69
GMI4483797	RAM1-38K6	RAM1-38K4A	327.09	10.0	2223.00	2216.88	2216.18	6.12	0.21%	0.012	0.35	0.09	0.70
GMI4483795	RAM1-38K61	RAM1-38K5	351.34	10.0	2225.97	2217.37	2216.44	8.60	0.26%	0.093	0.78	0.27	0.70
GMI4483798	RAM1-38K7	RAM1-38K6	268.92	10.0	2221.27	2217.44	2216.88	3.83	0.21%	0.010	0.69	0.08	0.69
GMI4481489	RAM1-38L	RAM1-38K	144.00	12.0	2218.66	2211.26	2210.88	7.40	0.26%	0.149	1.29	0.23	1.13
GMI4481488	RAM1-38M	RAM1-38L	350.35	12.0	2221.76	2212.37	2211.26	9.39	0.32%	0.145	1.71	0.22	1.26
GMI4481487	RAM1-38N	RAM1-38M	349.39	12.0	2227.21	2213.50	2212.37	13.71	0.32%	0.141	1.76	0.21	1.28
GMI4481486	RAM1-38O	RAM1-38N	241.83	12.0	2227.35	2214.28	2213.50	13.07	0.32%	0.141	1.76	0.22	1.28
GMI4480752	RAM1-39	RAM1-38	105.85	10.0	2218.14	2210.36	2204.19	7.78	5.83%	0.829	4.90	0.32	2.88
GMI4481529	RAM1-40	RAM1-39	414.48	10.0	2220.85	2212.48	2210.36	8.37	0.51%	0.804	4.14	0.76	0.29
GMI4481528	RAM1-41	RAM1-40	430.90	10.0	2223.56	2214.84	2212.48	8.72	0.55%	0.805	3.11	0.62	0.33
GMI4481493	RAM1-42	RAM1-41	420.25	10.0	2225.99	2216.78	2214.84	9.21	0.46%	0.804	3.28	0.69	0.24
GMI4481491	RAM1-43	RAM1-42	251.00	8.0	2228.39	2218.67	2216.88	9.72	0.71%	0.631	3.55	0.76	0.08

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481476	RAM1-43A	RAM1-43	250.20	8.0	2229.17	2220.47	2218.67	8.70	0.72%	0.631	3.65	0.67	0.16
GMI4481475	RAM1-43B	RAM1-43A	350.51	8.0	2231.26	2221.87	2220.47	9.39	0.40%	0.620	3.08	2.31	-0.17
GMI4480928	RAM1-44	RAM1-43B	350.58	8.0	2232.35	2225.89	2221.87	6.46	1.15%	0.620	3.19	0.61	0.29
GMI4480929	RAM1-45	RAM1-44	349.74	8.0	2238.10	2231.72	2225.89	6.38	1.67%	0.541	4.24	0.50	0.55
GMI4481464	RAM1-45A	RAM1-45	348.92	8.0	2244.68	2233.46	2231.72	11.22	0.50%	0.541	3.34	0.87	0.06
GMI4481463	RAM1-46	RAM1-45A	350.15	8.0	2246.16	2235.74	2233.46	10.42	0.65%	0.543	2.96	0.67	0.14
GMI4481462	RAM1-46A	RAM1-46	334.68	8.0	2244.06	2237.62	2235.74	6.44	0.56%	0.543	3.17	0.75	0.09
GMI4480893	RAM1-46B	RAM1-46B1	287.00	10.0	2257.58	2245.87	2237.70	11.71	2.85%	0.497	2.89	0.30	2.09
GMI4480892	RAM1-46C	RAM1-46B	255.11	10.0	2267.32	2248.07	2245.87	19.25	0.86%	0.496	4.12	0.45	0.93
GMI4481465	RAM1-46D	RAM1-46C	242.13	10.0	2270.32	2249.62	2248.07	20.70	0.64%	0.494	3.21	0.45	0.73
GMI4481466	RAM1-46E	RAM1-46D	242.14	10.0	2271.49	2251.27	2249.62	20.22	0.68%	0.493	3.26	0.44	0.77
GMI4481467	RAM1-46F	RAM1-46E	243.32	10.0	2271.50	2252.48	2251.27	19.02	0.50%	0.491	3.05	0.49	0.59
GMI4483241	RAM1-46F1	RAM1-46F	277.09	10.0	2276.70	2253.80	2252.48	22.90	0.47%	0.307	2.11	0.37	0.75
GMI4483242	RAM1-46F2	RAM1-46F1	192.81	10.0	2277.60	2254.71	2253.80	22.89	0.48%	0.306	2.56	0.38	0.75
GMI4483243	RAM1-46F3	RAM1-46F2	280.63	10.0	2276.70	2256.04	2254.71	20.66	0.47%	0.300	2.51	0.37	0.76
GMI4483244	RAM1-46F4	RAM1-46F3	271.81	10.0	2275.90	2257.34	2256.04	18.57	0.47%	0.299	2.54	0.37	0.76
GMI4481438	RAM1-46G	RAM1-46F	161.19	10.0	2271.95	2253.17	2252.48	18.78	0.43%	0.180	1.44	0.29	0.82
GMI4481437	RAM1-46H	RAM1-46G	258.82	10.0	2272.08	2254.08	2253.17	18.00	0.35%	0.162	1.93	0.29	0.75
GMI4481434	RAM1-46I	RAM1-46H	140.32	10.0	2273.01	2254.91	2254.08	18.10	0.59%	0.141	1.92	0.23	1.04
GMI4481422	RAM1-46J	RAM1-46I	88.53	10.0	2273.43	2255.33	2254.91	18.10	0.47%	0.139	2.08	0.25	0.92
CDT-1051	REL-0	MIL1-01E	91.25	10.0	2133.41	2113.86	2113.40	19.55	0.51%	0.092	1.87	0.20	1.00
CDT-1049	REL-1	REL-0	100.48	10.0	2133.41	2116.71	2113.86	16.70	2.83%	0.092	2.41	0.13	2.49
CDT-1027	REL-10	REL-9	121.83	10.0	2140.02	2120.97	2120.50	19.05	0.39%	0.036	1.38	0.14	0.92
CDT-1025	REL-11	REL-10	47.67	10.0	2141.24	2121.19	2120.97	20.05	0.45%	0.036	1.29	0.13	0.99
CDT-1023	REL-12	REL-11	198.86	10.0	2143.48	2121.93	2121.19	21.55	0.37%	0.036	1.30	0.14	0.90
CDT-1047	REL-2	REL-1	216.75	10.0	2135.58	2117.33	2116.71	18.25	0.29%	0.092	1.98	0.25	0.73
CDT-1045	REL-3	REL-2	97.54	10.0	2134.50	2117.65	2117.33	16.85	0.33%	0.092	1.46	0.22	0.79
CDT-1043	REL-4	REL-3	111.96	10.0	2133.87	2118.17	2117.65	15.70	0.46%	0.092	1.72	0.20	0.95
CDT-1041	REL-5	REL-4	54.20	10.0	2133.93	2118.48	2118.17	15.45	0.58%	0.092	1.87	0.19	1.07
CDT-1039	REL-5A	REL-5	185.23	10.0	2133.01	2118.91	2118.48	14.10	0.23%	0.092	1.52	0.26	0.65
CDT-1037	REL-6	REL-5A	46.29	10.0	2133.68	2118.18	2118.91	15.50	-1.58%	0.036	1.66	1.14	1.89
CDT-1035	REL-7	REL-6	87.38	10.0	2134.76	2119.76	2118.18	15.00	1.81%	0.036	0.18	0.09	2.03
CDT-1033	REL-8	REL-7	56.41	10.0	2136.69	2119.69	2119.76	17.00	-0.13%	0.036	0.78	0.29	0.51
CDT-1031	REL-8A	REL-8	184.70	10.0	2138.21	2120.16	2119.69	18.05	0.25%	0.036	0.80	0.15	0.74
CDT-1029	REL-9	REL-8A	49.39	10.0	2138.50	2120.50	2120.16	18.00	0.69%	0.036	1.33	0.12	1.24
GMI4481665	REX1-01	RAM1-10	395.04	18.0	2209.40	2198.41	2181.12	10.99	4.38%	1.293	2.93	0.20	14.10

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481664	REX1-02	REX1-01	399.60	18.0	2211.70	2200.06	2198.41	11.64	0.41%	1.288	4.35	0.42	3.44
GMI4481663	REX1-03	REX1-02	369.71	18.0	2213.20	2201.10	2200.06	12.10	0.28%	1.260	2.91	0.39	2.64
GMI4481662	REX1-04	REX1-03	316.19	18.0	2213.78	2201.93	2201.10	11.85	0.26%	1.257	2.91	0.41	2.51
GMI4482135	REX1-04A	REX1-04	382.60	10.0	2217.14	2208.58	2201.93	8.56	1.74%	0.056	1.40	0.11	1.97
GMI4482136	REX1-04B	REX1-04A	192.02	10.0	2220.15	2209.46	2208.58	10.69	0.46%	0.054	1.80	0.17	0.98
GMI4482137	REX1-04C	REX1-04B	91.11	10.0	2221.59	2209.91	2209.46	11.68	0.49%	0.029	0.98	0.11	1.05
GMI4482138	REX1-04D	REX1-04C	117.44	10.0	2223.96	2215.68	2209.91	8.28	4.91%	0.013	1.09	0.05	3.39
GMI4482139	REX1-04E	REX1-04D	399.46	10.0	2240.52	2235.73	2215.68	4.79	5.02%	0.011	2.08	0.04	3.43
GMI4482140	REX1-04F	REX1-04E	222.78	10.0	2246.68	2239.63	2235.73	7.05	1.75%	0.009	1.56	0.05	2.02
NEW6755945	REX1-04G	REX1-04F	237.00	10.0	2250.48	2243.78	2239.63	6.70	1.75%	0.007	1.18	0.04	2.02
NEW8483931	REX1-04H	REX1-04G	259.00	10.0	2255.43	2248.31	2243.78	7.11	1.75%	0.005	1.05	0.04	2.03
NEW3250837	REX1-04I	REX1-04H	239.00	10.0	2257.91	2252.50	2248.31	5.41	1.75%	0.002	0.72	0.03	2.03
GMI4482659	REX1-05	REX1-04	341.41	15.0	2221.66	2210.30	2201.93	11.36	2.45%	1.210	4.26	0.28	5.87
GMI4482711	REX1-06	REX1-05	342.08	15.0	2234.09	2221.69	2210.30	12.40	3.33%	1.199	6.99	0.26	7.06
GMI4482673	REX1-07	REX1-06	184.38	15.0	2237.03	2227.51	2221.69	9.52	3.16%	1.196	7.16	0.27	6.84
GMI4482674	REX1-08	REX1-07	82.48	15.0	2239.16	2229.45	2227.51	9.71	2.35%	1.175	6.20	0.31	5.76
GMI4482675	REX1-09	REX1-08	209.57	15.0	2242.41	2230.69	2229.45	11.72	0.59%	1.175	4.28	0.45	2.30
GMI4482668	REX1-10	REX1-09	350.13	15.0	2246.21	2236.59	2230.69	9.63	1.68%	1.172	4.30	0.31	4.70
GMI4482667	REX1-11	REX1-10	351.59	15.0	2252.11	2239.51	2236.59	12.60	0.83%	1.170	4.41	0.37	2.96
GMI4482625	REX1-12	REX1-11	225.91	15.0	2251.49	2239.94	2239.51	11.55	0.19%	1.170	3.00	0.62	0.80
GMI4482663	REX1-13	REX1-12	300.07	15.0	2249.15	2240.65	2239.94	8.51	0.23%	1.168	2.52	0.52	1.02
GMI4482664	REX1-14	REX1-13	270.03	15.0	2251.47	2241.08	2240.65	10.39	0.16%	1.167	2.50	0.62	0.65
GMI4480745A	REX1-14A	REX1-14	99.79	15.0	2252.69	2241.29	2241.08	11.40	0.21%	1.165	2.31	0.60	0.91
GMI4480745	REX1-15	REX1-14A	135.22	15.0	2253.28	2241.70	2241.29	11.58	0.30%	1.165	2.61	0.50	1.33
GMI4480744	REX1-16	REX1-15	400.72	15.0	2255.81	2242.40	2241.70	13.41	0.17%	1.165	2.58	0.61	0.73
GMI4480743	REX1-17	REX1-16	400.01	15.0	2257.31	2242.99	2242.40	14.32	0.15%	1.166	2.28	0.62	0.57
GMI4480742	REX1-18	REX1-17	398.85	15.0	2255.14	2243.62	2242.99	11.52	0.16%	1.167	2.31	0.60	0.63
GMI4480741	REX1-19	REX1-18	286.21	15.0	2253.40	2244.13	2243.62	9.27	0.18%	1.167	2.40	0.59	0.75
GMI4480740	REX1-20	REX1-19	288.15	15.0	2254.01	2245.08	2244.13	8.93	0.33%	1.167	2.76	0.47	1.43
GMI4480739	REX1-21	REX1-20	399.42	15.0	2254.56	2245.33	2245.08	9.23	0.06%	1.163	2.21	0.79	-0.03
GMI4480738	REX1-22	REX1-21	214.94	15.0	2255.89	2246.04	2245.33	9.85	0.33%	1.139	2.18	0.46	1.46
GMI4480819	REX1-23	REX1-22	279.77	15.0	2255.58	2246.68	2246.04	8.90	0.23%	1.123	2.79	0.55	1.04
GMI4480820	REX1-23A	REX1-23	133.26	12.0	2256.07	2247.05	2246.68	9.02	0.28%	0.592	1.93	0.48	0.72
GMI4480821	REX1-23B	REX1-23A	141.01	12.0	2257.12	2247.53	2247.05	9.59	0.34%	0.592	2.53	0.46	0.86
GMI4480822	REX1-23C	REX1-23B	117.53	12.0	2257.21	2247.96	2247.53	9.25	0.37%	0.580	2.60	0.45	0.93
GMI4480823	REX1-23D	REX1-23C	296.41	12.0	2260.05	2248.76	2247.96	11.29	0.27%	0.579	2.48	0.49	0.72

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4480824	REX1-23E	REX1-23D	312.82	12.0	2260.68	2249.55	2248.76	11.13	0.25%	0.573	2.34	0.48	0.68
GMI4483181	REX1-23F	REX1-23E	231.66	12.0	2258.70	2249.80	2249.55	8.90	0.11%	0.569	1.94	0.64	0.25
GMI4483182	REX1-23G	REX1-23F	161.10	12.0	2259.90	2250.20	2249.80	9.70	0.25%	0.568	1.96	0.47	0.68
GMI4483183	REX1-23H	REX1-23G	156.84	12.0	2261.10	2250.68	2250.20	10.42	0.31%	0.567	2.44	0.46	0.81
GMI4483184	REX1-23I	REX1-23H	261.89	12.0	2263.10	2251.22	2250.68	11.88	0.21%	0.547	2.22	0.52	0.59
GMI4483185	REX1-23J	REX1-23I	393.76	12.0	2263.10	2252.24	2251.22	10.86	0.26%	0.547	2.23	0.46	0.72
GMI4483195	REX1-23K	REX1-23J	398.97	12.0	2267.30	2253.10	2252.24	14.20	0.22%	0.546	2.26	0.51	0.61
GMI4483200	REX1-23K1	REX1-23K	241.86	12.0	2263.70	2253.94	2253.10	9.76	0.35%	0.514	2.28	0.41	0.96
NEW1175170	REX1-23K10	REX1-23K9	299.32	10.0	2276.14	2260.44	2259.34	15.70	0.37%	0.195	2.13	0.32	0.74
NEW1175169	REX1-23K11	REX1-23K10	207.27	10.0	2276.85	2261.33	2260.44	15.52	0.43%	0.194	2.09	0.64	0.81
GMI4483201	REX1-23K2	REX1-23K1	176.62	12.0	2264.60	2254.18	2253.94	10.42	0.14%	0.514	2.08	0.57	0.41
GMI4483435	REX1-23K3	REX1-23K2	252.44	12.0	2265.40	2254.88	2254.18	10.52	0.28%	0.494	1.96	0.43	0.82
GMI4483434	REX1-23K4	REX1-23K3	239.83	12.0	2267.30	2255.46	2254.88	11.84	0.24%	0.494	2.27	0.46	0.73
GMI4483202	REX1-23K5	REX1-23K4	278.78	12.0	2267.50	2256.10	2255.46	11.40	0.23%	0.481	2.15	0.45	0.72
GMI4483210	REX1-23K6	REX1-23K5	293.16	12.0	2268.40	2256.85	2256.10	11.55	0.26%	0.428	2.09	0.40	0.83
GMI4483211	REX1-23K7	REX1-23K6	307.28	12.0	2268.30	2257.42	2256.85	10.88	0.19%	0.428	2.03	0.47	0.65
GMI4483212	REX1-23K8	REX1-23K7	211.44	12.0	2269.90	2258.00	2257.42	11.90	0.27%	0.427	2.05	0.39	0.88
MSTR1175350	REX1-23K9	REX1-23KA	117.96	10.0	2275.99	2259.34	2258.77	16.65	0.48%	0.195	1.79	0.29	0.87
MSTR1175353	REX1-23KA	REX1-23K8	174.14	12.0	2272.73	2258.77	2258.00	13.96	0.44%	0.423	2.49	0.34	1.24
4666	REX1-23KN	REX1-23KM	209.72	10.0	2271.79	2260.96	2260.13	10.83	0.40%	0.097	1.39	0.21	0.87
4665	REX1-23KP	REX1-23KN	264.62	10.0	2274.56	2261.66	2260.96	12.90	0.26%	0.095	1.55	0.25	0.69
4664	REX1-23KQ	REX1-23KP	164.95	10.0	2275.98	2262.12	2261.66	13.86	0.28%	0.091	1.43	0.23	0.72
4663	REX1-23KR	REX1-23KQ	160.38	10.0	2276.78	2263.07	2262.12	13.71	0.59%	0.089	1.70	0.19	1.09
4662	REX1-23KS	REX1-23KR	309.57	10.0	2277.89	2263.99	2263.07	13.90	0.30%	0.087	1.63	0.23	0.75
4661	REX1-23KT	REX1-23KS	204.76	10.0	2278.71	2264.83	2263.99	13.88	0.41%	0.085	1.53	0.20	0.90
4659	REX1-23KV	REX1-23KY	183.01	10.0	2280.37	2266.60	2265.77	13.77	0.45%	0.070	1.66	0.18	0.96
4660	REX1-23KY	REX1-23KT	193.86	10.0	2278.97	2265.77	2264.83	13.20	0.48%	0.072	1.57	0.18	1.00
GMI4483427	REX1-24	REX1-23	175.38	15.0	2259.70	2247.00	2246.68	12.70	0.18%	0.535	1.52	0.38	1.40
GMI4483168	REX1-25	REX1-24	131.37	15.0	2258.80	2247.24	2247.00	11.56	0.18%	0.535	1.96	0.38	1.40
GMI4483169	REX1-26	REX1-25	246.71	15.0	2256.49	2247.69	2247.24	8.80	0.18%	0.522	1.98	0.36	1.41
GMI4483170	REX1-27	REX1-26	199.04	15.0	2261.40	2248.08	2247.69	13.32	0.19%	0.515	2.03	0.35	1.49
GMI4484044	REX1-28	REX1-27	143.40	15.0	2259.85	2248.36	2248.08	11.49	0.19%	0.514	2.02	0.36	1.49
GMI4484043	REX1-29	REX1-28	101.80	15.0	2261.21	2248.63	2248.36	12.58	0.26%	0.512	2.11	0.33	1.82
GMI4484042	REX1-29A	REX1-29	153.42	15.0	2264.25	2248.94	2248.63	15.31	0.20%	0.082	0.64	0.14	1.95
GMI4484041	REX1-29B	REX1-29A	170.24	12.0	2265.30	2249.39	2248.94	15.91	0.26%	0.080	1.39	0.17	1.20
GMI4484040	REX1-29C	REX1-29B	199.60	12.0	2263.53	2249.98	2249.39	13.55	0.30%	0.067	1.26	0.15	1.29

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4484039	REX1-29D	REX1-29C	290.03	12.0	2264.02	2250.93	2249.98	13.09	0.33%	0.035	0.91	0.11	1.39
GMI4484038	REX1-29E	REX1-29D	251.13	12.0	2261.43	2251.82	2250.93	9.61	0.35%	0.032	1.12	0.10	1.45
GMI4484052	REX1-30	REX1-29	284.90	12.0	2258.00	2249.30	2248.63	8.70	0.24%	0.446	2.18	0.44	0.76
GMI4484051	REX1-31	REX1-30	189.67	12.0	2257.15	2249.83	2249.30	7.32	0.28%	0.439	2.20	0.40	0.88
GMI4484050	REX1-32	REX1-31	323.21	12.0	2259.66	2250.55	2249.83	9.11	0.22%	0.438	2.16	0.44	0.74
GMI4484049	REX1-33	REX1-32	179.27	12.0	2259.34	2251.14	2250.55	8.20	0.33%	0.435	2.22	0.38	1.00
GMI4484046	REX1-34	REX1-33	294.54	12.0	2262.32	2251.86	2251.14	10.46	0.24%	0.424	2.23	0.43	0.81
GMI4484032	REX1-35	REX1-34	226.90	12.0	2262.17	2252.33	2251.86	9.84	0.20%	0.414	2.01	0.43	0.72
GMI4779229	REX1-36	REX1-35	95.56	12.0	2262.27	2252.92	2252.33	9.35	0.63%	0.413	2.42	0.32	1.55
GMI4779228	REX1-37	REX1-36	131.40	12.0	2263.34	2253.20	2252.92	10.15	0.21%	0.412	2.22	0.46	0.72
GMI4779227	REX1-38	REX1-37	305.40	12.0	2263.14	2253.94	2253.20	9.20	0.24%	0.398	1.96	0.39	0.83
NEW279	REX1-38B	REX1-38	185.04	12.0	2263.24	2254.48	2253.94	8.76	0.29%	0.070	0.65	0.16	1.28
NEW278	REX1-38C	REX1-38B	147.23	12.0	2264.34	2254.82	2254.48	9.52	0.23%	0.068	1.29	0.17	1.13
NEW282	REX1-38C4	REX1-38C	306.21	12.0	2266.63	2255.50	2254.82	11.13	0.22%	0.043	0.91	0.13	1.13
NEW1175048	REX1-38C4A	REX1-38C4	184.39	12.0	2268.28	2255.91	2255.50	12.36	0.22%	0.031	0.88	0.15	1.15
4617	REX1-38C4B	REX1-38C4A	99.77	12.0	2269.17	2256.34	2255.88	12.83	0.47%	0.028	0.84	0.09	1.67
4618	REX1-38C4C	REX1-38C4B	302.75	12.0	2271.62	2257.03	2256.34	14.59	0.23%	0.017	0.79	0.08	1.17
4619	REX1-38C4D	REX1-38C4C	248.70	12.0	2273.15	2257.69	2257.03	15.46	0.27%	0.014	0.76	0.07	1.27
GMI4779242	REX1-39	REX1-38	181.04	10.0	2261.27	2254.62	2253.94	6.65	0.38%	0.321	2.18	0.40	0.62
GMI4779241	REX1-40	REX1-39	178.43	10.0	2260.47	2255.07	2254.62	5.40	0.25%	0.319	2.13	0.48	0.45
GMI4779240	REX1-41	REX1-40	178.19	10.0	2262.23	2255.58	2255.07	6.65	0.29%	0.318	2.03	0.43	0.50
GMI4779239	REX1-42	REX1-41	106.99	10.0	2263.13	2255.93	2255.58	7.20	0.33%	0.314	2.17	0.43	0.56
GMI4779238	REX1-43	REX1-42	106.84	10.0	2264.08	2256.28	2255.93	7.80	0.33%	0.313	2.17	0.43	0.57
GMI4779237	REX1-44	REX1-43	112.41	10.0	2264.97	2256.47	2256.28	8.50	0.17%	0.311	1.88	0.53	0.32
NEW1175019	REX1-45	REX1-44	295.20	10.0	2263.24	2257.35	2256.47	5.89	0.30%	0.257	1.66	0.38	0.58
NEW1174981	REX1-46	REX1-45	365.01	10.0	2266.15	2258.13	2257.35	8.02	0.21%	0.214	1.74	0.39	0.50
NEW1174980	REX1-47	REX1-46	307.36	10.0	2265.75	2258.82	2258.13	6.93	0.22%	0.213	1.75	0.37	0.51
NEW1174979	REX1-48	REX1-47	237.11	10.0	2267.63	2259.39	2258.82	8.24	0.24%	0.210	1.78	0.37	0.55
NEW1174978	REX1-49	REX1-48	184.08	10.0	2269.10	2259.93	2259.39	9.17	0.29%	0.207	1.88	0.34	0.63
NEW1174977	REX1-50	REX1-49	185.95	10.0	2269.96	2260.53	2259.93	9.43	0.32%	0.154	1.64	0.29	0.72
NEW1174976	REX1-51	REX1-50	124.53	10.0	2268.63	2261.06	2260.53	7.57	0.43%	0.152	1.94	0.27	0.85
GMI4483466	RIV1-02	FG1-01	31.65	24.0	2133.74	2121.69	2119.31	12.05	7.53%	5.465	4.14	0.24	38.05
GMI4483465	RIV1-03	RIV1-02	290.65	24.0	2138.41	2122.49	2121.69	15.92	0.27%	5.465	4.42	0.65	2.84
GMI4483464	RIV1-03A	RIV1-03B	10.59	24.0	2135.06	2122.99	2122.49	12.07	4.73%	5.467	2.75	0.90	18.38
4852	RIV1-03B	RIV1-03C	45.77	24.0	2135.20	2122.75	2122.60	12.45	0.33%	5.467	2.70	0.99	3.60
4853	RIV1-03C	RIV1-03D	39.30	24.0	2138.35	2122.60	2122.60	15.75	0.00%	5.467	2.71	1.00	-4.67

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
4854	RIV1-03D	RIV1-03E	52.87	24.0	2139.00	2122.60	2122.79	16.40	-0.36%	5.467	2.98	0.95	4.03
4855	RIV1-03E	RIV1-03F	33.88	24.0	2138.19	2122.79	2122.63	15.40	0.47%	5.467	3.33	0.75	5.42
4856	RIV1-03F	RIV1-03	99.22	24.0	2138.18	2122.63	2122.49	15.55	0.14%	5.467	3.57	0.76	0.48
NEW1175256	RIV1-04	RIV1-03A	26.84	24.0	2135.08	2123.27	2122.99	11.81	1.06%	5.468	3.64	0.81	10.80
GMI4483463	RIV1-05	RIV1-04	514.27	24.0	2137.11	2124.54	2123.27	12.57	0.25%	5.479	3.61	0.62	2.39
GMI4483462	RIV1-06	RIV1-05	354.89	24.0	2135.77	2125.48	2124.54	10.29	0.26%	5.482	4.09	0.64	2.67
GMI4483461	RIV1-07	RIV1-06	361.36	24.0	2135.24	2126.35	2125.48	8.89	0.24%	5.484	3.92	0.66	2.29
GMI4483460	RIV1-08	RIV1-07	53.94	24.0	2136.25	2126.70	2126.35	9.55	0.64%	5.484	4.08	0.60	7.28
GMI4483459	RIV1-09	RIV1-08	216.12	24.0	2137.02	2127.31	2126.70	9.72	0.28%	5.485	4.14	0.65	2.93
GMI4483458	RIV1-10	RIV1-09	408.22	24.0	2151.25	2128.25	2127.31	23.00	0.23%	5.487	3.88	0.67	2.11
GMI4483457	RIV1-11	RIV1-10	398.99	24.0	2149.09	2129.31	2128.25	19.78	0.26%	5.490	3.96	0.63	2.67
GMI4483456	RIV1-12	RIV1-11	401.40	24.0	2146.11	2130.33	2129.31	15.78	0.26%	5.492	4.04	0.65	2.51
GMI4483455	RIV1-13	RIV1-12	399.80	24.0	2139.74	2131.32	2130.33	8.42	0.25%	5.495	3.95	0.65	2.37
GMI4483454	RIV1-14	RIV1-13	395.68	24.0	2139.38	2132.51	2131.32	6.87	0.30%	5.497	4.13	0.60	3.19
GMI4483453	RIV1-15	RIV1-14	466.24	24.0	2139.82	2133.49	2132.51	6.33	0.21%	5.499	3.95	0.70	1.76
GMI4483452	RIV1-16	RIV1-15	423.55	24.0	2140.70	2134.55	2133.49	6.15	0.25%	5.503	3.82	0.64	2.42
GMI4483451	RIV1-17	RIV1-16	434.68	24.0	2143.90	2135.73	2134.55	8.17	0.27%	5.508	4.09	0.62	2.75
GMI4483450	RIV1-17A	RIV1-17	104.19	24.0	2146.72	2136.08	2135.73	10.64	0.34%	5.445	4.00	0.75	3.75
4873	RIV1-18	RIV1-17A	13.29	24.0	2149.68	2136.08	2135.73	13.60	2.66%	5.445	3.45	0.70	14.66
GMI4483449	RIV1-19	RIV1-18	421.70	24.0	2148.83	2137.24	2136.08	11.59	0.28%	5.433	3.90	0.60	2.88
NEW348	RIV1-20	RIV1-19	140.88	24.0	2146.54	2137.57	2137.24	8.97	0.23%	5.433	3.93	0.69	2.22
GMI4483448	RIV1-21	RIV1-20	260.87	24.0	2146.09	2138.34	2137.57	7.75	0.29%	5.365	3.84	0.61	3.24
GMI4483447	RIV1-21A	RIV1-21	274.68	24.0	2145.16	2138.97	2138.34	6.19	0.23%	5.365	3.90	0.67	2.22
NEW370	RIV1-22	RIV1-21A	124.01	24.0	2146.38	2139.39	2138.97	6.99	0.34%	5.298	3.77	0.63	3.94
GMI4483446	RIV1-23	RIV1-22	398.65	24.0	2147.91	2140.41	2139.39	7.50	0.25%	5.302	3.94	0.62	2.70
GMI4483436	RIV1-24	RIV1-23	399.94	24.0	2148.54	2141.39	2140.41	7.15	0.25%	5.306	3.94	0.64	2.55
GMI4483443	RIV1-24A	RIV1-24	192.50	24.0	2148.88	2141.78	2141.39	7.11	0.20%	5.306	3.67	0.70	1.74
NEW369	RIV1-24C	RIV1-24A	85.17	24.0	2148.31	2142.12	2141.78	6.19	0.40%	5.300	3.62	0.65	4.72
4797	RIV1-25	RIV1-24C	122.34	24.0	2148.68	2142.35	2142.12	6.33	0.19%	5.301	3.58	0.72	1.63
GMI4483442	RIV1-25A	RIV1-25	285.33	24.0	2149.86	2143.01	2142.35	6.85	0.23%	5.305	3.54	0.67	2.31
NEW1175067	RIV1-26	RIV1-25A	111.96	24.0	2148.52	2143.36	2143.01	5.16	0.31%	5.286	3.72	0.66	3.57
GMI4483441	RIV1-27	RIV1-26	384.30	24.0	2149.01	2144.40	2143.36	4.61	0.27%	5.293	3.93	0.61	2.96
GMI4483440	RIV1-28	RIV1-27	281.08	24.0	2151.27	2145.29	2144.40	5.98	0.31%	5.296	4.18	0.59	3.60
NEW349	RIV1-28A	RIV1-28	17.42	24.0	2151.14	2145.46	2145.29	5.68	1.02%	5.296	4.13	0.62	10.54
GMI4483439	RIV1-28B	RIV1-28A	298.09	24.0	2158.95	2146.11	2145.46	12.84	0.22%	5.296	3.81	0.74	2.08
4570	RIV1-29	RIV1-28B	43.61	24.0	2159.91	2146.11	2145.46	13.80	1.48%	5.269	3.23	0.76	3.35

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483438	RIV1-30	RIV1-29	247.99	24.0	2158.99	2146.73	2146.11	12.26	0.25%	5.273	3.42	0.67	2.64
NEW368	RIV1-31	RIV1-30	339.80	24.0	2160.97	2147.41	2146.73	13.55	0.20%	5.284	3.69	0.67	2.14
NEW346	RIV1-32	RIV1-31	33.03	24.0	2158.78	2147.50	2147.41	11.28	0.27%	4.980	3.35	0.74	0.39
GMI4483437	RIV1-33	RIV1-32	26.94	24.0	2158.75	2147.65	2147.50	11.09	0.56%	4.102	2.71	0.71	7.40
GMI4481630	RX1-01	RAM1-22	335.57	12.0	2202.45	2193.70	2191.41	8.75	0.68%	0.583	1.80	0.36	1.48
GMI4481632	RX1-02	RX1-01	335.89	12.0	2202.80	2195.10	2193.70	7.70	0.42%	0.581	3.07	0.44	1.03
GMI4481633	RX1-03	RX1-02	335.53	12.0	2202.80	2196.51	2195.10	6.29	0.42%	0.581	2.82	0.42	1.04
GMI4481631	RX1-04	RX1-03	339.07	10.0	2206.73	2198.56	2196.51	8.17	0.60%	0.516	3.11	0.46	0.68
GMI4481611	RX1-05	RX1-04	349.87	10.0	2206.24	2200.41	2198.56	5.83	0.53%	0.515	3.12	0.49	0.60
GMI4481610	RX1-06	RX1-05	349.25	10.0	2208.01	2202.31	2200.41	5.70	0.54%	0.515	3.05	0.48	0.62
GMI4481609	RX1-07	RX1-06	269.27	10.0	2211.94	2203.67	2202.31	8.27	0.51%	0.510	3.01	0.49	0.58
GMI4481612	RX1-08	RX1-07	331.45	8.0	2222.23	2209.16	2203.67	13.07	1.66%	0.509	4.02	0.48	0.58
GMI4481608	RX1-09	RX1-08	329.10	8.0	2226.80	2214.24	2209.16	12.56	1.54%	0.509	4.62	0.50	0.54
GMI4481578	RX1-10	RX1-09	154.49	8.0	2226.99	2216.83	2214.24	10.16	1.68%	0.508	4.58	0.49	0.59
GMI4481579	RX1-11	RX1-10	130.66	8.0	2229.76	2219.05	2216.83	10.71	1.70%	0.508	4.64	0.49	0.60
GMI4481580	RX1-12	RX1-11	318.83	8.0	2231.71	2222.06	2219.05	9.65	0.94%	0.483	3.93	0.58	0.34
GMI4481581	RX1-13	RX1-12	318.09	8.0	2234.47	2224.97	2222.06	9.50	0.91%	0.481	3.64	0.56	0.33
GMI4481582	RX1-14	RX1-13	355.03	8.0	2252.39	2235.57	2224.97	16.82	2.99%	0.479	4.52	0.39	0.98
GMI4481541	RX1-15	RX1-14	200.30	8.0	2252.92	2237.37	2235.57	15.55	0.90%	0.477	4.11	0.63	0.33
GMI4482571	RX1-16	RX1-15	347.62	8.0	2254.48	2238.78	2237.37	15.70	0.41%	0.438	2.69	0.73	0.10
GMI4482592	RX1-17	RX1-16	317.79	8.0	2256.75	2240.25	2238.78	16.50	0.46%	0.435	2.64	0.65	0.14
GMI4482591	RX1-18	RX1-17	195.61	8.0	2258.89	2240.94	2240.25	17.95	0.35%	0.434	2.53	0.78	0.07
GMI4482590	RX1-18A	RX1-18	283.53	10.0	2259.96	2241.83	2240.94	18.13	0.31%	0.178	1.18	0.31	0.68
GMI4480753	RX1-18B	RX1-18A	253.33	10.0	2259.40	2242.95	2241.83	16.45	0.44%	0.178	2.04	0.28	0.84
GMI4480754	RX1-18C	RX1-18B	306.05	10.0	2260.31	2243.91	2242.95	16.40	0.31%	0.110	1.49	0.24	0.75
GMI4482176	RX1-18D	RX1-18C	166.63	10.0	2259.13	2244.23	2243.91	14.90	0.19%	0.110	1.45	0.29	0.56
GMI4482177	RX1-18E	RX1-18D	250.70	10.0	2257.00	2245.10	2244.23	11.90	0.35%	0.109	1.47	0.23	0.80
GMI4482178	RX1-18F	RX1-18E	252.03	10.0	2257.41	2245.98	2245.10	11.43	0.35%	0.107	1.71	0.23	0.80
GMI4482179	RX1-18F1	RX1-18F	401.62	10.0	2256.80	2247.18	2245.98	9.62	0.30%	0.089	1.48	0.22	0.75
GMI4482180	RX1-18F2	RX1-18F1	215.86	10.0	2256.09	2248.05	2247.18	8.04	0.40%	0.086	1.60	0.20	0.89
GMI4480829	RX1-18F3	RX1-18F2	349.27	10.0	2257.61	2249.21	2248.05	8.40	0.33%	0.079	1.55	0.21	0.81
GMI4481554	RX1-18F4	RX1-18F3	231.36	10.0	2259.32	2249.86	2249.21	9.46	0.28%	0.077	1.45	0.21	0.74
GMI4481553	RX1-18F5	RX1-18F4	235.83	10.0	2257.59	2250.83	2249.86	6.76	0.41%	0.074	1.48	0.18	0.91
GMI4482597	RX1-19	RX1-18	247.34	8.0	2257.37	2241.88	2240.94	15.49	0.38%	0.257	1.71	0.49	0.27
GMI4482596	RX1-20	RX1-19	246.12	8.0	2256.26	2242.95	2241.88	13.31	0.43%	0.256	2.35	0.48	0.30
GMI4482595	RX1-21	RX1-20	279.05	8.0	2259.42	2244.18	2242.95	15.24	0.44%	0.209	2.13	0.42	0.35

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482594	RX1-22	RX1-21	363.99	8.0	2261.25	2245.68	2244.18	15.57	0.41%	0.209	2.25	0.44	0.33
GMI4482570	RX1-23	RX1-22	402.34	8.0	2261.62	2247.42	2245.68	14.20	0.43%	0.209	2.25	0.42	0.35
GMI4482569	RX1-23A	RX1-23	400.66	8.0	2262.77	2249.19	2247.42	13.58	0.44%	0.209	2.29	0.43	0.35
GMI4482568	RX1-24	RX1-23A	402.07	8.0	2263.98	2250.81	2249.19	13.17	0.40%	0.203	2.20	0.43	0.33
GMI4481517	RX1-25	RX1-24	307.55	8.0	2265.04	2252.04	2250.81	13.00	0.40%	0.200	2.17	0.43	0.34
GMI4481460A	RX1-25A1	RX1-25	209.10	8.0	2265.84	2253.14	2252.04	12.70	0.53%	0.165	2.03	0.35	0.45
GMI4481460	RX1-26	RX1-25A1	92.13	8.0	2266.22	2253.35	2253.14	12.87	0.23%	0.165	1.83	0.48	0.24
GMI4481459	RX1-27	RX1-26	400.70	8.0	2267.94	2255.34	2253.35	12.60	0.50%	0.161	1.80	0.36	0.44
GMI4480690	RX1-27A	RX1-27	200.44	8.0	2268.44	2256.14	2255.34	12.30	0.40%	0.148	2.01	0.37	0.39
GMI4480689	RX1-28	RX1-27A	272.87	8.0	2271.36	2257.49	2256.14	13.87	0.50%	0.146	2.06	0.43	0.45
NEW384	SELT1-01	STOR_10	131.39	10.0	2131.61	2113.52	2107.85	18.08	4.32%	0.113	4.23	0.13	3.08
NEW380	SELT1-02	SELT1-01	334.87	10.0	2144.76	2127.96	2113.52	16.80	4.31%	0.101	3.93	0.12	3.09
NEW601661	SELT1-03	SELT1-02	86.11	10.0	2151.08	2129.83	2127.96	21.25	2.17%	0.100	3.43	0.15	2.16
NEW1175158	SELT1-03A	SELT1-03	352.82	10.0	2148.16	2131.46	2129.83	16.70	0.46%	0.019	0.77	0.09	1.02
NEW1175202	SELT1-03B	SELT1-03A	20.83	10.0	2149.91	2131.56	2131.46	18.35	0.50%	0.013	0.88	0.08	1.05
NEW1175161	SELT1-04	SELT1-03	348.76	10.0	2153.35	2130.85	2129.83	22.50	0.29%	0.046	1.33	0.17	0.78
NEW1175160	SELT1-05	SELT1-04	350.61	10.0	2154.21	2132.01	2130.85	22.20	0.33%	0.043	1.20	0.15	0.84
NEW1175159	SELT1-06	SELT1-05	46.97	10.0	2153.76	2132.16	2132.01	21.60	0.33%	0.036	1.15	0.14	0.83
GMI4480477	SHR1-01	M1-04	101.05	12.0	2139.92	2131.36	2128.74	8.56	2.59%	0.092	1.47	0.11	3.93
GMI4480476	SHR1-02	SHR1-01	117.57	12.0	2142.10	2132.27	2131.36	9.83	0.77%	0.089	2.38	0.15	2.11
GMI4480579	SHR1-03	SHR1-02	219.48	12.0	2147.18	2136.06	2132.27	11.12	1.73%	0.066	1.85	0.10	3.21
GMI4480578	SHR1-04	SHR1-03	150.69	12.0	2151.09	2144.35	2136.06	6.74	5.50%	0.063	2.97	0.07	5.79
GMI4480441	SHR1-05	SHR1-04	360.61	12.0	2155.52	2147.90	2144.35	7.62	0.98%	0.055	2.36	0.11	2.42
GMI4480440	SHR1-06	SHR1-05	233.05	10.0	2160.89	2148.82	2147.90	12.07	0.40%	0.038	1.34	0.14	0.93
GMI4480439	SHR1-07	SHR1-06	125.45	10.0	2161.78	2149.32	2148.82	12.46	0.40%	0.033	1.21	0.13	0.93
GMI4480438	SHR1-08	SHR1-07	359.97	10.0	2171.05	2160.85	2149.32	10.20	3.20%	0.030	1.64	0.07	2.72
NEW1174975	SUN1-01	REX1-51	179.66	10.0	2268.23	2261.82	2261.06	6.41	0.42%	0.141	1.94	0.36	0.85
GMI4779474	SUN1-02	SUN1-01	145.37	10.0	2269.87	2262.12	2261.82	7.75	0.21%	0.140	1.64	0.33	0.56
GMI4779473	SUN1-03	SUN1-02	323.04	10.0	2273.85	2262.82	2262.12	11.03	0.22%	0.123	1.37	0.28	0.60
GMI4779472	SUN1-04	SUN1-03	326.23	10.0	2275.73	2263.61	2262.82	12.12	0.24%	0.110	1.48	0.25	0.69
NEW1175168	SUN2-01	REX1-23K11	165.63	10.0	2278.98	2262.08	2261.33	16.90	0.45%	0.192	2.20	0.30	0.85
GMI4484015	SUN2-02	SUN2-01	184.58	10.0	2278.54	2262.80	2262.08	15.74	0.39%	0.191	2.10	0.34	0.75
GMI4484014	SUN2-03	SUN2-02	351.57	10.0	2281.26	2263.77	2262.80	17.49	0.27%	0.176	1.82	0.33	0.63
GMI4483998	SUN2-04	SUN2-03	325.12	10.0	2280.07	2264.68	2263.77	15.39	0.28%	0.164	1.74	0.30	0.65
GMI4483997	SUN2-05	SUN2-04	309.74	10.0	2281.86	2265.75	2264.68	16.11	0.35%	0.147	1.75	0.27	0.76
4677	VM1-01	REX1-23KV	269.97	10.0	2281.00	2267.36	2266.60	13.64	0.28%	0.068	1.44	0.21	0.74

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
4796	VM1-02	VM1-01	393.52	10.0	2282.50	2268.56	2267.46	13.94	0.28%	0.065	1.46	0.21	0.75
4795	VM1-03	VM1-02	235.18	10.0	2283.50	2269.32	2268.66	14.18	0.28%	0.052	1.37	0.18	0.76
4787	VM1-04	VM1-03	129.08	10.0	2283.75	2269.78	2269.42	13.97	0.28%	0.009	0.81	0.08	0.80
4788	VM1-05	VM1-04	383.24	10.0	2286.00	2270.95	2269.88	15.05	0.28%	0.006	0.75	0.07	0.81

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Appendix H

Master Plan Model Results

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Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4480657	A1-01	FG1-03	116.43	21.0	2145.91	2134.70	2121.13	11.21	11.65%	5.371	5.96	0.25	32.63
GMI4480913	A1-01A	A1-01	75.01	24.0	2145.32	2136.08	2134.70	9.24	1.84%	2.224	6.20	0.24	19.26
GMI4480912	A1-02	A1-01	255.39	24.0	2147.05	2138.41	2134.70	8.64	1.45%	3.146	7.23	0.31	15.93
GMI4480911	A1-03	A1-02	272.83	24.0	2147.53	2139.46	2138.41	8.07	0.39%	3.144	4.16	0.41	6.71
GMI4480910	A1-04	A1-03	266.60	24.0	2148.41	2140.85	2139.46	7.56	0.52%	3.145	4.34	0.36	8.29
GMI4480909	A1-04A	A1-04	50.75	24.0	2148.64	2140.98	2140.85	7.66	0.25%	3.142	3.76	0.50	4.87
GMI4480908	A1-05	A1-04A	288.97	24.0	2148.67	2143.15	2140.98	5.52	0.75%	3.127	3.98	0.33	10.61
GMI4483514	A1-05A	A1-05	294.38	24.0	2154.85	2144.93	2143.15	9.92	0.60%	3.125	4.90	0.36	9.18
NEW1175257	A1-06	A1-05A	356.89	24.0	2162.77	2152.86	2144.93	9.91	2.22%	3.125	6.03	0.25	20.49
GMI4483513	A1-08	A1-06	445.00	24.0	2166.75	2155.40	2152.86	11.35	0.57%	3.080	5.53	0.39	8.89
GMI4482409	A1-09	A1-08	226.78	24.0	2168.15	2156.27	2155.40	11.88	0.38%	2.396	3.64	0.34	7.42
GMI4482408	A1-10	A1-09	240.24	24.0	2169.79	2156.95	2156.27	12.84	0.28%	1.262	2.51	0.26	7.17
GMI4482407	A1-11	A1-10	241.52	24.0	2170.31	2157.51	2156.95	12.80	0.23%	1.260	2.76	0.29	6.37
GMI4482406	A1-12	A1-11	382.48	24.0	2169.65	2158.50	2157.51	11.15	0.26%	1.258	2.72	0.27	6.80
GMI4482405	A1-13	A1-12	378.74	24.0	2168.47	2159.52	2158.50	8.95	0.27%	1.256	2.86	0.27	6.96
GMI4482344	A1-13A	A1-13	71.89	12.0	2168.50	2161.65	2159.52	6.85	2.96%	0.013	0.32	0.04	4.28
GMI4482347	A1-14	A1-13	404.99	24.0	2169.95	2160.50	2159.52	9.45	0.24%	1.250	2.77	0.28	6.54
GMI4482346	A1-15	A1-14	396.43	24.0	2173.39	2161.39	2160.50	12.00	0.22%	1.232	2.66	0.28	6.27
GMI4482345	A1-16	A1-15	281.24	24.0	2174.65	2162.15	2161.39	12.50	0.27%	0.902	2.31	0.22	7.33
GMI4480685	A1-17	A1-16	133.86	24.0	2174.70	2164.10	2162.15	10.60	1.46%	0.901	3.47	0.15	18.22
GMI4480683	A1-18	A1-17	388.30	24.0	2176.11	2163.19	2164.10	12.92	-0.23%	0.819	1.03	0.68	6.85
GMI4480726	A1-19	A1-18	367.50	24.0	2179.63	2164.11	2163.19	15.52	0.25%	0.820	0.90	0.24	7.11
GMI4480725	A1-20	A1-19	340.94	24.0	2183.09	2165.10	2164.11	18.00	0.29%	0.822	2.44	0.26	7.69
GMI4483600	A2-01	A1-20	18.94	24.0	2181.51	2165.14	2165.10	16.37	0.24%	0.821	2.33	0.25	6.90
NEW1175254	A2-02	A2-01	130.24	24.0	2194.11	2177.56	2165.14	16.55	9.54%	0.820	3.59	0.09	48.21
GMI4481841	A2-03	A2-02	94.66	18.0	2192.88	2178.93	2177.56	13.95	1.45%	0.786	5.21	0.26	8.06
GMI4481840	A2-04	A2-03	367.59	18.0	2195.39	2184.49	2178.93	10.90	1.51%	0.785	3.97	0.20	8.26
GMI4481839	A2-05	A2-04	226.85	18.0	2198.43	2190.27	2184.49	8.16	2.55%	0.784	5.30	0.18	10.96
GMI4481838	A2-06	A2-05	66.41	18.0	2219.12	2191.00	2190.27	28.12	1.10%	0.783	4.30	0.26	6.93
GMI4481837	A2-07	A2-06	154.77	18.0	2205.52	2192.68	2191.00	12.84	1.09%	0.782	3.78	0.22	6.88
GMI4483618	A2-08	A2-07	321.91	18.0	2206.42	2199.56	2192.68	6.86	2.14%	0.774	4.81	0.18	9.98

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483617	A2-09	A2-08	196.43	18.0	2211.23	2203.68	2199.56	7.55	2.10%	0.772	5.35	0.19	9.88
GMI4483619	A2-10	A2-09	32.62	18.0	2214.56	2204.34	2203.68	10.22	2.03%	0.771	4.70	0.22	9.67
GMI4483742	A2-11	A2-10	268.00	18.0	2231.20	2209.77	2204.34	21.43	2.03%	0.770	4.74	0.18	9.70
GMI4481765	A2-12	A2-11	298.47	18.0	2234.51	2221.19	2209.77	13.32	3.83%	0.765	5.93	0.16	13.63
GMI4483616	A2-13	A2-12	237.98	18.0	2231.00	2221.38	2221.19	9.62	0.08%	0.763	2.09	0.44	1.30
GMI4483615	A2-14	A2-13	235.00	18.0	2231.64	2222.18	2221.38	9.46	0.34%	0.764	2.04	0.29	3.53
GMI4481256	A2-15	A2-14	73.07	18.0	2232.19	2222.28	2222.18	9.91	0.14%	0.762	2.32	0.38	2.00
GMI4483713	A2-15A	A2-15	78.00	12.0	2232.43	2222.61	2222.28	9.82	0.42%	0.228	1.21	0.26	1.38
GMI4483712	A2-15B	A2-15A	210.83	12.0	2232.93	2223.49	2222.61	9.44	0.42%	0.225	2.20	0.26	1.39
GMI4481186	A2-15C	A2-15B	263.86	12.0	2233.98	2224.04	2223.49	9.94	0.21%	0.222	1.82	0.32	0.92
GMI4481182	A2-15D	A2-15C	426.57	12.0	2236.85	2225.59	2224.04	11.26	0.36%	0.168	1.50	0.23	1.34
GMI4481108	A2-15E	A2-15D	423.60	12.0	2238.97	2227.63	2225.59	11.34	0.48%	0.162	2.02	0.21	1.57
GMI4482260	A2-15E1	A2-15E	187.95	10.0	2239.29	2228.55	2227.63	10.74	0.49%	0.101	1.69	0.21	0.97
GMI4481112	A2-15E2	A2-15E1	166.08	10.0	2240.07	2229.13	2228.55	10.94	0.35%	0.072	1.48	0.19	0.83
GMI4480764	A2-15E3	A2-15E2	386.23	10.0	2241.97	2230.88	2229.13	11.09	0.45%	0.061	1.46	0.16	0.97
GMI4481255	A2-16	A2-15	335.39	18.0	2234.27	2222.49	2222.28	11.78	0.06%	0.544	1.40	0.38	1.28
GMI4481254	A2-17	A2-16	253.03	18.0	2236.00	2222.84	2222.49	13.16	0.14%	0.542	1.57	0.30	2.19
GMI4481253	A2-17A	A2-17	32.90	10.0	2235.15	2223.20	2222.84	11.95	1.09%	0.118	1.05	0.18	1.49
GMI4480647	A2-18	A2-17	263.63	18.0	2237.24	2223.75	2222.84	13.49	0.35%	0.433	1.87	0.21	3.89
GMI4480646	A2-19	A2-18	411.00	12.0	2238.83	2224.99	2223.75	13.84	0.30%	0.414	2.50	0.40	0.96
GMI4481249	A2-19A	A2-19	373.09	12.0	2239.19	2226.11	2224.99	13.08	0.30%	0.217	1.48	0.27	1.15
GMI4481180	A2-19B	A2-19A	287.03	12.0	2240.94	2226.98	2226.11	13.96	0.30%	0.179	1.74	0.24	1.20
GMI4481174	A2-19C	A2-19B	324.10	10.0	2242.50	2228.00	2226.98	14.50	0.31%	0.162	1.86	0.30	0.70
GMI4481093	A2-19D	A2-19C	324.72	10.0	2242.45	2228.71	2228.00	13.74	0.22%	0.158	1.65	0.33	0.56
GMI4481092	A2-19E	A2-19D	207.39	10.0	2242.80	2229.28	2228.71	13.52	0.27%	0.153	1.61	0.30	0.65
GMI4481091	A2-19F	A2-19E	287.33	10.0	2244.56	2230.11	2229.28	14.45	0.29%	0.136	1.64	0.27	0.69
GMI4481090	A2-19G	A2-19F	132.45	10.0	2245.14	2230.43	2230.11	14.71	0.24%	0.129	1.58	0.29	0.63
GMI4481089	A2-19H	A2-19G	157.00	10.0	2245.91	2231.06	2230.43	14.85	0.40%	0.117	1.59	0.23	0.86
GMI4481001	A2-19HA	A2-19H	287.03	10.0	2247.22	2232.09	2231.06	15.13	0.36%	0.113	1.77	0.24	0.81
NEW9737666	A2-19I	A2-19HA	9.08	10.0	2247.03	2231.83	2232.09	15.20	-2.90%	0.094	0.68	0.59	2.52
GMI4481252	A2-20	A2-19	343.05	12.0	2238.21	2225.90	2224.99	12.31	0.27%	0.207	1.38	0.27	1.08
GMI4481251	A2-21	A2-20	144.48	12.0	2237.89	2226.57	2225.90	11.32	0.46%	0.159	1.71	0.21	1.54
GMI4481250	A2-22	A2-21	294.91	12.0	2237.71	2227.40	2226.57	10.31	0.28%	0.157	1.82	0.25	1.17
GMI4481248	A2-23	A2-22	437.88	12.0	2236.78	2228.64	2227.40	8.14	0.28%	0.034	0.63	0.11	1.29
GMI4481246	A2-24	A2-23	404.80	10.0	2236.05	2229.88	2228.64	6.17	0.31%	0.014	0.65	0.09	0.84
GMI4481172	A3-01	A2-22	660.69	12.0	2240.61	2229.47	2227.40	11.14	0.31%	0.121	1.45	0.20	1.28

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481171	A3-02	A3-01	377.73	12.0	2237.94	2230.68	2229.47	7.26	0.32%	0.119	1.68	0.20	1.29
GMI4481169	A3-04	A3-02	468.23	12.0	2238.29	2232.03	2230.68	6.26	0.29%	0.083	1.33	0.17	1.26
GMI4483806	AEXT1-01A	AEXT1-13	135.64	18.0	2158.92	2150.57	2147.97	8.35	1.91%	6.049	6.97	0.70	4.13
GMI4483805	AEXT1-02	AEXT1-01A	292.47	18.0	2160.14	2154.14	2150.57	6.00	1.22%	6.073	7.66	0.72	2.06
GMI4483813	AEXT1-13	RIV1-33	19.05	24.0	2159.19	2147.97	2147.65	11.21	1.67%	6.048	3.65	1.35	14.35
GMI4481734	AEXT2-03	AEXT1-02	272.01	18.0	2163.92	2157.04	2154.14	6.88	1.07%	6.050	7.02	0.73	1.55
GMI4481733	AEXT2-04	AEXT2-03	178.82	18.0	2164.99	2159.39	2157.04	5.60	1.31%	3.858	5.77	0.47	4.57
GMI4481732	AEXT2-05	AEXT2-04	367.29	18.0	2171.24	2164.77	2159.39	6.47	1.47%	3.853	7.24	0.47	5.05
GMI4481730	AEXT2-06	AEXT2-05	234.92	18.0	2172.81	2166.13	2164.77	6.68	0.58%	3.808	5.02	0.65	1.78
GMI4481729	AEXT2-07	AEXT2-06	364.90	18.0	2179.46	2167.91	2166.13	11.55	0.49%	3.808	4.73	0.67	1.33
GMI4481190	AEXT2-08	AEXT2-07	55.93	24.0	2180.04	2168.41	2167.91	11.63	0.89%	3.640	4.47	0.34	11.34
GMI4480693	AF1-01	AF1-01AA	66.72	10.0	2178.59	2170.96	2168.92	7.63	3.06%	0.154	3.27	0.16	2.53
GMI4480694	AF1-01A	AF1-01	52.05	10.0	2178.86	2172.12	2170.96	6.74	2.23%	0.154	3.71	0.19	2.14
GMI4481191	AF1-01AA	AEXT2-07	76.15	18.0	2178.45	2168.92	2167.91	9.53	1.33%	0.272	1.04	0.12	8.20
GMI4480695	AF1-02	AF1-01A	124.22	10.0	2179.83	2173.86	2172.12	5.97	1.40%	0.153	3.17	0.20	1.66
GMI4481116	AF1-03	AF1-02	187.45	10.0	2185.09	2177.16	2173.86	7.93	1.76%	0.153	3.18	0.18	1.88
GMI4481115	AF1-04	AF1-03	341.09	10.0	2190.92	2182.79	2177.16	8.13	1.65%	0.152	3.32	0.19	1.82
GMI4481114	AF1-05	AF1-04	269.42	10.0	2194.37	2185.43	2182.79	8.94	0.98%	0.151	2.90	0.22	1.37
GMI4481113	AF1-06	AF1-05	190.24	10.0	2195.51	2186.26	2185.43	9.25	0.44%	0.144	2.17	0.27	0.87
GMI4481005	AF1-07	AF1-06	334.36	10.0	2197.60	2188.08	2186.26	9.52	0.54%	0.134	1.96	0.23	1.00
GMI4481007	AF1-07A	AF1-07	216.30	10.0	2198.41	2190.19	2188.08	8.22	0.98%	0.006	0.28	0.05	1.51
GMI4481006	AF1-08	AF1-07	324.86	10.0	2200.55	2191.25	2188.08	9.30	0.98%	0.122	2.23	0.19	1.39
GMI4480963	AF1-09	AF1-08	365.02	10.0	2203.04	2194.04	2191.25	9.00	0.76%	0.119	2.41	0.21	1.22
GMI4480964	AF1-09A	AF1-09	305.50	10.0	2208.11	2199.02	2194.04	9.09	1.63%	0.078	1.95	0.14	1.88
GMI4480965	AF1-09B	AF1-09A	296.29	10.0	2213.70	2203.69	2199.02	10.01	1.58%	0.076	2.64	0.14	1.85
GMI4480831	AF1-09B1	AF1-09B	345.78	10.0	2219.15	2209.53	2203.69	9.62	1.69%	0.062	2.34	0.12	1.93
GMI4480946	AF1-09B2	AF1-09B1	323.02	10.0	2224.08	2212.86	2209.53	11.22	1.03%	0.022	1.16	0.08	1.54
GMI4480941	AF1-09B2A	AF1-09B2	402.35	10.0	2232.61	2221.95	2212.86	10.66	2.26%	0.011	1.13	0.05	2.30
GMI4480955	AF1-15	AF1-14	320.82	10.0	2231.69	2216.29	2215.31	15.40	0.31%	0.022	1.35	0.12	0.83
GMI4480796	AF1-15A1	AF1-15	277.00	10.0	2228.83	2217.14	2216.29	11.69	0.31%	0.003	0.31	0.04	0.85
CDT-1021	ATL-5	REL-12	127.47	10.0	2143.00	2123.00	2121.93	20.00	0.84%	0.022	1.03	0.09	1.38
NEW-032316B	B1-01	M1-11B	406.98	24.0	2164.28	2151.08	2139.06	13.20	2.95%	4.255	12.66	0.80	28.42
GMI4480458	B1-02	B1-01	315.17	24.0	2169.15	2151.48	2151.08	17.67	0.13%	4.255	3.59	0.68	1.39
GMI4480457	B1-03	B1-02	591.26	24.0	2174.54	2152.04	2151.48	22.50	0.09%	4.259	2.77	0.74	0.62
GMI4480456	B1-04	B1-03	141.81	24.0	2171.39	2152.36	2152.04	19.03	0.23%	4.262	2.78	0.68	3.26
GMI4480455	B1-05	B1-04	141.96	24.0	2171.03	2152.58	2152.36	18.45	0.15%	4.261	2.91	0.69	1.98

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4480454	B1-06	B1-05	301.14	24.0	2171.01	2152.87	2152.58	18.14	0.10%	4.264	2.77	0.74	0.65
GMI4480453	B1-07	B1-06	310.21	24.0	2170.29	2153.33	2152.87	16.96	0.15%	4.268	2.77	0.69	1.83
GMI4480448	B1-08	B1-07	77.93	24.0	2169.61	2153.44	2153.33	16.17	0.14%	4.270	2.82	0.71	1.68
GMI4480447	B1-09	B1-08	140.44	24.0	2169.09	2153.87	2153.44	15.22	0.31%	4.271	3.04	0.60	4.49
GMI4480435	B1-10	B1-09	299.75	24.0	2166.34	2154.22	2153.87	12.12	0.12%	4.259	3.10	0.69	1.15
GMI4480449	B1-11	B1-10	301.84	24.0	2165.13	2154.72	2154.22	10.41	0.17%	4.251	2.96	0.65	2.20
GMI4480402	B1-12	B1-11	447.98	24.0	2166.67	2155.21	2154.72	11.46	0.11%	4.243	2.98	0.68	1.40
GMI4481397	B1-13	B1-12	305.86	24.0	2167.74	2156.15	2155.21	11.59	0.31%	4.244	3.46	0.49	4.58
GMI4481396	B1-14	B1-13	353.46	24.0	2172.34	2162.62	2156.15	9.72	1.83%	4.244	5.70	0.30	17.40
GMI4481395	B1-15	B1-14	357.91	24.0	2177.40	2163.06	2162.62	14.34	0.12%	4.243	4.04	0.73	0.85
GMI4481394	B1-16	B1-15	369.66	24.0	2172.78	2163.64	2163.06	9.14	0.16%	4.244	2.71	0.72	1.20
GMI4481393	B1-17	B1-16	350.41	24.0	2171.27	2164.12	2163.64	7.15	0.14%	4.248	2.80	0.69	1.62
GMI4481373	B1-18	B1-17	240.13	24.0	2180.07	2164.47	2164.12	15.60	0.15%	4.251	2.89	0.68	1.80
GMI4481374	B1-19	B1-18	299.50	24.0	2180.09	2164.91	2164.47	15.18	0.15%	4.250	2.93	0.67	1.82
GMI4481375	B1-20	B1-19	240.11	24.0	2179.43	2165.07	2164.91	14.36	0.07%	4.253	2.75	0.76	-0.16
GMI4481323	B1-21	B1-20	297.67	24.0	2178.59	2165.68	2165.07	12.91	0.20%	4.253	2.86	0.62	2.92
GMI4481320	B1-22	B1-21	300.12	24.0	2177.11	2166.02	2165.68	11.09	0.11%	4.253	3.01	0.69	1.08
GMI4481317	B1-23	B1-22	74.52	24.0	2176.94	2166.22	2166.02	10.72	0.27%	4.247	2.89	0.67	3.96
GMI4481295	B1-25	B1-23	229.78	24.0	2175.72	2166.40	2166.22	9.32	0.08%	4.249	2.77	0.74	0.19
GMI4481294	B1-26	B1-25	461.01	24.0	2176.15	2167.25	2166.40	8.89	0.18%	4.249	2.96	0.59	2.55
GMI4481300	B1-27	B1-26	289.44	24.0	2176.34	2168.08	2167.25	8.26	0.29%	4.252	3.69	0.52	4.23
GMI4481299	B1-28	B1-27	341.63	24.0	2178.60	2168.38	2168.08	10.22	0.09%	4.250	3.22	0.72	0.47
GMI4483728	B1-29	B1-28	315.69	24.0	2182.78	2168.60	2168.38	14.18	0.07%	4.250	2.59	0.79	-0.10
GMI4483727	B1-30	B1-29	340.74	24.0	2183.47	2169.13	2168.60	14.34	0.16%	4.250	2.64	0.69	2.00
GMI4481946	B1-31	B1-30	506.38	24.0	2184.36	2169.66	2169.13	14.70	0.10%	4.258	2.79	0.72	0.87
GMI4481945	B1-32	B1-31	498.12	24.0	2185.75	2170.32	2169.66	15.43	0.13%	4.265	2.82	0.68	1.50
GMI4481944	B1-33	B1-32	446.42	24.0	2187.31	2171.12	2170.32	16.19	0.18%	4.272	3.13	0.60	2.43
GMI4481286	B1-34	B1-33	438.62	24.0	2186.91	2171.52	2171.12	15.39	0.09%	4.275	2.97	0.73	0.51
GMI4481285	B1-35	B1-34	421.83	24.0	2185.38	2172.06	2171.52	13.32	0.13%	4.277	2.75	0.70	1.39
GMI4481284	B1-36	B1-35	280.09	24.0	2186.26	2172.55	2172.06	13.71	0.17%	4.281	2.96	0.64	2.35
GMI4481844	B1-37	B1-36	56.97	24.0	2186.01	2172.71	2172.55	13.30	0.28%	4.278	3.10	0.65	4.12
GMI4481843	B1-38	B1-37	348.77	24.0	2183.65	2173.06	2172.71	10.59	0.10%	4.280	2.90	0.72	0.74
GMI4483752	B1-39	B1-38	251.55	24.0	2196.05	2173.51	2173.06	22.54	0.18%	4.282	2.88	0.66	2.42
GMI4483753	B1-40	B1-39	114.60	24.0	2185.01	2173.73	2173.51	11.28	0.19%	4.277	3.03	0.66	2.66
GMI4481276	B1-41	B1-40	453.26	24.0	2183.63	2174.72	2173.73	8.91	0.22%	4.275	3.34	0.55	3.13
GMI4481273	B1-42	B1-41	359.58	24.0	2184.18	2174.81	2174.72	9.37	0.03%	4.265	2.92	0.81	-1.76

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481257	B1-43	B1-42	466.89	24.0	2186.75	2175.50	2174.81	11.25	0.15%	4.244	2.63	0.68	1.85
GMI4481271	B1-44	B1-43	174.85	24.0	2184.55	2175.88	2175.50	8.67	0.22%	4.236	3.08	0.63	3.15
GMI4481270	B1-45	B1-44	153.48	24.0	2185.57	2176.12	2175.88	9.45	0.16%	4.239	3.10	0.66	2.03
4804	BEL-2A10	BEL-2A9	390.56	10.0	2134.14	2128.89	2127.53	5.25	0.35%	0.061	1.39	0.18	0.84
4803	BEL-2A11	BEL-2A10	319.21	10.0	2133.34	2129.89	2128.89	3.45	0.31%	0.060	1.41	0.18	0.80
4808	BEL-2A12	BEL-2A11	389.74	10.0	2140.88	2131.28	2129.89	9.60	0.36%	0.059	1.41	0.17	0.86
4800	BEL-2A9	BEL-2A8	389.62	10.0	2135.33	2127.53	2126.49	7.80	0.27%	0.062	0.56	0.19	0.73
GMI4481260	BEXT1-01	B1-45	80.07	24.0	2185.70	2176.19	2176.12	9.51	0.08%	4.238	2.85	0.72	0.28
GMI4481261	BEXT1-02	BEXT1-01	302.36	24.0	2187.69	2177.11	2176.19	10.58	0.31%	4.239	3.30	0.49	4.52
GMI4481258	BEXT1-03	BEXT1-02	328.18	24.0	2197.78	2183.53	2177.11	14.25	1.96%	4.228	5.70	0.30	17.93
GMI4481237	BEXT1-04	BEXT1-03	296.45	24.0	2199.63	2184.14	2183.53	15.49	0.21%	4.225	4.66	0.62	2.96
GMI4481243	BEXT1-05	BEXT1-04	347.96	24.0	2201.17	2184.52	2184.14	16.65	0.11%	4.206	2.97	0.70	1.03
GMI4481231	BEXT1-06	BEXT1-05	339.99	24.0	2200.86	2185.04	2184.52	15.82	0.15%	4.200	2.88	0.65	2.00
GMI4481232	BEXT1-06A	BEXT1-06	21.00	24.0	2200.87	2185.03	2185.04	15.84	-0.05%	3.806	2.60	0.71	-0.35
GMI4481230	BEXT1-06AE	BEXT1-06	294.81	12.0	2194.55	2185.78	2185.04	8.77	0.25%	0.405	0.97	0.64	0.85
GMI4481227	BEXT1-06BE	BEXT1-06AE	385.28	12.0	2192.58	2187.76	2185.78	4.82	0.51%	0.407	2.43	0.32	1.38
GMI4481226	BEXT1-06CE	BEXT1-06BE	405.56	12.0	2197.40	2188.88	2187.76	8.52	0.28%	0.392	2.36	0.40	0.92
GMI4481225	BEXT1-06DE	BEXT1-06CE	239.15	12.0	2196.69	2189.50	2188.88	7.19	0.26%	0.390	2.12	0.38	0.88
GMI4481217	BEXT1-06DE1	BEXT1-06DE	171.61	12.0	2195.61	2190.04	2189.50	5.57	0.31%	0.379	2.22	0.36	1.02
GMI4481216	BEXT1-06DE2	BEXT1-06DE1	230.48	12.0	2195.70	2190.73	2190.04	4.97	0.30%	0.375	2.26	0.37	0.99
GMI4481215	BEXT1-06DE3	BEXT1-06DE2	378.78	12.0	2197.57	2191.50	2190.73	6.07	0.20%	0.374	2.02	0.42	0.75
GMI4481727	BEXT1-07	BEXT1-06A	150.75	24.0	2199.23	2185.27	2185.03	13.96	0.16%	3.799	2.54	0.68	2.52
GMI4481229	BEXT1-08	BEXT1-07	267.78	18.0	2196.59	2186.13	2185.27	10.46	0.32%	3.802	3.63	0.83	0.37
GMI4481228	BEXT1-09	BEXT1-08	359.99	18.0	2193.56	2187.08	2186.13	6.48	0.26%	1.066	1.63	0.36	2.71
GMI4481214	BEXT1-10	BEXT1-09	301.50	18.0	2195.22	2187.78	2187.08	7.44	0.23%	1.076	2.72	0.40	2.47
GMI4481209	BEXT1-11	BEXT1-10	247.64	18.0	2197.22	2188.87	2187.78	8.35	0.44%	1.077	2.97	0.32	3.80
GMI4480649	BEXT1-12	BEXT1-11	381.58	18.0	2200.54	2190.42	2188.87	10.12	0.41%	1.069	3.34	0.33	3.62
GMI4482891	BEXT1-13	BEXT1-12	270.08	15.0	2209.53	2200.66	2190.42	8.87	3.79%	1.067	5.02	0.24	7.74
GMI4482910	BEXT1-14	BEXT1-13	303.01	15.0	2213.55	2203.99	2200.66	9.56	1.10%	1.007	5.26	0.35	3.74
GMI4482909	BEXT1-15	BEXT1-14	370.23	15.0	2215.94	2206.62	2203.99	9.32	0.71%	1.011	4.06	0.36	2.80
GMI4482908	BEXT1-16	BEXT1-15	284.92	15.0	2218.29	2208.32	2206.62	9.97	0.60%	0.997	3.77	0.38	2.50
GMI4480904	BEXT1-17	BEXT1-16	47.34	15.0	2219.11	2208.64	2208.32	10.47	0.68%	0.991	3.49	0.40	2.73
GMI4480903	BEXT1-18	BEXT1-17	202.81	15.0	2222.46	2209.66	2208.64	12.80	0.50%	0.984	3.39	0.39	2.22
GMI4482918	BEXT1-19	BEXT1-18	120.80	15.0	2224.36	2209.92	2209.66	14.44	0.22%	0.977	2.78	0.52	1.12
GMI4483680	BEXT1-19E1	BEXT1-19	141.94	10.0	2221.84	2210.61	2209.92	11.23	0.49%	0.288	1.62	0.35	0.78
GMI4483679	BEXT1-19E2	BEXT1-19E1	187.00	10.0	2221.00	2211.00	2210.61	10.00	0.21%	0.281	2.01	0.48	0.42

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483678	BEXT1-19E3	BEXT1-19E2	198.00	10.0	2226.77	2211.54	2211.00	15.23	0.27%	0.279	1.84	0.41	0.52
GMI4483677	BEXT1-19E4	BEXT1-19E3	170.57	10.0	2218.51	2211.84	2211.54	6.67	0.17%	0.276	1.81	0.49	0.37
GMI4482870	BEXT1-19E4AE	BEXT1-19E4	133.65	10.0	2218.89	2212.26	2211.84	6.63	0.31%	0.230	1.63	0.35	0.63
GMI4480895	BEXT1-19E4BE	BEXT1-19E4AE	323.39	10.0	2220.45	2212.95	2212.26	7.50	0.21%	0.186	1.68	0.36	0.52
GMI4480894	BEXT1-19E4CE	BEXT1-19E4BE	307.87	10.0	2220.84	2213.84	2212.95	7.00	0.29%	0.184	1.77	0.32	0.64
GMI4482871	BEXT1-19E4DE	BEXT1-19E4CE	255.96	10.0	2221.58	2214.71	2213.84	6.87	0.34%	0.181	1.92	0.30	0.71
GMI4482872	BEXT1-19E4DE1	BEXT1-19E4DE	254.65	10.0	2222.98	2215.39	2214.71	7.59	0.27%	0.149	1.68	0.29	0.64
GMI4482875	BEXT1-19E4DE3	BEXT1-19E4DE1	136.74	10.0	2224.01	2215.84	2215.39	8.17	0.33%	0.142	1.73	0.27	0.74
GMI4482921	BEXT1-20	BEXT1-19	323.38	15.0	2228.93	2217.98	2209.92	10.95	2.49%	0.712	2.83	0.21	6.43
GMI4482923	BEXT1-21	BEXT1-20	181.05	15.0	2230.30	2219.78	2217.98	10.52	0.99%	0.704	4.45	0.29	3.81
GMI4482925	BEXT1-22	BEXT1-21	170.29	12.0	2231.26	2220.75	2219.78	10.51	0.57%	0.690	3.54	0.45	1.19
GMI4482926	BEXT1-22A	BEXT1-22	179.02	12.0	2232.06	2221.76	2220.75	10.30	0.56%	0.686	3.21	0.43	1.19
GMI4482927	BEXT1-22B	BEXT1-22A	313.13	12.0	2231.17	2221.52	2221.76	9.65	-0.08%	0.683	1.79	1.13	0.01
GMI4480771	BEXT1-22C	BEXT1-22B	160.57	12.0	2234.14	2223.63	2221.52	10.51	1.31%	0.678	1.96	0.33	2.18
GMI4480770	BEXT1-22D	BEXT1-22C	165.02	12.0	2234.59	2223.90	2223.63	10.69	0.16%	0.673	2.69	0.66	0.34
GMI4482928	BEXT1-22E	BEXT1-22D	329.53	12.0	2235.55	2224.93	2223.90	10.62	0.31%	0.661	2.85	0.49	0.73
GMI4482932	BEXT1-22F	BEXT1-22E	164.73	12.0	2235.68	2225.67	2224.93	10.01	0.45%	0.622	3.73	0.49	1.05
GMI4482935	BEXT1-22G	STOR_16	122.48	10.0	2229.33	2213.56	2213.19	15.77	0.30%	0.401	2.53	0.51	0.44
GMI4481212	BEXT2-01	BEXT1-08	272.70	18.0	2198.94	2186.72	2186.13	12.22	0.22%	2.819	3.03	0.75	0.60
GMI4481129	BEXT2-02	BEXT2-01	239.78	18.0	2198.85	2188.40	2186.72	10.45	0.70%	2.822	3.87	0.48	3.33
GMI4481726	BEXT2-03	BEXT2-02	237.23	18.0	2202.87	2189.33	2188.40	13.54	0.39%	2.811	4.36	0.63	1.79
GMI4481130	BEXT2-03A	BEXT2-03	247.07	10.0	2203.45	2193.94	2189.33	9.51	1.87%	0.068	0.89	0.12	2.03
GMI4484061	BEXT2-03A1	BEXT2-03	256.62	18.0	2199.35	2190.10	2189.33	9.25	0.30%	2.777	3.61	0.65	1.25
GMI4484060	BEXT2-04	BEXT2-03A1	259.08	18.0	2201.40	2190.69	2190.10	10.71	0.23%	2.776	3.34	0.72	0.74
GMI4481035	BEXT2-05	BEXT2-04	239.90	18.0	2199.50	2191.07	2190.69	8.43	0.16%	2.764	2.97	0.81	0.17
GMI4481036	BEXT2-06	BEXT2-05	95.24	18.0	2200.13	2191.24	2191.07	8.89	0.18%	2.758	2.76	0.83	0.35
GMI4481037	BEXT2-06A	BEXT2-06	145.12	10.0	2203.13	2193.49	2191.24	9.64	1.55%	0.052	0.56	0.11	1.86
GMI4481038	BEXT2-06C	BEXT2-06A	236.73	10.0	2204.11	2194.76	2193.49	9.35	0.54%	0.033	1.44	0.12	1.09
GMI4481039	BEXT2-07	BEXT2-06	128.22	18.0	2201.51	2191.81	2191.24	9.70	0.44%	2.729	3.12	0.61	2.16
GMI4483385	BEXT2-070	BEXT2-07N	285.16	10.0	2239.00	2217.20	2216.76	21.80	0.15%	0.439	1.93	0.68	0.16
GMI4481043	BEXT2-07A	BEXT2-07	136.39	12.0	2202.20	2193.37	2191.81	8.83	1.15%	0.589	1.85	0.32	2.08
GMI4481040	BEXT2-07B	BEXT2-07A	306.44	12.0	2211.78	2203.22	2193.37	8.56	3.21%	0.588	5.00	0.25	3.89
GMI4480648	BEXT2-07C	BEXT2-07B	350.71	12.0	2213.72	2204.69	2203.22	9.03	0.42%	0.583	3.57	0.47	1.03
GMI4482852	BEXT2-07D	BEXT2-07C	235.50	12.0	2214.13	2205.59	2204.69	8.54	0.38%	0.572	2.61	0.42	0.97
4782	BEXT2-07DAA	BEXT2-07D	24.00	12.0	2214.13	2205.64	2205.59	8.49	0.22%	0.561	2.38	0.52	0.61
GMI4482853	BEXT2-07E	BEXT2-07DAA	414.94	12.0	2214.29	2206.23	2205.64	8.06	0.14%	0.550	1.93	0.58	0.39

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482904	BEXT2-07F	BEXT2-07E	328.10	12.0	2217.99	2207.60	2206.23	10.39	0.42%	0.539	2.21	0.40	1.07
GMI4482903	BEXT2-07G	BEXT2-07F	323.78	10.0	2220.50	2212.22	2207.60	8.28	1.43%	0.524	3.71	0.37	1.31
GMI4483817	BEXT2-07H	BEXT2-07G	20.10	10.0	2220.75	2212.49	2212.22	8.26	1.34%	0.510	3.64	0.47	1.27
GMI4482902	BEXT2-07I	BEXT2-07H	168.94	10.0	2222.10	2213.40	2212.49	8.70	0.54%	0.508	3.04	0.49	0.62
GMI4483380	BEXT2-07J	BEXT2-07I	158.84	10.0	2223.80	2213.46	2213.40	10.34	0.04%	0.507	1.98	0.88	-0.21
GMI4483381	BEXT2-07K	BEXT2-07J	367.84	10.0	2229.00	2214.30	2213.46	14.70	0.23%	0.483	1.74	0.59	0.25
GMI4483382	BEXT2-07L	BEXT2-07K	382.94	10.0	2237.20	2215.34	2214.30	21.86	0.27%	0.472	2.27	0.55	0.33
GMI4483383	BEXT2-07M	BEXT2-07L	271.44	10.0	2238.30	2216.00	2215.34	22.30	0.24%	0.470	2.25	0.60	0.29
GMI4483384	BEXT2-07N	BEXT2-07M	330.87	10.0	2239.40	2216.76	2216.00	22.64	0.23%	0.440	2.09	0.56	0.30
GMI4482953	BEXT2-07Q1	BEXT2-07Q	82.65	10.0	2240.20	2225.20	2224.09	15.00	1.34%	0.121	1.39	0.18	1.66
GMI4482954	BEXT2-07Q2	BEXT2-07Q1	193.24	10.0	2240.71	2225.99	2225.20	14.72	0.41%	0.118	2.14	0.25	0.87
GMI4482955	BEXT2-07Q3	BEXT2-07Q2	358.91	10.0	2239.11	2227.47	2225.99	11.64	0.41%	0.094	1.54	0.21	0.89
GMI4482956	BEXT2-07Q4	BEXT2-07Q3	332.21	10.0	2238.26	2229.16	2227.47	9.10	0.51%	0.091	1.79	0.19	1.00
GMI4482961	BEXT2-07Q4A	BEXT2-07Q4	119.54	10.0	2238.38	2229.76	2229.16	8.62	0.50%	0.006	0.35	0.05	1.08
GMI4482962	BEXT2-07Q5	BEXT2-07Q4	263.39	10.0	2239.30	2230.26	2229.16	9.04	0.42%	0.041	1.09	0.14	0.95
GMI4482963	BEXT2-07Q6	BEXT2-07Q5	278.42	10.0	2240.64	2231.52	2230.26	9.12	0.45%	0.027	1.05	0.11	1.01
GMI4482964	BEXT2-07Q7	BEXT2-07Q6	279.02	10.0	2242.06	2232.78	2231.52	9.28	0.45%	0.017	0.93	0.09	1.01
GMI4482965	BEXT2-07Q8	BEXT2-07Q7	234.76	10.0	2243.55	2233.69	2232.78	9.86	0.39%	0.005	0.48	0.05	0.95
GMI4482978	BEXT2-07U5	BEXT2-07U4	303.40	10.0	2245.50	2235.10	2233.78	10.40	0.44%	0.005	0.49	0.05	1.01
GMI4481044	BEXT2-08	BEXT2-07	119.94	18.0	2200.98	2193.03	2191.81	7.95	1.02%	2.162	4.09	0.37	5.26
GMI4481045	BEXT2-09	BEXT2-08	261.23	18.0	2203.99	2195.28	2193.03	8.71	0.86%	2.140	5.23	0.41	4.69
GMI4481046	BEXT2-10	BEXT2-09	259.45	18.0	2206.07	2195.91	2195.28	10.16	0.24%	2.045	3.57	0.60	1.58
GMI4481051	BEXT2-11	BEXT2-10	258.20	18.0	2205.19	2196.83	2195.91	8.36	0.36%	2.025	3.24	0.48	2.37
NEW416	BEXT2-12A	BEXT2-11	115.80	18.0	2208.00	2197.76	2196.83	10.24	0.80%	2.007	4.30	0.38	4.57
NEW418	BEXT2-13	BEXT2-12A	42.00	15.0	2207.28	2198.09	2197.76	9.19	0.80%	2.006	4.49	0.64	2.03
GMI4481052	BEXT2-14	BEXT2-13	158.55	15.0	2208.07	2198.66	2198.09	9.41	0.36%	1.429	2.99	0.53	1.28
GMI4481062	BEXT2-15	BEXT2-14	105.50	15.0	2208.93	2198.87	2198.66	10.06	0.20%	1.379	2.86	0.65	0.64
GMI4481065	BEXT2-16	BEXT2-15	247.78	15.0	2210.98	2199.48	2198.87	11.50	0.25%	1.373	2.70	0.58	0.87
NEW209	BEXT2-16C	BEXT2-16	126.39	15.0	2211.55	2199.77	2199.48	11.78	0.23%	1.364	2.75	0.62	0.80
GMI4481066	BEXT2-17	BEXT2-16C	129.86	15.0	2211.53	2200.12	2199.77	11.41	0.27%	1.352	2.70	0.59	1.00
GMI4481067	BEXT2-18	BEXT2-17	87.25	15.0	2210.42	2200.39	2200.12	10.03	0.31%	1.351	2.82	0.58	1.17
GMI4480880	BEXT2-19B2A10	BEXT2-19B2A9	342.57	12.0	2237.88	2233.16	2232.44	4.72	0.21%	0.067	0.97	0.16	1.08
GMI4481082	BEXT2-19B2A11	BEXT2-19B2A10	412.48	12.0	2239.22	2235.73	2233.16	3.49	0.62%	0.043	1.10	0.10	1.93
GMI4481081	BEXT2-19B2A12	BEXT2-19B2A11	252.00	12.0	2238.51	2236.46	2235.73	2.05	0.29%	0.032	1.11	1.46	1.31
GMI4481162	BEXT2-19B2A8	BEXT2-19B2A6	285.17	12.0	2237.91	2232.04	2231.30	5.87	0.26%	0.083	1.25	0.17	1.19
GMI4480879	BEXT2-19B2A9	BEXT2-19B2A8	315.40	12.0	2237.46	2232.44	2232.04	5.02	0.13%	0.080	1.11	0.22	0.81

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483698	BEXT2-20	BEXT2-18	547.46	15.0	2216.88	2202.02	2200.39	14.86	0.30%	1.158	2.73	0.48	1.31
GMI4481058	BEXT2-21	BEXT2-20	168.92	12.0	2217.64	2202.74	2202.02	14.90	0.43%	1.137	3.37	0.66	0.49
GMI4480989	BEXT2-23	BEXT2-21	495.85	12.0	2217.92	2203.64	2202.74	14.28	0.18%	1.087	2.54	0.92	-0.02
GMI4480990	BEXT2-24	BEXT2-23	303.46	12.0	2217.13	2205.09	2203.64	12.04	0.48%	1.064	2.66	0.57	0.66
GMI4480991	BEXT2-25	BEXT2-24	262.30	12.0	2217.39	2205.99	2205.09	11.40	0.34%	1.059	3.18	0.68	0.40
GMI4480994	BEXT2-26	BEXT2-25	26.17	12.0	2217.41	2205.93	2205.99	11.48	-0.23%	1.048	2.44	0.90	0.15
GMI4480996	BEXT2-27	BEXT2-26	295.52	12.0	2218.41	2207.16	2205.93	11.25	0.42%	1.045	2.59	0.59	0.56
GMI4480998	BEXT2-28	BEXT2-27	421.92	12.0	2218.50	2208.40	2207.16	10.10	0.29%	1.042	2.99	0.71	0.31
NEW1175246	BUS1-01	BUS1-01AA1	138.96	15.0	2137.56	2129.91	2129.42	7.65	0.35%	2.404	3.39	0.84	0.28
GMI4480655	BUS1-01A	FG1-13	81.93	15.0	2136.39	2128.56	2127.94	7.83	0.77%	2.394	3.30	0.80	1.55
NEW345	BUS1-01AA	BUS1-01A	64.89	15.0	2136.37	2129.04	2128.56	7.33	0.73%	2.400	4.29	0.66	1.47
NEW344	BUS1-01AA1	BUS1-01AA	120.89	15.0	2141.77	2129.42	2129.04	12.35	0.32%	2.402	3.75	0.86	0.14
GMI4483570	BUS1-01B	BUS1-01	359.17	12.0	2145.61	2131.89	2129.91	13.72	0.55%	2.407	4.74	6.24	-0.56
GMI4481407	BUS1-02	BUS1-01B	154.45	10.0	2146.20	2132.28	2131.89	13.92	0.25%	0.631	1.79	9.72	0.14
GMI4481406	BUS1-02A	BUS1-02	212.29	10.0	2146.78	2138.86	2132.28	7.92	3.10%	0.494	2.74	0.29	2.21
GMI4481405	BUS1-03	BUS1-02A	130.75	10.0	2148.78	2139.36	2138.86	9.42	0.38%	0.493	3.29	0.59	0.46
GMI4481404	BUS1-03A	BUS1-03	216.05	10.0	2153.60	2145.40	2139.36	8.20	2.80%	0.494	3.26	0.30	2.07
GMI4481403	BUS1-04	BUS1-03A	359.44	10.0	2160.86	2152.28	2145.40	8.58	1.91%	0.443	4.82	0.32	1.68
GMI4779204	BUS1-05	BUS1-04	370.11	10.0	2167.95	2158.89	2152.28	9.06	1.79%	0.261	3.26	0.24	1.79
GMI4480918	BUS1-05A	BUS1-05	357.52	10.0	2174.68	2165.62	2158.89	9.06	1.88%	0.239	3.81	0.23	1.87
GMI4480917	BUS1-05B	BUS1-05A	327.60	10.0	2178.66	2171.40	2165.62	7.26	1.76%	0.085	1.93	0.14	1.95
GMI4480791	BUS2-01	BUS1-01B	300.67	10.0	2150.97	2138.11	2131.89	12.86	2.07%	1.758	5.40	0.74	0.45
GMI4483575	BUS2-01A	BUS2-01	148.51	12.0	2153.73	2139.71	2138.11	14.02	1.07%	1.106	4.28	0.46	1.48
GMI4483576	BUS2-01B	BUS2-01A	371.33	12.0	2153.99	2143.70	2139.71	10.29	1.07%	1.105	4.83	0.47	1.48
GMI4481410	BUS2-02	BUS2-01	258.89	12.0	2151.75	2140.73	2138.11	11.02	1.01%	0.562	2.83	0.32	1.95
MSTR1175260	BUS2-02A	BUS2-02A1	76.55	10.0	2150.50	2141.60	2140.87	8.90	0.95%	0.191	2.20	0.24	1.31
MSTR1175261	BUS2-02A1	BUS2-02	50.12	10.0	2150.00	2140.87	2140.73	9.13	0.28%	0.191	1.66	0.35	0.62
NEW1175047	BUS2-03	BUS2-01B	146.41	10.0	2156.67	2145.27	2143.70	11.40	1.07%	1.104	4.83	0.68	0.49
GMI4481413	BUS2-04	BUS2-03	363.84	10.0	2154.86	2147.86	2145.27	7.00	0.71%	0.509	2.53	0.44	0.79
GMI4483691	BUS2-04A	BUS2-04	328.35	10.0	2159.14	2148.50	2147.86	10.64	0.19%	0.002	0.13	0.03	1.46
GMI4779191	BUS2-05	BUS2-04	300.78	10.0	2159.99	2151.69	2147.86	8.30	1.27%	0.390	3.19	0.32	1.34
GMI4779190	BUS2-06	BUS2-05	361.51	10.0	2162.60	2153.84	2151.69	8.76	0.59%	0.257	2.65	0.32	0.93
GMI4779166	BUS2-07	BUS2-06	299.62	10.0	2167.06	2156.32	2153.84	10.74	0.83%	0.053	1.67	0.13	1.34
GMI4482020	BUS9-04B	CEN9-09A	317.76	10.0	2205.61	2196.14	2194.77	9.47	0.43%	0.020	1.06	0.10	0.99
GMI4482023	BUS9-04C	BUS9-04B	53.54	10.0	2205.59	2196.37	2196.14	9.22	0.43%	0.017	1.03	0.09	0.99
GMI4481366	CEN1-01	L1-01	381.37	15.0	2155.84	2150.14	2146.92	5.70	0.84%	1.187	4.72	0.39	2.97

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481368	CEN1-02	CEN1-01	313.69	15.0	2158.64	2152.00	2150.14	6.64	0.59%	1.173	3.96	0.41	2.31
GMI4481369	CEN1-03	CEN1-02	253.61	15.0	2163.75	2156.73	2152.00	7.02	1.87%	1.172	4.65	0.30	5.01
GMI4481363	CEN1-04	CEN1-03	301.84	15.0	2171.90	2162.02	2156.73	9.88	1.75%	1.156	5.78	0.30	4.83
GMI4481362	CEN1-05	CEN1-04	301.93	15.0	2176.49	2164.91	2162.02	11.58	0.96%	1.135	4.85	0.37	3.29
GMI4481361	CEN1-06	CEN1-05	189.44	15.0	2175.59	2166.27	2164.91	9.32	0.72%	1.128	4.11	0.39	2.70
GMI4481360	CEN1-06A1	CEN1-06	169.19	15.0	2174.42	2168.00	2166.27	6.42	1.02%	1.095	4.58	0.29	4.74
NEW206	CEN1-07	CEN1-06A1	360.47	15.0	2182.14	2171.74	2168.00	10.40	1.04%	1.093	4.54	0.39	2.79
GMI4481359	CEN1-08	CEN1-07	552.90	15.0	2188.14	2179.84	2171.74	8.30	1.47%	1.012	4.25	0.29	4.46
GMI4481358	CEN1-09	CEN1-08	233.29	15.0	2190.72	2182.47	2179.84	8.25	1.13%	0.752	4.15	0.27	4.05
GMI4481380	CEN1-10	CEN1-09	301.26	15.0	2192.31	2183.91	2182.47	8.40	0.48%	0.750	3.53	0.36	2.38
GMI4481338	CEN1-11	CEN1-10	375.00	15.0	2193.72	2185.34	2183.91	8.38	0.38%	0.746	2.92	0.36	2.05
GMI4481344	CEN1-12	CEN1-11	245.43	15.0	2197.52	2188.14	2185.34	9.38	1.14%	0.495	2.63	0.22	4.34
GMI4481341	CEN1-12E1	CEN1-12	160.47	10.0	2198.50	2190.92	2188.14	7.58	1.73%	0.006	0.36	0.04	2.01
GMI4481343	CEN1-13	CEN1-12	66.60	15.0	2198.26	2188.86	2188.14	9.40	1.08%	0.489	3.67	0.23	4.21
GMI4481342	CEN1-14	CEN1-13	344.16	15.0	2202.69	2192.51	2188.86	10.18	1.06%	0.486	3.62	0.22	4.17
GMI4481336	CEN1-15	CEN1-14	347.07	12.0	2214.32	2195.54	2192.51	18.78	0.87%	0.047	1.10	0.10	2.28
GMI4481335	CEN1-16	CEN1-15	353.17	12.0	2207.46	2198.62	2195.54	8.84	0.87%	0.044	1.75	0.10	2.29
GMI4481334	CEN1-17	CEN1-16	150.89	12.0	2208.46	2200.00	2198.62	8.46	0.91%	0.041	1.72	0.09	2.35
GMI4481312	CEN1-18	CEN1-17	194.13	12.0	2209.37	2200.39	2200.00	8.98	0.20%	0.039	1.14	0.15	1.08
GMI4481347	CEN6-01	CEN1-07	195.67	10.0	2183.22	2174.12	2171.74	9.10	1.22%	0.082	1.17	0.15	1.61
GMI4482511	CEN6-02	CEN6-01	482.59	10.0	2187.12	2179.28	2174.12	7.84	1.07%	0.058	1.94	0.13	1.53
GMI4482510	CEN6-03	CEN6-02	407.27	10.0	2194.83	2183.93	2179.28	10.90	1.14%	0.053	2.03	0.12	1.59
GMI4482477	CEN6-04	CEN6-03	441.89	10.0	2197.73	2187.43	2183.93	10.30	0.79%	0.049	1.89	0.13	1.32
GMI4779162	CEN7-03B	CEN7-03A	320.92	10.0	2209.89	2199.29	2198.02	10.60	0.40%	0.033	1.18	0.13	0.93
GMI4482012	CEN7-03C	CEN7-03B	152.90	10.0	2209.74	2199.48	2199.29	10.26	0.12%	0.032	0.89	0.19	0.51
GMI4482011	CEN7-03D	CEN7-03C	292.04	10.0	2210.19	2200.19	2199.48	10.00	0.24%	0.027	0.75	0.13	0.73
GMI4482010	CEN7-03E	CEN7-03D	304.52	10.0	2210.02	2200.86	2200.19	9.16	0.22%	0.021	0.87	0.12	0.70
GMI4482009	CEN7-03F	CEN7-03E	237.09	10.0	2209.04	2201.44	2200.86	7.60	0.24%	0.017	0.80	0.10	0.74
GMI4481987	CEN7-03G	CEN7-03F	94.84	10.0	2208.40	2201.60	2201.44	6.80	0.17%	0.014	0.73	0.11	0.62
GMI4481985	CEN7-03H	CEN7-03G	208.53	10.0	2208.09	2202.07	2201.60	6.02	0.23%	0.008	0.52	0.07	0.72
GMI4481984	CEN7-03I	CEN7-03H	302.44	10.0	2211.68	2202.74	2202.07	8.94	0.22%	0.006	0.58	0.07	0.72
GMI4481983	CEN7-03J	CEN7-03I	10.07	10.0	2212.06	2202.92	2202.74	9.14	1.79%	0.004	0.65	0.03	2.05
GMI4481346	CEN9-01	CEN1-11	160.54	10.0	2194.69	2186.64	2185.34	8.05	0.81%	0.093	0.82	0.18	1.29
GMI4482756	CEN9-02	CEN9-01	294.18	10.0	2200.13	2191.73	2186.64	8.40	1.73%	0.091	2.50	0.15	1.93
GMI4482758	CEN9-03	CEN9-02	275.05	10.0	2203.79	2193.89	2191.73	9.90	0.79%	0.083	2.29	0.17	1.28
GMI4482022	CEN9-04D	BUS9-04C	299.55	10.0	2206.76	2197.66	2196.37	9.10	0.43%	0.012	0.86	0.08	0.99

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482018	CEN9-04E	CEN9-04D	298.46	10.0	2209.15	2198.99	2197.66	10.16	0.45%	0.005	0.56	0.05	1.02
GMI4482757	CEN9-09A	CEN9-03	203.72	10.0	2208.88	2194.77	2193.89	14.11	0.43%	0.024	0.93	0.11	0.99
GMI4482084	CH11-01	M3-13	326.15	12.0	2172.17	2167.22	2166.04	4.95	0.36%	0.291	1.33	0.30	1.21
GMI4482090	CH11-02	CH11-01	203.64	12.0	2174.44	2168.22	2167.22	6.22	0.49%	0.286	2.39	0.27	1.46
GMI4482001	CH11-02A	CH11-02	187.09	12.0	2176.17	2171.29	2168.22	4.88	1.64%	0.268	2.96	0.20	2.93
GMI4482000	CH11-03	CH11-02A	248.86	12.0	2181.47	2175.37	2171.29	6.10	1.64%	0.264	3.76	0.20	2.93
GMI4481999	CH11-04	CH11-03	111.46	12.0	2187.26	2179.94	2175.37	7.32	4.10%	0.222	3.90	0.14	4.83
GMI4481998	CH11-05	CH11-04	196.63	12.0	2231.70	2227.35	2179.94	4.35	24.11%	0.218	6.52	0.09	12.22
GMI4481976	CH11-06	CH11-05	262.01	12.0	2249.74	2244.80	2227.35	4.94	6.66%	0.215	6.75	0.14	6.23
GMI4481971	CH11-06A	CH11-06	201.50	12.0	2259.78	2255.68	2244.80	4.10	5.40%	0.197	5.05	0.13	5.60
GMI4481972	CH11-07	CH11-06A	214.12	12.0	2264.02	2257.97	2255.68	6.05	1.07%	0.154	3.15	0.18	2.43
GMI4481973	CH11-07A	CH11-07	130.24	12.0	2273.64	2258.26	2257.97	15.38	0.22%	0.149	1.77	0.27	1.02
4562	D1-01	M3-41B	43.63	10.0	2227.95	2214.70	2214.09	13.25	1.40%	0.376	1.47	0.88	0.71
GMI4481776	D1-02	D1-01	229.27	10.0	2232.26	2214.70	2214.70	17.56	0.00%	0.372	1.08	1.03	-0.34
GMI4481777	D1-03	D1-02	262.05	10.0	2233.32	2215.77	2214.70	17.55	0.41%	0.365	1.36	0.42	0.62
GMI4481778	D1-04	D1-03	337.59	10.0	2235.60	2216.76	2215.77	18.84	0.29%	0.360	2.32	0.48	0.47
GMI4481779	D1-05	D1-04	306.67	10.0	2235.17	2217.77	2216.76	17.40	0.33%	0.355	2.23	0.44	0.53
GMI4481780	D1-06	D1-05	352.29	10.0	2237.27	2218.77	2217.77	18.50	0.28%	0.350	2.23	0.47	0.47
GMI4482275	D1-07	D1-06	83.71	10.0	2236.98	2218.98	2218.77	18.00	0.25%	0.305	1.89	0.46	0.46
GMI4481752	D1-08	D1-07	259.67	10.0	2237.21	2219.61	2218.98	17.60	0.24%	0.298	1.95	0.44	0.46
GMI4482280	D1-09	D1-08	269.56	10.0	2236.47	2220.58	2219.61	15.89	0.36%	0.268	2.01	0.37	0.65
GMI4482281	D1-10	D1-09	284.56	10.0	2237.11	2221.17	2220.58	15.94	0.21%	0.261	1.90	0.46	0.44
GMI4482282	D1-11	D1-10	41.58	10.0	2237.04	2221.62	2221.17	15.42	1.08%	0.245	2.14	0.27	1.35
GMI4481753	D1-12	D1-11	257.51	10.0	2232.47	2222.37	2221.62	10.10	0.29%	0.216	2.20	0.38	0.61
GMI4481758	D1-13	D1-12	408.94	10.0	2233.72	2223.60	2222.37	10.12	0.30%	0.174	1.63	0.31	0.67
GMI4481760	D1-13A	D1-13	199.46	10.0	2236.24	2224.18	2223.60	12.06	0.29%	0.076	1.06	0.20	0.75
GMI4482201	DAV1-01	A1-15	377.29	15.0	2188.60	2180.06	2161.39	8.54	4.95%	0.407	2.17	0.14	9.66
GMI4482200	DAV1-02	DAV1-01	218.00	15.0	2209.70	2198.12	2180.06	11.58	8.28%	0.404	6.73	0.12	12.64
GMI4482199	DAV1-03	DAV1-02	205.65	15.0	2222.68	2211.02	2198.12	11.66	6.27%	0.401	6.88	0.13	10.94
GMI4482198	DAV1-03A	DAV1-03	43.33	15.0	2223.73	2211.18	2211.02	12.55	0.37%	0.397	2.98	0.32	2.37
GMI1654596	DAV1-03B	DAV1-03A	164.24	15.0	2225.20	2212.04	2211.18	13.16	0.52%	0.390	2.20	0.23	2.88
GMI1654595	DAV1-04	DAV1-03B	46.88	15.0	2224.89	2212.13	2212.04	12.76	0.20%	0.383	2.15	0.32	1.60
GMI4482197	DAV1-05	DAV1-04	303.54	15.0	2224.13	2212.93	2212.13	11.20	0.26%	0.380	1.93	0.27	1.94
GMI4482196	DAV1-06	DAV1-05	148.88	15.0	2225.04	2213.40	2212.93	11.64	0.32%	0.343	2.08	0.25	2.20
GMI4482195	DAV1-06A	DAV1-06	151.67	12.0	2225.72	2213.94	2213.40	11.78	0.36%	0.049	0.66	0.13	1.44
GMI4482191	DAV1-07	DAV1-06	300.94	15.0	2227.40	2214.50	2213.40	12.90	0.37%	0.292	2.06	0.22	2.44

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481898	DAV1-08	DAV1-07	300.23	15.0	2228.22	2215.18	2214.50	13.04	0.23%	0.288	1.95	0.26	1.87
GMI4481899	DAV1-09	DAV1-08	46.19	15.0	2228.05	2215.45	2215.18	12.60	0.58%	0.284	2.08	0.19	3.18
GMI4481821	DAV1-10	DAV1-09	311.37	12.0	2227.20	2216.37	2215.45	10.83	0.30%	0.280	2.32	0.33	1.08
GMI4481823	DAV1-10A	DAV1-10	210.46	12.0	2227.84	2216.99	2216.37	10.85	0.30%	0.165	1.50	0.24	1.19
GMI4481822	DAV1-10B	DAV1-10A	211.12	12.0	2229.86	2217.62	2216.99	12.24	0.30%	0.129	1.56	0.21	1.23
GMI4481824	DAV1-11	DAV1-10	242.22	12.0	2227.12	2216.90	2216.37	10.22	0.22%	0.113	1.01	0.21	1.06
GMI4481826	DAV1-12	DAV1-11	297.24	12.0	2228.81	2217.93	2216.90	10.88	0.35%	0.110	1.55	0.19	1.36
GMI4481825	DAV1-13	DAV1-12	269.09	12.0	2231.28	2218.78	2217.93	12.50	0.31%	0.106	1.62	0.19	1.29
GMI4480763	DAV1-13A	DAV1-13	205.77	12.0	2232.17	2219.43	2218.78	12.75	0.31%	0.023	0.57	0.31	1.37
NEW417	DAV1-13B	DAV1-13A	75.60	12.0	2232.46	2219.66	2219.43	12.80	0.32%	0.004	0.35	0.04	1.40
GMI4481828	DAV1-14	DAV1-13	113.79	12.0	2230.77	2219.08	2218.78	11.69	0.26%	0.080	1.30	0.17	1.20
NEW351	DAV1-15	DAV1-15A	48.91	12.0	2230.71	2219.94	2219.81	10.77	0.26%	0.053	1.21	0.14	1.22
GMI4481829	DAV1-15A	DAV1-14	236.54	12.0	2230.87	2219.81	2219.08	11.06	0.31%	0.057	1.17	0.14	1.33
GMI4481831	DAV1-16	DAV1-15	170.30	12.0	2229.79	2221.78	2219.94	8.01	1.08%	0.041	1.24	0.09	2.55
GMI4779484	DAV1-16A	DAV1-16	81.50	12.0	2229.61	2222.26	2221.78	7.35	0.59%	0.011	0.84	0.05	1.91
NEW1175082	DEP1-01	STOR_14	200.59	12.0	2275.30	2236.50	2236.05	38.80	0.22%	0.544	2.44	0.52	0.64
NEW1175003	DEP1-02	DEP1-01	117.10	12.0	2278.56	2236.56	2236.50	42.00	0.05%	0.544	1.76	0.65	0.02
NEW1175002	DEP1-03	DEP1-02	135.06	12.0	2279.10	2237.00	2236.56	42.10	0.33%	0.543	1.95	0.43	0.88
NEW1175001	DEP1-04	DEP1-03	125.53	12.0	2279.35	2237.45	2237.00	41.90	0.36%	0.543	2.58	0.44	0.95
NEW1175000	DEP1-05	DEP1-04	81.29	12.0	2280.73	2237.73	2237.45	43.00	0.34%	0.542	2.49	0.45	0.92
NEW1174999	DEP1-06	DEP1-05	202.97	12.0	2282.55	2238.46	2237.73	44.10	0.36%	0.542	2.56	0.43	0.95
NEW1174998	DEP1-07	DEP1-06	175.91	12.0	2281.16	2238.96	2238.46	42.20	0.29%	0.542	2.49	0.47	0.80
NEW1174997	DEP1-08	DEP1-07	294.83	12.0	2280.77	2240.27	2238.96	40.50	0.44%	0.541	2.59	0.39	1.12
NEW1174996	DEP1-09	DEP1-08	188.11	12.0	2276.80	2240.70	2240.27	36.11	0.23%	0.521	2.37	0.50	0.67
NEW1174995	DEP1-10	DEP1-09	161.79	12.0	2275.71	2241.11	2240.70	34.60	0.26%	0.520	2.17	0.46	0.74
NEW1174994	DEP1-11	DEP1-10	108.17	12.0	2274.62	2241.52	2241.11	33.10	0.38%	0.520	2.48	0.41	1.02
NEW1174993	DEP1-12	DEP1-11	111.64	12.0	2273.22	2241.62	2241.52	31.60	0.09%	0.486	1.96	0.57	0.26
NEW1174992	DEP1-13	DEP1-12	87.50	12.0	2272.52	2241.81	2241.62	30.71	0.22%	0.485	1.76	0.50	0.68
NEW1174991	DEP1-14	DEP1-13	79.05	12.0	2271.36	2242.56	2241.81	28.81	0.94%	0.485	2.55	0.31	1.93
NEW1174990	DEP1-15	DEP1-14	86.10	12.0	2270.68	2242.88	2242.56	27.80	0.38%	0.484	2.65	0.42	1.05
NEW1174989	DEP1-16	DEP1-15	60.56	12.0	2270.71	2243.11	2242.88	27.60	0.38%	0.483	2.42	0.42	1.05
NEW1174988	DEP1-17	DEP1-16	212.91	12.0	2272.54	2243.68	2243.11	28.86	0.27%	0.435	2.22	0.41	0.86
NEW1174987	DEP1-18	DEP1-17	179.67	12.0	2273.01	2244.30	2243.68	28.71	0.35%	0.434	2.37	0.37	1.03
NEW1174986	DEP1-19	DEP1-18	166.19	12.0	2271.45	2244.65	2244.30	26.80	0.21%	0.433	2.16	0.46	0.71
NEW1174985	DEP1-20	DEP1-19	190.51	12.0	2269.61	2245.12	2244.65	24.49	0.25%	0.428	2.03	0.41	0.81
NEW1174984	DEP1-21	DEP1-20	260.57	12.0	2267.07	2245.86	2245.12	21.21	0.28%	0.406	2.20	0.38	0.92

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
NEW1174983	DEP1-22	DEP1-21	122.70	12.0	2266.47	2246.27	2245.86	20.20	0.34%	0.405	2.31	0.37	1.04
GMI4482029	FG1-01	FG1-01A	150.09	36.0	2133.42	2119.31	2119.00	14.11	0.21%	20.423	5.23	0.86	0.80
NEW132	FG1-01A	OFALL_10	39.60	36.0	2133.54	2119.00	2118.50	14.54	1.26%	20.434	7.38	0.73	32.05
GMI4482028	FG1-02	FG2-01	255.18	36.0	2132.26	2120.03	2119.59	12.23	0.17%	13.505	3.54	0.76	5.89
GMI4482027	FG1-03	FG1-02	309.49	36.0	2139.91	2121.13	2120.03	18.78	0.36%	13.525	4.42	0.54	14.36
GMI4480686	FG1-04	FG1-03	400.32	36.0	2134.26	2121.83	2121.13	12.43	0.17%	10.190	4.15	0.55	9.31
GMI4480687	FG1-05	FG1-04	538.09	36.0	2133.25	2122.90	2121.83	10.35	0.20%	10.193	4.12	0.51	10.62
GMI4482026	FG1-06	FG1-05	360.50	36.0	2138.95	2123.70	2122.90	15.25	0.22%	10.194	4.31	0.51	11.81
NEW082719	FG1-07	FG1-07A	76.80	36.0	2136.35	2124.59	2124.59	11.76	0.01%	0.013	0.14	0.43	3.36
GMI4482041	FG1-07A	FG1-06	222.18	36.0	2137.00	2124.59	2123.70	12.41	0.40%	10.194	4.81	0.43	19.30
GMI4482040	FG1-08	FG1-07A	304.45	36.0	2135.24	2125.22	2124.59	10.02	0.21%	10.193	4.67	0.54	11.19
GMI4482039	FG1-09	FG1-08	196.11	36.0	2132.97	2125.82	2125.22	7.15	0.30%	10.185	4.31	0.49	15.58
GMI4482054	FG1-10	FG1-09	210.05	36.0	2132.36	2126.21	2125.82	6.15	0.18%	10.185	4.21	0.55	9.91
GMI4483608	FG1-11	FG1-10	290.74	36.0	2136.03	2127.02	2126.21	9.01	0.28%	10.185	4.27	0.48	14.47
GMI4482056	FG1-12	FG1-11	187.83	36.0	2136.03	2127.36	2127.02	8.67	0.18%	10.185	4.26	0.56	9.80
GMI4483605	FG1-13	FG1-12	267.92	36.0	2136.89	2127.94	2127.36	8.95	0.21%	10.185	4.00	0.53	11.47
GMI4483567	FG1-14	FG1-13	216.13	36.0	2135.77	2128.11	2127.94	7.66	0.08%	9.742	3.57	0.62	3.36
NEW1175064	FG2-01	FG1-01	43.10	36.0	2134.36	2119.59	2119.31	14.77	0.64%	13.811	3.43	0.80	23.83
NEW1175237	FG2-02	FG2-01	239.26	12.0	2134.59	2122.28	2119.59	12.31	1.13%	0.327	0.99	0.24	2.32
NEW1175236	FG2-03	FG2-02	137.79	12.0	2133.40	2122.70	2122.28	10.70	0.30%	0.325	2.29	0.36	1.05
NEW1175235	FG2-04	FG2-03	168.99	12.0	2131.48	2123.33	2122.70	8.15	0.37%	0.325	2.20	0.32	1.20
NEW1175065	FG2-04A	FG2-04	104.22	10.0	2131.97	2123.65	2123.33	8.32	0.30%	0.013	0.29	0.09	0.83
NEW1175234	FG2-05	FG2-04	76.39	12.0	2130.26	2123.60	2123.33	6.66	0.35%	0.313	2.21	0.33	1.16
NEW1175233	FG2-06	FG2-05	74.90	12.0	2131.14	2123.91	2123.60	7.23	0.41%	0.312	2.23	0.31	1.29
NEW1175232	FG2-07	FG2-06	192.92	12.0	2130.03	2124.63	2123.91	5.41	0.37%	0.308	2.30	0.32	1.21
GMI4779175	FG2-08	FG2-07	249.70	10.0	2130.06	2125.73	2125.26	4.33	0.19%	0.290	1.98	0.52	0.38
GMI4779178	FG2-09	FG2-08	71.83	10.0	2129.76	2125.75	2125.73	4.01	0.03%	0.274	1.43	0.60	-0.02
GMI4481731	FWN1-01	AEXT2-03	64.84	15.0	2173.20	2158.83	2157.04	14.37	2.76%	2.319	4.63	0.38	5.20
GMI4481735	FWN1-02	FWN1-01	49.95	15.0	2172.40	2161.03	2158.83	11.37	4.41%	2.319	8.67	0.36	7.18
GMI4481736	FWN1-03	FWN1-02	301.75	15.0	2178.45	2162.93	2161.03	15.52	0.63%	2.319	4.68	0.61	1.27
GMI4482263	FWN1-04	FWN1-03	185.11	18.0	2176.77	2163.05	2162.93	13.72	0.07%	2.319	2.96	0.78	-0.45
GMI4482266	FWN1-05	FWN1-04	259.48	18.0	2174.53	2163.49	2163.05	11.04	0.17%	2.313	2.51	0.72	0.72
GMI4482268	FWN1-06	FWN1-05	274.65	18.0	2171.88	2163.91	2163.49	7.97	0.15%	2.312	2.62	0.72	0.57
GMI4482267	FWN1-07	FWN1-06	320.60	18.0	2186.57	2175.30	2163.91	11.27	3.55%	2.311	4.07	0.28	11.56
GMI4480786	FWN1-08	FWN1-07	174.16	18.0	2190.85	2180.02	2175.30	10.83	2.71%	2.307	8.07	0.32	9.80
GMI4480785	FWN1-09	FWN1-08	372.47	18.0	2193.75	2180.10	2180.02	13.65	0.02%	2.306	2.98	0.96	-1.23

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482752	FWN1-10	FWN1-09	338.25	18.0	2195.53	2180.51	2180.10	15.02	0.12%	2.303	2.08	0.90	0.26
GMI4482753	FWN1-11	FWN1-10	307.18	18.0	2194.50	2181.06	2180.51	13.44	0.18%	2.302	2.34	0.75	0.81
GMI4482754	FWN1-12	FWN1-11	112.85	18.0	2194.76	2181.40	2181.06	13.36	0.30%	2.302	2.87	0.65	1.74
GMI4482749	FWN1-13	FWN1-12	356.59	18.0	2196.41	2181.85	2181.40	14.56	0.13%	2.289	2.72	0.75	0.32
GMI4482119	FWN1-14	FWN1-13	187.14	18.0	2197.79	2182.14	2181.85	15.65	0.15%	2.283	2.51	0.74	0.61
GMI4482118	FWN1-15	FWN1-14	100.87	18.0	2198.84	2182.16	2182.14	16.68	0.02%	2.282	2.35	0.85	-1.25
GMI4482117	FWN1-16	FWN1-15	259.71	18.0	2199.92	2182.87	2182.16	17.05	0.27%	2.282	2.63	0.58	1.56
GMI4482116	FWN1-17	FWN1-16	153.89	18.0	2197.99	2182.59	2182.87	15.40	-0.18%	2.282	2.39	0.98	0.86
GMI4482115	FWN1-18	FWN1-17	244.90	18.0	2195.29	2183.53	2182.59	11.76	0.38%	2.278	2.52	0.51	2.28
GMI4481703	FWN1-19	FWN1-18	175.44	18.0	2188.13	2183.78	2183.53	4.35	0.14%	2.261	3.15	0.70	0.52
GMI4480832	FWN1-20	FWN1-19	377.23	18.0	2194.77	2184.09	2183.78	10.68	0.08%	2.262	2.42	0.83	-0.15
GMI4481704	FWN1-21	FWN1-20	390.82	18.0	2188.59	2184.55	2184.09	4.04	0.12%	2.265	2.28	0.80	0.26
GMI4481705	FWN1-22	FWN1-21	258.18	18.0	2210.36	2194.87	2184.55	15.49	4.00%	2.269	3.74	0.27	12.44
GMI4481706	FWN1-22A	FWN1-22	183.47	15.0	2198.94	2196.02	2194.87	2.92	0.63%	1.130	4.19	0.43	2.45
GMI4779372	FWN1-22B	FWN1-22A	171.73	15.0	2202.52	2196.52	2196.02	6.00	0.29%	1.131	3.07	0.52	1.32
GMI4779371	FWN1-22C	FWN1-22B	129.05	15.0	2203.46	2196.91	2196.52	6.55	0.30%	1.126	2.78	0.50	1.35
GMI4779370	FWN1-22D	FWN1-22C	235.47	15.0	2211.95	2199.45	2196.91	12.50	1.08%	1.127	3.60	0.33	3.57
GMI4779362	FWN1-22E	FWN1-22D	107.62	15.0	2203.39	2200.19	2199.45	3.20	0.69%	1.124	4.11	0.42	2.63
GMI4779361	FWN1-22F	FWN1-22E	98.56	15.0	2211.11	2201.95	2200.19	9.16	1.79%	1.106	4.38	0.29	4.94
GMI4481710	FWN1-22G	FWN1-22F	253.95	15.0	2217.24	2202.77	2201.95	14.47	0.32%	1.107	3.70	0.52	1.46
GMI4482106	FWN1-23	FWN1-22	251.49	12.0	2226.98	2218.78	2204.32	8.20	5.75%	1.218	9.13	0.31	4.77
GMI4482108	FWN1-23A	FWN1-22G	250.15	15.0	2224.45	2203.68	2202.87	20.77	0.32%	1.106	3.11	0.48	1.47
NEW400	FWN1-23AS	STOR_12	48.37	24.0	2221.04	2206.19	2206.14	14.85	0.11%	0.277	1.51	0.21	4.97
GMI4482109	FWN1-23B	FWN1-23A	350.01	15.0	2230.51	2204.92	2203.78	25.59	0.33%	1.105	3.20	0.48	1.48
GMI4482744	FWN1-23C	FWN1-23B	334.19	15.0	2232.51	2206.10	2205.02	26.41	0.32%	1.114	3.20	0.49	1.46
GMI4482252	FWN1-23D	FWN1-23C	333.56	15.0	2227.91	2207.28	2206.20	20.63	0.32%	1.123	3.20	0.49	1.45
GMI4482253	FWN1-23E	FWN1-23D	354.73	15.0	2228.86	2208.53	2207.38	20.33	0.32%	1.139	3.22	0.49	1.44
GMI4482254	FWN1-23F	FWN1-23E	250.99	15.0	2231.64	2209.44	2208.63	22.20	0.32%	1.151	3.20	0.50	1.42
GMI4482255	FWN1-23G	FWN1-23F	262.27	15.0	2230.10	2210.39	2209.54	19.71	0.32%	1.162	3.22	0.50	1.41
GMI4482251	FWN1-23H	FWN1-23G	337.71	15.0	2230.32	2211.58	2210.49	18.74	0.32%	1.212	3.26	0.51	1.36
GMI4481019	FWN1-24	FWN1-23	393.07	12.0	2235.88	2220.04	2219.18	15.84	0.22%	1.217	2.89	0.96	-0.05
GMI4481018	FWN1-25	FWN1-24	205.53	12.0	2234.13	2224.78	2224.19	9.35	0.29%	0.442	2.46	0.43	0.89
GMI4482738	FWN1-26	FWN1-25	314.11	12.0	2233.31	2225.52	2224.78	7.79	0.24%	0.423	2.11	0.41	0.79
GMI4482742	FWN1-27	FWN1-26	339.94	12.0	2236.57	2228.47	2225.52	8.10	0.87%	0.422	2.68	0.29	1.90
GMI4482741	FWN1-28	FWN1-27	348.72	12.0	2241.40	2230.64	2228.47	10.76	0.62%	0.421	3.19	0.33	1.55
GMI4482730	FWN1-29	FWN1-28	345.61	12.0	2243.69	2231.42	2230.64	12.27	0.23%	0.419	2.30	0.45	0.77

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482733	FWN1-30	FWN1-29	345.40	12.0	2245.84	2232.24	2231.42	13.60	0.24%	0.418	2.02	0.40	0.80
GMI4482731	FWN1-31	FWN1-30	349.77	12.0	2247.69	2233.00	2232.24	14.69	0.22%	0.414	2.08	0.43	0.75
GMI4482717	FWN1-32	FWN1-31	347.63	12.0	2250.10	2234.07	2233.00	16.03	0.31%	0.412	2.18	0.37	0.97
GMI4482716	FWN1-33	FWN1-32	347.99	12.0	2251.98	2235.08	2234.07	16.90	0.29%	0.411	2.31	0.39	0.93
GMI4482712	FWN1-34	FWN1-33	374.20	12.0	2253.47	2235.62	2235.08	17.85	0.14%	0.409	1.87	0.50	0.54
GMI4482686	FWN1-35	FWN1-34	290.42	12.0	2254.09	2236.34	2235.62	17.75	0.25%	0.409	1.86	0.40	0.83
GMI4482687	FWN1-36	FWN1-35	319.61	12.0	2252.61	2237.36	2236.34	15.25	0.32%	0.372	2.16	0.35	1.04
GMI4482702	FWN1-37	FWN1-36	344.96	12.0	2252.18	2238.21	2237.36	13.97	0.25%	0.347	2.09	0.37	0.89
GMI4482703	FWN1-38	FWN1-37	145.24	12.0	2252.67	2238.64	2238.21	14.03	0.30%	0.345	2.10	0.35	1.01
GMI4482704	FWN1-39	FWN1-38	95.00	12.0	2252.97	2238.98	2238.64	13.99	0.35%	0.343	2.24	0.34	1.15
GMI4482705	FWN1-40	FWN1-39	329.34	12.0	2256.42	2239.67	2238.98	16.75	0.21%	0.342	2.01	0.40	0.80
GMI4482706	FWN1-41	FWN1-40	298.67	12.0	2254.42	2240.48	2239.67	13.94	0.27%	0.269	1.69	0.31	1.03
GMI4482707	FWN1-42	FWN1-41	368.85	12.0	2254.53	2241.47	2240.48	13.06	0.27%	0.268	1.99	0.31	1.02
GMI4482677	FWN1-43	FWN1-42	118.82	10.0	2254.65	2241.81	2241.47	12.84	0.29%	0.171	1.70	0.31	0.65
GMI4482653	FWN1-44	FWN1-43	115.92	10.0	2254.76	2242.32	2241.81	12.44	0.44%	0.171	1.98	0.28	0.85
GMI4482652	FWN1-45	FWN1-44	191.08	10.0	2255.58	2242.90	2242.32	12.68	0.30%	0.171	1.93	0.32	0.68
GMI4482651	FWN1-46	FWN1-45	354.73	10.0	2259.28	2243.86	2242.90	15.42	0.27%	0.169	1.76	0.31	0.63
GMI4482650	FWN1-47	FWN1-46	328.77	10.0	2262.09	2245.24	2243.86	16.85	0.42%	0.154	1.82	0.27	0.84
GMI4482649	FWN1-48	FWN1-47	225.05	10.0	2262.68	2245.86	2245.24	16.82	0.28%	0.141	1.74	0.30	0.66
GMI4481589	FWN1-49	FWN1-48	115.99	10.0	2263.59	2246.49	2245.86	17.10	0.54%	0.140	1.86	0.24	0.99
GMI4481590	FWN1-49A	FWN1-49	222.19	10.0	2262.73	2246.88	2246.49	15.85	0.18%	0.140	1.59	0.36	0.50
GMI4481591	FWN1-50	FWN1-49A	51.58	10.0	2262.41	2247.03	2246.88	15.38	0.29%	0.138	1.42	0.28	0.69
GMI4480747	FWN1-51	FWN1-50	164.18	10.0	2261.25	2247.59	2247.03	13.66	0.34%	0.137	1.76	0.27	0.76
GMI4480692	FWN1-52	FWN1-51	337.74	10.0	2261.82	2248.59	2247.59	13.23	0.30%	0.137	1.76	0.28	0.70
GMI4480691	FWN1-53	FWN1-52	336.81	10.0	2265.03	2249.77	2248.59	15.26	0.35%	0.137	1.77	0.26	0.77
GMI4482618	FWN1-54	FWN1-53	266.78	10.0	2265.33	2250.56	2249.77	14.77	0.30%	0.093	1.40	0.23	0.74
GMI4482603	FWN1-55	FWN1-54	313.76	10.0	2263.97	2251.49	2250.56	12.48	0.30%	0.093	1.55	0.23	0.74
GMI4482602	FWN1-56	FWN1-55	231.13	10.0	2262.62	2252.22	2251.49	10.40	0.32%	0.089	1.53	0.22	0.77
GMI4482601	FWN1-57	FWN1-56	342.52	10.0	2260.91	2253.41	2252.22	7.50	0.35%	0.087	1.59	0.21	0.82
GMI4482035	GAR1-01	GAR3-07	8.37	12.0	2168.34	2155.76	2155.51	12.58	3.00%	1.323	4.60	0.38	3.00
GMI4482515	GAR1-02	GAR1-01	355.29	12.0	2164.53	2156.63	2155.76	7.90	0.24%	1.312	3.02	0.99	-0.08
GMI4482487	GAR1-03	GAR1-02	346.35	12.0	2164.19	2156.91	2156.63	7.28	0.08%	1.328	2.63	1.69	-0.62
GMI4482492	GAR1-04	GAR1-03	192.88	12.0	2165.47	2156.55	2156.91	8.92	-0.19%	1.278	2.52	2.61	-0.20
GMI4482491	GAR1-05	GAR1-04	14.87	12.0	2165.60	2156.56	2156.55	9.04	0.07%	1.268	2.50	2.70	-0.62
GMI4482490	GAR1-06	GAR1-05	267.34	12.0	2166.60	2157.78	2156.56	8.82	0.46%	1.266	2.49	2.24	0.42
GMI4482016	GAR1-07	GAR1-06	171.69	12.0	2164.90	2158.22	2157.78	6.68	0.26%	1.129	2.67	2.19	0.13

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482015	GAR1-08	GAR1-07	299.03	12.0	2167.78	2158.78	2158.22	9.00	0.19%	1.098	2.45	2.23	-0.02
GMI4482498	GAR1-09	GAR1-08	298.85	12.0	2168.90	2159.44	2158.78	9.46	0.22%	1.095	2.47	2.18	0.08
GMI4482499	GAR1-10	GAR1-09	177.92	12.0	2168.26	2159.62	2159.44	8.64	0.10%	1.132	2.33	2.39	-0.34
GMI4482066	GAR1-11	GAR1-10	401.65	10.0	2169.86	2161.44	2159.62	8.42	0.45%	1.120	3.18	3.18	-0.09
GMI4482068	GAR1-12	GAR1-11	298.28	10.0	2171.93	2162.28	2161.44	9.65	0.28%	0.811	2.34	2.88	0.00
GMI4482069	GAR1-13	GAR1-12	264.32	10.0	2171.15	2162.85	2162.28	8.30	0.22%	0.803	2.40	2.88	-0.09
GMI4482070	GAR1-14	GAR1-13	27.18	10.0	2171.63	2163.17	2162.85	8.46	1.18%	0.791	2.91	2.63	0.87
GMI4482071	GAR1-15	GAR1-14	189.28	10.0	2170.34	2163.72	2163.17	6.62	0.29%	0.836	2.95	2.59	-0.01
GMI4480556	GAR3-01	M2-10	309.33	15.0	2159.23	2146.63	2145.81	12.60	0.27%	1.366	2.02	0.65	0.96
GMI4480469	GAR3-02	GAR3-01	297.84	15.0	2162.96	2150.98	2146.63	11.98	1.46%	1.339	3.88	0.34	4.13
GMI4480401	GAR3-03	GAR3-02	300.68	15.0	2163.96	2151.43	2150.98	12.53	0.15%	1.329	3.08	0.73	0.42
GMI4482795	GAR3-04	GAR3-03	269.21	15.0	2165.40	2154.04	2151.43	11.36	0.97%	1.328	2.96	0.37	3.13
GMI4480638	GAR3-05	GAR3-04	383.61	15.0	2167.28	2154.64	2154.04	12.64	0.16%	1.326	2.94	0.73	0.46
GMI4480881	GAR3-06	GAR3-05	100.72	15.0	2166.81	2154.79	2154.64	12.02	0.15%	1.324	2.13	0.73	0.43
GMI4482514	GAR3-07	GAR3-06	344.25	15.0	2168.25	2155.51	2154.79	12.74	0.21%	1.325	2.41	0.58	0.74
GMI4480907	GOV1-01	BEXT2-28	385.45	15.0	2219.26	2209.91	2208.40	9.35	0.39%	0.921	2.51	0.39	1.91
GMI4480662	GOV1-02	GOV1-01	349.39	15.0	2221.05	2210.47	2209.91	10.58	0.16%	0.910	2.47	0.55	0.90
GMI4480925	GOV1-03	GOV1-02	21.12	15.0	2220.95	2210.75	2210.47	10.20	1.33%	0.857	2.77	0.27	4.35
GMI4483674	GOV1-04	GOV1-03	236.20	15.0	2223.00	2211.10	2210.75	11.90	0.15%	0.855	2.76	0.55	0.90
GMI4483675	GOV1-05	GOV1-04	390.97	15.0	2221.77	2211.62	2211.10	10.15	0.13%	0.622	1.62	0.43	1.02
GMI4480885	GOV1-06	GOV1-05	328.57	15.0	2223.70	2212.37	2211.62	11.33	0.23%	0.577	2.02	0.35	1.58
GMI4480886	GOV1-07	GOV1-06	37.97	15.0	2223.76	2212.70	2212.37	11.06	0.89%	0.562	2.82	0.25	3.67
GMI4480887	GOV1-08	GOV1-07	332.26	15.0	2224.45	2213.21	2212.70	11.24	0.15%	0.559	2.16	0.43	1.21
GMI4482142	GOV1-09	GOV1-08	346.03	15.0	2229.10	2213.90	2213.21	15.20	0.20%	0.561	1.93	0.36	1.46
GMI4482143	GOV1-09A	GOV1-09	229.13	12.0	2228.02	2216.07	2213.90	11.95	0.95%	0.244	1.78	0.21	2.18
GMI4482144	GOV1-09B	GOV1-09A	343.00	12.0	2229.85	2217.95	2216.07	11.90	0.55%	0.230	2.61	0.25	1.62
GMI4482145	GOV1-09C	GOV1-09B	354.19	12.0	2238.95	2224.80	2217.95	14.15	1.93%	0.225	2.92	0.17	3.24
GMI4482141	GOV1-10	GOV1-09	399.09	12.0	2228.95	2214.78	2213.90	14.17	0.22%	0.329	1.70	0.36	0.84
GMI4482236	GOV1-11	GOV1-10	388.51	12.0	2230.57	2215.68	2214.78	14.89	0.23%	0.328	1.98	0.36	0.87
GMI4482237	GOV1-12	GOV1-11	354.44	12.0	2232.28	2216.69	2215.68	15.59	0.28%	0.240	1.69	0.29	1.09
GMI4482238	GOV1-13	GOV1-12	224.67	12.0	2232.98	2217.32	2216.69	15.66	0.28%	0.223	1.89	0.28	1.10
GMI4482239	GOV1-14	GOV1-13	384.60	12.0	2232.78	2218.21	2217.32	14.57	0.23%	0.214	1.78	0.29	0.99
GMI4482213	GOV1-15	GOV1-14	295.86	12.0	2235.93	2218.79	2218.21	17.14	0.20%	0.210	1.66	0.30	0.89
GMI4482217	GOV1-15N1	GOV1-15	10.24	10.0	2236.03	2218.82	2218.79	17.21	0.28%	0.106	1.00	0.34	0.71
GMI4482215	GOV1-16	GOV1-15N1	361.68	10.0	2237.85	2220.06	2218.82	17.79	0.34%	0.100	1.22	0.23	0.80
GMI4482214	GOV1-17	GOV1-16	308.74	10.0	2237.14	2221.09	2220.06	16.05	0.33%	0.091	1.60	0.22	0.80

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482218	GOV1-18	GOV1-17	425.95	10.0	2237.06	2222.58	2221.09	14.48	0.35%	0.085	1.56	0.21	0.82
GMI4482219	GOV1-19	GOV1-18	295.38	10.0	2235.56	2223.40	2222.58	12.16	0.28%	0.050	1.11	0.17	0.76
GMI4481601	GOV1-20	GOV1-19	292.47	10.0	2234.72	2224.30	2223.40	10.42	0.31%	0.044	1.19	0.15	0.81
GMI4481600	GOV1-21	GOV1-20	358.41	10.0	2234.63	2225.61	2224.30	9.02	0.37%	0.037	1.20	0.14	0.89
GMI4481599	GOV1-22	GOV1-21	79.47	10.0	2233.55	2225.98	2225.61	7.57	0.47%	0.030	1.17	0.12	1.02
GMI4481057	HON1-01	BEXT2-13	325.40	12.0	2211.06	2199.98	2198.09	11.08	0.58%	0.578	1.86	0.38	1.32
GMI4481700	HON1-02	HON1-01	327.01	12.0	2213.73	2200.88	2199.98	12.85	0.28%	0.576	2.66	0.51	0.73
GMI4481699	HON1-03	HON1-02	322.10	12.0	2213.95	2202.79	2200.88	11.16	0.59%	0.574	2.67	0.38	1.35
GMI4481672	HON1-04	HON1-03	357.66	12.0	2213.12	2205.08	2202.79	8.04	0.64%	0.572	3.32	0.37	1.42
GMI4481671	HON1-04A	HON1-04	148.15	12.0	2211.72	2205.83	2205.08	5.88	0.51%	0.569	3.11	0.41	1.21
NEW1175253	HON1-05	HON1-04A	11.27	12.0	2211.69	2205.89	2205.83	5.80	0.51%	0.566	2.57	0.49	1.21
GMI4483036	HON1-06	HON1-05	397.29	12.0	2217.82	2207.32	2205.89	10.50	0.36%	0.497	2.30	0.40	1.00
GMI4483037	HON1-07	HON1-06	336.57	12.0	2220.82	2208.29	2207.32	12.53	0.29%	0.496	2.46	0.44	0.84
GMI4483038	HON1-08	HON1-07	235.02	12.0	2222.51	2209.09	2208.29	13.42	0.34%	0.493	2.43	0.40	0.96
GMI4483043	HON1-09	HON1-08	220.31	12.0	2225.43	2210.08	2209.09	15.35	0.45%	0.464	2.61	0.36	1.21
GMI4483050	HON1-09A	HON1-09	22.12	12.0	2225.37	2214.07	2210.08	11.30	18.04%	0.460	4.61	0.14	10.22
GMI4483049	HON1-10	HON1-09A	303.45	12.0	2228.51	2216.65	2214.07	11.86	0.85%	0.435	4.47	0.35	1.87
GMI4483025	HON1-11	HON1-10	353.00	12.0	2231.28	2218.72	2216.65	12.56	0.59%	0.400	2.72	0.31	1.51
GMI4483020	HON1-12	HON1-11	22.14	12.0	2230.96	2218.92	2218.72	12.04	0.90%	0.369	2.83	0.30	2.00
GMI4483009	HON1-18D	HON1-18C	304.01	10.0	2248.14	2235.98	2234.86	12.16	0.37%	0.132	1.71	0.25	0.80
GMI4483008	HON1-18E	HON1-18D	300.20	10.0	2246.42	2236.93	2235.98	9.49	0.32%	0.127	1.76	0.27	0.74
GMI4482992	HON1-18E1	HON1-18E	186.15	10.0	2246.62	2237.51	2236.93	9.11	0.31%	0.122	1.68	0.26	0.73
GMI4482991	HON1-18E2	HON1-18E1	150.64	10.0	2247.00	2238.06	2237.51	8.94	0.37%	0.110	1.65	0.23	0.82
GMI4482980	HON1-18E2A	HON1-18E2	303.89	10.0	2248.04	2239.09	2238.06	8.95	0.34%	0.037	0.85	0.14	0.86
GMI4482981	HON1-18E2B	HON1-18E2A	50.42	10.0	2247.98	2239.27	2239.09	8.71	0.36%	0.029	1.09	0.12	0.89
GMI4482982	HON1-18E2C	HON1-18E2B	174.09	10.0	2248.96	2239.95	2239.27	9.01	0.39%	0.023	1.03	0.11	0.94
GMI4482983	HON1-18E2D	HON1-18E2C	350.37	10.0	2248.93	2241.11	2239.95	7.82	0.33%	0.016	0.86	0.09	0.87
GMI4482984	HON1-18E2E	HON1-18E2D	215.02	10.0	2247.83	2241.57	2241.11	6.26	0.21%	0.008	0.58	0.07	0.70
GMI4482990	HON1-18E3	HON1-18E2	167.85	10.0	2245.93	2238.34	2238.06	7.59	0.17%	0.071	1.16	0.23	0.56
GMI4482989	HON1-18E4	HON1-18E3	315.37	10.0	2245.67	2239.22	2238.34	6.45	0.28%	0.060	1.15	0.18	0.75
GMI4482987	HON1-18E4A	HON1-18E4	248.10	10.0	2245.16	2239.35	2239.22	5.81	0.05%	0.028	0.61	0.20	0.32
GMI4482988	HON1-18E5	HON1-18E4	324.62	10.0	2247.58	2240.38	2239.22	7.20	0.36%	0.027	0.82	0.12	0.89
GMI4482986	HON1-18E5A	HON1-18E5	227.72	10.0	2247.66	2240.11	2240.38	7.55	-0.12%	0.014	0.17	0.45	0.51
GMI4482985	HON1-18E5B	HON1-18E5	312.70	10.0	2247.70	2241.25	2240.38	6.45	0.28%	0.007	0.49	0.07	0.80
NEW253	HUT-1	RIV1-31	74.40	18.0	2167.13	2148.37	2147.41	18.76	1.28%	0.522	1.11	1.18	7.82
NEW252	HUT-2	HUT-1	336.33	18.0	2179.89	2165.73	2148.37	14.16	5.16%	0.469	4.79	0.12	16.22

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
NEW251	HUT-3	HUT-2	90.36	18.0	2186.18	2169.82	2165.73	16.36	4.52%	0.468	6.01	0.12	15.19
NEW250	HUT-4	HUT-3	288.14	18.0	2185.67	2172.11	2169.82	13.56	0.80%	0.467	3.90	0.20	6.09
NEW249	HUT-5	HUT-4	47.44	18.0	2186.03	2172.66	2172.11	13.37	1.15%	0.466	3.26	0.16	7.45
NEW248	HUT-6	HUT-5	399.76	18.0	2192.23	2175.88	2172.66	16.35	0.81%	0.466	3.47	0.19	6.14
NEW247	HUT-7	HUT-6	399.68	18.0	2195.65	2179.22	2175.88	16.43	0.84%	0.465	3.28	0.18	6.26
NEW246	HUT-8	HUT-7	311.58	18.0	2193.99	2181.64	2179.22	12.35	0.78%	0.464	3.29	0.18	6.02
NEW347	HWK-01	RIV1-32	35.28	36.0	2159.37	2149.55	2147.50	9.82	5.79%	1.461	1.00	0.31	110.71
NEW1175011	HWK1-06	HWK1-05	285.71	10.0	2275.64	2246.44	2245.44	29.20	0.35%	0.319	2.43	0.43	0.59
NEW1175010	HWK1-07	HWK1-06	382.24	10.0	2275.56	2247.76	2246.44	27.80	0.34%	0.319	2.27	0.41	0.58
NEW1174971	HWK1-07A	HWK1-07	254.19	12.0	2277.56	2248.70	2247.76	28.86	0.37%	0.079	0.84	0.19	1.44
4535	HWK1-07A1	HWK1-07A	30.62	12.0	2276.92	2248.83	2248.76	28.09	0.22%	0.002	0.22	0.03	1.17
NEW1175009	HWK1-08	HWK1-07	198.82	10.0	2277.05	2248.45	2247.76	28.60	0.35%	0.253	2.02	0.49	0.65
NEW1175008	HWK1-09	HWK1-08	385.66	10.0	2272.38	2249.49	2248.45	22.89	0.27%	0.252	2.03	0.40	0.54
NEW1175007	HWK1-10	HWK1-09	151.07	10.0	2270.35	2250.00	2249.49	20.35	0.34%	0.252	2.06	0.36	0.68
NEW1175006	HWK1-11	HWK1-10	310.44	10.0	2272.34	2251.02	2250.00	21.32	0.33%	0.252	2.42	0.32	0.90
NEW1175005	HWK1-12	HWK1-11	313.09	10.0	2274.41	2252.32	2251.02	22.09	0.42%	0.252	1.96	0.47	0.44
NEW1175004	HWK1-13	HWK1-12	184.58	10.0	2274.46	2252.89	2252.32	21.57	0.31%	0.067	0.65	0.35	0.69
NEW391	HWK1-14	HWK1-13	391.57	10.0	2273.40	2254.25	2252.89	19.15	0.35%	0.067	1.41	0.18	0.84
NEW178	HWK1-15	HWK1-14	277.00	10.0	2274.39	2255.11	2254.25	19.28	0.31%	0.066	1.45	0.20	0.79
NEW179	HWK1-16	HWK1-15	338.89	10.0	2271.68	2256.16	2255.11	15.52	0.31%	0.065	1.41	0.19	0.79
NEW180	HWK1-17	HWK1-16	334.92	10.0	2269.02	2257.18	2256.16	11.84	0.30%	0.065	1.41	0.19	0.78
NEW181	HWK1-18	HWK1-17	92.71	10.0	2268.01	2257.58	2257.18	10.43	0.43%	0.064	1.48	0.17	0.94
NEW175	HWK1-19	HWK1-18	159.05	10.0	2268.59	2258.14	2257.58	10.45	0.36%	0.063	1.49	0.18	0.85
NEW174	HWK1-20	HWK1-19	179.75	10.0	2268.84	2258.71	2258.14	10.13	0.32%	0.061	1.40	0.18	0.80
GMI4480656	L1-01	A1-01A	226.82	15.0	2155.84	2146.92	2136.08	8.92	4.78%	2.222	8.79	0.32	7.67
GMI4482764	L1-02	L1-01	101.47	12.0	2157.87	2152.45	2146.92	5.42	5.45%	1.038	6.89	0.29	4.79
GMI4482480	L1-02A	L1-02	243.14	12.0	2166.02	2158.78	2152.45	7.24	2.60%	1.034	7.05	0.38	2.99
MSTR1175284	L1-03	L1-02A	123.82	12.0	2167.68	2162.10	2158.78	5.58	2.68%	1.019	6.23	0.34	3.07
GMI4482481	L1-04	L1-03	370.01	12.0	2178.88	2171.98	2162.10	6.90	2.67%	1.015	6.59	0.35	3.06
GMI4480718	L1-05	L1-04	263.34	12.0	2180.82	2174.83	2171.98	5.99	1.08%	1.011	5.14	0.48	1.58
GMI4480717	L1-06	L1-05	245.96	12.0	2186.78	2181.32	2174.83	5.46	2.64%	0.999	5.13	0.34	3.05
GMI4482443	L1-07	L1-06	310.36	12.0	2193.50	2188.52	2181.32	4.98	2.32%	0.652	5.03	0.28	3.15
GMI4482444	L1-08	L1-07	319.02	12.0	2201.09	2189.94	2188.52	11.15	0.45%	0.650	3.63	0.49	1.01
GMI4482445	L1-09	L1-08	292.08	12.0	2199.17	2191.24	2189.94	7.93	0.45%	0.622	2.77	0.42	1.05
GMI4482448	L1-10	L1-09	296.66	12.0	2200.29	2192.45	2191.24	7.84	0.41%	0.599	2.87	0.44	0.98
GMI4482447	L1-11	L1-10	329.51	12.0	2210.26	2205.58	2192.45	4.68	3.98%	0.597	4.00	0.23	4.38

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GMI4482446	L1-12	L1-11	348.30	12.0	2215.11	2207.09	2205.58	8.02	0.43%	0.594	3.67	0.48	1.05
GMI4482402	L1-13	L1-12	351.75	12.0	2218.36	2207.90	2207.09	10.46	0.23%	0.592	2.35	0.52	0.61
GMI4482401	L1-14	L1-13	282.35	12.0	2219.82	2208.66	2207.90	11.16	0.27%	0.589	2.35	0.47	0.71
GMI4483768	L1-15	L1-14	144.80	12.0	2220.26	2209.38	2208.66	10.88	0.50%	0.582	2.75	0.40	1.18
GMI4483767	L1-16	L1-15	334.34	12.0	2220.82	2210.18	2209.38	10.64	0.24%	0.579	2.51	0.53	0.64
GMI4481914	L1-17	L1-16	327.89	12.0	2221.11	2211.02	2210.18	10.09	0.26%	0.562	2.23	0.47	0.70
GMI4481913	L1-18	L1-17	329.33	12.0	2221.97	2211.48	2211.02	10.49	0.14%	0.518	1.95	0.57	0.41
GMI4481912	L1-19	L1-18	331.22	12.0	2221.91	2212.37	2211.48	9.54	0.27%	0.468	1.89	0.42	0.83
GMI4481889	L1-20	L1-19	314.78	12.0	2221.73	2213.01	2212.37	8.72	0.20%	0.424	2.05	0.44	0.70
GMI4481890	L1-21	L1-20	323.59	12.0	2222.71	2213.84	2213.01	8.87	0.26%	0.328	1.77	0.35	0.94
GMI4481880	L1-22	L1-21	280.24	12.0	2221.81	2214.52	2213.84	7.29	0.24%	0.314	1.99	0.35	0.92
GMI4480767	L1-23	L1-22	253.83	10.0	2223.06	2215.88	2214.52	7.18	0.54%	0.287	2.31	0.34	0.84
GMI4480721	L1-24	L1-23	305.18	10.0	2225.92	2216.46	2215.88	9.46	0.19%	0.278	1.95	0.51	0.39
GMI4483802	L1-24A	L1-24	17.53	10.0	2225.92	2216.51	2216.46	9.41	0.26%	0.270	1.52	0.50	0.52
GMI4480720	L1-24C	L1-24A	174.04	10.0	2225.27	2216.84	2216.51	8.43	0.19%	0.252	1.58	0.42	0.42
GMI4480719	L1-24D	L1-24C	225.15	10.0	2223.47	2217.27	2216.84	6.20	0.19%	0.243	1.71	0.42	0.43
GMI4482298	L1-24E	L1-24D	142.17	10.0	2224.51	2217.77	2217.27	6.74	0.35%	0.085	0.95	0.21	0.82
GMI4484069	L1-24E1	L1-24E	153.48	10.0	2225.35	2219.56	2217.77	5.79	1.16%	0.074	1.78	0.52	1.58
GMI4481266	L1-24H	L1-24D	396.61	10.0	2225.59	2218.39	2217.27	7.20	0.28%	0.128	1.19	0.27	0.69
GMI4482301	L1-24I	L1-24H	102.12	10.0	2226.58	2218.80	2218.39	7.78	0.40%	0.055	0.99	0.16	0.92
GMI4482300	L1-24O	L1-24I	299.00	10.0	2227.91	2219.59	2218.80	8.32	0.26%	0.033	1.00	0.14	0.76
NEW06162016	L1-24P	L1-24O	404.88	10.0	2227.91	2219.59	2218.80	8.32	0.20%	0.023	0.44	0.27	0.00
GMI4483572	M1-01	FG1-14	74.73	36.0	2136.10	2128.09	2128.11	8.01	-0.03%	9.742	3.08	0.69	-2.10
GMI4480478	M1-02	M1-01	419.73	36.0	2137.23	2128.44	2128.09	8.79	0.08%	9.744	2.91	0.69	3.74
GMI4480479	M1-03	M1-02	185.65	36.0	2138.35	2128.58	2128.44	9.77	0.08%	9.747	2.87	0.71	3.08
GMI4480480	M1-04	M1-03	115.27	36.0	2137.96	2128.74	2128.58	9.22	0.14%	9.618	2.80	0.70	7.78
GMI4480481	M1-05	M1-04	105.81	30.0	2138.72	2128.95	2128.74	9.77	0.20%	9.563	3.35	0.84	3.23
GMI4480483	M1-07	M1-05	841.83	30.0	2136.94	2130.07	2128.95	6.87	0.13%	9.572	3.43	0.80	0.90
GMI4480429	M1-08	M1-07	679.66	30.0	2138.84	2131.77	2130.07	7.07	0.25%	9.596	4.07	0.60	4.77
GMI4480428	M1-09	M1-08	431.24	30.0	2163.61	2132.56	2131.77	31.05	0.18%	9.600	4.35	0.73	2.69
GMI4480525	M1-10	M1-09	150.37	30.0	2165.43	2132.83	2132.56	32.60	0.18%	9.558	3.82	0.76	2.61
GMI4480524	M1-11	M1-10	227.88	30.0	2156.97	2133.27	2132.83	23.70	0.19%	9.516	3.71	0.75	3.10
GMI4480519	M1-11A	M1-11	176.63	30.0	2151.39	2133.49	2133.27	17.90	0.13%	9.516	3.59	0.81	0.64
NEW032316A	M1-11B	M1-11A	12.53	24.0	2151.30	2136.00	2133.49	15.30	19.98%	4.256	3.89	0.13	107.32
SPLIT032316	M1-12	M1-11A	52.50	30.0	2150.84	2133.54	2133.49	17.30	0.09%	6.310	2.43	0.81	2.46
GMI4480510	M1-13	M1-12	383.39	30.0	2149.13	2133.95	2133.54	15.18	0.11%	6.317	2.51	0.73	3.08

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4480508	M1-14	M1-13	347.75	30.0	2140.50	2134.66	2133.95	5.84	0.20%	6.327	3.07	0.56	6.65
GMI4480507	M1-15	M1-14	447.04	24.0	2161.95	2136.18	2134.66	25.77	0.34%	6.336	4.50	0.62	2.90
GMI4480513	M1-16	M1-15	558.58	30.0	2142.76	2136.94	2136.18	5.82	0.14%	6.317	3.59	0.59	4.30
GMI4480506	M1-17	M1-16	433.85	24.0	2144.03	2137.30	2136.94	6.73	0.08%	6.315	3.41	0.98	-1.77
GMI4480501	M1-18	M1-17	587.80	24.0	2152.33	2138.16	2137.30	14.17	0.15%	6.294	3.11	1.03	-0.24
GMI4480490	M1-19	M1-18	194.43	24.0	2140.80	2137.96	2138.16	2.84	-0.10%	6.305	3.11	1.34	-1.22
GMI4480489	M1-20	M1-19	321.81	24.0	2144.42	2138.33	2137.96	6.09	0.11%	6.295	3.10	1.28	1.23
GMI4480488	M1-20A	M1-20	59.25	24.0	2151.15	2138.59	2138.33	12.56	0.44%	6.320	3.11	1.42	0.06
GMI4480487	M1-20B	M1-20A	374.70	24.0	2163.70	2140.30	2138.59	23.40	0.46%	6.290	3.57	0.83	4.41
GMI4480545	M1-20C	M1-20B	427.11	24.0	2158.37	2141.31	2140.30	17.06	0.24%	6.425	4.43	0.75	1.28
GMI4480570	M1-21	M1-20C	173.98	24.0	2157.47	2141.45	2141.31	16.02	0.08%	6.365	3.56	0.91	-1.84
GMI4480574	M1-23	M1-22	298.04	24.0	2156.21	2145.61	2141.73	10.60	1.30%	3.437	2.97	0.30	14.64
GMI4480543	M1-24	M1-23	303.69	24.0	2158.88	2148.82	2145.61	10.06	1.06%	3.384	6.27	0.33	12.90
GMI4480404	M1-25	M1-24	298.93	24.0	2162.37	2151.31	2148.82	11.06	0.83%	3.221	5.51	0.33	11.24
GMI4482799	M1-26	M1-25	155.77	24.0	2164.40	2152.98	2151.31	11.42	1.07%	3.159	5.67	0.31	13.24
GMI4482801	M1-26AW	M1-25	359.80	10.0	2162.24	2153.64	2151.31	8.60	0.65%	0.132	0.92	0.22	1.10
GMI4482802	M1-26BW	M1-26AW	359.90	10.0	2163.36	2154.54	2153.64	8.82	0.25%	0.129	1.75	0.30	0.64
GMI4482803	M1-26CW	M1-26BW	359.81	10.0	2164.73	2156.57	2154.54	8.16	0.56%	0.125	1.71	0.22	1.03
GMI4482800	M1-27	M1-26	142.65	24.0	2165.07	2154.75	2152.98	10.32	1.24%	1.585	3.91	0.20	16.06
GMI4483654	M1-28	M1-27	149.00	18.0	2167.68	2157.11	2154.75	10.57	1.58%	1.519	5.80	0.29	7.74
GMI4482551	M1-28A	M1-27	359.43	10.0	2164.48	2156.96	2154.75	7.52	0.61%	0.076	0.91	0.17	1.13
GMI4482552	M1-28B	M1-28A	359.41	10.0	2165.50	2158.36	2156.96	7.14	0.39%	0.070	1.64	0.19	0.89
GMI4483778	M1-29	M1-28	331.39	18.0	2165.28	2157.64	2157.11	7.64	0.16%	1.513	3.20	0.57	1.42
GMI4483777	M1-30	M1-29	37.97	18.0	2165.25	2157.70	2157.64	7.55	0.16%	1.514	2.19	0.59	1.51
GMI4482548	M1-31	M1-30	367.95	18.0	2167.66	2158.12	2157.70	9.54	0.12%	1.516	2.18	0.59	0.98
GMI4482549	M1-32	M1-31	362.11	18.0	2166.02	2158.92	2158.12	7.10	0.22%	1.522	2.66	0.42	2.55
GMI4482550	M1-33	M1-32	349.38	18.0	2167.70	2159.52	2158.92	8.18	0.17%	1.524	2.80	0.54	1.52
GMI4482052	M1-34	M1-33	350.67	18.0	2167.51	2160.40	2159.52	7.11	0.25%	1.526	2.56	0.49	1.66
GMI4482051	M1-35	M1-34	148.15	18.0	2167.18	2160.58	2160.49	6.60	0.06%	1.525	2.33	0.62	0.26
GMI4482774	M1-36	M1-35	302.74	18.0	2168.43	2161.53	2160.58	6.90	0.31%	1.492	2.50	0.42	2.64
GMI4482780	M1-37	M1-36	46.59	18.0	2168.84	2161.56	2161.53	7.28	0.06%	1.484	2.73	0.55	0.38
GMI4482781	M1-38	M1-37	252.80	18.0	2171.05	2162.87	2161.56	8.18	0.52%	1.476	2.93	0.36	3.82
GMI4482782	M1-39	M1-38	151.86	18.0	2172.12	2163.12	2162.87	9.00	0.16%	1.472	2.98	0.53	1.51
GMI4482127	M1-40	M1-39	241.18	18.0	2173.86	2164.56	2163.12	9.30	0.60%	1.466	3.04	0.35	4.22
GMI4482128	M1-41	M1-40	302.74	18.0	2175.57	2165.79	2164.56	9.78	0.41%	1.457	3.72	0.40	3.23
GMI4482129	M1-42	M1-41	298.75	18.0	2177.49	2167.01	2165.79	10.48	0.41%	1.448	3.45	0.39	3.25

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GMI4482125	M1-43	M1-42	207.25	18.0	2176.28	2167.26	2167.01	9.02	0.12%	1.387	2.63	0.55	1.16
GMI4482126	M1-44	M1-43	218.16	18.0	2179.00	2169.10	2167.26	9.90	0.84%	1.387	2.96	0.31	5.37
GMI4482470	M1-45	M1-44	300.42	18.0	2179.27	2170.47	2169.10	8.80	0.46%	1.383	3.93	0.39	3.58
GMI4482469	M1-46	M1-45	295.39	18.0	2180.72	2171.52	2170.47	9.20	0.36%	1.376	3.31	0.40	3.01
GMI4482468	M1-47	M1-46	139.27	18.0	2181.91	2172.01	2171.52	9.90	0.35%	1.361	3.16	0.41	3.00
GMI4482467	M1-48	M1-47	197.80	18.0	2180.76	2172.92	2172.01	7.84	0.46%	1.360	3.38	0.36	3.63
GMI4482466	M1-49	M1-48	163.18	18.0	2181.81	2173.91	2172.92	7.90	0.61%	1.358	3.81	0.34	4.37
GMI4482424	M1-50	M1-49	330.09	18.0	2183.53	2175.81	2173.91	7.72	0.58%	1.350	3.92	0.34	4.23
GMI4482425	M1-51	M1-50	329.35	18.0	2186.84	2178.38	2175.81	8.46	0.78%	1.344	4.17	0.31	5.15
GMI4482421	M1-52	M1-51	166.19	18.0	2189.83	2179.69	2178.38	10.14	0.79%	1.316	4.30	0.32	5.21
GMI4481303	M1-53	M1-52	332.02	18.0	2191.68	2182.28	2179.69	9.40	0.78%	1.314	4.29	0.31	5.18
GMI4779199	M1-54	M1-53	167.61	15.0	2192.58	2183.51	2182.28	9.07	0.73%	1.313	4.40	0.43	2.56
GMI4482153	M1-55	M1-54	178.43	15.0	2205.25	2196.67	2183.51	8.58	7.38%	1.157	5.28	0.21	11.14
GMI4482154	M1-56	M1-55	280.41	15.0	2208.24	2200.29	2196.67	7.95	1.29%	1.142	5.99	0.37	4.00
GMI4482376	M1-57	M1-56	280.71	15.0	2211.93	2203.63	2200.29	8.30	1.19%	1.141	4.62	0.33	3.79
GMI4482377	M1-58	M1-57	275.17	15.0	2213.61	2204.01	2203.63	9.60	0.14%	1.140	2.88	0.67	0.54
GMI4482378	M1-59	M1-58	343.72	12.0	2214.71	2205.53	2204.01	9.18	0.44%	0.153	0.72	0.21	1.51
GMI4483624	M1-59A	M1-59	206.84	12.0	2215.24	2205.91	2205.53	9.33	0.18%	0.134	1.50	0.26	0.93
GMI4483626	M1-60	M1-59A	143.19	12.0	2215.77	2206.18	2205.91	9.59	0.19%	0.117	1.25	0.22	0.97
GMI4482390	M1-61	M1-60	181.84	12.0	2215.87	2206.51	2206.18	9.36	0.18%	0.106	1.30	0.21	0.96
GMI4779198	M1-62	M1-61	223.08	12.0	2216.40	2207.00	2206.51	9.40	0.22%	0.084	1.18	0.18	1.09
GMI4779197	M1-63	M1-62	315.65	12.0	2215.36	2207.76	2207.00	7.60	0.24%	0.081	1.33	0.17	1.14
GMI4779196	M1-64	M1-63	280.43	12.0	2216.23	2208.39	2207.76	7.84	0.22%	0.053	1.03	0.15	1.13
GMI4779195	M1-65	M1-64	271.83	12.0	2217.15	2210.57	2208.39	6.58	0.80%	0.033	1.03	0.09	2.20
GMI4779212	M2-01	M2-01AA	171.09	12.0	2147.23	2140.39	2139.35	6.84	0.61%	0.135	1.20	0.73	1.90
GMI4779211	M2-01AA	M1-20	174.67	12.0	2145.27	2139.35	2138.33	5.92	0.58%	0.139	0.83	1.88	1.40
GMI4779210	M2-02	M2-01	255.40	12.0	2151.67	2141.00	2140.39	10.67	0.24%	0.064	1.26	0.22	1.06
GMI4779209	M2-03	M2-02	143.19	12.0	2145.88	2141.02	2141.00	4.86	0.01%	0.051	0.95	0.15	1.02
GMI4483580	M2-09	M2-09A	294.58	21.0	2155.85	2145.75	2145.23	10.10	0.18%	3.334	3.14	0.67	1.31
NEW1175186	M2-09A	M2-09B	303.47	21.0	2155.13	2145.23	2144.54	9.90	0.23%	3.331	3.78	0.63	1.99
NEW414	M2-09D	M2-05	161.76	12.0	2150.70	2142.91	2142.22	7.79	0.43%	0.004	0.80	0.22	1.62
GMI4480555	M2-10	M2-09	64.10	18.0	2155.93	2145.81	2145.75	10.12	0.09%	3.348	3.26	0.92	-1.10
GMI4483581	M2-12	M2-10	301.19	18.0	2156.64	2146.88	2145.81	9.76	0.36%	2.201	2.62	0.50	2.18
GMI4483582	M2-13	M2-12	309.93	18.0	2157.73	2147.79	2146.88	9.94	0.29%	2.206	3.55	0.57	1.78
GMI4483587	M2-13A	M2-13	19.52	18.0	2157.61	2147.81	2147.79	9.80	0.12%	0.928	1.66	0.57	1.60
GMI4483422	M2-13B	M2-13A	158.10	18.0	2158.50	2148.00	2147.81	10.50	0.12%	0.476	0.94	0.45	2.07

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GMI4483423	M2-13C	M2-13B	147.26	18.0	2156.90	2148.18	2148.00	8.72	0.12%	0.442	1.23	0.36	2.10
GMI4483585	M2-13D	M2-13C	297.95	18.0	2159.20	2149.77	2148.18	9.43	0.53%	0.419	1.83	0.19	4.96
GMI4483424	M2-13E	M2-13D	254.26	18.0	2160.10	2150.07	2149.77	10.03	0.12%	0.418	1.89	0.31	2.12
GMI4483583	M2-13F	M2-13E	35.30	18.0	2160.10	2150.12	2150.07	9.99	0.12%	0.414	1.38	0.31	2.12
GMI4480560	M2-14	M2-13A	15.55	10.0	2157.38	2147.96	2147.81	9.42	0.95%	0.675	2.32	0.89	0.82
GMI4483425	M2-18	M2-13F	167.69	18.0	2160.42	2151.18	2150.12	9.24	0.64%	0.413	1.91	0.18	5.45
GMI4480563	M2-19	M2-18	21.23	18.0	2160.35	2151.33	2151.18	9.02	0.71%	0.411	2.68	0.20	5.77
GMI4480561	M2-20	M2-19	146.02	10.0	2160.20	2151.60	2151.33	8.60	0.18%	0.049	0.69	0.18	0.61
GMI4480405	M2-21	M2-20	141.58	10.0	2159.09	2151.93	2151.60	7.16	0.23%	0.045	1.09	0.17	0.70
GMI4482062	M2-22	M2-21	159.04	10.0	2159.09	2152.87	2151.93	6.22	0.59%	0.042	1.29	0.13	1.14
GMI4482061	M2-23	M2-22	170.37	10.0	2157.81	2152.95	2152.87	4.86	0.05%	0.024	0.65	0.20	0.31
GMI4482063	M2-24	M2-23	253.55	10.0	2162.53	2153.99	2152.95	8.54	0.41%	0.021	0.64	0.10	0.96
GMI4482050	M3-01	M1-26	359.86	15.0	2166.67	2155.47	2152.98	11.20	0.69%	1.576	4.33	0.46	2.19
GMI4482049	M3-02	M3-01	360.02	15.0	2165.58	2156.47	2155.47	9.11	0.28%	1.573	3.46	0.92	0.81
GMI4482524	M3-03	M3-02	359.75	15.0	2169.43	2160.31	2156.47	9.12	1.07%	1.535	3.63	0.39	3.14
GMI4482525	M3-04	M3-03	365.80	15.0	2173.76	2160.88	2160.31	12.88	0.16%	1.532	3.08	0.81	0.25
GMI4482526	M3-05	M3-04	349.50	15.0	2173.16	2161.54	2160.88	11.62	0.19%	1.529	2.41	0.69	0.44
GMI4482520	M3-06	M3-05	392.84	15.0	2170.64	2161.90	2161.54	8.74	0.09%	1.527	2.32	0.87	-0.16
GMI4482509	M3-07	M3-06	328.60	15.0	2172.29	2162.47	2161.90	9.82	0.17%	1.519	2.24	0.74	0.36
GMI4482507	M3-08	M3-07	330.19	15.0	2170.52	2162.88	2162.47	7.64	0.12%	1.514	2.35	0.80	0.08
GMI4482505	M3-09	M3-08	371.24	15.0	2172.24	2163.38	2162.88	8.86	0.13%	1.510	2.26	0.79	0.15
GMI4482504	M3-10	M3-09	306.48	15.0	2174.37	2163.99	2163.38	10.38	0.20%	1.510	2.47	0.67	0.51
GMI4483819	M3-10A	M3-10	9.22	15.0	2174.38	2164.27	2163.99	10.11	3.06%	1.500	4.00	0.30	6.41
GMI4483818	M3-11	M3-10A	330.47	15.0	2174.00	2164.56	2164.27	9.44	0.09%	1.491	2.98	0.91	-0.16
GMI4482455	M3-12	M3-11	344.48	15.0	2175.07	2164.93	2164.56	10.14	0.11%	1.487	1.97	0.90	-0.01
GMI4482002	M3-13	M3-12	327.45	15.0	2175.41	2166.04	2164.93	9.38	0.34%	1.483	2.51	0.54	1.15
GMI4482003	M3-14	M3-13	355.04	15.0	2176.44	2166.57	2166.04	9.87	0.15%	1.292	2.56	0.69	0.46
GMI4482004	M3-15	M3-14	51.69	15.0	2176.67	2167.14	2166.57	9.53	1.09%	1.288	3.09	0.36	3.45
GMI4483729	M3-16	M3-15	239.86	15.0	2178.58	2167.99	2167.14	10.60	0.35%	1.268	3.72	0.53	1.42
GMI4483647	M3-17	M3-16	209.72	15.0	2179.70	2168.73	2167.99	10.97	0.35%	1.266	3.10	0.49	1.43
GMI4481301	M3-18	M3-17	355.66	12.0	2177.48	2169.64	2168.73	7.84	0.26%	1.259	3.02	0.91	0.00
GMI4482419	M3-19	M3-18	324.82	12.0	2178.82	2170.28	2169.64	8.54	0.20%	1.238	2.48	1.03	-0.13
GMI4480781	M3-20	M3-19	324.34	12.0	2181.15	2171.50	2170.28	9.65	0.38%	1.199	2.69	0.67	0.33
GMI4480780	M3-21	M3-20	184.93	12.0	2180.75	2171.59	2171.50	9.16	0.05%	1.193	2.64	1.13	-0.64
GMI4482357	M3-22	M3-21	187.29	12.0	2181.28	2172.32	2171.59	8.96	0.39%	1.172	2.44	0.79	0.39
GMI4482358	M3-23	M3-22	180.34	12.0	2182.35	2172.55	2172.32	9.80	0.13%	1.155	2.55	0.99	-0.27

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482359	M3-24	M3-23	140.40	12.0	2181.89	2172.63	2172.55	9.26	0.06%	1.152	2.27	1.25	-0.56
GMI4482360	M3-25	M3-24	300.63	12.0	2182.05	2173.33	2172.63	8.72	0.23%	1.146	2.26	1.23	0.06
GMI4482361	M3-26	M3-25	149.80	12.0	2182.85	2174.15	2173.33	8.70	0.55%	1.144	3.08	0.71	0.70
GMI4482363	M3-27	M3-26	149.17	12.0	2183.49	2175.17	2174.15	8.32	0.68%	1.155	3.85	0.55	0.91
GMI4481288	M3-27A	M3-27	148.10	12.0	2184.72	2176.01	2175.17	8.70	0.57%	1.146	3.83	0.87	0.74
GMI4481287	M3-28	M3-27A	151.00	12.0	2183.88	2176.74	2176.01	7.14	0.48%	1.139	3.46	0.63	0.59
GMI4482362	M3-29	M3-28	152.09	12.0	2184.40	2177.10	2176.74	7.30	0.24%	1.136	2.89	0.82	0.08
NEW415	M3-30	M3-29	352.55	12.0	2187.00	2178.00	2177.10	9.00	0.26%	1.124	2.64	0.75	0.14
GMI4483645	M3-31	M3-30	255.00	12.0	2190.49	2179.99	2178.00	10.50	0.78%	1.113	3.37	0.50	1.09
GMI4480670	M3-32	M3-32A	351.35	12.0	2187.44	2181.93	2180.40	5.51	0.44%	1.080	3.21	0.59	0.57
GMI4480671	M3-32A	M3-31	93.80	12.0	2189.61	2180.40	2179.99	9.21	0.44%	1.083	3.50	0.67	0.57
GMI4480696	M3-33	M3-32	403.89	12.0	2192.31	2183.20	2181.93	9.11	0.31%	0.970	2.96	0.64	0.43
GMI4480716	M3-34	M3-33	461.69	10.0	2207.15	2197.45	2183.20	9.70	3.09%	0.971	4.51	0.42	1.72
GMI4481790	M3-34A	M3-34	239.25	10.0	2209.43	2198.12	2197.45	11.31	0.28%	0.266	2.00	0.40	0.55
GMI4481789	M3-34B	M3-34A	231.33	10.0	2209.22	2198.89	2198.12	10.33	0.33%	0.258	2.08	0.37	0.63
GMI4480639	M3-34C	M3-34B	384.94	10.0	2209.80	2200.16	2198.89	9.64	0.33%	0.252	2.13	0.37	0.63
GMI4482285	M3-34C1	M3-34C	147.57	10.0	2206.13	2200.55	2200.16	5.58	0.26%	0.234	1.92	0.39	0.55
GMI4482286	M3-34C2	M3-34C1	142.58	10.0	2207.23	2201.12	2200.55	6.11	0.40%	0.225	1.99	0.33	0.75
GMI4482287	M3-34C4	M3-34C2	238.00	10.0	2208.95	2201.76	2201.12	7.19	0.27%	0.208	1.92	0.37	0.59
GMI4481793	M3-35	M3-34	236.67	10.0	2208.76	2200.09	2197.45	8.67	1.12%	0.707	4.57	0.49	0.91
GMI4481794	M3-36	M3-35	228.41	10.0	2211.32	2202.17	2200.09	9.15	0.91%	0.704	4.03	0.50	0.76
GMI4481792	M3-37	M3-36	475.98	10.0	2218.29	2209.21	2202.17	9.08	1.48%	0.647	4.16	0.41	1.22
GMI4480772	M3-38	M3-37	165.33	10.0	2221.54	2210.54	2209.21	11.00	0.80%	0.627	3.96	0.52	0.75
GMI4480773	M3-39	M3-38	207.43	10.0	2220.91	2211.61	2210.54	9.30	0.52%	0.624	3.22	0.56	0.48
GMI4480700	M3-40	M3-39	203.52	10.0	2222.20	2213.14	2211.61	9.06	0.75%	0.511	2.92	0.43	0.82
GMI4480701	M3-41	M3-40	163.82	10.0	2223.17	2213.39	2213.14	9.78	0.15%	0.503	2.32	0.75	0.10
GMI4481773	M3-41A	M3-41	16.94	10.0	2223.42	2214.09	2213.39	9.33	4.13%	0.391	2.24	0.24	2.73
GMI4481775	M3-41B	M3-41A	182.79	10.0	2227.30	2214.70	2214.09	12.60	0.33%	0.381	3.30	0.49	0.65
GMI4481774	M3-42	M3-41	197.87	10.0	2227.36	2218.00	2213.39	9.36	2.33%	0.119	0.88	0.15	2.26
GMI4482271	M3-44	M3-43	338.04	10.0	2233.69	2223.49	2222.59	10.20	0.27%	0.103	1.66	0.26	0.69
GMI4482270	M3-45	M3-44	287.91	10.0	2232.82	2224.48	2223.49	8.34	0.34%	0.081	1.31	0.20	0.82
GMI4481749	M3-46	M3-45	385.66	10.0	2230.92	2225.48	2224.48	5.44	0.26%	0.061	1.26	0.19	0.72
GMI4482384	M4-01	M1-58	299.04	15.0	2213.95	2204.99	2204.01	8.96	0.33%	1.004	2.25	0.43	1.59
GMI4482383	M4-02	M4-01	305.91	15.0	2215.61	2205.05	2204.99	10.56	0.02%	1.001	2.03	0.76	-0.37
GMI4482382	M4-03	M4-02	123.89	15.0	2216.26	2205.34	2205.05	10.92	0.23%	0.997	1.73	0.60	1.19
GMI4482381	M4-04	M4-03	167.57	15.0	2216.59	2205.52	2205.34	11.08	0.11%	0.995	1.96	0.63	0.49

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4482380	M4-04A	M4-04	165.40	15.0	2214.59	2205.83	2205.52	8.76	0.19%	0.991	2.08	0.54	0.98
NEW1175063	M4-05	M4-04A	138.00	15.0	2213.61	2205.89	2205.83	7.72	0.04%	0.987	1.98	0.66	-0.07
GMI4482379	M4-06	M4-05	239.12	15.0	2216.23	2206.17	2205.89	10.06	0.12%	0.982	1.83	0.62	0.57
GMI4482315	M4-07	M4-06	361.37	15.0	2212.70	2206.44	2206.17	6.26	0.07%	0.876	1.68	0.64	0.36
GMI4482314	M4-08	M4-07	353.75	15.0	2213.28	2207.08	2206.44	6.20	0.18%	0.791	1.83	0.45	1.13
GMI4482316	M4-09	M4-08	184.22	12.0	2215.74	2209.22	2207.08	6.52	1.16%	0.466	2.39	0.28	2.22
GMI4482305	M4-09AN	M4-08	349.64	12.0	2219.07	2210.69	2207.08	8.38	1.03%	0.308	1.64	0.24	2.23
GMI4481873	M4-09BN	M4-09AN	362.54	12.0	2217.98	2211.26	2210.69	6.72	0.16%	0.301	1.98	0.44	0.69
GMI4481876	M4-09CN	M4-09BN	473.16	12.0	2219.10	2212.31	2211.26	6.79	0.22%	0.282	1.57	0.33	0.89
GMI4481812	M4-09DN	M4-09CN	301.71	12.0	2221.29	2213.05	2212.31	8.24	0.25%	0.239	1.75	0.30	1.00
GMI4481813	M4-09EN	M4-09DN	305.54	12.0	2225.32	2213.66	2213.05	11.66	0.20%	0.207	1.68	0.29	0.96
GMI4481814	M4-09EN1	M4-09EN	170.25	12.0	2223.85	2214.10	2213.66	9.75	0.26%	0.059	0.76	0.15	1.12
GMI4482317	M4-10	M4-09	359.13	12.0	2219.59	2210.77	2209.22	8.82	0.43%	0.421	2.96	0.37	1.22
GMI4482326	M4-11	M4-10	181.26	12.0	2219.90	2211.34	2210.77	8.56	0.31%	0.179	1.37	0.24	1.22
GMI4482324	M4-12	M4-11	290.51	12.0	2220.86	2211.68	2211.34	9.18	0.12%	0.131	1.24	0.28	0.72
GMI4482048	M6-02	M6-01	100.57	12.0	2167.77	2160.97	2159.91	6.80	1.05%	0.062	1.97	0.11	2.50
GMI4482530	M6-03	M6-02	324.34	12.0	2171.18	2163.06	2160.97	8.12	0.64%	0.059	1.84	0.12	1.94
GMI4482531	M6-04	M6-03	331.15	12.0	2175.61	2163.91	2163.06	11.70	0.26%	0.056	1.33	0.15	1.21
GMI4482529	M6-05	M6-04	305.56	12.0	2175.78	2164.40	2163.91	11.38	0.16%	0.039	0.87	0.14	0.96
GMI4482519	M6-05AN	M6-05	252.75	12.0	2174.30	2164.94	2164.40	9.36	0.21%	0.036	0.95	0.12	1.12
GMI4482502	M6-05BN	M6-05AN	334.64	12.0	2173.32	2165.76	2164.94	7.56	0.25%	0.033	0.99	0.11	1.20
GMI4482503	M6-05CN	M6-05BN	325.87	12.0	2172.28	2166.36	2165.76	5.92	0.18%	0.030	0.93	0.12	1.04
GMI4480562	M7-01	M2-19	54.94	10.0	2160.02	2152.02	2151.33	8.00	1.26%	0.336	3.26	0.30	1.38
NEW107	M7-01A	STOR_44	37.53	12.0	2137.84	2126.65	2126.55	11.19	0.26%	0.053	1.32	0.52	1.22
GMI4483118	M7-01B	M7-01A	30.76	12.0	2137.89	2126.72	2126.28	11.17	1.43%	0.036	0.36	0.08	2.95
GMI4779338	MIL1-01	STOR_10	263.35	10.0	2131.91	2108.66	2107.85	23.25	0.31%	0.190	2.03	0.34	0.66
GMI4779343	MIL1-01A	MIL1-01	90.82	10.0	2131.59	2108.84	2108.66	22.75	0.20%	0.104	1.22	0.26	0.58
GMI4779342	MIL1-01B	MIL1-01A	360.49	10.0	2130.71	2110.16	2108.84	20.55	0.37%	0.102	1.54	0.23	0.83
GMI4779341	MIL1-01C	MIL1-01B	349.55	10.0	2130.82	2111.27	2110.16	19.55	0.32%	0.101	1.65	0.24	0.76
NEW1175046	MIL1-01CO	MIL1-01E	92.70	10.0	2131.29	2113.53	2113.25	17.76	0.30%	0.002	0.10	0.03	0.86
GMI4779340	MIL1-01D	MIL1-01C	349.93	10.0	2131.00	2112.38	2111.27	18.62	0.32%	0.098	1.59	0.26	0.77
GMI4779339	MIL1-01E	MIL1-01D	272.97	10.0	2131.29	2113.25	2112.38	18.04	0.32%	0.096	1.63	0.22	0.81
GMI4481189	RAM1-01	AEXT2-08	298.83	24.0	2184.45	2169.32	2168.41	15.13	0.30%	3.633	4.51	0.50	5.11
GMI4482261	RAM1-02	RAM1-01	366.23	24.0	2184.43	2170.53	2169.32	13.90	0.33%	3.630	3.87	0.44	5.48
GMI4482262	RAM1-03	RAM1-02	276.22	24.0	2185.93	2171.38	2170.53	14.55	0.31%	3.629	3.98	0.48	5.16
GMI4483808	RAM1-04	RAM1-03	398.54	24.0	2185.57	2171.67	2171.38	13.90	0.07%	3.573	2.93	0.68	0.70

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483807	RAM1-05	RAM1-04	280.95	24.0	2186.24	2173.53	2171.67	12.71	0.66%	3.573	3.35	0.36	9.32
GMI4481702	RAM1-06	RAM1-05	380.75	24.0	2186.32	2174.83	2173.53	11.49	0.34%	3.573	4.51	0.47	5.68
GMI4481677	RAM1-07	RAM1-06	395.40	24.0	2187.72	2175.63	2174.83	12.09	0.20%	3.574	3.51	0.54	3.55
GMI4481676	RAM1-08	RAM1-07	406.01	24.0	2190.86	2176.71	2175.63	14.15	0.27%	3.574	3.53	0.46	4.60
GMI4481675	RAM1-09	RAM1-08	288.41	24.0	2192.80	2179.87	2176.71	12.93	1.10%	3.574	4.89	0.32	13.01
GMI4481674	RAM1-10	RAM1-09	405.80	24.0	2203.95	2181.12	2179.87	22.83	0.31%	3.546	4.63	0.49	5.25
GMI4481661	RAM1-11	RAM1-10	370.82	18.0	2196.99	2182.33	2181.12	14.66	0.33%	2.312	3.34	0.53	1.89
GMI4481660	RAM1-12	RAM1-11	275.97	18.0	2191.11	2183.11	2182.33	8.00	0.28%	2.312	3.51	0.59	1.60
GMI4481659	RAM1-13	RAM1-12	161.17	18.0	2198.99	2183.74	2183.11	15.25	0.39%	2.312	3.52	0.52	2.29
GMI4481658	RAM1-14	RAM1-13	364.87	18.0	2197.26	2184.96	2183.74	12.30	0.33%	2.311	3.70	0.55	1.94
GMI4481656	RAM1-15	RAM1-14	400.68	18.0	2194.28	2185.82	2184.96	8.46	0.21%	2.291	3.23	0.64	1.12
GMI4481655	RAM1-15A	RAM1-15	263.90	18.0	2193.36	2186.54	2185.82	6.82	0.27%	2.291	3.16	0.57	1.56
MSTR1175352	RAM1-16	RAM1-15A	136.62	18.0	2193.52	2186.86	2186.54	6.66	0.23%	2.290	3.18	0.64	1.25
GMI4481654	RAM1-17	RAM1-16	180.61	18.0	2194.53	2187.53	2186.86	7.00	0.37%	2.290	3.35	0.52	2.19
GMI4481653	RAM1-18	RAM1-17	370.91	18.0	2194.61	2188.47	2187.53	6.14	0.25%	2.289	3.45	0.61	1.41
GMI4481649	RAM1-19	RAM1-18	400.37	18.0	2195.91	2189.47	2188.47	6.44	0.25%	2.270	3.20	0.58	1.41
GMI4481648	RAM1-20	RAM1-19	156.35	21.0	2203.84	2189.84	2189.47	14.00	0.24%	2.270	2.98	0.49	3.13
GMI4480758	RAM1-21	RAM1-20	308.96	21.0	2206.86	2190.53	2189.84	16.33	0.22%	2.223	3.02	0.47	3.01
GMI4480759	RAM1-21A	RAM1-21	368.94	18.0	2204.51	2191.35	2190.53	13.17	0.22%	2.223	3.21	0.62	1.24
GMI4482229	RAM1-22	RAM1-21A	29.12	18.0	2203.74	2191.41	2191.35	12.33	0.22%	2.222	2.84	0.67	1.25
GMI4482230	RAM1-23	RAM1-22	251.00	18.0	2203.46	2192.06	2191.41	11.40	0.26%	1.750	2.56	0.48	1.99
GMI4482232	RAM1-23A	RAM1-23	119.78	18.0	2203.74	2192.44	2192.06	11.30	0.32%	1.732	3.15	0.49	2.41
GMI4482231	RAM1-24	RAM1-23A	333.22	18.0	2204.67	2193.51	2192.44	11.16	0.32%	1.731	3.27	0.45	2.44
GMI4482225	RAM1-25	RAM1-24	328.68	18.0	2204.99	2194.45	2193.51	10.54	0.29%	1.731	3.28	0.49	2.20
GMI4482212	RAM1-26	RAM1-25	352.62	18.0	2208.33	2197.65	2194.45	10.68	0.91%	1.731	3.89	0.34	5.28
GMI4482211	RAM1-27	RAM1-26	248.54	18.0	2208.11	2198.52	2197.65	9.59	0.35%	1.731	3.92	0.48	2.62
GMI4483815	RAM1-27A	RAM1-27	331.59	18.0	2209.75	2199.09	2198.52	10.66	0.17%	1.730	2.82	0.58	1.32
GMI4483814	RAM1-28	RAM1-27A	70.19	18.0	2211.44	2199.24	2199.09	12.20	0.21%	1.725	2.52	0.58	1.66
GMI4482164	RAM1-29	RAM1-28	404.76	18.0	2216.05	2199.86	2199.24	16.19	0.15%	1.726	2.52	0.58	1.15
GMI4482155	RAM1-30	RAM1-29	208.32	18.0	2214.40	2200.11	2199.86	14.29	0.12%	1.723	2.41	0.63	0.83
GMI4482156	RAM1-31	RAM1-30	209.59	18.0	2214.95	2200.67	2200.11	14.28	0.27%	1.723	2.67	0.48	2.08
GMI4482157	RAM1-31A	RAM1-31	18.23	18.0	2215.05	2200.70	2200.67	14.35	0.16%	1.722	2.86	0.57	1.26
GMI4482158	RAM1-32	RAM1-31A	363.28	18.0	2211.24	2201.10	2200.70	10.14	0.11%	1.470	2.25	0.58	0.97
GMI4481562	RAM1-33	RAM1-32	272.10	18.0	2211.40	2201.64	2201.10	9.76	0.20%	1.470	2.42	0.47	1.81
GMI4481561	RAM1-34	RAM1-33	300.66	18.0	2213.68	2201.75	2201.64	11.93	0.04%	1.470	2.17	0.68	-0.06
GMI4481560	RAM1-35	RAM1-34	269.94	18.0	2215.47	2202.12	2201.75	13.35	0.14%	1.465	1.95	0.58	1.26

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481555	RAM1-36	RAM1-35	366.11	18.0	2215.59	2202.73	2202.12	12.86	0.17%	1.467	2.36	0.49	1.54
GMI4481556	RAM1-36A	RAM1-36	352.85	10.0	2216.10	2210.34	2202.73	5.76	2.16%	0.170	1.08	0.19	2.08
GMI4481557	RAM1-36B	RAM1-36A	337.87	10.0	2217.55	2210.83	2210.34	6.72	0.15%	0.149	1.65	0.42	0.44
GMI4481558	RAM1-36C	RAM1-36B	315.16	10.0	2224.97	2211.70	2210.83	13.27	0.28%	0.148	1.33	0.29	0.66
GMI4480841	RAM1-36D	RAM1-36C	325.10	10.0	2231.53	2212.85	2211.70	18.68	0.35%	0.140	1.77	0.27	0.77
GMI4481527	RAM1-37	RAM1-36	373.17	18.0	2216.79	2203.42	2202.73	13.37	0.18%	1.353	2.52	0.46	1.81
GMI4480750	RAM1-38	RAM1-37	260.42	18.0	2217.55	2204.19	2203.42	13.36	0.30%	1.355	2.87	0.40	2.65
GMI4480751	RAM1-38A	RAM1-38	205.81	12.0	2215.11	2204.51	2204.19	10.60	0.16%	0.492	1.70	0.51	0.49
NEW398	RAM1-38B	RAM1-38A	243.00	12.0	2218.35	2206.16	2204.51	12.19	0.68%	0.493	2.43	0.33	1.56
GMI4481485	RAM1-38K1	RAM1-38K	88.02	10.0	2219.48	2211.65	2210.88	7.83	0.87%	0.140	1.31	0.19	1.63
GMI4481484	RAM1-38K2	RAM1-38K1	266.31	10.0	2220.40	2212.79	2211.65	7.61	0.43%	0.138	2.21	0.28	0.81
GMI4481483	RAM1-38K2A	RAM1-38K2	351.43	10.0	2220.64	2213.65	2212.79	6.99	0.24%	0.018	0.39	0.12	0.61
GMI4481482	RAM1-38K2B	RAM1-38K2A	347.06	10.0	2223.63	2214.75	2213.65	8.88	0.32%	0.015	0.76	0.09	0.85
GMI4481478	RAM1-38K3	RAM1-38K2	351.27	10.0	2221.03	2213.76	2212.79	7.27	0.28%	0.118	1.56	0.26	0.69
GMI4483797	RAM1-38K6	RAM1-38K4A	327.09	10.0	2223.00	2216.88	2216.18	6.12	0.21%	0.012	0.35	0.09	0.70
GMI4483795	RAM1-38K61	RAM1-38K5	351.34	10.0	2225.97	2217.37	2216.44	8.60	0.26%	0.093	0.77	0.27	0.70
GMI4483798	RAM1-38K7	RAM1-38K6	268.92	10.0	2221.27	2217.44	2216.88	3.83	0.21%	0.010	0.69	0.08	0.69
GMI4481489	RAM1-38L	RAM1-38K	144.00	12.0	2218.66	2211.26	2210.88	7.40	0.26%	0.289	1.65	0.32	0.99
GMI4481488	RAM1-38M	RAM1-38L	350.35	12.0	2221.76	2212.37	2211.26	9.39	0.32%	0.285	2.09	0.31	1.12
GMI4481487	RAM1-38N	RAM1-38M	349.39	12.0	2227.21	2213.50	2212.37	13.71	0.32%	0.282	2.15	0.31	1.14
GMI4481486	RAM1-38O	RAM1-38N	241.83	12.0	2227.35	2214.28	2213.50	13.07	0.32%	0.281	2.13	0.31	1.14
GMI4480752	RAM1-39	RAM1-38	105.85	10.0	2218.14	2210.36	2204.19	7.78	5.83%	0.934	4.96	0.34	2.77
GMI4481529	RAM1-40	RAM1-39	414.48	10.0	2220.85	2212.48	2210.36	8.37	0.51%	0.910	4.17	0.85	0.19
GMI4481528	RAM1-41	RAM1-40	430.90	10.0	2223.56	2214.84	2212.48	8.72	0.55%	0.910	3.18	0.68	0.23
GMI4481493	RAM1-42	RAM1-41	420.25	10.0	2225.99	2216.78	2214.84	9.21	0.46%	0.909	3.34	0.76	0.13
GMI4481491	RAM1-43	RAM1-42	251.00	8.0	2228.39	2218.67	2216.88	9.72	0.71%	0.746	3.59	1.14	-0.03
GMI4481476	RAM1-43A	RAM1-43	250.20	8.0	2229.17	2220.47	2218.67	8.70	0.72%	0.745	3.67	0.77	0.05
GMI4481475	RAM1-43B	RAM1-43A	350.51	8.0	2231.26	2221.87	2220.47	9.39	0.40%	0.737	3.49	3.45	-0.28
GMI4480928	RAM1-44	RAM1-43B	350.58	8.0	2232.35	2225.89	2221.87	6.46	1.15%	0.736	3.42	2.05	0.17
GMI4480929	RAM1-45	RAM1-44	349.74	8.0	2238.10	2231.72	2225.89	6.38	1.67%	0.712	4.40	0.59	0.38
GMI4481464	RAM1-45A	RAM1-45	348.92	8.0	2244.68	2233.46	2231.72	11.22	0.50%	0.715	3.75	2.75	-0.12
GMI4481463	RAM1-46	RAM1-45A	350.15	8.0	2246.16	2235.74	2233.46	10.42	0.65%	0.715	3.17	3.22	-0.03
GMI4481462	RAM1-46A	RAM1-46	334.68	8.0	2244.06	2237.62	2235.74	6.44	0.56%	0.714	3.20	4.11	-0.08
GMI4480893	RAM1-46B	RAM1-46B1	287.00	10.0	2257.58	2245.87	2237.70	11.71	2.85%	0.666	2.99	0.35	1.92
GMI4480892	RAM1-46C	RAM1-46B	255.11	10.0	2267.32	2248.07	2245.87	19.25	0.86%	0.666	4.42	0.54	0.76
GMI4481465	RAM1-46D	RAM1-46C	242.13	10.0	2270.32	2249.62	2248.07	20.70	0.64%	0.664	3.44	0.54	0.56

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481466	RAM1-46E	RAM1-46D	242.14	10.0	2271.49	2251.27	2249.62	20.22	0.68%	0.663	3.50	0.52	0.60
GMI4481467	RAM1-46F	RAM1-46E	243.32	10.0	2271.50	2252.48	2251.27	19.02	0.50%	0.661	3.26	0.60	0.42
GMI4483241	RAM1-46F1	RAM1-46F	277.09	10.0	2276.70	2253.80	2252.48	22.90	0.47%	0.463	2.45	0.46	0.59
GMI4483242	RAM1-46F2	RAM1-46F1	192.81	10.0	2277.60	2254.71	2253.80	22.89	0.48%	0.463	2.84	0.48	0.60
GMI4483243	RAM1-46F3	RAM1-46F2	280.63	10.0	2276.70	2256.04	2254.71	20.66	0.47%	0.456	2.80	0.46	0.60
GMI4483244	RAM1-46F4	RAM1-46F3	271.81	10.0	2275.90	2257.34	2256.04	18.57	0.47%	0.456	2.83	0.47	0.60
GMI4481438	RAM1-46G	RAM1-46F	161.19	10.0	2271.95	2253.17	2252.48	18.78	0.43%	0.195	1.32	0.30	0.81
GMI4481437	RAM1-46H	RAM1-46G	258.82	10.0	2272.08	2254.08	2253.17	18.00	0.35%	0.178	1.98	0.30	0.73
GMI4481434	RAM1-46I	RAM1-46H	140.32	10.0	2273.01	2254.91	2254.08	18.10	0.59%	0.156	1.98	0.25	1.02
GMI4481422	RAM1-46J	RAM1-46I	88.53	10.0	2273.43	2255.33	2254.91	18.10	0.47%	0.154	2.14	0.27	0.90
CDT-1051	REL-0	MIL1-01E	91.25	10.0	2133.41	2113.86	2113.40	19.55	0.51%	0.092	1.87	0.20	1.00
CDT-1049	REL-1	REL-0	100.48	10.0	2133.41	2116.71	2113.86	16.70	2.83%	0.092	2.41	0.13	2.49
CDT-1027	REL-10	REL-9	121.83	10.0	2140.02	2120.97	2120.50	19.05	0.39%	0.036	1.38	0.14	0.92
CDT-1025	REL-11	REL-10	47.67	10.0	2141.24	2121.19	2120.97	20.05	0.45%	0.036	1.29	0.13	0.99
CDT-1023	REL-12	REL-11	198.86	10.0	2143.48	2121.93	2121.19	21.55	0.37%	0.036	1.30	0.14	0.90
CDT-1047	REL-2	REL-1	216.75	10.0	2135.58	2117.33	2116.71	18.25	0.29%	0.092	1.98	0.25	0.73
CDT-1045	REL-3	REL-2	97.54	10.0	2134.50	2117.65	2117.33	16.85	0.33%	0.092	1.46	0.22	0.79
CDT-1043	REL-4	REL-3	111.96	10.0	2133.87	2118.17	2117.65	15.70	0.46%	0.092	1.72	0.20	0.95
CDT-1041	REL-5	REL-4	54.20	10.0	2133.93	2118.48	2118.17	15.45	0.58%	0.092	1.87	0.19	1.07
CDT-1039	REL-5A	REL-5	185.23	10.0	2133.01	2118.91	2118.48	14.10	0.23%	0.092	1.52	0.26	0.65
CDT-1037	REL-6	REL-5A	46.29	10.0	2133.68	2118.18	2118.91	15.50	-1.58%	0.036	1.69	1.14	1.89
CDT-1035	REL-7	REL-6	87.38	10.0	2134.76	2119.76	2118.18	15.00	1.81%	0.036	0.18	0.09	2.03
CDT-1033	REL-8	REL-7	56.41	10.0	2136.69	2119.69	2119.76	17.00	-0.13%	0.036	0.78	0.29	0.51
CDT-1031	REL-8A	REL-8	184.70	10.0	2138.21	2120.16	2119.69	18.05	0.25%	0.036	0.81	0.15	0.74
CDT-1029	REL-9	REL-8A	49.39	10.0	2138.50	2120.50	2120.16	18.00	0.69%	0.036	1.33	0.12	1.24
GMI4481665	REX1-01	RAM1-10	395.04	18.0	2209.40	2198.41	2181.12	10.99	4.38%	1.344	2.89	0.20	14.05
GMI4481664	REX1-02	REX1-01	399.60	18.0	2211.70	2200.06	2198.41	11.64	0.41%	1.338	4.40	0.42	3.39
GMI4481663	REX1-03	REX1-02	369.71	18.0	2213.20	2201.10	2200.06	12.10	0.28%	1.310	2.94	0.40	2.59
GMI4481662	REX1-04	REX1-03	316.19	18.0	2213.78	2201.93	2201.10	11.85	0.26%	1.307	2.94	0.42	2.46
GMI4482135	REX1-04A	REX1-04	382.60	10.0	2217.14	2208.58	2201.93	8.56	1.74%	0.056	1.40	0.11	1.97
GMI4482136	REX1-04B	REX1-04A	192.02	10.0	2220.15	2209.46	2208.58	10.69	0.46%	0.054	1.80	0.17	0.98
GMI4482137	REX1-04C	REX1-04B	91.11	10.0	2221.59	2209.91	2209.46	11.68	0.49%	0.029	0.98	0.11	1.05
GMI4482138	REX1-04D	REX1-04C	117.44	10.0	2223.96	2215.68	2209.91	8.28	4.91%	0.013	1.09	0.05	3.39
GMI4482139	REX1-04E	REX1-04D	399.46	10.0	2240.52	2235.73	2215.68	4.79	5.02%	0.011	2.08	0.04	3.43
GMI4482140	REX1-04F	REX1-04E	222.78	10.0	2246.68	2239.63	2235.73	7.05	1.75%	0.009	1.56	0.05	2.02
NEW6755945	REX1-04G	REX1-04F	237.00	10.0	2250.48	2243.78	2239.63	6.70	1.75%	0.007	1.18	0.04	2.02

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
NEW8483931	REX1-04H	REX1-04G	259.00	10.0	2255.43	2248.31	2243.78	7.11	1.75%	0.005	1.05	0.04	2.03
NEW3250837	REX1-04I	REX1-04H	239.00	10.0	2257.91	2252.50	2248.31	5.41	1.75%	0.002	0.72	0.03	2.03
GMI4482659	REX1-05	REX1-04	341.41	15.0	2221.66	2210.30	2201.93	11.36	2.45%	1.260	4.31	0.29	5.82
GMI4482711	REX1-06	REX1-05	342.08	15.0	2234.09	2221.69	2210.30	12.40	3.33%	1.249	7.08	0.26	7.01
GMI4482673	REX1-07	REX1-06	184.38	15.0	2237.03	2227.51	2221.69	9.52	3.16%	1.246	7.24	0.28	6.79
GMI4482674	REX1-08	REX1-07	82.48	15.0	2239.16	2229.45	2227.51	9.71	2.35%	1.226	6.27	0.31	5.71
GMI4482675	REX1-09	REX1-08	209.57	15.0	2242.41	2230.69	2229.45	11.72	0.59%	1.225	4.32	0.46	2.25
GMI4482668	REX1-10	REX1-09	350.13	15.0	2246.21	2236.59	2230.69	9.63	1.68%	1.222	4.35	0.31	4.65
GMI4482667	REX1-11	REX1-10	351.59	15.0	2252.11	2239.51	2236.59	12.60	0.83%	1.221	4.46	0.38	2.91
GMI4482625	REX1-12	REX1-11	225.91	15.0	2251.49	2239.94	2239.51	11.55	0.19%	1.220	3.03	0.63	0.75
GMI4482663	REX1-13	REX1-12	300.07	15.0	2249.15	2240.65	2239.94	8.51	0.23%	1.219	2.55	0.54	0.97
GMI4482664	REX1-14	REX1-13	270.03	15.0	2251.47	2241.08	2240.65	10.39	0.16%	1.217	2.53	0.64	0.60
GMI4480745A	REX1-14A	REX1-14	99.79	15.0	2252.69	2241.29	2241.08	11.40	0.21%	1.216	2.33	0.62	0.86
GMI4480745	REX1-15	REX1-14A	135.22	15.0	2253.28	2241.70	2241.29	11.58	0.30%	1.216	2.63	0.52	1.28
GMI4480744	REX1-16	REX1-15	400.72	15.0	2255.81	2242.40	2241.70	13.41	0.17%	1.216	2.60	0.63	0.67
GMI4480743	REX1-17	REX1-16	400.01	15.0	2257.31	2242.99	2242.40	14.32	0.15%	1.216	2.31	0.64	0.52
GMI4480742	REX1-18	REX1-17	398.85	15.0	2255.14	2243.62	2242.99	11.52	0.16%	1.217	2.33	0.62	0.58
GMI4480741	REX1-19	REX1-18	286.21	15.0	2253.40	2244.13	2243.62	9.27	0.18%	1.217	2.41	0.60	0.70
GMI4480740	REX1-20	REX1-19	288.15	15.0	2254.01	2245.08	2244.13	8.93	0.33%	1.218	2.78	0.48	1.37
GMI4480739	REX1-21	REX1-20	399.42	15.0	2254.56	2245.33	2245.08	9.23	0.06%	1.213	2.24	0.81	-0.08
GMI4480738	REX1-22	REX1-21	214.94	15.0	2255.89	2246.04	2245.33	9.85	0.33%	1.190	2.21	0.48	1.41
GMI4480819	REX1-23	REX1-22	279.77	15.0	2255.58	2246.68	2246.04	8.90	0.23%	1.173	2.82	0.56	0.99
GMI4480820	REX1-23A	REX1-23	133.26	12.0	2256.07	2247.05	2246.68	9.02	0.28%	0.600	1.90	0.49	0.72
GMI4480821	REX1-23B	REX1-23A	141.01	12.0	2257.12	2247.53	2247.05	9.59	0.34%	0.599	2.53	0.46	0.86
GMI4480822	REX1-23C	REX1-23B	117.53	12.0	2257.21	2247.96	2247.53	9.25	0.37%	0.587	2.61	0.45	0.92
GMI4480823	REX1-23D	REX1-23C	296.41	12.0	2260.05	2248.76	2247.96	11.29	0.27%	0.587	2.48	0.49	0.71
GMI4480824	REX1-23E	REX1-23D	312.82	12.0	2260.68	2249.55	2248.76	11.13	0.25%	0.580	2.35	0.49	0.67
GMI4483181	REX1-23F	REX1-23E	231.66	12.0	2258.70	2249.80	2249.55	8.90	0.11%	0.576	1.95	0.64	0.24
GMI4483182	REX1-23G	REX1-23F	161.10	12.0	2259.90	2250.20	2249.80	9.70	0.25%	0.575	1.96	0.48	0.67
GMI4483183	REX1-23H	REX1-23G	156.84	12.0	2261.10	2250.68	2250.20	10.42	0.31%	0.574	2.45	0.46	0.81
GMI4483184	REX1-23I	REX1-23H	261.89	12.0	2263.10	2251.22	2250.68	11.88	0.21%	0.555	2.23	0.52	0.58
GMI4483185	REX1-23J	REX1-23I	393.76	12.0	2263.10	2252.24	2251.22	10.86	0.26%	0.555	2.24	0.46	0.72
GMI4483195	REX1-23K	REX1-23J	398.97	12.0	2267.30	2253.10	2252.24	14.20	0.22%	0.554	2.26	0.51	0.60
GMI4483200	REX1-23K1	REX1-23K	241.86	12.0	2263.70	2253.94	2253.10	9.76	0.35%	0.522	2.29	0.41	0.95
NEW1175170	REX1-23K10	REX1-23K9	299.32	10.0	2276.14	2260.44	2259.34	15.70	0.37%	0.195	2.13	0.32	0.74
NEW1175169	REX1-23K11	REX1-23K10	207.27	10.0	2276.85	2261.33	2260.44	15.52	0.43%	0.194	2.09	0.64	0.81

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483201	REX1-23K2	REX1-23K1	176.62	12.0	2264.60	2254.18	2253.94	10.42	0.14%	0.522	2.09	0.58	0.40
GMI4483435	REX1-23K3	REX1-23K2	252.44	12.0	2265.40	2254.88	2254.18	10.52	0.28%	0.502	1.97	0.43	0.81
GMI4483434	REX1-23K4	REX1-23K3	239.83	12.0	2267.30	2255.46	2254.88	11.84	0.24%	0.502	2.28	0.47	0.73
GMI4483202	REX1-23K5	REX1-23K4	278.78	12.0	2267.50	2256.10	2255.46	11.40	0.23%	0.488	2.16	0.45	0.71
GMI4483210	REX1-23K6	REX1-23K5	293.16	12.0	2268.40	2256.85	2256.10	11.55	0.26%	0.436	2.10	0.41	0.83
GMI4483211	REX1-23K7	REX1-23K6	307.28	12.0	2268.30	2257.42	2256.85	10.88	0.19%	0.436	2.04	0.47	0.64
GMI4483212	REX1-23K8	REX1-23K7	211.44	12.0	2269.90	2258.00	2257.42	11.90	0.27%	0.435	2.06	0.40	0.87
MSTR1175350	REX1-23K9	REX1-23KA	117.96	10.0	2275.99	2259.34	2258.77	16.65	0.48%	0.195	1.78	0.29	0.87
MSTR1175353	REX1-23KA	REX1-23K8	174.14	12.0	2272.73	2258.77	2258.00	13.96	0.44%	0.431	2.50	0.35	1.23
4666	REX1-23KN	REX1-23KM	209.72	10.0	2271.79	2260.96	2260.13	10.83	0.40%	0.105	1.42	0.22	0.86
4665	REX1-23KP	REX1-23KN	264.62	10.0	2274.56	2261.66	2260.96	12.90	0.26%	0.103	1.59	0.26	0.69
4664	REX1-23KQ	REX1-23KP	164.95	10.0	2275.98	2262.12	2261.66	13.86	0.28%	0.099	1.47	0.24	0.71
4663	REX1-23KR	REX1-23KQ	160.38	10.0	2276.78	2263.07	2262.12	13.71	0.59%	0.097	1.74	0.19	1.08
4662	REX1-23KS	REX1-23KR	309.57	10.0	2277.89	2263.99	2263.07	13.90	0.30%	0.095	1.67	0.24	0.74
4661	REX1-23KT	REX1-23KS	204.76	10.0	2278.71	2264.83	2263.99	13.88	0.41%	0.093	1.57	0.21	0.89
4659	REX1-23KV	REX1-23KY	183.01	10.0	2280.37	2266.60	2265.77	13.77	0.45%	0.078	1.71	0.19	0.96
4660	REX1-23KY	REX1-23KT	193.86	10.0	2278.97	2265.77	2264.83	13.20	0.48%	0.080	1.63	0.18	0.99
GMI4483427	REX1-24	REX1-23	175.38	15.0	2259.70	2247.00	2246.68	12.70	0.18%	0.577	1.57	0.40	1.36
GMI4483168	REX1-25	REX1-24	131.37	15.0	2258.80	2247.24	2247.00	11.56	0.18%	0.577	1.99	0.39	1.36
GMI4483169	REX1-26	REX1-25	246.71	15.0	2256.49	2247.69	2247.24	8.80	0.18%	0.565	2.02	0.38	1.37
GMI4483170	REX1-27	REX1-26	199.04	15.0	2261.40	2248.08	2247.69	13.32	0.19%	0.558	2.07	0.37	1.44
GMI4484044	REX1-28	REX1-27	143.40	15.0	2259.85	2248.36	2248.08	11.49	0.19%	0.556	2.06	0.38	1.44
GMI4484043	REX1-29	REX1-28	101.80	15.0	2261.21	2248.63	2248.36	12.58	0.26%	0.554	2.15	0.34	1.78
GMI4484042	REX1-29A	REX1-29	153.42	15.0	2264.25	2248.94	2248.63	15.31	0.20%	0.082	0.61	0.14	1.95
GMI4484041	REX1-29B	REX1-29A	170.24	12.0	2265.30	2249.39	2248.94	15.91	0.26%	0.080	1.39	0.17	1.20
GMI4484040	REX1-29C	REX1-29B	199.60	12.0	2263.53	2249.98	2249.39	13.55	0.30%	0.067	1.26	0.15	1.29
GMI4484039	REX1-29D	REX1-29C	290.03	12.0	2264.02	2250.93	2249.98	13.09	0.33%	0.035	0.91	0.11	1.39
GMI4484038	REX1-29E	REX1-29D	251.13	12.0	2261.43	2251.82	2250.93	9.61	0.35%	0.032	1.12	0.10	1.45
GMI4484052	REX1-30	REX1-29	284.90	12.0	2258.00	2249.30	2248.63	8.70	0.24%	0.490	2.24	0.46	0.72
GMI4484051	REX1-31	REX1-30	189.67	12.0	2257.15	2249.83	2249.30	7.32	0.28%	0.482	2.25	0.42	0.84
GMI4484050	REX1-32	REX1-31	323.21	12.0	2259.66	2250.55	2249.83	9.11	0.22%	0.481	2.22	0.47	0.70
GMI4484049	REX1-33	REX1-32	179.27	12.0	2259.34	2251.14	2250.55	8.20	0.33%	0.478	2.27	0.40	0.95
GMI4484046	REX1-34	REX1-33	294.54	12.0	2262.32	2251.86	2251.14	10.46	0.24%	0.467	2.28	0.45	0.77
GMI4484032	REX1-35	REX1-34	226.90	12.0	2262.17	2252.33	2251.86	9.84	0.20%	0.458	2.06	0.46	0.68
GMI4779229	REX1-36	REX1-35	95.56	12.0	2262.27	2252.92	2252.33	9.35	0.63%	0.457	2.48	0.33	1.51
GMI4779228	REX1-37	REX1-36	131.40	12.0	2263.34	2253.20	2252.92	10.15	0.21%	0.456	2.29	0.49	0.68

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4779227	REX1-38	REX1-37	305.40	12.0	2263.14	2253.94	2253.20	9.20	0.24%	0.442	2.02	0.41	0.79
NEW279	REX1-38B	REX1-38	185.04	12.0	2263.24	2254.48	2253.94	8.76	0.29%	0.070	0.62	0.16	1.28
NEW278	REX1-38C	REX1-38B	147.23	12.0	2264.34	2254.82	2254.48	9.52	0.23%	0.068	1.29	0.17	1.13
NEW282	REX1-38C4	REX1-38C	306.21	12.0	2266.63	2255.50	2254.82	11.13	0.22%	0.043	0.91	0.13	1.13
NEW1175048	REX1-38C4A	REX1-38C4	184.39	12.0	2268.28	2255.91	2255.50	12.36	0.22%	0.031	0.88	0.15	1.15
4617	REX1-38C4B	REX1-38C4A	99.77	12.0	2269.17	2256.34	2255.88	12.83	0.47%	0.028	0.84	0.09	1.67
4618	REX1-38C4C	REX1-38C4B	302.75	12.0	2271.62	2257.03	2256.34	14.59	0.23%	0.017	0.79	0.08	1.17
4619	REX1-38C4D	REX1-38C4C	248.70	12.0	2273.15	2257.69	2257.03	15.46	0.27%	0.014	0.76	0.07	1.27
GMI4779242	REX1-39	REX1-38	181.04	10.0	2261.27	2254.62	2253.94	6.65	0.38%	0.366	2.28	0.43	0.57
GMI4779241	REX1-40	REX1-39	178.43	10.0	2260.47	2255.07	2254.62	5.40	0.25%	0.365	2.20	0.52	0.41
GMI4779240	REX1-41	REX1-40	178.19	10.0	2262.23	2255.58	2255.07	6.65	0.29%	0.363	2.10	0.47	0.46
GMI4779239	REX1-42	REX1-41	106.99	10.0	2263.13	2255.93	2255.58	7.20	0.33%	0.360	2.24	0.46	0.52
GMI4779238	REX1-43	REX1-42	106.84	10.0	2264.08	2256.28	2255.93	7.80	0.33%	0.358	2.24	0.46	0.52
GMI4779237	REX1-44	REX1-43	112.41	10.0	2264.97	2256.47	2256.28	8.50	0.17%	0.357	1.95	0.57	0.27
NEW1175019	REX1-45	REX1-44	295.20	10.0	2263.24	2257.35	2256.47	5.89	0.30%	0.306	1.77	0.42	0.53
NEW1174981	REX1-46	REX1-45	365.01	10.0	2266.15	2258.13	2257.35	8.02	0.21%	0.266	1.86	0.44	0.45
NEW1174980	REX1-47	REX1-46	307.36	10.0	2265.75	2258.82	2258.13	6.93	0.22%	0.265	1.85	0.42	0.46
NEW1174979	REX1-48	REX1-47	237.11	10.0	2267.63	2259.39	2258.82	8.24	0.24%	0.262	1.89	0.41	0.49
NEW1174978	REX1-49	REX1-48	184.08	10.0	2269.10	2259.93	2259.39	9.17	0.29%	0.260	1.99	0.39	0.57
NEW1174977	REX1-50	REX1-49	185.95	10.0	2269.96	2260.53	2259.93	9.43	0.32%	0.208	1.83	0.34	0.66
NEW1174976	REX1-51	REX1-50	124.53	10.0	2268.63	2261.06	2260.53	7.57	0.43%	0.206	2.11	0.31	0.80
GMI4483466	RIV1-02	FG1-01	31.65	24.0	2133.74	2121.69	2119.31	12.05	7.53%	7.391	5.39	0.28	36.13
GMI4483465	RIV1-03	RIV1-02	290.65	24.0	2138.41	2122.49	2121.69	15.92	0.27%	7.391	4.77	0.82	0.91
GMI4483464	RIV1-03A	RIV1-03B	10.59	24.0	2135.06	2122.99	2122.49	12.07	4.73%	7.414	3.65	1.28	16.44
4852	RIV1-03B	RIV1-03C	45.77	24.0	2135.20	2122.75	2122.60	12.45	0.33%	7.431	3.66	1.33	1.64
4853	RIV1-03C	RIV1-03D	39.30	24.0	2138.35	2122.60	2122.60	15.75	0.00%	7.425	3.66	1.29	-6.63
4854	RIV1-03D	RIV1-03E	52.87	24.0	2139.00	2122.60	2122.79	16.40	-0.36%	7.396	3.66	1.18	2.10
4855	RIV1-03E	RIV1-03F	33.88	24.0	2138.19	2122.79	2122.63	15.40	0.47%	7.393	3.70	0.96	3.49
4856	RIV1-03F	RIV1-03	99.22	24.0	2138.18	2122.63	2122.49	15.55	0.14%	7.391	3.90	0.94	-1.44
NEW1175256	RIV1-04	RIV1-03A	26.84	24.0	2135.08	2123.27	2122.99	11.81	1.06%	7.408	3.68	1.22	8.86
GMI4483463	RIV1-05	RIV1-04	514.27	24.0	2137.11	2124.54	2123.27	12.57	0.25%	7.391	3.64	1.21	0.47
GMI4483462	RIV1-06	RIV1-05	354.89	24.0	2135.77	2125.48	2124.54	10.29	0.26%	7.390	4.14	1.18	0.76
GMI4483461	RIV1-07	RIV1-06	361.36	24.0	2135.24	2126.35	2125.48	8.89	0.24%	7.390	4.06	1.20	0.38
GMI4483460	RIV1-08	RIV1-07	53.94	24.0	2136.25	2126.70	2126.35	9.55	0.64%	7.390	4.14	1.15	5.37
GMI4483459	RIV1-09	RIV1-08	216.12	24.0	2137.02	2127.31	2126.70	9.72	0.28%	7.390	4.21	1.14	1.03
GMI4483458	RIV1-10	RIV1-09	408.22	24.0	2151.25	2128.25	2127.31	23.00	0.23%	7.400	4.05	1.18	0.20

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483457	RIV1-11	RIV1-10	398.99	24.0	2149.09	2129.31	2128.25	19.78	0.26%	7.481	4.08	1.14	0.68
GMI4483456	RIV1-12	RIV1-11	401.40	24.0	2146.11	2130.33	2129.31	15.78	0.26%	7.563	4.17	1.13	0.44
GMI4483455	RIV1-13	RIV1-12	399.80	24.0	2139.74	2131.32	2130.33	8.42	0.25%	7.616	4.11	1.13	0.25
GMI4483454	RIV1-14	RIV1-13	395.68	24.0	2139.38	2132.51	2131.32	6.87	0.30%	7.678	4.27	1.03	1.01
GMI4483453	RIV1-15	RIV1-14	466.24	24.0	2139.82	2133.49	2132.51	6.33	0.21%	7.741	4.14	1.11	-0.48
GMI4483452	RIV1-16	RIV1-15	423.55	24.0	2140.70	2134.55	2133.49	6.15	0.25%	7.760	3.96	1.10	0.16
GMI4483451	RIV1-17	RIV1-16	434.68	24.0	2143.90	2135.73	2134.55	8.17	0.27%	7.784	4.19	1.05	0.47
GMI4483450	RIV1-17A	RIV1-17	104.19	24.0	2146.72	2136.08	2135.73	10.64	0.34%	7.733	4.18	1.15	1.46
4873	RIV1-18	RIV1-17A	13.29	24.0	2149.68	2136.08	2135.73	13.60	2.66%	7.734	3.84	1.12	12.37
GMI4483449	RIV1-19	RIV1-18	421.70	24.0	2148.83	2137.24	2136.08	11.59	0.28%	7.725	4.02	1.05	0.59
NEW348	RIV1-20	RIV1-19	140.88	24.0	2146.54	2137.57	2137.24	8.97	0.23%	7.730	4.07	1.09	-0.08
GMI4483448	RIV1-21	RIV1-20	260.87	24.0	2146.09	2138.34	2137.57	7.75	0.29%	7.663	4.00	1.04	0.94
GMI4483447	RIV1-21A	RIV1-21	274.68	24.0	2145.16	2138.97	2138.34	6.19	0.23%	7.667	4.03	1.07	-0.09
NEW370	RIV1-22	RIV1-21A	124.01	24.0	2146.38	2139.39	2138.97	6.99	0.34%	7.602	3.92	1.05	1.64
GMI4483446	RIV1-23	RIV1-22	398.65	24.0	2147.91	2140.41	2139.39	7.50	0.25%	7.610	4.06	1.01	0.40
GMI4483436	RIV1-24	RIV1-23	399.94	24.0	2148.54	2141.39	2140.41	7.15	0.25%	7.621	4.10	0.93	0.24
GMI4483443	RIV1-24A	RIV1-24	192.50	24.0	2148.88	2141.78	2141.39	7.11	0.20%	7.626	3.91	0.97	-0.58
NEW369	RIV1-24C	RIV1-24A	85.17	24.0	2148.31	2142.12	2141.78	6.19	0.40%	7.620	3.82	0.95	2.40
4797	RIV1-25	RIV1-24C	122.34	24.0	2148.68	2142.35	2142.12	6.33	0.19%	7.623	3.79	1.03	-0.70
GMI4483442	RIV1-25A	RIV1-25	285.33	24.0	2149.86	2143.01	2142.35	6.85	0.23%	7.623	3.75	1.09	-0.01
NEW1175067	RIV1-26	RIV1-25A	111.96	24.0	2148.52	2143.36	2143.01	5.16	0.31%	7.603	3.76	1.11	1.25
GMI4483441	RIV1-27	RIV1-26	384.30	24.0	2149.01	2144.40	2143.36	4.61	0.27%	7.603	4.00	1.10	0.65
GMI4483440	RIV1-28	RIV1-27	281.08	24.0	2151.27	2145.29	2144.40	5.98	0.31%	7.603	4.32	1.04	1.29
NEW349	RIV1-28A	RIV1-28	17.42	24.0	2151.14	2145.46	2145.29	5.68	1.02%	7.644	4.33	1.04	8.19
GMI4483439	RIV1-28B	RIV1-28A	298.09	24.0	2158.95	2146.11	2145.46	12.84	0.22%	7.681	4.05	1.19	-0.30
4570	RIV1-29	RIV1-28B	43.61	24.0	2159.91	2146.11	2145.46	13.80	1.48%	7.707	3.80	1.24	0.91
GMI4483438	RIV1-30	RIV1-29	247.99	24.0	2158.99	2146.73	2146.11	12.26	0.25%	7.713	3.80	1.28	0.20
NEW368	RIV1-31	RIV1-30	339.80	24.0	2160.97	2147.41	2146.73	13.55	0.20%	7.715	3.80	1.36	-0.29
NEW346	RIV1-32	RIV1-31	33.03	24.0	2158.78	2147.50	2147.41	11.28	0.27%	7.384	3.64	1.44	-2.01
GMI4483437	RIV1-33	RIV1-32	26.94	24.0	2158.75	2147.65	2147.50	11.09	0.56%	6.047	2.98	1.43	5.45
GMI4481630	RX1-01	RAM1-22	335.57	12.0	2202.45	2193.70	2191.41	8.75	0.68%	0.583	1.70	0.36	1.48
GMI4481632	RX1-02	RX1-01	335.89	12.0	2202.80	2195.10	2193.70	7.70	0.42%	0.581	3.07	0.44	1.03
GMI4481633	RX1-03	RX1-02	335.53	12.0	2202.80	2196.51	2195.10	6.29	0.42%	0.581	2.82	0.42	1.04
GMI4481631	RX1-04	RX1-03	339.07	10.0	2206.73	2198.56	2196.51	8.17	0.60%	0.516	3.11	0.46	0.68
GMI4481611	RX1-05	RX1-04	349.87	10.0	2206.24	2200.41	2198.56	5.83	0.53%	0.515	3.12	0.49	0.60
GMI4481610	RX1-06	RX1-05	349.25	10.0	2208.01	2202.31	2200.41	5.70	0.54%	0.515	3.05	0.48	0.62

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481609	RX1-07	RX1-06	269.27	10.0	2211.94	2203.67	2202.31	8.27	0.51%	0.510	3.01	0.49	0.58
GMI4481612	RX1-08	RX1-07	331.45	8.0	2222.23	2209.16	2203.67	13.07	1.66%	0.509	4.02	0.48	0.58
GMI4481608	RX1-09	RX1-08	329.10	8.0	2226.80	2214.24	2209.16	12.56	1.54%	0.509	4.62	0.50	0.54
GMI4481578	RX1-10	RX1-09	154.49	8.0	2226.99	2216.83	2214.24	10.16	1.68%	0.509	4.58	0.49	0.59
GMI4481579	RX1-11	RX1-10	130.66	8.0	2229.76	2219.05	2216.83	10.71	1.70%	0.508	4.64	0.49	0.60
GMI4481580	RX1-12	RX1-11	318.83	8.0	2231.71	2222.06	2219.05	9.65	0.94%	0.483	3.93	0.58	0.34
GMI4481581	RX1-13	RX1-12	318.09	8.0	2234.47	2224.97	2222.06	9.50	0.91%	0.481	3.64	0.56	0.33
GMI4481582	RX1-14	RX1-13	355.03	8.0	2252.39	2235.57	2224.97	16.82	2.99%	0.479	4.52	0.39	0.98
GMI4481541	RX1-15	RX1-14	200.30	8.0	2252.92	2237.37	2235.57	15.55	0.90%	0.477	4.11	0.63	0.33
GMI4482571	RX1-16	RX1-15	347.62	8.0	2254.48	2238.78	2237.37	15.70	0.41%	0.437	2.69	0.73	0.10
GMI4482592	RX1-17	RX1-16	317.79	8.0	2256.75	2240.25	2238.78	16.50	0.46%	0.435	2.64	0.65	0.14
GMI4482591	RX1-18	RX1-17	195.61	8.0	2258.89	2240.94	2240.25	17.95	0.35%	0.434	2.53	0.78	0.07
GMI4482590	RX1-18A	RX1-18	283.53	10.0	2259.96	2241.83	2240.94	18.13	0.31%	0.178	1.18	0.31	0.68
GMI4480753	RX1-18B	RX1-18A	253.33	10.0	2259.40	2242.95	2241.83	16.45	0.44%	0.178	2.04	0.28	0.84
GMI4480754	RX1-18C	RX1-18B	306.05	10.0	2260.31	2243.91	2242.95	16.40	0.31%	0.110	1.49	0.24	0.75
GMI4482176	RX1-18D	RX1-18C	166.63	10.0	2259.13	2244.23	2243.91	14.90	0.19%	0.110	1.45	0.29	0.56
GMI4482177	RX1-18E	RX1-18D	250.70	10.0	2257.00	2245.10	2244.23	11.90	0.35%	0.109	1.47	0.23	0.80
GMI4482178	RX1-18F	RX1-18E	252.03	10.0	2257.41	2245.98	2245.10	11.43	0.35%	0.107	1.71	0.23	0.80
GMI4482179	RX1-18F1	RX1-18F	401.62	10.0	2256.80	2247.18	2245.98	9.62	0.30%	0.089	1.48	0.22	0.75
GMI4482180	RX1-18F2	RX1-18F1	215.86	10.0	2256.09	2248.05	2247.18	8.04	0.40%	0.086	1.60	0.20	0.89
GMI4480829	RX1-18F3	RX1-18F2	349.27	10.0	2257.61	2249.21	2248.05	8.40	0.33%	0.079	1.55	0.21	0.81
GMI4481554	RX1-18F4	RX1-18F3	231.36	10.0	2259.32	2249.86	2249.21	9.46	0.28%	0.077	1.45	0.21	0.74
GMI4481553	RX1-18F5	RX1-18F4	235.83	10.0	2257.59	2250.83	2249.86	6.76	0.41%	0.074	1.48	0.18	0.91
GMI4482597	RX1-19	RX1-18	247.34	8.0	2257.37	2241.88	2240.94	15.49	0.38%	0.257	1.71	0.49	0.27
GMI4482596	RX1-20	RX1-19	246.12	8.0	2256.26	2242.95	2241.88	13.31	0.43%	0.256	2.35	0.48	0.30
GMI4482595	RX1-21	RX1-20	279.05	8.0	2259.42	2244.18	2242.95	15.24	0.44%	0.209	2.13	0.42	0.35
GMI4482594	RX1-22	RX1-21	363.99	8.0	2261.25	2245.68	2244.18	15.57	0.41%	0.209	2.25	0.44	0.33
GMI4482570	RX1-23	RX1-22	402.34	8.0	2261.62	2247.42	2245.68	14.20	0.43%	0.209	2.25	0.42	0.35
GMI4482569	RX1-23A	RX1-23	400.66	8.0	2262.77	2249.19	2247.42	13.58	0.44%	0.209	2.29	0.43	0.35
GMI4482568	RX1-24	RX1-23A	402.07	8.0	2263.98	2250.81	2249.19	13.17	0.40%	0.203	2.20	0.43	0.33
GMI4481517	RX1-25	RX1-24	307.55	8.0	2265.04	2252.04	2250.81	13.00	0.40%	0.200	2.17	0.43	0.34
GMI4481460A	RX1-25A1	RX1-25	209.10	8.0	2265.84	2253.14	2252.04	12.70	0.53%	0.165	2.03	0.35	0.45
GMI4481460	RX1-26	RX1-25A1	92.13	8.0	2266.22	2253.35	2253.14	12.87	0.23%	0.165	1.83	0.48	0.24
GMI4481459	RX1-27	RX1-26	400.70	8.0	2267.94	2255.34	2253.35	12.60	0.50%	0.161	1.80	0.36	0.44
GMI4480690	RX1-27A	RX1-27	200.44	8.0	2268.44	2256.14	2255.34	12.30	0.40%	0.148	2.01	0.37	0.39
GMI4480689	RX1-28	RX1-27A	272.87	8.0	2271.36	2257.49	2256.14	13.87	0.50%	0.146	2.06	0.43	0.45

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
NEW384	SELT1-01	STOR_10	131.39	10.0	2131.61	2113.52	2107.85	18.08	4.32%	0.319	5.71	0.22	2.87
NEW380	SELT1-02	SELT1-01	334.87	10.0	2144.76	2127.96	2113.52	16.80	4.31%	0.307	5.57	0.21	2.88
NEW601661	SELT1-03	SELT1-02	86.11	10.0	2151.08	2129.83	2127.96	21.25	2.17%	0.306	4.66	0.27	1.96
NEW1175158	SELT1-03A	SELT1-03	352.82	10.0	2148.16	2131.46	2129.83	16.70	0.46%	0.116	1.71	0.22	0.93
NEW1175202	SELT1-03B	SELT1-03A	20.83	10.0	2149.91	2131.56	2131.46	18.35	0.50%	0.110	1.79	0.24	0.95
NEW1175161	SELT1-04	SELT1-03	348.76	10.0	2153.35	2130.85	2129.83	22.50	0.29%	0.153	1.83	0.30	0.68
NEW1175160	SELT1-05	SELT1-04	350.61	10.0	2154.21	2132.01	2130.85	22.20	0.33%	0.149	1.77	0.28	0.73
NEW1175159	SELT1-06	SELT1-05	46.97	10.0	2153.76	2132.16	2132.01	21.60	0.33%	0.138	1.70	0.29	0.73
GMI4480477	SHR1-01	M1-04	101.05	12.0	2139.92	2131.36	2128.74	8.56	2.59%	0.092	1.47	0.11	3.93
GMI4480476	SHR1-02	SHR1-01	117.57	12.0	2142.10	2132.27	2131.36	9.83	0.77%	0.088	2.38	0.15	2.11
GMI4480579	SHR1-03	SHR1-02	219.48	12.0	2147.18	2136.06	2132.27	11.12	1.73%	0.066	1.85	0.10	3.21
GMI4480578	SHR1-04	SHR1-03	150.69	12.0	2151.09	2144.35	2136.06	6.74	5.50%	0.063	2.97	0.07	5.79
GMI4480441	SHR1-05	SHR1-04	360.61	12.0	2155.52	2147.90	2144.35	7.62	0.98%	0.055	2.36	0.11	2.42
GMI4480440	SHR1-06	SHR1-05	233.05	10.0	2160.89	2148.82	2147.90	12.07	0.40%	0.038	1.34	0.14	0.93
GMI4480439	SHR1-07	SHR1-06	125.45	10.0	2161.78	2149.32	2148.82	12.46	0.40%	0.033	1.21	0.13	0.93
GMI4480438	SHR1-08	SHR1-07	359.97	10.0	2171.05	2160.85	2149.32	10.20	3.20%	0.030	1.64	0.07	2.72
NEW1174975	SUN1-01	REX1-51	179.66	10.0	2268.23	2261.82	2261.06	6.41	0.42%	0.188	2.09	0.40	0.81
GMI4779474	SUN1-02	SUN1-01	145.37	10.0	2269.87	2262.12	2261.82	7.75	0.21%	0.187	1.78	0.39	0.52
GMI4779473	SUN1-03	SUN1-02	323.04	10.0	2273.85	2262.82	2262.12	11.03	0.22%	0.171	1.52	0.33	0.56
GMI4779472	SUN1-04	SUN1-03	326.23	10.0	2275.73	2263.61	2262.82	12.12	0.24%	0.158	1.66	0.30	0.64
NEW1175168	SUN2-01	REX1-23K11	165.63	10.0	2278.98	2262.08	2261.33	16.90	0.45%	0.192	2.20	0.30	0.85
GMI4484015	SUN2-02	SUN2-01	184.58	10.0	2278.54	2262.80	2262.08	15.74	0.39%	0.191	2.10	0.34	0.75
GMI4484014	SUN2-03	SUN2-02	351.57	10.0	2281.26	2263.77	2262.80	17.49	0.27%	0.176	1.82	0.33	0.63
GMI4483998	SUN2-04	SUN2-03	325.12	10.0	2280.07	2264.68	2263.77	15.39	0.28%	0.164	1.74	0.30	0.65
GMI4483997	SUN2-05	SUN2-04	309.74	10.0	2281.86	2265.75	2264.68	16.11	0.35%	0.147	1.75	0.27	0.76
4677	VM1-01	REX1-23KV	269.97	10.0	2281.00	2267.36	2266.60	13.64	0.28%	0.075	1.49	0.22	0.74
4796	VM1-02	VM1-01	393.52	10.0	2282.50	2268.56	2267.46	13.94	0.28%	0.073	1.51	0.22	0.74
4795	VM1-03	VM1-02	235.18	10.0	2283.50	2269.32	2268.66	14.18	0.28%	0.060	1.43	0.20	0.75
4787	VM1-04	VM1-03	129.08	10.0	2283.75	2269.78	2269.42	13.97	0.28%	0.017	1.00	0.11	0.80
4788	VM1-05	VM1-04	383.24	10.0	2286.00	2270.95	2269.88	15.05	0.28%	0.011	0.89	0.09	0.80

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Design Slope	10 State Standard Min. Slope	Required Master Plan Min.Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
CDT-10263	HWK1-05	JCT-1110	38.96	12.0	2276.54	2245.44	2245.33	31.10	0.28%	0.22%	0.22%	0.319	2.51	0.31	1.27
CDT_109	JCT_88	JCT_90	324.28	24.0	2154.00	2142.36	2142.10	11.64	0.08%	0.10%	0.08%	3.310	2.10	0.73	1.59
CDT_111	JCT_90	JCT_92	380.48	24.0	2154.00	2142.00	2141.70	12.00	0.08%	0.10%	0.08%	3.303	1.79	0.81	1.50
CDT_113	JCT_92	JCT_94	168.46	24.0	2156.51	2141.60	2141.46	14.91	0.08%	0.10%	0.08%	3.306	1.66	0.92	2.01
CDT_117	JCT_94	M1-21	22.25	24.0	2157.47	2141.46	2141.45	16.01	0.04%	0.10%	0.19%	6.362	3.21	0.97	-3.36
CDT_125	JCT_96	M2-03	183.15	12.0	2151.00	2141.37	2141.12	9.63	0.14%	0.22%	0.14%	0.046	0.80	0.20	0.59
CDT-897	JCT-1020	JCT-1024	313.30	10.0	2141.62	2133.44	2131.72	8.18	0.55%	0.28%	0.28%	0.416	3.35	0.39	0.95
CDT-899	JCT-1024	JCT-1026	305.31	10.0	2137.57	2131.52	2130.66	6.05	0.28%	0.28%	0.28%	0.422	2.70	0.48	0.55
CDT-901	JCT-1026	JCT-1028	298.45	10.0	2138.61	2130.36	2129.53	8.25	0.28%	0.28%	0.28%	0.427	2.71	0.49	0.55
CDT-903	JCT-1028	JCT-1030	284.96	10.0	2136.51	2129.23	2128.43	7.28	0.28%	0.28%	0.28%	0.433	2.72	0.49	0.54
CDT-905	JCT-1030	JCT-910	242.84	10.0	2135.71	2128.13	2127.45	7.58	0.28%	0.28%	0.28%	0.439	2.72	0.50	0.54
CDT-909	JCT-1032	STOR_54	131.22	10.0	2132.37	2126.02	2125.65	6.35	0.28%	0.28%	0.28%	0.470	2.72	0.53	0.50
CDT-929	JCT-1044	JCT-450	2379.58	10.0	2253.74	2248.07	2237.37	5.67	0.45%	0.28%	0.28%	0.420	3.16	0.40	0.82
CDT-933	JCT-1048	BEXT1-06DE6B	395.86	12.0	2205.00	2194.47	2193.68	10.53	0.20%	0.22%	0.20%	0.323	2.22	0.35	1.02
CDT-947	JCT-1060	JCT-1048	425.81	12.0	2210.00	2195.43	2194.57	14.57	0.20%	0.22%	0.20%	0.316	2.25	0.35	1.02
CDT-10243	JCT-1110	JCT-1264	370.27	15.0	2277.50	2245.06	2244.25	32.44	0.22%	0.15%	0.15%	0.948	3.11	0.43	1.60
CDT-10251	JCT-1112	JCT-1110	417.39	12.0	2273.00	2248.67	2247.50	24.33	0.28%	0.22%	0.22%	0.660	3.06	0.46	0.92
CDT-10253	JCT-1114	JCT-1112	395.97	12.0	2272.00	2250.18	2249.07	21.82	0.28%	0.22%	0.22%	0.551	2.91	0.41	1.03
CDT-10247	JCT-1116	JCT-1152	374.30	10.0	2269.50	2252.94	2251.89	16.56	0.28%	0.28%	0.28%	0.428	2.77	0.47	0.55
CDT-10249	JCT-1118	JCT-1116	312.50	10.0	2270.00	2254.22	2253.34	15.78	0.28%	0.28%	0.28%	0.420	2.76	0.47	0.55
CDT-10193	JCT-1138	JCT-1210	494.42	12.0	2258.00	2241.41	2240.03	16.59	0.28%	0.22%	0.22%	0.536	2.89	0.41	1.05
CDT-10177	JCT-1140	JCT-1196	303.82	15.0	2242.00	2231.86	2231.41	10.14	0.15%	0.15%	0.15%	0.777	2.69	0.44	1.33
CDT-10245	JCT-1152	JCT-1114	326.06	10.0	2272.00	2251.49	2250.58	20.51	0.28%	0.28%	0.28%	0.437	2.79	0.48	0.54
CDT-10169	JCT-1190	FWN1-23HA	220.81	15.0	2225.00	2216.68	2216.35	8.32	0.15%	0.15%	0.15%	0.959	2.89	0.49	1.14
CDT-10171	JCT-1192	JCT-1190	367.25	15.0	2232.00	2217.53	2216.98	14.47	0.15%	0.15%	0.15%	0.953	2.84	0.49	1.15
CDT-10173	JCT-1194	JCT-1192	309.54	15.0	2237.25	2218.30	2217.83	18.95	0.15%	0.15%	0.15%	0.946	2.85	0.49	1.16
CDT-10175	JCT-1196	JCT-1194	332.09	15.0	2239.00	2231.11	2230.61	7.89	0.15%	0.15%	0.15%	0.831	2.74	0.46	1.27
CDT-10179	JCT-1198	JCT-1140	283.03	15.0	2246.00	2232.49	2232.06	13.51	0.15%	0.15%	0.15%	0.769	2.69	0.44	1.33
CDT-10181	JCT-1200	JCT-1198	261.61	15.0	2249.50	2233.08	2232.69	16.42	0.15%	0.15%	0.15%	0.761	2.69	0.43	1.34
CDT-10183	JCT-1202	JCT-1200	405.10	15.0	2250.00	2233.99	2233.38	16.01	0.15%	0.15%	0.15%	0.707	2.60	0.42	1.40
CDT-10185	JCT-1204	JCT-1202	337.20	12.0	2250.00	2235.28	2234.54	14.72	0.22%	0.22%	0.22%	0.698	2.92	0.52	0.71
CDT-10187	JCT-1206	JCT-1204	284.67	12.0	2252.00	2236.54	2235.75	15.46	0.28%	0.22%	0.22%	0.630	3.02	0.45	0.95
CDT-10189	JCT-1208	JCT-1206	413.33	12.0	2254.50	2238.10	2236.94	16.40	0.28%	0.22%	0.22%	0.618	3.01	0.44	0.97
CDT-10191	JCT-1210	JCT-1208	366.75	12.0	2255.50	2239.53	2238.50	15.97	0.28%	0.22%	0.22%	0.607	2.99	0.44	0.98
CDT-10195	JCT-1212	JCT-1138	92.50	12.0	2258.00	2241.77	2241.51	16.23	0.28%	0.22%	0.22%	0.524	2.88	0.40	1.06
CDT-10197	JCT-1236	JCT-1212	300.68	10.0	2258.00	2244.69	2243.34	13.31	0.45%	0.28%	0.28%	0.315	2.93	0.34	0.92
CDT-10255	JCT-1260	JCT-1266	183.66	10.0	2284.00	2261.32	2260.50	22.68	0.45%	0.28%	0.28%	0.164	2.43	0.25	1.07

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Design Slope	10 State Standard Min. Slope	Required Master Plan Min.Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
CDT-10241	JCT-1264	JCT-1266	355.33	15.0	2279.50	2243.85	2243.07	35.65	0.22%	0.15%	0.15%	0.953	3.12	0.43	1.59
CDT-10257	JCT-1266	STOR_14	142.23	15.0	2282.00	2242.77	2242.45	39.23	0.22%	0.15%	0.15%	1.105	3.28	0.47	1.44
CDT-287	JCT-436	JCT-438	1135.41	10.0	2238.00	2232.26	2227.15	5.74	0.45%	0.28%	0.28%	0.344	2.15	0.36	0.89
CDT-289	JCT-438	JCT-440	299.60	12.0	2244.72	2227.15	2225.80	17.57	0.45%	0.22%	0.29%	0.897	3.71	0.48	1.11
CDT-291	JCT-440	JCT-442	312.62	12.0	2243.23	2225.80	2224.40	17.43	0.45%	0.22%	0.29%	0.896	3.71	0.48	1.11
CDT-293	JCT-442	JCT-444	308.16	12.0	2241.79	2224.40	2223.01	17.39	0.45%	0.22%	0.29%	0.896	3.69	0.48	1.11
CDT-295	JCT-444	JCT-446	286.46	12.0	2240.11	2223.01	2221.72	17.10	0.45%	0.22%	0.29%	0.895	3.73	0.49	1.11
CDT-297	JCT-446	FWN1-24	299.40	12.0	2234.96	2221.72	2220.42	13.24	0.43%	0.22%	0.29%	0.895	3.54	0.47	1.08
CDT-301	JCT-450	JCT-438	1419.28	10.0	2251.63	2234.38	2227.99	17.25	0.45%	0.28%	0.35%	0.529	3.36	0.46	0.71
CDT-321	JCT-468	JCT-470	321.23	8.0	2230.00	2223.00	2221.72	7.00	0.40%	0.40%	0.40%	0.012	1.13	0.10	0.63
CDT-323	JCT-470	JCT-472	337.50	8.0	2232.00	2221.62	2220.27	10.38	0.40%	0.40%	0.40%	0.021	1.31	0.12	0.62
CDT-325	JCT-472	JCT-474	326.63	8.0	2230.00	2220.17	2218.86	9.83	0.40%	0.40%	0.40%	0.033	1.50	0.15	0.61
CDT-327	JCT-474	JCT-476	325.61	8.0	2229.00	2218.76	2217.46	10.24	0.40%	0.40%	0.40%	0.041	1.59	0.17	0.60
CDT-335	JCT-476	BEXT1-19E4DE3KS	463.50	8.0	2229.00	2217.36	2215.50	11.64	0.40%	0.40%	0.40%	0.050	1.69	0.19	0.59
CDT-339	JCT-486	JCT-488	304.73	12.0	2230.00	2215.00	2214.39	15.00	0.20%	0.22%	0.20%	0.021	1.04	0.10	1.32
CDT-341	JCT-488	JCT-490	313.37	12.0	2226.00	2214.29	2213.66	11.71	0.20%	0.22%	0.20%	0.033	1.19	0.12	1.31
CDT-343	JCT-490	JCT-492	310.77	12.0	2226.00	2213.56	2212.94	12.44	0.20%	0.22%	0.20%	0.044	1.29	0.13	1.30
CDT-345	JCT-492	JCT-494	135.42	12.0	2224.00	2212.84	2212.57	11.16	0.20%	0.22%	0.20%	0.059	1.40	0.15	1.28
CDT-395	JCT-494	JCT-540	320.71	12.0	2219.00	2212.47	2211.83	6.53	0.20%	0.22%	0.20%	0.067	1.46	0.16	1.27
CDT-349	JCT-496	JCT-498	121.85	12.0	2214.00	2202.38	2202.13	11.62	0.20%	0.22%	0.20%	0.224	2.02	0.30	1.11
CDT-351	JCT-498	JCT-500	378.70	12.0	2221.00	2202.03	2201.28	18.97	0.20%	0.22%	0.20%	0.261	2.14	0.32	1.08
CDT-353	JCT-500	JCT-508	364.58	12.0	2228.00	2201.18	2200.45	26.82	0.20%	0.22%	0.20%	0.265	2.15	0.32	1.07
CDT-361	JCT-508	JCT-510	377.04	12.0	2214.00	2200.35	2199.59	13.65	0.20%	0.22%	0.20%	0.274	2.17	0.33	1.07
CDT-389	JCT-510	JCT-512	117.19	12.0	2207.00	2199.49	2199.26	7.51	0.20%	0.22%	0.20%	0.279	2.14	0.34	1.06
CDT-365	JCT-512	JCT-514	60.98	12.0	2215.00	2199.16	2199.04	15.84	0.20%	0.22%	0.20%	0.286	2.14	0.35	1.05
CDT-367	JCT-514	JCT-516	207.23	12.0	2211.00	2198.94	2198.52	12.06	0.20%	0.22%	0.20%	0.291	2.19	0.34	1.05
CDT-371	JCT-516	JCT-520	286.47	12.0	2221.00	2198.42	2197.85	22.58	0.20%	0.22%	0.20%	0.296	2.20	0.34	1.04
CDT-373	JCT-520	JCT-522	333.36	12.0	2202.00	2197.75	2197.08	4.25	0.20%	0.22%	0.20%	0.298	2.21	0.34	1.04
CDT-375	JCT-522	JCT-524	328.15	12.0	2213.00	2196.98	2196.33	16.02	0.20%	0.22%	0.20%	0.308	2.23	0.35	1.03
CDT-377	JCT-524	JCT-1060	349.36	12.0	2213.00	2196.23	2195.53	16.77	0.20%	0.22%	0.20%	0.315	2.25	0.35	1.02
CDT-347	JCT-540	JCT-496	335.93	12.0	2222.00	2203.15	2202.48	18.85	0.20%	0.22%	0.20%	0.218	2.03	0.29	1.12
CDT-471	JCT-614	JCT-616	350.91	10.0	2154.84	2143.33	2141.75	11.51	0.45%	0.28%	0.28%	0.322	2.86	0.35	0.91
CDT-473	JCT-616	JCT-618	293.15	10.0	2159.71	2141.75	2140.43	17.96	0.45%	0.28%	0.28%	0.335	2.89	0.36	0.90
CDT-475	JCT-618	JCT-620	276.93	10.0	2148.96	2140.43	2139.19	8.53	0.45%	0.28%	0.28%	0.349	2.92	0.37	0.89
CDT-477	JCT-620	JCT-622	315.70	10.0	2152.94	2139.19	2137.77	13.75	0.45%	0.28%	0.28%	0.361	2.96	0.38	0.87
CDT-479	JCT-622	JCT-624	308.81	10.0	2164.38	2137.77	2136.38	26.61	0.45%	0.28%	0.28%	0.373	2.97	0.38	0.86
CDT-481	JCT-624	JCT-626	266.19	10.0	2158.24	2136.38	2135.18	21.86	0.45%	0.28%	0.28%	0.385	3.04	0.39	0.85
CDT-483	JCT-626	STOR_48	189.78	12.0	2152.08	2134.84	2133.78	17.24	0.56%	0.22%	0.22%	0.740	3.83	0.42	1.50
CDT-543	JCT-674	JCT-676	309.42	10.0	2357.99	2352.11	2333.30	5.88	6.08%	0.28%	0.28%	0.306	7.29	0.18	4.24
CDT-545	JCT-676	JCT-678	289.35	10.0	2342.79	2333.10	2332.29	9.69	0.28%	0.28%	0.28%	0.318	2.51	0.41	0.66
CDT-547	JCT-678	JCT-680	279.21	10.0	2345.34	2331.99	2331.21	13.35	0.28%	0.28%	0.28%	0.330	2.53	0.42	0.65
CDT-549	JCT-680	JCT-682	256.82	10.0	2345.89	2330.91	2313.70	14.98	6.70%	0.28%	0.28%	0.356	7.88	0.19	4.41

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Design Slope	10 State Standard Min. Slope	Required Master Plan Min.Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
CDT-551	JCT-682	JCT-684	289.81	10.0	2323.18	2313.50	2294.08	9.68	6.70%	0.28%	0.28%	0.370	7.97	0.19	4.40
CDT-553	JCT-684	JCT-686	317.91	10.0	2303.90	2293.88	2272.58	10.02	6.70%	0.28%	0.28%	0.383	8.06	0.19	4.39
CDT-555	JCT-686	JCT-688	297.44	10.0	2278.49	2272.38	2252.46	6.11	6.70%	0.28%	0.28%	0.395	8.13	0.20	4.37
CDT-557	JCT-688	JCT-690	291.48	10.0	2258.39	2252.26	2235.21	6.13	5.85%	0.28%	0.28%	0.409	7.46	0.21	4.05
CDT-559	JCT-690	JCT-692	297.82	10.0	2243.39	2235.01	2234.18	8.38	0.28%	0.28%	0.28%	0.417	2.70	0.48	0.56
CDT-561	JCT-692	JCT-694	310.82	10.0	2240.04	2233.88	2233.01	6.16	0.28%	0.28%	0.28%	0.429	2.72	0.49	0.55
CDT-563	JCT-694	JCT-696	330.96	10.0	2242.02	2232.71	2231.78	9.31	0.28%	0.28%	0.28%	0.440	2.74	0.50	0.53
CDT-565	JCT-696	JCT-698	384.17	10.0	2239.00	2231.38	2230.30	7.62	0.28%	0.28%	0.28%	0.448	2.76	0.50	0.53
CDT-567	JCT-698	JCT-700	319.28	10.0	2237.84	2229.90	2229.01	7.94	0.28%	0.28%	0.28%	0.456	2.76	0.51	0.52
CDT-569	JCT-700	JCT-702	269.18	10.0	2236.22	2228.61	2227.86	7.61	0.28%	0.28%	0.32%	0.506	2.83	0.54	0.47
CDT-571	JCT-702	JCT-704	247.73	10.0	2238.21	2227.56	2226.86	10.65	0.28%	0.28%	0.33%	0.514	2.83	0.55	0.46
CDT-573	JCT-704	JCT-706	289.66	10.0	2237.55	2226.56	2225.75	10.99	0.28%	0.28%	0.34%	0.522	2.85	0.55	0.45
CDT-575	JCT-706	JCT-708	249.65	10.0	2237.51	2225.45	2213.34	12.06	4.85%	0.28%	0.35%	0.531	5.04	0.24	3.53
CDT-577	JCT-708	JCT-710	344.23	10.0	2219.21	2213.24	2212.28	5.97	0.28%	0.28%	0.36%	0.536	2.88	0.56	0.44
CDT-579	JCT-710	JCT-712	301.74	10.0	2219.31	2211.88	2211.04	7.43	0.28%	0.28%	0.36%	0.541	2.88	0.57	0.43
CDT-581	JCT-712	JCT-714	325.98	10.0	2219.64	2210.74	2209.82	8.90	0.28%	0.28%	0.37%	0.545	2.89	0.57	0.43
CDT-583	JCT-714	JCT-716	338.89	12.0	2218.52	2209.26	2207.49	9.26	0.52%	0.22%	0.22%	0.587	3.56	0.37	1.57
CDT-585	JCT-716	JCT-718	282.06	12.0	2213.53	2207.29	2206.67	6.24	0.22%	0.22%	0.22%	0.592	2.72	0.49	0.81
CDT-587	JCT-718	JCT-720	307.29	12.0	2214.58	2206.37	2205.70	8.21	0.22%	0.22%	0.22%	0.597	2.73	0.49	0.81
CDT-589	JCT-720	JCT-722	289.70	12.0	2214.45	2205.40	2204.76	9.05	0.22%	0.22%	0.22%	0.649	2.79	0.51	0.76
CDT-591	JCT-722	JCT-724	326.66	12.0	2213.92	2204.46	2203.74	9.46	0.22%	0.22%	0.22%	0.652	2.80	0.52	0.75
CDT-593	JCT-724	JCT-726	266.99	12.0	2215.05	2203.44	2202.85	11.61	0.22%	0.22%	0.22%	0.656	2.79	0.52	0.75
CDT-595	JCT-726	JCT-728	291.88	12.0	2213.05	2202.55	2201.91	10.50	0.22%	0.22%	0.22%	0.693	2.84	0.54	0.71
CDT-597	JCT-728	JCT-730	283.83	12.0	2214.75	2201.61	2200.99	13.14	0.22%	0.22%	0.22%	0.697	2.84	0.54	0.71
CDT-599	JCT-730	JCT-732	278.96	12.0	2214.00	2200.69	2200.07	13.31	0.22%	0.22%	0.22%	0.700	2.84	0.54	0.70
CDT-601	JCT-732	JCT-734	292.92	12.0	2214.00	2199.77	2199.13	14.23	0.22%	0.22%	0.22%	0.703	2.85	0.54	0.70
CDT-603	JCT-734	JCT-736	295.55	12.0	2213.71	2198.83	2198.18	14.88	0.22%	0.22%	0.22%	0.706	2.85	0.54	0.70
CDT-605	JCT-736	JCT-738	280.44	12.0	2214.00	2197.88	2197.26	16.12	0.22%	0.22%	0.22%	0.709	2.85	0.54	0.70
CDT-607	JCT-738	JCT-740	310.53	12.0	2213.82	2196.96	2196.28	16.86	0.22%	0.22%	0.22%	0.788	2.93	0.58	0.62
CDT-609	JCT-740	JCT-742	296.56	12.0	2206.58	2195.98	2195.33	10.60	0.22%	0.22%	0.22%	0.791	2.93	0.58	0.61
CDT-611	JCT-742	JCT-744	305.35	12.0	2204.57	2195.03	2194.35	9.54	0.22%	0.22%	0.22%	0.794	2.94	0.58	0.61
CDT-613	JCT-744	JCT-746	306.44	12.0	2203.98	2194.05	2193.38	9.93	0.22%	0.22%	0.23%	0.797	2.94	0.59	0.61
CDT-615	JCT-746	JCT-748	306.69	12.0	2203.67	2193.08	2192.41	10.59	0.22%	0.22%	0.23%	0.800	2.94	0.59	0.60
CDT-617	JCT-748	JCT-750	390.73	15.0	2205.56	2192.11	2191.25	13.45	0.22%	0.15%	0.15%	0.835	2.93	0.42	1.71
CDT-619	JCT-750	JCT-752	324.93	15.0	2205.98	2190.85	2190.13	15.13	0.22%	0.15%	0.15%	0.838	2.93	0.42	1.71
CDT-621	JCT-752	JCT-754	353.50	15.0	2202.64	2189.83	2189.05	12.81	0.22%	0.15%	0.15%	0.841	2.93	0.42	1.71
CDT-623	JCT-754	JCT-756	286.99	15.0	2206.13	2188.75	2188.12	17.38	0.22%	0.15%	0.15%	0.844	2.93	0.42	1.70
CDT-625	JCT-756	JCT-758	260.27	15.0	2200.99	2187.82	2187.25	13.17	0.22%	0.15%	0.15%	0.847	2.92	0.43	1.70
CDT-627	JCT-758	JCT-760	295.65	15.0	2202.46	2186.70	2186.26	15.76	0.15%	0.15%	0.15%	0.933	2.74	0.51	1.17
CDT-629	JCT-760	JCT-762	277.79	15.0	2199.81	2185.96	2160.96	13.85	9.00%	0.15%	0.15%	0.936	11.05	0.16	15.38
CDT-631	JCT-762	JCT-764	283.61	15.0	2167.23	2160.76	2144.59	6.47	5.70%	0.15%	0.15%	0.939	6.37	0.18	12.03
CDT-633	JCT-764	JCT-766	238.59	15.0	2150.88	2144.39	2144.03	6.49	0.15%	0.15%	0.15%	0.957	2.76	0.52	1.15

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Design Slope	10 State Standard Min. Slope	Required Master Plan Min.Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
CDT-635	JCT-766	JCT-768	244.07	15.0	2161.35	2143.83	2143.47	17.52	0.15%	0.15%	0.15%	0.959	2.76	0.52	1.14
CDT-637	JCT-768	JCT-770	280.76	15.0	2168.99	2143.27	2142.84	25.72	0.15%	0.15%	0.15%	0.962	2.76	0.52	1.14
CDT-639	JCT-770	JCT-772	295.21	15.0	2166.73	2142.64	2142.20	24.09	0.15%	0.15%	0.15%	0.965	2.76	0.52	1.14
CDT-641	JCT-772	JCT-774	320.22	15.0	2152.20	2141.90	2141.42	10.30	0.15%	0.15%	0.15%	0.967	2.76	0.52	1.14
CDT-643	JCT-774	JCT-776	281.79	15.0	2150.10	2141.12	2137.09	8.98	1.43%	0.15%	0.15%	0.970	5.77	0.27	5.52
CDT-645	JCT-776	JCT-778	302.58	15.0	2145.58	2136.89	2132.56	8.69	1.43%	0.15%	0.15%	0.972	5.78	0.27	5.52
CDT-647	JCT-778	STOR_52	221.70	15.0	2142.46	2132.36	2129.18	10.10	1.44%	0.15%	0.15%	0.975	5.75	0.27	5.53
CDT-893	JCT-906	JCT-1020	322.45	10.0	2140.75	2134.74	2133.84	6.01	0.28%	0.28%	0.28%	0.409	2.68	0.47	0.57
CDT-907	JCT-910	JCT-1032	296.45	10.0	2137.35	2127.15	2126.32	10.20	0.28%	0.28%	0.28%	0.464	2.77	0.51	0.51
CDT-841	JCT-970	JCT-972	270.85	10.0	2323.20	2301.15	2296.28	22.05	1.80%	0.28%	0.28%	0.385	5.04	0.27	2.09
CDT-843	JCT-972	JCT-974	152.58	10.0	2302.18	2296.08	2283.87	6.10	8.00%	0.28%	0.28%	0.422	8.76	0.20	4.79
CDT-845	JCT-974	JCT-976	318.69	10.0	2290.01	2283.77	2266.56	6.24	5.40%	0.28%	0.28%	0.441	7.77	0.22	3.84
CDT-847	JCT-976	JCT-978	282.43	10.0	2272.67	2266.36	2235.30	6.31	11.00%	0.28%	0.29%	0.482	10.27	0.19	5.64
CDT-849	JCT-978	JCT-980	224.65	10.0	2241.70	2235.10	2214.20	6.60	9.30%	0.28%	0.36%	0.538	9.96	0.21	5.09
CDT-851	JCT-980	JCT-982	393.10	10.0	2220.39	2214.10	2177.54	6.29	9.30%	0.28%	0.41%	0.574	10.19	0.22	5.05
CDT-853	JCT-982	GAR1-15	253.34	10.0	2184.40	2177.34	2164.17	7.06	5.20%	0.28%	0.44%	0.593	8.07	0.25	3.61
CDT_115	M1-22	JCT_94	137.70	24.0	2155.70	2141.73	2141.46	13.97	0.19%	0.10%	0.10%	3.479	1.83	0.87	3.54
CDT_119	M1-22A	JCT_92	20.43	6.0	2156.51	2144.99	2141.65	11.52	16.34%	0.40%	0.40%	0.016	1.12	0.07	1.90
CDT_127	M2-04	M2-05	177.89	12.0	2149.71	2142.32	2142.06	7.39	0.15%	0.22%	0.15%	0.009	0.61	0.33	0.95
CDT_123	M2-04A	JCT_96	176.78	6.0	2152.77	2144.53	2143.39	8.24	0.64%	0.40%	0.40%	0.015	1.33	0.15	0.32
CDT_121	M2-05	JCT_96	320.36	12.0	2152.14	2141.96	2141.47	10.18	0.15%	0.22%	0.15%	0.031	0.90	0.14	0.94
CDT_107	M2-09B	JCT_88	156.16	24.0	2156.00	2142.58	2142.46	13.42	0.08%	0.10%	0.08%	3.332	3.47	0.30	13.24

Appendix I

CIP Packets

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J-U-B ENGINEERS, INC.

City of Coeur d'Alene - 2022 Wastewater Collection System Update - CIP Cost Summary Table by Project Category

PROJECT CATEGORY	TOTAL PROBABLE COST IN 2022 DOLLARS[1]	0 - 5 YEARS	5 - 10 YEARS	10 - 20 YEARS	AS NEEDED/WITH GROWTH	AS NEEDED FOR RR
CAPACITY	**$18,238,000**	$1,598,000	$1,978,000	-	$14,662,000	-
SYSTEM MODIFICATION	**$1,553,000**	-	-	-	$1,553,000	-
REPLACE/REHABILITATION	**$7,008,000**	-	-	-	-	$7,008,000
MASTER PLAN EXTENSION	**$9,386,000**	-	$130,000	-	$9,256,000	-
FUTURE LIFT STATION	**$11,728,000**	-	-	-	$11,728,000	-
Approximate Total	**$47,913,000**	**$1,598,000**	**$2,108,000**	**$0**	**$37,199,000**	**$7,008,000**

1. Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Pipe and fitting costs used for this cost opinion were obtained from H.D. Fowler in 2021 and 2022. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

J-U-B ENGINEERS, INC.

City of Coeur d'Alene - 2022 Wastewater Collection System Update - CIP Cost Summary Table - Capacity Projects

	PROJECT NUMBER	PROJECT/MH IDENTIFIERS	REFERENCE FIGURE	ISSUE	RECOMMENDED ACTION	ESTIMATED CONSTRUCTION SUBTOTAL	CONTINGENCY [1]	CONSTRUCTION PLUS CONTINGENCY	PLANNING, ENGINEERING, & ADMINISTRATION COSTS [2]	TOTAL PROBABLE COST IN 2022 DOLLARS [3]	0 - 5 YEARS	5 - 10 YEARS	10 - 20 YEARS	AS NEEDED/ WITH GROWTH	AS NEEDED FOR RR
CAPACITY	C.1	BUS1-01 to BUS2-01	C.1	Undersized trunk/Upstream inflow	Pipe replacement and inflow reduction	$248,000.00	$74,000.00	$322,000.00	$64,000.00	**$386,000.00**	x				
	C.2	M1-21 to M2-09B	C.2	Undersized trunk	Pipe replacement and re-route flow	$777,000.00	$233,000.00	$1,010,000.00	$202,000.00	**$1,212,000.00**	x				
	C.3	M3-17	N/A	Undersized trunk/insufficient slope	Verify slopes and inverts	-	-	-	-	**-**					
	C.4	RIV1-02 to FWN1-01	C.4	Undersized interceptor	New parallel pipe and re-route flow	$5,237,000.00	$1,571,000.00	$6,808,000.00	$1,362,000.00	**$8,170,000.00**				x	
	C.5	-	-	-	-	-	-	-	-	**-**					
	C.6	GAR1-01 to GAR1-15	C.6	Undersized trunk	Pipe replacement	$1,036,000.00	$311,000.00	$1,347,000.00	$269,000.00	**$1,616,000.00**				x	
	C.7	M1-14 to M1-18	C.7	Undersized trunk	Pipe replacement	$1,268,000.00	$380,000.00	$1,648,000.00	$330,000.00	**$1,978,000.00**		x			
	C.8	-	-	-	-	-	-	-	-	**-**					
	C.9	Mill River Lift Station & Force Main	C.9	Insufficient pump and force main capacity	Upgrade pumps, utilize existing 8" pipe for upsized force main, and add emergency storage	$276,000.00	$83,000.00	$359,000.00	$72,000.00	**$431,000.00**				x	
	C.10	FWN1-22A to FWN1-23HA	C.10	Undersized trunk/insufficient slope	Pipe replacement and re-grade inverts	$1,460,000.00	$438,000.00	$1,898,000.00	$380,000.00	**$2,278,000.00**				x	
	C.11	FWN1-04 to FWN1-11	C.11	Insufficient slope	Re-grade inverts	$1,012,000.00	$304,000.00	$1,316,000.00	$263,000.00	**$1,579,000.00**				x	
	C.12	RAM1-42 to RAM1-46B	C.12	Undersized trunk	New parallel pipe and re-route flow	$377,000.00	$113,000.00	$490,000.00	$98,000.00	**$588,000.00**				x	
									Approximate Total	**$18,238,000.00**					

1. Estimated at 30% of construction subtotal.
2. Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.
3. Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Pipe and fitting costs used for this cost opinion were obtained from H.D. Fowler in 2021 and 2022. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

J-U-B ENGINEERS, INC.

City of Coeur d'Alene - 2022 Wastewater Collection System Update - CIP Cost Summary Table - System Modification Projects

	PROJECT NUMBER	PROJECT/MH IDENTIFIERS	REFERENCE FIGURE	ISSUE	RECOMMENDED ACTION	ESTIMATED CONSTRUCTION SUBTOTAL	CONTINGENCY [1]	CONSTRUCTION PLUS CONTINGENCY	PLANNING, ENGINEERING, & ADMINISTRATION COSTS [2]	TOTAL PROBABLE COST IN 2022 DOLLARS [3]	0 - 5 YEARS	5 - 10 YEARS	10 - 20 YEARS	AS NEEDED/ WITH GROWTH	AS NEEDED FOR RR
SYSTEM MODIFICATION	S.1	FWN1-22 to FWN1-24	S.1	Insufficient depth to serve	Pipe replacement with growth	$186,000.00	$56,000.00	$242,000.00	$48,000.00	**$290,000.00**				x	
	S.2	BEXT1-06DE3 to BEXT1-06DE6B	S.2	Insufficient depth to serve upstream extension	Pipe replacement with Nettleton extension	$223,000.00	$67,000.00	$290,000.00	$58,000.00	**$348,000.00**				x	
	S.3	-	-	-	-	-	-	-	-	**-**					
	S.4	Hawks Nest Lift Station	S.4	Insufficient pump capacity	Upgrade pumps	$516,000.00	$155,000.00	$671,000.00	$134,000.00	**$805,000.00**				x	
	S.5	-	-	-	-	-	-	-	-	**-**					
	S.6	Foothills Lift Station	S.6	Re-route to future Nettleton Gulch extension	Abandon lift station with completion of Nettleton Gulch extension	$71,000.00	$21,000.00	$92,000.00	$18,000.00	**$110,000.00**				x	
	S.7	-	-	-	-	-	-	-	-	**-**					
									Approximate Total	**$1,553,000.00**					

1. Estimated at 30% of construction subtotal.

2. Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3. Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Pipe and fitting costs used for this cost opinion were obtained from H.D. Fowler in 2021 and 2022. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

J·U·B ENGINEERS, INC.

City of Coeur d'Alene - 2022 Wastewater Collection System Update - CIP Cost Summary Table - Replace and Rehabilitation Projects

	PROJECT NUMBER	PROJECT/MH IDENTIFIERS	REFERENCE FIGURE	ISSUE	RECOMMENDED ACTION	ESTIMATED CONSTRUCTION SUBTOTAL	CONTINGENCY[1]	CONSTRUCTION PLUS CONTINGENCY	PLANNING, ENGINEERING, & ADMINISTRATION COSTS[2]	TOTAL PROBABLE COST IN 2022 DOLLARS[3]	0 - 5 YEARS	5 - 10 YEARS	10 - 20 YEARS	AS NEEDED/ WITH GROWTH	AS NEEDED FOR RR
REPLACE/REHAB	RR.30	M2-04B to M2-03A (NewMH)	RR.30	Poor condition 6" PVC and concrete pipe	8" Open Trench Replacement	$170,000.00	$51,000.00	$221,000.00	$44,000.00	**$265,000.00**					x
	RR.31	M4-09HN to M4-09HN3 M4-09GN to M4-09GN1 M4-09FN to M4-09FN1	RR.31	Poor condition 6" PVC and concrete pipe	8" Open Trench Replacement	$440,000.00	$132,000.00	$572,000.00	$114,000.00	**$686,000.00**					x
	RR.32	DAV1-05A to DAV1-05C	RR.32	Poor condition 6" PVC pipe	8" Open Trench Replacement	$111,000.00	$33,000.00	$144,000.00	$29,000.00	**$173,000.00**					x
	RR.33	M3-22C to M3-22E	RR.33	Poor condition 6" concrete pipe	8" Open Trench Replacement	$219,000.00	$66,000.00	$285,000.00	$57,000.00	**$342,000.00**					x
	RR.35	M2-22A to M2-22C	RR.35	Poor condition 6" concrete pipe	8" Open Trench Replacement	$233,000.00	$70,000.00	$303,000.00	$61,000.00	**$364,000.00**					x
	RR.36	M2-25 to M2-26A	RR.36	Poor condition 6" concrete pipe	8" Open Trench Replacement	$258,000.00	$77,000.00	$335,000.00	$67,000.00	**$402,000.00**					x
	RR.37	M1-37B to M1-37E M1-37C to M1-37D	RR.37	Poor condition 6" concrete pipe	8" Open Trench Replacement	$385,000.00	$116,000.00	$501,000.00	$100,000.00	**$601,000.00**					x
	RR.38	M3-20D to M3-20E	RR.38	Poor condition 6" concrete pipe	8" Open Trench Replacement	$162,000.00	$49,000.00	$211,000.00	$42,000.00	**$253,000.00**					x
	RR.39	M7-07 to M7-08	RR.39	Poor condition 8" PVC pipe	8" Cured-in-Place Pipe Rehabilitation	$13,000.00	$4,000.00	$17,000.00	$3,000.00	**$20,000.00**					x
	RR.40	Varies (see Appendix I)	RR.40	Poor condition 8" to 12" pipe (concrete, clay & PVC)	8", 10", 12" Cured-in-Place Pipe Rehabilitation	$714,000.00	$214,000.00	$928,000.00	$186,000.00	**$1,114,000.00**					x
	RR.41	Varies (see Appendix I)	RR.41	Pipe material transitions to concrete (Pipe Size Ranging from 8" to 12")	8"and 12" Partial Cured-in-Place Pipe Rehabilitation	$248,000.00	$74,000.00	$322,000.00	$64,000.00	**$386,000.00**					x
	RR.42	GAR1-110B to GAR1-11M M7-09D to M7-09D1	RR.42	Poor condition 8" PVC pipe	8" Open Trench Replacement & 8" Cured-in-Place Pipe	$499,000.00	$150,000.00	$649,000.00	$130,000.00	**$779,000.00**					x
	RR.43	M1-23EE to M1-23FE	RR.43	Poor condition 6" concrete pipe	8" Open Trench Replacement	$173,000.00	$52,000.00	$225,000.00	$45,000.00	**$270,000.00**					x
	RR.44	B1-42 to B1-43[5]	RR.44	Poor condition 24" concrete pipe	24" Cured-in-Place Pipe Rehabilitation * Project extents to be further reviewed	$120,000.00	$36,000.00	$156,000.00	$31,000.00	**$187,000.00**					x
	RR.45	B1-17 to B1-18[5]	RR.45	Poor condition 24" concrete pipe	24" Cured-in-Place Pipe Rehabilitation * Project extents to be further reviewed	$62,000.00	$19,000.00	$81,000.00	$16,000.00	**$97,000.00**					x
	RR.46	M1-26 to M3-02[5]	RR.46	Poor condition 15" concrete pipe	15" Cured-in-Place Pipe Rehabilitation * Project extents to be further reviewed	$47,000.00	$14,000.00	$61,000.00	$12,000.00	**$73,000.00**					x
	RR.47	M1-21C to M1-21D	RR.47	Poor condition 6" concrete and PVC pipe	8" Open Trench Replacement	$345,000.00	$104,000.00	$449,000.00	$90,000.00	**$539,000.00**					x
	RR.48	M2-05 to M2-06B	RR.48	Poor condition 6" concrete pipe	8" Open Trench Replacement	$200,000.00	$60,000.00	$260,000.00	$52,000.00	**$312,000.00**					x
	Point Repair	Varies (see Appendix I)	Point Repair	Pipe material generally new (i.e. PVC, HDPE, CIPP) with single high priority defect	8", 12" and 18" Point Repair to Fix High Priority Defect	$93,000.00	$28,000.00	$121,000.00	$24,000.00	**$145,000.00**					x
	No Project	Varies (see Appendix I)	No Project	Pipe material generally new (i.e. PVC, HDPE, CIPP) with single high priority defect	No project recommended.	-	-	-	-	-					x
									Approximate Total	**$7,008,000.00**					

1. Estimated at 30% of construction subtotal.

2. Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3. Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Pipe and fitting costs used for this cost opinion were obtained from H.D. Fowler in 2021 and 2022. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4. 2022 Construction Cost is based on 2005 bid opening results and escalation. Project assumes an LID would be implemented.

5. Large diameter CIPP Project extents should be further reviewed and defined. Cost per linear foot of large diameter CIPP project is dependent on bypass pumping requirements.

J-U-B ENGINEERS, INC.

City of Coeur d'Alene - 2022 Wastewater Collection System Update - CIP Cost Summary Table - Master Plan Extension Projects

	PROJECT NUMBER	PROJECT/MH IDENTIFIERS	REFERENCE FIGURE	ISSUE	RECOMMENDED ACTION	ESTIMATED CONSTRUCTION SUBTOTAL	CONTINGENCY [1]	CONSTRUCTION PLUS CONTINGENCY	PLANNING, ENGINEERING, & ADMINISTRATION COSTS [2]	TOTAL PROBABLE COST IN 2022 DOLLARS [3]	0 - 5 YEARS	5 - 10 YEARS	10 - 20 YEARS	AS NEEDED/ WITH GROWTH	AS NEEDED FOR RR
MASTER PLAN EXTENSION	E.1	-	-	-	-	-	-	-	-	-					
	E.2.01	Lakeside Study Extension North	A12	Growth/Expansion	Service extension as needed with growth	$550,000.00	$165,000.00	$715,000.00	$143,000.00	**$858,000.00**				x	
	E.2.02	Lakeside Study Extension South	A12	Growth/Expansion	Service extension as needed with growth	$644,000.00	$193,000.00	$837,000.00	$167,000.00	**$1,004,000.00**				x	
	E.3	-	-	-	-	-	-	-	-	-					
	E.4	Nettleton Gulch Extension	A12	Growth/Expansion	Service extension as needed with growth	$952,000.00	$286,000.00	$1,238,000.00	$248,000.00	**$1,486,000.00**				x	
	E.5	Hill Drive Extension	A12	Growth/Expansion	Service extension as needed with growth	$414,000.00	$124,000.00	$538,000.00	$108,000.00	**$646,000.00**				x	
	E.6	Silver Beach Interceptor	A12	Growth/Expansion	Service extension as needed with growth	$389,000.00	$117,000.00	$506,000.00	$101,000.00	**$607,000.00**				x	
	E.7	Blackwell Hill Interceptor	A12	Growth/Expansion	Service extension as needed with growth	$2,674,000.00	$802,000.00	$3,476,000.00	$695,000.00	**$4,171,000.00**				x	
	E.8	Cougar Bay Interceptor	A12	Growth/Expansion	Service extension as needed with growth	$310,000.00	$93,000.00	$403,000.00	$81,000.00	**$484,000.00**				x	
	E.9[4]	Montana Pressure Sewer	A12	Unsewered area in the City	Incorporate into collection system	$83,000.00	$25,000.00	$108,000.00	$22,000.00	**$130,000.00**		x			
									Approximate Total	**$9,386,000.00**					

1. Estimated at 30% of construction subtotal.
2. Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.
3. Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Pipe and fitting costs used for this cost opinion were obtained from H.D. Fowler in 2021 and 2022. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.
4. 2022 Construction Cost is based on 2005 bid opening results and escalation. Project assumes an LID would be implemented.

J-U-B ENGINEERS, INC.

City of Coeur d'Alene - 2022 Wastewater Collection System Update - CIP Cost Summary Table - Future Lift Station Projects

	PROJECT NUMBER	PROJECT/MH IDENTIFIERS	REFERENCE FIGURE	ISSUE	RECOMMENDED ACTION	ESTIMATED CONSTRUCTION SUBTOTAL	CONTINGENCY [1]	CONSTRUCTION PLUS CONTINGENCY	PLANNING, ENGINEERING, & ADMINISTRATION COSTS [2]	TOTAL PROBABLE COST IN 2022 DOLLARS [3]	0 - 5 YEARS	5 - 10 YEARS	10 - 20 YEARS	AS NEEDED/ WITH GROWTH	AS NEEDED FOR RR
FUTURE LIFT STATION	LS.1	Blackwell Hill LS and Force Main	A12	Growth/Expansion	Service extension as needed with growth	$2,238,000.00	$671,000.00	$2,909,000.00	$582,000.00	**$3,491,000.00**				x	
	LS.2	Cougar Bay LS and Force Main	A12	Growth/Expansion	Service extension as needed with growth	$2,004,000.00	$601,000.00	$2,605,000.00	$521,000.00	**$3,126,000.00**				x	
	LS.3	-	-	-	-	-	-	-	-	**-**					
	LS.4	Silver Beach LS and Force Main	A12	Growth/Expansion	Service extension as needed with growth	$2,257,000.00	$677,000.00	$2,934,000.00	$587,000.00	**$3,521,000.00**				x	
	LS.5	Evergreen LS and Force Main	A12	Growth/Expansion	Service extension as needed with growth	$1,019,000.00	$306,000.00	$1,325,000.00	$265,000.00	**$1,590,000.00**				x	
									Approximate Total	**$11,728,000.00**					

1. Estimated at 30% of construction subtotal.

2. Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

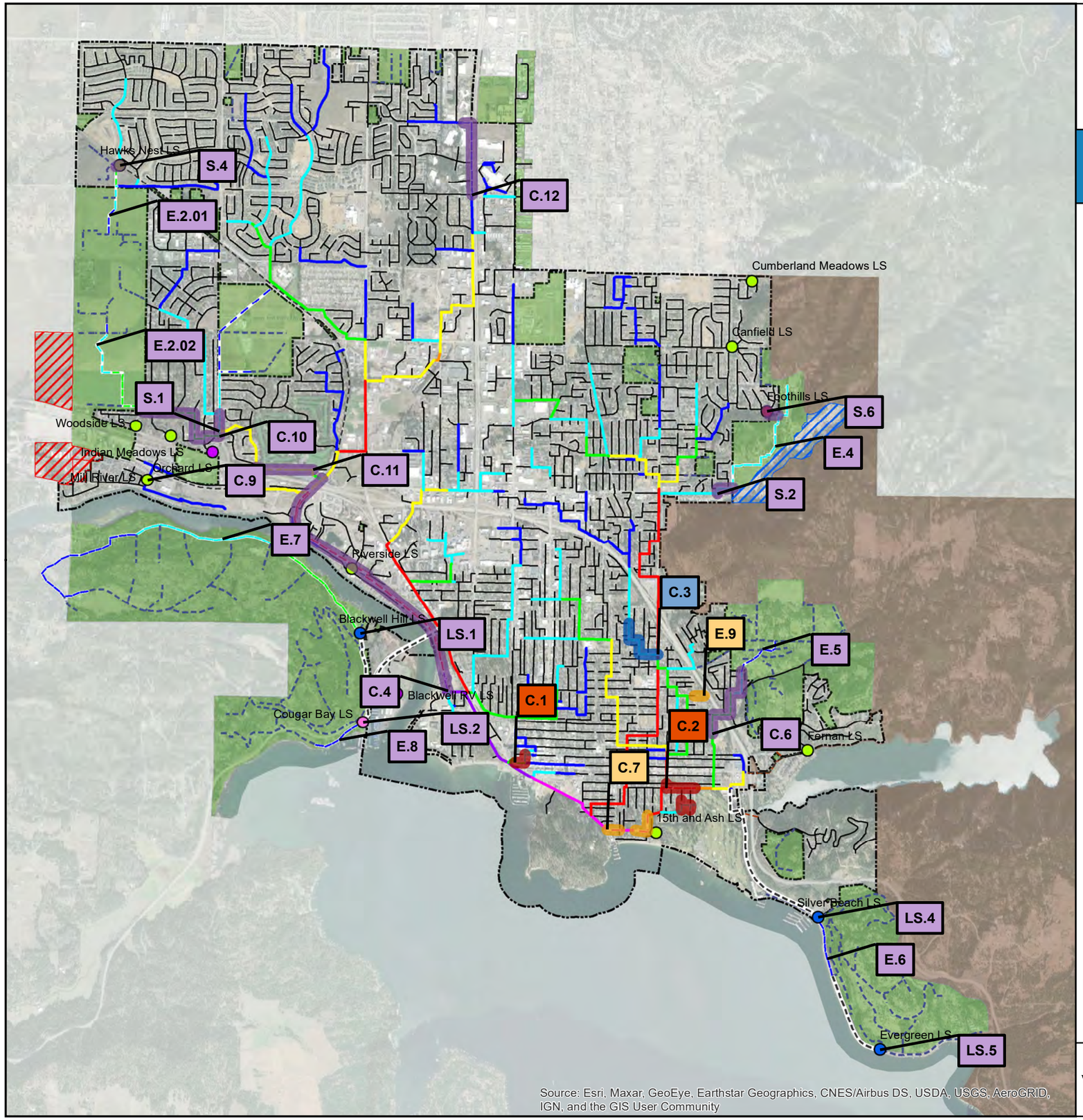
3. Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Pipe and fitting costs used for this cost opinion were obtained from H.D. Fowler in 2021 and 2022. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

City of Coeur d'Alene IDAHO

CIP Summary Map



Master Plan Size (in)

- 10
- 12
- 15
- 18
- 21
- 24
- 30
- 36
- Check Line
- Force Main

CIP Timeframe

- 0 - 5 Years
- 5 - 10 Years
- As Needed With Growth
- Do Nothing

Existing Size (in)

- 10
- 12
- 15
- 18
- 21
- 24
- 30
- 36
- Collector
- Force Main
- Siphon

Lift Stations

- Existing - City
- Existing Privately Owned & Maintained
- Abandoned
- Master Planned - City
- Master Planned - Privately Owned & Maintained
- City Limits
- Area of City Impact Outside Study Boundary
- Future WW Service Area

No Service Areas

- Not Served by City
- FEMA Flood Plain

Note:

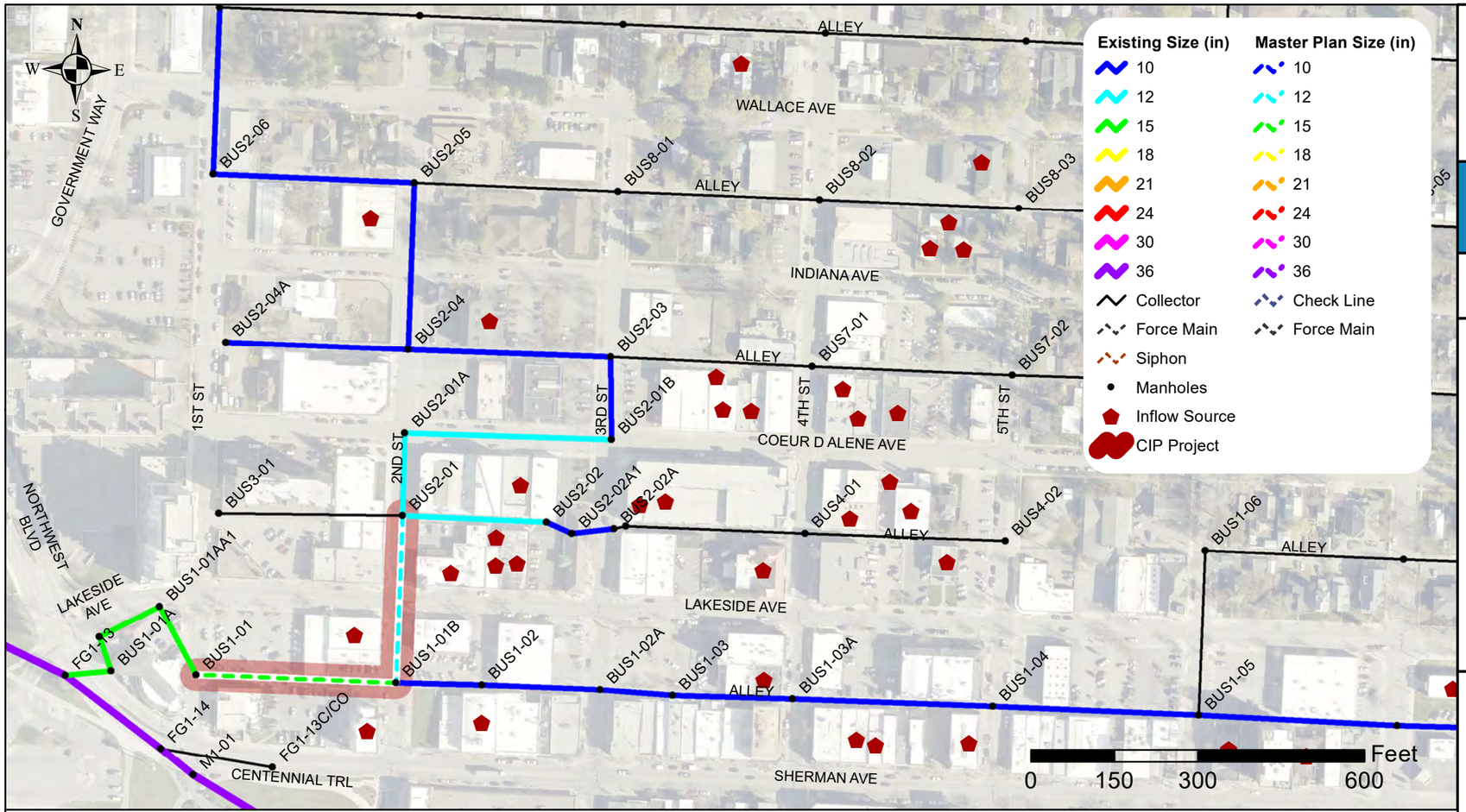
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

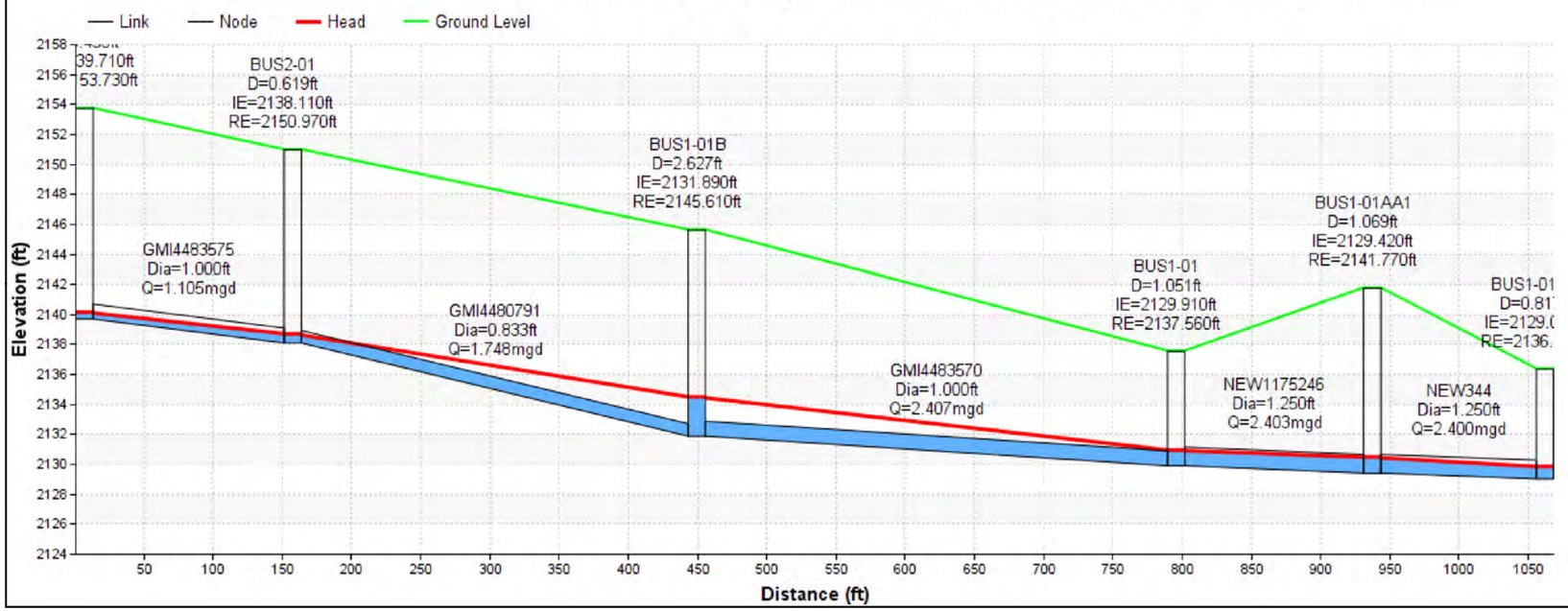
0 2,000 4,000 8,000 Feet

PRINT DATE: 11/4/2022

JUB



C.1 - Maximum Water Surface Profile (Master Plan Flows Without Improvement)



City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

C.1 BUS1-01

CORE ISSUE — **Insufficient Capacity**

BACKGROUND

The Business District sewershed has many roof drains, parking lots, and catch basins that are connected directly to the sewer. The total impervious inflow area in the sewer shed is about 2.91 AC.

The Existing Sewer Model shows surcharging of up to 1.6 feet at BUS1-02 but this increases to 1.7 feet under the Master Plan Scenario.

Redevelopment of the downtown area was not accounted for in the Master Plan Model. Future redevelopment should be considered before implementation of this project.

See Appendix E for more background information.

RECOMMENDED SOLUTION

This project has two parts, pipe replacement and inflow source removal.

Pipe Replacement

> Replace 359 LF of 12-inch gravity trunk from BUS1-01 to BUS1-01B with 15-inch pipe.

> Replace 301 LF of 10-inch gravity trunk from BUS1-01B to BUS2-01 with 12-inch pipe.

> Opinion of Probable Cost (Sept 2022 Dollars) **$386,000**

Inflow Source Removal

Disconnect the following inflow sources as identified in the 2013 Master Plan:

> B1-B4, B6-B12, B15, B18-B25, B29, B31, B34-B39, and P1-P4

> Opinion of Probable Cost For Inflow Removal Not Included

PROJECT TIMING

This project was identified in the Existing Sewer Model, which represents the combination of existing sewer flows and a storm event. **0 - 5 years**

NOTE:

1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

PRINT DATE: 11/4/2022

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

C.2 M1-21

CORE ISSUE — **Insufficient Capacity**

BACKGROUND

Part of the existing trunk line from M1-20 to M2-09B is under large trees, landscaping, and an existing home. This portion of the trunk has been rehabilitated with CIPP (M2-03 to M2-09D).

The Existing Sewer Model shows surcharging of up to 0.9 feet at M2-09D but this increases to 1.4 feet under the Committed Model Scenario. The C.2 Project preliminary design is currently underway. Preliminary design inverts and routing was included in the Master Plan Model to evaluate the design under Master Plan Flows.

Redevelopment of the downtown area was not accounted for in the Master Plan Model. Future redevelopment should be considered before implementation of this project.

See Appendix E for more background information.

RECOMMENDED SOLUTION

Install a 24-inch relief sewer from M2-09B to M1-21 routed west on Mullan Avenue. Install 12-inch sewer from M2-04 to M2-03 routing North in the Alley between 18th and 19th Street, west on Young Avenue, and South in the Alley between 17th and 18th Street.

> Install 1,189 LF of 24-inch gravity trunk from M2-09B to M1-21.

> Install 681 LF of 12-inch gravity trunk from M2-04 to M2-03.

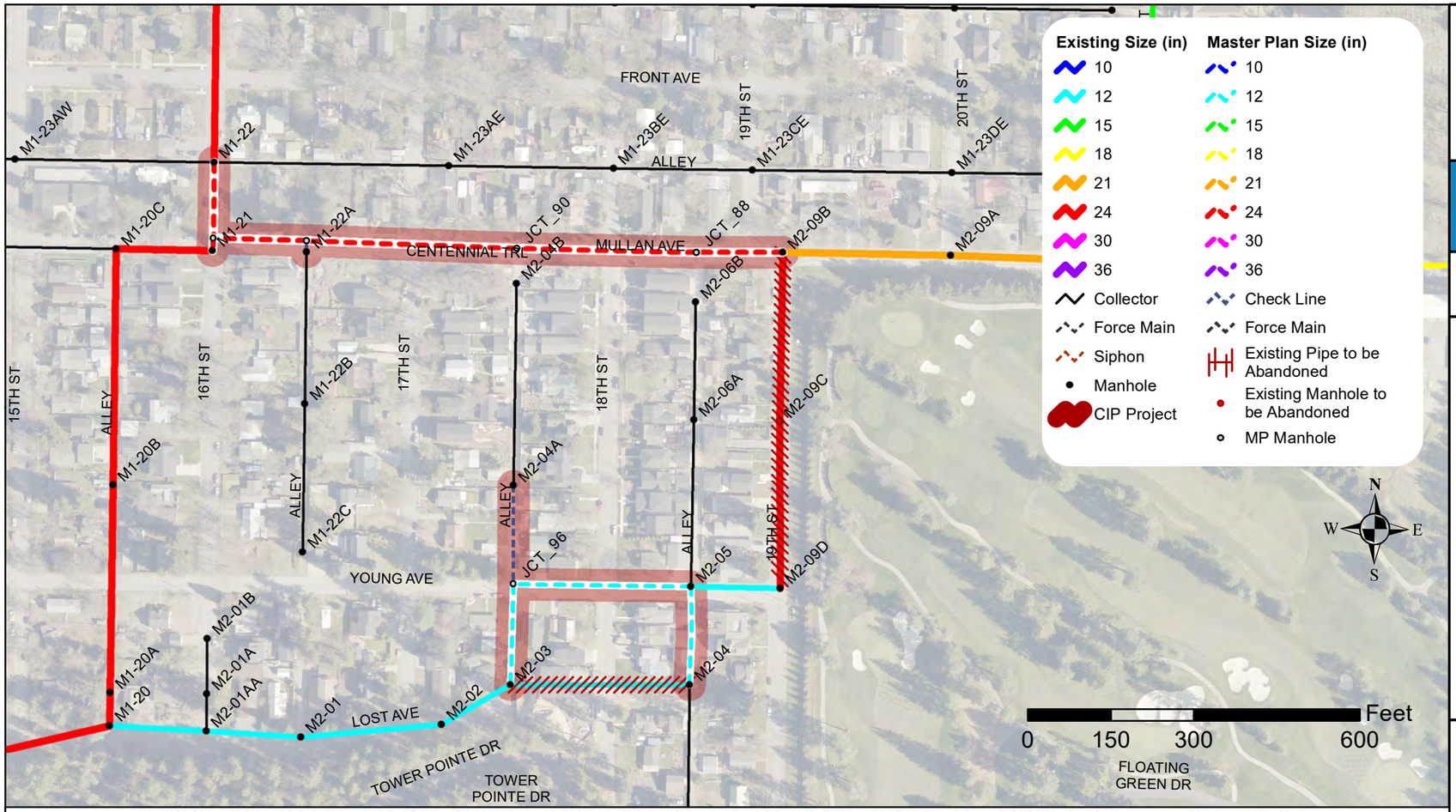
> Abandon existing 24-inch gravity trunk from M2-09B to M2-09D and existing 12-inch gravity trunk from M2-04 to M2-03.

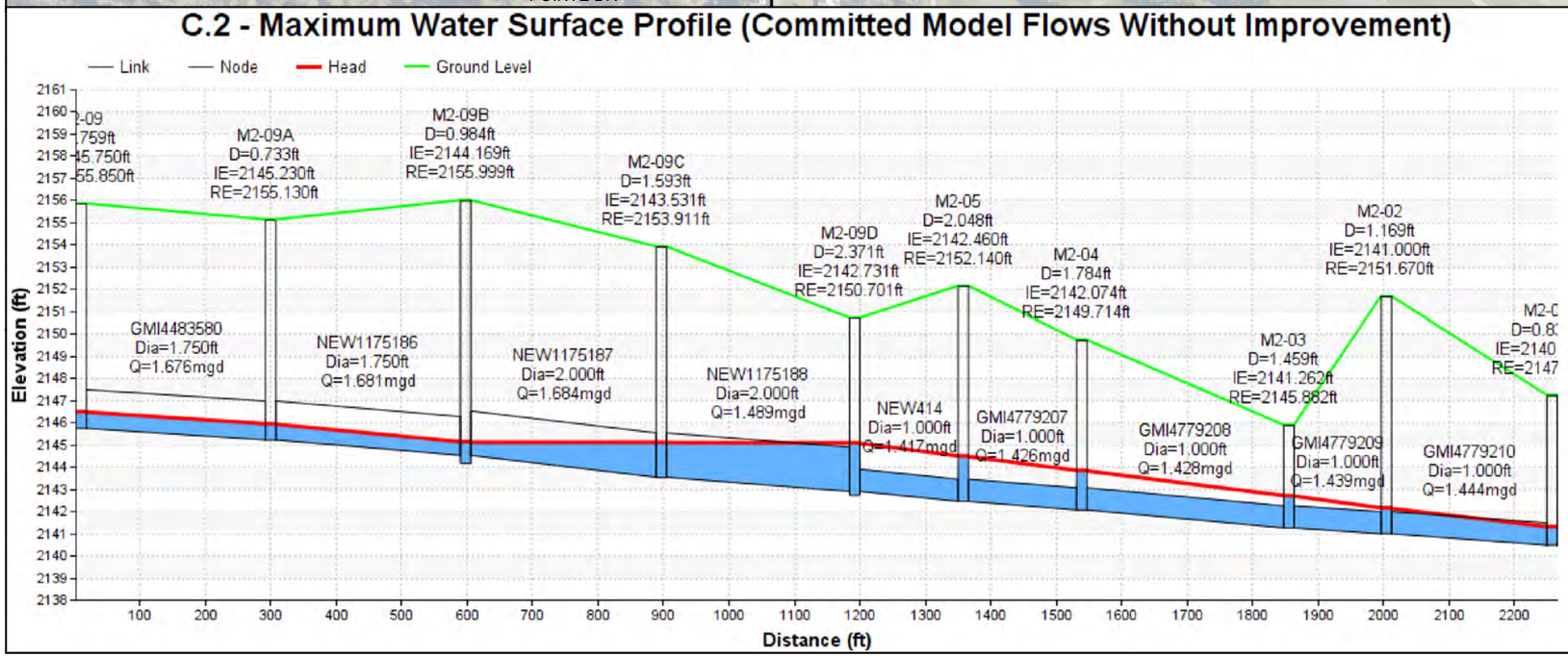
> Opinion of Probable Cost (Sept 2022 Dollars) **$1,212,000**

> Opinion of Probable Cost for Water System Improvements Not Included

PROJECT TIMING

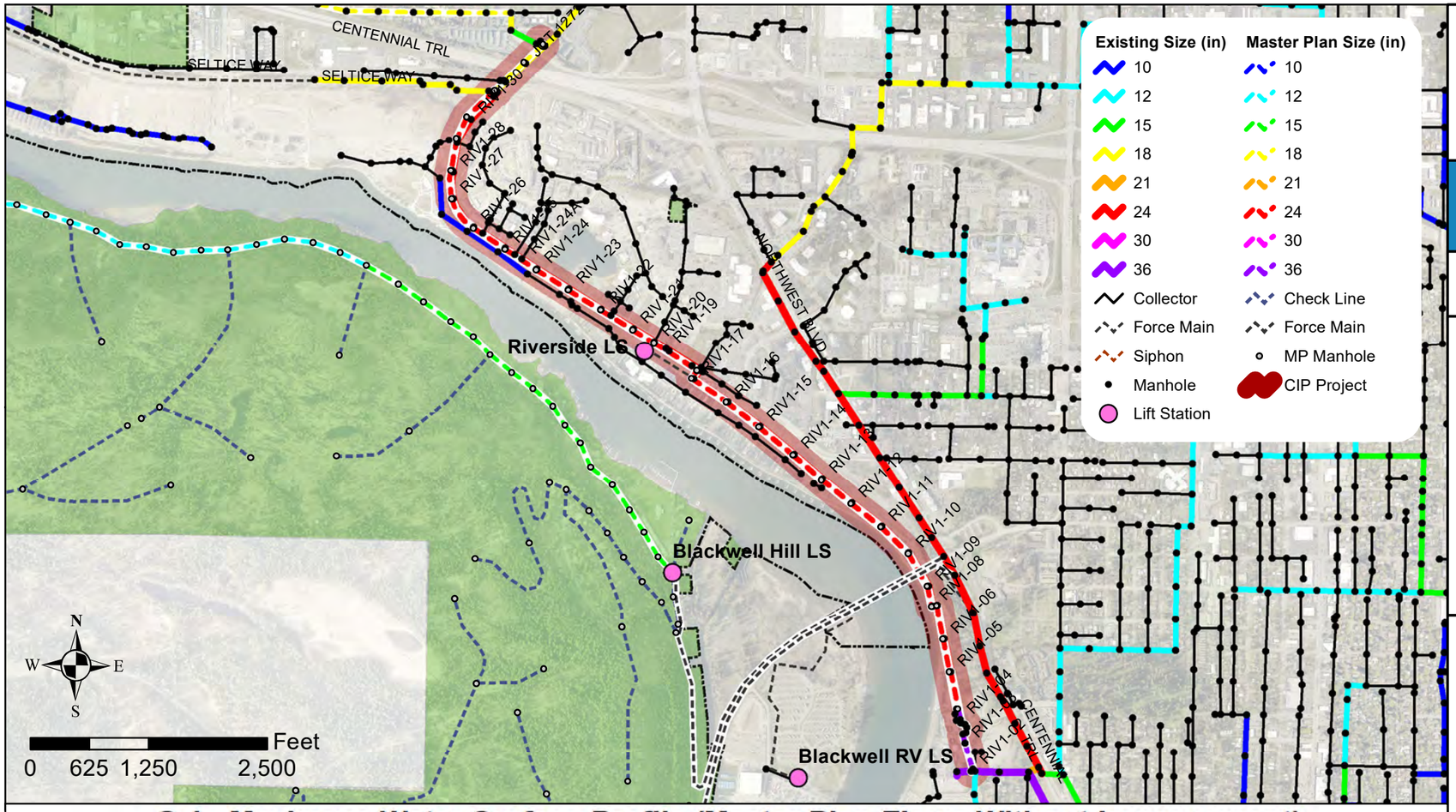
This project was identified in the Existing Sewer Model, which represents the combination of existing sewer flows and a storm event. **0 - 5 years**





NOTE:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

PRINT DATE: 11/4/2022



City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

City of Coeur d'Alene IDAHO

C.4 RIV1-02

CORE ISSUE — **Insufficient Capacity**

BACKGROUND

The existing 24-inch Riverside Interceptor serves flows from the RIV, FWN/AF/AEX, and RX/REX/RAM sewer basins and follows the Centennial Trail alignment from Seltice Way to the wastewater treatment plant. The existing pipe does not have enough remaining capacity to accommodate increased flows from the Lakeside Study Area and future flows.

The Existing and Committed Model scenarios show no surcharging within this reach but shows surcharging up to 0.6 feet at RIV1-03B under the Master Plan Scenario.

See Appendix E for more background information.

RECOMMENDED SOLUTION

Install a 24-inch relief sewer from RIV1-04 to RIV1-33 that runs parallel to the existing 24-inch interceptor, upsize the 24-inch interceptor from FG1-01 to RIV1-04, extend an 18-inch gravity line to FWN1-01 to re-route the flows from Fairway Drive, and extend a 21-inch gravity line to the Hawks Nest Force Main discharge to re-route the lift station flows into the new gravity sewer interceptor. Logistics and routing for bypassing flow is to be determined in design.

> Install 746 LF of 36-inch gravity trunk from FG1-01 to the new manhole upstream of RIV1-04.

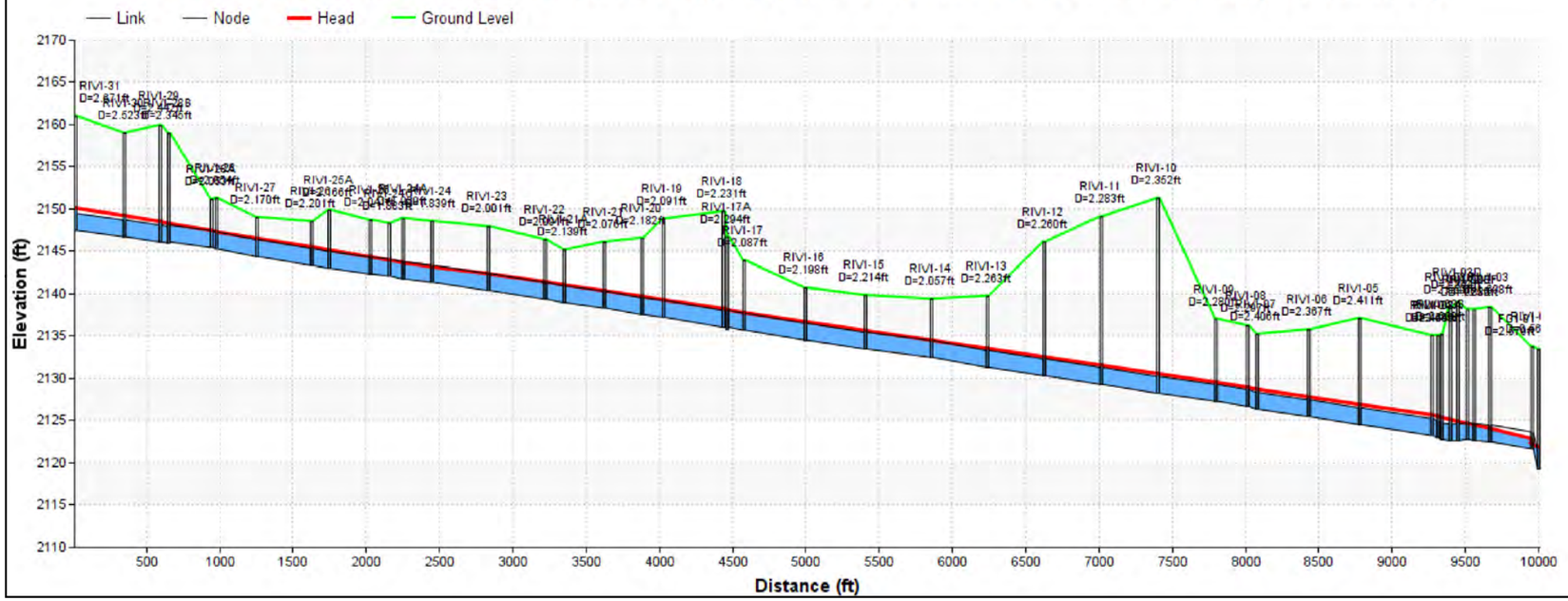
> Install 9,734 LF of 24-inch gravity trunk from the new manhole upstream of RIV1-04 to the new manhole adjacent to HWK-01.

> Install 16 LF of 21-inch gravity trunk from HWK-01 to the new adjacent manhole.

> Install 752 LF of 18-inch gravity trunk from Seltice Way to FWN1-01

> Opinion of Probable Cost (Sept 2022 Dollars) **$8,170,000**

C.4 - Maximum Water Surface Profile (Master Plan Flows Without Improvement)



PROJECT TIMING

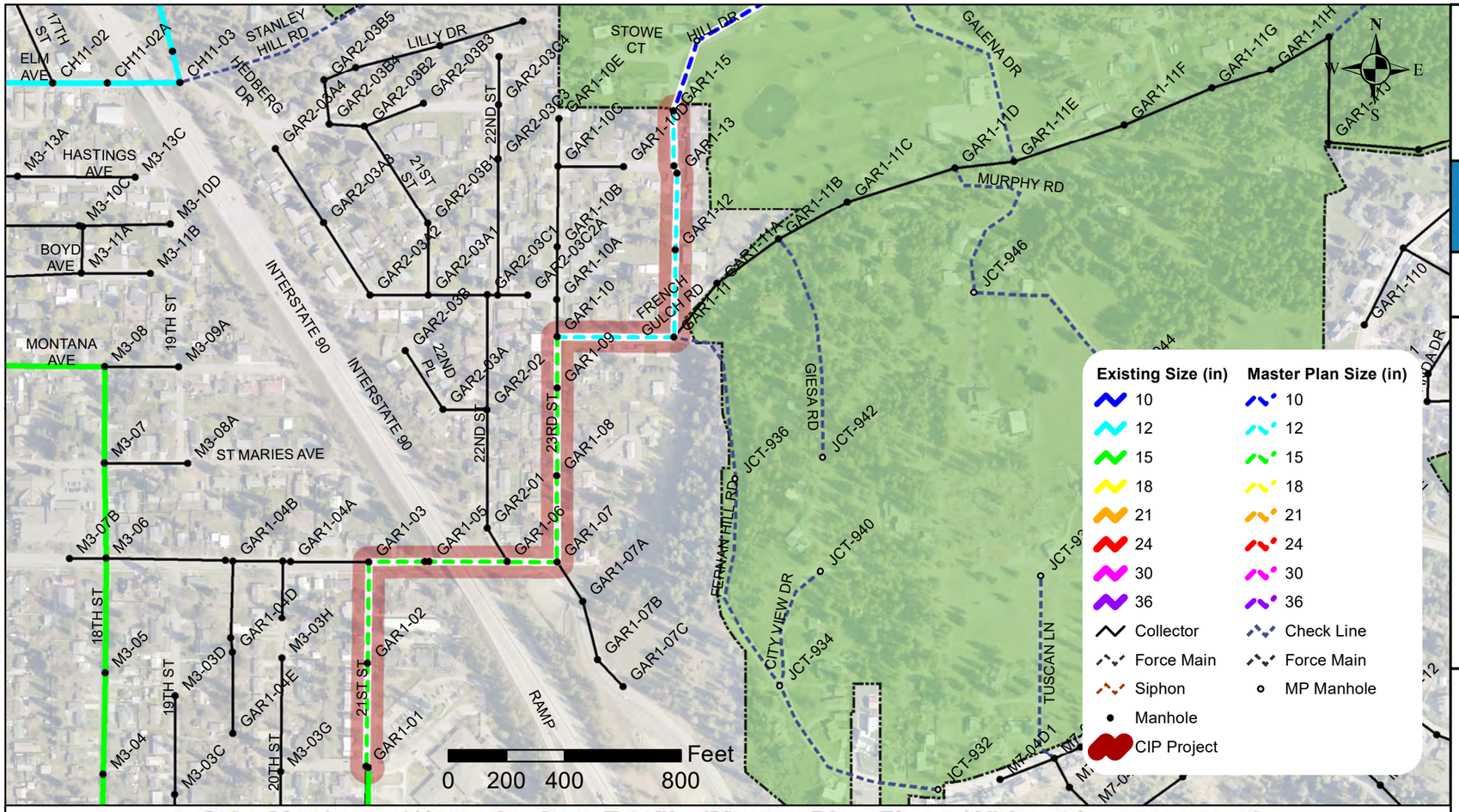
This project was identified in the Master Plan Model, which represents the combination of Master Plan sewer flows and a storm event. Reference the Lakeside Study and coordinate with the developer for more specific project timing.

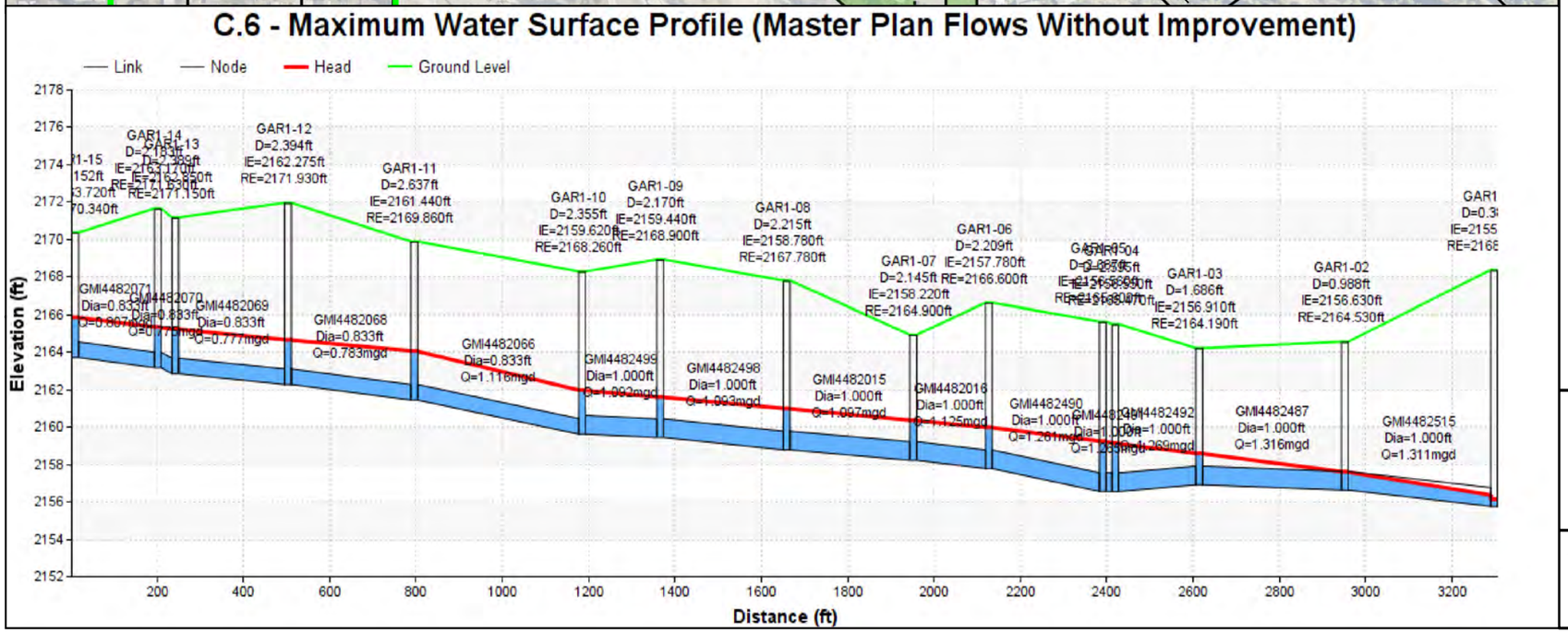
As Needed with Growth

NOTE:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

PRINT DATE: 11/4/2022

JUB





City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

C.6 GAR1-01

CORE ISSUE — **Insufficient Capacity**

BACKGROUND

The existing 12-inch gravity line extends from GAR1-01 at the intersection of Garden Avenue and 21st Street to GAR1-10 where it transitions into a 10-inch gravity line to GAR1-15. This line was not sized for the future flows from the Hill Drive Extension (reference CIP project E.5). There is an inverted siphon storm line between GAR1-04 and GAR1-05 that is to be accounted for in design.

The Existing Sewer Model shows surcharging of up to 0.3 feet at GAR1-05 but this increases to 1.7 feet under the Master Plan Scenario.

See Appendix E for more background information.

RECOMMENDED SOLUTION

Upsize the 10-inch and 12-inch trunk sewer from GAR1-01 to GAR1-15 to serve future flows from the master planned Hill Drive Extension.

> Replace 2,133 LF of 12-inch gravity trunk from GAR1-01 to GAR1-10 with 15-inch gravity trunk.

> Replace 1,181 LF of 10-inch gravity trunk from GAR1-10 to GAR1-15 with 12-inch gravity trunk.

> Opinion of Probable Cost (Sept 2022 Dollars) **$1,616,000**

PROJECT TIMING

This project was identified in the Master Plan Model, which represents the combination of Master Plan sewer flows and a storm event. This project should be completed before the Hill Drive Extension is brought online.

As Needed with Growth

NOTE:
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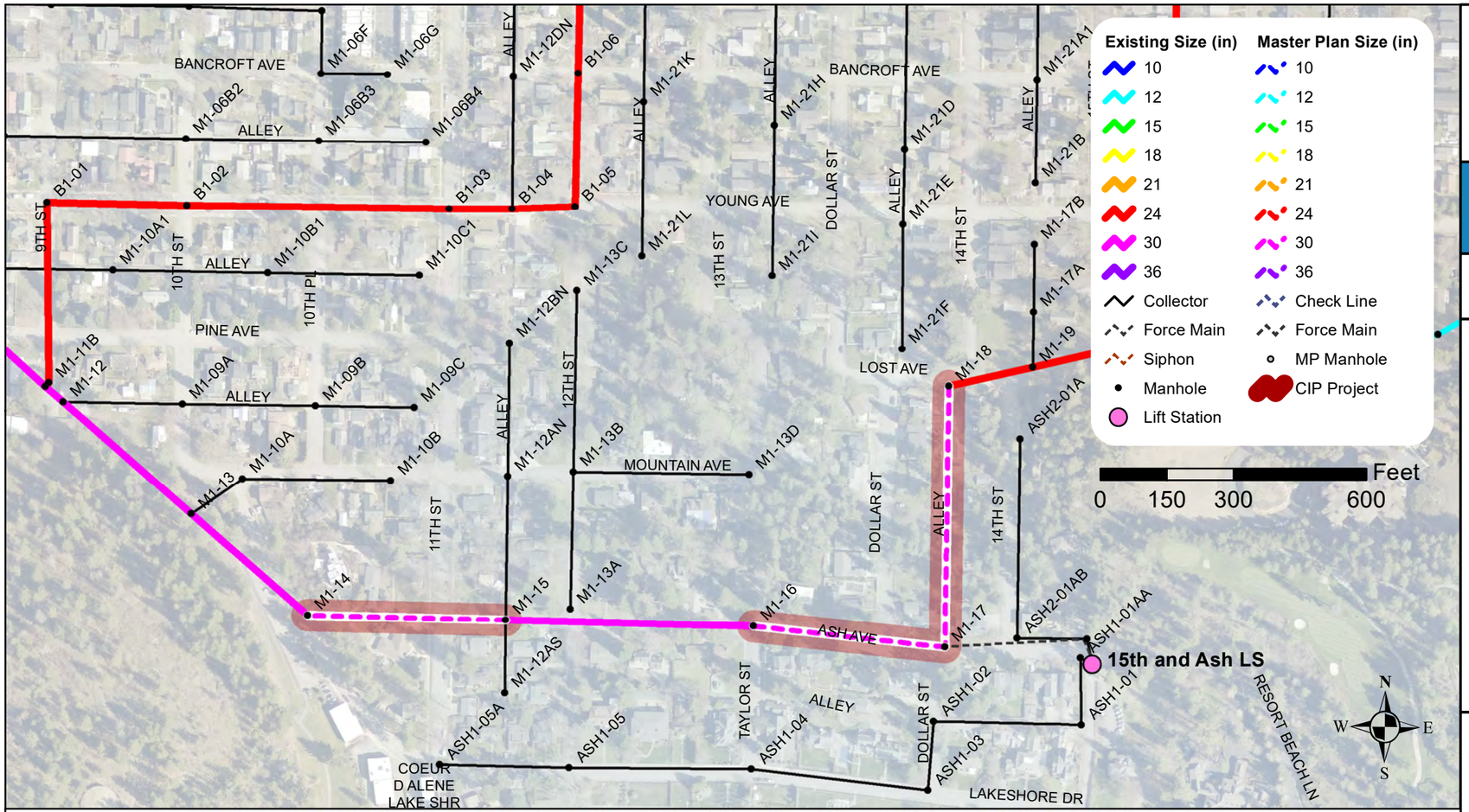

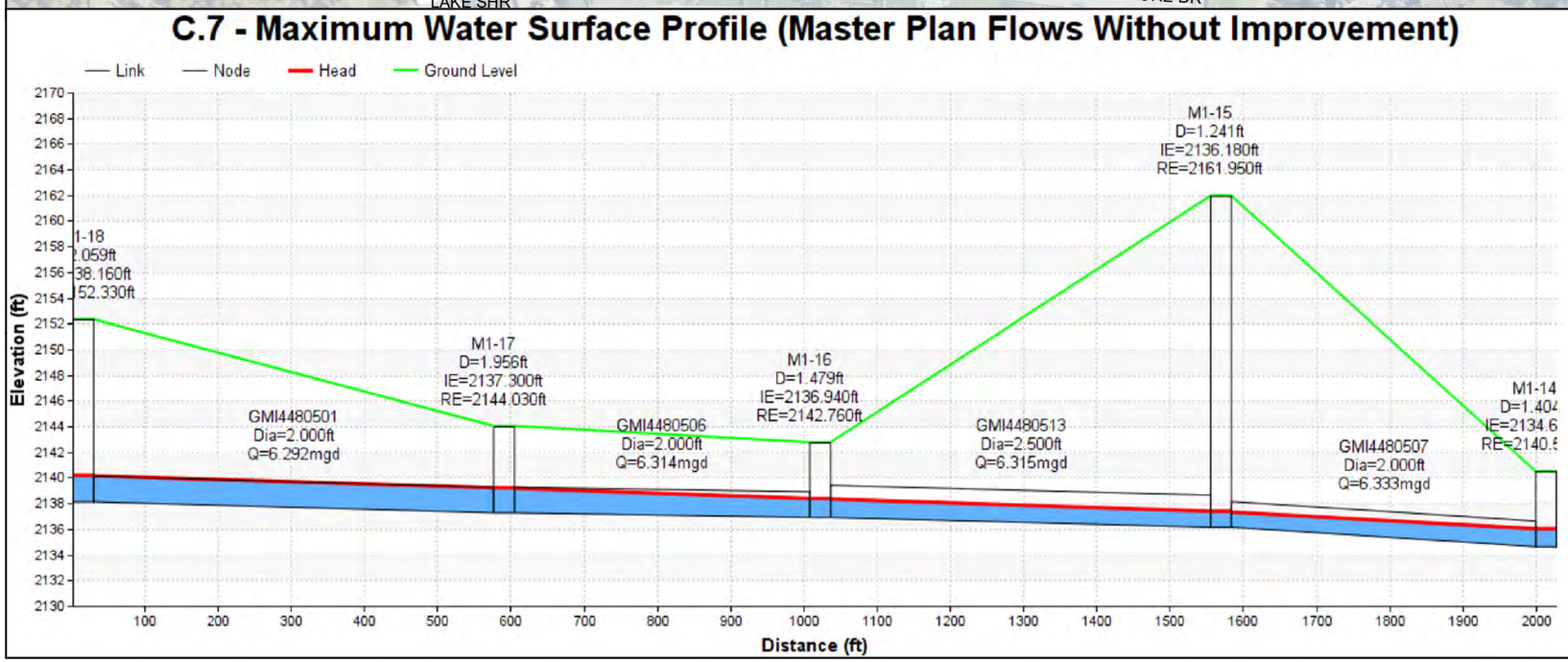

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

C.7 M1-14

CORE ISSUE — **Insufficient Capacity**

BACKGROUND

The existing 24-inch gravity sewer trunk line from M1-14 to M1-15 has existing 30-inch lines upstream and downstream causing a bottleneck.

The Existing and Committed Model scenarios show no surcharging within this reach but shows surcharging up to 0.1 feet at M1-18 and M1-17 has less than 0.1 feet of depth remaining before surcharging under the Master Plan Scenario.

Redevelopment of the area was not accounted for in the Master Plan Model. Future redevelopment should be considered before implementation of this project.

See Appendix E for more background information.

RECOMMENDED SOLUTION

Upsize the 24-inch sewer from M1-14 to M1-18 to serve future flows from the upstream master planned areas and eliminate the existing bottleneck.

Design should consider the alternate alignment continuing south in Dollar Street, west in Lakeshore Drive, and connecting to M1-14 in 10th Street. If alternate alignment is used, re-routing of existing laterals is to be determined in design.

> Replace 1,469 LF of 24-inch gravity trunk from M1-14 to M1-15 and M1-16 to M1-18 with 30-inch gravity trunk.

> Opinion of Probable Cost (Sept 2022 Dollars) **$1,978,000**

PROJECT TIMING

This project was identified in the Master Plan Model with surcharge, which represents the combination of Master Plan sewer flows and a storm event. However, Existing and Committed models show minimal capacity remaining.

5 - 10 years

NOTE:
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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

C.9 Mill River

Lift Station and Force Main

CORE ISSUE — **Insufficient Capacity**

BACKGROUND

The Mill River Lift Station is a duplex submersible lift station that is responsible for pumping wastewaters from the Mill River Subdivision. The lift station is equipped with two 40 hp submersible Hydromatic Model S4B pumps with 10.75-inch impellers capable of 300 gpm each. The 10.75-inch impellers provide sufficient capacity for exisitng and committed flows, but a 11.375-inch impeller will be required in the future to meet master planned flows at buildout conditions (peak flows of approximately 375 gpm).

Although the lift station has a generator for stand-by power, it does not have 45-minute emergency storage in the event of a lift station failure as required by the Wastewater Utility. Construction of an emergency storage basin is recommended upon reaching the committed flows for the lift station. The basin should provide 45-minutes storage at peak master plan flows, which equates to approximately 17,000 gallons. The most likely location for the storage basin is in the median, although there are utility conflicts in this area (e.g., force mains, gravity sewer, power).

The lift station currently discharges through a 6-inch force main to Manhole HUT-8. In order to serve future flows, the Mill River Lift Station should utilize the existing 8-inch force main and connect to the existing 8-inch siphon from the intersection of Grand Mill Lane and Seltice Way to HUT-8 which would result in an increased firm capacity of 650 gpm with the upgraded pumps and 11.375-inch impeller. Reference the 2013 Master Plan Appendix J for discussion regarding alternate solutions.

RECOMMENDED SOLUTION

Current planned upgrades as summarized below are sufficient if development follows the current density assumptions. Lift station upgrades should be reevaluated upon design if development densities differ from this master plan.

> Replace impellers with 11.735-inch impellers

> Add 17,000 gallons of emergency storage

> Utilize existing 8-inch Mill River force main and existing 8-inch siphon pipe to existing discharge manhole HUT-8

> Opinion of Probable Cost (Sept 2022 Dollars) **$431,000**

PROJECT TIMING

Add emergency storage upon reaching committed flows (198 gpm). Other improvements as needed with increased flows.

As Needed with Growth

NOTE:
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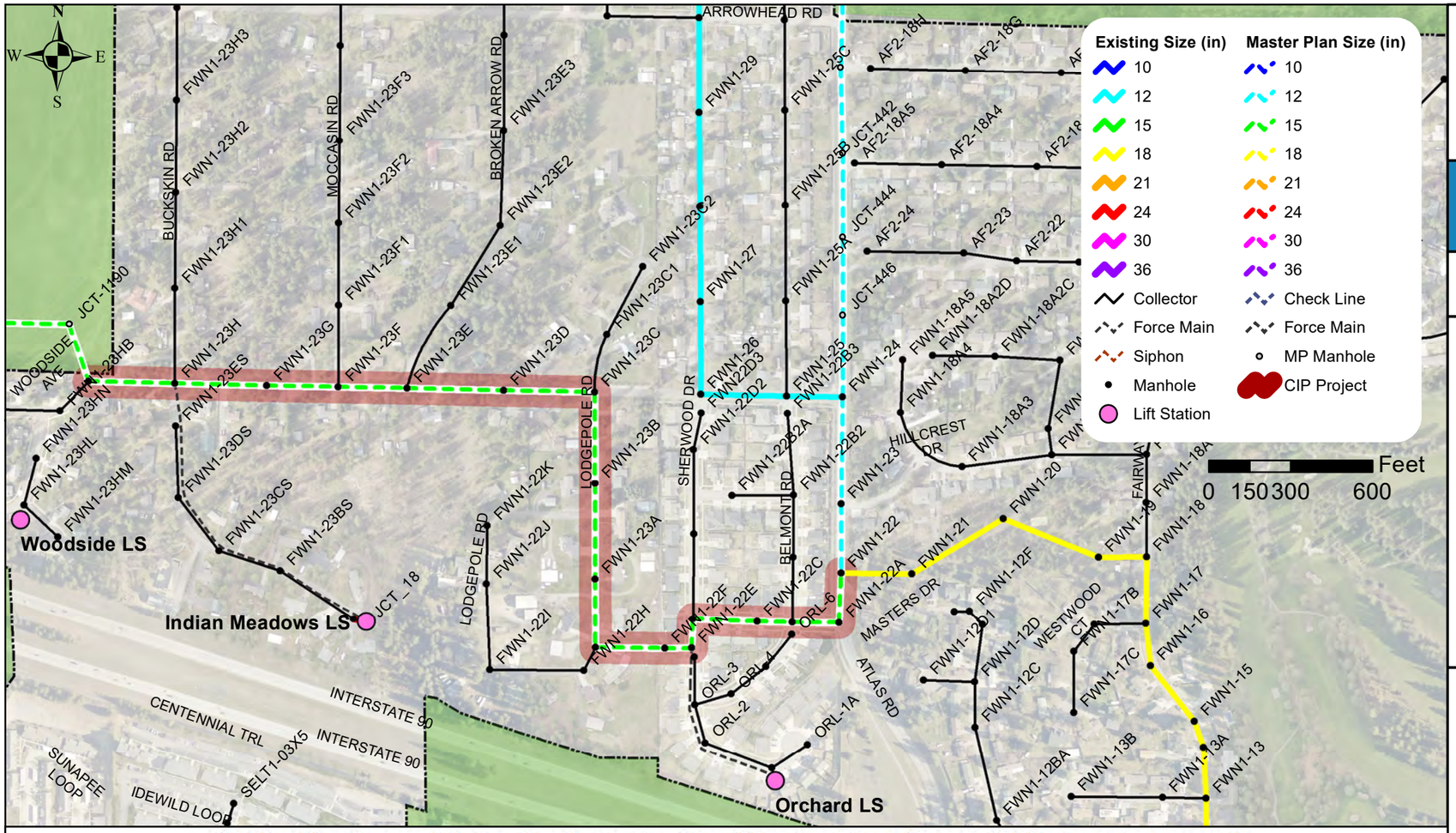
Existing Size (in)	Master Plan Size (in)
10	10
12	12
15	15
18	18
21	21
24	24
30	30
36	36
Collector	Check Line
Force Main	Force Main
Siphon	MP Manhole
Manhole	Future WW Service Area
Lift Station	CIP Project

0 205 410 820 Feet



City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

C.10 FWN1-22A

CORE ISSUE — **Insufficient Capacity**

BACKGROUND

The existing 12-inch gravity sewer trunk line is not sized for the increased flows from the Lakeside Study Extension South (reference CIP project E.2.02). Existing pipe slopes are variable and contain several near-flat reaches.

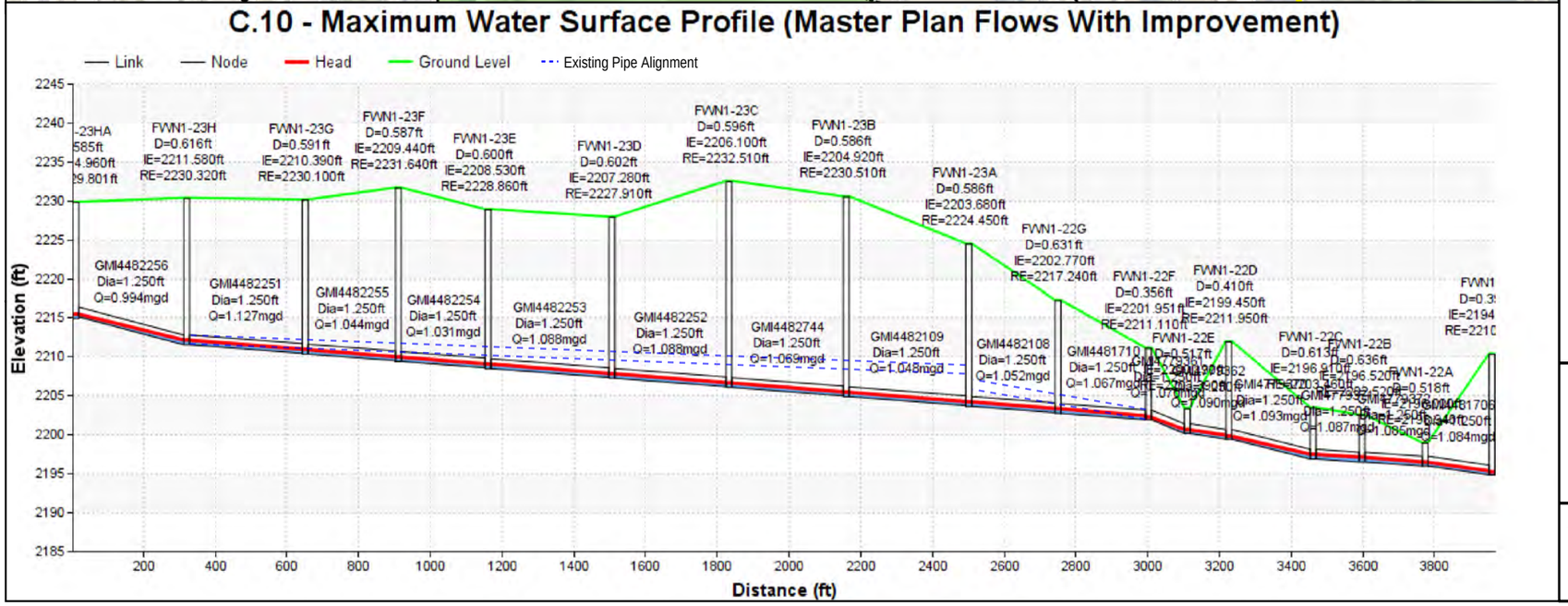
Future flows from the upstream development require a larger trunk pipe size. In order to avoid downstream bottlenecks, the 12-inch gravity line from FWN1-22 to FWN1-HA was upsized in the Master Plan Scenario.

RECOMMENDED SOLUTION

Upsize the 12-inch trunk sewer from FWN1-22 to FWN1-22HA and re-grade the pipe slope to serve future flows from the master planned Lakeside Study Extension South. Design should consider the alternative alignment continuing east on Appaloosa Road and connecting to the existing trunk in Atlas Road.

> Replace 3,968 LF of 12-inch gravity trunk from FWN1-22 to FWN1-22HA with 15-inch gravity trunk.

> Opinion of Probable Cost (Sept 2022 Dollars) **$2,278,000**



PROJECT TIMING

This project was identified in the Master Plan Model, which represents the combination of Master Plan sewer flows and a storm event. Reference the Lakeside Study and coordinate with the developer for more specific project timing.

As Needed with Growth

NOTE:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

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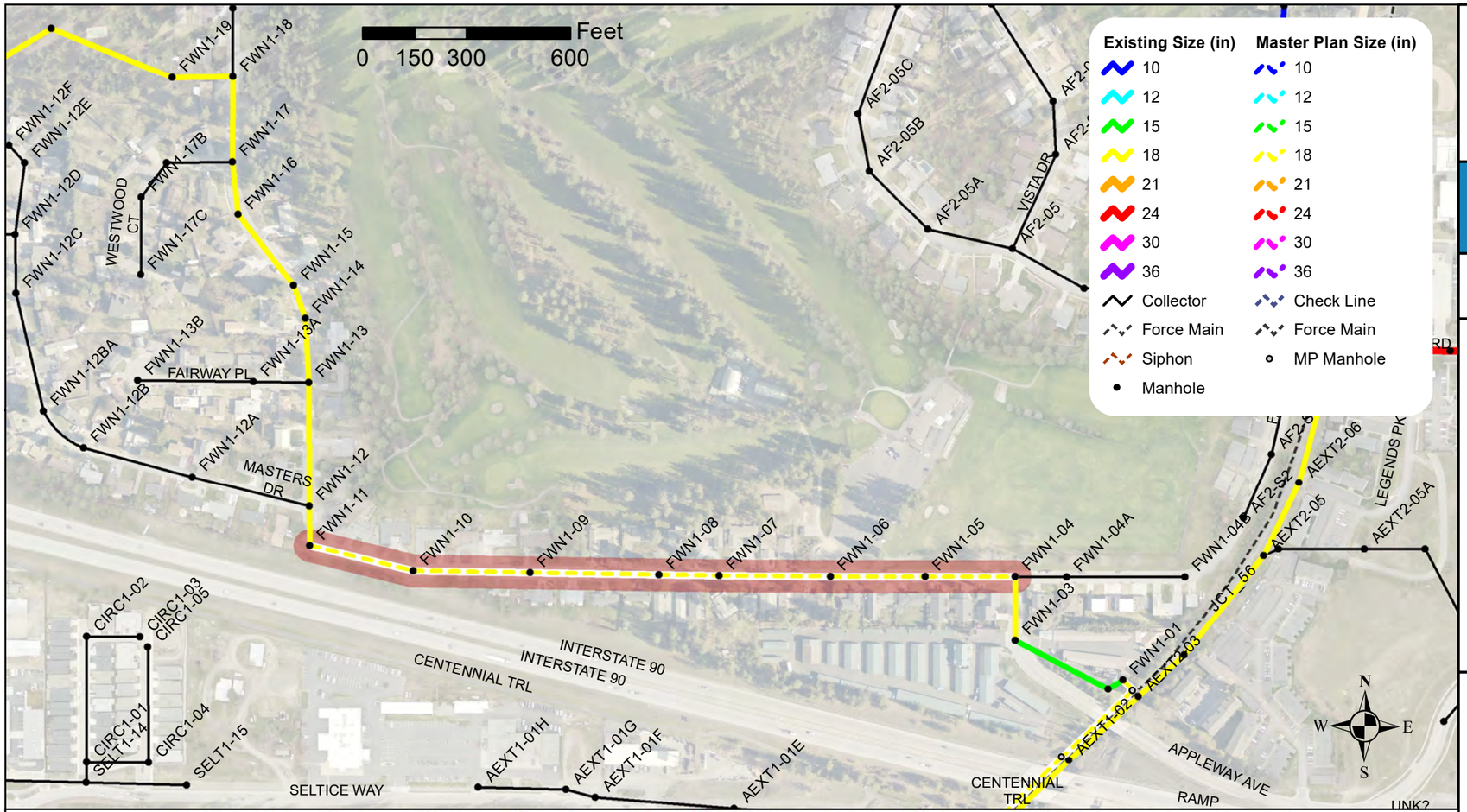
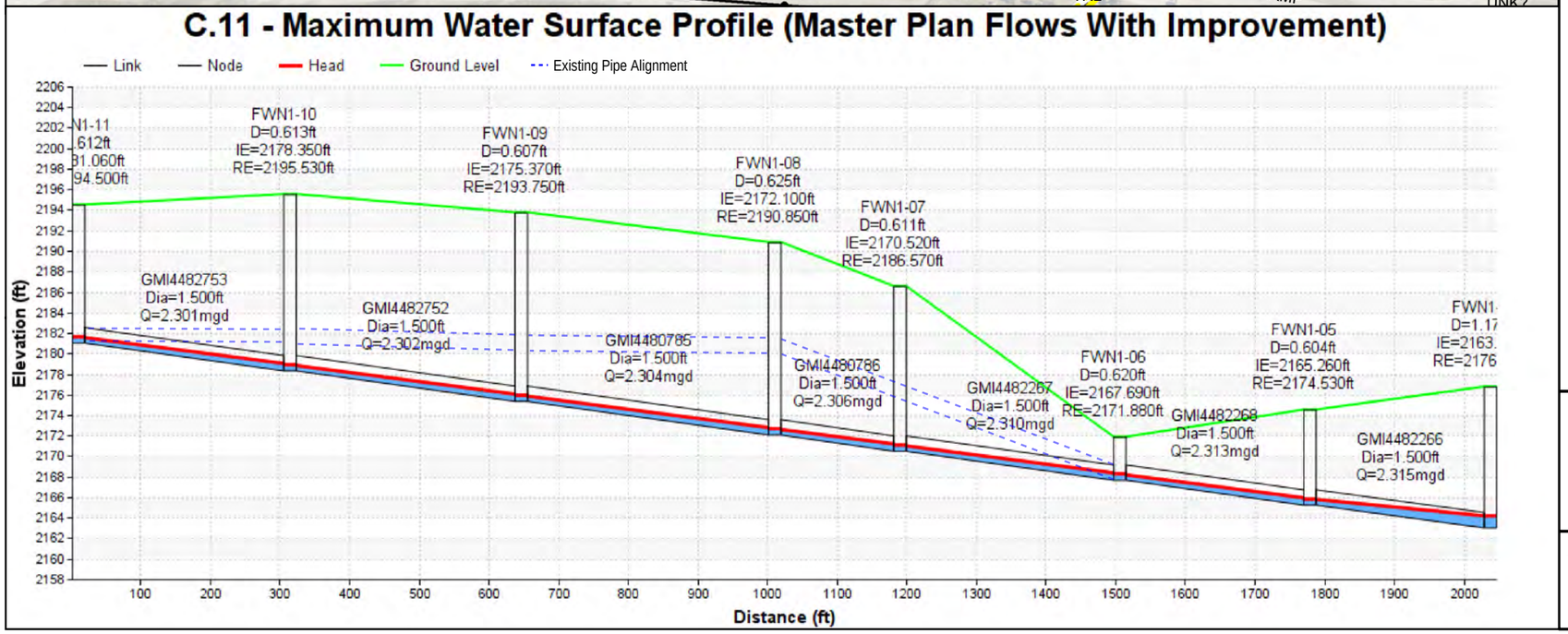




City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

C.11 FWN1-04

CORE ISSUE

Insufficient Capacity

BACKGROUND

The existing 18-inch gravity sewer trunk line is not sized for the increased flows from the Lakeside Study Extension South (reference CIP project E.2.02). Existing pipe slopes are variable and contain several near-flat reaches.

The Existing and Committed Model scenarios show no surcharging within this reach. No surcharge is seen under the Master Plan scenario, however the existing pipes show no remaining capacity and FWN1-09 and FNW1-10 have less than 0.1 feet of depth remaining before surcharging.

RECOMMENDED SOLUTION

Re-grade the pipe slope from FWN1-06 to FWN1-11 to serve future flows from the master planned Lakeside Study Extension South. Actual pipe slopes should be evaluated in design.

> Re-grade 2,047 LF of 18-inch gravity trunk from FWN1-04 to FWN1-11.

> Opinion of Probable Cost (Sept 2022 Dollars) **$1,579,000**

PROJECT TIMING

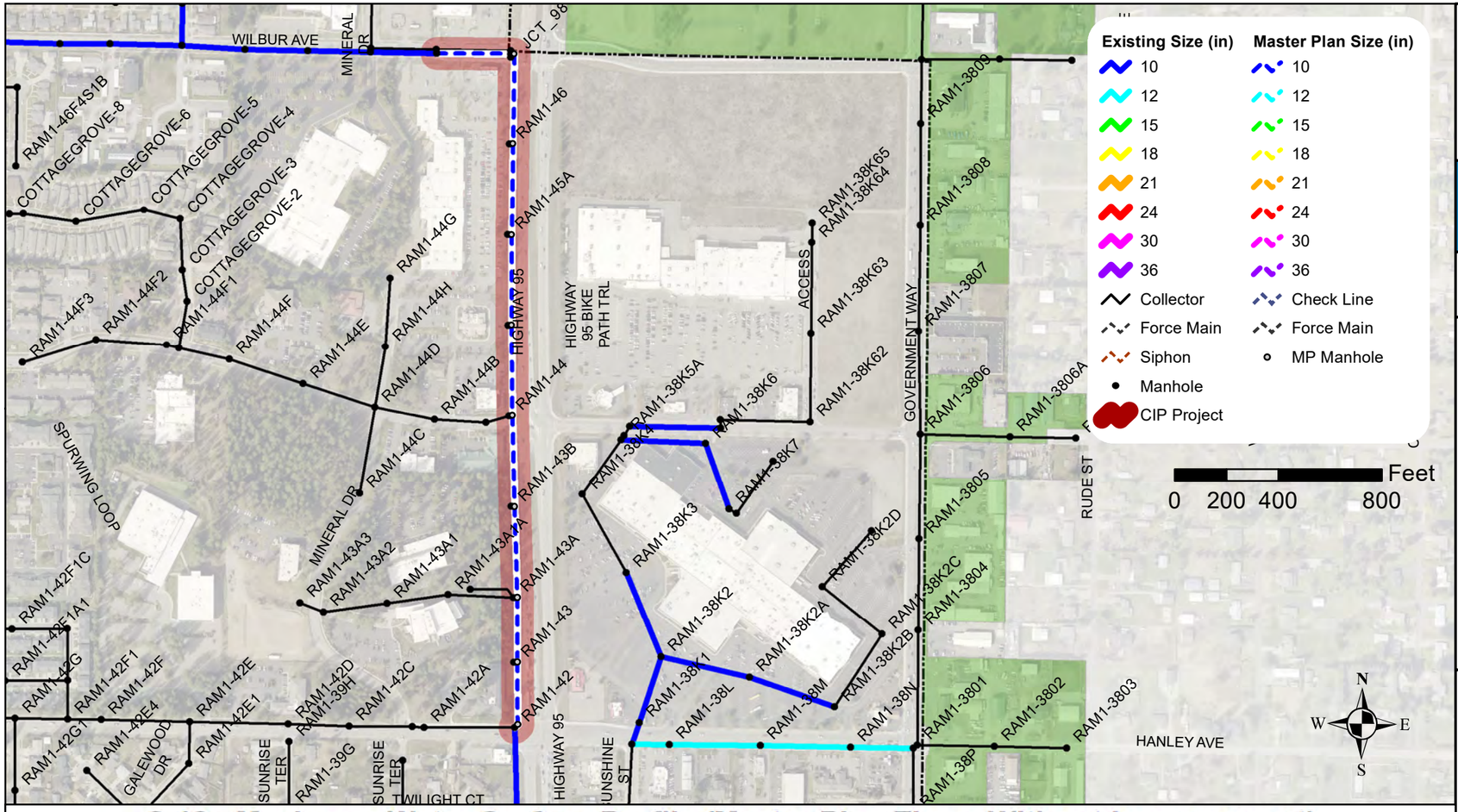
This project was identified in the Master Plan Model, which represents the combination of Master Plan sewer flows and a storm event. Reference the Lakeside Study and coordinate with the developer for more specific project timing.

As Needed with Growth

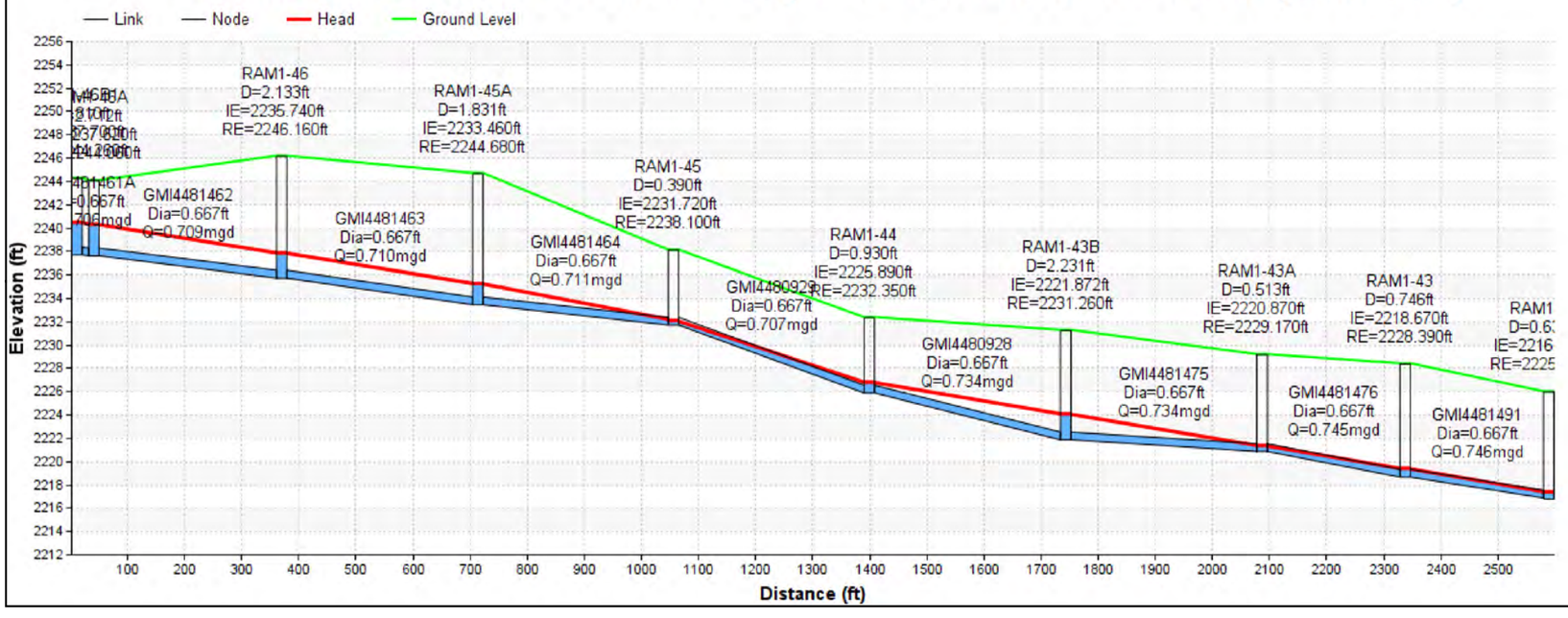
NOTE:

1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

PRINT DATE: 11/4/2022



C.12 - Maximum Water Surface Profile (Master Plan Flows Without Improvement)



City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

C.12 RAM1-42

CORE ISSUE — **Insufficient Capacity**

BACKGROUND

The existing 8-inch gravity line extends from RAM1-42 at the intersection of Hanley Avenue and Highway 95 to the intersection of Wilbur Avenue and Highway 95. This line was not sized for the future flows from properties bordering Prairie Avenue.

The Existing Sewer Model shows surcharging of up to 0.2 feet at RAM1-43B but this increases to 2.2 feet at RAM1-46B1 under the Master Plan Scenario.

See Appendix E for more background information.

RECOMMENDED SOLUTION

Install a 10-inch relief sewer from RAM1-42 to RAM1-46B that runs parallel to the existing 8" gravity line to serve future flows and separate the existing flows.

> Install 2,903 LF of 10-inch gravity trunk from RAM1-42 to RAM1-46B.

> Opinion of Probable Cost (Sept 2022 Dollars) **$588,000**

PROJECT TIMING

This project was identified in the Master Plan Model, which represents the combination of Master Plan sewer flows and a storm event. This project should be completed before service is extended upstream.

As Needed with Growth

NOTE:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

City of Coeur d'Alene IDAHO

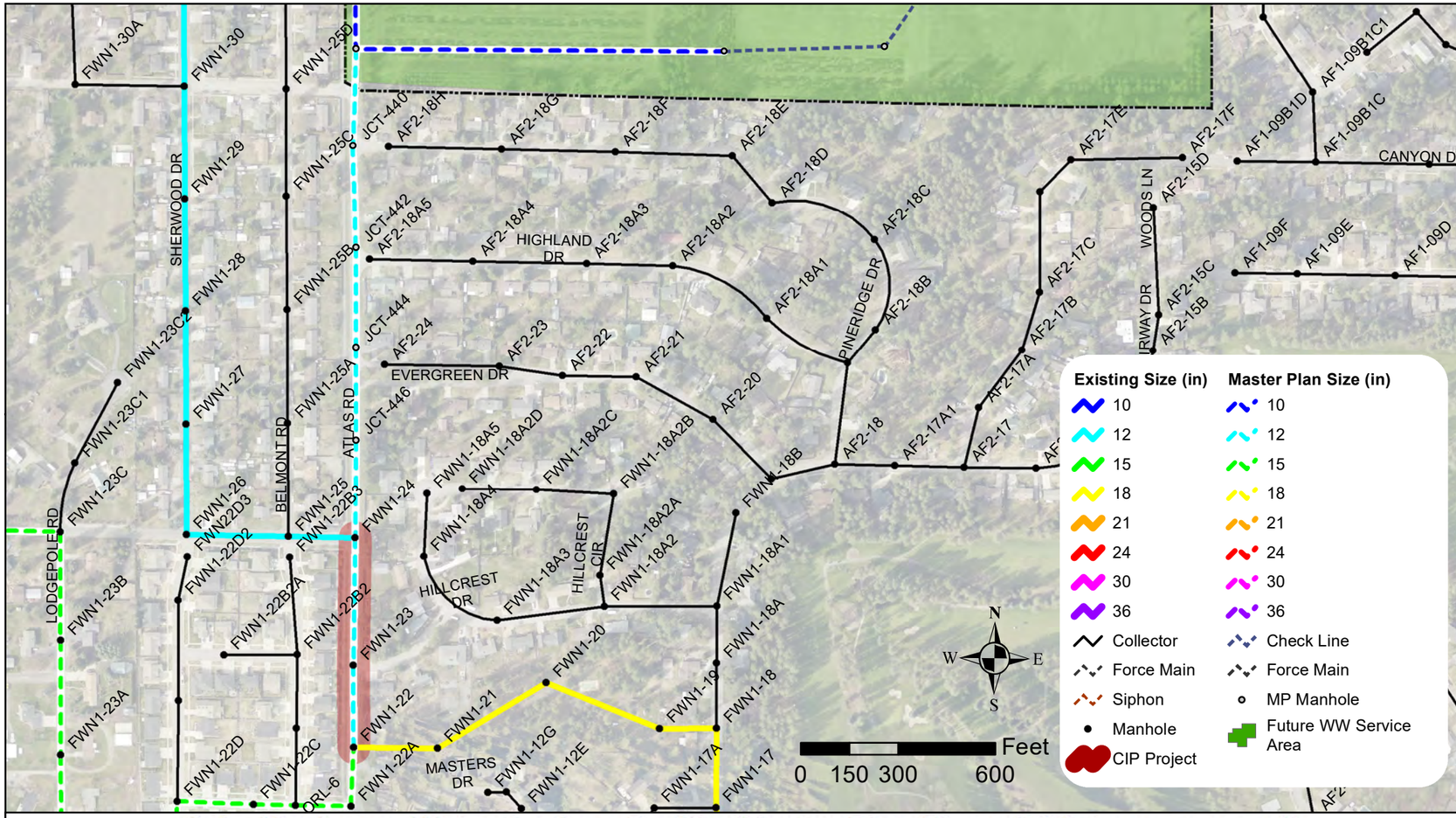
S.1 FWN1-22

CORE ISSUE — **Unable to Serve Future Area**

BACKGROUND

The 2013 Master Plan looked at the topography to be served and determined that the existing 12-inch trunk between FWN1-22 and FWN1-24 would need to be replaced at lower inverts to provide service to the Forest Service Land.

A detailed survey of the Forest Service Land was not done for the Master Plan. Detailed survey should be performed of the Forest Service land to verify service depth requirements as part of the preliminary engineering for this future project.



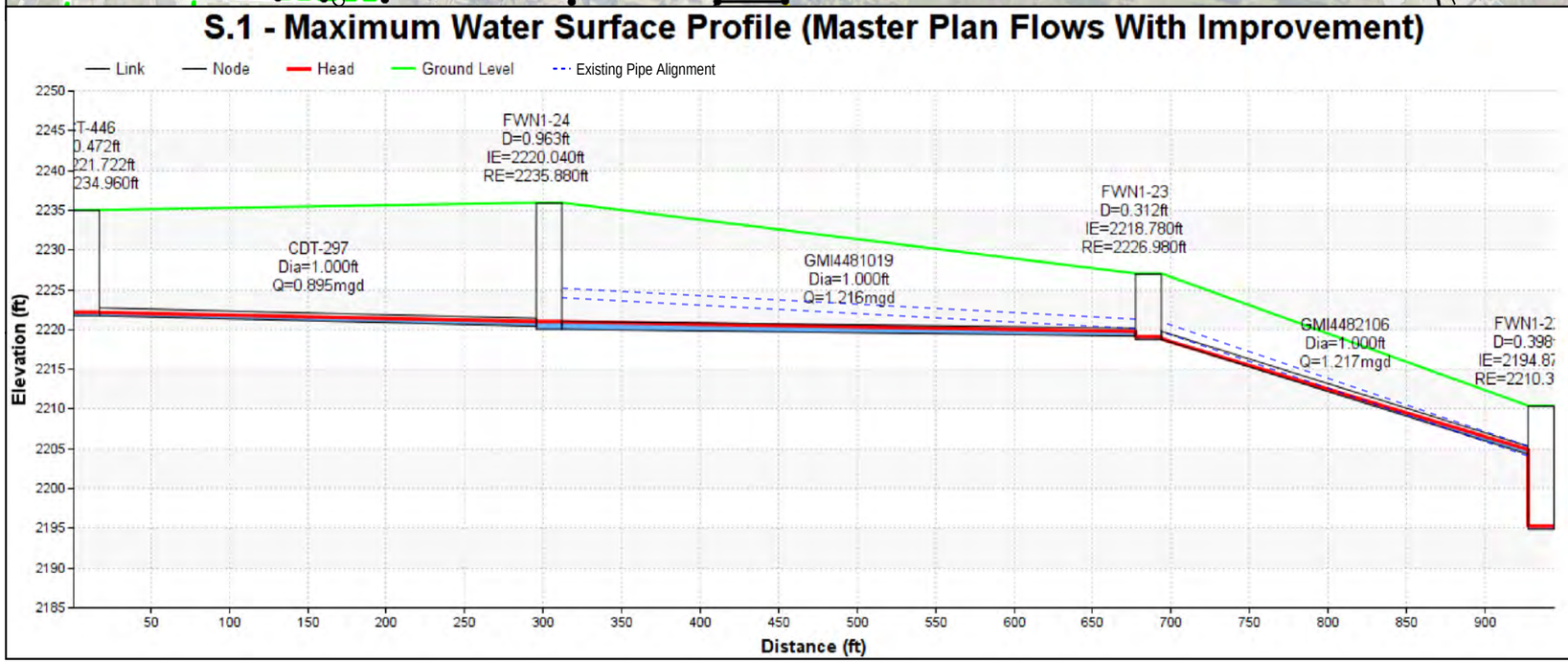
RECOMMENDED SOLUTION

> Replace 645 LF of 12-inch gravity trunk from FWN1-22 to FWN1-24.

> Original invert at FWN1-24 is 2224.19 feet. New invert should be at or below 2220.04 feet.

> Opinion of Probable Cost (Sept 2022 Dollars) **$290,000**

The 10-inch extension north of Appaloosa Road is not included in this cost estimate.



PROJECT TIMING

This project was identified in the Master Plan Model in order to serve the area to the north currently owned by the Forest Service. This project should be completed before service is extended north on Atlas Road.

As Needed with Growth

NOTE:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

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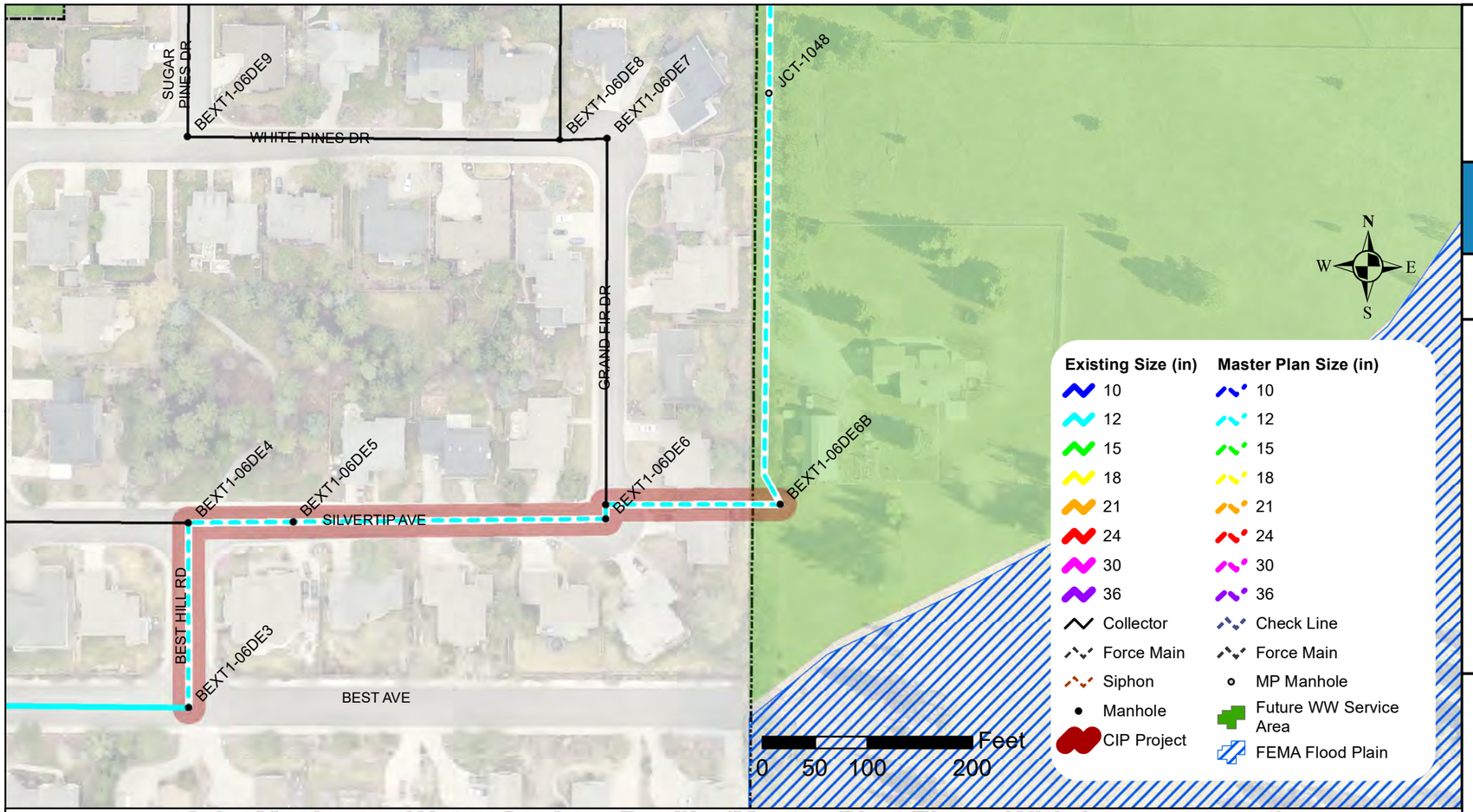


City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

City of Coeur d'Alene IDAHO

S.2 BEXT1-06DE3

CORE ISSUE — **Unable to Serve Future Area**

BACKGROUND

The Nettleton Gulch Extension will extend gravity service and take the Foothills LS offline (reference CIP project S.6). The construction tolerances will be very tight, with slopes lower than 10 States Standards. Additionally, the existing section of 8-inch and 12-inch trunk at the downstream end must be lowered to connect the existing system to the Nettleton Gulch Extension (reference CIP project E.4).

RECOMMENDED SOLUTION

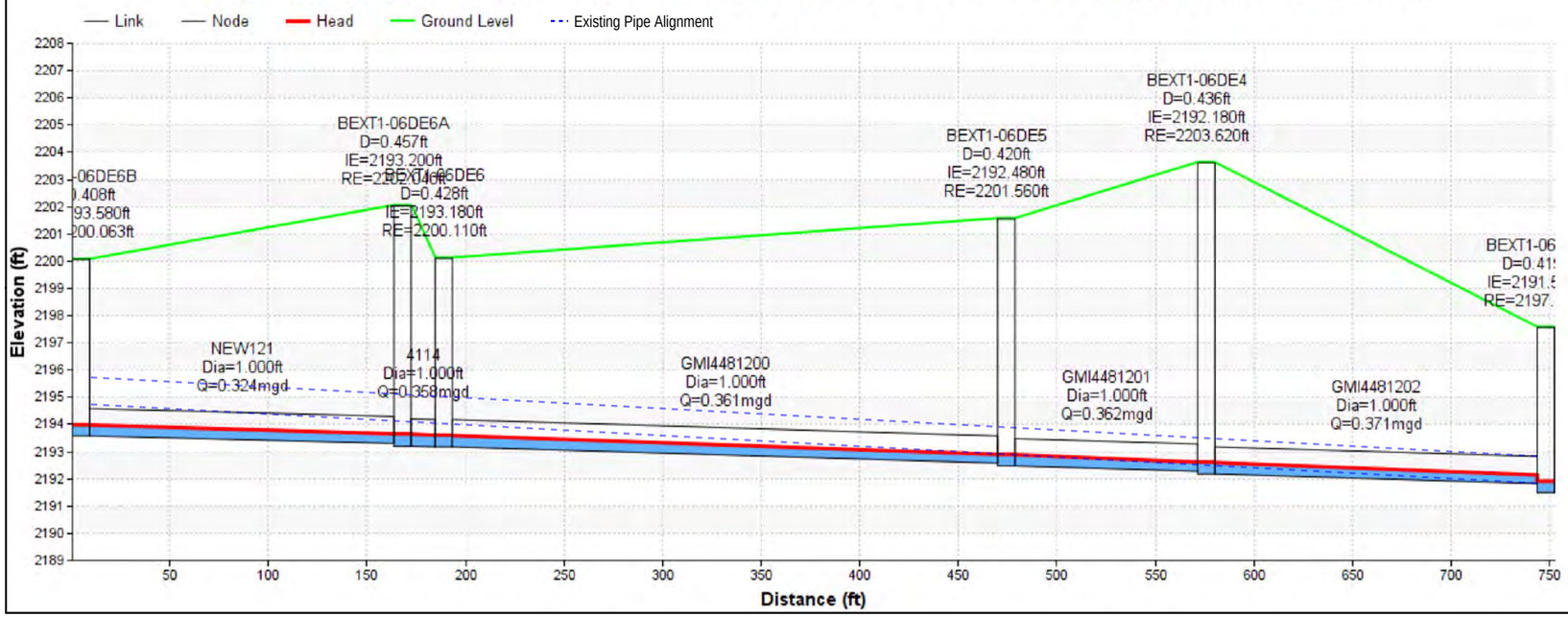
> Replace 752 LF of 12-inch gravity trunk from BEXT1-06DE3 to BEXT1-06DE6B.

> Original invert at BEXT1-06DE6B is 2194.70 feet. New invert should be at or below 2193.58 feet.

> Opinion of Probable Cost (Sept 2022 Dollars) **$348,000**

The 12-inch extension north of Silvertip Avenue is not included in this cost estimate, reference CIP project E.4.

S.2 - Maximum Water Surface Profile (Master Plan Flows With Improvement)



PROJECT TIMING

This project was identified in the Master Plan Model to serve the future area to the northeast and specifically take the Foothills Lift Station offline. This project should be completed before the Nettleton Gulch Extension is finished.

As Needed with Growth

NOTE:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

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2022 Wastewater Collection System Master Plan

City of Coeur d'Alene IDAHO

S.4 Hawks Nest Lift Station

CORE ISSUE — **Insufficient Capacity**

BACKGROUND

The existing Hawks Nest Lift Station was not originally intended to serve the Lakeside Study North area (reference CIP project E.2.01) and therefore does not have sufficient capacity to accommodate the additional future flow.

The Lakeside design piping is currently shown discharging directly into the Hawks Nest wet well with the re-routing of the existing gravtiy piping to the south into the new master planned trunk piping. Alternate connection points to either of the existing upstream manholes should be evaluated in design. Utilizing the alternate connection to existing manhole HWK1-05 would require the existing 10-inch trunk into the lift station to be upsized in order to serve the Lakeside Study north area.

RECOMMENDED SOLUTION

Hawks Nest Lift Station will require larger pumps to increase the firm capacity. The force main appears to be sufficient for the increased flow and does not require modifications. Alternate connection points should be evaluated in design.

> Upsized pumps

> Site electrical, instrumentation, controls and generator

> Wet well coring

> Install 150 LF of 15-inch site piping and flow meter

> Opinion of Probable Cost (Sept 2022 Dollars) **$805,000**

PROJECT TIMING

This project was identified in the Master Plan Model, which represents the combination of Master Plan sewer flows and a storm event. Reference the Lakeside Study and coordinate with the developer for more specific project timing.

As Needed with Growth

NOTE:
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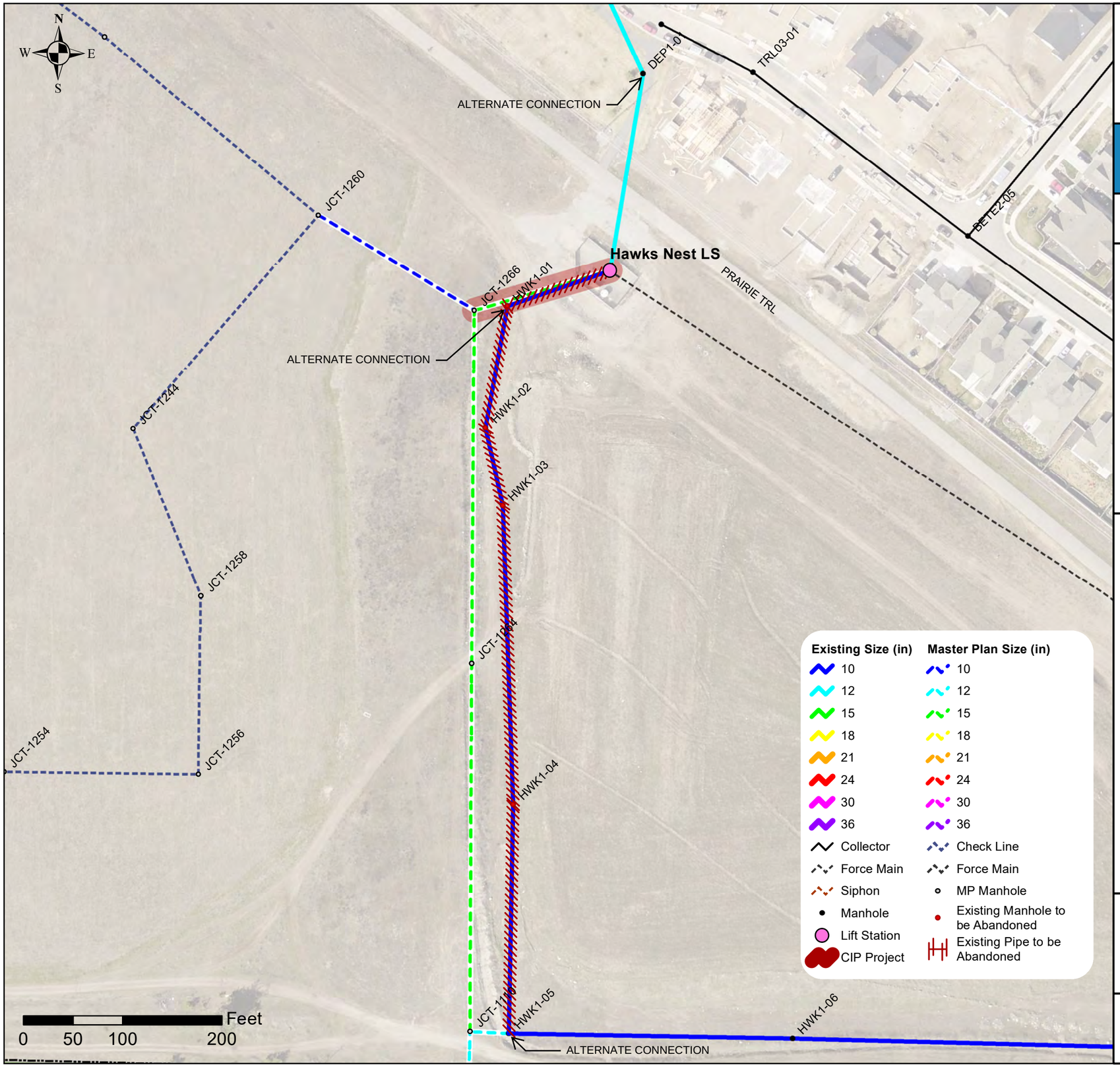


City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

S.6 Foothills Lift Station

CORE ISSUE — **Abandon Lift Station**

BACKGROUND

With the completion of the Nettleton Gulch Extension (reference CIP project E.4), the Foothills Lift Station can be abandoned in favor of gravity sewer service to the nearest master planned manhole. The existing force main and influent line into the wet well will need to be abandoned.

RECOMMENDED SOLUTION

> Abandon existing Foothills Lift Station, inlet piping, and 8-inch force main

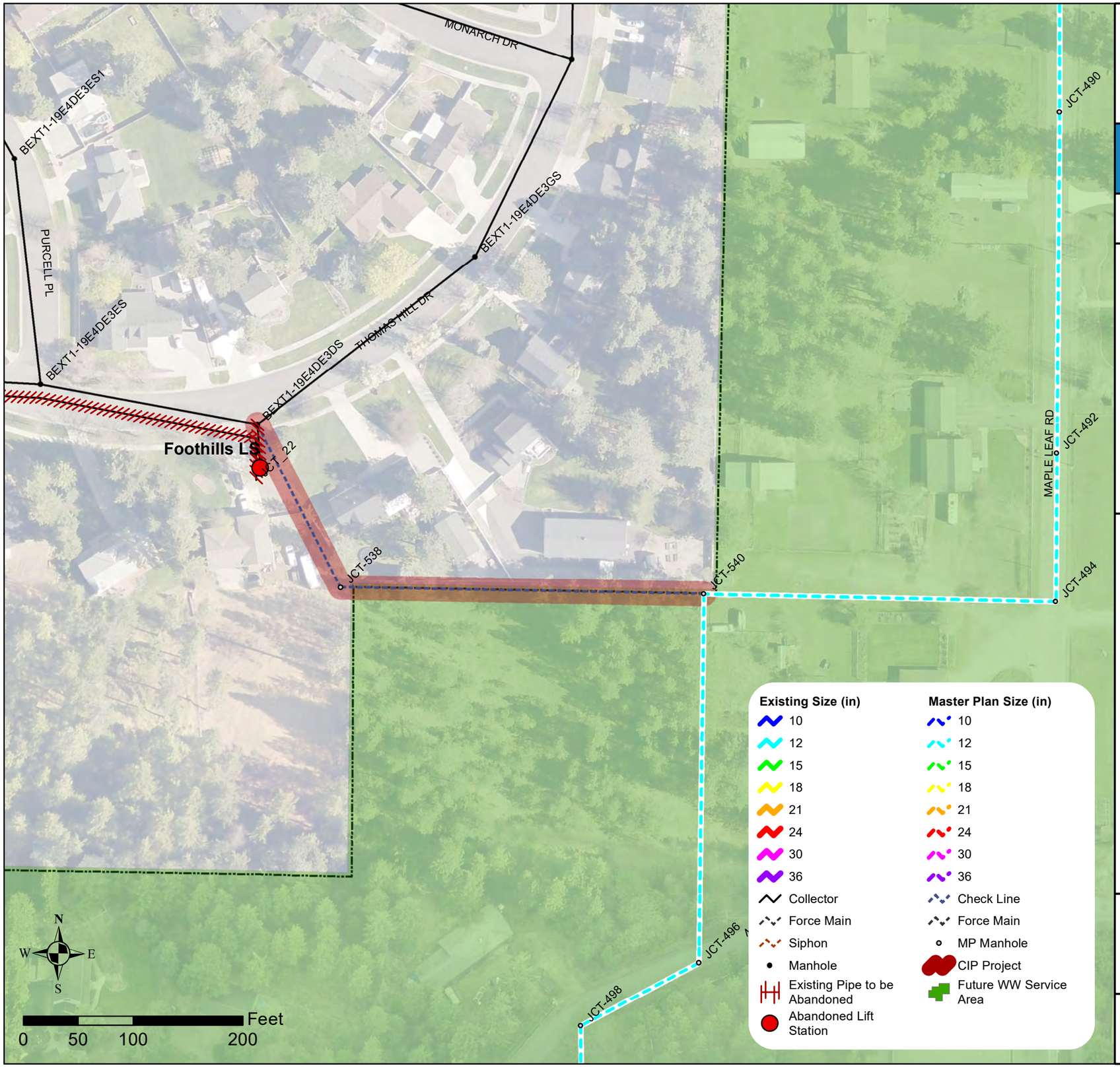
> Install 497 LF of 8-inch gravity sewer to connect the existing system to the Nettleton Gulch Extension (reference CIP project E.4).

> Opinion of Probable Cost (Sept 2022 Dollars) **$110,000**

PROJECT TIMING

This project was identified in the Master Plan Model. This project should be completed after the Nettleton Gulch Extension is finished.

As Needed with Growth



NOTE:
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2022 Wastewater Collection System Master Plan

Project: RR.30

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 6" PVC and concrete pipe

RECOMMENDED SOLUTION

8" open trench replacement

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$265,000

0 35 70 140 Feet

Note:

1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

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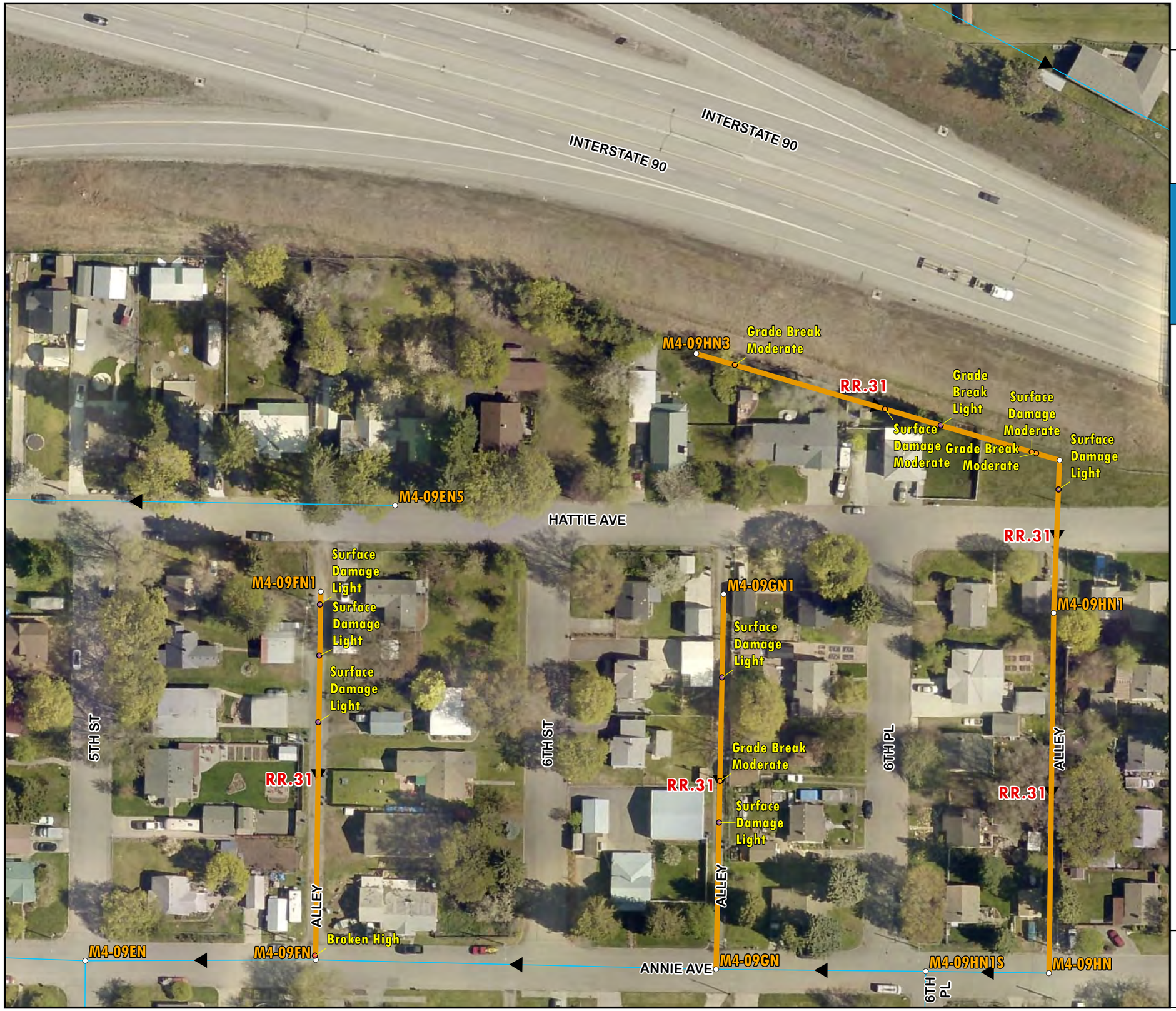
J-U-B



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2022 Wastewater Collection System Master Plan

Project: RR.31

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 6" PVC and concrete pipe

RECOMMENDED SOLUTION

8" open trench replacement

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$686,000

Feet

0 35 70 140

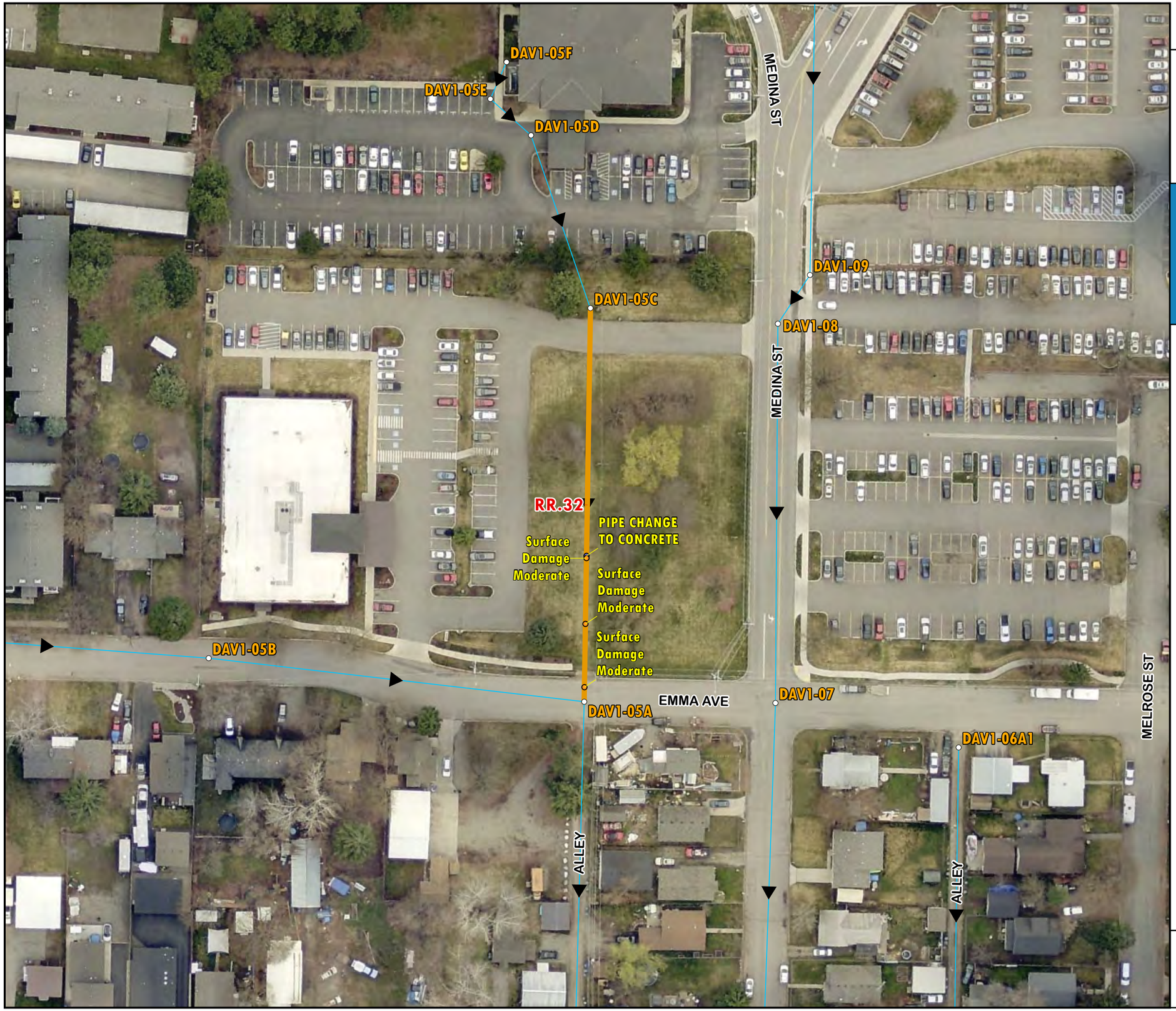
Note:

1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

PRINT DATE: 10/20/2022

J-U-B



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2022 Wastewater Collection System Master Plan

Project: RR.32

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 6" PVC pipe

RECOMMENDED SOLUTION

8" open trench replacement

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$173,000

Feet
0 35 70 140

Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

PRINT DATE: 10/20/2022

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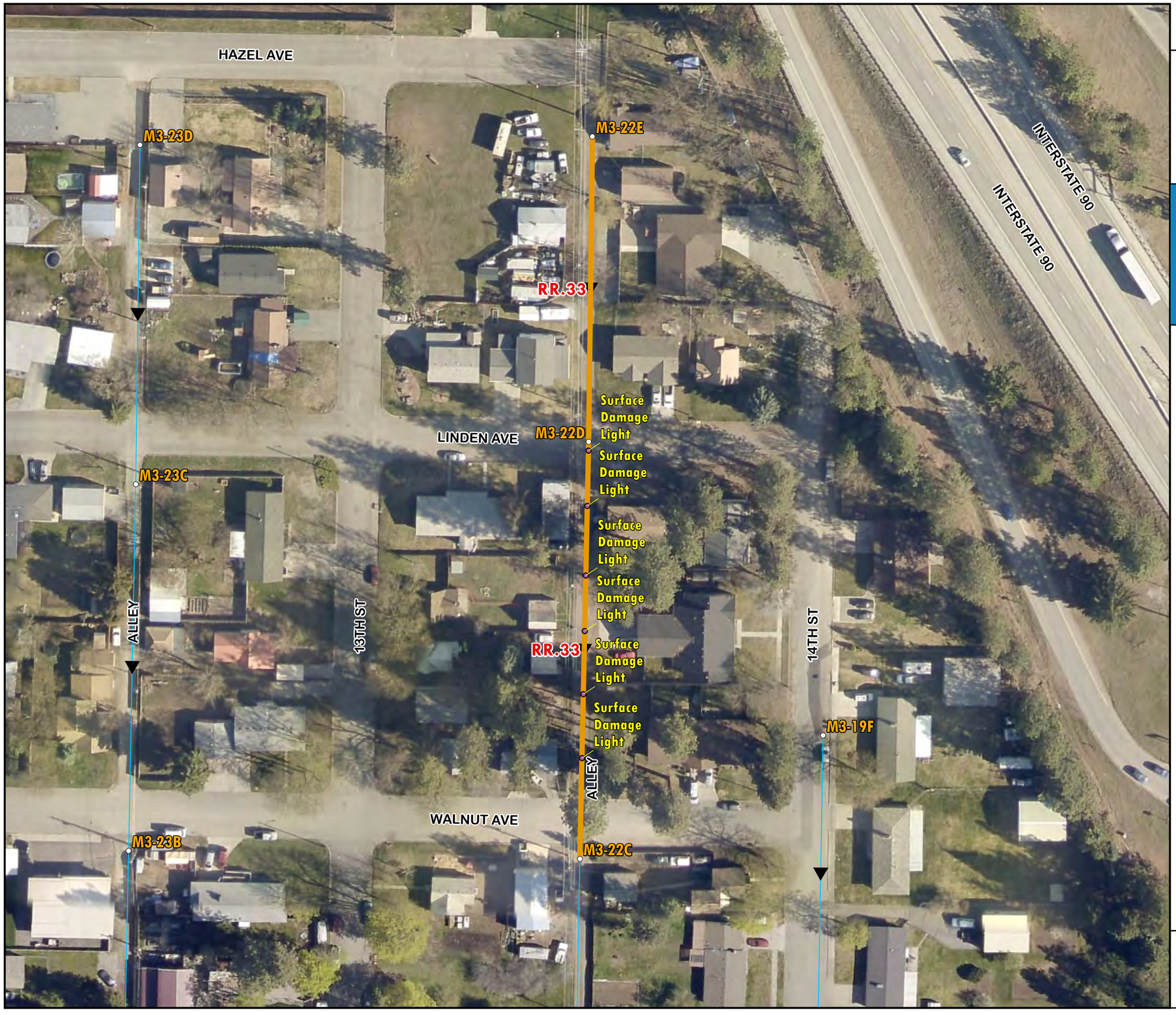

City of Coeur d'Alene
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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.33

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 6" concrete pipe

RECOMMENDED SOLUTION

8" open trench replacement

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$342,000

Feet
0 35 70 140

Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

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2022 Wastewater Collection System Master Plan

Project: RR.35

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 6" concrete pipe

RECOMMENDED SOLUTION

8" open trench replacement

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$364,000

Feet

0 30 60 120

Note:

1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

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J-U-B

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2022 Wastewater Collection System Master Plan

Project: RR.36

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 6" concrete pipe

RECOMMENDED SOLUTION

8" open trench replacement

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$402,000

0 20 40 80 Feet

Note:

1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

PRINT DATE: 10/20/2022

J-U-B

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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.37

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 6" concrete pipe

RECOMMENDED SOLUTION

8" open trench replacement

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$601,000

Feet

0 20 40 80

Note:

1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

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2022 Wastewater Collection System Master Plan

Project: RR.38

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 6" concrete pipe

RECOMMENDED SOLUTION

8" open trench replacement

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$253,000

Feet
0 35 70 140

Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

PRINT DATE: 10/20/2022

J-U-B

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IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.39

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 8" PVC pipe

RECOMMENDED SOLUTION

8" cured-in place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$20,000

Feet
0 30 60 120

Note:
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PRINT DATE: 10/20/2022

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City of Coeur d'Alene
IDAHO

City of Coeur d'Alene
2022 Wastewater Collection System Master Plan

Project: RR.40

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 8" PVC pipe

RECOMMENDED SOLUTION

8" cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

Combined RR.40 projects: $1,114,000

0 35 70 140 Feet

Note:

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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.40

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 8" pipe

RECOMMENDED SOLUTION

8" cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

Combined RR.40 projects: $1,114,000

0 20 40 80 Feet

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City of Coeur d'Alene
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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.40

D2-06N
D2-06
D2-04
D2-03
Cracks High
GOVERNMENT WAY
D2-02
RR.40
Point Repair
D2-01
Broken High
D2-06ACO
AST
D2-04A
D1-12C
BORAH AVE
CARDWELL DR
INTERSTATE 90
INTERSTATE 90

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 8" concrete pipe

RECOMMENDED SOLUTION

8" cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

Combined RR.40 projects: $1,114,000

Feet
0 35 70 140

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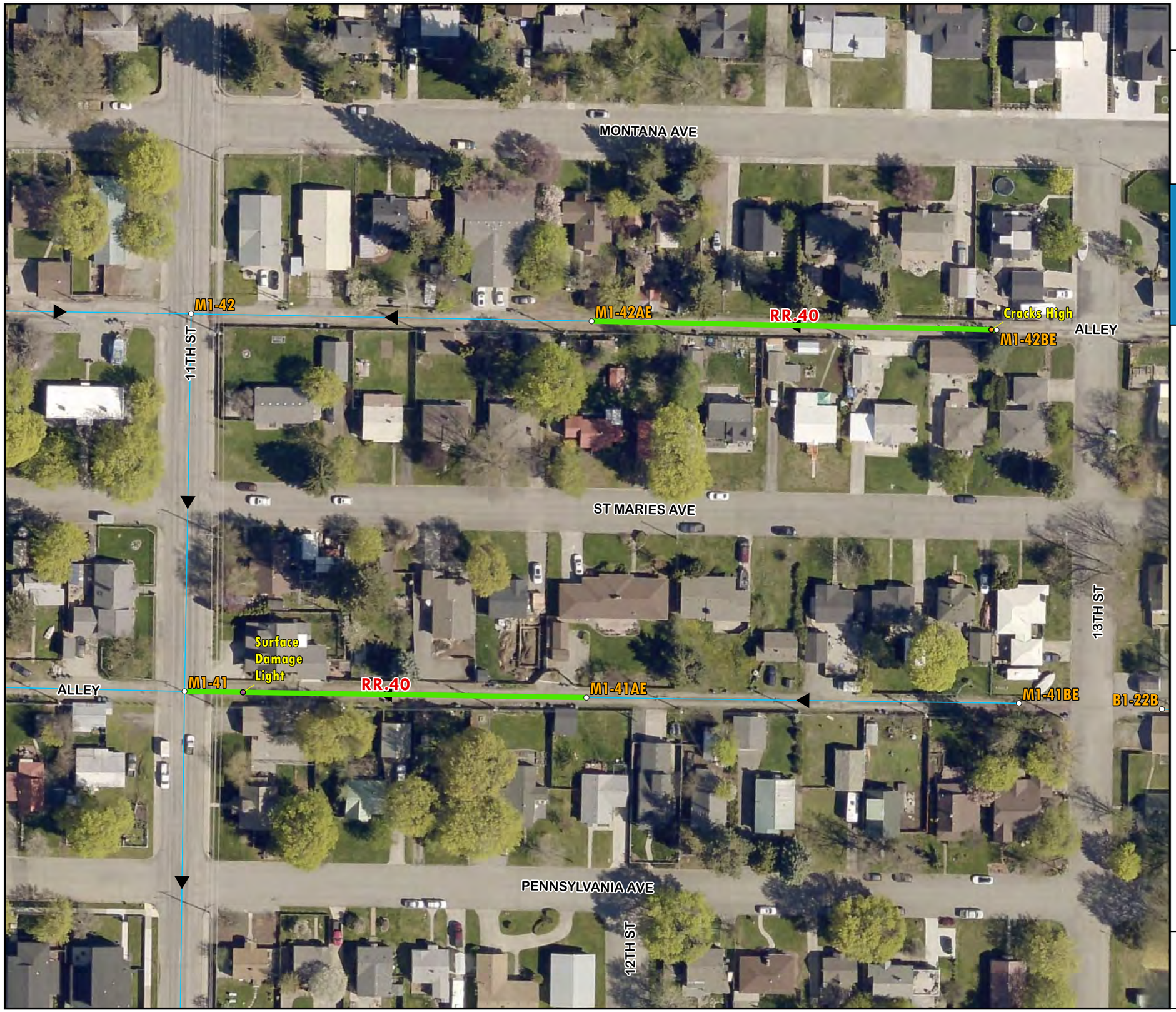

City of Coeur d'Alene
IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.40

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 8" concrete pipes

RECOMMENDED SOLUTION

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OPINION OF PROBABLE COST

(Sept 2022 Dollars)

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Feet

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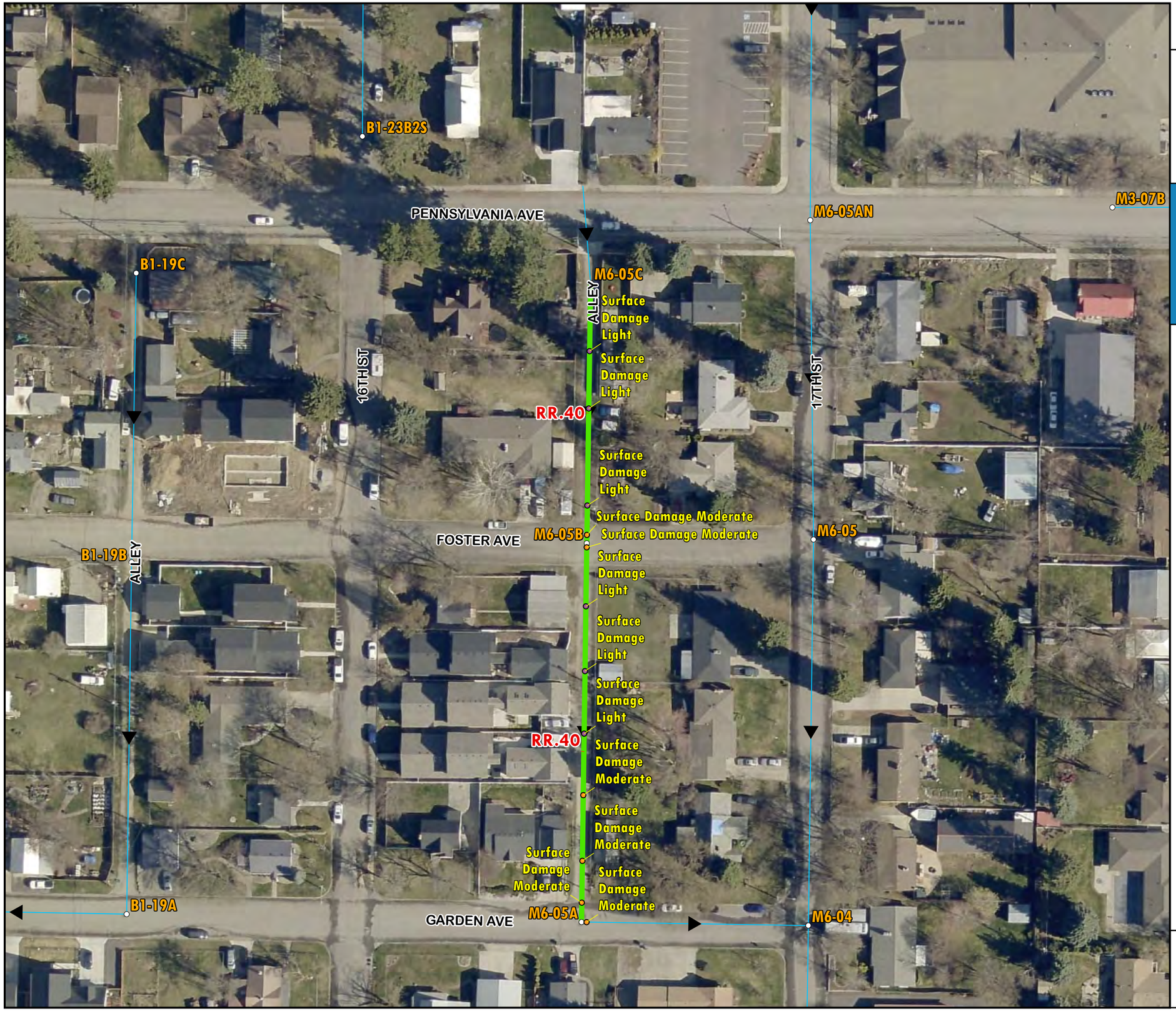

City of Coeur d'Alene
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2022 Wastewater Collection System Master Plan

Project: RR.40

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Project Type

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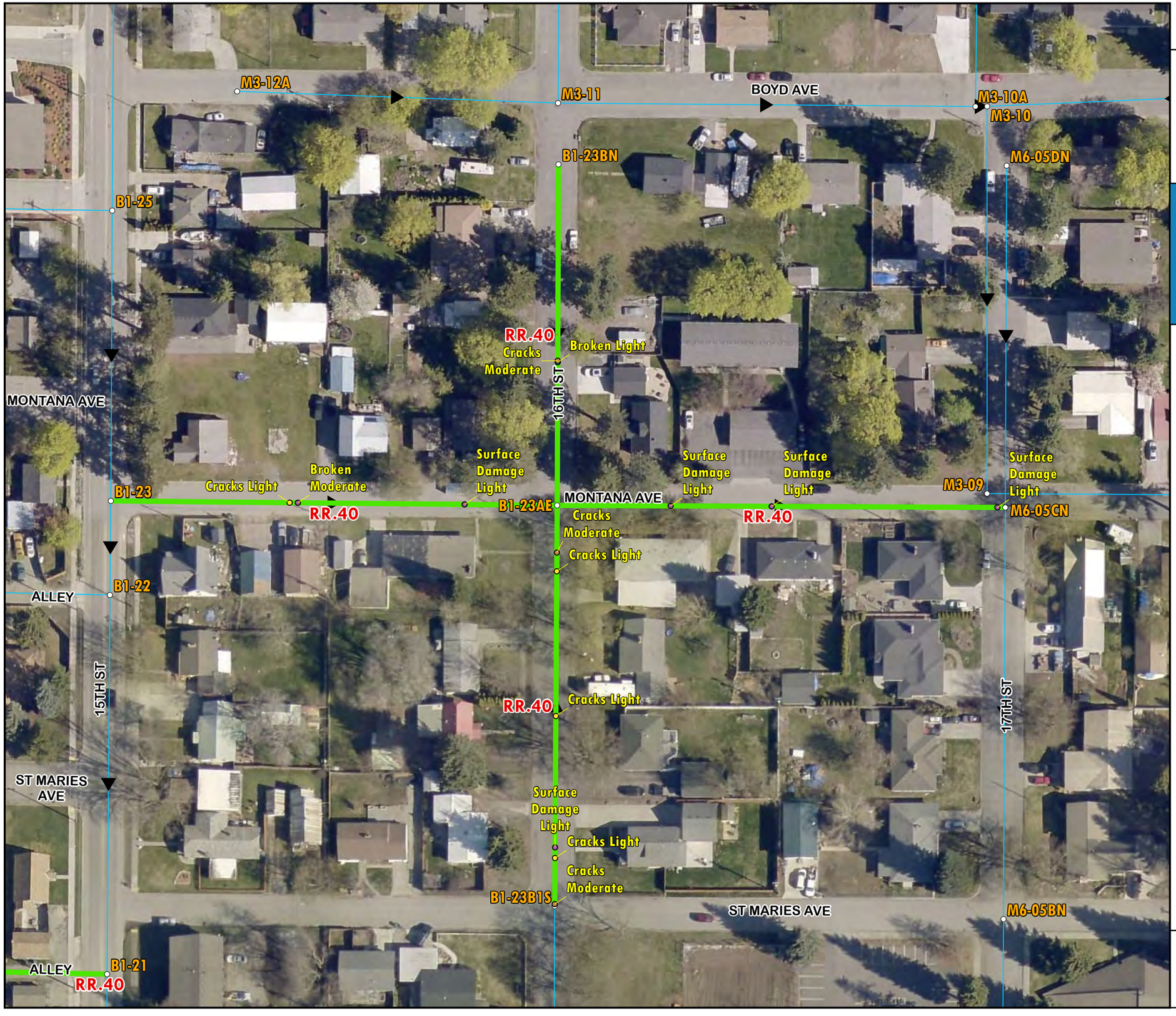

City of Coeur d'Alene
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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.40

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 8" concrete pipes

RECOMMENDED SOLUTION

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OPINION OF PROBABLE COST

(Sept 2022 Dollars)

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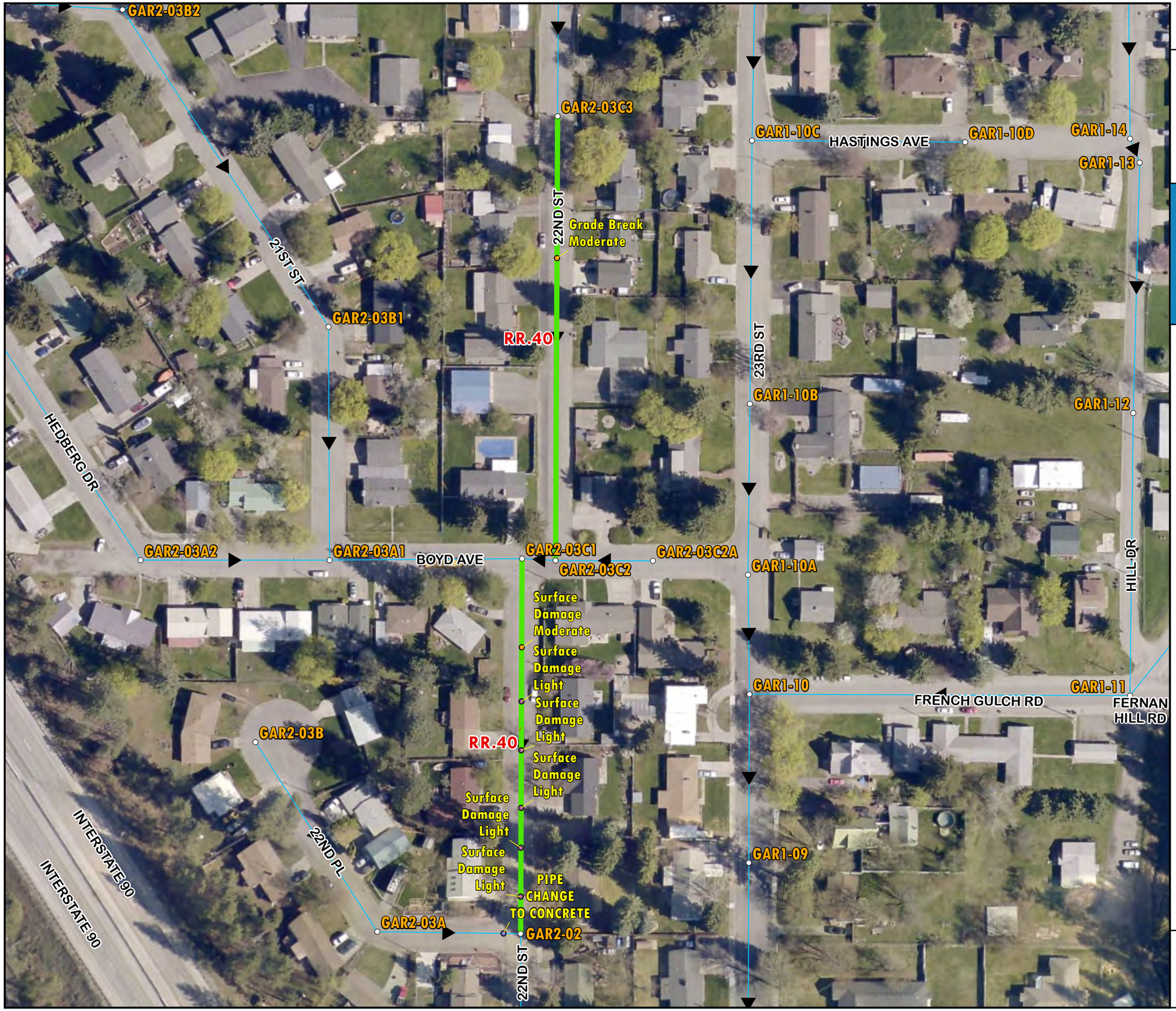

City of Coeur d'Alene
IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.40

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 8" concrete pipes

RECOMMENDED SOLUTION

8" cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

Combined RR.40 projects: $1,114,000

Feet

0 45 90 180

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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.40

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 12" clay pipe

RECOMMENDED SOLUTION

12" cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

Combined RR.40 projects: $1,114,000

0 35 70 140 Feet

Note:

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2022 Wastewater Collection System Master Plan

Project: RR.40

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 8" PVC and concrete pipes

RECOMMENDED SOLUTION

8" cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

Combined RR.40 projects: $1,114,000

Feet

0 35 70 140

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Project: RR.40

ALLEY
M1-46AW
M1-46
M1-46AE
M1-46BE
10TH ST
BOYD AVE
ALLEY
M1-45AW
M1-45
RR.40
Surface Damage Light
Surface Damage Moderate
Cracks Light
Grade Break Moderate
M1-45AE
11TH ST
MONTANA AVE
ALLEY
M1-44A
M1-44
M1-43
M1-42

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 8" concrete pipe

RECOMMENDED SOLUTION

8" cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

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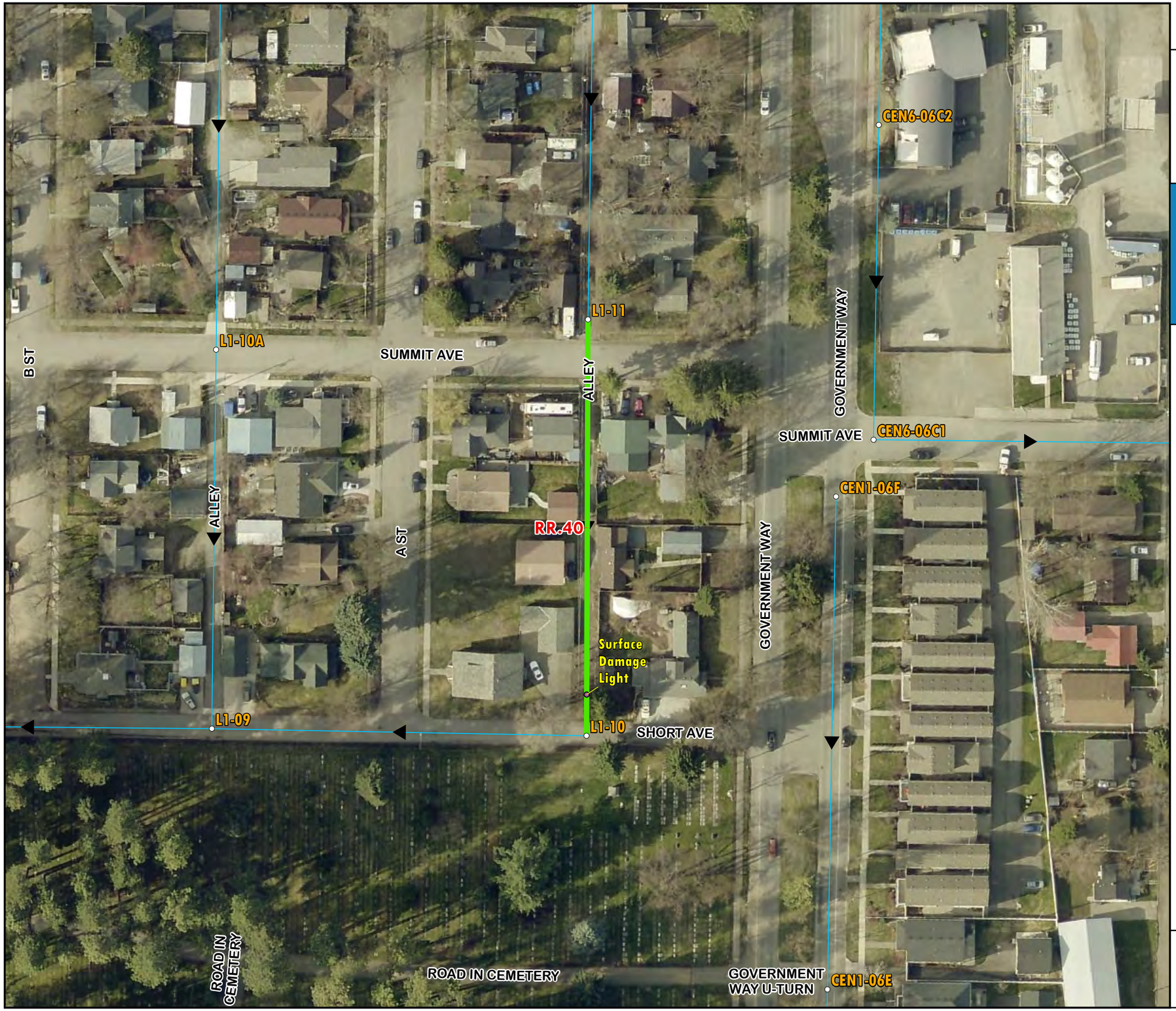

City of Coeur d'Alene
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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.40

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

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2022 Wastewater Collection System Master Plan

Project: RR.40

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 8" PVC and concrete pipes

RECOMMENDED SOLUTION

8" cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

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Feet

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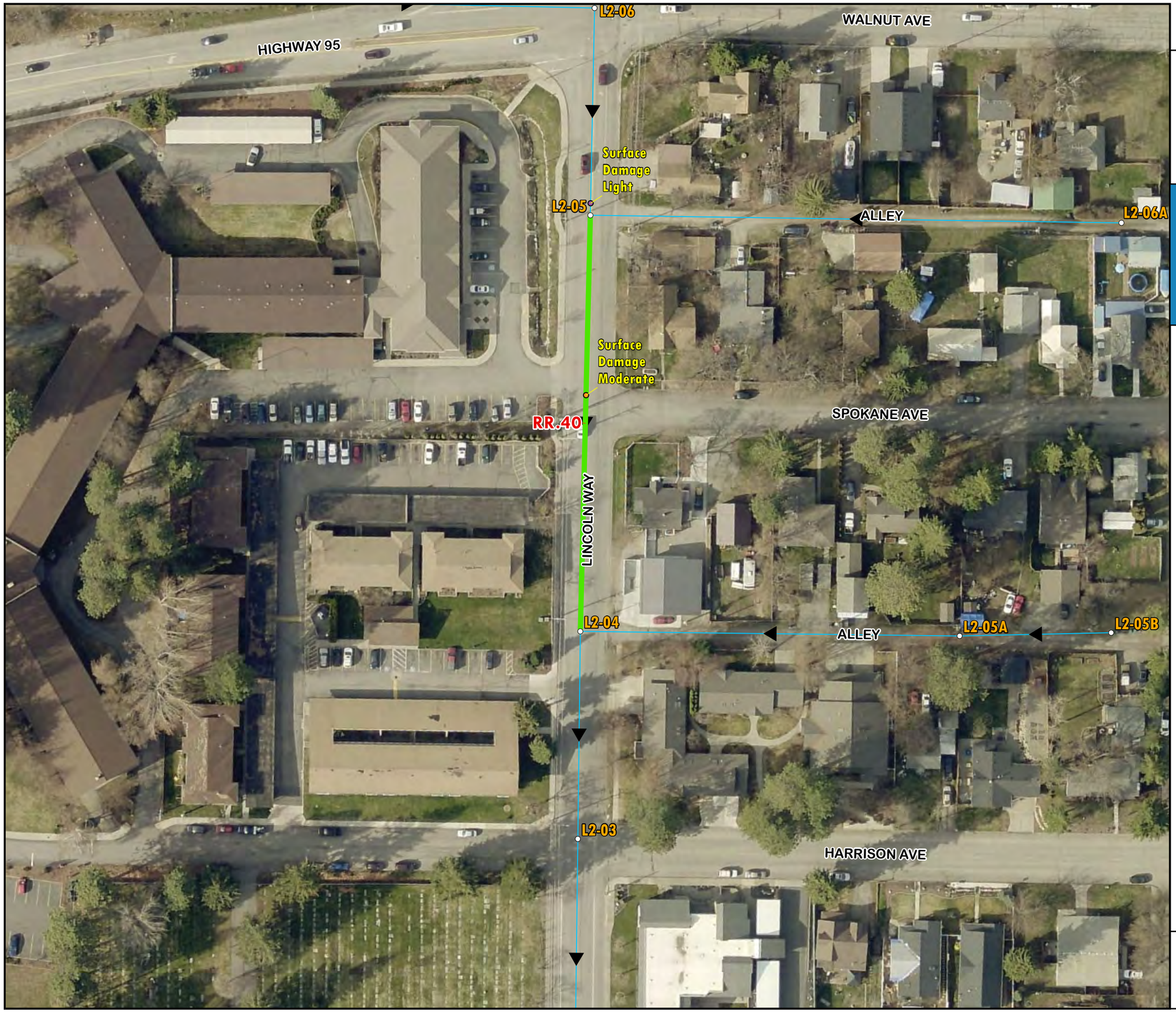

City of Coeur d'Alene
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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.40

Repair & Rehabilitation Projects

Project Type

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CORE ISSUE

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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.40

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 8" and 10" concrete pipes

RECOMMENDED SOLUTION

8" cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

Combined RR.40 projects: $1,114,000

0 40 80 160 Feet

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2022 Wastewater Collection System Master Plan

Project: RR.40

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 8" concrete pipes

RECOMMENDED SOLUTION

8" cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

Combined RR.40 projects: $1,114,000

Feet
0 30 60 120

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CORE ISSUE

Poor condition 8" concrete pipe

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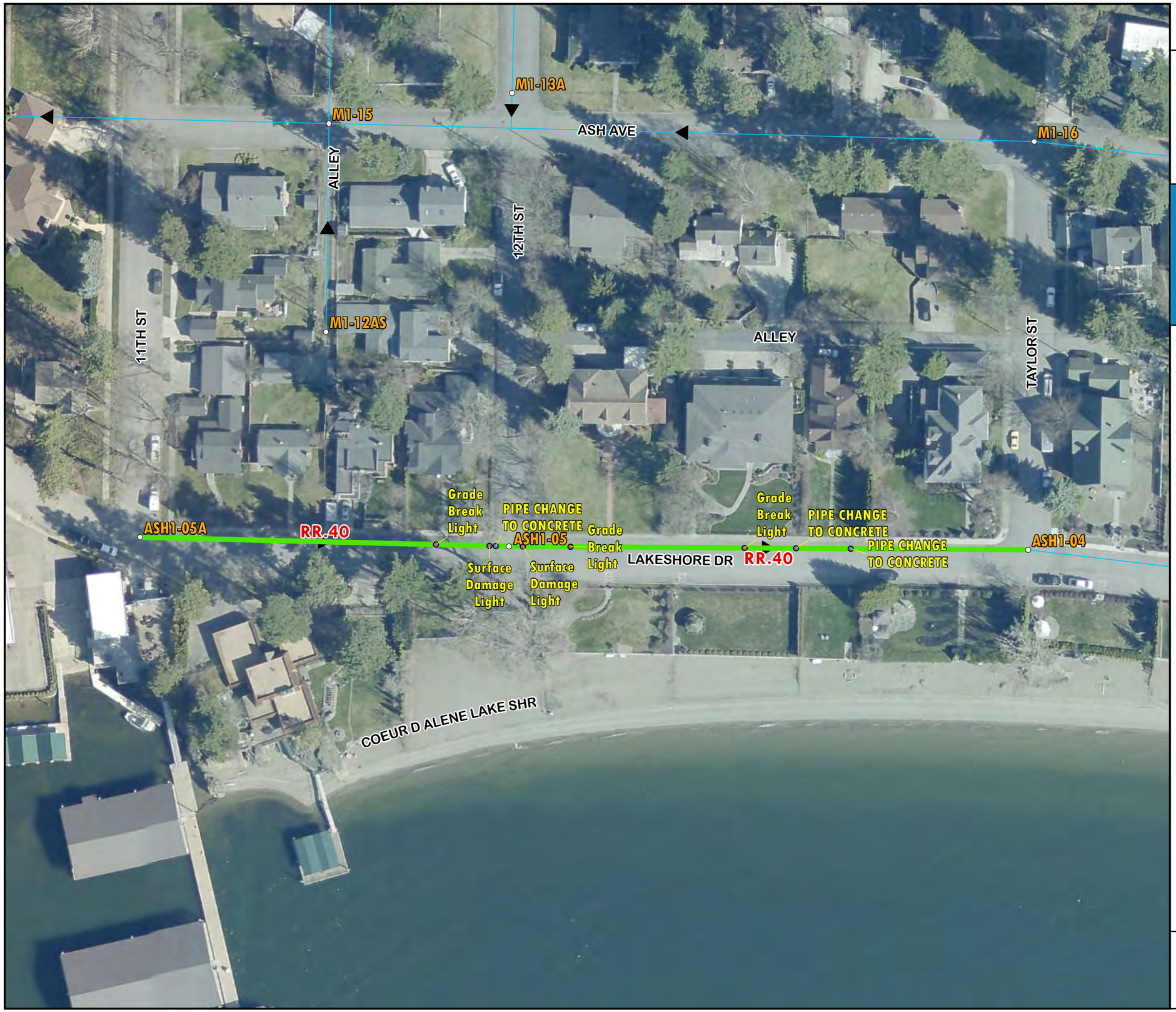

City of Coeur d'Alene
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2022 Wastewater Collection System Master Plan

Project: RR.40

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

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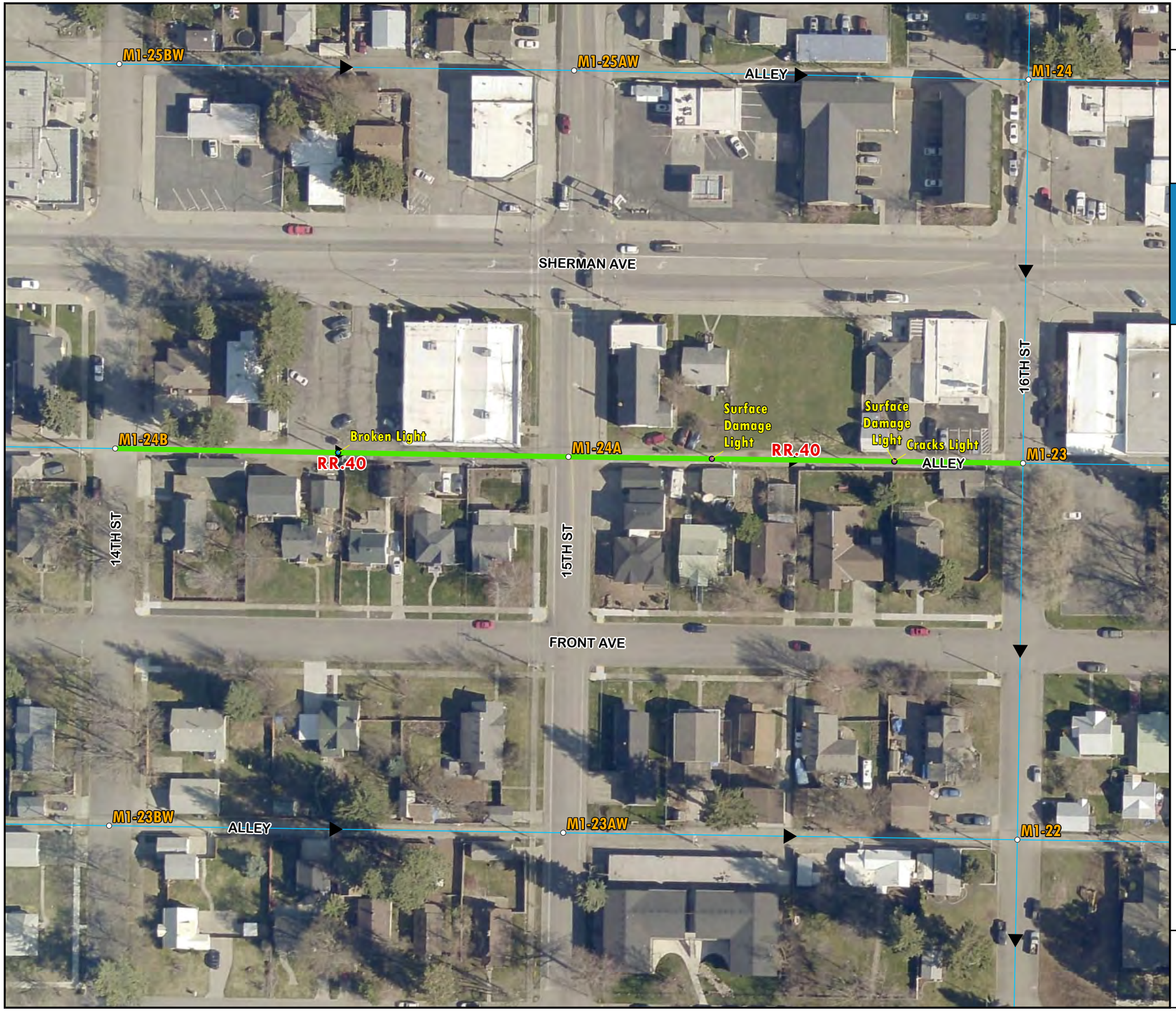

City of Coeur d'Alene
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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

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City of Coeur d'Alene
IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.41

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Pipe material transitions to concrete

RECOMMENDED SOLUTION

8" partial cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

Combined RR.41 projects: $386,000

Feet

0 35 70 140

Note:

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City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.41

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

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RECOMMENDED SOLUTION

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OPINION OF PROBABLE COST

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Feet

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Repair & Rehabilitation Projects

Project Type

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CORE ISSUE

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RECOMMENDED SOLUTION

8" partial cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

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Project: RR.41

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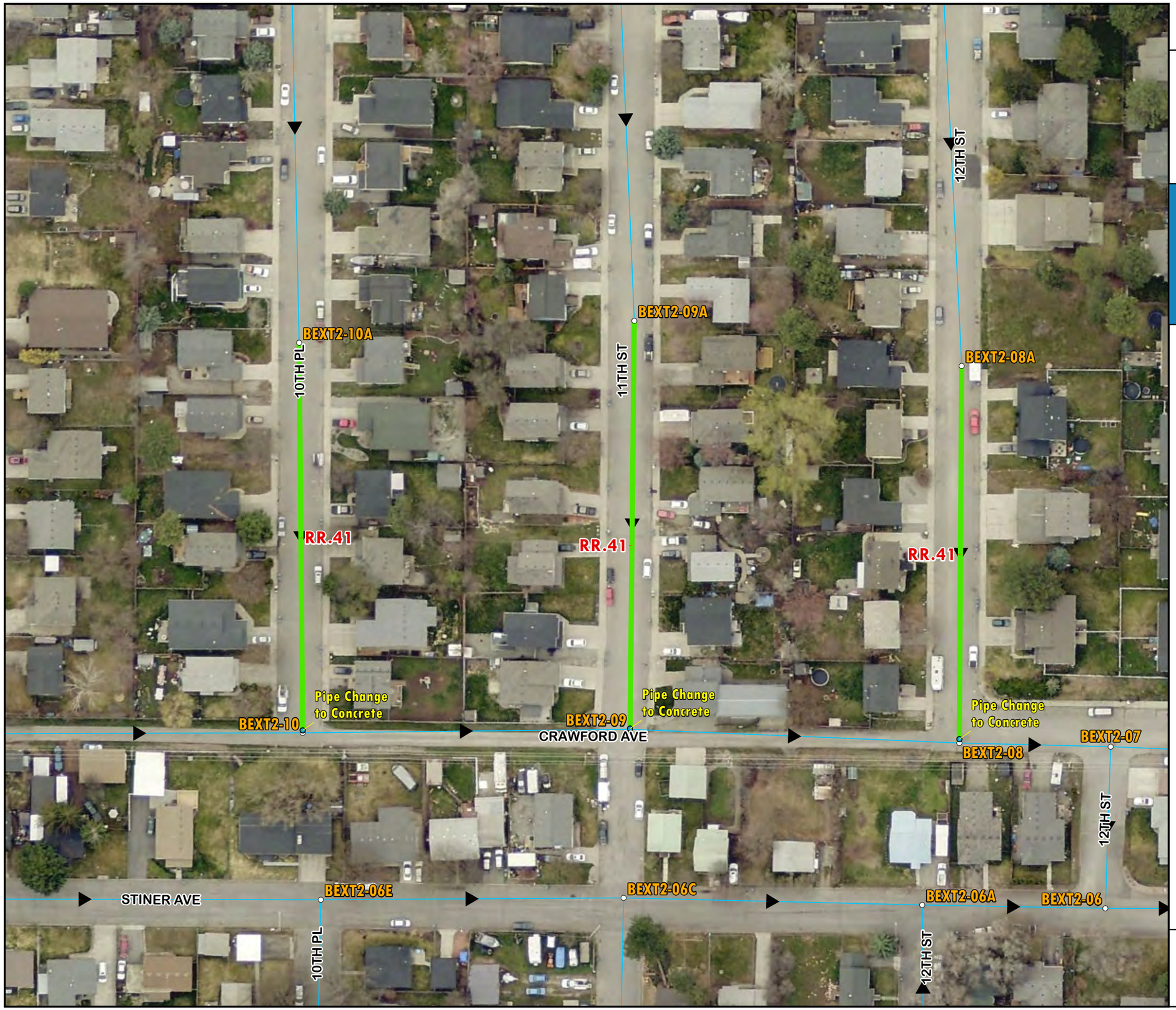

Repair & Rehabilitation Projects

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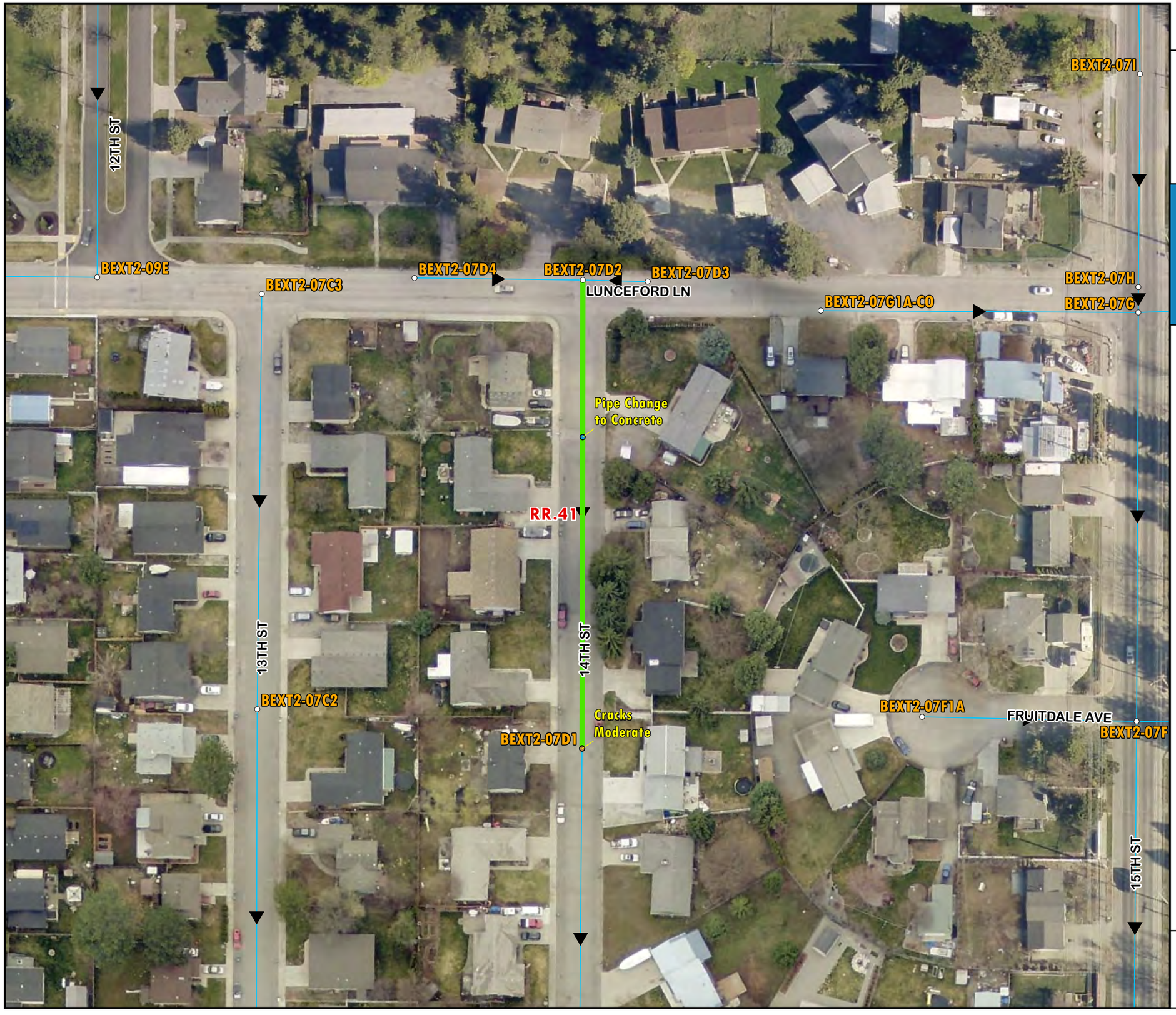

City of Coeur d'Alene
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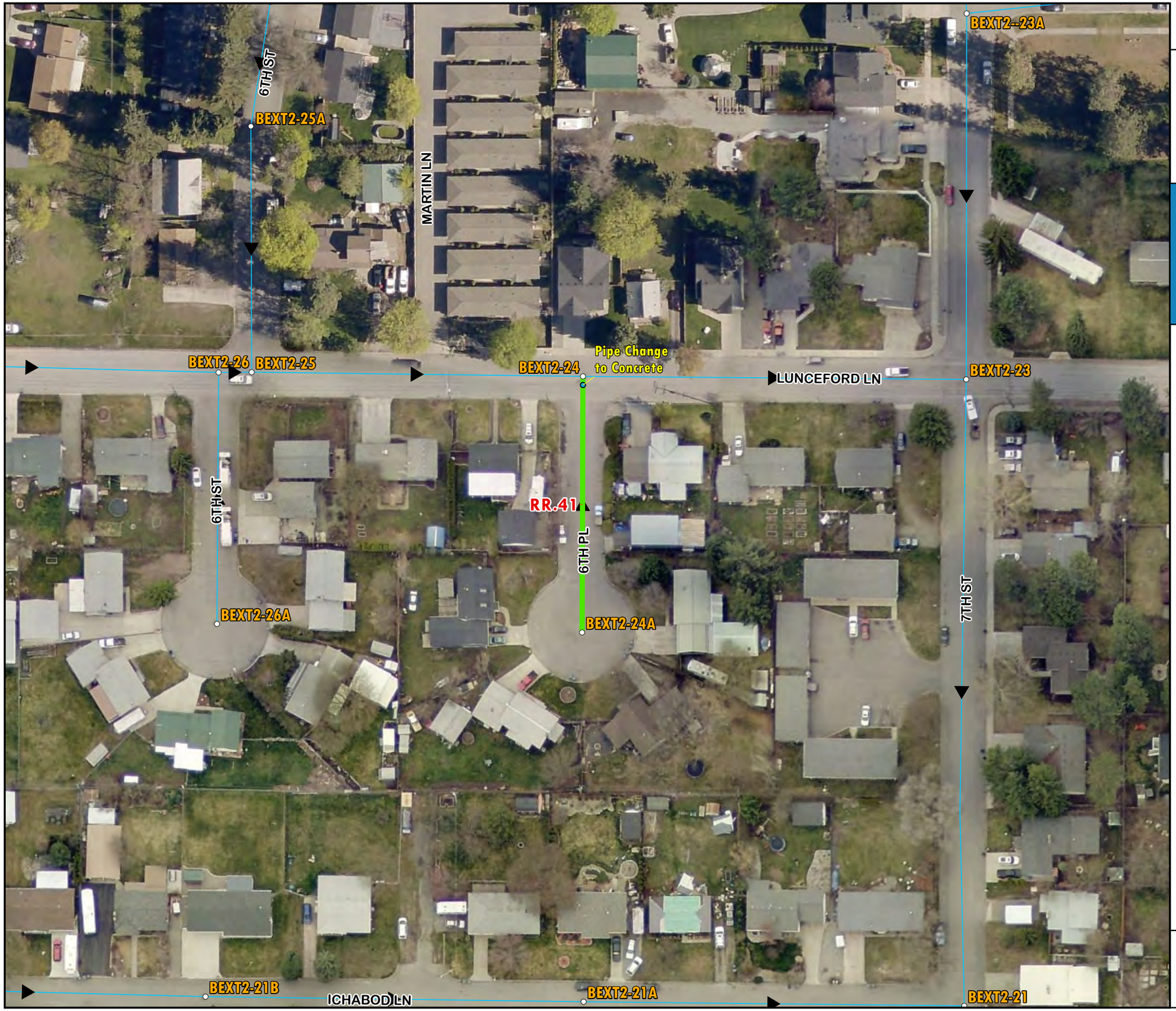


City of Coeur d'Alene
IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.41

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Pipe material transitions to concrete

RECOMMENDED SOLUTION

8" partial cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

Combined RR.41 projects: $386,000

0 35 70 140 Feet

Note:

1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

PRINT DATE: 10/20/2022

JUB

City of Coeur d'Alene
IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.41

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Pipe material transitions to concrete

RECOMMENDED SOLUTION

8" partial cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

Combined RR.41 projects: $386,000

Feet
0 20 40 80

Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

PRINT DATE: 10/20/2022

J-U-B

City of Coeur d'Alene
IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.41

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Pipe material transitions to concrete

RECOMMENDED SOLUTION

12" partial cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

Combined RR.41 projects: $386,000

0 35 70 140 Feet

Note:

1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

PRINT DATE: 10/20/2022

JUB

City of Coeur d'Alene
IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.42 (1 of 2)

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 8" PVC pipe

RECOMMENDED SOLUTION

8" open trench replacement & cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

Combined RR.42 projects: $779,000

Feet

0 35 70 140

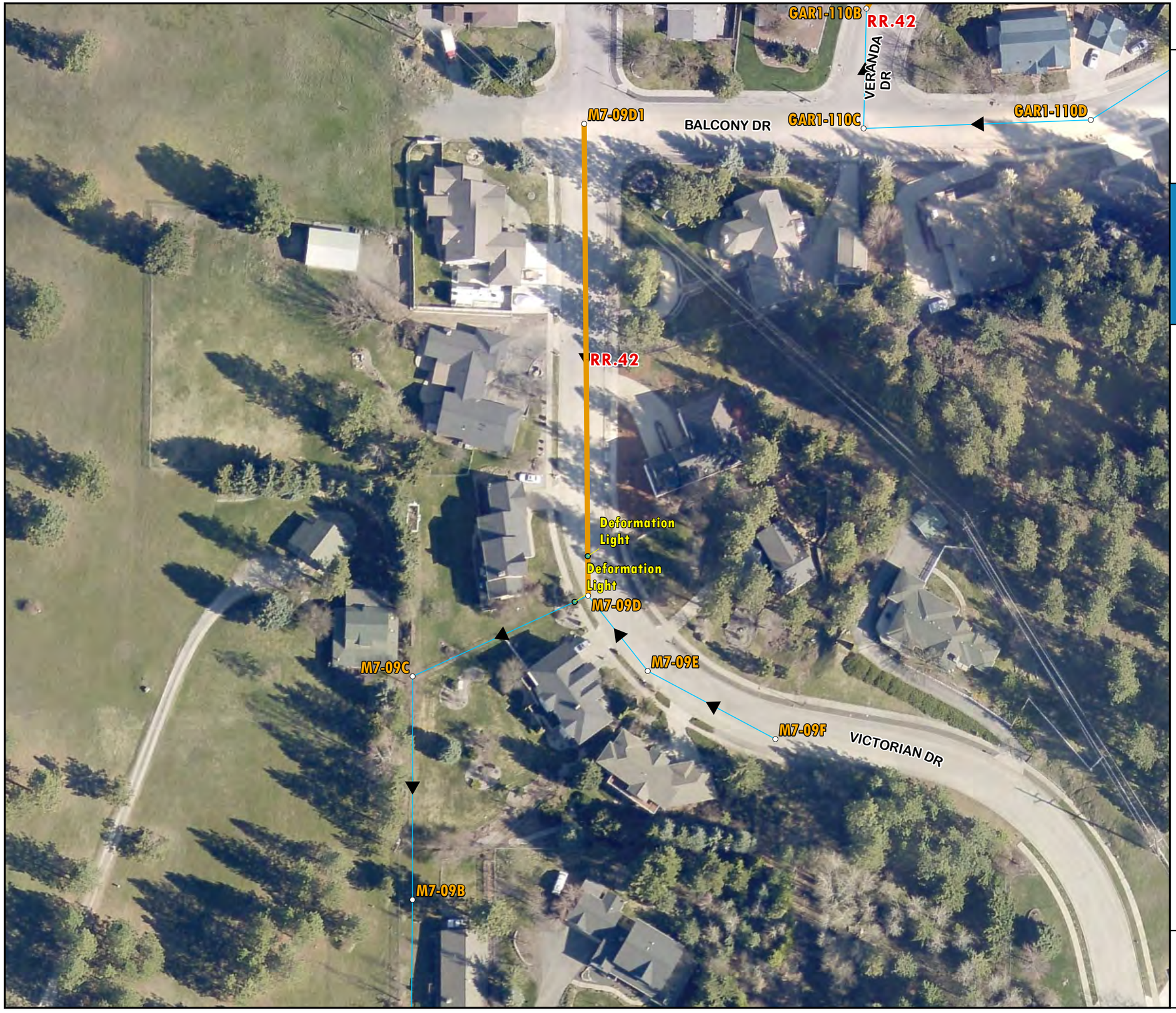
Note:

1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

PRINT DATE: 10/20/2022

J-U-B



City of Coeur d'Alene
IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.42 (2 of 2)

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 8" PVC pipe

RECOMMENDED SOLUTION

8" open trench replacement & cured-in-place pipe rehabilitation

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

Combined RR.42 projects: $779,000

Feet
0 35 70 140

Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

PRINT DATE: 10/20/2022

J-U-B

City of Coeur d'Alene
IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.43

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 6" concrete pipe

RECOMMENDED SOLUTION

8" open trench replacement

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$270,000

Feet

0 35 70 140

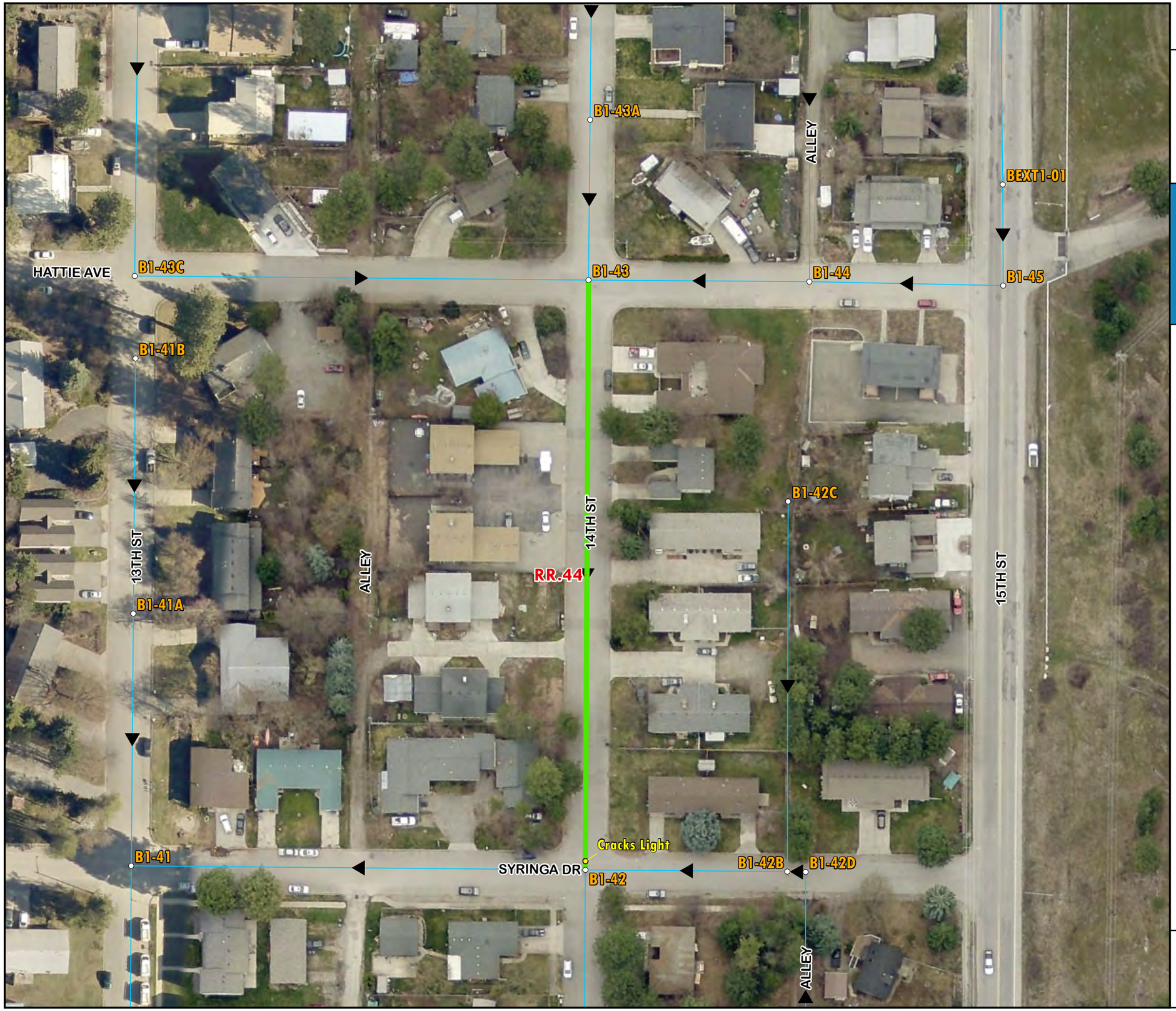
Note:

1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

PRINT DATE: 10/20/2022

J-U-B



City of Coeur d'Alene
IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.44

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 24" concrete pipe

RECOMMENDED SOLUTION

24" cured-in-place pipe rehabilitation
*project extents to be further reviewed

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$187,000

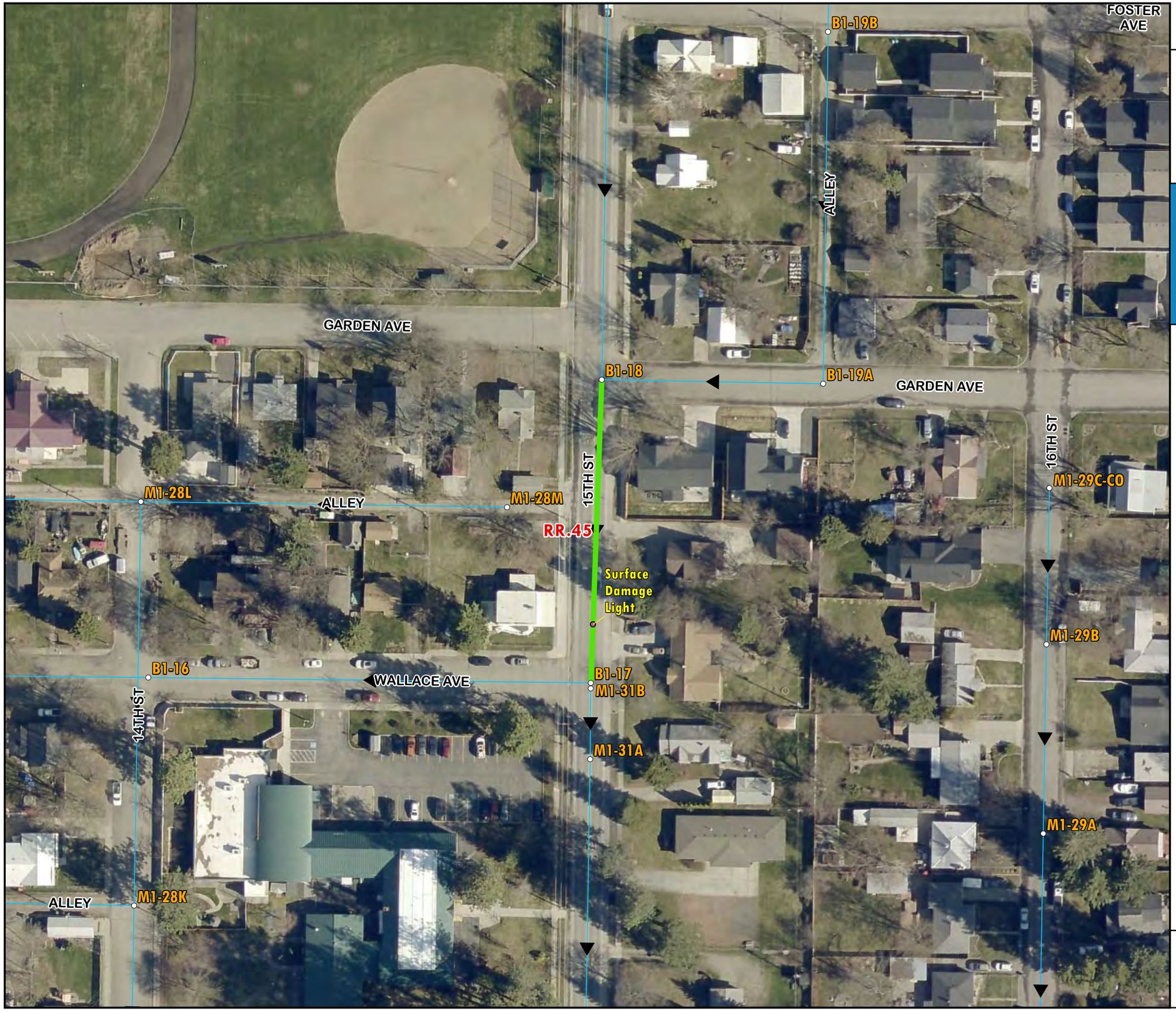
Feet
0 35 70 140

Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

PRINT DATE: 10/20/2022

J-U-B



City of Coeur d'Alene
IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.45

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 24" concrete pipe

RECOMMENDED SOLUTION

24" cured-in-place pipe rehabilitation
*project extents to be further reviewed

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$97,000

0 35 70 140 Feet

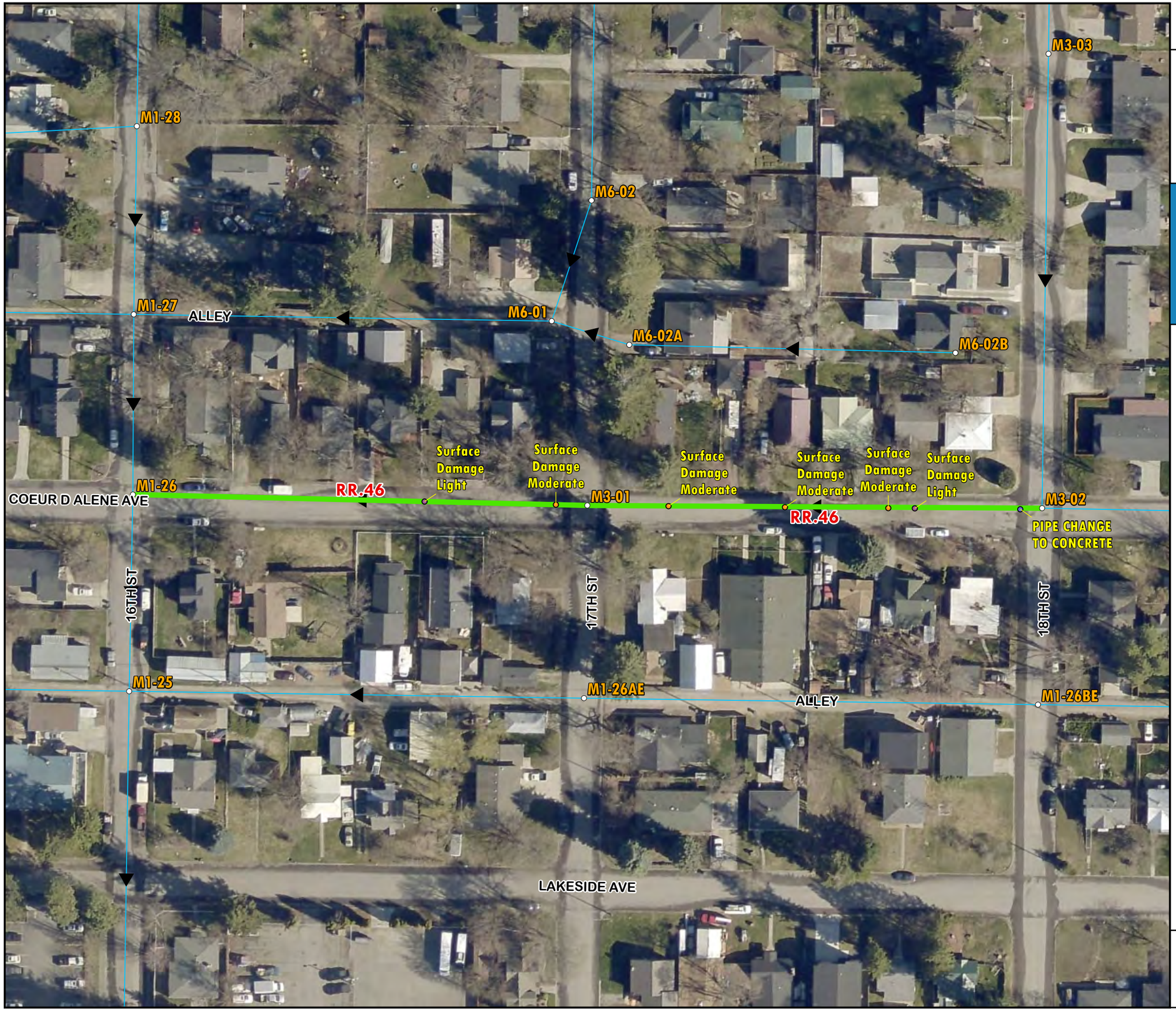
Note:

1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

PRINT DATE: 10/20/2022

JUB



City of Coeur d'Alene
IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.46

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 15" concrete pipe

RECOMMENDED SOLUTION

15" cured-in-place pipe rehabilitation
*project extents to be further reviewed

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$73,000

Feet
0 35 70 140

Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

PRINT DATE: 10/20/2022

J-U-B

City of Coeur d'Alene
IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.47

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 6" concrete and PVC pipe

RECOMMENDED SOLUTION

8" open trench replacement

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$539,000

0 50 100 200 Feet

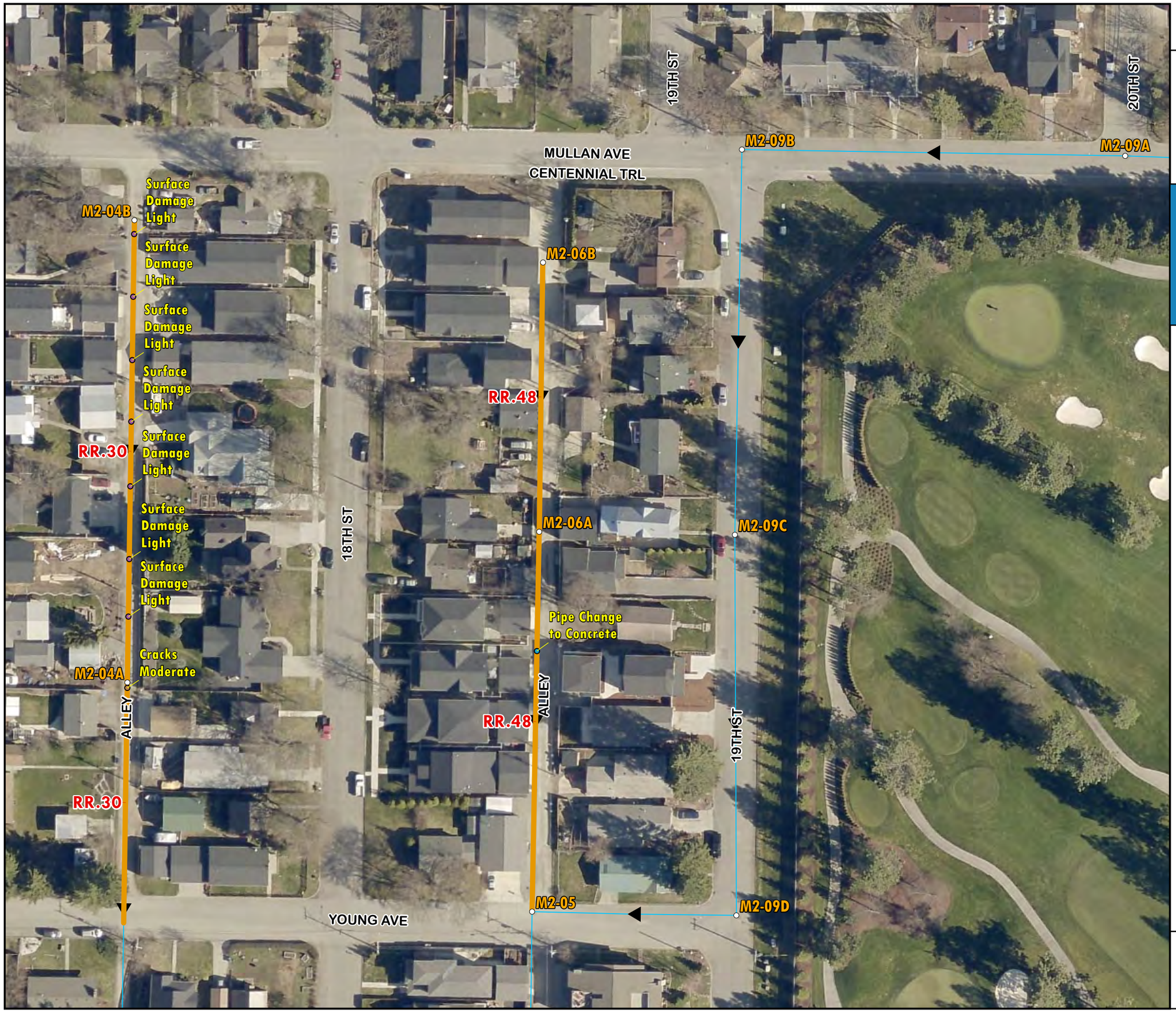
Note:

1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

N W E S

PRINT DATE: 10/20/2022

J-U-B



City of Coeur d'Alene
IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: RR.48

Repair & Rehabilitation Projects

Project Type

- CIPP
- Open Trench

CORE ISSUE

Poor condition 6" concrete pipe

RECOMMENDED SOLUTION

8" open trench replacement

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$312,000

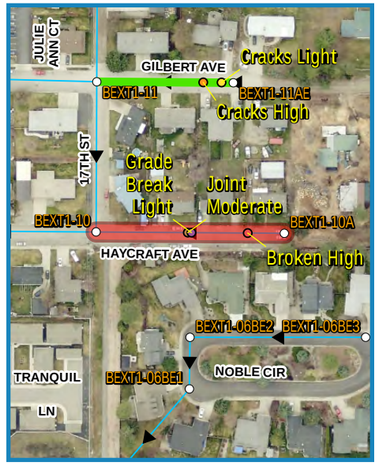
Feet
0 35 70 140

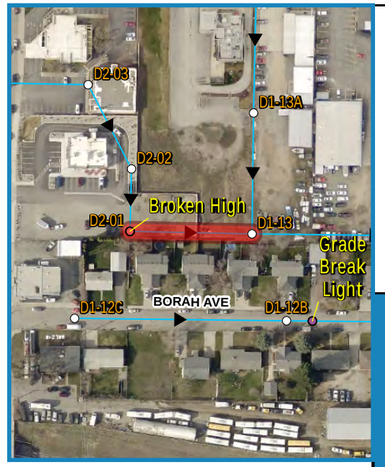
Note:
1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

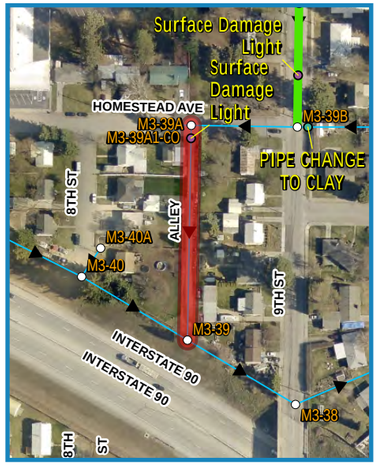
N W E S

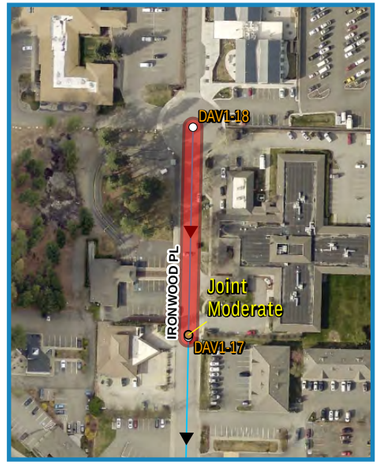
PRINT DATE: 10/20/2022

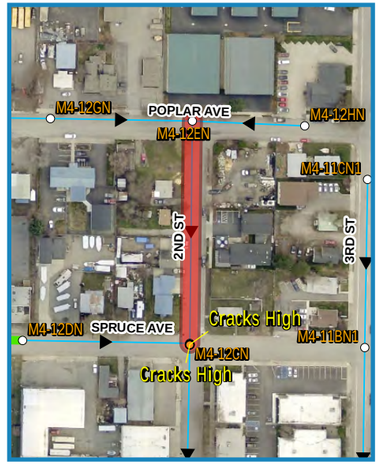
JUB

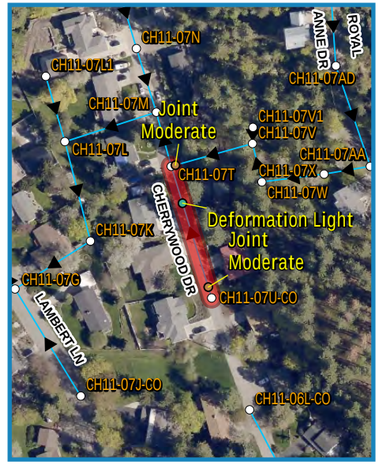


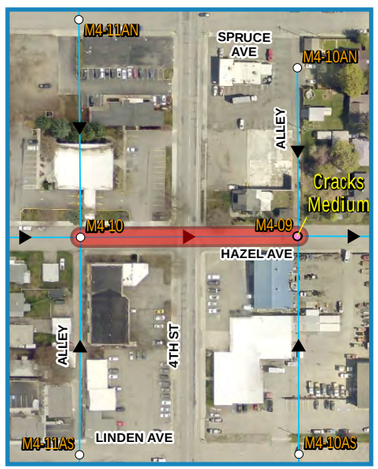


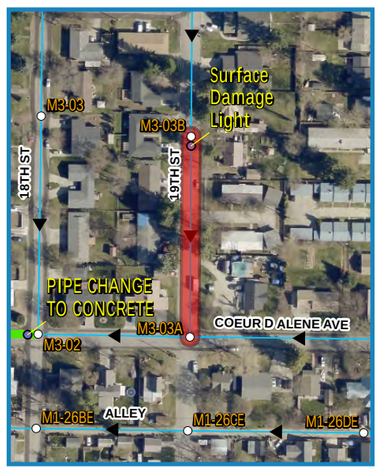












City of Coeur d'Alene
IDAHO

City of Coeur d'Alene

2022 Wastewater Collection System Master Plan

Project: Point Repairs

Project Type

Line of Point Repair

CORE ISSUE

Pipe material generally new with single high priority defect

RECOMMENDED SOLUTION

8", 12" and 18" point repair to fix high priority defect.

OPINION OF PROBABLE COST

(Sept 2022 Dollars)

$145,000

Feet

0 120 240 480

Note:

1. Model is conceptual in nature and intended for planning purposes only. Field verification, survey utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

PRINT DATE: 10/17/2022

J-U-B

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: C.1

IDENTIFIER: BUS1-01 to BUS2-01

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 11,000
2.00	**Construction Traffic Control**			5.0%	$ 11,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.03	12" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	301	LF	$ 42	$ 12,718
	Trench Excav./Backfill for 12-18 ft deep Sewer	301	LF	$ 23	$ 6,909
4.04	15" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	359	LF	$ 62	$ 22,412
	Trench Excav./Backfill for 12-18 ft deep Sewer	359	LF	$ 34	$ 12,380
4.12	Bedding - 10" - 15"	660	LF	$ 6	$ 3,959
5.00	**Surface Repair**				
5.04	Asphalt - 1/2 Street width per City Standards (Required for 16-20' Depth Sewer) 4	660	LF	$ 143	$ 94,357
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	1	EA	$ 4,453	$ 4,453
6.02	48" Manholes, 10-16 ft.	2	EA	$ 5,937	$ 11,874
7.00	**Project Specific Considerations**				
7.04	I/I Removal (By Others)	1	LS	$ -	$ -
7.05	Storm and Water System Improvements (By Others)	1	LS	$ -	$ -
7.06	Allotment for Sidewalk, Curb/Gutter, Landscape Bricks	1	LS	$ 15,000	$ 15,000
7.07	Concrete Street Approaches	2	LS	$ 5,000	$ 10,000
7.08	Alley Construction and Utilities Markup	1	LS	$ 10,000	$ 10,000
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			10.0%	$ 20,000
8.02	Bonding and Insurance			1.0%	$ 2,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 248,000**
				Contingency [1]	**$ 74,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 64,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 386,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: C.2

IDENTIFIER: M1-21 to M2-09B

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 35,000
2.00	**Construction Traffic Control**			5.0%	$ 35,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.03	12" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	681	LF	$ 42	$ 28,823
	Trench Excav./Backfill for 4-8 ft deep Sewer	178	LF	$ 14	$ 2,453
	Trench Excav./Backfill for 8-12 ft deep Sewer	504	LF	$ 17	$ 8,677
4.07	24" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	1,189	LF	$ 157	$ 186,130
	Trench Excav./Backfill for 12-18 ft deep Sewer	1,189	LF	$ 57	$ 68,324
4.12	Bedding - 10" - 15"	681	LF	$ 6	$ 4,088
4.13	Bedding - 18" - 27"	1,189	LF	$ 10	$ 11,893
5.00	**Surface Repair**				
5.04	Asphalt - 1/2 Street width per City Standards (Required for 16-20' Depth Sewer) 4	2,068	LF	$ 143	$ 295,716
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	1	EA	$ 4,453	$ 4,453
6.02	48" Manholes, 10-16 ft.	4	EA	$ 5,937	$ 23,748
6.03	48" Manholes, 16-32 ft.	1	EA	$ 7,421	$ 7,421
7.00	**Project Specific Considerations**				
7.03	Storm and Water System Improvements (By Others)	1	LS		$ -
7.04	Alley Construction and Utilities Markup	1	LS	$ 25,000	$ 25,000
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			5.0%	$ 33,000
8.02	Bonding and Insurance			1.0%	$ 7,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 777,000**
				Contingency [1]	**$ 233,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 202,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 1,212,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: C.4

IDENTIFIER: RIV1-02 to FWN1-01

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 238,000
2.00	**Construction Traffic Control**			5.0%	$ 238,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.05	18" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	752	LF	$ 86	$ 64,761
	Trench Excav./Backfill for 4-8 ft deep Sewer	711	LF	$ 28	$ 19,604
	Trench Excav./Backfill for 12-18 ft deep Sewer	41	LF	$ 46	$ 1,894
4.06	21" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	16	LF	$ 120	$ 1,918
	Trench Excav./Backfill for 8-12 ft deep Sewer	16	LF	$ 40	$ 643
4.07	24" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	9,734	LF	$ 157	$ 1,523,308
	Trench Excav./Backfill for 8-12 ft deep Sewer	7,118	LF	$ 46	$ 327,108
	Trench Excav./Backfill for 12-18 ft deep Sewer	1,816	LF	$ 57	$ 104,326
	Trench Excav./Backfill for 18-22 ft deep Sewer	400	LF	$ 76	$ 30,332
	Trench Excav./Backfill for >22 ft deep Sewer	400	LF	$ 164	$ 65,720
4.10	36" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	746	LF	$ 439	$ 327,747
	Trench Excav./Backfill for 12-18 ft deep Sewer	264	LF	$ 75	$ 19,743
	Trench Excav./Backfill for 18-22 ft deep Sewer	482	LF	$ 93	$ 44,861
4.13	Bedding - 18" - 27"	11,248	LF	$ 10	$ 112,481
5.00	**Surface Repair**				
5.04	Asphalt - Centennial Trail Section (16 ft Wide) [4]	11,248	LF	$ 105	$ 1,181,055
6.00	**Manholes**				
7.00	**Project Specific Considerations**				
7.02	72" Manholes, 10-16 ft	39	EA	$ 11,874	$ 463,090
7.03	Storm and Water System Improvements (By Others)	1	LS		$ -
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			10.0%	$ 429,000
8.02	Bonding and Insurance			1.0%	$ 43,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 5,237,000**
				Contingency [1]	**$ 1,571,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 1,362,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 8,170,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: C.6

IDENTIFIER: GAR1-01 to GAR1-15

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 47,000
2.00	**Construction Traffic Control**			5.0%	$ 47,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.03	12" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	1,181	LF	$ 42	$ 49,944
	Trench Excav./Backfill for 4-8 ft deep Sewer	189	LF	$ 14	$ 2,610
	Trench Excav./Backfill for 8-12 ft deep Sewer	991	LF	$ 17	$ 17,086
4.04	15" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	2,133	LF	$ 62	$ 133,074
	Trench Excav./Backfill for 4-8 ft deep Sewer	172	LF	$ 23	$ 3,945
	Trench Excav./Backfill for 8-12 ft deep Sewer	1,953	LF	$ 28	$ 53,840
	Trench Excav./Backfill for 12-18 ft deep Sewer	8	LF	$ 34	$ 289
4.12	Bedding - 10" - 15"	3,313	LF	$ 6	$ 19,880
5.00	**Surface Repair**				
5.04	Asphalt - 1/2 Street width per City Standards (Required for 16-20' Depth Sewer) 4	3,313	LF	$ 143	$ 473,802
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	13	EA	$ 4,453	$ 57,887
6.02	48" Manholes, 10-16 ft.	2	EA	$ 5,937	$ 11,874
7.00	**Project Specific Considerations**				
7.03	Storm and Water System Improvements (By Others)	1	LS		$ -
7.04	I-90 Bridge Under-Crossing	1	LS	$ 15,000	$ 15,000
7.05	Narrow Road Markup in N. Hill Drive	1	LS	$ 10,000	$ 10,000
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			10.0%	$ 85,000
8.02	Bonding and Insurance			1.0%	$ 8,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 1,036,000**
				Contingency [1]	**$ 311,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 269,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 1,616,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: C.7

IDENTIFIER: M1-14 to M1-18

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 58,000
2.00	**Construction Traffic Control**			5.0%	$ 58,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.09	30" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	1,469	LF	$ 303	$ 444,426
	Trench Excav./Backfill for 8-12 ft deep Sewer	434	LF	$ 57	$ 24,924
	Trench Excav./Backfill for 12-18 ft deep Sewer	588	LF	$ 69	$ 40,521
	Trench Excav./Backfill for >22 ft deep Sewer	447	LF	$ 176	$ 78,585
5.00	**Surface Repair**				
5.05	Asphalt - Full Street width per City Standards (Required for 20' - 30' Depth Sewer) 4	1,469	LF	$ 240	$ 352,486
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	2	EA	$ 4,453	$ 8,906
6.02	48" Manholes, 10-16 ft.	1	EA	$ 5,937	$ 5,937
6.03	48" Manholes, 16-32 ft.	1	EA	$ 7,421	$ 7,421
7.00	**Project Specific Considerations**				
7.03	Storm and Water System Improvements (By Others)	1	LS		$ -
7.04	Alley Construction and Utilities Markup	1	LS	$ 25,000	$ 25,000
7.05	Cross-Country Markup btw M1-14 and M1-15.	1	LS	$ 50,000	$ 50,000
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			10.0%	$ 104,000
8.02	Bonding and Insurance			1.0%	$ 10,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 1,268,000**
				Contingency [1]	**$ 380,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 330,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 1,978,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: C.9

IDENTIFIER: Mill River Lift Station & Force Main

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 13,000
2.00	**Construction Traffic Control**			5.0%	$ 13,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
5.00	**Surface Repair**				
6.00	**Manholes**				
7.00	**Project Specific Considerations**				
7.04	Utilize existing 8" force main and existing 8" siphon pipe to LS discharge Contingency for valves and fittings to connect into existing siphon line	1	LS	$ 75,000	$ 75,000
7.05	Impeller Improvements (no electrical required)	1	LS	$ 25,000	$ 25,000
7.06	Emergency Overflow Basin (17,000 gallons)	1	LS	$ 100,000	$ 100,000
7.07	Site Surface Repair for Overflow Basin Structure	1	LS	$ 25,000	$ 25,000
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			10.0%	$ 23,000
8.02	Bonding and Insurance			1.0%	$ 2,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 276,000**
				Contingency [1]	**$ 83,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 72,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 431,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: C.10

IDENTIFIER: FWN1-22A to FWN1-23HA

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 66,000
2.00	**Construction Traffic Control**			5.0%	$ 66,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.04	15" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	3,968	LF	$ 62	$ 247,629
	Trench Excav./Backfill for 4-8 ft deep Sewer	592	LF	$ 23	$ 13,601
	Trench Excav./Backfill for 8-12 ft deep Sewer	99	LF	$ 28	$ 2,718
	Trench Excav./Backfill for 12-18 ft deep Sewer	804	LF	$ 34	$ 27,725
	Trench Excav./Backfill for 18-22 ft deep Sewer	1,538	LF	$ 53	$ 81,308
	Trench Excav./Backfill for >22 ft deep Sewer	935	LF	$ 141	$ 132,161
4.12	Bedding - 10" - 15"	3,968	LF	$ 6	$ 23,810
5.00	**Surface Repair**				
5.04	Asphalt - 1/2 Street width per City Standards (Required for 16-20' Depth Sewer) 4	3,968	LF	$ 143	$ 567,483
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	5	EA	$ 4,453	$ 22,264
6.02	48" Manholes, 10-16 ft.	3	EA	$ 5,937	$ 17,811
6.03	48" Manholes, 16-32 ft.	8	EA	$ 7,421	$ 59,371
7.00	**Project Specific Considerations**				
7.03	Storm and Water System Improvements (By Others)	1	LS		$ -
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			10.0%	$ 120,000
8.02	Bonding and Insurance			1.0%	$ 12,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 1,460,000**
				Contingency [1]	**$ 438,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 380,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 2,278,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: C.11

IDENTIFIER: FWN1-04 to FWN1-11

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 46,000
2.00	**Construction Traffic Control**			5.0%	$ 46,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.05	18" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	2,047	LF	$ 86	$ 176,229
	Trench Excav./Backfill for 4-8 ft deep Sewer	275	LF	$ 28	$ 7,573
	Trench Excav./Backfill for 8-12 ft deep Sewer	259	LF	$ 34	$ 8,944
	Trench Excav./Backfill for 12-18 ft deep Sewer	628	LF	$ 46	$ 28,851
	Trench Excav./Backfill for 18-22 ft deep Sewer	885	LF	$ 64	$ 56,934
4.13	Bedding - 18" - 27"	2,047	LF	$ 10	$ 20,468
5.00	**Surface Repair**				
5.05	Asphalt - Fairway Restoration - Full Width (36 ft Wide) [4]	2,047	LF	$ 240	$ 491,230
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	2	EA	$ 4,453	$ 8,906
6.03	48" Manholes, 16-32 ft.	4	EA	$ 7,421	$ 29,686
7.00	**Project Specific Considerations**				
7.03	Storm and Water System Improvements (By Others)	1	LS		$ -
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			10.0%	$ 83,000
8.02	Bonding and Insurance			1.0%	$ 8,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 1,012,000**
				Contingency [1]	**$ 304,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 263,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 1,579,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: C.12

IDENTIFIER: RAM1-42 to RAM1-46B

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 17,000
2.00	**Construction Traffic Control**			5.0%	$ 17,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.02	10" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	2,903	LF	$ 29	$ 85,354
	Trench Excav./Backfill for 4-8 ft deep Sewer	1,047	LF	$ 13	$ 13,227
	Trench Excav./Backfill for 8-12 ft deep Sewer	1,557	LF	$ 16	$ 25,037
	Trench Excav./Backfill for 12-18 ft deep Sewer	300	LF	$ 20	$ 6,034
4.12	Bedding - 10" - 15"	2,903	LF	$ 6	$ 17,419
5.00	**Surface Repair**				
5.01	Natural Ground	2,240	LF	$ 15	$ 33,605
5.04	Asphalt - 1/2 Street width per City Standards (Required for 16-20' Depth Sewer) 4	663	LF	$ 143	$ 94,793
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	7	EA	$ 4,453	$ 31,170
6.02	48" Manholes, 10-16 ft.	2	EA	$ 5,937	$ 11,874
7.00	**Project Specific Considerations**				
7.03	Storm and Water System Improvements (By Others)	1	LS		$ -
7.04	I-90 ROW Coordination	1	LS	$ 5,000	$ 5,000
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			5.0%	$ 16,000
8.02	Bonding and Insurance			1.0%	$ 3,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 377,000**
				Contingency [1]	**$ 113,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 98,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 588,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: S.1

IDENTIFIER: FWN1-22 to FWN1-24

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 8,000
2.00	**Construction Traffic Control**			5.0%	$ 8,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.03	12" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	645	LF	$ 42	$ 27,265
	Trench Excav./Backfill for 8-12 ft deep Sewer	251	LF	$ 17	$ 4,334
	Trench Excav./Backfill for 12-18 ft deep Sewer	393	LF	$ 23	$ 9,032
4.12	Bedding - 10" - 15"	645	LF	$ 6	$ 3,867
5.00	**Surface Repair**				
5.04	Asphalt - 1/2 Street width per City Standards (Required for 16-20' Depth Sewer) 4	645	LF	$ 143	$ 92,172
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	1	EA	$ 4,453	$ 4,453
6.02	48" Manholes, 10-16 ft.	2	EA	$ 5,937	$ 11,874
7.00	**Project Specific Considerations**				
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			10.0%	$ 15,000
8.02	Bonding and Insurance			1.0%	$ 2,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 186,000**
				Contingency [1]	**$ 56,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 48,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 290,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: S.2

IDENTIFIER: BEXT1-06DE3 to BEXT1-06DE6B

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 10,000
2.00	**Construction Traffic Control**			5.0%	$ 10,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.03	12" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	752	LF	$ 42	$ 31,825
	Trench Excav./Backfill for 4-8 ft deep Sewer	464	LF	$ 14	$ 6,394
	Trench Excav./Backfill for 8-12 ft deep Sewer	289	LF	$ 17	$ 4,974
4.12	Bedding - 10" - 15"	752	LF	$ 6	$ 4,514
5.00	**Surface Repair**				
5.04	Asphalt - 1/2 Street width per City Standards (Required for 16-20' Depth Sewer) 4	752	LF	$ 143	$ 107,587
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	5	EA	$ 4,453	$ 22,264
6.02	48" Manholes, 10-16 ft.	1	EA	$ 5,937	$ 5,937
7.00	**Project Specific Considerations**				
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			10.0%	$ 18,000
8.02	Bonding and Insurance			1.0%	$ 2,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 223,000**
				Contingency [1]	**$ 67,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 58,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 348,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: S.4

IDENTIFIER: Hawks Nest Lift Station

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 25,000
2.00	**Construction Traffic Control**			0.0%	$ -
3.00	**Duplex Submersible Lift Station**				
3.01	Wet Pit				
	Excavation, Backfill, and Shoring for Deep Excavation and Limited Footprint	1	LS	$50,000	$50,000
	Coring	1	LS	$5,000	$5,000
3.02	Site Piping				
	15" Gravity Sewer	150	LF	$62	$9,360
	Trench Excav./Backfill for >22 ft deep Sewer	150	LF	$141	$21,198
3.03	Equipment				
	Pumps - 2 total	2	EA	$50,000	$100,000
	Installation and Mark-up			25%	$25,000
3.04	Project Specific Considerations				
	Bypass Pumping	1	LS	$25,000	$25,000
3.05	Additional Elements (estimated % of above)				
	Site Civil (Final Grading, Landscaping, Fencing, etc)			5.0%	$12,000
	Electrical and Instrumentation			50.0%	$118,000
	Flow Meter and Vaults	1	LS	$50,000	$50,000
	Generator	1	LS	$75,000	$75,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 516,000**
				Contingency [1]	**$ 155,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 134,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 805,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: S.6

IDENTIFIER: Foothills Lift Station

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 3,000
2.00	**Construction Traffic Control**			5.0%	$ 3,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	497	LF	$ 19	$ 9,399
	Trench Excav./Backfill for 12-18 ft deep Sewer	497	LF	$ 17	$ 8,571
4.11	Bedding - 8"	497	LF	$ 3	$ 1,492
5.00	**Surface Repair**				
5.01	Natural Ground	497	LF	$ 15	$ 7,460
6.00	**Manholes**				
6.02	48" Manholes, 10-16 ft.	1	EA	$ 5,937	$ 5,937
7.00	**Project Specific Considerations**				
7.04	Abandon Existing Lift Station	1	LS	$ 25,000	$ 25,000
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			10.0%	$ 6,000
8.02	Bonding and Insurance			1.0%	$ 1,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 71,000**
				Contingency [1]	**$ 21,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 18,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 110,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.30

IDENTIFIER: M2-04B to M2-03A; Poor condition 6" PVC and concrete pipe; 8"Open Trench Replacement

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.00	**Mobilization**			20%	$ 27,000
2.00	**Construction Traffic Control**			5%	$ 7,000
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	726	LF	$ 19	$ 13,716
	Trench Excav./Backfill for Sewer	726	LF	$ 14	$ 10,160
	Bedding - 8"	726	LF	$ 3	$ 2,177
5.00	**Surface Repair**				
5.02	Gravel Roadway	726	LF	$ 28	$ 20,328
5.06	Asphalt Intersection Repair	1	LS	$ 20,000	$ 20,000
5.07	Concrete Approach Repair	1	LS	$ 5,000	$ 5,000
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	3	EA	$ 4,453	$ 13,358
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			5%	$ 4,000
8.02	Bonding and Insurance			1%	$ 1,000
9.00	**Project Specific Considerations**				
9.01	Tree Trimming			1%	$ 1,000
9.02	Alleyway Construction Contingency			50%	$ 45,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 170,000**
				Contingency [1]	**$ 51,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 44,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 265,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.31

IDENTIFIER: M4-09HN to M4-09HN3 & M4-09GN to M4-09GN1 & M4-09FN to M4-09FN1; Poor condition 6" PVC and concrete pipe; 8"Open Trench Replacement

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.00	**Mobilization**			20%	$ 70,000
2.00	**Construction Traffic Control**			5%	$ 18,000
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	1,295	LF	$ 19	$ 24,478
	Trench Excav./Backfill for Sewer	1,295	LF	$ 14	$ 18,132
	Bedding - 8"	1,295	LF	$ 3	$ 3,885
5.00	**Surface Repair**				
5.01	Natural Ground	300	LF	$ 15	$ 4,500
5.02	Gravel Roadway	995	LF	$ 28	$ 27,863
5.06	Asphalt Intersection Repair	4	LS	$ 20,000	$ 80,000
5.07	Concrete Approach Repair	4	LS	$ 5,000	$ 20,000
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	4	EA	$ 4,453	$ 17,811
6.02	48" Manholes, 10-16 ft.	4	EA	$ 5,937	$ 23,748
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			5%	$ 11,000
8.02	Bonding and Insurance			1%	$ 2,000
9.00	**Project Specific Considerations**				
9.01	Tree Trimming			1%	$ 2,000
9.02	Alleyway Construction Contingency			50%	$ 117,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 440,000**
				Contingency [1]	**$ 132,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 114,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 686,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.32

IDENTIFIER: DAV1-05A to DAV1-05C; Poor condition 6" PVC Pipe; 8"Open Trench Replacement

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.00	**Mobilization**			20%	$ 18,000
2.00	**Construction Traffic Control**			5%	$ 4,000
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	312	LF	$ 19	$ 5,890
	Trench Excav./Backfill for Sewer	312	LF	$ 14	$ 4,363
	Bedding - 8"	312	LF	$ 3	$ 935
5.00	**Surface Repair**				
5.01	Natural Ground	312	LF	$ 15	$ 4,674
5.06	Asphalt Intersection Repair	1	LS	$ 20,000	$ 20,000
5.07	Concrete Approach Repair	2	LS	$ 5,000	$ 10,000
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	2	EA	$ 4,453	$ 8,906
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			5%	$ 3,000
8.02	Bonding and Insurance			1%	$ 1,000
9.00	**Project Specific Considerations**				
9.01	Tree Trimming			1%	$ 1,000
9.02	Alleyway Construction Contingency			50%	$ 29,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 111,000**
				Contingency [1]	**$ 33,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 29,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 173,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.33

IDENTIFIER: M3-22C to M3-22E; Poor condition 6" concrete pipe; 8"Open Trench Replacement

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.00	**Mobilization**			20%	$ 35,000
2.00	**Construction Traffic Control**			5%	$ 9,000
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	572	LF	$ 19	$ 10,812
	Trench Excav./Backfill for Sewer	572	LF	$ 14	$ 8,009
	Bedding - 8"	572	LF	$ 3	$ 1,716
5.00	**Surface Repair**				
5.02	Gravel Roadway	572	LF	$ 28	$ 16,017
5.06	Asphalt Intersection Repair	2	LS	$ 20,000	$ 40,000
5.07	Concrete Approach Repair	4	LS	$ 5,000	$ 20,000
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	3	EA	$ 4,453	$ 13,358
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			5%	$ 5,000
8.02	Bonding and Insurance			1%	$ 1,000
9.00	**Project Specific Considerations**				
9.01	Tree Trimming			1%	$ 1,000
9.02	Alleyway Construction Contingency			50%	$ 58,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 219,000**
				Contingency [1]	**$ 66,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 57,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 342,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.35

IDENTIFIER: M2-22A to M2-22C; Poor condition 6" concrete pipe; 8"Open Trench Replacement

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	**Description**	**Est. Quant.**	**Unit**	**Unit Price**	**Total Price**
1.00	**Mobilization**			20%	$ 37,000
2.00	**Construction Traffic Control**			5%	$ 9,000
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	681	LF	$ 19	$ 12,871
	Trench Excav./Backfill for Sewer	681	LF	$ 14	$ 9,534
	Bedding - 8"	681	LF	$ 3	$ 2,043
5.00	**Surface Repair**				
5.02	Gravel Roadway	681	LF	$ 28	$ 19,068
5.06	Asphalt Intersection Repair	2	LS	$ 20,000	$ 40,000
5.07	Concrete Approach Repair	4	LS	$ 5,000	$ 20,000
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	3	EA	$ 4,453	$ 13,358
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			5%	$ 6,000
8.02	Bonding and Insurance			1%	$ 1,000
9.00	**Project Specific Considerations**				
9.01	Tree Trimming			1%	$ 1,000
9.02	Alleyway Construction Contingency			50%	$ 62,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 233,000**
				Contingency [1]	**$ 70,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 61,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 364,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.36

IDENTIFIER: M2-25 to M2-26A; Poor condition 6" concrete pipe; 8"Open Trench Replacement

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.00	**Mobilization**			20%	$ 40,000
2.00	**Construction Traffic Control**			10%	$ 20,000
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	563	LF	$ 19	$ 10,636
	Trench Excav./Backfill for Sewer	563	LF	$ 14	$ 7,879
	Bedding - 8"	563	LF	$ 3	$ 1,688
5.00	**Surface Repair**				
5.04	Asphalt - 1/2 Street width per City Standards [4]	563	LF	$ 143	$ 80,476
5.07	Concrete Approach Repair	2	LS	$ 5,000	$ 10,000
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	3	EA	$ 4,453	$ 13,358
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			5%	$ 6,000
8.02	Bonding and Insurance			1%	$ 1,000
9.00	**Project Specific Considerations**				
9.01	Tree Trimming			1%	$ 1,000
9.02	Alleyway Construction Contingency			50%	$ 66,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 258,000**
				Contingency [1]	**$ 77,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 67,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 402,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.37

IDENTIFIER: M1-37B to M1-37E & M1-37C to M1-37D; Poor condition 6" concrete pipe; 8"Open Trench Replacement

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.00	**Mobilization**			20%	$ 59,000
2.00	**Construction Traffic Control**			10%	$ 30,000
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	609	LF	$ 19	$ 11,510
	Trench Excav./Backfill for Sewer	609	LF	$ 14	$ 8,526
	Bedding - 8"	609	LF	$ 3	$ 1,827
5.00	**Surface Repair**				
5.02	Gravel Roadway	329	LF	$ 28	$ 9,212
5.04	Asphalt - 1/2 Street width per City Standards [4]	280	LF	$ 143	$ 40,040
5.06	Asphalt Intersection Repair	2	LS	$ 20,000	$ 40,000
5.07	Concrete Approach Repair	2	LS	$ 5,000	$ 10,000
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	4	EA	$ 4,453	$ 17,811
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			5%	$ 7,000
8.02	Bonding and Insurance			1%	$ 1,000
9.00	**Project Specific Considerations**				
9.01	Tree Trimming			1%	$ 1,000
9.02	Alleyway Construction Contingency			50%	$ 73,000
9.03	Reroute Sanitary Sewer Service	10	LS	$ 7,500	$ 75,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 385,000**
				Contingency [1]	**$ 116,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 100,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 601,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.38

IDENTIFIER: M3-20D to M3-20E; Poor condition 6" concrete pipe; 8"Open Trench Replacement

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.00	**Mobilization**			20%	$ 25,000
2.00	**Construction Traffic Control**			10%	$ 12,000
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	308	LF	$ 19	$ 5,821
	Trench Excav./Backfill for Sewer	308	LF	$ 14	$ 4,312
	Bedding - 8"	308	LF	$ 3	$ 924
5.00	**Surface Repair**				
5.04	Asphalt - 1/2 Street width per City Standards [4]	308	LF	$ 143	$ 44,040
5.07	Concrete Approach Repair	1	LS	$ 5,000	$ 5,000
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	4	EA	$ 4,453	$ 17,811
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			5%	$ 4,000
8.02	Bonding and Insurance			1%	$ 1,000
9.00	**Project Specific Considerations**				
9.01	Tree Trimming			1%	$ 1,000
9.02	Alleyway Construction Contingency			50%	$ 41,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 162,000**
				Contingency [1]	**$ 49,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 42,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 253,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.39

IDENTIFIER: M7-07 to M7-08; Poor condition 8" PVC Pipe; 8"CIPP Rehabilitation

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.00	**Mobilization**			20%	$ 2,000
2.00	**Construction Traffic Control**			1%	$ -
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	8" Cured-in-Place Pipe (CIPP) Liner	234	LF	$ 38	$ 8,892
4.04	$/ LF Incidentals	234	LF	$ 7	$ 1,638
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			2%	$ 200
8.02	Bonding and Insurance			1%	$ 100
9.00	**Project Specific Considerations**				
9.01	None				
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 13,000**
				Contingency [1]	**$ 4,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 3,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 20,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.40

IDENTIFIER: Poor Condition 8", 10", and 12" concrete, clay and PVC Pipe; 8", 10", and 12" Cured-in-Place Pipe (CIPP)

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	**Description**	**Est. Quant.**	**Unit**	**Unit Price**	**Total Price**
1.00	**Mobilization**			20%	$ 118,000
2.00	**Construction Traffic Control**			1%	$ 6,000
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	8" Cured-in-Place Pipe (CIPP) Liner	11,405	LF	$ 38	$ 433,380
4.02	10" PVC Gravity Sewer Pipe				
	10" Cured-in-Place Pipe (CIPP) Liner	720	LF	$ 42	$ 30,228
4.03	12" PVC Gravity Sewer Pipe				
	12" Cured-in-Place Pipe (CIPP) Liner	467	LF	$ 45	$ 21,029
4.04	$/ LF Incidentals	12,592	LF	$ 7	$ 88,142
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			2%	$ 11,000
8.02	Bonding and Insurance			1%	$ 6,000
9.00	**Project Specific Considerations**				
9.01	None				$ -
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 714,000**
				Contingency [1]	**$ 214,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 186,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 1,114,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.41

IDENTIFIER: 8" and 12" Partial Cured-in-Place Pipe (CIPP) (concrete to PVC material transition)

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.00	**Mobilization**			20%	$ 41,000
2.00	**Construction Traffic Control**			1%	$ 2,000
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	8" Cured-in-Place Pipe (CIPP) Liner [4]	4,002	LF	$ 38	$ 152,070
4.02	12" PVC Gravity Sewer Pipe				
	12" Cured-in-Place Pipe (CIPP) Liner [4]	373	LF	$ 45	$ 16,789
4.04	$/ LF Incidentals	4,375	LF	$ 7	$ 30,625
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			2%	$ 4,000
8.02	Bonding and Insurance			1%	$ 2,000
9.00	**Project Specific Considerations**				
9.01	None				$ -
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 248,000**
				Contingency [1]	**$ 74,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 64,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 386,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Length of CIPP Liner should be verified during preliminary design.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.42

IDENTIFIER: GAR1-110B to GAR1-11M &M7-09D to M7-09D1; Poor condition 8" PVC Pipe; 8"Open Trench Replacement & CIPP Rehabilitation

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.00	**Mobilization**			20%	$ 77,000
2.00	**Construction Traffic Control**			10%	$ 38,000
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	1,055	LF	$ 19	$ 19,940
	Trench Excav./Backfill for Sewer	1,055	LF	$ 14	$ 14,770
	Bedding - 8"	1,055	LF	$ 3	$ 3,165
4.02	8" PVC Gravity Sewer Pipe				
	8" Cured-in-Place Pipe (CIPP) Liner	303	LF	$ 38	$ 11,514
4.03	$/ LF Incidentals	303	LF	$ 7	$ 2,121
5.00	**Surface Repair**				
5.01	Natural Ground	-	LF	$ 15	$ -
5.04	Asphalt - 1/2 Street width per City Standards [4]	1,055	LF	$ 143	$ 150,865
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	2	EA	$ 4,453	$ 8,906
6.02	48" Manholes, 10-16 ft.	1	EA	$ 5,937	$ 5,937
6.03	48" Manholes, 16-32 ft.	3	EA	$ 7,421	$ 22,264
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			5%	$ 12,000
8.02	Bonding and Insurance			1%	$ 3,000
9.00	**Project Specific Considerations**				
9.01	Tree Trimming			1%	$ 3,000
9.02	ROW Construction Contingency			50%	$ 127,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 499,000**
				Contingency [1]	**$ 150,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 130,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 779,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.43

IDENTIFIER: M1-23EE to M1-23FE; Poor condition 6" concrete pipe; 8"Open Trench Replacement

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.00	**Mobilization**			20%	$ 27,000
2.00	**Construction Traffic Control**			10%	$ 13,000
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	300	LF	$ 19	$ 5,670
	Trench Excav./Backfill for Sewer	300	LF	$ 14	$ 4,200
	Bedding - 8"	300	LF	$ 3	$ 900
5.00	**Surface Repair**				
5.02	Gravel Roadway	300	LF	$ 28	$ 8,400
5.06	Asphalt Intersection Repair	2	LS	$ 20,000	$ 40,000
5.07	Concrete Approach Repair	3	LS	$ 5,000	$ 15,000
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	2	EA	$ 4,453	$ 8,906
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			5%	$ 4,000
8.02	Bonding and Insurance			1%	$ 1,000
9.00	**Project Specific Considerations**				
9.01	Tree Trimming			1%	$ 1,000
9.02	Alleyway Construction Contingency			50%	$ 44,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 173,000**
				Contingency [1]	**$ 52,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 45,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 270,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.44

IDENTIFIER: B1-43 to B1-42; Poor condition 24" concrete pipe; 24" Cured-in-Place Pipe (CIPP)

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.00	**Mobilization**			20%	$ 20,000
2.00	**Construction Traffic Control**			1%	$ 1,000
4.00	**Gravity Sewer Pipe**				
4.01	24" PVC Gravity Sewer Pipe				
	24" Cured-in-Place Pipe (CIPP) Liner	467	LF	$ 120	$ 56,040
4.04	$/ LF Incidentals	467	LF	$ 70	$ 32,690
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			10%	$ 8,900
8.02	Bonding and Insurance			1%	$ 1,000
9.00	**Project Specific Considerations**				
9.01	None				$ -
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 120,000**
				Contingency [1]	**$ 36,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 31,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 187,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.45

IDENTIFIER: B1-18 to B1-17; Poor condition 24" concrete pipe; 24" Cured-in-Place Pipe (CIPP)

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.00	**Mobilization**			20%	$ 10,000
2.00	**Construction Traffic Control**			1%	$ 1,000
4.00	**Gravity Sewer Pipe**				
4.01	24" PVC Gravity Sewer Pipe				
	24" Cured-in-Place Pipe (CIPP) Liner	240	LF	$ 120	$ 28,800
4.04	$/ LF Incidentals	240	LF	$ 70	$ 16,800
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			10%	$ 4,600
8.02	Bonding and Insurance			1%	$ 500
9.00	**Project Specific Considerations**				
9.01	None				$ -
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 62,000**
				Contingency [1]	**$ 19,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 16,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 97,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.46

IDENTIFIER: M1-26 to M3-02; Poor condition 15" concrete pipe; 15" Cured-in-Place Pipe (CIPP)

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.00	**Mobilization**			20%	$ 8,000
2.00	**Construction Traffic Control**			1%	$ -
4.00	**Gravity Sewer Pipe**				
4.01	15" PVC Gravity Sewer Pipe				
	15" Cured-in-Place Pipe (CIPP) Liner	240	LF	$ 75	$ 18,000
4.04	$/ LF Incidentals	240	LF	$ 70	$ 16,800
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			10%	$ 3,500
8.02	Bonding and Insurance			1%	$ 400
9.00	**Project Specific Considerations**				
9.01	None				$ -
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 47,000**
				Contingency [1]	**$ 14,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 12,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 73,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.47

IDENTIFIER: M1-21C to M1-21F; Poor condition 6" PVC and concrete pipe; 8"Open Trench Replacement

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	**Description**	**Est. Quant.**	**Unit**	**Unit Price**	**Total Price**
1.00	**Mobilization**			20%	$ 53,000
2.00	**Construction Traffic Control**			10%	$ 27,000
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	902	LF	$ 19	$ 17,051
	Trench Excav./Backfill for Sewer	902	LF	$ 14	$ 12,630
	Bedding - 8"	902	LF	$ 3	$ 2,707
5.00	**Surface Repair**				
5.02	Gravel Roadway	902	LF	$ 28	$ 25,261
5.06	Asphalt Intersection Repair	3	LS	$ 20,000	$ 60,000
5.07	Concrete Approach Repair	6	LS	$ 5,000	$ 30,000
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	4	EA	$ 4,453	$ 17,811
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			5%	$ 8,000
8.02	Bonding and Insurance			1%	$ 2,000
9.00	**Project Specific Considerations**				
9.01	Tree Trimming			1%	$ 2,000
9.02	Alleyway Construction Contingency			50%	$ 88,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 345,000**
				Contingency [1]	**$ 104,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 90,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 539,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: RR.48

IDENTIFIER: M2-05 to M2-06B; Poor condition 6" PVC Pipe; 8"Open Trench Replacement

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	Description	Est. Quant.	Unit	Unit Price	Total Price
1.00	**Mobilization**			20%	$ 31,000
2.00	**Construction Traffic Control**			10%	$ 15,000
4.00	**Gravity Sewer Pipe**				
4.01	8" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	514	LF	$ 19	$ 9,715
	Trench Excav./Backfill for Sewer	514	LF	$ 14	$ 7,196
	Bedding - 8"	514	LF	$ 3	$ 1,542
5.00	**Surface Repair**				
5.02	Gravel Roadway	514	LF	$ 28	$ 14,392
5.06	Asphalt Intersection Repair	2	LS	$ 20,000	$ 40,000
5.07	Concrete Approach Repair	2	LS	$ 5,000	$ 10,000
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	3	EA	$ 4,453	$ 13,358
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			5%	$ 5,000
8.02	Bonding and Insurance			1%	$ 1,000
9.00	**Project Specific Considerations**				
9.01	Tree Trimming			1%	$ 1,000
9.02	Alleyway Construction Contingency			50%	$ 51,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 200,000**
				Contingency [1]	**$ 60,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 52,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 312,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 7-Nov-22

PROJECT NUMBER: Point Repair

IDENTIFIER: Varies (see Appendix I)

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
ITEM No.	**Description**	**Est. Quant.**	**Unit**	**Unit Price**	**Total Price**
1.00	**Mobilization**			20%	$ 15,000
2.00	**Construction Traffic Control**			1%	$ 1,000
4.00	**Gravity Sewer Pipe**				
4.01	Point Repair				
	Point Repair Allotment (per each)	15	EA	$ 5,000	$ 75,000
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			2%	$ 1,500
8.02	Bonding and Insurance			1%	$ 800
9.00	**Project Specific Considerations**				
9.01	None				
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 93,000**
				Contingency [1]	**$ 28,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 24,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 145,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: E.2.01

IDENTIFIER: Lakeside Study Extension North

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 25,000
2.00	**Construction Traffic Control**			5.0%	$ 25,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.02	10" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	1,197	LF	$ 29	$ 35,178
	Trench Excav./Backfill for 12-18 ft deep Sewer	687	LF	$ 20	$ 13,809
	Trench Excav./Backfill for 18-22 ft deep Sewer	326	LF	$ 38	$ 12,363
	Trench Excav./Backfill for >22 ft deep Sewer	184	LF	$ 128	$ 23,422
4.03	12" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	852	LF	$ 42	$ 36,053
	Trench Excav./Backfill for >22 ft deep Sewer	852	LF	$ 130	$ 110,657
4.04	15" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	726	LF	$ 62	$ 45,277
	Trench Excav./Backfill for >22 ft deep Sewer	726	LF	$ 141	$ 102,542
4.12	Bedding - 10" - 15"	2,774	LF	$ 6	$ 16,647
5.00	**Surface Repair**				
5.01	Natural Ground	2,774	LF	$ 15	$ 41,617
6.00	**Manholes**				
6.02	48" Manholes, 10-16 ft.	1	EA	$ 5,937	$ 5,937
6.03	48" Manholes, 16-32 ft.	7	EA	$ 7,421	$ 51,950
7.00	**Project Specific Considerations**				
8.00	**Miscellaneous Other**				
8.02	Bonding and Insurance			1.0%	$ 5,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 550,000**
				Contingency [1]	**$ 165,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 143,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 858,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: E.2.02

IDENTIFIER: Lakeside Study Extension South

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 29,000
2.00	**Construction Traffic Control**			5.0%	$ 29,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.02	10" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	301	LF	$ 29	$ 8,840
	Trench Excav./Backfill for 12-18 ft deep Sewer	301	LF	$ 20	$ 6,046
4.03	12" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	1,989	LF	$ 42	$ 84,129
	Trench Excav./Backfill for 12-18 ft deep Sewer	1,989	LF	$ 23	$ 45,702
4.04	15" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	2,483	LF	$ 62	$ 154,955
	Trench Excav./Backfill for 8-12 ft deep Sewer	857	LF	$ 28	$ 23,624
	Trench Excav./Backfill for 12-18 ft deep Sewer	1,317	LF	$ 34	$ 45,395
	Trench Excav./Backfill for 18-22 ft deep Sewer	310	LF	$ 53	$ 16,360
4.12	Bedding - 10" - 15"	4,773	LF	$ 6	$ 28,637
5.00	**Surface Repair**				
5.01	Natural Ground	4,773	LF	$ 15	$ 71,592
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	2	EA	$ 4,453	$ 8,906
6.02	48" Manholes, 10-16 ft.	7	EA	$ 5,937	$ 41,560
6.03	48" Manholes, 16-32 ft.	6	EA	$ 7,421	$ 44,528
7.00	**Project Specific Considerations**				
8.00	**Miscellaneous Other**				
8.02	Bonding and Insurance			1.0%	$ 6,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 644,000**
				Contingency [1]	**$ 193,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 167,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 1,004,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: E.4

IDENTIFIER: Nettleton Gulch Extension

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 43,000
2.00	**Construction Traffic Control**			5.0%	$ 43,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.03	12" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	5,468	LF	$ 42	$ 231,276
	Trench Excav./Backfill for 4-8 ft deep Sewer	654	LF	$ 14	$ 9,018
	Trench Excav./Backfill for 8-12 ft deep Sewer	648	LF	$ 17	$ 11,176
	Trench Excav./Backfill for 12-18 ft deep Sewer	2,799	LF	$ 23	$ 64,325
	Trench Excav./Backfill for 18-22 ft deep Sewer	715	LF	$ 41	$ 29,559
	Trench Excav./Backfill for >22 ft deep Sewer	651	LF	$ 130	$ 84,527
4.12	Bedding - 10" - 15"	5,468	LF	$ 6	$ 32,805
5.00	**Surface Repair**				
5.01	Natural Ground	3,945	LF	$ 15	$ 59,182
5.04	Asphalt - 1/2 Street width per City Standards (Required for 16-20' Depth Sewer) 4	1,522	LF	$ 143	$ 217,656
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	3	EA	$ 4,453	$ 13,358
6.02	48" Manholes, 10-16 ft.	10	EA	$ 5,937	$ 59,371
6.03	48" Manholes, 16-32 ft.	6	EA	$ 7,421	$ 44,528
7.00	**Project Specific Considerations**				
8.00	**Miscellaneous Other**				
8.02	Bonding and Insurance			1.0%	$ 9,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 952,000**
				Contingency [1]	**$ 286,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 248,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 1,486,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: E.5

IDENTIFIER: Hill Drive Extension

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 19,000
2.00	**Construction Traffic Control**			5.0%	$ 19,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.02	10" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	1,896	LF	$ 29	$ 55,732
	Trench Excav./Backfill for 4-8 ft deep Sewer	1,625	LF	$ 13	$ 20,535
	Trench Excav./Backfill for >22 ft deep Sewer	271	LF	$ 128	$ 34,542
4.12	Bedding - 10" - 15"	1,896	LF	$ 6	$ 11,374
5.00	**Surface Repair**				
5.03	Asphalt - Trench Patch width per City Standards (Required for 4-16' Depth Sewer) 4	1,625	LF	$ 93	$ 151,106
5.05	Asphalt - Full Street width per City Standards (Required for 20' - 30' Depth Sewer) 4	271	LF	$ 240	$ 65,003
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	6	EA	$ 4,453	$ 26,717
6.03	48" Manholes, 16-32 ft.	1	EA	$ 7,421	$ 7,421
7.00	**Project Specific Considerations**				
8.00	**Miscellaneous Other**				
8.02	Bonding and Insurance			1.0%	$ 4,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 414,000**
				Contingency [1]	**$ 124,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 108,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 646,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: E.6

IDENTIFIER: Silver Beach Interceptor

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 18,000
2.00	**Construction Traffic Control**			5.0%	$ 18,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.02	10" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	2,195	LF	$ 29	$ 64,532
	Trench Excav./Backfill for 4-8 ft deep Sewer	1,287	LF	$ 13	$ 16,263
	Trench Excav./Backfill for 8-12 ft deep Sewer	908	LF	$ 16	$ 14,608
4.12	Bedding - 10" - 15"	2,195	LF	$ 6	$ 13,170
5.00	**Surface Repair**				
5.03	Asphalt - Trench Patch width per City Standards (Required for 4-16' Depth Sewer) 4	2,195	LF	$ 93	$ 204,132
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	7	EA	$ 4,453	$ 31,170
6.02	48" Manholes, 10-16 ft.	1	EA	$ 5,937	$ 5,937
7.00	**Project Specific Considerations**				
8.00	**Miscellaneous Other**				
8.02	Bonding and Insurance			1.0%	$ 3,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 389,000**
				Contingency [1]	**$ 117,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 101,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 607,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: E.7

IDENTIFIER: Blackwell Hill Interceptor

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 122,000
2.00	**Construction Traffic Control**			5.0%	$ 122,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.02	10" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	6,003	LF	$ 29	$ 176,478
	Trench Excav./Backfill for 4-8 ft deep Sewer	2,508	LF	$ 13	$ 31,703
	Trench Excav./Backfill for 8-12 ft deep Sewer	2,708	LF	$ 16	$ 43,567
	Trench Excav./Backfill for 12-18 ft deep Sewer	786	LF	$ 20	$ 15,797
4.03	12" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	5,061	LF	$ 42	$ 214,069
	Trench Excav./Backfill for 4-8 ft deep Sewer	282	LF	$ 14	$ 3,889
	Trench Excav./Backfill for 8-12 ft deep Sewer	2,769	LF	$ 17	$ 47,729
	Trench Excav./Backfill for 12-18 ft deep Sewer	2,009	LF	$ 23	$ 46,170
4.04	15" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	4,658	LF	$ 62	$ 290,684
	Trench Excav./Backfill for 4-8 ft deep Sewer	522	LF	$ 23	$ 12,000
	Trench Excav./Backfill for 8-12 ft deep Sewer	1,126	LF	$ 28	$ 31,057
	Trench Excav./Backfill for 12-18 ft deep Sewer	1,903	LF	$ 34	$ 65,589
	Trench Excav./Backfill for 18-22 ft deep Sewer	531	LF	$ 53	$ 28,067
	Trench Excav./Backfill for >22 ft deep Sewer	576	LF	$ 141	$ 81,396
4.12	Bedding - 10" - 15"	15,722	LF	$ 6	$ 94,331
5.00	**Surface Repair**				
5.01	Natural Ground	7,072	LF	$ 15	$ 106,082
5.02	Gravel Roadway	1,726	LF	$ 28	$ 48,331
5.03	Asphalt - Trench Patch width per City Standards (Required for 4-16' Depth Sewer) 4	5,264	LF	$ 93	$ 489,556
5.04	Asphalt - 1/2 Street width per City Standards (Required for 16-20' Depth Sewer) 4	1,084	LF	$ 143	$ 154,944
5.05	Asphalt - Full Street width per City Standards (Required for 20' - 30' Depth Sewer) 4	576	LF	$ 240	$ 138,233
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	25	EA	$ 4,453	$ 111,321
6.02	48" Manholes, 10-16 ft.	22	EA	$ 5,937	$ 130,616
6.03	48" Manholes, 16-32 ft.	6	EA	$ 7,421	$ 44,528
7.00	**Project Specific Considerations**				
8.00	**Miscellaneous Other**				
8.02	Bonding and Insurance			1.0%	$ 24,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 2,674,000**
				Contingency [1]	**$ 802,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 695,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 4,171,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: E.8

IDENTIFIER: Cougar Bay Interceptor

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 14,000
2.00	**Construction Traffic Control**			5.0%	$ 14,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
4.02	10" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	1,812	LF	$ 29	$ 53,263
	Trench Excav./Backfill for 8-12 ft deep Sewer	628	LF	$ 16	$ 10,099
	Trench Excav./Backfill for 12-18 ft deep Sewer	316	LF	$ 20	$ 6,348
	Trench Excav./Backfill for 18-22 ft deep Sewer	293	LF	$ 38	$ 11,115
	Trench Excav./Backfill for >22 ft deep Sewer	575	LF	$ 128	$ 73,331
4.03	12" PVC Gravity Sewer Pipe				
	Pipe Cost (excavation, bedding, backfill not included)	190	LF	$ 42	$ 8,028
	Trench Excav./Backfill for 12-18 ft deep Sewer	190	LF	$ 23	$ 4,361
4.12	Bedding - 10" - 15"	2,001	LF	$ 6	$ 12,009
5.00	**Surface Repair**				
5.01	Natural Ground	1,812	LF	$ 15	$ 27,175
5.04	Asphalt - 1/2 Street width per City Standards (Required for 16-20' Depth Sewer) 4	190	LF	$ 143	$ 27,138
6.00	**Manholes**				
6.01	48" Manholes, 4-10 ft.	1	EA	$ 4,453	$ 4,453
6.02	48" Manholes, 10-16 ft.	2	EA	$ 5,937	$ 11,874
6.03	48" Manholes, 16-32 ft.	4	EA	$ 7,421	$ 29,686
7.00	**Project Specific Considerations**				
8.00	**Miscellaneous Other**				
8.02	Bonding and Insurance			1.0%	$ 3,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 310,000**
				Contingency [1]	**$ 93,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 81,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 484,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: E.9

IDENTIFIER: Montana Pressure Sewer

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 4,000
2.00	**Construction Traffic Control**			5.0%	$ 4,000
3.00	**Pressure Sewer Pipe**				
4.00	**Gravity Sewer Pipe**				
5.00	**Surface Repair**				
6.00	**Manholes**				
7.00	**Project Specific Considerations**				
7.04	2022 Construction Cost based on 2005 bid opening results and escalation	1	LS	$ 70,336	$ 70,336
8.00	**Miscellaneous Other**				
8.01	Bypass Pumping			5.0%	$ 4,000
8.02	Bonding and Insurance			1.0%	$ 1,000
	ESTIMATED CONSTRUCTION SUBTOTAL				**$ 83,000**
	Contingency [1]				**$ 25,000**
	Planning, Engineering, & Administrative Costs [2]				**$ 22,000**
	TOTAL PROBABLE COST IN 2022 DOLLARS [3]				**$ 130,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: LS.1

IDENTIFIER: Blackwell Hill LS and Force Main

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 102,000
2.00	**Construction Traffic Control**			5.0%	$ 102,000
3.00	**Pressure Sewer Pipe**				
3.03	8" Pressure Sewer Pipe				
	Pipe, fittings, valves, air vac assemblies (excavation, bedding, backfill not included)	6,043	LF	$ 27	$ 163,516
	Trench Excav./Backfill for 4-8 ft deep Sewer	4,993	LF	$ 13	$ 63,100
3.11	Bedding - 4" - 8"	6,043	LF	$ 3	$ 18,128
4.00	**Gravity Sewer Pipe**				
5.00	**Surface Repair**				
5.03	Asphalt - Trench Patch width per City Standards (Required for 4-16' Depth Sewer) 4	4,993	LF	$ 93	$ 464,322
6.00	**Manholes**				
7.00	**Project Specific Considerations**				
7.05	I-90 Bridge Force Main Construction	1,050	LF	$ 100	$ 105,000
7.06	Large Sized Lift Station (Flow of greater than 500 gpm (0.72 MGD))	1	LS	$ 1,200,000	$ 1,200,000
	Triplex Pumps	3	EA		$ -
	Submersible L.S. Configuration	1	LS		$ -
	Overflow Basin	1	LS		$ -
	Control Building	1	LS		$ -
	Generator	1	LS		$ -
	Odor Control	1	LS		$ -
	SCADA/Controls	1	LS		$ -
8.00	**Miscellaneous Other**				
8.02	Bonding and Insurance			1.0%	$ 20,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 2,238,000**
				Contingency [1]	**$ 671,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 582,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 3,491,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency.

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: LS.2

IDENTIFIER: Cougar Bay LS and Force Main

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 91,000
2.00	**Construction Traffic Control**			5.0%	$ 91,000
3.00	**Pressure Sewer Pipe**				
3.02	6" Pressure Sewer Pipe				
	Pipe, fittings, valves, air vac assemblies (excavation, bedding, backfill not included)	4,750	LF	$ 20	$ 94,096
	Trench Excav./Backfill for 4-8 ft deep Sewer	3,700	LF	$ 13	$ 46,761
3.11	Bedding - 4" - 8"	4,750	LF	$ 3	$ 14,250
4.00	**Gravity Sewer Pipe**				
5.00	**Surface Repair**				
5.03	Asphalt - Trench Patch width per City Standards (Required for 4-16' Depth Sewer) 4	3,700	LF	$ 93	$ 344,094
6.00	**Manholes**				
7.00	**Project Specific Considerations**				
7.05	I-90 Bridge Force Main Construction	1,050	LF	$ 100	$ 105,000
7.06	Large Sized Lift Station (Flow of greater than 500 gpm (0.72 MGD))	1	LS	$ 1,200,000	$ 1,200,000
	Triplex Pumps	3	EA		$ -
	Submersible L.S. Configuration	1	LS		$ -
	Overflow Basin	1	LS		$ -
	Control Building	1	LS		$ -
	Generator	1	LS		$ -
	Odor Control	1	LS		$ -
	SCADA/Controls	1	LS		$ -
8.00	**Miscellaneous Other**				
8.02	Bonding and Insurance			1.0%	$ 18,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 2,004,000**
				Contingency [1]	**$ 601,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 521,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 3,126,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: LS.4

IDENTIFIER: Silver Beach LS and Force Main

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 103,000
2.00	**Construction Traffic Control**			5.0%	$ 103,000
3.00	**Pressure Sewer Pipe**				
3.02	6" Pressure Sewer Pipe				
	Pipe, fittings, valves, air vac assemblies (excavation, bedding, backfill not included)	6,468	LF	$ 20	$ 128,123
	Trench Excav./Backfill for 4-8 ft deep Sewer	6,468	LF	$ 13	$ 81,740
3.11	Bedding - 4" - 8"	6,468	LF	$ 3	$ 19,403
4.00	**Gravity Sewer Pipe**				
5.00	**Surface Repair**				
5.03	Asphalt - Trench Patch width per City Standards (Required for 4-16' Depth Sewer) 4	6,468	LF	$ 93	$ 601,485
6.00	**Manholes**				
7.00	**Project Specific Considerations**				
7.06	Large Sized Lift Station (Flow of greater than 500 gpm (0.72 MGD))	1	LS	$ 1,200,000	$ 1,200,000
	Triplex Pumps	3	EA		$ -
	Submersible L.S. Configuration	1	LS		$ -
	Overflow Basin	1	LS		$ -
	Control Building	1	LS		$ -
	Generator	1	LS		$ -
	Odor Control	1	LS		$ -
	SCADA/Controls	1	LS		$ -
8.00	**Miscellaneous Other**				
8.02	Bonding and Insurance			1.0%	$ 20,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 2,257,000**
				Contingency [1]	**$ 677,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 587,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 3,521,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, Coeur d'Alene, ID 83815 / 208.762.8787

PROJECT: CDA Master Plan Update 2022 **DATE:** 4-Nov-22

PROJECT NUMBER: LS.5

IDENTIFIER: Evergreen LS and Force Main

J-U-B PROJ. NO.: 20-21-047

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1.00	**Mobilization**			5.0%	$ 46,000
2.00	**Construction Traffic Control**			5.0%	$ 46,000
3.00	**Pressure Sewer Pipe**				
3.01	4" Pressure Sewer Pipe				
	Pipe, fittings, valves, air vac assemblies (excavation, bedding, backfill not included)	3,366	LF	$ 17	$ 57,106
	Trench Excav./Backfill for 4-8 ft deep Sewer	3,366	LF	$ 11	$ 38,670
3.11	Bedding - 4" - 8"	3,366	LF	$ 3	$ 10,097
4.00	**Gravity Sewer Pipe**				
5.00	**Surface Repair**				
5.03	Asphalt - Trench Patch width per City Standards (Required for 4-16' Depth Sewer) 4	3,366	LF	$ 93	$ 313,007
6.00	**Manholes**				
7.00	**Project Specific Considerations**				
7.06	Medium Sized Lift Station (Flow of 100 gpm to 500 gpm (0.144 MGD to 0.72 MGD))	1	LS	$ 500,000	$ 500,000
	Duplex Submersible Pumps	2	EA		$ -
	Wet Well	1	LS		$ -
	Generator	1	LS		$ -
	Odor Control	1	LS		$ -
	SCADA/Controls	1	LS		$ -
8.00	**Miscellaneous Other**				
8.02	Bonding and Insurance			1.0%	$ 8,000
				ESTIMATED CONSTRUCTION SUBTOTAL	**$ 1,019,000**
				Contingency [1]	**$ 306,000**
				Planning, Engineering, & Administrative Costs [2]	**$ 265,000**
				TOTAL PROBABLE COST IN 2022 DOLLARS [3]	**$ 1,590,000**

1 Estimated at 30% of construction subtotal.

2 Planning, Engineering, & Administrative costs include: Geotechnical Evaluations, Design, Survey, Construction Management, O&M Manuals, Record Drawings, and Administration. Estimated at 20% of construction subtotal, including contingency

3 Costs are in 2022 dollars and should be inflated appropriately to the mid-point of construction for budgeting purposes. Costs are generated during a period of extreme cost volatility, material and wage shortage and therefore may not representative the current market materials cost escalations. No easement acquisition or legal costs are included.

4 Asphalt Surface Repair width varies with a section of 4" Asphalt on 4" of 3/4-inch Crushed Aggregate, on 12" of Subgrade

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Appendix J

Additional Master Plan Model Scenarios (2013 Master Plan)

*By request of City Staff, Appendix J from the 2013 Master Plan was included as Appendix J in the 2022 Master Plan. No edits were made.

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Contents

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Master Plan Model Results for Additional Scenarios

Appendix J Additional Master Plan Model Scenarios

J.1 Introduction

As discussed in Chapter 6 of the main report, the Wastewater Utility requested additional modeling efforts and more detailed analyses of several items during the course of this study. A summary of these analyses is presented in Section 6.5 while this appendix includes a more detailed assessment, as follows:

- The Effect of Higher Densities on the Northwest Quadrant – Section J.2
- Huetter Interceptor Appaloosa Road Alternate Route – Section J.3
- Mill River Lift Station Mill River at Higher Densities – Section J.4
- 3-Pipe Siphon with Mill River at Higher Densities – Section J.5

J.2 The Effect of Higher Densities on the Northwest Quadrant

J.2.1 Introduction

Prior master plan evaluations assumed a C-17 or R-17 zoned parcel would develop at 11.8 ERU/acre (J-U-B, 2009). This assumption was based on evaluations of prior development within the City and appeared to reflect a probable upper-end of densities for these mixed-use areas. This density assumption was also utilized in the study; however, several recent developments have requested higher densities than the previously assumed values, with some reaching the full 17 ERU/acre density allowed in the City's land use plans.

The City requested analysis of an additional master plan scenario in the Northwest Quadrant with increased densities in currently undeveloped parcels to evaluate the impacts to major trunk lines and lift stations. **Table J-1** lists the general areas and associated densities included in this analysis. **Figure J1** at the end of this appendix shows the areas and the corresponding increased densities included in the analysis. Redevelopment of existing parcels to higher densities was not considered in this evaluation.

Table J-1 – NW Quadrant Increased Density Analysis-Density Changes

Area	Master Plan Density (ERU/AC)	Increased Density (ERU/AC)	Number of Acres Affected
Riverstone/Mill River/Seltice Way	11.8	17.0	258
Forest Service Nursery	2.9	8.0	216
Huetter Interceptor south of Hanley	2.9	8.0	561

Table J-2 provides a detailed breakdown of increases in flow per land use type and the total flow that is not changed to demonstrate the relative impact of the density changes to projected flows.

Table J-2 – NW Quadrant Increased Density Analysis – Increased Flows

		Area (AC)	Master Plan Density		Increased Density			
			Total ERU	Average Flow (MGD)	Unmodified Area (AC)	Modified Area (AC)	Total ERU	Average Flow (MGD)
Residential	Developed	1,740	7,987	1.24	1,740	0	7,987	1.24
	Un-developed	1,543	5,677	0.88	725	818	8,316	1.29
	Subtotal	**3,283**	**13,665**	**2.12**	**2,465**	**818**	**16,303**	**2.53**
Non-Residential	Developed	1,296	2,710	0.42	1,296	0	2,710	0.42
	Un-developed	593	4,903	0.76	376	217	5,974	0.93
	Subtotal	**1,889**	**7,613**	**1.18**	**1,672**	**217**	**8,684**	**1.35**
Total		**5,172**	**21,277**	**3.30**	**4,137**	**1,035**	**24,987**	**3.87**

J.2.2 Model Results

The Master Plan Model indicated three notable impacts to the system with the increased densities. First, the flow to the Mill River Lift Station increases significantly. The model results showed the peak flows in excess of the capacity of the currently planned build-out improvements. Impacts to the Mill River Lift Station were further analyzed and are discussed in detail in **Section J.4**.

Second, the Riverside Interceptor will experience some additional surcharging. **Figure J2** shows a plot of the diurnal curves from the Master Plan Model and the Master Plan Model with increased densities between Manholes RIV1-11 and RIV1-12. The surcharging identified in the Master Plan Model increases, and a majority of the reaches exceed the criteria established for design pipes (see **Table 6-1, Chapter 6**), with d/D greater than 0.75. The maximum surcharge is estimated at less than 6 inches above the pipe crown and occurred at Manhole RIV1-13, similar to the Master Plan Model results. The surcharging in both Master Plan Model scenarios is caused by one section of flat pipe between Manholes RIV1-10 and RIV1-11.

Depth over diameter (d/D) plots for the Riverside Interceptor are included at the end of this Appendix for the original master plan densities (**Figure J3**) and for the increased densities (**Figure J4**). Reserve capacity plots are also included for the original master plan densities (**Figure J5**) and for the increased densities (**Figure J6**). The corresponding water surface profile plots for each scenario are also included in these figures.

Third, the master plan pipe sizes at several locations must be increased (reference **Figure J7**). The changes are summarized as follows:

- **Huetter Interceptor**: ±3,700 LF would need to be upsized from a 15-inch trunk to an 18-inch trunk.

- **Collector North of I-90**: ±1,700 LF would need to be upsized from an 8-inch to a 10-inch trunk.
- **Collector in Atlas Road**: ±1,500 LF of 8-inch line serving the Forest Service Nursery area would need to be upsized to a 10-inch trunk.

These revised sizes also translate into different master plan inverts. Master Plan model results for this alternative are included at the end of this appendix.

Since increased density developments are currently being pursued in the Northwest Quadrant and may continue in the future, the City should monitor flows in these lines and continue assessing capacity as developments are proposed. Further, the City may choose to consider special surcharges for developments that exceed the capacity of previous Master Plans since remedies may be necessary to reduce or alleviate impacts arising from the additional flows.

J.3 Huetter Interceptor Appaloosa Road Alternate Route

J.3.1 Introduction

An alternative master plan alignment has been evaluated for the Huetter Interceptor that does not require the I-90 bore and Seltice Siphon. In this alternative, the Huetter Interceptor would be routed east on Appaloosa Road and follow the existing sewer to Atlas Road. Approximately 3,650 LF of existing 12-inch trunk in Appaloosa Road would be replaced with an 18-inch trunk, with the first 2,470 LF being placed at a lower elevation to serve the Huetter Interceptor. This new trunk would allow the Woodside Lift Station to be abandoned and routed into this line. **Figure J8** shows the master plan trunk layout with the Appaloosa Road Alternative.

J.3.2 Model Results

This alternative eliminates the need to complete the I-90 bore and Seltice Siphon. However, the 3-pipe Seltice Siphon has been partially constructed and extends from the intersection of Grand Mill Lane and Seltice Way (with a valving structure near that intersection) to its outlet structure at Manhole HUT-8. As discussed in the Mill River Lift Station evaluation in **Section J.4,** the 8-inch barrel of the siphon will need to be utilized for master plan flows from the Mill River area (also see **Section J.5**).

Under the original master plan densities, the downstream 18-inch trunk in Fairway Drive is nearing capacity but does not surcharge, and the Riverside Interceptor remains near capacity, with some areas showing minor surcharging (approximately 4 inches). Under the increased density scenario, the surcharge in the 18-inch Fairway Drive trunk is less than 1 inch and surcharge in the Riverside Interceptor increases to 6 inches. The d/D and reserve capacity plots are slightly different under this alternative because the timing of the flow peaks entering the Riverside Interceptor have changed.

Depth over diameter (d/D) plots for this alternative are included as follows:

- The Fairway Drive Trunk and Riverside Interceptor are included with the original master plan routing and densities (**Figure J9**)
- The Appaloosa alternative with original densities (**Figure J10**)
- The Appaloosa alternative with increased densities (**Figure J11**)

Reserve capacity plots, including water surface profiles, are also included as follows:

- The original master plan routing and densities (**Figure J12**)
- The Appaloosa alternative with original densities (**Figure J13**)
- The Appaloosa alternative with increased densities (**Figure J14**)

The revised sizes and depths for this alternative also require new master plan inverts. Master Plan model results from this alternative are included at the end of this appendix. If pursued, this project should be funded through cap fees.

This alternative is preferred over the 3-Pipe Siphon if either or both of the following conditions are realized (also see **Section J.5**):

- Increased densities occur in the Northwest Quadrant that subsequently exceed the capacity of the 3-Pipe Siphon.
- The final elevations of the 3-Pipe Siphon are such that insufficient driving head is available for conveying the projected flows.

If this alternative is pursued, the following issues should be taken into account and analyzed further:

- Per Wastewater requirements that laterals not be connected to lines more than 15 inches in diameter, a parallel 8-inch line to collect services along Appaloosa Road will likely be required with the new 18-inch trunk line.
- Replacement along lot lines is required between FWN1-22G and FWN1-22F. An alternate route is available to avoid this lot line issue by continuing on Appaloosa after Manhole FWN1-23C and turning south on Atlas Road. Utility conflicts in Atlas Road may make this alternative less feasible and will need to be evaluated further during preliminary design.

J.4 Mill River Lift Station Evaluation with Mill River Area at Higher Densities

J.4.1 Introduction

The Mill River area of the City of Coeur d'Alene has experienced significant commercial and mixed-use development. Portions of the remaining vacant land are currently being considered for development, with some areas at an increased density compared to previous Master Plans (17 ERU/Ac compared to

11.8 ERU/Ac). Because this area is dominated by commercial and high-density residential land uses, changes in density significantly impact the Mill River Lift Station.

J.4.2 Existing Mill River Lift Station Description

The Mill River Lift Station is a duplex submersible lift station located south of East Seltice Way in the landscaped median of Grand Mill Lane in the Mill River Subdivision as shown on **Figure J15**. Initially constructed in 2005, it is responsible for pumping wastewater from the Mill River Subdivision.

Existing Lift Station Pumping Capacity and Current Demands: The lift station is equipped with two 40 hp submersible Hydromatic Model S4B pumps with 10.75-inch impellers as summarized on **Table J-3**. The pumps were designed to accommodate an 11.375-inch impeller that would be installed in the future to meet master planned flows at buildout.

Table J-3 – Mill River Lift Station Pump Summary

Pump No.	Pump Type	Year Installed	Motor Horsepower	Firm Capacity
1 and 2	Hydromatic Model S4B – 10.75" Impeller	2005	40 [1]	300 gpm
	11.375" Impeller	Master Plan Buildout	40 [1]	650 gpm

[1] *The existing pumps operate at approximately 20 hp, but were installed with 40 hp motors to accommodate a larger impeller.*

Flow into the lift station enters the wet well from the upstream gravity sewer at a rate of approximately 65 gpm (master planned lift station peak flow plus 10 percent safety factor), which is well below the existing lift station design point of 300 gpm.

Existing Wet Well, Emergency Storage Capacity, and Emergency Standby Power: The existing concrete wet well is 10 feet in diameter with the following critical elevations:

- Rim Elevation = 2127.60
- Gravity Influent Invert (10-inch sewer main) = 2107.85
- Bottom of Wet Well = 2099.00

Although operators may vary the lift station operation points, the working volume of the lift station is effectively 6.85 feet based on maintaining submergence of the pumps and operating below the incoming 10-inch invert. This equates to approximately 4,000 gallons of working volume. There is no dedicated emergency storage capacity at the lift station, but the lift station is equipped with onsite emergency standby power and complies with IDAPA 58.01.16 (reference **Table J-4**). In addition to these requirements, the City requires 45-minute storage capacity to respond to lift station failures. The Wastewater Utility has indicated that this deficiency at the Mill River Lift Station must be remedied as development continues. For the build-out flows under Master Plan densities of 11.8 ERU/acre, the necessary storage volume is 24,000 gallons.

Table J-4 – Mill River Lift Station Existing Infrastructure versus Idaho Code and City Requirements

Regulation	Code/Concept	Discussion	Conclusion
Idaho Code IDAPA 58.01.16.440.07.b	Definition - Emergency Pumping Capability	Emergency pumping capability is required for all existing lift stations that undergo a material modification or expansion unless overall system reliability can be proven adequate to the Department as shown in Subsections 440.07.b.i. and 440.07.b.ii. or overflow prevention is provided by adequate emergency storage capacity as defined in these rules.	The lift station currently has onsite emergency power generation equipment; therefore, the requirement for emergency pumping capability is satisfied.
Idaho Code IDAPA 58.01.16.010.02	Definition - Adequate Emergency Storage Capacity	The emergency storage capacity of a lift station wet well is the volume of the wet well measured between the high water alarm and the gravity sewer invert into the wet well. The collection system shall not be used in the calculation for emergency storage. For the purpose of this definition, "adequate" shall be defined as twice the estimated emergency response time multiplied by the peak hour flow to the wet well. The high water alarm shall be placed at an elevation below the wet well invert sufficient to achieve the defined volumetric emergency storage capacity.	Emergency storage capacity is ***not*** required since the existing lift station includes emergency standby power (onsite power generator).
City of Coeur d'Alene Wastewater Utility Policies	Emergency Storage Capacity	45-minute emergency storage capacity to respond to lift station failure.	Insufficient emergency storage capacity; add necessary storage.

Existing Lift Station Force Main Operations and Discharge Options: The design point of the existing lift station (300 gpm, **Table J-3**) occurs when flow discharges through the existing 6-inch force main to the existing Siphon Outlet (Manhole HUT-8). The Mill River Lift Station is also configured such that an existing 8-inch force main from the lift station could be connected to the 8-inch siphon pipe with discharge routed directly to the Siphon Outlet. This option reduces the backpressure on the pump, thereby increasing the pump's discharge capacity. Available discharge options are as follows:

- Configuration A – Mill River 6-inch Force Main to Siphon Outlet (Existing Conditions); firm capacity of 300 gpm (existing pumps) or 375 gpm (upgraded pumps with ±11.375-inch impeller)
- Configuration B – Mill River 8-inch Force Main to Siphon Outlet (using 8-inch siphon pipe); firm capacity of 530 gpm (existing pumps) or 650 gpm (upgraded pumps with 11.375-inch impeller)
- Configuration C – Mill River 8-inch Force Main to Siphon Inlet (not yet constructed); firm capacity of 600 gpm (upgraded pumps with 11.375-inch impeller)

J.4.3 Impacts to Mill River Lift Station due to Growth

Projected development in the Mill River area will result in the following conditions:

- Committed: 165 gpm peak; ±650 ERUs
- Master Plan: 540 gpm peak; ±2,080 ERUs based on commercial/high-density residential developments at 11.8 ERU/Ac

- Master Plan at Increased Density: 760 gpm peak; ±3,340 ERUs based on commercial/high-density residential developments at 17 ERU/Ac

Based on the discharge options and capacities listed in the previous section, increasing build-out densities in the Mill River area to 17 ERU/AC results in the need for additional lift station improvements beyond those previously planned. **Table J-5** summarizes the density of the various model scenarios, impacts to the Mill River Lift Station, recommended operations, and modifications to the lift station (as necessary).

Under increased Master Plan densities (i.e., exceeding 11.8 ERU/Ac), the following improvements will be necessary:

- **New Submersible Pumps**: 800 gpm firm capacity at 140 feet; 50 hp motors.
- **Electrical Systems**: Electrical upgrades are likely, including power service, Motor Control Center(s), drives, and possibly the generator.
- **Emergency Storage**: Provide additional emergency storage to accommodate higher peak flows. The storage basin will need to fill and drain within the existing operating limits of the lift station since infrastructure and gravity sewer are already in place. Additionally, the basin will need access via hatches to enable cleaning and have sufficient slope to prevent deposits/accumulation. The most likely location for the storage basin is in the median, although there are utility conflicts in this area (e.g., force mains, gravity sewer, power).
- **Force Main**: No improvement required; utilize 8-inch force main and 8-inch siphon to the Siphon Outlet. **Note**: This removes the 8-inch siphon from potential use in the 3-Pipe Siphon. If the 8-inch siphon pipe is needed for the 3-Pipe Siphon and flows arising from the Huetter Interceptor, a new dedicated force main for the Mill River Lift Station will be required.

J.5 3-Pipe Siphon with Mill River at Higher Densities

J.5.1 Introduction

Flows for currently-developed portions of the Northwest Quadrant near Prairie Avenue, as well as undeveloped land east of Huetter Road, are currently planned to be routed from the future Huetter Interceptor through a future bored sewer main under Interstate 90 (I-90) and into a future 3-Pipe Siphon along Seltice Way. The siphon could also convey wastewater from the Mill River Lift Station, depending on the chosen discharge condition (reference **Section J.4**).

The 3-Pipe Siphon consists of a Siphon Inlet, three separate siphon lines (8-inch, 12-inch, and 14-inch), and a Siphon Outlet at Manhole HUT-8. The siphon lines were partially constructed in 2004 as part of the Mill River Offsite Sewer project and extend from the intersection of East Seltice Way and North Grand Mill Lane, east approximately 4,000 feet until gravity flow is achieved at Manhole HUT-8 (reference **Figure J15**). Remaining work includes an extension of all three siphon pipes from the intersection of Seltice Way and West Shoreview Lane, west to the future siphon inlet box immediately south of I-90. Additionally, the siphon inlet has not been constructed yet.

Table J-5 – Mill River Lift Station Demands, Capacity, and Recommendations

Master Plan Model Scenario	Mill River Master Plan Density (ERU/AC)	Mill River Lift Station Influent Flow [1] and ERUs			Mill River LS Firm Capacity		Discharge Option	Recommendation
		Flow (average)	Flow (peak)	Approx. ERUs	Flow	Approx. ERUs		
Existing Model	Varies	14	65	110±	300	1,160±	Configuration A – Mill River 6-inch Force Main to Siphon Outlet (Existing Conditions)	No improvements required to lift station or force main.
Committed Model	• Varies (existing developments) • 11.8 (new developments)	70	165	660±	300	1,160±	Configuration A – Mill River 6-inch Force Main to Siphon Outlet (Existing Conditions)	No improvements required to lift station or force main. Provide 45-minute emergency storage for peak Master Plan flows as a minimum (see Capital Improvement Plan Item C.9).
Master Plan Model	• Varies (existing developments) • 11.8 (new developments)	210	540	2,080±	650	2,680	Configuration B – Mill River 8-inch Force Main to Siphon Outlet (using 8-inch Siphon Pipe) [2]	New 11.375-inch impeller at Mill River Lift Station required (40 hp pump). No force main improvements required.
Master Plan Model at Increased Density	• Varies (existing developments) • 17 (new developments)	350	760	3,340±	800	3,340±	Configuration B – Mill River 8-inch Force Main to Siphon Outlet (using 8-inch Siphon Pipe) [2]	Mill River Lift Station improvements for 800 gpm at 140-feet TDH (50 hp pump). Provide additional emergency storage to accommodate higher peak flows. No force main improvements required.

[1] *Indicated Peak Hour Flow represents model output peak flow with a 10 percent factor of safety.*

[2] *This discharge configuration eliminates the 8-inch siphon line as an option in the 3-Pipe Siphon (reference Section J.5).*

J.5.2 I-90 Gravity Sewer Bore and Impacts to the 3-Pipe Siphon

Flows from the service area north of I-90 are intended to reach the siphon headworks via an 18-inch gravity main to be bored under I-90. The *Mill River Off-Site Sewer – Phase III* plans (currently watermarked with "Do Not Construct – For Informational Purposes Only") expanded previous master planning efforts into a design and provided two potential alignments under the Interstate. Since those plans were developed, the Idaho Transportation Department (ITD) has implemented a policy requiring ten feet of cover above bore casings to the end prism, which includes shoulders and ditches. Consequently, this lowers the previously planned bore inverts connecting the Huetter Interceptor to the Siphon Inlet on the south side of I-90 and reduces the available driving head for the siphon from 20 feet under the original plan to approximately 14 feet (based on topographical data contained in the Mill River offsite plans).

An additional potential concern in the preliminary plans is the intended pipe slope in the bore. The bore profile is currently designed at 10-States minimum standard slope of 0.12 percent for an 18-inch gravity sewer. The tolerances for boring may not yield the desired slopes, resulting in bellies or inverse grades, especially in such a long bore (approximately 400 feet). If the grade was increased to 1 percent, the potential for bellies or inverse grades could be reduced, although not eliminated. Increasing the slope, however, reduces the available driving head of the siphon, leaving approximately 10 feet of driving head.

Table J-6 summarizes the impacts to the capacity of the 3-Pipe Siphon from these potential issues, identifies the estimated capacity of each siphon line, and identifies the corresponding approximate number of maximum ERUs that can be served. As this project is pursued in the future, it is recommended that the Wastewater Utility determine cover limits and construction specifics with ITD during preliminary design. That information will then establish the Siphon Inlet elevation and probable system capacity. If sufficient capacity is not available, the Wastewater Utility may need to pursue the Appaloosa Road alternative discussed in **Section J.3**. Additionally, the corridor for the Siphon Inlet and siphon from the south side of I-90 to Seltice Way has been constricted with adjacent development. As part of the preliminary design process, layouts and alignments must be reviewed and some land and/or construction easements acquired.

Table J-6 – 3-Pipe Siphon Capacity at Different Driving Heads [1]

Siphon Pipe	Preliminary Plans – Mill River Offsite Sewer - Phase III (approx. 20' of driving head)	Revised Siphon Capacity for Adequate Bore Cover (approx. 14' of driving head)	Revised Siphon Capacity for Adequate Bore Cover and 1 percent slope (approx. 10' of driving head)
8-inch	480 gpm (1,940 ERUs±)	400 gpm (1,940 ERUs±)	340 gpm (1,330 ERUs±)
12-inch	1,400 gpm (5,970 ERUs±)	1,170 gpm (4,970 ERUs±)	990 gpm (4,180 ERUs±)
14-inch	2,060 gpm (8,830 ERUs±)	1,720 gpm (7,360 ERUs±)	1,460 gpm (6,200 ERUs±)

[1] *Based on full pipe hydraulic conditions from inlet to outlet, including entrance, exit, and minor losses.*

J.5.3 Impacts to Proposed 3-Pipe Siphon due to Growth

Expected contributions from the Northwest Quadrant that will be conveyed down the Huetter Interceptor and into the 3-Pipe Siphon are summarized in **Table J-7**. Also included is the recommended operation of the 3-Pipe Siphon in conjunction with the Mill River Lift Station. In general, it is recommended that the Mill River Lift Station discharge directly from the Mill River Force Main through the 8-inch siphon and to the Siphon Outlet. Pumping to the siphon headworks results in a higher discharge pressure, which reduces the capacity of the lift station. Pumping to the siphon headworks may be advisable, however, to maintain sufficient flows to scour the 8-, 12-, or 14-inch siphon pipes when the Huetter Interceptor is only partially built out (i.e., experiencing conditions below build-out design flows and for odor control during other low-flow conditions in the siphon).

As shown in **Table J-7**, the 3-Pipe Siphon at reduced driving heads is not able to convey the flows generated under increased densities from the Huetter Interceptor while maintaining a redundant siphon. Consequently, if increased density developments occur, the Appaloosa Road Alternate Route (**Section J.3**) will likely become the Wastewater Utility's preferred routing option for the Huetter Interceptor. Construction of either alternative should be funded through cap fees.

Table J-7 – 3-Pipe Siphon Demands, Capacity, and Recommendations

Master Plan Model Scenario	Huetter Interceptor Peak Flow	Mill River Lift Station Peak Flow [1]	Recommended Flow Configuration	
			3-Pipe Siphon	Mill River Lift Station
Existing Model	Not Applicable	65 gpm (110 ERUs±)	N/A	Route Mill River Lift Station through 6" FM to Siphon Outlet
Committed Model	Not Applicable	165 gpm (660 ERUs±)	N/A	Route Mill River Lift Station through 6" FM to Siphon Outlet
Master Plan Model	1,000 gpm (3,980 ERUs±)	540 gpm (2,080 ERUs±)	Route Huetter Interceptor Flow through 12" Siphon. Capacity: 990 to 1,170 gpm, depending on siphon headworks elevation. [2]	Route Mill River Lift Station through 8" FM to Siphon Outlet (using 8" Siphon Pipe).
Master Plan Model – Increased Density	1,270 gpm (5,520 ERUs±)	760 gpm (3,340 ERUs±)	Route Huetter Interceptor Flow through 14" Siphon. Capacity: 1,460 to 1,720 gpm, depending on siphon headworks elevation. [2] No redundant siphon is available unless a new Mill River Lift Station force main is built.	Route Mill River Lift Station through 8" FM to Siphon Outlet (using 8" Siphon Pipe).

[1] *Indicated Peak Hour Flow represents model output flow with a 10 percent factor of safety. ERUs derived from corresponding model data.*

[2] *Excludes capacity estimates utilizing preliminary design elevations, which do not appear to provide sufficient cover per ITD requirements.*

Figures

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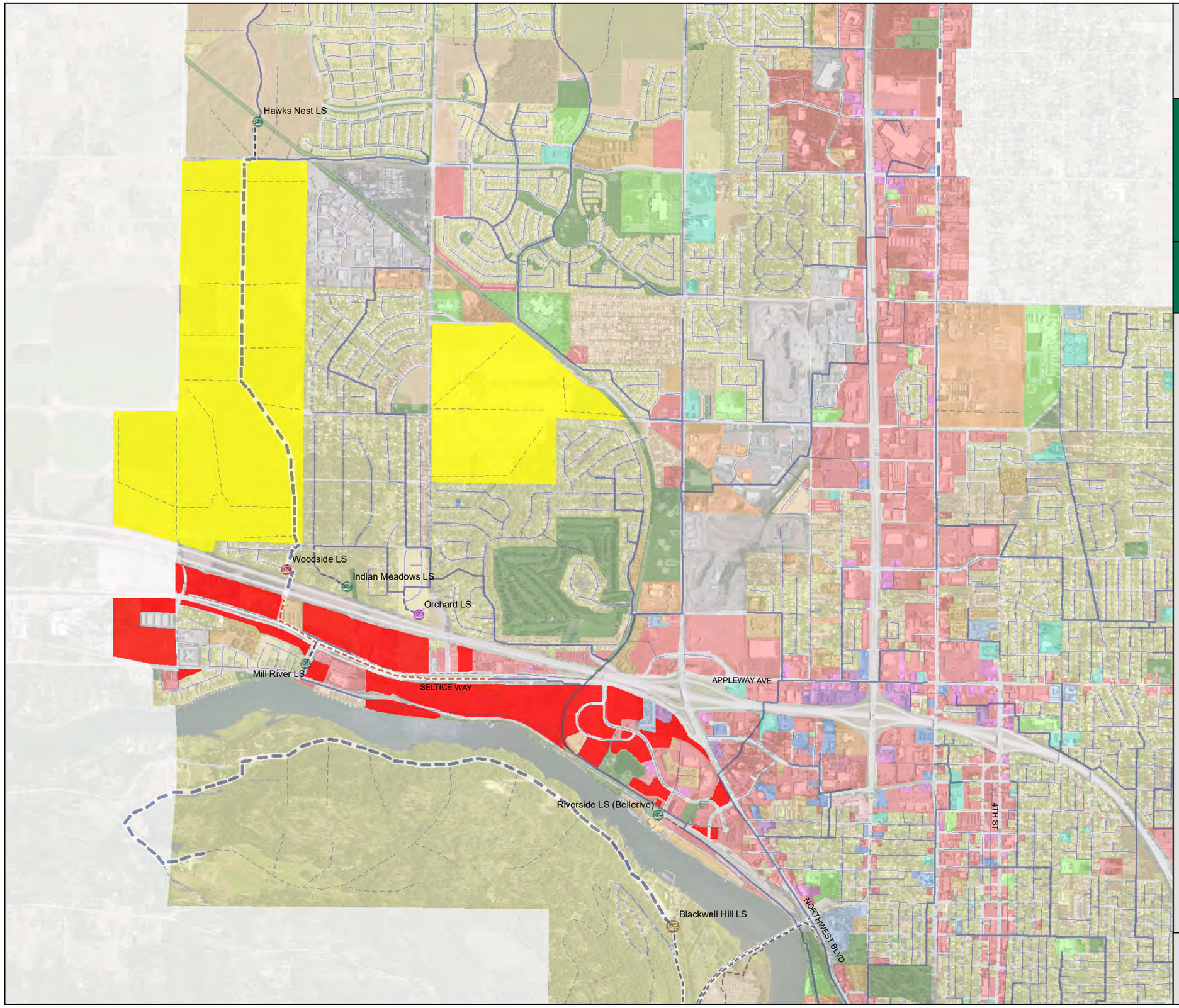


City of Coeur d'Alene

2013 Wastewater Collection System Master Plan

Figure J1
NW Quadrant Density Analysis

Land Use Density Increases

Land Use Type
- Assisted Living
- Church
- Commercial
- Hospital
- Hotel
- Industrial
- Office
- Open Space
- Public
- High Density Residential
- Medium Density Residential
- Low Density Residential
- Restaurant
- School

New Density
- 17 ERU/AC
- 8 ERU/AC

Existing Sewer
- Trunk
- Collector
- Force Main
- Siphon

Master Plan Sewer
- Trunk
- Check Line
- Force Main
- Siphon

Lift Stations
- Existing - City
- Existing - Private
- To Be Abandoned
- Master Planned

Note:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

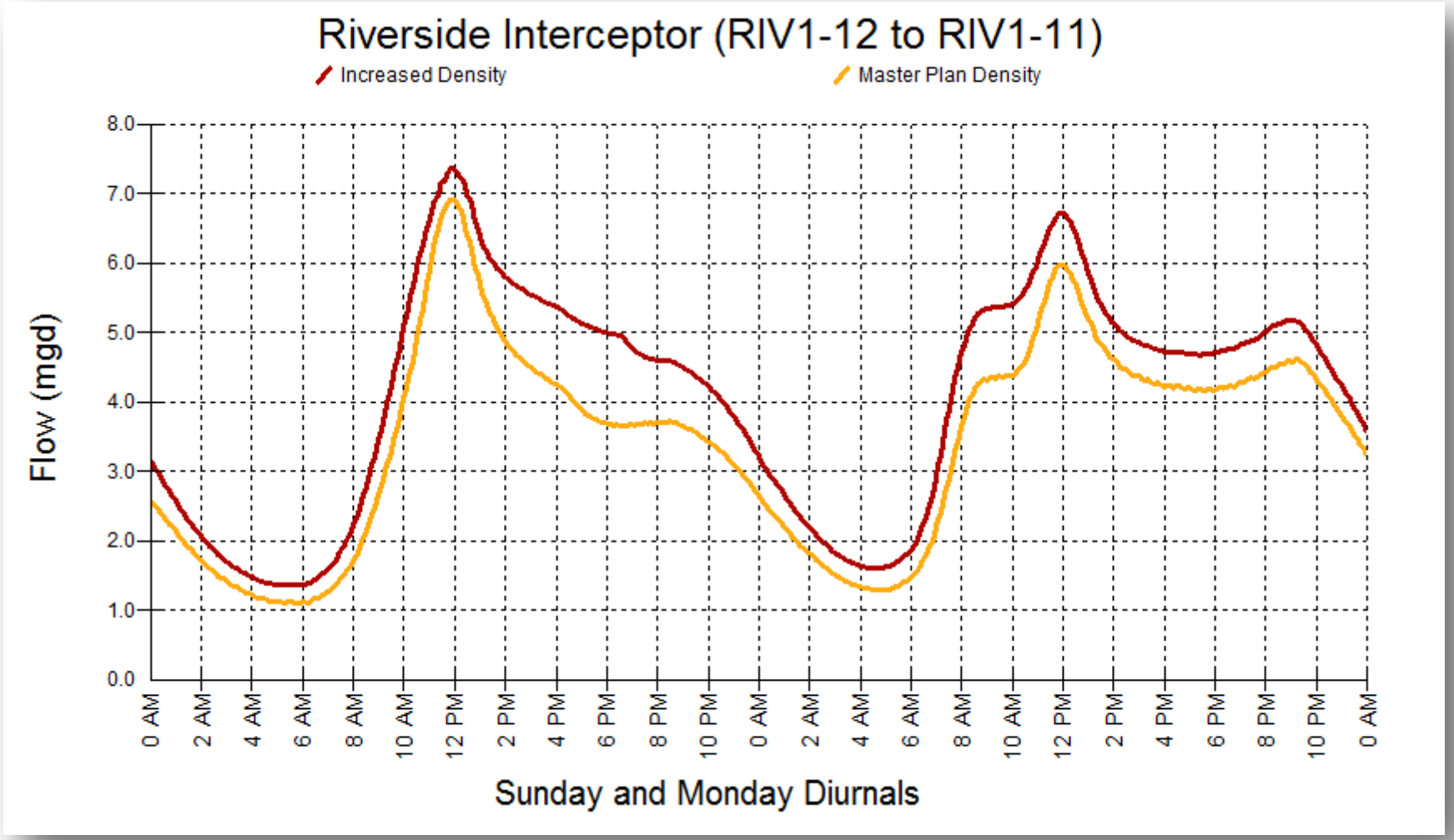
0 2,000 4,000 ft

N W E S

Date: Mar 15, 2013

J-U-B ENGINEERS, INC.

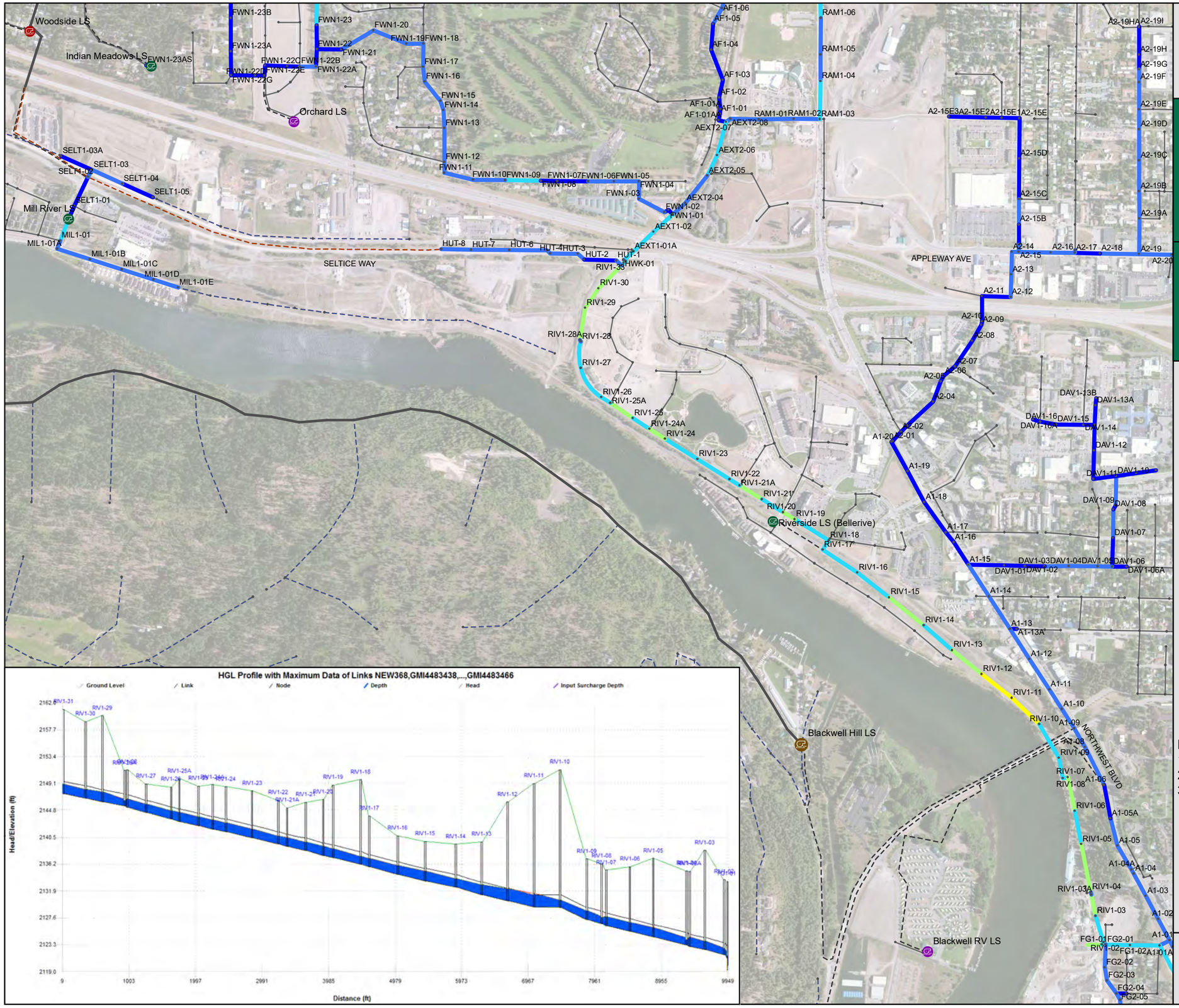
Figure J2 – NW Quadrant Density Analysis–Riverside Interceptor Diurnal Curves



City of Coeur d'Alene
2013 Wastewater Collection System Master Plan

Figure J3
NW Quadrant Density Analysis

Depth over Diameter Riverside Trunk Master Plan Densities



Depth over Diameter

Trunk Lines	Lift Stations
0.00 - 0.25	Existing - City
0.25 - 0.50	Existing - Private
0.50 - 0.75	To Be Abandoned
0.75 - 1.00	Master Planned
1.00 - 1.50	Manholes
1.50 - 2.00	Collector
2.00 - 5.00	Force Main
> 5.00	Siphon
	Master Plan
	Check Line

Notes:
1. Results include the design storm event - 1.70"
2. Depth over Diameter only shown for existing pipes.
3. A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 1,000 2,000 ft

N W E S

Date: Mar 15, 2013

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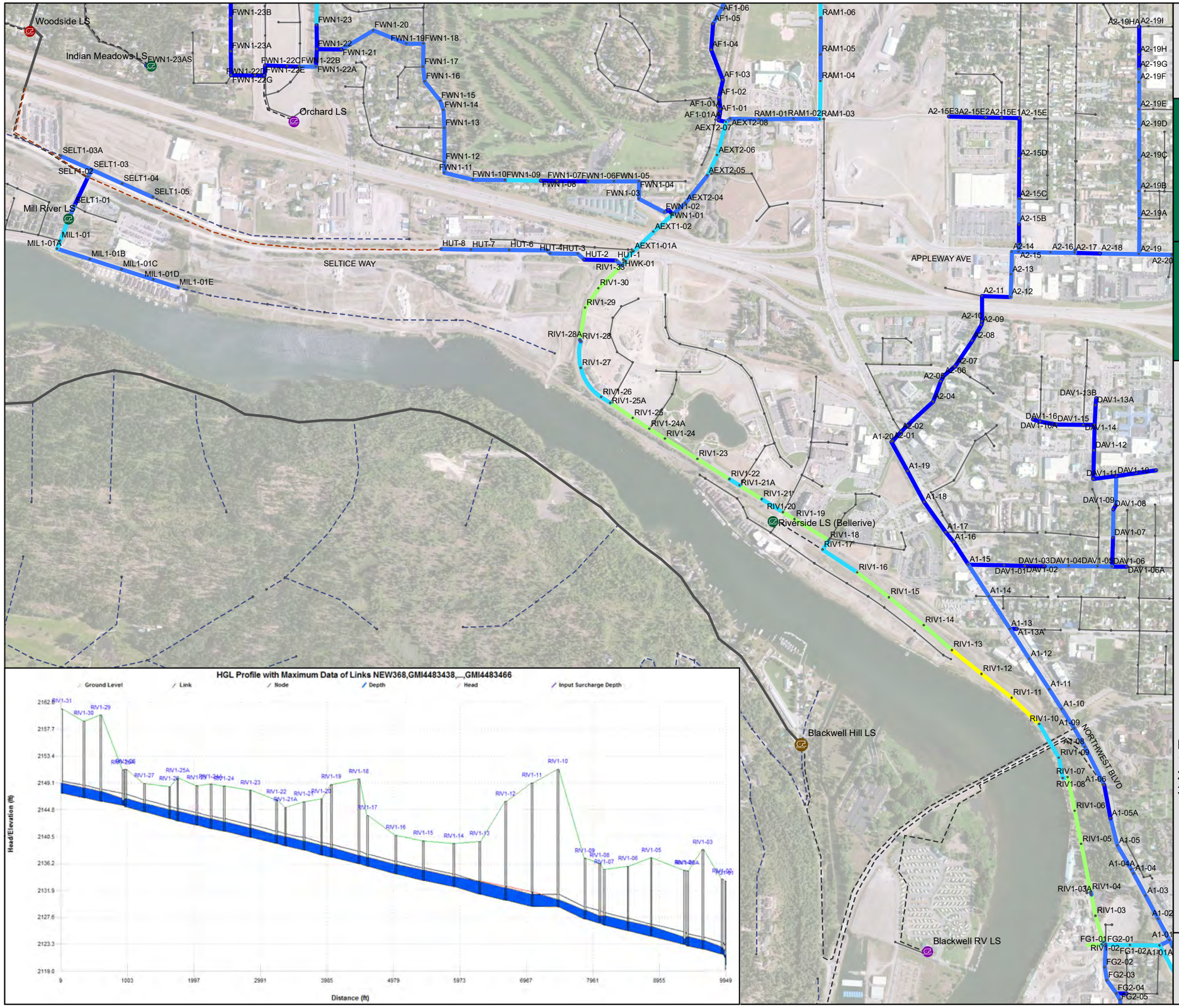
City of Coeur d'Alene
2013 Wastewater Collection System Master Plan

Figure J4
NW Quadrant Density Analysis

Depth over Diameter Riverside Trunk Increased Densities



Depth over Diameter

Trunk Lines	Lift Stations
0.00 - 0.25	Existing - City
0.25 - 0.50	Existing - Private
0.50 - 0.75	To Be Abandoned
0.75 - 1.00	Master Planned
1.00 - 1.50	Manholes
1.50 - 2.00	Collector
2.00 - 5.00	Force Main
> 5.00	Siphon
	Master Plan
	Check Line

Notes:
1. Results include the design storm event - 1.70"
2. Depth over Diameter only shown for existing pipes.
3. A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 1,000 2,000 ft

N W E S

Date: Mar 15, 2013

J-U-B ENGINEERS, INC.

Path: \\BOISEFILES\Public\Projects\JUB\20-11-047 CdA Sewer Master Plan\Model\GIS\Report Figures\Maps\NW Quadrant Density Analysis\J4 - NW Quadrant Density Analysis - Depth Over Diameter - Increased Densities.mxd

City of Coeur d'Alene
2013 Wastewater Collection System Master Plan

Figure J5
NW Quadrant Density Analysis

Reserve Capacity Riverside Trunk Master Plan Densities

Reserve Capacity (MGD)

Trunk Lines	Lift Stations
Over Capacity	Existing - City
0.00 - 0.25	Existing - Private
0.25 - 0.50	To Be Abandoned
0.50 - 1.00	Master Planned
1.00 - 1.50	Manholes
1.50 - 2.00	Collector
2.00 - 3.00	Force Main
3.00 - 5.00	Siphon
5.00 - 10.00	Master Plan
> 10.00	Check Line

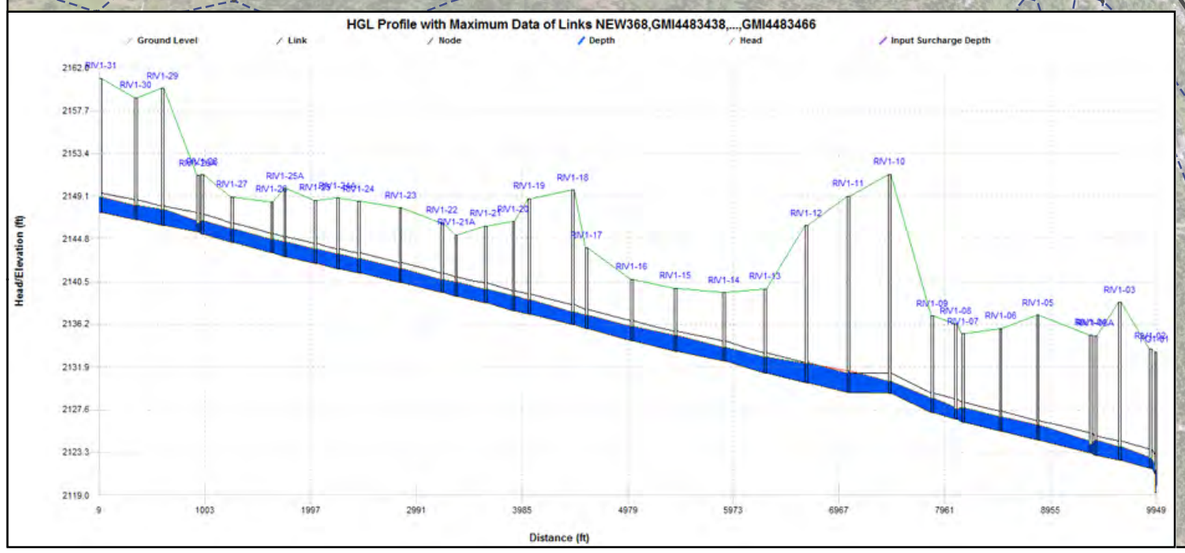
Notes:
1. Results include the design storm event - 1.70"
2. Reserve Capacity only shown for existing pipes.
3. A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 1,000 2,000 ft

N W E S

Date: Mar 15, 2013

J-U-B ENGINEERS, INC.



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City of Coeur d'Alene
2013 Wastewater Collection System Master Plan

Figure J6
NW Quadrant Density Analysis

Reserve Capacity Riverside Trunk Increased Densities

Reserve Capacity (MGD)

Trunk Lines	Lift Stations
Over Capacity	Existing - City
0.00 - 0.25	Existing - Private
0.25 - 0.50	To Be Abandoned
0.50 - 1.00	Master Planned
1.00 - 1.50	Manholes
1.50 - 2.00	Collector
2.00 - 3.00	Force Main
3.00 - 5.00	Siphon
5.00 - 10.00	Master Plan
> 10.00	Check Line

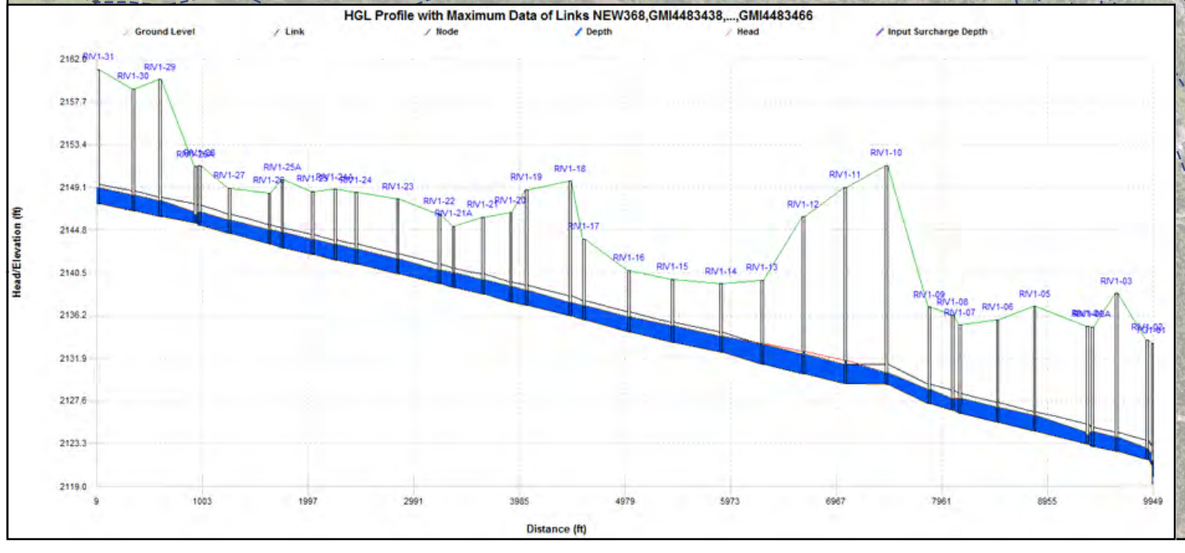
Notes:
1. Results include the design storm event - 1.70"
2. Reserve Capacity only shown for existing pipes.
3. A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 1,000 2,000 ft

N W E S

Date: March15, 2013

J-U-B ENGINEERS, INC.



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City of Coeur d'Alene
2013 Wastewater Collection System Master Plan

Figure J7
NW Quadrant Density Analysis

Pipe Size Increases

Existing Size (in)
- 10
- 12
- 15
- 18
- 21
- 24
- 30
- 36
- Collector
- Force Main
- Siphon

Master Plan Size (in)
- 10
- 12
- 15
- 18
- 21
- 24
- 30
- 36
- Check Line
- Force Main
- Siphon

Lift Stations
- Existing - City
- Existing - Private
- To Be Abandoned
- Master Planned
- Manholes

New MP Size (in)
- 10
- 18

Note:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 600 1,200 ft

N W E S

Date: Mar 15, 2013

J-U-B ENGINEERS, INC.

City of Coeur d'Alene
2013 Wastewater Collection System Master Plan

Figure J8
Appaloosa Alternative

Routing & Sizes

Existing Size (in)
- 10
- 12
- 15
- 18
- 21
- 24
- 30
- 36
- Collector
- Force Main
- Siphon
- Manholes

Master Plan Size (in)
- 10
- 12
- 15
- 18
- 21
- 24
- 30
- 36
- Collector
- Force Main
- Siphon
- Check Line

Lift Stations
- Existing - City
- Existing - Private
- To Be Abandoned
- Master Planned

Note:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 600 1,200 ft

N W E S

Date: Mar 15, 2013

J·U·B ENGINEERS, INC.

Abandon Woodside LS and re-grade to new Huetter Interceptor

Woodside LS
Indian Meadows LS
Orchard LS
Mill River LS
SELTICE WAY

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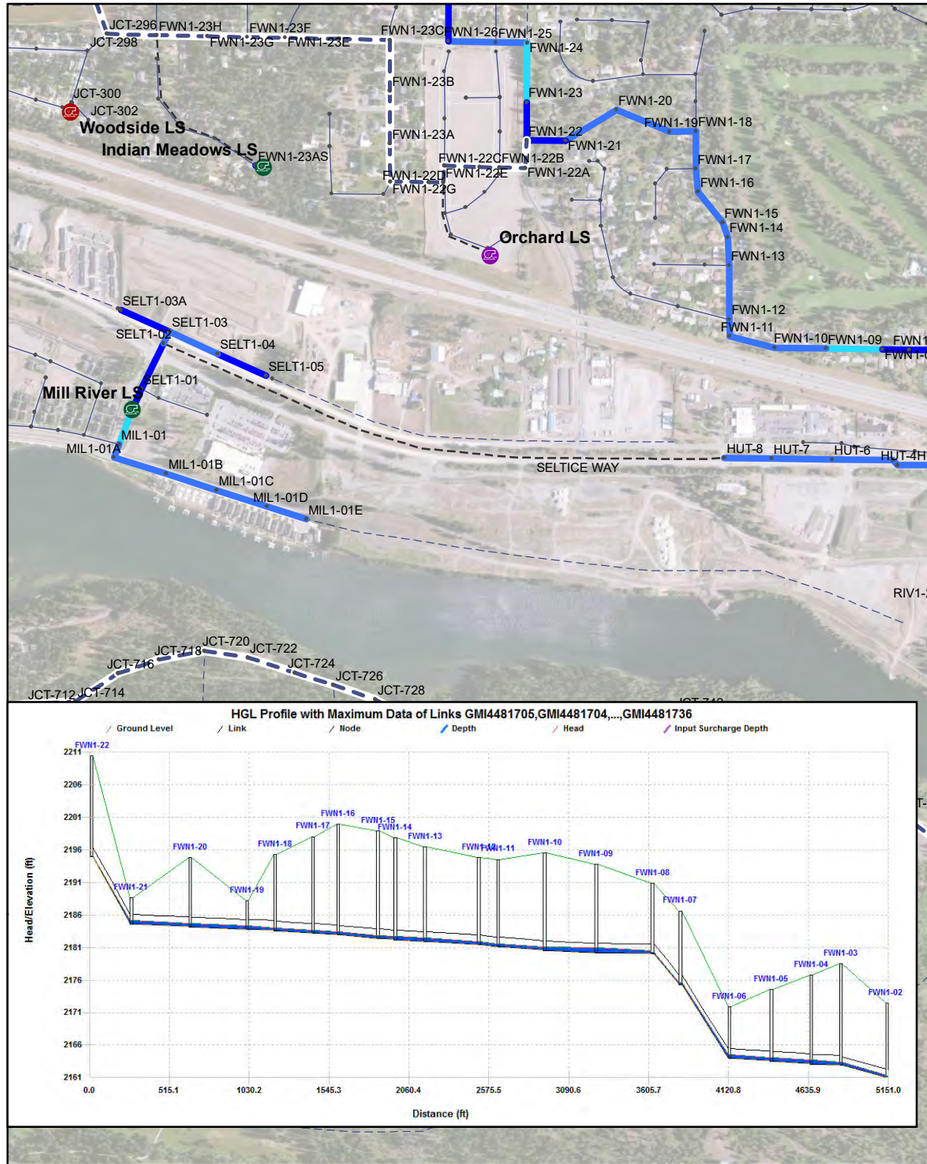
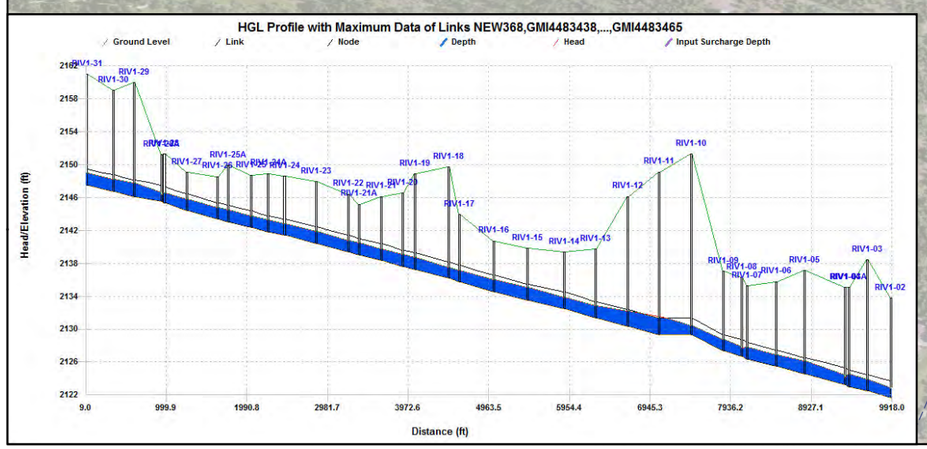
City of Coeur d'Alene
2013 Wastewater Collection System Master Plan

Figure J9
Appaloosa Alternative

Depth over Diameter
Original MP Route & Densities





Depth over Diameter

Trunk Line	Lift Stations
0.00 - 0.25	Existing - City
0.25 - 0.50	Existing - Private
0.50 - 0.75	To Be Abandoned
0.75 - 1.00	Master Planned
1.00 - 1.50	Manholes
1.50 - 2.00	Force Main
2.00 - 5.00	Siphon
> 5.00	Collector
	MP Trunk
	MP Force Main
	MP Siphon
	MP Check Line

Note:
1. Results include the design storm event - 1.70"
2. Depth over Diameter only shown for existing pipes.
3. A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 1,000 2,000 ft

N W E S

Date: Mar 15, 2013

J-U-B ENGINEERS, INC.

Path: \\BOISEFILES\Public\Projects\JUB\20-11-047 CdA Sewer Master Plan\Model\GIS\Report Figures\Maps\Appaloosa Road Alternative\J9 - Appaloosa Road Alternative - Depth over Diameter - Original Master Plan Route & Densities.mxd

City of Coeur d'Alene
2013 Wastewater Collection System Master Plan

Figure J10
Appaloosa Alternative

Depth over Diameter Appaloosa Route & Original Densities

Depth over Diameter

Trunk Line	Lift Stations
0.00 - 0.25	Existing - City
0.25 - 0.50	Existing - Private
0.50 - 0.75	To Be Abandoned
0.75 - 1.00	Master Planned
1.00 - 1.50	Manholes
1.50 - 2.00	Force Main
2.00 - 5.00	Siphon
> 5.00	Collector
	MP Trunk
	MP Force Main
	MP Siphon
	MP Check Line

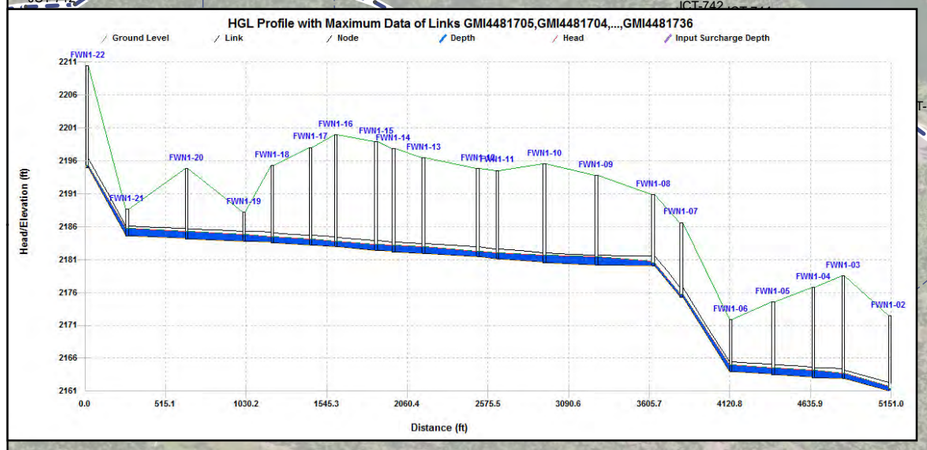
Note:
1. Results include the design storm event - 1.70"
2. Depth over Diameter only shown for existing pipes.
3. A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

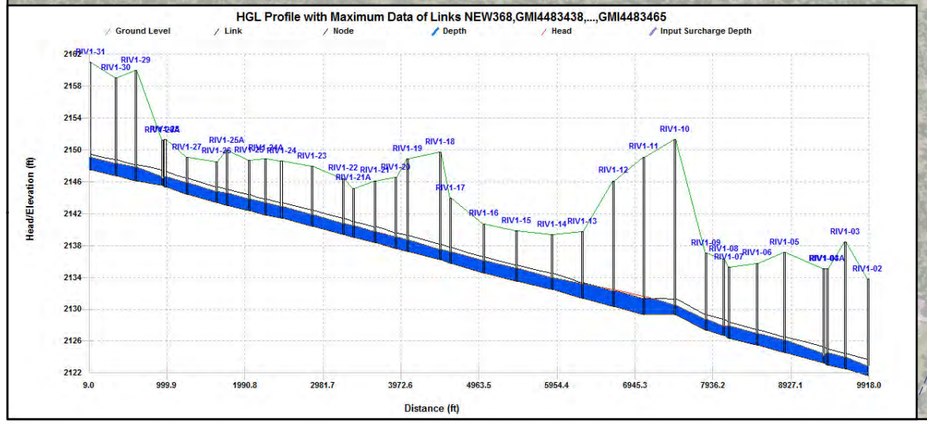
0 1,000 2,000 ft

N W E S

Date: Mar 15, 2013

J-U-B ENGINEERS, INC.





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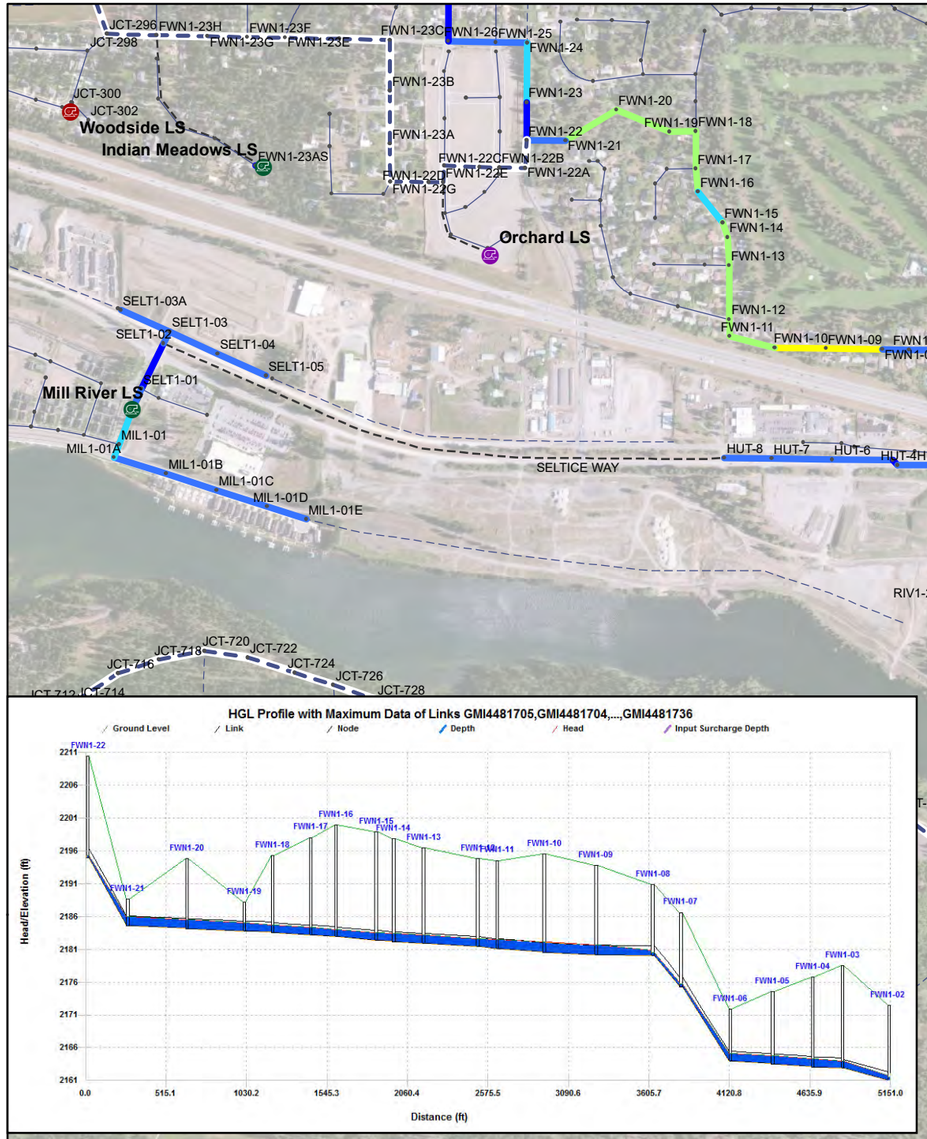
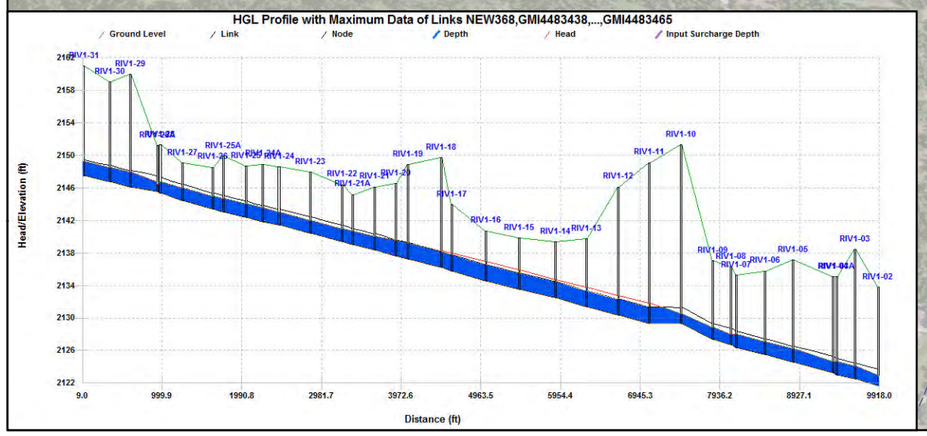
City of Coeur d'Alene
2013 Wastewater Collection System Master Plan

Figure J11
Appaloosa Alternative

Depth over Diameter Appaloosa Route & Increased Densities





Depth over Diameter

Trunk Line	Lift Stations
0.00 - 0.25	Existing - City
0.25 - 0.50	Existing - Private
0.50 - 0.75	To Be Abandoned
0.75 - 1.00	Master Planned
1.00 - 1.50	Manholes
1.50 - 2.00	Force Main
2.00 - 5.00	Siphon
> 5.00	Collector
	MP Trunk
	MP Force Main
	MP Siphon
	MP Check Line

Note:
1. Results include the design storm event - 1.70"
2. Depth over Diameter only shown for existing pipes.
3. A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 1,000 2,000 ft

N W E S

Date: Mar 15, 2013

J-U-B ENGINEERS, INC.

Path: \\BOISEFILES\Public\Projects\JUB\20-11-047 CdA Sewer Master Plan\Model\GIS\Report Figures\Maps\Appaloosa Road Alternative\J11 - Appaloosa Road Alternative - Depth over Diameter - Appaloosa Route & Increased Densities.mxd

City of Coeur d'Alene
2013 Wastewater Collection System Master Plan

Figure J12
Appaloosa Alternative

Reserve Capacity
Original MP Route & Densities

Reserve Capacity (MGD)

Trunk Line	Lift Stations
Over Capacity	Existing - City
0.00 - 0.25	Existing - Private
0.25 - 0.50	To Be Abandoned
0.50 - 1.00	Master Planned
1.00 - 1.50	Manholes
1.50 - 2.00	Force Main
2.00 - 3.00	Siphon
3.00 - 5.00	Collector
5.00 - 10.00	MP Trunk
> 10.00	MP Force Main
	MP Siphon
	MP Check Line

Note:
1. Results include the design storm event - 1.70"
2. Reserve Capacity only shown for existing pipes.
3. A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

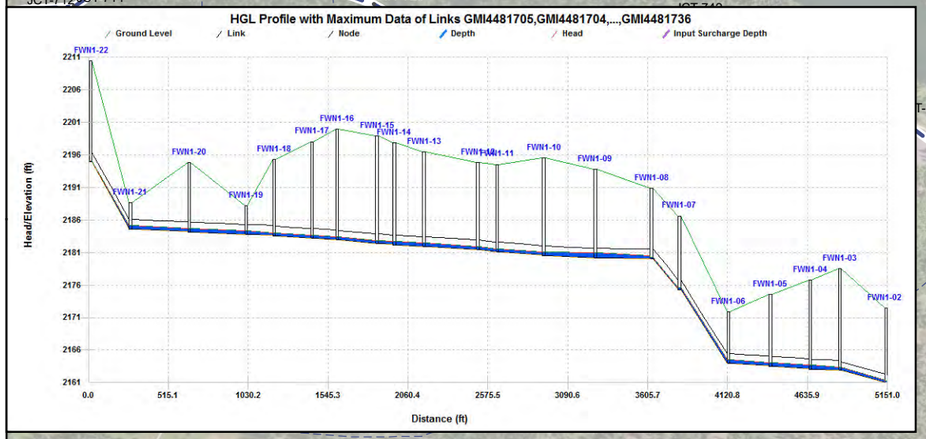
0 1,000 2,000 ft

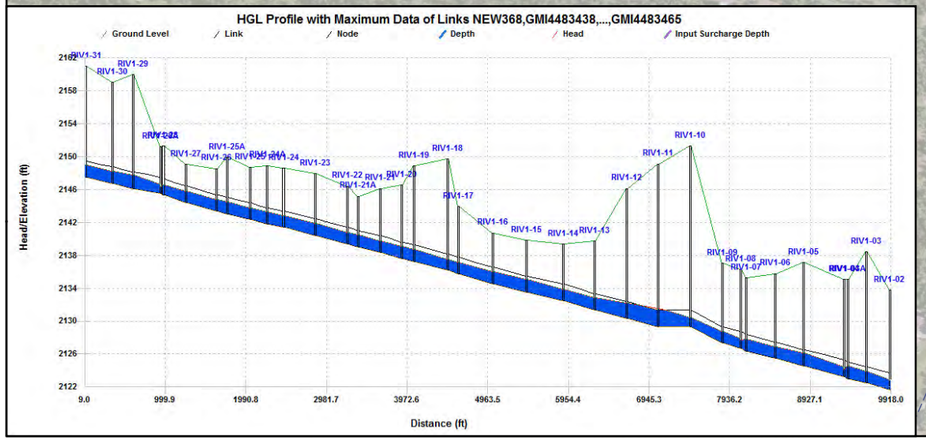
N W E S

Date: Mar 15, 2013

J-U-B ENGINEERS, INC.

Woodside LS
Indian Meadows LS
Orchard LS
Mill River LS
Riverside LS (Bellerive)
Blackwell Hill LS
Blackwell RV LS
SELTICE WAY
APPLEWAY AVE
NORTHWEST BLVD





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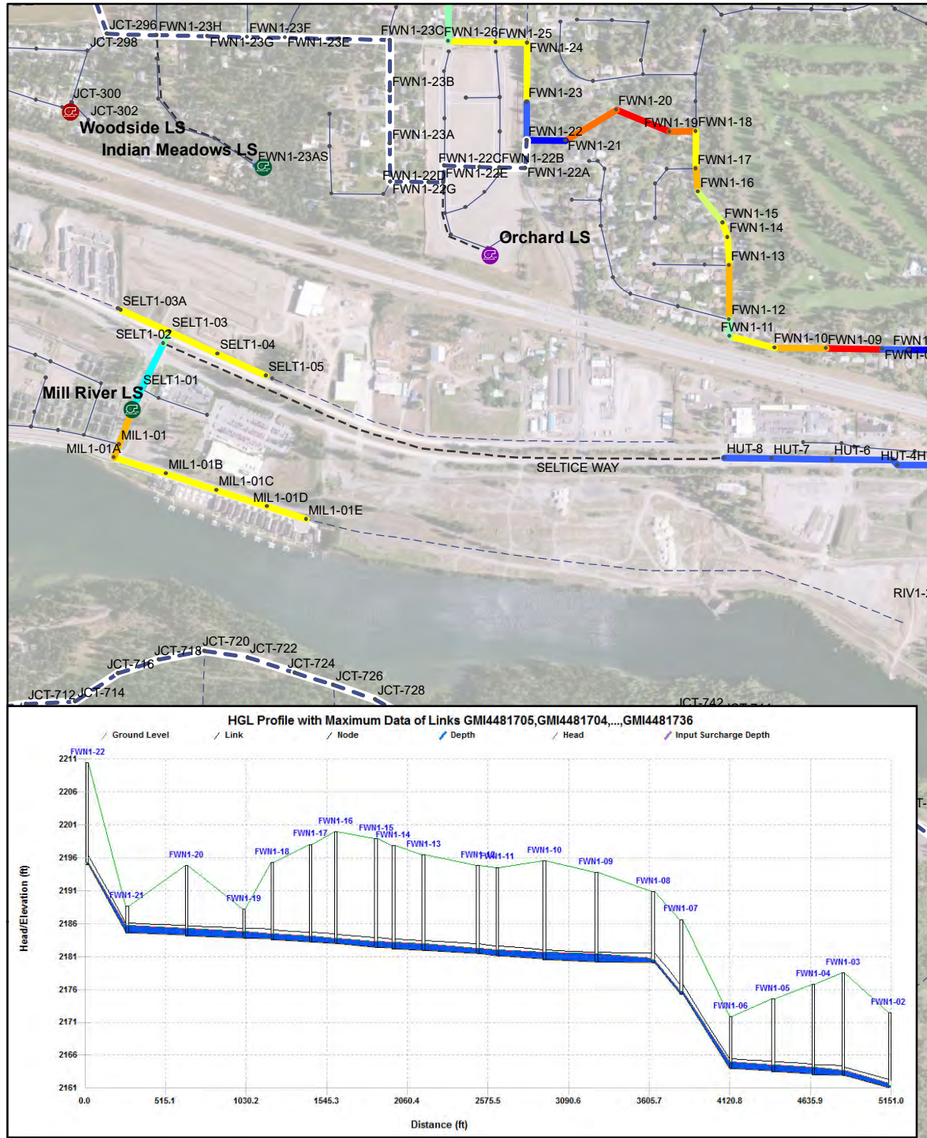
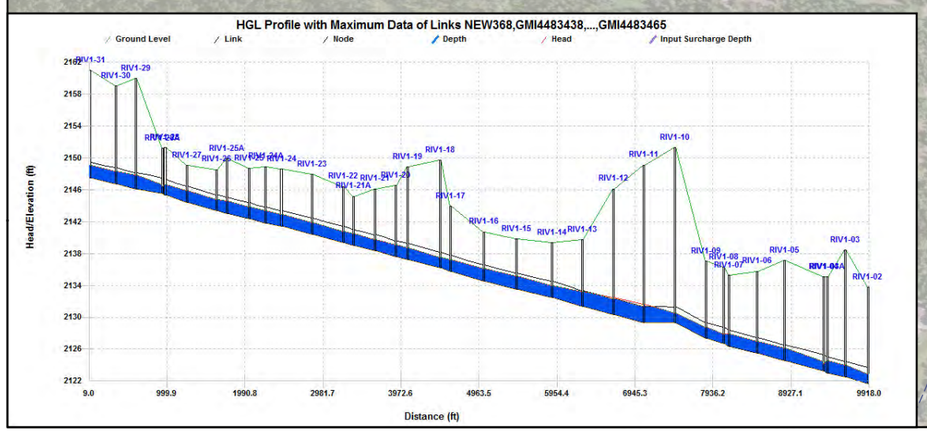
Path: \\BOISEFILES\Public\Projects\JUB\20-11-047 CdA Sewer Master Plan\Model\GIS\Report Figures\Maps\Appaloosa Road Alternative\J13 - Appaloosa Road Alternative - Reserve Capacity - Appaloosa Route & Original Densities.mxd





City of Coeur d'Alene
2013 Wastewater Collection System Master Plan

Figure J13
Appaloosa Alternative

Reserve Capacity Appaloosa Route & Original Densities

Reserve Capacity (MGD)

Trunk Line	Lift Stations
Over Capacity	Existing - City
0.00 - 0.25	Existing - Private
0.25 - 0.50	To Be Abandoned
0.50 - 1.00	Master Planned
1.00 - 1.50	Manholes
1.50 - 2.00	Force Main
2.00 - 3.00	Siphon
3.00 - 5.00	Collector
5.00 - 10.00	MP Trunk
> 10.00	MP Force Main
	MP Siphon
	MP Check Line

Note:
1. Results include the design storm event - 1.70"
2. Reserve Capacity only shown for existing pipes.
3. A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 1,000 2,000 ft

N W E S

Date: Mar 15, 2013

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City of Coeur d'Alene
2013 Wastewater Collection System Master Plan

Figure J14
Appaloosa Alternative

Reserve Capacity Appaloosa Route & Increased Densities

Reserve Capacity (MGD)

Trunk Line	Lift Stations
Over Capacity	Existing - City
0.00 - 0.25	Existing - Private
0.25 - 0.50	To Be Abandoned
0.50 - 1.00	Master Planned
1.00 - 1.50	Manholes
1.50 - 2.00	Force Main
2.00 - 3.00	Siphon
3.00 - 5.00	Collector
5.00 - 10.00	MP Trunk
> 10.00	MP Force Main
	MP Siphon
	MP Check Line

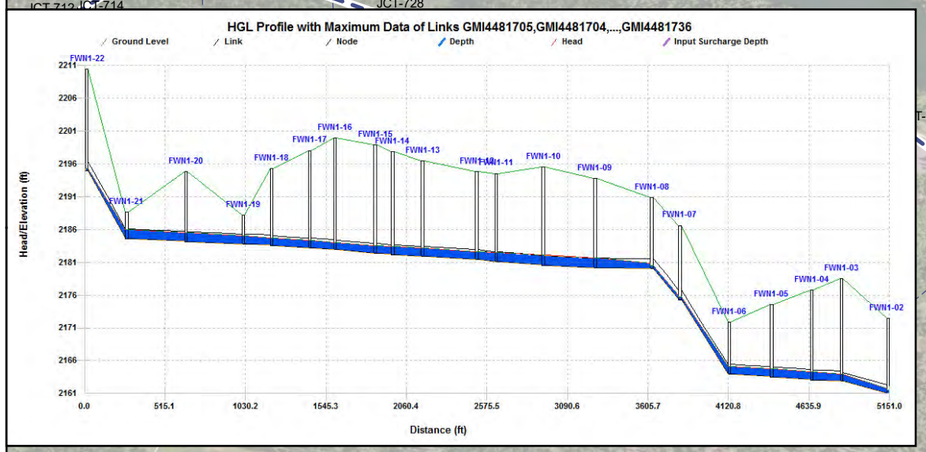
Note:
1. Results include the design storm event - 1.70"
2. Reserve Capacity only shown for existing pipes.
3. A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

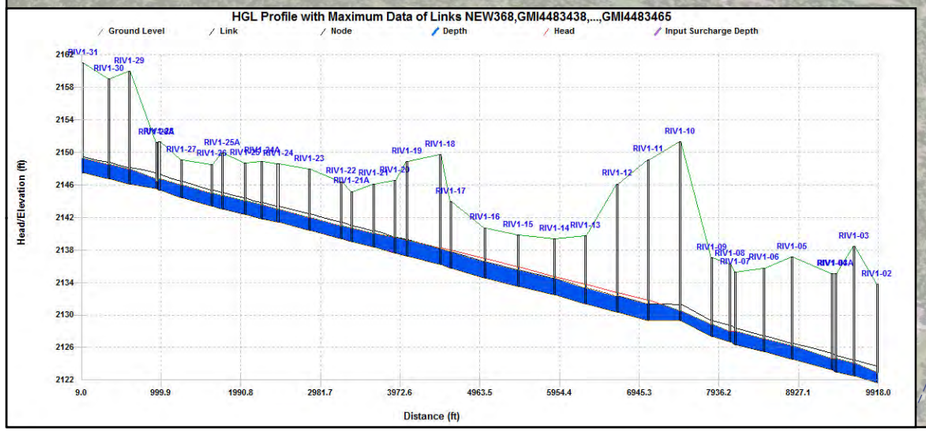
0 1,000 2,000 ft

N W E S

Date: Mar 15, 2013

J-U-B ENGINEERS, INC.





Woodside LS
Indian Meadows LS
Orchard LS
Mill River LS
Riverside LS (Bellerive)
Blackwell Hill LS
Blackwell RV LS
SELTICE WAY
APPLEWAY AVE
NORTHWEST BLVD

Path: \\BOISEFILES\Public\Projects\JUB\20-11-047 CdA Sewer Master Plan\Model\GIS\Report Figures\Maps\Appaloosa Road Alternative\J14 - Appaloosa Road Alternative - Reserve Capacity - Appaloosa Route & Increased Densities.mxd

City of Coeur d'Alene
2013 Wastewater Collection System Master Plan

Figure J15

Mill River Lift Station Location Summary

Existing Pipe Size (in)

- Collector
- 10
- 12
- 15
- 18
- 21
- 24
- 30
- 36
- Force Main
- Siphon
- Manhole

Master Plan Size (in)

- Check Line
- 10
- 12
- 15
- 18
- 21
- 24
- 30
- 36
- Force Main
- Siphon
- MP Manhole
- Future I-90 Bore

Lift Stations

- Existing - City
- Existing - Private
- To Be Abandoned
- Master Planned

Note:
A Master Plan is conceptual in nature and intended for planning purposes only. Field verification, survey, utility locates, and investigation of other potential upstream and downstream conflicts should be completed prior to preliminary and final design.

0 400 800 ft

N W E S

Date: Mar 15, 2013

J-U-B ENGINEERS, INC.

Path: \\BOISEFILES\Public\Projects\JUB\20-11-047 CdA Sewer Master Plan\Model\GIS\Report Figures\Maps\Mill River LS Analysis\Mill River Lift Station Location Summary.mxd

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483806	AEXT1-01A	AEXT1-13	135.97	18.0	2155.92	2150.57	2147.97	5.35	1.91%	5.199	8.78	0.55	4.96
GMI4483805	AEXT1-02	AEXT1-01A	292.14	18.0	2160.14	2154.14	2150.57	6.00	1.22%	4.957	7.72	0.60	3.18
GMI4483813	AEXT1-13	RIV1-33	19.13	24.0	2155.86	2147.97	2147.65	7.89	1.66%	5.275	4.64	0.53	15.15
GMI4481734	AEXT2-03	AEXT1-02	272.01	18.0	2163.92	2157.04	2154.14	6.88	1.07%	4.966	7.07	0.60	2.63
GMI4481733	AEXT2-04	AEXT2-03	178.82	18.0	2164.99	2159.39	2157.04	5.60	1.31%	4.093	6.49	0.49	4.34
GMI4481732	AEXT2-05	AEXT2-04	367.29	18.0	2171.24	2164.77	2159.39	6.47	1.47%	4.089	7.47	0.48	4.82
GMI4481730	AEXT2-06	AEXT2-05	234.92	18.0	2172.81	2166.13	2164.77	6.68	0.58%	4.040	5.80	0.70	1.55
GMI4481729	AEXT2-07	AEXT2-06	364.90	18.0	2179.46	2167.91	2166.13	11.55	0.49%	4.040	4.86	0.67	1.10
GMI4481190	AEXT2-08	AEXT2-07	55.93	24.0	2180.04	2168.41	2167.91	11.63	0.89%	3.815	4.67	0.34	11.16
GMI4481731	FWN1-01	AEXT2-03	64.84	15.0	2173.20	2158.83	2157.04	14.37	2.76%	0.944	2.59	0.24	6.57
GMI4481735	FWN1-02	FWN1-01	49.95	15.0	2172.40	2161.03	2158.83	11.37	4.41%	0.943	7.01	0.21	8.56
GMI4481736	FWN1-03	FWN1-02	301.75	15.0	2178.38	2162.86	2161.03	15.52	0.60%	0.943	4.61	0.40	2.64
GMI4482263	FWN1-04	FWN1-03	185.11	18.0	2176.77	2163.05	2162.93	13.72	0.07%	0.943	2.22	0.47	0.97
GMI4482266	FWN1-05	FWN1-04	259.48	18.0	2174.53	2163.49	2163.17	11.04	0.12%	0.939	2.16	0.42	1.64
GMI4482268	FWN1-06	FWN1-05	274.65	18.0	2171.88	2163.91	2163.59	7.97	0.12%	0.937	2.22	0.44	1.57
GMI4482267	FWN1-07	FWN1-06	320.60	18.0	2186.57	2175.30	2163.91	11.27	3.55%	0.936	3.16	0.18	12.93
GMI4480786	FWN1-08	FWN1-07	174.16	18.0	2190.85	2180.02	2175.32	10.83	2.70%	0.932	6.25	0.19	11.15
GMI4480785	FWN1-09	FWN1-08	372.47	18.0	2193.75	2180.10	2180.05	13.65	0.01%	0.930	1.92	0.58	-0.08
GMI4482752	FWN1-10	FWN1-09	338.25	18.0	2195.53	2180.51	2180.12	15.02	0.12%	0.930	1.63	0.43	1.57
GMI4482753	FWN1-11	FWN1-10	307.18	18.0	2194.50	2181.06	2180.55	13.44	0.17%	0.932	2.23	0.38	2.06
GMI4482754	FWN1-12	FWN1-11	112.85	18.0	2194.76	2181.40	2181.09	13.36	0.27%	0.931	2.63	0.33	2.92
GMI4482749	FWN1-13	FWN1-12	356.59	18.0	2196.41	2181.85	2181.46	14.56	0.11%	0.909	2.31	0.45	1.54
GMI4482119	FWN1-14	FWN1-13	187.14	18.0	2197.79	2182.14	2181.87	15.65	0.14%	0.901	2.00	0.39	1.89
GMI4482118	FWN1-15	FWN1-14	100.87	18.0	2198.84	2182.34	2182.18	16.50	0.16%	0.900	2.31	0.38	2.07
GMI4482117	FWN1-16	FWN1-15	259.71	18.0	2199.92	2182.87	2182.34	17.05	0.20%	0.900	2.35	0.36	2.41
GMI4482116	FWN1-17	FWN1-16	153.89	18.0	2197.99	2183.12	2182.96	14.87	0.11%	0.899	2.44	0.42	1.51
GMI4482115	FWN1-18	FWN1-17	244.90	18.0	2195.29	2183.53	2183.12	11.76	0.17%	0.893	2.11	0.37	2.10
GMI4481703	FWN1-19	FWN1-18	175.44	18.0	2188.13	2183.78	2183.63	4.35	0.09%	0.867	2.25	0.43	1.28
GMI4480832	FWN1-20	FWN1-19	377.23	18.0	2194.77	2184.09	2183.80	10.68	0.08%	0.867	1.80	0.46	1.17
GMI4481704	FWN1-21	FWN1-20	390.82	18.0	2188.59	2184.55	2184.18	4.04	0.09%	0.867	1.92	0.44	1.40
GMI4481705	FWN1-22	FWN1-21	258.18	18.0	2210.36	2194.87	2184.62	15.49	3.97%	0.866	3.36	0.16	13.79

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481706	FWN1-22A	FWN1-22	183.47	12.0	2198.94	2196.02	2195.36	2.92	0.36%	0.185	2.08	0.24	1.31
GMI4779372	FWN1-22B	FWN1-22A	171.73	12.0	2202.52	2196.52	2196.02	6.00	0.29%	0.185	1.88	0.25	1.17
GMI4779371	FWN1-22C	FWN1-22B	129.05	12.0	2203.46	2196.91	2196.52	6.55	0.30%	0.170	1.76	0.24	1.20
GMI4779370	FWN1-22D	FWN1-22C	235.47	12.0	2211.95	2199.45	2196.91	12.50	1.08%	0.169	2.25	0.17	2.42
GMI4779362	FWN1-22E	FWN1-22D	107.62	12.0	2203.39	2200.19	2199.45	3.20	0.69%	0.159	2.51	0.19	1.91
GMI4779361	FWN1-22F	FWN1-22E	98.56	12.0	2211.11	2201.95	2200.19	9.16	1.79%	0.126	2.35	0.13	3.21
GMI4481710	FWN1-22G	FWN1-22F	253.95	12.0	2217.24	2206.49	2201.95	10.75	1.79%	0.125	3.13	0.13	3.21
GMI4482106	FWN1-23	FWN1-22	251.49	12.0	2226.98	2218.78	2204.32	8.20	5.75%	0.682	7.81	0.23	5.31
GMI4482108	FWN1-23A	FWN1-22G	250.15	12.0	2224.45	2213.95	2206.61	10.50	2.93%	0.114	3.62	0.11	4.16
GMI4482109	FWN1-23B	FWN1-23A	350.01	12.0	2230.51	2215.01	2214.04	15.50	0.28%	0.112	1.68	0.21	1.20
GMI4482744	FWN1-23C	FWN1-23B	334.19	12.0	2232.51	2215.92	2215.08	16.59	0.25%	0.112	1.63	0.22	1.14
GMI4482252	FWN1-23D	FWN1-23C	333.56	12.0	2227.91	2216.81	2216.03	11.10	0.23%	0.110	1.59	0.22	1.10
GMI4482253	FWN1-23E	FWN1-23D	354.73	12.0	2228.86	2217.65	2216.90	11.21	0.21%	0.113	1.55	0.23	1.03
GMI4482254	FWN1-23F	FWN1-23E	250.99	12.0	2231.64	2218.38	2217.75	13.26	0.25%	0.114	1.64	0.22	1.14
GMI4482255	FWN1-23G	FWN1-23F	262.27	12.0	2230.10	2219.27	2218.49	10.83	0.30%	0.114	1.72	0.20	1.25
GMI4482251	FWN1-23H	FWN1-23G	337.71	12.0	2230.32	2220.02	2219.38	10.30	0.19%	0.158	1.65	0.29	0.93
GMI4481019	FWN1-24	FWN1-23	393.07	12.0	2235.88	2220.04	2219.18	15.84	0.22%	0.680	2.59	0.60	0.49
NEW253	HUT-1	RIV1-31	74.82	18.0	2167.08	2148.37	2147.77	18.71	0.80%	2.532	3.78	0.45	4.03
NEW252	HUT-2	HUT-1	336.26	18.0	2179.89	2165.73	2148.37	14.16	5.16%	2.177	6.91	0.24	14.55
NEW251	HUT-3	HUT-2	90.36	18.0	2186.18	2169.82	2165.73	16.36	4.52%	2.177	9.60	0.26	13.47
NEW250	HUT-4	HUT-3	288.14	18.0	2185.67	2172.11	2169.82	13.56	0.80%	2.177	5.93	0.45	4.39
NEW249	HUT-5	HUT-4	47.44	18.0	2186.03	2172.66	2172.11	13.37	1.15%	2.177	5.00	0.36	5.71
NEW248	HUT-6	HUT-5	399.76	18.0	2192.23	2175.88	2172.66	16.35	0.81%	2.177	5.39	0.41	4.43
NEW247	HUT-7	HUT-6	399.68	18.0	2195.65	2179.22	2175.88	16.43	0.84%	2.177	5.10	0.39	4.55
NEW246	HUT-8	HUT-7	311.58	18.0	2193.99	2181.64	2179.22	12.35	0.78%	2.177	5.14	0.40	4.30
CDT-77	JCT-232	JCT-234	181.99	15.0	2273.70	2244.68	2244.41	29.02	0.15%	0.949	2.64	0.54	0.79
CDT-79	JCT-234	JCT-236	245.16	15.0	2273.34	2244.21	2243.84	29.13	0.15%	0.951	2.52	0.55	0.81
CDT-81	JCT-236	JCT-238	274.39	15.0	2272.51	2243.64	2243.23	28.87	0.15%	1.027	2.57	0.58	0.72
CDT-83	JCT-238	JCT-240	264.62	15.0	2272.29	2243.03	2242.63	29.26	0.15%	1.084	2.60	0.59	0.67
CDT-85	JCT-240	JCT-242	358.74	15.0	2271.31	2242.43	2241.89	28.88	0.15%	1.084	2.66	0.61	0.67
CDT-87	JCT-242	JCT-244	236.50	15.0	2269.62	2241.59	2241.24	28.03	0.15%	1.086	2.64	0.59	0.65
CDT-89	JCT-244	JCT-246	281.29	15.0	2271.93	2241.04	2240.61	30.89	0.15%	1.087	2.67	0.60	0.68
CDT-91	JCT-246	JCT-248	180.59	15.0	2270.25	2240.41	2240.14	29.84	0.15%	1.107	2.65	0.58	0.64
CDT-93	JCT-248	JCT-250	324.34	15.0	2272.41	2239.94	2239.46	32.47	0.15%	1.107	2.68	0.62	0.63
CDT-95	JCT-250	JCT-252	295.17	15.0	2275.05	2239.16	2238.71	35.89	0.15%	1.108	2.71	0.61	0.66
CDT-97	JCT-252	JCT-254	214.60	15.0	2272.77	2238.41	2238.09	34.36	0.15%	1.212	2.68	0.62	0.53

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
CDT-99	JCT-254	JCT-256	302.11	15.0	2268.44	2237.89	2237.44	30.55	0.15%	1.213	2.76	0.65	0.53
CDT-101	JCT-256	JCT-258	306.26	15.0	2266.41	2237.14	2236.68	29.27	0.15%	1.236	2.78	0.65	0.52
CDT-103	JCT-258	JCT-260	225.71	15.0	2263.95	2236.38	2236.04	27.57	0.15%	1.237	2.69	0.63	0.52
CDT-105	JCT-260	JCT-262	275.02	15.0	2262.26	2235.84	2235.43	26.42	0.15%	1.275	2.71	0.65	0.47
CDT-107	JCT-262	JCT-264	192.37	15.0	2260.36	2235.23	2234.94	25.13	0.15%	1.338	2.81	0.65	0.42
CDT-109	JCT-264	JCT-266	233.34	15.0	2258.90	2234.74	2234.39	24.16	0.15%	1.344	2.76	0.67	0.41
CDT-111	JCT-266	JCT-268	256.96	15.0	2256.40	2234.19	2233.81	22.21	0.15%	1.349	2.73	0.67	0.39
CDT-113	JCT-268	JCT-270	235.70	15.0	2254.97	2233.61	2233.25	21.36	0.15%	1.422	2.73	0.68	0.35
CDT-115	JCT-270	JCT-272	350.97	15.0	2254.73	2233.05	2232.53	21.68	0.15%	1.428	2.81	0.72	0.31
CDT-117	JCT-272	JCT-274	348.47	15.0	2254.10	2232.23	2231.70	21.87	0.15%	1.487	2.88	0.74	0.28
CDT-119	JCT-274	JCT-276	350.62	15.0	2250.10	2231.40	2230.88	18.70	0.15%	1.492	2.82	0.74	0.25
CDT-121	JCT-276	JCT-278	349.97	15.0	2248.19	2230.58	2230.05	17.61	0.15%	1.561	2.90	0.76	0.20
CDT-123	JCT-278	JCT-280	325.86	15.0	2243.92	2229.75	2229.26	14.17	0.15%	1.564	2.93	0.76	0.19
CDT-125	JCT-280	JCT-282	268.92	15.0	2239.77	2228.96	2228.56	10.81	0.15%	1.567	3.00	0.75	0.18
CDT-127	JCT-282	JCT-284	271.05	15.0	2237.23	2228.36	2225.38	8.87	1.10%	1.571	5.35	0.40	3.17
CDT-129	JCT-284	JCT-286	251.17	15.0	2233.43	2225.18	2222.41	8.25	1.10%	1.575	5.36	0.40	3.18
CDT-131	JCT-286	JCT-288	232.66	15.0	2230.64	2222.21	2219.66	8.43	1.10%	1.579	5.35	0.40	3.16
CDT-133	JCT-288	JCT-290	208.33	18.0	2227.88	2216.60	2216.35	11.28	0.12%	1.971	2.91	0.64	0.58
CDT-135	JCT-290	JCT-292	206.94	18.0	2227.04	2216.15	2215.90	10.89	0.12%	1.974	2.91	0.64	0.58
CDT-137	JCT-292	JCT-294	146.53	18.0	2224.28	2215.70	2215.53	8.58	0.12%	1.978	2.69	0.64	0.53
CDT-139	JCT-294	JCT-296	223.29	18.0	2222.19	2215.43	2215.16	6.76	0.12%	2.021	2.92	0.65	0.54
CDT-141	JCT-296	JCT-298	168.58	18.0	2229.61	2214.96	2214.76	14.65	0.12%	2.024	2.79	0.65	0.51
CDT-143	JCT-298	JCT-300	358.77	18.0	2227.43	2214.56	2214.13	12.87	0.12%	2.069	3.03	0.70	0.48
CDT-145	JCT-300	JCT-302	161.08	18.0	2221.79	2213.83	2213.63	7.96	0.12%	2.078	3.24	0.64	0.51
CDT-147	JCT-302	JCT-304	151.33	18.0	2223.95	2204.13	2203.95	19.82	0.12%	2.082	2.63	0.68	0.45
CDT-149	JCT-304	JCT-230	395.06	18.0	2222.00	2203.85	2203.38	18.15	0.12%	2.085	3.01	0.71	0.45
CDT-191	JCT-340	JCT-342	333.79	8.0	2240.82	2224.93	2223.43	15.89	0.45%	0.329	2.58	0.55	0.24
CDT-193	JCT-342	JCT-344	295.17	8.0	2240.80	2223.43	2222.10	17.37	0.45%	0.337	2.60	0.55	0.23
CDT-195	JCT-344	JCT-346	304.10	8.0	2240.45	2222.10	2220.73	18.35	0.45%	0.346	2.52	0.56	0.22
CDT-197	JCT-346	JCT-348	295.27	8.0	2239.12	2220.73	2219.40	18.39	0.45%	0.388	2.62	0.61	0.18
CDT-199	JCT-348	JCT-288	437.16	8.0	2237.71	2219.40	2217.44	18.31	0.45%	0.396	2.82	0.64	0.17
CDT-289	JCT-438	JCT-440	299.60	8.0	2244.72	2227.15	2225.80	17.57	0.45%	0.369	2.65	0.59	0.20
CDT-291	JCT-440	JCT-442	312.62	8.0	2243.23	2225.80	2224.40	17.43	0.45%	0.379	2.67	0.60	0.19
CDT-293	JCT-442	JCT-444	308.16	8.0	2241.79	2224.40	2223.01	17.39	0.45%	0.388	2.68	0.61	0.18
CDT-295	JCT-444	JCT-446	286.46	8.0	2240.11	2223.01	2221.72	17.10	0.45%	0.398	2.64	0.62	0.17
CDT-297	JCT-446	FWN1-24	299.40	8.0	2234.96	2221.72	2220.37	13.24	0.45%	0.407	2.85	0.65	0.16

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4779338	MIL1-01	STOR-10	243.08	10.0	2131.91	2108.66	2107.85	23.25	0.33%	0.582	2.84	0.63	0.30
GMI4779343	MIL1-01A	MIL1-01	90.82	10.0	2131.59	2108.84	2108.66	22.75	0.20%	0.348	1.65	0.53	0.34
GMI4779342	MIL1-01B	MIL1-01A	360.49	10.0	2130.71	2110.16	2108.84	20.55	0.37%	0.348	2.11	0.42	0.58
GMI4779341	MIL1-01C	MIL1-01B	349.55	10.0	2130.82	2111.27	2110.16	19.55	0.32%	0.348	2.35	0.45	0.52
GMI4779340	MIL1-01D	MIL1-01C	349.87	10.0	2131.00	2112.38	2111.27	18.62	0.32%	0.346	2.28	0.44	0.52
GMI4779339	MIL1-01E	MIL1-01D	272.99	10.0	2131.30	2113.25	2112.38	18.05	0.32%	0.345	2.31	0.44	0.52
GMI4481189	RAM1-01	AEXT2-08	298.83	24.0	2184.45	2169.32	2168.41	15.13	0.30%	3.815	4.74	0.49	4.93
GMI4482261	RAM1-02	RAM1-01	366.23	24.0	2184.43	2170.53	2169.32	13.90	0.33%	3.811	4.05	0.45	5.29
GMI4482262	RAM1-03	RAM1-02	276.22	24.0	2185.93	2171.38	2170.53	14.55	0.31%	3.803	4.18	0.47	4.98
GMI4483808	RAM1-04	RAM1-03	398.54	24.0	2185.57	2171.67	2171.38	13.90	0.07%	3.739	3.13	0.67	0.53
GMI4483807	RAM1-05	RAM1-04	280.95	24.0	2186.24	2173.53	2171.67	12.71	0.66%	3.739	3.50	0.37	9.15
GMI4481702	RAM1-06	RAM1-05	380.75	24.0	2186.32	2174.83	2173.53	11.49	0.34%	3.739	4.68	0.46	5.52
GMI4481677	RAM1-07	RAM1-06	395.40	24.0	2187.72	2175.63	2174.83	12.09	0.20%	3.739	3.71	0.53	3.39
GMI4481676	RAM1-08	RAM1-07	406.03	24.0	2190.86	2176.71	2175.63	14.15	0.27%	3.740	3.66	0.48	4.43
GMI4481675	RAM1-09	RAM1-08	288.41	24.0	2192.80	2179.87	2176.71	12.93	1.10%	3.739	4.95	0.32	12.84
GMI4481674	RAM1-10	RAM1-09	405.80	24.0	2203.95	2181.12	2179.87	22.83	0.31%	3.739	4.82	0.49	5.05
GMI4481665	REX1-01	RAM1-10	395.04	18.0	2209.40	2198.41	2181.12	10.99	4.38%	1.513	3.29	0.21	13.88
GMI4481664	REX1-02	REX1-01	399.60	18.0	2211.70	2200.06	2198.47	11.64	0.40%	1.511	3.66	0.40	3.13
GMI4481663	REX1-03	REX1-02	369.71	18.0	2213.20	2201.10	2200.11	12.10	0.27%	1.478	3.29	0.45	2.33
GMI4481662	REX1-04	REX1-03	316.19	18.0	2213.78	2201.93	2201.15	11.85	0.25%	1.475	3.09	0.45	2.18
GMI4482135	REX1-04A	REX1-04	382.60	10.0	2217.14	2208.58	2202.01	8.56	1.72%	0.204	2.03	0.22	1.81
GMI4482136	REX1-04B	REX1-04A	192.02	10.0	2220.15	2209.46	2208.68	10.69	0.41%	0.203	2.25	0.32	0.77
GMI4482137	REX1-04C	REX1-04B	91.11	10.0	2221.59	2209.91	2209.51	11.68	0.44%	0.198	2.27	0.30	0.82
GMI4482138	REX1-04D	REX1-04C	117.44	10.0	2223.96	2215.68	2209.91	8.28	4.91%	0.175	2.89	0.15	3.23
GMI4482139	REX1-04E	REX1-04D	399.46	10.0	2240.52	2235.73	2215.74	4.79	5.00%	0.174	5.10	0.15	3.26
GMI4482140	REX1-04F	REX1-04E	222.78	10.0	2246.68	2239.63	2235.83	7.05	1.71%	0.159	3.40	0.19	1.84
NEW6755945	REX1-04G	REX1-04F	237.00	10.0	2250.48	2243.78	2239.73	6.70	1.71%	0.158	3.39	0.19	1.85
NEW8483931	REX1-04H	REX1-04G	259.00	10.0	2255.43	2248.31	2243.78	7.11	1.75%	0.157	3.46	0.19	1.87
NEW3250837	REX1-04I	REX1-04H	239.00	10.0	2257.91	2252.50	2248.31	5.41	1.75%	0.157	3.48	0.19	1.87
GMI4482659	REX1-05	REX1-04	341.41	15.0	2221.66	2210.30	2202.08	11.36	2.41%	1.278	5.06	0.29	5.74
GMI4482711	REX1-06	REX1-05	342.08	15.0	2234.09	2221.69	2210.31	12.40	3.33%	1.264	7.21	0.26	6.99
GMI4483466	RIV1-02	FG1-01	31.65	24.0	2133.74	2121.69	2121.12	12.05	1.81%	7.391	7.41	0.58	13.90
GMI4483465	RIV1-03	RIV1-02	290.65	24.0	2138.41	2122.49	2121.69	15.92	0.27%	7.391	5.10	0.76	0.90
GMI4483464	RIV1-03A	RIV1-03	224.28	24.0	2135.06	2122.99	2122.49	12.07	0.22%	7.391	4.32	0.81	0.10
CBWTEMP07	RIV1-04	RIV1-03A	26.84	24.0	2135.08	2123.27	2122.99	11.81	1.06%	7.392	5.39	0.47	8.90
GMI4483463	RIV1-05	RIV1-04	514.27	24.0	2137.11	2124.54	2123.27	12.57	0.25%	7.350	5.24	0.83	0.52

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483462	RIV1-06	RIV1-05	354.89	24.0	2135.77	2125.48	2124.54	10.29	0.26%	7.351	4.24	0.76	0.78
GMI4483461	RIV1-07	RIV1-06	361.36	24.0	2135.24	2126.35	2125.48	8.89	0.24%	7.352	4.38	0.78	0.43
GMI4483460	RIV1-08	RIV1-07	53.94	24.0	2136.25	2126.70	2126.35	9.55	0.64%	7.377	5.09	0.62	5.33
GMI4483459	RIV1-09	RIV1-08	216.12	24.0	2137.03	2127.31	2126.70	9.72	0.28%	7.366	5.22	0.74	1.04
GMI4483458	RIV1-10	RIV1-09	408.22	24.0	2151.25	2129.30	2127.31	21.95	0.49%	7.352	5.10	0.60	3.73
GMI4483457	RIV1-11	RIV1-10	398.99	24.0	2149.09	2129.31	2129.30	19.78	0.00%	7.352	4.23	1.19	-6.85
GMI4483456	RIV1-12	RIV1-11	401.40	24.0	2146.11	2130.33	2129.31	15.78	0.26%	7.351	3.62	1.12	0.66
GMI4483455	RIV1-13	RIV1-12	399.80	24.0	2139.74	2131.32	2130.33	8.42	0.25%	7.351	4.13	1.07	0.51
GMI4483454	RIV1-14	RIV1-13	395.68	24.0	2139.38	2132.51	2131.32	6.87	0.30%	7.351	4.50	0.83	1.32
GMI4483453	RIV1-15	RIV1-14	466.24	24.0	2139.82	2133.49	2132.51	6.33	0.21%	7.391	4.37	0.84	-0.13
GMI4483452	RIV1-16	RIV1-15	423.55	24.0	2140.70	2134.55	2133.49	6.15	0.25%	7.402	4.21	0.78	0.52
GMI4483451	RIV1-17	RIV1-16	434.68	24.0	2143.90	2135.73	2134.55	8.17	0.27%	7.405	4.46	0.75	0.85
GMI4483450	RIV1-18	RIV1-17	116.76	24.0	2149.70	2136.16	2135.73	13.54	0.37%	7.353	4.71	0.69	2.25
GMI4483449	RIV1-19	RIV1-18	422.22	24.0	2148.83	2137.24	2136.16	11.59	0.26%	7.333	4.62	0.77	0.70
NEW348	RIV1-20	RIV1-19	140.58	24.0	2146.52	2137.58	2137.24	8.94	0.24%	7.333	4.32	0.79	0.36
GMI4483448	RIV1-21	RIV1-20	261.16	24.0	2146.09	2138.34	2137.58	7.75	0.29%	7.270	4.41	0.72	1.31
GMI4483447	RIV1-21A	RIV1-21	274.68	24.0	2145.16	2138.97	2138.34	6.19	0.23%	7.270	4.41	0.79	0.30
NEW370	RIV1-22	RIV1-21A	124.01	24.0	2146.38	2139.39	2138.97	6.99	0.34%	7.164	4.37	0.72	2.10
GMI4483446	RIV1-23	RIV1-22	398.65	24.0	2147.91	2140.41	2139.39	7.50	0.25%	7.166	4.49	0.75	0.82
GMI4483436	RIV1-24	RIV1-23	399.94	24.0	2148.54	2141.39	2140.41	7.15	0.25%	7.165	4.35	0.76	0.71
GMI4483443	RIV1-24A	RIV1-24	192.50	24.0	2148.88	2141.78	2141.39	7.11	0.20%	7.165	4.19	0.81	-0.12
NEW369	RIV1-25	RIV1-24A	207.50	24.0	2148.68	2142.35	2141.78	6.33	0.28%	7.146	4.20	0.75	1.19
GMI4483442	RIV1-25A	RIV1-25	285.33	24.0	2149.86	2143.01	2142.35	6.85	0.23%	7.148	4.29	0.78	0.45
NEW1175067	RIV1-26	RIV1-25A	111.96	24.0	2148.52	2143.36	2143.01	5.16	0.31%	7.107	4.31	0.74	1.74
GMI4483441	RIV1-27	RIV1-26	384.58	24.0	2149.01	2144.40	2143.36	4.61	0.27%	7.109	4.48	0.72	1.16
GMI4483440	RIV1-28	RIV1-27	281.08	24.0	2151.27	2145.29	2144.40	5.98	0.31%	7.112	4.66	0.68	1.76
NEW349	RIV1-28A	RIV1-28	17.42	24.0	2151.14	2145.46	2145.29	5.68	1.02%	7.115	5.88	0.47	8.90
GMI4483439	RIV1-29	RIV1-28A	341.70	24.0	2159.91	2146.11	2145.46	13.80	0.19%	7.116	5.03	0.85	-0.22
GMI4483438	RIV1-30	RIV1-29	247.99	24.0	2158.99	2146.73	2146.11	12.26	0.25%	7.127	4.02	0.79	0.77
NEW368	RIV1-31	RIV1-30	338.81	24.0	2160.93	2147.41	2146.73	13.52	0.20%	7.141	4.11	0.82	-0.01
NEW346	RIV1-32	RIV1-31	33.95	24.0	2158.80	2147.50	2147.41	11.30	0.26%	5.209	2.99	0.80	2.86
GMI4483437	RIV1-33	RIV1-32	26.94	24.0	2158.80	2147.65	2147.50	11.15	0.56%	5.269	3.20	0.74	6.63
NEW384	SELT1-01	STOR-10	151.67	10.0	2131.61	2113.52	2107.85	18.08	3.74%	0.421	5.94	0.26	2.55
NEW380	SELT1-02	SELT1-01	334.87	10.0	2144.76	2127.96	2113.52	16.80	4.31%	0.396	5.86	0.24	2.79
NEW601661	SELT1-03	SELT1-02	85.41	10.0	2149.37	2129.69	2127.96	19.68	2.02%	0.395	5.00	0.31	1.79
NEW1175158	SELT1-03A	SELT1-03	352.92	10.0	2148.16	2131.46	2129.69	16.70	0.50%	0.190	2.16	0.28	0.90

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NEW1175161	SELT1-04	SELT1-03	348.65	10.0	2153.35	2130.85	2129.69	22.50	0.33%	0.210	2.20	0.35	0.68
NEW1175160	SELT1-05	SELT1-04	350.61	10.0	2154.21	2132.01	2130.85	22.20	0.33%	0.165	1.76	0.29	0.72

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GMI4483806	AEXT1-01A	AEXT1-13	135.97	18.0	2155.92	2150.57	2147.97	5.35	1.91%	6.229	9.17	0.65	3.94
GMI4483805	AEXT1-02	AEXT1-01A	292.14	18.0	2160.14	2154.14	2150.57	6.00	1.22%	6.226	7.78	0.66	1.90
GMI4483813	AEXT1-13	RIV1-33	19.13	24.0	2155.86	2147.97	2147.65	7.89	1.67%	6.229	5.56	0.38	14.19
GMI4481734	AEXT2-03	AEXT1-02	272.01	18.0	2163.92	2157.04	2154.14	6.88	1.07%	6.226	7.42	0.71	1.37
GMI4481733	AEXT2-04	AEXT2-03	178.82	18.0	2164.99	2159.39	2157.04	5.60	1.31%	4.082	5.75	0.49	4.35
GMI4481732	AEXT2-05	AEXT2-04	367.29	18.0	2171.24	2164.77	2159.39	6.47	1.46%	4.078	7.47	0.48	4.83
GMI4481730	AEXT2-06	AEXT2-05	234.92	18.0	2172.81	2166.13	2164.77	6.68	0.58%	4.029	5.80	0.70	1.56
GMI4481729	AEXT2-07	AEXT2-06	364.90	18.0	2179.46	2167.91	2166.13	11.55	0.49%	4.029	4.86	0.67	1.11
GMI4481190	AEXT2-08	AEXT2-07	55.93	24.0	2180.04	2168.41	2167.91	11.63	0.89%	3.803	4.67	0.34	11.17
GMI4481731	FWN1-01	AEXT2-03	64.84	15.0	2173.20	2158.83	2157.04	14.37	2.76%	2.168	4.43	0.37	5.35
GMI4481735	FWN1-02	FWN1-01	49.95	15.0	2172.40	2161.03	2158.83	11.37	4.40%	2.167	8.89	0.32	7.33
GMI4481736	FWN1-03	FWN1-02	301.75	15.0	2178.38	2162.86	2161.03	15.51	0.61%	2.167	5.59	0.66	1.42
GMI4482263	FWN1-04	FWN1-03	185.11	18.0	2176.77	2163.05	2162.93	13.72	0.06%	2.167	2.84	0.72	-0.29
GMI4482266	FWN1-05	FWN1-04	259.48	18.0	2174.53	2163.49	2163.17	11.04	0.12%	2.164	2.67	0.69	0.42
GMI4482268	FWN1-06	FWN1-05	274.65	18.0	2171.88	2163.91	2163.59	7.97	0.12%	2.162	2.69	0.70	0.35
GMI4482267	FWN1-07	FWN1-06	320.60	18.0	2186.57	2175.30	2163.91	11.27	3.55%	2.162	3.95	0.27	11.71
GMI4480786	FWN1-08	FWN1-07	174.16	18.0	2190.85	2180.02	2175.32	10.83	2.70%	2.158	7.95	0.29	9.93
GMI4480785	FWN1-09	FWN1-08	372.47	18.0	2193.75	2180.10	2180.05	13.65	0.01%	2.156	2.64	0.88	-1.30
GMI4482752	FWN1-10	FWN1-09	338.25	18.0	2195.53	2180.51	2180.12	15.02	0.12%	2.153	2.13	0.79	0.34
GMI4482753	FWN1-11	FWN1-10	307.18	18.0	2194.50	2181.06	2180.55	13.44	0.17%	2.153	2.51	0.65	0.84
GMI4482754	FWN1-12	FWN1-11	112.85	18.0	2194.76	2181.40	2181.09	13.36	0.27%	2.154	3.08	0.56	1.70
GMI4482749	FWN1-13	FWN1-12	356.59	18.0	2196.41	2181.85	2181.46	14.56	0.11%	2.138	2.88	0.72	0.29
GMI4482119	FWN1-14	FWN1-13	187.14	18.0	2197.79	2182.14	2181.87	15.65	0.14%	2.131	2.52	0.68	0.66
GMI4482118	FWN1-15	FWN1-14	100.87	18.0	2198.84	2182.34	2182.18	16.50	0.16%	2.131	2.70	0.65	0.84
GMI4482117	FWN1-16	FWN1-15	259.71	18.0	2199.92	2182.87	2182.34	17.05	0.20%	2.131	2.88	0.59	1.18
GMI4482116	FWN1-17	FWN1-16	153.89	18.0	2197.99	2183.12	2182.96	14.87	0.10%	2.130	3.01	0.66	0.28
GMI4482115	FWN1-18	FWN1-17	244.90	18.0	2195.29	2183.53	2183.12	11.76	0.17%	2.126	2.71	0.63	0.87
GMI4481703	FWN1-19	FWN1-18	175.44	18.0	2188.13	2183.78	2183.63	4.35	0.09%	2.108	2.78	0.69	0.04
GMI4480832	FWN1-20	FWN1-19	377.23	18.0	2194.77	2184.09	2183.80	10.68	0.08%	2.108	2.37	0.78	-0.07
GMI4481704	FWN1-21	FWN1-20	390.82	18.0	2188.59	2184.55	2184.18	4.04	0.09%	2.108	2.35	0.75	0.15
GMI4481705	FWN1-22	FWN1-21	258.18	18.0	2210.36	2194.87	2184.62	15.49	3.97%	2.110	3.95	0.26	12.55

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GMI4481706	FWN1-22A	FWN1-22	183.47	18.0	2198.94	2196.02	2195.36	2.92	0.36%	1.588	3.61	0.42	2.82
GMI4779372	FWN1-22B	FWN1-22A	171.73	18.0	2202.52	2196.52	2196.02	6.00	0.29%	1.590	3.34	0.45	2.39
GMI4779371	FWN1-22C	FWN1-22B	129.05	18.0	2203.46	2196.91	2196.52	6.55	0.30%	1.584	3.24	0.44	2.45
GMI4779370	FWN1-22D	FWN1-22C	235.47	18.0	2211.95	2199.45	2196.91	12.50	1.08%	1.585	4.07	0.31	6.05
GMI4779362	FWN1-22E	FWN1-22D	107.62	18.0	2203.39	2200.19	2199.45	3.20	0.69%	1.582	4.62	0.37	4.52
GMI4779361	FWN1-22F	FWN1-22E	98.56	18.0	2211.11	2201.95	2200.19	9.16	1.79%	1.571	4.98	0.27	8.26
GMI4481710	FWN1-22G	FWN1-22F	253.95	18.0	2217.24	2206.49	2201.95	10.75	1.79%	1.572	6.29	0.27	8.26
GMI4482106	FWN1-23	FWN1-22	251.49	12.0	2226.98	2218.78	2204.32	8.20	5.75%	0.528	7.26	0.20	5.46
GMI4482108	FWN1-23A	FWN1-22G	250.15	18.0	2224.45	2208.22	2207.91	16.23	0.12%	1.567	2.87	0.58	1.02
GMI4482109	FWN1-23B	FWN1-23A	350.01	18.0	2230.51	2208.74	2208.32	21.77	0.12%	1.589	2.52	0.58	0.96
GMI4482744	FWN1-23C	FWN1-23B	334.19	18.0	2232.51	2209.24	2208.84	23.27	0.12%	1.601	2.51	0.58	0.94
GMI4482252	FWN1-23D	FWN1-23C	333.56	18.0	2227.91	2209.74	2209.34	18.17	0.12%	1.616	2.53	0.59	0.93
GMI4482253	FWN1-23E	FWN1-23D	354.73	18.0	2228.86	2210.26	2209.84	18.60	0.12%	1.641	2.53	0.59	0.90
GMI4482254	FWN1-23F	FWN1-23E	250.99	18.0	2231.64	2210.66	2210.36	20.98	0.12%	1.664	2.57	0.59	0.89
GMI4482255	FWN1-23G	FWN1-23F	262.27	18.0	2230.10	2211.08	2210.76	19.02	0.12%	1.679	2.60	0.59	0.89
GMI4482251	FWN1-23H	FWN1-23G	337.71	18.0	2230.32	2211.58	2211.18	18.74	0.12%	1.743	2.62	0.62	0.80
GMI4481019	FWN1-24	FWN1-23	393.07	12.0	2235.88	2220.04	2219.18	15.84	0.22%	0.527	2.42	0.51	0.64
NEW253	HUT-1	RIV1-31	74.82	18.0	2167.08	2148.37	2147.77	18.71	0.80%	1.366	3.49	0.44	5.22
NEW252	HUT-2	HUT-1	336.26	18.0	2179.89	2165.73	2148.37	14.16	5.16%	0.999	5.59	0.17	15.72
NEW251	HUT-3	HUT-2	90.36	18.0	2186.18	2169.82	2165.73	16.36	4.53%	1.000	7.73	0.18	14.65
NEW250	HUT-4	HUT-3	288.14	18.0	2185.67	2172.11	2169.82	13.56	0.79%	0.999	4.14	0.26	5.56
NEW249	HUT-5	HUT-4	47.44	18.0	2186.03	2172.66	2172.11	13.37	1.16%	1.008	4.47	0.24	6.90
NEW248	HUT-6	HUT-5	399.76	18.0	2192.23	2175.88	2172.66	16.35	0.81%	1.008	4.17	0.26	5.59
NEW247	HUT-7	HUT-6	399.68	18.0	2195.65	2179.22	2175.88	16.43	0.84%	1.030	4.90	0.27	5.69
NEW246	HUT-8	HUT-7	311.58	18.0	2193.99	2181.64	2179.22	12.35	0.78%	1.022	4.13	0.27	5.46
CDT-77	JCT-232	JCT-234	181.99	15.0	2273.70	2244.68	2244.41	29.02	0.15%	1.016	2.68	0.56	0.73
CDT-79	JCT-234	JCT-236	245.16	15.0	2273.34	2244.21	2243.84	29.13	0.15%	1.017	2.62	0.57	0.74
CDT-81	JCT-236	JCT-238	274.39	15.0	2272.51	2243.64	2243.23	28.87	0.15%	1.058	2.63	0.59	0.69
CDT-83	JCT-238	JCT-240	264.62	15.0	2272.29	2243.03	2242.63	29.26	0.15%	1.090	2.67	0.59	0.67
CDT-85	JCT-240	JCT-242	358.74	15.0	2271.31	2242.43	2241.89	28.88	0.15%	1.076	2.65	0.61	0.68
CDT-87	JCT-242	JCT-244	236.50	15.0	2269.62	2241.59	2241.24	28.03	0.15%	1.077	2.67	0.59	0.66
CDT-89	JCT-244	JCT-246	281.29	15.0	2271.93	2241.04	2240.61	30.89	0.15%	1.077	2.68	0.59	0.69
CDT-91	JCT-246	JCT-248	180.59	15.0	2270.25	2240.41	2240.14	29.84	0.15%	1.087	2.68	0.58	0.66
CDT-93	JCT-248	JCT-250	324.34	15.0	2272.41	2239.94	2239.46	32.47	0.15%	1.081	2.66	0.61	0.66
CDT-95	JCT-250	JCT-252	295.17	15.0	2275.05	2239.16	2238.71	35.89	0.15%	1.079	2.69	0.60	0.69
CDT-97	JCT-252	JCT-254	214.60	15.0	2272.77	2238.41	2238.09	34.36	0.15%	1.133	2.68	0.60	0.61

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CDT-99	JCT-254	JCT-256	302.11	15.0	2268.44	2237.89	2237.44	30.55	0.15%	1.130	2.71	0.62	0.62
CDT-101	JCT-256	JCT-258	306.26	15.0	2266.41	2237.14	2236.68	29.27	0.15%	1.140	2.72	0.62	0.61
CDT-103	JCT-258	JCT-260	225.71	15.0	2263.95	2236.38	2236.04	27.57	0.15%	1.141	2.66	0.60	0.61
CDT-105	JCT-260	JCT-262	275.02	15.0	2262.26	2235.84	2235.43	26.42	0.15%	1.161	2.68	0.62	0.59
CDT-107	JCT-262	JCT-264	192.37	15.0	2260.36	2235.23	2234.94	25.13	0.15%	1.193	2.75	0.61	0.56
CDT-109	JCT-264	JCT-266	233.34	15.0	2258.90	2234.74	2234.39	24.16	0.15%	1.194	2.70	0.62	0.56
CDT-111	JCT-266	JCT-268	256.96	15.0	2256.40	2234.19	2233.81	22.21	0.15%	1.194	2.69	0.63	0.55
CDT-113	JCT-268	JCT-270	235.70	15.0	2254.97	2233.61	2233.25	21.36	0.15%	1.224	2.68	0.63	0.54
CDT-115	JCT-270	JCT-272	350.97	15.0	2254.73	2233.05	2232.53	21.68	0.15%	1.221	2.74	0.66	0.52
CDT-117	JCT-272	JCT-274	348.47	15.0	2254.10	2232.23	2231.70	21.87	0.15%	1.242	2.77	0.66	0.52
CDT-119	JCT-274	JCT-276	350.62	15.0	2250.10	2231.40	2230.88	18.70	0.15%	1.241	2.75	0.67	0.50
CDT-121	JCT-276	JCT-278	349.97	15.0	2248.19	2230.58	2230.05	17.61	0.15%	1.270	2.78	0.67	0.49
CDT-123	JCT-278	JCT-280	325.86	15.0	2243.92	2229.75	2229.26	14.17	0.15%	1.269	2.79	0.67	0.49
CDT-125	JCT-280	JCT-282	268.92	15.0	2239.77	2228.96	2228.56	10.81	0.15%	1.269	2.82	0.66	0.48
CDT-127	JCT-282	JCT-284	271.05	15.0	2237.23	2228.36	2225.38	8.87	1.10%	1.269	5.05	0.35	3.47
CDT-129	JCT-284	JCT-286	251.17	15.0	2233.43	2225.18	2222.41	8.25	1.10%	1.270	5.05	0.35	3.48
CDT-131	JCT-286	JCT-288	232.66	15.0	2230.64	2222.21	2219.66	8.43	1.10%	1.271	5.04	0.36	3.46
CDT-133	JCT-288	JCT-290	208.33	18.0	2227.88	2216.60	2216.35	11.28	0.12%	1.428	2.71	0.54	1.12
CDT-135	JCT-290	JCT-292	206.94	18.0	2227.04	2216.15	2215.90	10.89	0.12%	1.429	2.74	0.54	1.13
CDT-137	JCT-292	JCT-294	146.53	18.0	2224.28	2215.70	2215.53	8.58	0.12%	1.429	2.48	0.53	1.08
CDT-139	JCT-294	JCT-296	223.29	18.0	2222.19	2215.43	2215.16	6.76	0.12%	1.445	2.81	0.54	1.11
CDT-141	JCT-296	JCT-298	168.58	18.0	2229.61	2212.27	2211.88	17.34	0.23%	1.487	2.76	0.57	1.06
CDT-191	JCT-340	JCT-342	333.79	8.0	2240.82	2224.93	2223.43	15.89	0.45%	0.201	2.27	0.41	0.37
CDT-193	JCT-342	JCT-344	295.17	8.0	2240.80	2223.43	2222.10	17.37	0.45%	0.209	2.29	0.42	0.36
CDT-195	JCT-344	JCT-346	304.10	8.0	2240.45	2222.10	2220.73	18.35	0.45%	0.217	2.25	0.43	0.35
CDT-197	JCT-346	JCT-348	295.27	8.0	2239.12	2220.73	2219.40	18.39	0.45%	0.242	2.36	0.46	0.33
CDT-199	JCT-348	JCT-288	437.16	8.0	2237.71	2219.40	2217.44	18.31	0.45%	0.249	2.50	0.47	0.32
CDT-289	JCT-438	JCT-440	299.60	8.0	2244.72	2227.15	2225.80	17.57	0.45%	0.216	2.31	0.43	0.35
CDT-291	JCT-440	JCT-442	312.62	8.0	2243.23	2225.80	2224.40	17.43	0.45%	0.224	2.33	0.44	0.34
CDT-293	JCT-442	JCT-444	308.16	8.0	2241.79	2224.40	2223.01	17.39	0.45%	0.232	2.36	0.45	0.34
CDT-295	JCT-444	JCT-446	286.46	8.0	2240.11	2223.01	2221.72	17.10	0.45%	0.241	2.35	0.45	0.33
CDT-297	JCT-446	FWN1-24	299.40	8.0	2234.96	2221.72	2220.37	13.24	0.45%	0.249	2.51	0.47	0.32
GMI4779338	MIL1-01	STOR-10	243.08	10.0	2131.91	2108.66	2107.85	23.25	0.33%	0.416	2.60	0.51	0.47
GMI4779343	MIL1-01A	MIL1-01	90.82	10.0	2131.59	2108.84	2108.66	22.75	0.20%	0.262	1.62	0.43	0.42
GMI4779342	MIL1-01B	MIL1-01A	360.49	10.0	2130.71	2110.16	2108.84	20.55	0.37%	0.262	2.00	0.36	0.67
GMI4779341	MIL1-01C	MIL1-01B	349.55	10.0	2130.82	2111.27	2110.16	19.55	0.32%	0.261	2.18	0.38	0.60

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4779340	MIL1-01D	MIL1-01C	349.87	10.0	2131.00	2112.38	2111.27	18.62	0.32%	0.259	2.12	0.38	0.61
GMI4779339	MIL1-01E	MIL1-01D	272.99	10.0	2131.30	2113.25	2112.38	18.05	0.32%	0.258	2.13	0.38	0.61
GMI4481189	RAM1-01	AEXT2-08	298.83	24.0	2184.45	2169.32	2168.41	15.13	0.30%	3.803	4.74	0.49	4.94
GMI4482261	RAM1-02	RAM1-01	366.23	24.0	2184.43	2170.53	2169.32	13.90	0.33%	3.800	4.04	0.45	5.31
GMI4482262	RAM1-03	RAM1-02	276.22	24.0	2185.93	2171.38	2170.53	14.55	0.31%	3.791	4.18	0.47	5.00
GMI4483808	RAM1-04	RAM1-03	398.54	24.0	2185.57	2171.67	2171.38	13.90	0.07%	3.727	3.13	0.67	0.55
GMI4483807	RAM1-05	RAM1-04	280.95	24.0	2186.24	2173.53	2171.67	12.71	0.66%	3.728	3.50	0.37	9.16
GMI4481702	RAM1-06	RAM1-05	380.75	24.0	2186.32	2174.83	2173.53	11.49	0.34%	3.728	4.68	0.46	5.53
GMI4481677	RAM1-07	RAM1-06	395.40	24.0	2187.72	2175.63	2174.83	12.09	0.20%	3.728	3.71	0.53	3.40
GMI4481676	RAM1-08	RAM1-07	406.03	24.0	2190.86	2176.71	2175.63	14.15	0.27%	3.728	3.65	0.47	4.44
GMI4481675	RAM1-09	RAM1-08	288.41	24.0	2192.80	2179.87	2176.71	12.93	1.10%	3.727	4.94	0.32	12.85
GMI4481674	RAM1-10	RAM1-09	405.80	24.0	2203.95	2181.12	2179.87	22.83	0.31%	3.727	4.82	0.49	5.06
GMI4481665	REX1-01	RAM1-10	395.04	18.0	2209.40	2198.41	2181.12	10.99	4.38%	1.499	3.26	0.21	13.90
GMI4481664	REX1-02	REX1-01	399.60	18.0	2211.70	2200.06	2198.47	11.64	0.40%	1.498	3.65	0.39	3.14
GMI4481663	REX1-03	REX1-02	369.71	18.0	2213.20	2201.10	2200.11	12.10	0.27%	1.465	3.28	0.45	2.34
GMI4481662	REX1-04	REX1-03	316.19	18.0	2213.78	2201.93	2201.15	11.85	0.25%	1.461	3.09	0.45	2.19
GMI4482135	REX1-04A	REX1-04	382.60	10.0	2217.14	2208.58	2202.01	8.56	1.72%	0.204	2.05	0.22	1.81
GMI4482136	REX1-04B	REX1-04A	192.02	10.0	2220.15	2209.46	2208.68	10.69	0.41%	0.203	2.25	0.32	0.77
GMI4482137	REX1-04C	REX1-04B	91.11	10.0	2221.59	2209.91	2209.51	11.68	0.44%	0.198	2.27	0.30	0.82
GMI4482138	REX1-04D	REX1-04C	117.44	10.0	2223.96	2215.68	2209.91	8.28	4.91%	0.175	2.89	0.15	3.23
GMI4482139	REX1-04E	REX1-04D	399.46	10.0	2240.52	2235.73	2215.74	4.79	5.00%	0.174	5.10	0.15	3.26
GMI4482140	REX1-04F	REX1-04E	222.78	10.0	2246.68	2239.63	2235.83	7.05	1.71%	0.159	3.40	0.19	1.84
NEW6755945	REX1-04G	REX1-04F	237.00	10.0	2250.48	2243.78	2239.73	6.70	1.71%	0.158	3.39	0.19	1.85
NEW8483931	REX1-04H	REX1-04G	259.00	10.0	2255.43	2248.31	2243.78	7.12	1.75%	0.157	3.40	0.19	1.87
NEW3250837	REX1-04I	REX1-04H	239.00	10.0	2257.91	2252.50	2248.31	5.41	1.75%	0.157	3.51	0.19	1.87
GMI4482659	REX1-05	REX1-04	341.41	15.0	2221.66	2210.30	2202.08	11.36	2.41%	1.264	5.04	0.29	5.75
GMI4482711	REX1-06	REX1-05	342.08	15.0	2234.09	2221.69	2210.31	12.40	3.33%	1.250	7.19	0.26	7.00
GMI4483466	RIV1-02	FG1-01	31.65	24.0	2133.74	2121.69	2121.12	12.05	1.80%	7.202	7.37	0.57	14.09
GMI4483465	RIV1-03	RIV1-02	290.65	24.0	2138.41	2122.49	2121.69	15.92	0.28%	7.202	5.08	0.75	1.10
GMI4483464	RIV1-03A	RIV1-03	224.28	24.0	2135.06	2122.99	2122.49	12.07	0.22%	7.202	4.30	0.79	0.28
CBWTEMP07	RIV1-04	RIV1-03A	26.84	24.0	2135.08	2123.27	2122.99	11.81	1.04%	7.202	5.37	0.47	9.06
GMI4483463	RIV1-05	RIV1-04	514.27	24.0	2137.11	2124.54	2123.27	12.57	0.25%	7.159	5.22	0.81	0.71
GMI4483462	RIV1-06	RIV1-05	354.89	24.0	2135.77	2125.48	2124.54	10.29	0.26%	7.160	4.24	0.74	0.99
GMI4483461	RIV1-07	RIV1-06	361.36	24.0	2135.24	2126.35	2125.48	8.89	0.24%	7.161	4.37	0.77	0.61
GMI4483460	RIV1-08	RIV1-07	53.94	24.0	2136.25	2126.70	2126.35	9.55	0.65%	7.161	5.10	0.58	5.60
GMI4483459	RIV1-09	RIV1-08	216.12	24.0	2137.03	2127.31	2126.70	9.71	0.28%	7.161	5.02	0.73	1.25

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483458	RIV1-10	RIV1-09	408.22	24.0	2151.25	2129.30	2127.31	21.95	0.49%	7.162	5.07	0.59	3.91
GMI4483457	RIV1-11	RIV1-10	398.99	24.0	2149.09	2129.31	2129.30	19.78	0.00%	7.162	4.15	1.16	-6.50
GMI4483456	RIV1-12	RIV1-11	401.40	24.0	2146.11	2130.33	2129.31	15.78	0.25%	7.162	3.53	1.07	0.84
GMI4483455	RIV1-13	RIV1-12	399.80	24.0	2139.74	2131.32	2130.33	8.42	0.25%	7.162	4.13	0.94	0.70
GMI4483454	RIV1-14	RIV1-13	395.68	24.0	2139.38	2132.51	2131.32	6.87	0.30%	7.188	4.51	0.70	1.50
GMI4483453	RIV1-15	RIV1-14	466.24	24.0	2139.82	2133.49	2132.51	6.33	0.21%	7.191	4.36	0.82	0.07
GMI4483452	RIV1-16	RIV1-15	423.55	24.0	2140.70	2134.55	2133.49	6.15	0.25%	7.190	4.19	0.76	0.73
GMI4483451	RIV1-17	RIV1-16	434.68	24.0	2143.90	2135.73	2134.55	8.17	0.27%	7.194	4.46	0.73	1.06
GMI4483450	RIV1-18	RIV1-17	116.76	24.0	2149.70	2136.16	2135.73	13.54	0.37%	7.141	4.70	0.68	2.47
GMI4483449	RIV1-19	RIV1-18	422.22	24.0	2148.83	2137.24	2136.16	11.59	0.26%	7.127	4.61	0.75	0.89
NEW348	RIV1-20	RIV1-19	140.58	24.0	2146.52	2137.58	2137.24	8.93	0.24%	7.129	4.30	0.77	0.63
GMI4483448	RIV1-21	RIV1-20	261.16	24.0	2146.09	2138.34	2137.58	7.75	0.29%	7.072	4.40	0.71	1.48
GMI4483447	RIV1-21A	RIV1-21	274.68	24.0	2145.16	2138.97	2138.34	6.19	0.23%	7.074	4.40	0.77	0.51
NEW370	RIV1-22	RIV1-21A	124.01	24.0	2146.38	2139.39	2138.97	6.99	0.34%	6.993	4.38	0.70	2.25
GMI4483446	RIV1-23	RIV1-22	398.65	24.0	2147.91	2140.41	2139.39	7.50	0.26%	6.999	4.49	0.74	1.01
GMI4483436	RIV1-24	RIV1-23	399.94	24.0	2148.54	2141.39	2140.41	7.15	0.25%	7.002	4.34	0.75	0.85
GMI4483443	RIV1-24A	RIV1-24	192.50	24.0	2148.88	2141.78	2141.39	7.10	0.20%	7.005	4.18	0.80	0.09
NEW369	RIV1-25	RIV1-24A	207.50	24.0	2148.68	2142.35	2141.78	6.33	0.27%	6.996	4.20	0.74	1.31
GMI4483442	RIV1-25A	RIV1-25	285.33	24.0	2149.86	2143.01	2142.35	6.85	0.23%	7.004	4.29	0.77	0.61
NEW1175067	RIV1-26	RIV1-25A	111.96	24.0	2148.52	2143.36	2143.01	5.15	0.31%	6.975	4.32	0.72	1.88
GMI4483441	RIV1-27	RIV1-26	384.58	24.0	2149.01	2144.40	2143.36	4.61	0.27%	6.986	4.49	0.71	1.27
GMI4483440	RIV1-28	RIV1-27	281.08	24.0	2151.27	2145.29	2144.40	5.98	0.32%	6.994	4.66	0.68	1.90
NEW349	RIV1-28A	RIV1-28	17.42	24.0	2151.14	2145.46	2145.29	5.68	0.98%	6.995	5.86	0.47	8.84
GMI4483439	RIV1-29	RIV1-28A	341.70	24.0	2159.91	2146.11	2145.46	13.80	0.19%	6.996	5.00	0.84	-0.10
GMI4483438	RIV1-30	RIV1-29	247.99	24.0	2158.99	2146.73	2146.11	12.26	0.25%	7.006	4.01	0.77	0.91
NEW368	RIV1-31	RIV1-30	338.81	24.0	2160.93	2147.41	2146.73	13.52	0.20%	7.014	4.08	0.81	0.10
NEW346	RIV1-32	RIV1-31	33.95	24.0	2158.80	2147.50	2147.41	11.30	0.27%	6.271	3.68	0.80	1.79
GMI4483437	RIV1-33	RIV1-32	26.94	24.0	2158.80	2147.65	2147.50	11.15	0.56%	6.244	3.82	0.74	5.65
NEW384	SELT1-01	STOR-10	151.67	10.0	2131.61	2113.52	2107.85	18.09	3.74%	0.295	5.36	0.21	2.67
NEW380	SELT1-02	SELT1-01	334.87	10.0	2144.76	2127.96	2113.52	16.80	4.31%	0.275	5.25	0.20	2.91
NEW601661	SELT1-03	SELT1-02	85.41	10.0	2149.37	2129.69	2127.96	19.68	2.03%	0.274	4.54	0.26	1.91
NEW1175158	SELT1-03A	SELT1-03	352.92	10.0	2148.16	2131.46	2129.69	16.70	0.50%	0.131	1.95	0.24	0.96
NEW1175161	SELT1-04	SELT1-03	348.65	10.0	2153.35	2130.85	2129.69	22.50	0.33%	0.142	1.92	0.28	0.74
NEW1175160	SELT1-05	SELT1-04	350.61	10.0	2154.21	2132.01	2130.85	22.20	0.33%	0.114	1.57	0.25	0.77

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483806	AEXT1-01A	AEXT1-13	135.97	18.0	2155.92	2150.57	2147.97	5.35	1.91%	7.271	9.42	0.70	2.90
GMI4483805	AEXT1-02	AEXT1-01A	292.14	18.0	2160.14	2154.14	2150.57	6.00	1.22%	6.834	7.90	0.71	1.30
GMI4483813	AEXT1-13	RIV1-33	19.13	24.0	2155.86	2147.97	2147.65	7.89	1.67%	7.163	5.46	0.65	13.26
GMI4481734	AEXT2-03	AEXT1-02	272.01	18.0	2163.92	2157.04	2154.14	6.88	1.07%	6.835	7.52	0.77	0.76
GMI4481733	AEXT2-04	AEXT2-03	178.82	18.0	2164.99	2159.39	2157.04	5.60	1.31%	4.098	5.64	0.49	4.33
GMI4481732	AEXT2-05	AEXT2-04	367.29	18.0	2171.24	2164.77	2159.39	6.47	1.46%	4.094	7.47	0.48	4.81
GMI4481730	AEXT2-06	AEXT2-05	234.92	18.0	2172.81	2166.13	2164.77	6.68	0.58%	4.045	5.80	0.70	1.54
GMI4481729	AEXT2-07	AEXT2-06	364.90	18.0	2179.46	2167.91	2166.13	11.55	0.49%	4.045	4.86	0.67	1.09
GMI4481190	AEXT2-08	AEXT2-07	55.93	24.0	2180.04	2168.41	2167.91	11.63	0.89%	3.818	4.67	0.34	11.16
GMI4481731	FWN1-01	AEXT2-03	64.84	15.0	2173.20	2158.83	2157.04	14.37	2.76%	2.755	5.02	0.42	4.76
GMI4481735	FWN1-02	FWN1-01	49.95	15.0	2172.40	2161.03	2158.83	11.37	4.40%	2.755	9.49	0.37	6.74
GMI4481736	FWN1-03	FWN1-02	301.75	15.0	2178.38	2162.86	2161.03	15.51	0.61%	2.755	5.81	0.78	0.83
GMI4482263	FWN1-04	FWN1-03	185.11	18.0	2176.77	2163.05	2162.93	13.72	0.06%	2.755	3.02	0.84	-0.88
GMI4482266	FWN1-05	FWN1-04	259.48	18.0	2174.53	2163.49	2163.17	11.04	0.12%	2.751	2.83	0.83	-0.17
GMI4482268	FWN1-06	FWN1-05	274.65	18.0	2171.88	2163.91	2163.59	7.97	0.12%	2.749	2.81	0.84	-0.24
GMI4482267	FWN1-07	FWN1-06	320.60	18.0	2186.57	2175.30	2163.91	11.27	3.55%	2.749	4.10	0.30	11.12
GMI4480786	FWN1-08	FWN1-07	174.16	18.0	2190.85	2180.02	2175.32	10.83	2.70%	2.745	8.50	0.33	9.34
GMI4480785	FWN1-09	FWN1-08	372.47	18.0	2193.75	2180.10	2180.05	13.65	0.01%	2.743	2.93	1.01	-1.89
GMI4482752	FWN1-10	FWN1-09	338.25	18.0	2195.53	2180.51	2180.12	15.02	0.12%	2.739	2.40	1.05	-0.24
GMI4482753	FWN1-11	FWN1-10	307.18	18.0	2194.50	2181.06	2180.55	13.44	0.17%	2.737	2.53	0.93	0.26
GMI4482754	FWN1-12	FWN1-11	112.85	18.0	2194.76	2181.40	2181.09	13.36	0.27%	2.742	3.08	0.79	1.11
GMI4482749	FWN1-13	FWN1-12	356.59	18.0	2196.41	2181.85	2181.46	14.56	0.11%	2.743	2.94	0.86	-0.31
GMI4482119	FWN1-14	FWN1-13	187.14	18.0	2197.79	2182.14	2181.87	15.65	0.14%	2.744	2.69	0.84	0.05
GMI4482118	FWN1-15	FWN1-14	100.87	18.0	2198.84	2182.34	2182.18	16.50	0.16%	2.745	2.80	0.80	0.22
GMI4482117	FWN1-16	FWN1-15	259.71	18.0	2199.92	2182.87	2182.34	17.05	0.20%	2.747	2.96	0.72	0.56
GMI4482116	FWN1-17	FWN1-16	153.89	18.0	2197.99	2183.12	2182.96	14.87	0.10%	2.747	3.12	0.78	-0.34
GMI4482115	FWN1-18	FWN1-17	244.90	18.0	2195.29	2183.53	2183.12	11.76	0.17%	2.744	2.88	0.77	0.25
GMI4481703	FWN1-19	FWN1-18	175.44	18.0	2188.13	2183.78	2183.63	4.35	0.09%	2.725	2.91	0.83	-0.57
GMI4480832	FWN1-20	FWN1-19	377.23	18.0	2194.77	2184.09	2183.80	10.68	0.08%	2.725	2.55	0.95	-0.69
GMI4481704	FWN1-21	FWN1-20	390.82	18.0	2188.59	2184.55	2184.18	4.04	0.09%	2.725	2.46	0.97	-0.46
GMI4481705	FWN1-22	FWN1-21	258.18	18.0	2210.36	2194.87	2184.62	15.49	3.97%	2.729	3.98	0.29	11.93

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4481706	FWN1-22A	FWN1-22	183.47	18.0	2198.94	2196.02	2195.36	2.92	0.36%	2.057	3.88	0.49	2.35
GMI4779372	FWN1-22B	FWN1-22A	171.73	18.0	2202.52	2196.52	2196.02	6.00	0.29%	2.057	3.55	0.52	1.92
GMI4779371	FWN1-22C	FWN1-22B	129.05	18.0	2203.46	2196.91	2196.52	6.55	0.30%	2.047	3.45	0.51	1.99
GMI4779370	FWN1-22D	FWN1-22C	235.47	18.0	2211.95	2199.45	2196.91	12.50	1.08%	2.046	4.33	0.35	5.59
GMI4779362	FWN1-22E	FWN1-22D	107.62	18.0	2203.39	2200.19	2199.45	3.20	0.69%	2.040	4.93	0.43	4.06
GMI4779361	FWN1-22F	FWN1-22E	98.56	18.0	2211.11	2201.95	2200.19	9.16	1.79%	2.023	5.30	0.31	7.81
GMI4481710	FWN1-22G	FWN1-22F	253.95	18.0	2217.24	2206.49	2201.95	10.75	1.79%	2.022	6.75	0.31	7.81
GMI4482106	FWN1-23	FWN1-22	251.49	12.0	2226.98	2218.78	2204.32	8.20	5.75%	0.682	7.81	0.23	5.31
GMI4482108	FWN1-23A	FWN1-22G	250.15	18.0	2224.45	2208.22	2207.91	16.23	0.12%	2.016	3.11	0.66	0.57
GMI4482109	FWN1-23B	FWN1-23A	350.01	18.0	2230.51	2208.74	2208.32	21.77	0.12%	2.016	2.67	0.68	0.53
GMI4482744	FWN1-23C	FWN1-23B	334.19	18.0	2232.51	2209.24	2208.84	23.27	0.12%	2.016	2.64	0.67	0.53
GMI4482252	FWN1-23D	FWN1-23C	333.56	18.0	2227.91	2209.74	2209.34	18.17	0.12%	2.033	2.65	0.68	0.51
GMI4482253	FWN1-23E	FWN1-23D	354.73	18.0	2228.86	2210.26	2209.84	18.60	0.12%	2.059	2.66	0.68	0.48
GMI4482254	FWN1-23F	FWN1-23E	250.99	18.0	2231.64	2210.66	2210.36	20.98	0.12%	2.084	2.69	0.67	0.47
GMI4482255	FWN1-23G	FWN1-23F	262.27	18.0	2230.10	2211.08	2210.76	19.02	0.12%	2.102	2.73	0.68	0.47
GMI4482251	FWN1-23H	FWN1-23G	337.71	18.0	2230.32	2211.58	2211.18	18.74	0.12%	2.167	2.74	0.70	0.37
GMI4481019	FWN1-24	FWN1-23	393.07	12.0	2235.88	2220.04	2219.18	15.84	0.22%	0.680	2.59	0.60	0.49
NEW253	HUT-1	RIV1-31	74.82	18.0	2167.08	2148.37	2147.77	18.71	0.80%	1.475	3.32	0.58	5.11
NEW252	HUT-2	HUT-1	336.26	18.0	2179.89	2165.73	2148.37	14.16	5.16%	1.054	5.65	0.17	15.67
NEW251	HUT-3	HUT-2	90.36	18.0	2186.18	2169.82	2165.73	16.36	4.53%	1.053	7.84	0.18	14.60
NEW250	HUT-4	HUT-3	288.14	18.0	2185.67	2172.11	2169.82	13.56	0.79%	1.052	4.20	0.27	5.51
NEW249	HUT-5	HUT-4	47.44	18.0	2186.03	2172.66	2172.11	13.37	1.16%	1.051	4.50	0.25	6.86
NEW248	HUT-6	HUT-5	399.76	18.0	2192.23	2175.88	2172.66	16.35	0.81%	1.049	4.22	0.27	5.55
NEW247	HUT-7	HUT-6	399.68	18.0	2195.65	2179.22	2175.88	16.43	0.84%	1.057	4.72	0.27	5.67
NEW246	HUT-8	HUT-7	311.58	18.0	2193.99	2181.64	2179.22	12.35	0.78%	1.052	4.16	0.28	5.43
CDT-77	JCT-232	JCT-234	181.99	15.0	2273.70	2244.68	2244.41	29.02	0.15%	1.016	2.68	0.56	0.73
CDT-79	JCT-234	JCT-236	245.16	15.0	2273.34	2244.21	2243.84	29.13	0.15%	1.017	2.57	0.57	0.74
CDT-81	JCT-236	JCT-238	274.39	15.0	2272.51	2243.64	2243.23	28.87	0.15%	1.092	2.61	0.60	0.66
CDT-83	JCT-238	JCT-240	264.62	15.0	2272.29	2243.03	2242.63	29.26	0.15%	1.150	2.69	0.61	0.61
CDT-85	JCT-240	JCT-242	358.74	15.0	2271.31	2242.43	2241.89	28.88	0.15%	1.137	2.69	0.63	0.62
CDT-87	JCT-242	JCT-244	236.50	15.0	2269.62	2241.59	2241.24	28.03	0.15%	1.139	2.69	0.61	0.60
CDT-89	JCT-244	JCT-246	281.29	15.0	2271.93	2241.04	2240.61	30.89	0.15%	1.139	2.70	0.61	0.63
CDT-91	JCT-246	JCT-248	180.59	15.0	2270.25	2240.41	2240.14	29.84	0.15%	1.158	2.72	0.60	0.59
CDT-93	JCT-248	JCT-250	324.34	15.0	2272.41	2239.94	2239.46	32.47	0.15%	1.152	2.71	0.63	0.59
CDT-95	JCT-250	JCT-252	295.17	15.0	2275.05	2239.16	2238.71	35.89	0.15%	1.150	2.74	0.62	0.62
CDT-97	JCT-252	JCT-254	214.60	15.0	2272.77	2238.41	2238.09	34.36	0.15%	1.250	2.72	0.63	0.50

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CDT-99	JCT-254	JCT-256	302.11	15.0	2268.44	2237.89	2237.44	30.55	0.15%	1.246	2.79	0.66	0.50
CDT-101	JCT-256	JCT-258	306.26	15.0	2266.41	2237.14	2236.68	29.27	0.15%	1.267	2.80	0.66	0.49
CDT-103	JCT-258	JCT-260	225.71	15.0	2263.95	2236.38	2236.04	27.57	0.15%	1.268	2.71	0.64	0.49
CDT-105	JCT-260	JCT-262	275.02	15.0	2262.26	2235.84	2235.43	26.42	0.15%	1.304	2.72	0.66	0.44
CDT-107	JCT-262	JCT-264	192.37	15.0	2260.36	2235.23	2234.94	25.13	0.15%	1.363	2.82	0.66	0.39
CDT-109	JCT-264	JCT-266	233.34	15.0	2258.90	2234.74	2234.39	24.16	0.15%	1.364	2.77	0.67	0.39
CDT-111	JCT-266	JCT-268	256.96	15.0	2256.40	2234.19	2233.81	22.21	0.15%	1.364	2.74	0.68	0.38
CDT-113	JCT-268	JCT-270	235.70	15.0	2254.97	2233.61	2233.25	21.36	0.15%	1.419	2.75	0.68	0.35
CDT-115	JCT-270	JCT-272	350.97	15.0	2254.73	2233.05	2232.53	21.68	0.15%	1.420	2.84	0.72	0.32
CDT-117	JCT-272	JCT-274	348.47	15.0	2254.10	2232.23	2231.70	21.87	0.15%	1.463	2.88	0.73	0.30
CDT-119	JCT-274	JCT-276	350.62	15.0	2250.10	2231.40	2230.88	18.70	0.15%	1.463	2.84	0.73	0.28
CDT-121	JCT-276	JCT-278	349.97	15.0	2248.19	2230.58	2230.05	17.61	0.15%	1.522	2.91	0.75	0.24
CDT-123	JCT-278	JCT-280	325.86	15.0	2243.92	2229.75	2229.26	14.17	0.15%	1.519	2.93	0.75	0.23
CDT-125	JCT-280	JCT-282	268.92	15.0	2239.77	2228.96	2228.56	10.81	0.15%	1.516	2.97	0.74	0.23
CDT-127	JCT-282	JCT-284	271.05	15.0	2237.23	2228.36	2225.38	8.87	1.10%	1.516	5.30	0.39	3.23
CDT-129	JCT-284	JCT-286	251.17	15.0	2233.43	2225.18	2222.41	8.25	1.10%	1.517	5.30	0.39	3.23
CDT-131	JCT-286	JCT-288	232.66	15.0	2230.64	2222.21	2219.66	8.43	1.10%	1.518	5.29	0.39	3.22
CDT-133	JCT-288	JCT-290	208.33	18.0	2227.88	2216.60	2216.35	11.28	0.12%	1.822	2.86	0.61	0.73
CDT-135	JCT-290	JCT-292	206.94	18.0	2227.04	2216.15	2215.90	10.89	0.12%	1.827	2.86	0.61	0.73
CDT-137	JCT-292	JCT-294	146.53	18.0	2224.28	2215.70	2215.53	8.58	0.12%	1.832	2.63	0.61	0.67
CDT-139	JCT-294	JCT-296	223.29	18.0	2222.19	2215.43	2215.16	6.76	0.12%	1.875	3.05	0.63	0.68
CDT-141	JCT-296	JCT-298	168.58	18.0	2229.61	2212.27	2211.88	17.34	0.23%	1.952	2.93	0.67	0.59
CDT-191	JCT-340	JCT-342	333.79	8.0	2240.82	2224.93	2223.43	15.89	0.45%	0.329	2.58	0.55	0.24
CDT-193	JCT-342	JCT-344	295.17	8.0	2240.80	2223.43	2222.10	17.37	0.45%	0.337	2.60	0.55	0.23
CDT-195	JCT-344	JCT-346	304.10	8.0	2240.45	2222.10	2220.73	18.35	0.45%	0.346	2.52	0.56	0.22
CDT-197	JCT-346	JCT-348	295.27	8.0	2239.12	2220.73	2219.40	18.39	0.45%	0.388	2.62	0.61	0.18
CDT-199	JCT-348	JCT-288	437.16	8.0	2237.71	2219.40	2217.44	18.31	0.45%	0.396	2.82	0.64	0.17
CDT-289	JCT-438	JCT-440	299.60	8.0	2244.72	2227.15	2225.80	17.57	0.45%	0.369	2.65	0.59	0.20
CDT-291	JCT-440	JCT-442	312.62	8.0	2243.23	2225.80	2224.40	17.43	0.45%	0.379	2.67	0.60	0.19
CDT-293	JCT-442	JCT-444	308.16	8.0	2241.79	2224.40	2223.01	17.39	0.45%	0.388	2.68	0.61	0.18
CDT-295	JCT-444	JCT-446	286.46	8.0	2240.11	2223.01	2221.72	17.10	0.45%	0.398	2.64	0.62	0.17
CDT-297	JCT-446	FWN1-24	299.40	8.0	2234.96	2221.72	2220.37	13.24	0.45%	0.407	2.85	0.65	0.16
GMI4779338	MIL1-01	STOR-10	243.08	10.0	2131.91	2108.66	2107.85	23.25	0.33%	0.582	2.84	0.63	0.30
GMI4779343	MIL1-01A	MIL1-01	90.82	10.0	2131.59	2108.84	2108.66	22.75	0.20%	0.348	1.65	0.53	0.33
GMI4779342	MIL1-01B	MIL1-01A	360.49	10.0	2130.71	2110.16	2108.84	20.55	0.37%	0.348	2.10	0.42	0.58
GMI4779341	MIL1-01C	MIL1-01B	349.55	10.0	2130.82	2111.27	2110.16	19.55	0.32%	0.348	2.35	0.45	0.52

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GMI4779340	MIL1-01D	MIL1-01C	349.87	10.0	2131.00	2112.38	2111.27	18.62	0.32%	0.346	2.29	0.44	0.52
GMI4779339	MIL1-01E	MIL1-01D	272.99	10.0	2131.30	2113.25	2112.38	18.05	0.32%	0.345	2.31	0.44	0.52
GMI4481189	RAM1-01	AEXT2-08	298.83	24.0	2184.45	2169.32	2168.41	15.13	0.30%	3.818	4.74	0.49	4.92
GMI4482261	RAM1-02	RAM1-01	366.23	24.0	2184.43	2170.53	2169.32	13.90	0.33%	3.815	4.05	0.45	5.29
GMI4482262	RAM1-03	RAM1-02	276.22	24.0	2185.93	2171.38	2170.53	14.55	0.31%	3.807	4.18	0.47	4.98
GMI4483808	RAM1-04	RAM1-03	398.54	24.0	2185.57	2171.67	2171.38	13.90	0.07%	3.743	3.13	0.67	0.53
GMI4483807	RAM1-05	RAM1-04	280.95	24.0	2186.24	2173.53	2171.67	12.71	0.66%	3.743	3.50	0.37	9.15
GMI4481702	RAM1-06	RAM1-05	380.75	24.0	2186.32	2174.83	2173.53	11.49	0.34%	3.743	4.68	0.46	5.51
GMI4481677	RAM1-07	RAM1-06	395.40	24.0	2187.72	2175.63	2174.83	12.09	0.20%	3.743	3.72	0.53	3.38
GMI4481676	RAM1-08	RAM1-07	406.03	24.0	2190.86	2176.71	2175.63	14.15	0.27%	3.744	3.66	0.48	4.43
GMI4481675	RAM1-09	RAM1-08	288.41	24.0	2192.80	2179.87	2176.71	12.93	1.10%	3.743	4.95	0.32	12.84
GMI4481674	RAM1-10	RAM1-09	405.80	24.0	2203.95	2181.12	2179.87	22.83	0.31%	3.743	4.83	0.49	5.05
GMI4481665	REX1-01	RAM1-10	395.04	18.0	2209.40	2198.41	2181.12	10.99	4.38%	1.515	3.28	0.21	13.88
GMI4481664	REX1-02	REX1-01	399.60	18.0	2211.70	2200.06	2198.47	11.64	0.40%	1.513	3.66	0.40	3.13
GMI4481663	REX1-03	REX1-02	369.71	18.0	2213.20	2201.10	2200.11	12.10	0.27%	1.481	3.29	0.45	2.33
GMI4481662	REX1-04	REX1-03	316.19	18.0	2213.78	2201.93	2201.15	11.85	0.25%	1.477	3.10	0.45	2.18
GMI4482135	REX1-04A	REX1-04	382.60	10.0	2217.14	2208.58	2202.01	8.56	1.72%	0.204	2.02	0.22	1.81
GMI4482136	REX1-04B	REX1-04A	192.02	10.0	2220.15	2209.46	2208.68	10.69	0.41%	0.203	2.25	0.32	0.77
GMI4482137	REX1-04C	REX1-04B	91.11	10.0	2221.59	2209.91	2209.51	11.68	0.44%	0.198	2.27	0.30	0.82
GMI4482138	REX1-04D	REX1-04C	117.44	10.0	2223.96	2215.68	2209.91	8.28	4.91%	0.175	2.89	0.15	3.23
GMI4482139	REX1-04E	REX1-04D	399.46	10.0	2240.52	2235.73	2215.74	4.79	5.00%	0.174	5.10	0.15	3.26
GMI4482140	REX1-04F	REX1-04E	222.78	10.0	2246.68	2239.63	2235.83	7.05	1.71%	0.159	3.40	0.19	1.84
NEW6755945	REX1-04G	REX1-04F	237.00	10.0	2250.48	2243.78	2239.73	6.70	1.71%	0.158	3.39	0.19	1.85
NEW8483931	REX1-04H	REX1-04G	259.00	10.0	2255.43	2248.31	2243.78	7.12	1.75%	0.157	3.40	0.19	1.87
NEW3250837	REX1-04I	REX1-04H	239.00	10.0	2257.91	2252.50	2248.31	5.41	1.75%	0.157	3.51	0.19	1.87
GMI4482659	REX1-05	REX1-04	341.41	15.0	2221.66	2210.30	2202.08	11.36	2.41%	1.280	5.06	0.29	5.74
GMI4482711	REX1-06	REX1-05	342.08	15.0	2234.09	2221.69	2210.31	12.40	3.33%	1.266	7.21	0.26	6.99
GMI4483466	RIV1-02	FG1-01	31.65	24.0	2133.74	2121.69	2121.12	12.05	1.80%	7.781	7.48	0.60	13.51
GMI4483465	RIV1-03	RIV1-02	290.65	24.0	2138.41	2122.49	2121.69	15.92	0.28%	7.782	5.15	0.79	0.52
GMI4483464	RIV1-03A	RIV1-03	224.28	24.0	2135.06	2122.99	2122.49	12.07	0.22%	7.784	4.38	0.85	-0.31
CBWTEMP07	RIV1-04	RIV1-03A	26.84	24.0	2135.08	2123.27	2122.99	11.81	1.04%	7.788	5.49	0.69	8.48
GMI4483463	RIV1-05	RIV1-04	514.27	24.0	2137.11	2124.54	2123.27	12.57	0.25%	7.742	5.24	0.84	0.12
GMI4483462	RIV1-06	RIV1-05	354.89	24.0	2135.77	2125.48	2124.54	10.29	0.26%	7.741	4.38	0.80	0.41
GMI4483461	RIV1-07	RIV1-06	361.36	24.0	2135.24	2126.35	2125.48	8.89	0.24%	7.741	4.39	0.83	0.03
GMI4483460	RIV1-08	RIV1-07	53.94	24.0	2136.25	2126.70	2126.35	9.55	0.65%	7.741	5.10	0.68	5.02
GMI4483459	RIV1-09	RIV1-08	216.12	24.0	2137.03	2127.31	2126.70	9.71	0.28%	7.741	5.06	0.77	0.67

Pipe ID	Upstream Manhole	Downstream Manhole	Length (ft)	Size (in)	Ground Up	Invert Up	Invert Down	Depth Up (ft)	Slope	Peak Flow (mgd)	Peak Velocity (ft/s)	d/D	Reserve Capacity (mgd)
GMI4483458	RIV1-10	RIV1-09	408.22	24.0	2151.25	2129.30	2127.31	21.95	0.49%	7.741	5.17	0.62	3.33
GMI4483457	RIV1-11	RIV1-10	398.99	24.0	2149.09	2129.31	2129.30	19.78	0.00%	7.741	4.40	1.25	-7.08
GMI4483456	RIV1-12	RIV1-11	401.40	24.0	2146.11	2130.33	2129.31	15.78	0.25%	7.741	3.81	1.23	0.26
GMI4483455	RIV1-13	RIV1-12	399.80	24.0	2139.74	2131.32	2130.33	8.42	0.25%	7.741	4.13	1.22	0.13
GMI4483454	RIV1-14	RIV1-13	395.68	24.0	2139.38	2132.51	2131.32	6.87	0.30%	7.741	4.52	1.11	0.95
GMI4483453	RIV1-15	RIV1-14	466.24	24.0	2139.82	2133.49	2132.51	6.33	0.21%	7.740	4.38	1.19	-0.48
GMI4483452	RIV1-16	RIV1-15	423.55	24.0	2140.70	2134.55	2133.49	6.15	0.25%	7.740	4.23	1.18	0.18
GMI4483451	RIV1-17	RIV1-16	434.68	24.0	2143.90	2135.73	2134.55	8.17	0.27%	7.861	4.47	1.12	0.39
GMI4483450	RIV1-18	RIV1-17	116.76	24.0	2149.70	2136.16	2135.73	13.54	0.37%	7.840	4.72	1.05	1.77
GMI4483449	RIV1-19	RIV1-18	422.22	24.0	2148.83	2137.24	2136.16	11.59	0.26%	7.898	4.65	0.96	0.12
NEW348	RIV1-20	RIV1-19	140.58	24.0	2146.52	2137.58	2137.24	8.93	0.24%	7.877	4.40	0.95	-0.12
GMI4483448	RIV1-21	RIV1-20	261.16	24.0	2146.09	2138.34	2137.58	7.75	0.29%	7.824	4.44	0.82	0.73
GMI4483447	RIV1-21A	RIV1-21	274.68	24.0	2145.16	2138.97	2138.34	6.19	0.23%	7.831	4.44	0.84	-0.25
NEW370	RIV1-22	RIV1-21A	124.01	24.0	2146.38	2139.39	2138.97	6.99	0.34%	7.727	4.40	0.78	1.51
GMI4483446	RIV1-23	RIV1-22	398.65	24.0	2147.91	2140.41	2139.39	7.50	0.26%	7.730	4.51	0.80	0.27
GMI4483436	RIV1-24	RIV1-23	399.94	24.0	2148.54	2141.39	2140.41	7.15	0.25%	7.729	4.39	0.82	0.13
GMI4483443	RIV1-24A	RIV1-24	192.50	24.0	2148.88	2141.78	2141.39	7.10	0.20%	7.732	4.23	0.87	-0.64
NEW369	RIV1-25	RIV1-24A	207.50	24.0	2148.68	2142.35	2141.78	6.33	0.27%	7.715	4.22	0.82	0.59
GMI4483442	RIV1-25A	RIV1-25	285.33	24.0	2149.86	2143.01	2142.35	6.85	0.23%	7.720	4.31	0.84	-0.10
NEW1175067	RIV1-26	RIV1-25A	111.96	24.0	2148.52	2143.36	2143.01	5.15	0.31%	7.682	4.34	0.80	1.17
GMI4483441	RIV1-27	RIV1-26	384.58	24.0	2149.01	2144.40	2143.36	4.61	0.27%	7.691	4.51	0.78	0.56
GMI4483440	RIV1-28	RIV1-27	281.08	24.0	2151.27	2145.29	2144.40	5.98	0.32%	7.708	4.70	0.73	1.19
NEW349	RIV1-28A	RIV1-28	17.42	24.0	2151.14	2145.46	2145.29	5.68	0.98%	7.713	5.93	0.49	8.12
GMI4483439	RIV1-29	RIV1-28A	341.70	24.0	2159.91	2146.11	2145.46	13.80	0.19%	7.716	5.08	0.91	-0.82
GMI4483438	RIV1-30	RIV1-29	247.99	24.0	2158.99	2146.73	2146.11	12.26	0.25%	7.731	4.07	0.87	0.18
NEW368	RIV1-31	RIV1-30	338.81	24.0	2160.93	2147.41	2146.73	13.52	0.20%	7.773	4.10	0.91	-0.66
NEW346	RIV1-32	RIV1-31	33.95	24.0	2158.80	2147.50	2147.41	11.30	0.27%	7.270	3.85	0.90	0.79
GMI4483437	RIV1-33	RIV1-32	26.94	24.0	2158.80	2147.65	2147.50	11.15	0.56%	7.063	3.88	0.84	4.84
NEW384	SELT1-01	STOR-10	151.67	10.0	2131.61	2113.52	2107.85	18.09	3.74%	0.421	5.94	0.26	2.55
NEW380	SELT1-02	SELT1-01	334.87	10.0	2144.76	2127.96	2113.52	16.80	4.31%	0.397	5.86	0.24	2.79
NEW601661	SELT1-03	SELT1-02	85.41	10.0	2149.37	2129.69	2127.96	19.68	2.03%	0.395	5.01	0.32	1.79
NEW1175158	SELT1-03A	SELT1-03	352.92	10.0	2148.16	2131.46	2129.69	16.70	0.50%	0.190	2.16	0.29	0.90
NEW1175161	SELT1-04	SELT1-03	348.65	10.0	2153.35	2130.85	2129.69	22.50	0.33%	0.210	2.16	0.35	0.68
NEW1175160	SELT1-05	SELT1-04	350.61	10.0	2154.21	2132.01	2130.85	22.20	0.33%	0.165	1.76	0.30	0.72

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Appendix K

Asset Management

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City of Coeur d'Alene
Sewer Main Condition Assessment Method

Defect Type	CODE	Severity	Description	Weight
Structural Defects				
Surface Damage (SD)				
	SDL	light	<1/4 pipe wall thickness, corrosion, projection, dimpling	3
	SDM	moderate	1/4 - 1/2 pipe wall thickness, exposed aggregate, projection, spalling	10
	SDH	high	> 1/2 pipe wall thickness, corrosion, exposed rebar, inverse curvature	15
Crack (CRK)				
	CRKL	light	<1/16"; circumferential or longitudinal	3
	CRKM	moderate	1/16"-1/4"; circumferential or longitudinal	10
	CRKH	high	> 1/4"; circumferential or longitudinal	15
Broken Pipe (BRKN)				
	BRKNL	light	other breakage, chips in pipe wall	3
	BRKNM	moderate	thru-wall crack	10
	BRKNH	high	fracture collapse, soil visible	15
Joint (offset, displaced, broken, displaced seal) (J)				
	JL	light	joint open ½" or displaced <15% dia. or gasket starting to slip	3
	JM	moderate	joint open 1/2"-2" or displaced 15-35% dia. or joint partly broken, or gasket missing	10
	JH	high	joint open >2" or displaced >35% dia. or joint badly broken	15
Grade Break/ Settlement (GB)				
	GBL	light	5-25%	3
	GBM	moderate	25-50% dia.	10
	GBH	high	> 50% dia	15
Deformation/ Ovality (DEF)				
	DEFL	light	1-10%	3
	DEFM	moderate	10-25% dia.	10
	DEFH	high	> 25% dia	15
Dimple (DMPL)				
	DMPLL	light		3
	DMPLM	moderate		10
	DMPLH	high		15
Pipe Material Change (CT)				
	CTCLAY	high	Pipe change to clay	15
	CTCON	high	Pipe change to concrete	15
	CTTR	high	Pipe change to transite	15
	CTCI	high	Pipe change to cast iron	15
	CTPVC	high	Pipe change to PVC	15
	CTCIPP	high	Pipe change to CIPP	15

City of Coeur d'Alene
Sewer Main Condition Assessment Method

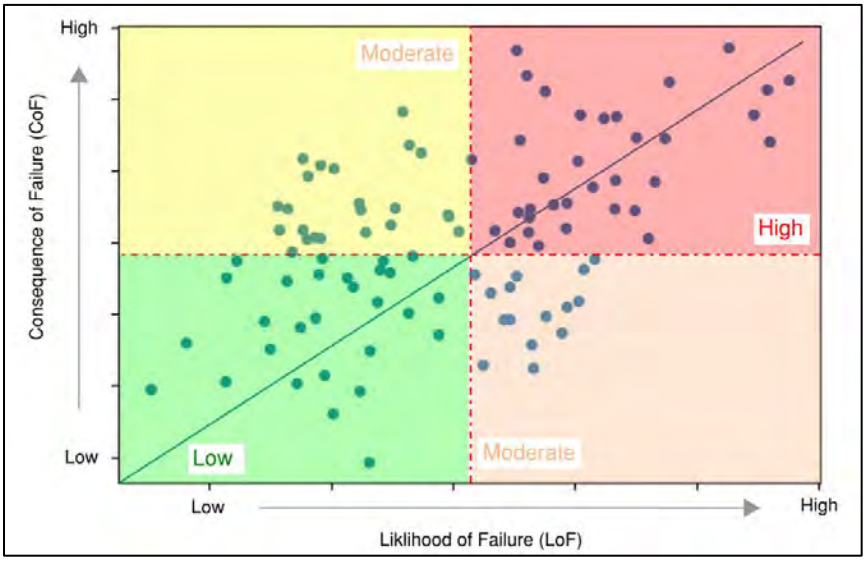
Maintenance Defects				
Protruding Lateral (PROL)				
	PROLL	light	protruding <10% dia.	3
	PROLM	moderate	protruding 10-25% dia	10
	PROLAH	high	protruding >25% dia.	15
Point Repair (patch, pipe replaced, liner) (PR)				
	PRL	light	showing beginning signs of wear	3
	PRM	moderate	repair partially defective	10
	PRH	high	repair defective	15
Roots (ROOT)				
	ROOTL	light	fine roots, reduction in diameter <10%	3
	ROOTM	moderate	reduction in diameter 10% to 25%	10
	ROOTH	high	reduction in diameter >25%	15
Infiltration (I)				
	IL	light	seeping, dripping	3
	IM	moderate	running, trickling	10
	IH	high	gushing, spurting	15
Grease (G)				
	GL	light	buildup <10% dia	3
	GM	moderate	buildup 10% to 25% dia	10
	GH	high	buildup >25% dia	15
Debris/ Sediment (DB)				
	DBL	light	reduction in diameter <10%	3
	DBM	moderate	reduction in diameter 10% to 25%	10
	DBH	high	reduction in diameter >25%	15
Grout/ Obstruction (GR)				
	GRL	light	reduction in diameter <10%	3
	GRM	moderate	reduction in diameter 10% to 25%	10
	GRH	high	reduction in diameter >25%	15
Informational Codes				
	BADGAS		Bad Gasket	
	CWP		Camera won't pass	
	CPD		Capped	
	CPDLAT		Capped Lateral	
	D		Deposits	
	DWNMH		Downstream Manhole	
	DMH		Drop Manhole	
	EI		End Inspection	
	GO		General Observation	
	LAMP		Lamp Hole	
	LAT MH		Lat in Manhole	
	LTTOP		Lateral Top	
	NR		Needs Repair	
	UPMH		Upstream MH	

Asset Management Scoring Breakdown

1. Evaluation of pipes with CCTV & utilizing the City's **Structural** Defect Scoring Method (CCTV since ~2012)
    a. Likelihood of Failure (LoF)
        i. City CCTV defect codes (Reference Current Methodology Matrix)
            1. Severity Weight
                a. Light – 3
                b. Moderate – 10
                c. High – 15
        ii. Sum LoF Score per pipe reach
            1. $\boldsymbol{LoF\ Score,\ Structural} = \left[\left(\sum Defect_{Light}\right) * \left(W_{Light}\right) + \left(\sum Defect_{Moderate}\right) * \left(W_{Moderate}\right) + \left(\sum Defect_{High}\right) * \left(W_{High}\right)\right]$
        iii. Normalize per pipe length
            1. $\boldsymbol{Normalized\ Overall\ LoF\ Score} = \frac{Overall\ LoF\ Score}{Pipe\ Length}$
    b. Consequence of Failure (CoF)
        i. Size
            1. Severity Weight
                a.

Diameter (inch)	Priority Weight	Priority Score
≤ 8	light	3
10 to 15	light to moderate	5
> 15 to 18 & Unknown	moderate	10
>18 to 24	moderate to high	12
≥ 24	high	15

        ii. Sum CoF Score per pipe reach
            1. $\boldsymbol{CoF\ Score} = \sum(Witem\ 1)$
        iii. Normalize per pipe length
            1. $\boldsymbol{Normalized\ Overall\ CoF\ Score} = Overall\ CoF * length$
    c. Overall Priority Score
        i. Plot LoF and CoF Score for each pipe on Scatter Plot
        ii. Categorize as High, Moderate or Low per Figure below.

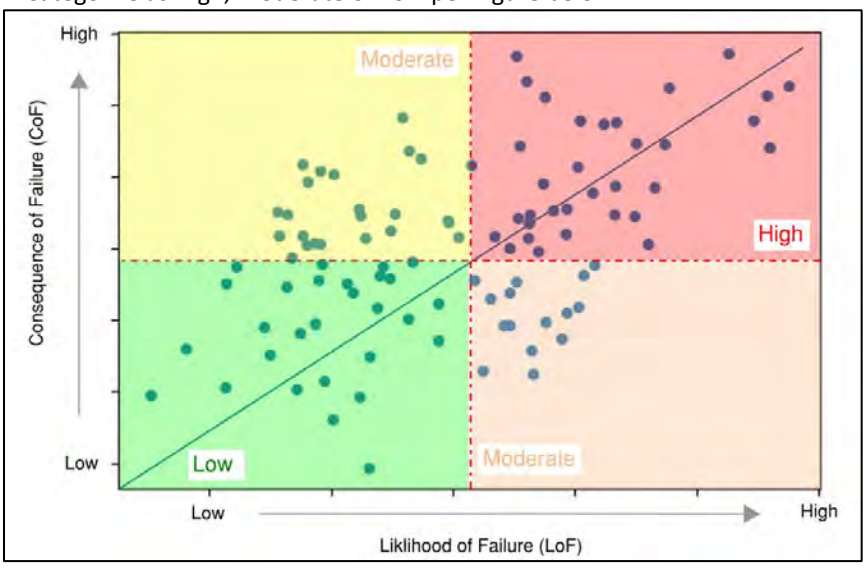


Asset Management Scoring Breakdown

1. Evaluation of pipes with CCTV & utilizing the City's **Maintenance** Defect Scoring Method (CCTV since ~2012)
    a. Likelihood of Failure (LoF)
        i. City CCTV defect codes (Reference Current Methodology Matrix)
            1. Severity Weight
                a. Light – 3
                b. Moderate – 10
                c. High – 15
        ii. Sum LoF Score per pipe reach
            1. $\boldsymbol{LoF\ Score,\ Maintenance} = \left[\left(\sum Defect_{Light}\right) * \left(W_{Light}\right) + \left(\sum Defect_{Moderate}\right) * \left(W_{Moderate}\right) + \left(\sum Defect_{High}\right) * \left(W_{High}\right)\right]$
            2. $\boldsymbol{Overall\ LoF\ Score} = \boldsymbol{LoF\ Score,\ Maintenance}$
        iii. Normalize per pipe length
            1. $\boldsymbol{Normalized\ Overall\ LoF\ Score} = \frac{Overall\ LoF\ Score}{Pipe\ Length}$
    b. Consequence of Failure (CoF)
        i. Size
            1. Severity Weight
                a.

Diameter (inch)	Priority Weight	Priority Score
≤ 8	light	3
10 to 15	light to moderate	5
> 15 to 18 & Unknown	moderate	10
>18 to 24	moderate to high	12
≥ 24	high	15

        ii. Sum CoF Score per pipe reach
            1. $\boldsymbol{CoF\ Score} = \sum(Witem\ 1)$
        iii. Normalize per pipe length
            1. $\boldsymbol{Normalized\ Overall\ CoF\ Score} = Overall\ CoF * length$
    c. Overall Priority Score
        i. Plot LoF and CoF Score for each pipe on Scatter Plot
        ii. Categorize as High, Moderate or Low per Figure below.



CCTV Prioritizing Scoring Breakdown

1. Prioritizing pipes for **CCTV inspection,** utilizing the City's Defect Scoring Method
    a. Likelihood of Failure (LoF)
        i. Pipe Material (listed in GIS)
            1. Severity Weight
                a.

Material	Priority Weight	Priority Score
Clay	high	15
Concrete	high	15
Unknown	high	15
"Force Main"	moderate	10
HDPE	moderate	10
PVC	low	3
CIPP	low	3

        ii. Sum LoF Score per pipe reach
            1. $\boldsymbol{LoF\ Score} = \sum(Witem\ 1)$
        iii. Normalize per pipe length
            1. $\boldsymbol{Normalized\ Overall\ LoF\ Score} = \frac{Overall\ LoF\ Score}{Pipe\ Length}$
    b. Consequence of Failure (CoF)
        i. Size
            1. Severity Weight
                a.

Diameter (inch)	Priority Weight	Priority Score
≤ 8	light	3
10 to 15	light to moderate	5
> 15 to 18 & Unknown	moderate	10
>18 to 24	moderate to high	12
≥ 24	high	15

        ii. Sum CoF values per pipe reach
            1. $\boldsymbol{CoF\ Score} = \sum(Witem\ 1)$
        iii. Normalize per pipe length
            1. $\boldsymbol{Normalized\ Overall\ CoF\ Score} = Overall\ CoF * length$
    c. Overall Priority Score
        i. Plot LoF and CoF Score for each pipe on Scatter Plot
        ii. Categorize as High, Moderate or Low per Figure below.