CITY OF INDEPENDENCE

STORMWATER MASTER PLAN

April 2005

PACWEST ENGINEERING

STORMWATER MASTER PLAN

Prepared for:

The City of Independence

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EXECUTIVE SUMMARY

This Stormwater Master Plan (SWMP) is a comprehensive planning document that provides analysis and recommendations through full build out within the Urban Growth Boundary (UGB). The SWMP provides recommendations for current and future needs of the stormwater conveyance system in Independence within the UGB. This plan was prepared by PacWest Engineering, PC under contract with the City of Independence.

This plan includes chapters concerning the various aspects of a fully functional stormwater conveyance system and all planning, operational, managerial, and funding aspects associated with this plans successful implementation.

Chapter One provides an introduction to this SWMP covering the purpose and scope of this report as well as a general overview of previous plans completed for the City that concern the overall functioning of various components of the stormwater conveyance system within Independence.

Chapter Two is concerned with public involvement in the development of this SWMP. Public involvement includes the citizens of Independence as well as involvement from the Public Works staff and the Citizens Advisory Committee.

Chapter Three covers the technical assumptions and parameters used to model the stormwater conveyance system. A discussion on potential design storm events is presented with a recommendation for design storm requirements to guide development of the City system through UGB build out.

Chapter Four provides a discussion on the general hydrological elements of stormwater unique to Independence. Topics include Land Use, Topography, Climate, and Soils. Drainage sub-basins are also discussed.

Chapter Five provides a detailed analysis and recommendations for future Planning and Policies of the City's stormwater system. The existing regulatory and planning framework is presented and recommendations for various aspects of stormwater management are included.

Chapter Six includes stormwater modeling results and recommendations for system improvements for both existing conditions and through UGB build out. Estimated costs for all improvements and a schedule for implementation of recommended improvements is also provided. Finally, an analysis and recommendations of the current Management and Maintenance effort is presented.

Chapter Seven presents a financial analysis detailing alternatives for funding the recommendations of this report. A funding recommendation is included along with an implementation plan.

Appendices are presented that provide detailed information on the existing stormwater system inventory, deficient stormwater elements, sub-basin identification, Best Management Practices, and Phase II of the National Pollution Discharge Elimination System Regulations.

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

The Stormwater Master Plan (SWMP) project was undertaken by the City as a development measure to address the condition of the existing stormwater system and improvements needed now and throughout the full build out of the Urban Growth Boundary (UGB). Further, the method for implementing recommended improvements through the UGB build out is addressed with consideration of Operational, Managerial, Financial, and Legal perspectives and requirements. The SWMP is an inclusive guide for development of the Stormwater Conveyance Network throughout the UGB. The recommendations will directly affect both the City's capital improvement and operating programs. Additionally, new policies and development standards are recommended that affect the way in which future development is conducted within the UGB of Independence.

1.2 AUTHORIZATION

The City of Independence contracted with PacWest Engineering to develop this SWMP. The city has the necessary legal and administrative resources and authority to construct, operate and manage the stormwater drainage system serving the city's residents. This plan was developed to address current deficiencies and provide a plan to meet the demands of urban growth through full build out.

1.3 MASTER PLAN PURPOSE

The purpose of this stormwater master plan is to identify the existing stormwater system, make a detailed inventory of existing systems, identify system deficiencies, determine current and future needs, and recommend a physical and finical plan to meet these needs. This plan is the management tool for implementing stormwater operations and improvements through full build out of the UGB.

1.4 MASTER PLAN SCOPE

This plan discusses the existing stormwater systems and facilities, and management and maintenance structures and procedures. The plan provides an analysis of this existing framework and makes recommendations for the present and future while considering the following factors:

- Status of current stormwater system and projected future needs.
- Projected improvement costs to achieve short and long term system goals.
- Uplands and wetlands natural resources.
- Financial planning alternatives and recommendations for implementation of the SWMP improvement schedule.
- Interviews and involvement with the City's Public Works Department and Financial Department.
- Cross jurisdictional stormwater management.

This document is organized to allow for problem identification and resolution. For example, Chapters 3 through 5 contain information concerning existing facilities, analysis methodology, stormwater quantity and quality, and operational and maintenance practices. Chapter 6 contains an exhaustive analysis of existing an growth related concerns covering deficiencies, project costs, and project prioritization. Finally, Chapter 7 contains a financial analysis for funding recommendations presented in Chapter 6.

1.5 PREVIOUS PLANS

Master plans for Sanitary Sewer, Water, Transportation, and Parks & Recreation have been developed for the City of Independence; Stormwater has only recently been addressed on a limited scope. Three documents have been previously developed to address stormwater management;

- Master Drainage Plan for N. Independence, JMS Engineering, March 1989
- Ash Creek Flood Study and Stream Model, Streamline Engineering, November 2002
- Stormwater Master Plan for Independence and Monmouth, Streamline Engineering, August 2003 (Draft)

The *Master Drainage Plan for N. Independence* focuses on stormwater quantities developed in pasture lands north of Hoffman Road and the conveyance capacities of culverts beneath Hoffman Road.

The *Ash Creek Flood Study and Stream Model* addresses the functionality of the South, Middle, and North forks of Ash Creek under flood conditions.

The *Stormwater Master Plan for Independence and Monmouth* is an uncompleted draft report that is a preliminary investigation into the conveyance capacities of choice stormwater conveyance systems along the perimeter of Independence and Monmouth and the effect of development and detention in these areas.

CHAPTER 2
PUBLIC INVOLVEMENT

2.1 OBJECTIVES AND GOALS

The City believes that public involvement is important whenever a significant change in policy is anticipated, as with the development of a stormwater master plan (SWMP). The success of this plan depends on public understanding of the importance of good stormwater management practices for the protection of the state's water and land resources. The city's goal is to have public participation and understanding in the implementation of this plan. The public was involved on different levels throughout the development of this SWMP.

2.2 PUBLIC INVOLVEMENT PROCESS

Public involvement with this plan begins with city officials working with PacWest Engineering to develop this SWMP. Frequent meetings have been utilized to provide status updates as this plan was developed.

In addition to the meetings with City officials, PacWest Engineering prepared an informational flyer which was included in the monthly water bills outlining the overall scope of the SWMP as well as necessity of stormwater improvements to deal with existing deficiencies and future development as well as the. The informational flyer included contact information where comments or concerns could be addressed. A Citizen Advisory Committee was formed that worked directly with PacWest during the SWMP development process providing feedback on the overall project direction.

2.3 PUBLIC FEEDBACK

As part of the approval process, the SWMP was presented to the City Council. At this public hearing, citizens were able to voice opinion, comments, or concerns regarding the SWMP. This report was created prior to this public hearing. For information on public input before the City Council, please refer to hearing minutes available from City Hall.

Another aspect of feedback was from the Public Works Department where a questionnaire was distributed to facilitate a work session with staff. The following is a summary of the discussion topics and feedback from Public Works Staff directly concerned with the recommendations and implementation of this SWMP.

Question: Level of Service – How and what are being done currently for stormwater maintenance?

Answer:

1. Storm drainage has never been funded as a program and has never been considered a program in and of itself.

2. There is no regular maintenance schedule.

3. Existing catch basins are currently cleaned infrequently and storm drain issues are dealt with as they become problems.

4. The crew feels that an appropriate maintenance schedule would be cleaning the system every two years.

5. It is estimated that it would take a two man crew one week to clean all catch basins and two weeks to clean all pipelines.

6. Waste from the cleaning efforts are typically disposed of at the lagoons.

Conclusions:

1. Implementation of the SWMP would ensure that stormwater facilities, maintenance, and operations become a unique Public Works program. This SWMP recommends implementation of a Stormwater Utility. Implementing a Stormwater Utility would create a funding source for the stormwater program.
2. This SWMP recommends a regular schedule for maintenance on stormwater facilities.
3. This cleaning frequency is inadequate to ensure proper functioning of stormwater facilities. This SWMP recommends that all catch basins be cleaned on a yearly basis.
4. Although 2-years would be an improvement over the existing catch basin cleaning schedule, a 1-year cleaning frequency is recommended with consideration to general standards.
5. This SWMP recommends the addition of one staff member to provide the required personal necessary for implementation of the maintenance recommendations of this report. One aspect of this additional staff member would be providing the ability to achieve the recommended yearly catch basin cleaning program.
6. This SWMP dose not provide recommendations on the disposal of wastes generated from catch basin cleaning activities.

Question: Known Deficiencies – Flooding or other system deficiencies.

Answer:

1. It was suggested that all of the storm sewer system get cleaned and have a Television inspection conducted in order to set a maintenance baseline for the stormwater system.
2. The low point on Gun Club Road at the box culvert crossing experiences elevated instances of flooding.
3. Ash Creek gets backed up during large storm events at the discharge point into the Willamette River. Namely, the lower portion of the River Front Park becomes submerged. It was suggested that the road get raised at this location or a wall get installed.
4. The log pond located on 'F' Street south of the bridge backs up water during storm events causing some flooding. It was suggested that the existing weir be removed or that another flow control device be designed and installed at this location.
5. Stormwater overtops Becken Road at a culvert crossing located at a low point. The culverts beneath Becken Road at this location have been improved to convey upstream stormwater. The concern is that a 42-inch corrugated metal pipe downstream is backing up and may crushed or have 'bellies' along the pipe run.
6. The new apartments on 'F' Street experience flooding.
7. ODOT facilities on Monmouth Street and Main Street are not being maintained by ODOT. On Main Street, north of town, the storm water cannot reach the Willamette River without causing flooding. ODOT has been contacted multiple times over the past two years without any actions taken on their part. On Monmouth street there are manholes that have been paved over and access is no longer possible.

Comments:

1. A through cleaning and Television inspection to establish a maintenance baseline for future scheduling is a prudent measure and is recommended as part of this SWMP.
2. This location on Gun Club road has been identified as a deficient area that experiences elevated levels of flooding. This report recommends that a detailed engineering study and design, beyond the scope of this report, be completed for the culvert crossing. This report contains a preliminary level cost estimate so that funding can be allocated to resolve the deficiency.
3. Flooding occurs at this location due to the elevation of the discharge point relative to the water surface elevation of the Willamette River during rainfall events. This report addresses this concern by recommending elimination of stormwater detention practices that hold stormwater back to be released in a way that coincides with the rise of the Willamette River. This solution is not expected to completely eliminate the flooding problem. A site specific engineering analysis is recommended as this level of detail is beyond the scope of this report.
4. This location has been identified as a deficient area that experiences elevated levels of flooding. This report recommends that a detailed engineering study and design, beyond

the scope of this report, be completed for the existing weir. This report contains a preliminary level cost estimate so that funding can be allocated to resolve the deficiency.

5. This report has identified the 42-inch pipe in question as a problem area and provides recommendations for resolution. This report contains a preliminary level cost estimate so that funding can be allocated to resolve the deficiency.
6. Need Text
7. ODOT is currently operating under a limited budget and has scaled back many maintenance efforts undertaken in the past. This report recommends dialogue between the City and ODOT be initiated so that a fair and equitable solution can be negotiated to ensure necessary maintenance efforts are completed.

Question: Standards, Policy, & Regulations – Needs for City Standard Construction Specifications and Details.

Answer:

1. Staff feels that 8-inch pipe is acceptable for a minimum pipe diameter standard.
2. Staff recommends the 2002 Oregon Standard Specifications and Details be adopted at the City standard.

Comments:

1. An 8-inch minimum pipe diameter is sufficient although a 10-inch minimum is desirable. This report recommends that any existing pipe with a diameter smaller than 8-inches be replaced with an 8-inch or larger diameter pipe and that all new pipes be a minimum of 10-inches in diameter. This reduces the cost of replacing existing pipes between 8-inches and 10-inches and ensures that all new pipes are at least 10-inches in diameter.
2. The City currently uses the 2002 Oregon Standard Specifications and Details unofficially as the City standard. Adoption of this SWMP will officially establish these as the City standard.

2.4 EVALUATION CRITERIA

Public feedback has been organized into evaluation criteria for identifying system deficiencies and recommending system improvements.

CHAPTER 3
MODELING AND TECHNICAL STUDIES

3.1 MODELING DATA, PARAMETERS, & ASSUMPTIONS

Development of this SWMP used available physical data as well as surveyed data collected by PacWest. The entire stormwater conveyance system was field surveyed using total stations. The coordinate system used for the collecting storm system features is based off of a control network established by PacWest as part of the development of this SWMP. The control network survey referenced is filed with the Polk County surveyor's office.

Many engineering assumptions were used to model stormwater characteristics for overland flow, channel flow, and closed conduit flow. This chapter identifies the physical data used from government agencies and data collected in-house as well as engineering assumptions used in our analysis.

The stormwater modeling software Pond Pac version 9.0 by Haestad Methods was used to model the hydrology and hydraulics of the Independence stormwater system. Peak flows, velocities, and water elevations were predicted for existing and future conditions using the Pond Pac model. Each inlet, pipe, culvert, manhole, ditch, and detention facility was considered in the analysis. Immediate deficiencies and improvements to be constructed during UGB build out were identified from detailed analysis of the model.

3.1.1 DESIGN STORMS

The storms used in the model were the 5-, 10- and 25- year event. It is appropriate to base all future development on the same storm events. The existing trunk lines were sized per the 25-year event; therefore new stormwater piping should be sized per the same event, and not greater events, so as not to overwhelm the downstream pipes.

The U.S. Soil Conservation Service SCS Type IA hyetograph was used in the model for each design storm.

3.1.2 MODEL ASSUMPTIONS AND LIMITATIONS

This model was created with the intention of identifying storm system deficiencies relating to flow restrictions or flooding.

All pipes were assumed to run at a consistent grade from end to end. This is occasionally not the case as evidenced from storm pipe improvement projects. When storm system deficiencies were identified, the possibility of adverse and/or non-uniform grades in storm pipe runs was considered.

This model was preformed assuming that all pipes were clean and free of debris. Field observations confirm that not all pipes are clean, which impedes the flow of stormwater. All pipes that were observed to be clogged or have restrictions at their inlets were noted and are included in the system inventory. As part of the recommendations of this report, all pipes and catch basins are to be thoroughly cleaned of debris so that the model results are realized in the actual operation of the stormwater system.

3.2 DESIGN STORM CONSIDERATIONS

PacWest Engineering developed its alternatives based on three criteria: (1) what would be needed to meet the minimum acceptable requirements; (2) what improvements would be needed to provide the best possible system available without regard to cost; (3) and which improvements would best meet the City's stormwater management needs based on future growth projects within reasonable budget constraints. The preferred alternative is based on an evaluation of systems which will be adequate to convey the 25- year flood event while remaining comfortably within the financial resources of the City.

Considerations:

- **10-year storm event:** This design storm is the least expensive and highest risk alternative presented. While it is valuable to consider the 10-year storm event when designing stormwater control structures such as detention ponds, solely using this return interval as the design storm could lead to undesirable and unnecessary flooding during heavier rainfalls such as the 25-year event. Using only the 10-year event will likely defer expensive stormwater system upgrades and retrofits to future generations.

- **25-year storm event:** This design storm is selected by many municipalities as the peak design storm. The 25-year storm event represents a conservative design standard that does not require the expense of designing for the more infrequent storms that inundate the FEMA flood plain. The 25-year design storm is typically used in conjunction with the 2-year and 10-year events in design of detention facilities.

- **100-year storm event:** This design storm is an expensive and very low risk standard. Implementing the 100-year event will increase expenses to new developments and create a higher stormwater system maintenance cost. New developments that would use this design storm and tie into the existing stormwater system could create a downstream capacity issue, conveying upstream flows greater than existing downstream capacities. A typical use of the 100-year event is in the design of culverts.

These three considerations for a design storm standard represent decreasing risks and increasing costs. The City of Independence currently requires the 25-year storm event as a design standard for conveyance pipes and both the 10-year and 25-year events for stormwater detention design. While no one consideration is sufficient as an all encapsulating standard, the event implemented as the peak design storm event is the aim of this alternatives analysis.

3.3 DESIGN STORM RECOMMENDATION

The City of Independence currently requires developments to convey the 25-year storm flows and detain storm water such that the post-developed outflow will not exceed the pre-developed rate for both the 10-year and 25-year events. This SWMP recommends that the current design storm events continue to guide the development of the stormwater system in Independence. Stormwater detention requirements are not recommended as discussed in Chapter 5.5.2. In addition to these design standards, it is recommended that culverts are designed to pass the 100-year storm to avoid backwater effects and the potential of stormwater overtopping ditches and possibly flooding roadways and developed lots. Additionally, all stormwater systems should be designed to provide safe passage of the 100-year storm event. Designing for safe passage of the 100-year storm event assumes that certain conveyance elements will overtop during extreme rainfall, although a surface passage way exists that will safely convey stormwater downstream such that no physical or financial damage is incurred.

CHAPTER 4
STUDY AREA

4.1 GENERAL CHARACTERISTICS

Ash Creek is the primary waterway draining the City of Independence and is formed by three forks; the North, Middle and South Forks. The North Fork of Ash Creek has its headwater in the hills southwest of the City of Dallas and flows through the south end of the city. The Middle Fork of Ash Creek has its headwater in the hills southeast of Dallas on the southeastern slope of Mt. Pisgah and joins the North Fork northeast of the City of Monmouth. The headwater of the South Fork is south of Mt Pisgah and joins the main stem of Ash Creek between the sewage lagoons and Pioneer Park in Independence. Ash Creek then flows through the north part of the city and empties into the Willamette River. All other areas of the city empty either into the stormwater drainage system or directly into the Willamette River.

4.1.1 LAND USE

The City of Independence is in Polk County abutting the City of Monmouth to the west and the Willamette River to the east. Independence has a population of approximately 7,000 and consists of a mix of commercial, industrial, and residential uses. Commercial properties are located mostly along Monmouth Street and 1st Ave, Industrial uses are mostly located on the northern line of the Urban Growth Boundary (UGB), and Residential properties spread throughout the City. With continuing development, residential, commercial, and industrial growth will impact the hydrological characteristics throughout the UGB.

Residential, commercial, and industrial development and associated infrastructure improvements increase the overall area of imperious surfaces such as roof tops, roadways, and parking areas. Impervious surfaces will not allow stormwater to infiltrate, as with the pre-developed condition, thus increasing runoff volume and velocity.

As development continues the increase in impervious areas, and other construction influencing hydrologic characteristics, more demand will be required of the city's stormwater conveyance system.

Land use influences stormwater quality as well as quantity. This SWMP identifies stormwater quality and quantity concerns as development continues and recommends operational and managerial measures that will accommodate projected growth in *Chapter 6*.

4.1.2 TOPOGRAPHY

Topography greatly influences the characteristics of stormwater runoff. As the slope of the ground decreases, the volume of stormwater that can be conveyed over that ground decreases as well. Steep slopes drain easily, but are more susceptible to erosion. Flat areas are subject to more flooding and experience sedimentation.

Independence lies in the Willamette Valley floor in an area with gentle slopes. Ground elevations vary from a low elevation of approximately 136 feet at the Willamette River to a high of approximately 186 feet in the southeast quadrant of Independence. The flat nature of Independence and surrounding areas limit the volume and speed at which stormwater can be conveyed through Independence and into the Willamette River. Many roadside ditches and stormwater pipes are constructed to minimum grades to accommodate the gently sloping nature of the surrounding land. As a result of the general topographic characteristics of Independence and surrounding areas and pipe cover concerns, stormwater conveyance system pipe size and slope becomes a central design concern. Stormwater conveyance piping has been designed with a minimum size pipe diameter at a minimum design slope ultimately resulting in facilities that operate at or near capacity.

4.1.3 CLIMATE

Independence has a mild environment and experiences rainfall typical of the surrounding area. Independence has no climatic monitoring station within the city, the nearest rainfall data is from the Salem Station located at the Salem Airport. Climatic data was retrieved from the Oregon Climatic Service website (http://www.ocs.orst.edu/) from 1928 through 2002. Yearly rainfall has varied from a low of 23.74 inches in 1985 to a high of 66.96 inches in 1996 with an average yearly rainfall of 40.30 inches. Annual rainfall from 1928 through 2002 is shown in *Figure 4-2*.

4.2 DRAINAGE BASINS

Independence drains to the north and south fork of Ash Creek and ultimately to the Willamette river. Stormwater is collected in localized, hydraulically independent, areas which are individually conveyed to theses waterways.

Each sub-basin contributing stormwater to these hydraulically independent systems is identified in **Appendix E**.

CHAPTER 5
PLANNING AND POLICY

5.1 TIME FRAME

The City of Independence contracted with PacWest Engineering in the fall of 2003 to develop this SWMP. Polk County provided an aerial map in digital format containing the most current photogrametric information of Independence and the current assessor's maps for the city in digital format as well.

5.2 ENGINEERING STANDARDS

PacWest employed generally accepted engineering standards for evaluation of the existing stormwater system. The following is a list of engineering standards used to identify existing deficiencies in the stormwater system.

- Surcharging pipes are considered undersized. Surcharging pipes are only recommended for replacement if the event also resulted in flooding or the pipe has been identified as deficient.
- Undersized pipes are recommended to be replaced with larger diameter pipes.
- Ditches are scheduled to be replaced with closed conduits.
- Culverts are considered undersized if they fail to pass the 100-year storm event without causing upstream backwater conditions.

5.3 REGULATORY ENVIRIONMENT

5.3.1 FEDERAL REGULATIONS

The U.S. Environmental Protection Agency (EPA) established a storm water program in 1990 under the Clean Water Act (CWA). This program is the National Pollutant Discharge Elimination System or NPDES and was implemented in two phases. Phase I dealt with permitting for medium and large municipal separate storm sewer systems (MS4s) and generally included cities with populations greater than 100,000 and construction activities which involved disturbance of five acres of land or more. It also included ten categories of industrial activity.

The next step in the storm water program is NDPES Phase II which expands the program by requiring additional municipalities and operators of smaller construction sites to control pollution from storm water runoff. Those covered by NPDES Phase II include operators of small MS4s located in urbanized areas (UA) and construction areas greater than one acre and less than five acres of land. The Bureau of Census defines urbanized areas as municipalities having a population greater than 50,000 and a population density of at least 1000 people per square mile. Certain municipalities with populations less than 50,000 and construction activities utilizing less area may fall under this category if so designated by the EPA or NPDES permitting authority.

5.3.2 STATE REGULATIONS

Oregon is a NPDES permitting authority and the Department Of Environmental Quality (DEQ) is responsible for implementing this program. There are 25 cities and counties in Oregon that fall within urbanized areas that are not already covered by a NPDES Phase I permit. DEQ has determined that the following communities may fall under the program. The first group of cities that will require evaluation are communities that fall outside of urbanized areas but with populations greater than 10,000. There are 18 cities in Oregon that fall into this category. DEQ also has the discretionary authority to designate communities outside urbanized areas with populations under 10,000 if their storm water discharges violate water quality standards. Finally, DEQ may evaluate an MS4 for inclusion in the program if so petitioned by an interested person. The criteria DEQ will use in evaluating MS4 communities will include population characteristics and water quality considerations such as the potential for discharging pollutants into water quality limited streams and other sensitive waters such as those containing threatened or endangered species. (Oregon's Phase II Municipal Storm Water Program Fact Sheet, updated August, 2002)

The City of Independence is not designated an MS4 community, but any construction activity which disturbs an area equal to or greater than one acre but less than five acres is covered under the Phase II rule and requires an NPDES permit. In cases where a construction area is less than one acre a permit may still be required if that construction is part of another planned disturbance equal to or greater than one acre but less than five acres. Disturbance areas equal to or greater than five acres are covered under Phase I rules.

NPDES permitting rules notwithstanding, as previously stated in section 1.2, ORS 468B and OAR 340-041 address water quality policies and standards for all municipalities, entities and individuals. These statutes and rules are in effect whenever another rule or statute does not apply. Excerpts of these rules and statutes are in *Appendix C*, as are applicable EPA and DEQ Fact Sheets.

5.3.3 LOCAL REGULATIONS

The City of Independence requires all development to conform to DEQ NPDES requirements. Additionally, Sub-Chapter 55 of the Independence Zoning Code establishes general standards for construction of stormwater conveyance systems.

5.4 PLANNING FRAMEWORK

5.4.1 POLK COUNTY ZONING CODE

Polk County zoning codes address storm water management in *Chapters 178, Floodplain Overlay Zone*, and *182, Significant Resource Areas Overlay Zone*. These codes have authority outside municipal boundaries but within the unincorporated urban growth boundaries until such areas are annexed. The purpose of the Floodplain Overlay Zone chapter is, in part, to minimize the impact of flooding on structures and land uses and to promote safe and sanitary drainage. An additional purpose of floodplain management is to minimize the financial burden frequent flooding places on the public and government entities. *Subchapter 178.040*, Prohibited Uses, states that development which is not consistent with this purpose is prohibited and that storage of materials and equipment which may damage water resources as a result of exposure to flooding is likewise prohibited. *Subchapters 178.050* and *178.060* discuss development and conditional use permit procedures and requirements. *Subchapter 178.070*, Provisions for Flood Hazard Reduction, states that developments shall have adequate drainage to prevent flood damage. *Subchapter 182.050* discusses specific property development standards as it affects natural resources and the setback requirements for developments along riparian and wetland areas. Setbacks are necessary to provide a buffer zone between fragile habitats and new construction. *Subchapters 182.060* and *182.070* discuss some of the fish and wildlife areas and habitats that may be in conflict with developed areas.

5.4.2 INDEPENDENCE ZONING CODE

City of Independence zoning codes require that any development activity within the city or within the urban growth boundary that increases the impervious area of the developed land must implement a drainage plan. The code provides an outline of the minimum requirements of the Drainage Management Plan in *chapter 55.015*. Larger developments are also required to develop a Storm Water Management Plan. This plan must show that the development runoff will not exceed 5-, 10- and 25- year storm events. Subsequent *chapters 55.020, 55.025*, and *55.030* provide guidance on design and construction standards and requirements.

5.4.3 POLK COUNTY COMPREHENSIVE PLAN

Section 2.D of the Polk County Comprehensive Plan states one of its goals (#6) is to "Conserve and manage water resources in order to maintain and protect water quality and quantity and to abate flood, erosion and sediment problems." In the Policy subsection under the Fish and Wildlife group, the plan states in part that the County recognizes the importance of riparian vegetation as habitat and that erosion, sediment and runoff shall be controlled through implementing ordinances (policy #3.3). They go on to state in the Water Resources group that the County encourages the implementation of water quality management plans and will cooperate with governmental agencies monitoring water quality (policy #'s 6.1 and 6.2). Finally in policy number 6.5, Polk County recognizes the significance of municipal watershed areas and the important natural values of the watershed and will prohibit any activity which could potentially degrade water quality.

5.4.4 INDEPENDENCE COMPREHENSIVE PLAN

Existing city plans will be updated to take into account policies developed by this plan. This plan will act in congruence with other existing plans.

5.4.5 CITY COUNCIL POLICY

The policy of the city council is to adopt rules which are in accordance with federal, state, and local policies regarding protection of natural resources within the fiscal capabilities of the City of Independence. All new development will adhere to such rules, codes, ordinances and practices which are in existence at the time said development. The council will develop and maintain an active public outreach program which continually seeks to educate citizens about responsible management of their properties to minimize the impact of various activities on the waters and other resources of the state.

5.4.6 DESIGN AND CONSTRUCTION STANDARDS

The City of Independence uses widely accepted design and construction standards to manage development. AASHTO and the 2002 Oregon Standard Construction Details and Specifications are the design and construction standards used in the City of Independence.

5.5 STORMWATER MANAGEMENT

The following sections address stormwater management issues including discussions on background, issues, strategies to address issues, and policies to ensure management goals are achieved.

5.5.1 STORMWATER QUALITY CONTROL

Human activities and practices can contribute to the degradation of water quality. Impervious sufaces such as roadways, driveways, and parking lots collect pollutants such as oil that are transported into streams and rivers during storm events. Development and agricultural activities disturb existing vegetation, which can result in elevated transportation of sediments into waterways.

The city's goal is to minimize the amount and severity of pollutants that it contributes to the waterways of the state, groundwater and wetlands. This will be accomplished by requiring all new development follow applicable ordinances and regulations, and through a program of education and training to avoid introducing pollutants into the stormwater system.

5.5.1.1 *QUALITY ISSUES*

The federal Clean Water Act is the basis for nearly all water quality related legislation, including the National Pollution Discharge Elimination System (NPDES). The Oregon Department of Environmental Quality (DEQ) regulates water quality issues in Independence through a permitting process. DEQ permits are required for developments disturbing more than one acre of land. Currently, the regulatory authority of the DEQ does not extend to enforcing compliance of Independence as a MS4s as discussed in Section 5.3.

5.5.1.2 *STRATEGIES TO ADDRESS QUALITY ISSUES*

Although the requirements on MS4s imposed by the DEQ are not currently required in Independence, more stringent regulations concerning stormwater quality should be anticipated in planning for the future of the stormwater system. Continued conformance with the current DEQ regulations on new developments, and conformance with the Best Management Practices (BMPs) outlined in Section 5.6 will prepare the City for the likelihood of more stringent regulatory measures from the DEQ in the future.

5.5.1.3 *QUALITY POLICIES*

- Continue enforcing compliance with DEQ standards for new development.
- Adopt the BMPs for stormwater treatment described in Appendix E.
- Encourage new development and improvement projects to exceed stormwater quality measures and include more advanced stormwater quality management techniques such as those found in the Washington King County Stormwater Management Manual.
- Work to ensure pollutant laden runoff is not discharged directly into streams.
- Work to preserve and enhance native stream corridor vegetation.

5.5.2 STORMWATER QUANTITY CONTROL

Stormwater quantity control addresses how stormwater is conveyed and stored beginning with where it falls to where it is ultimately discharged into receiving bodies of water downstream of the City.

5.5.2.1 *Quantity Issues*

Flooding is a natural process occurring in an open channel system when stormwater flow exceeds the hydraulic capacity of the channel and the floodplain is employed to temoraily store and transport this additional volume of water. Natural flooding is typical of historic flooding patterns that occurred before the City was established. Natural flooding has positive benefits, including creating and maintaining varied habitat for fish and wildlife, and transporting nutrients onto the floodplains.

Flooding can be the result of higher flows associated with increased development and can occur at natural and manmade constrictions in the conveyance system. Flooding that is the result of higher flows from increased development can be intensified by land uses that fill or isolate portions of the floodplain. Natural constrictions include low channel gradients, reduction in channel cross sections from sedimentation buildup, and debris jams. Manmade constrictions in natural channels are typically the result of undersized culverts or bridges.

Stormwater quantity control in piped conveyance systems is concerned with limiting water surcharging and flooding. Surcharging occurs when water flowing under pressure and exceeds the capcity of a pipe. Flooding occurs when water from a surcharging pipe reaches ground level. Both surcharging and flooding occur when flow exceeds pipe capacity due to undersized pipes, insufficient pipe gradient, downstream backwater effects, or a combination of these factors.

Total peak runoff flow from a storm event is directly related to the soils capacity to infiltrate water, ground water elevation relative to the ground surface elevations, amount of impervious area, amount of land storage capacity, and detention pocket areas such as wetlands, depressions, and swales. Steeper terrain generates more rapid runoff and greater peak flow than flatter terrain.

Currently the City controls the amount of stormwater entering the system by utilization of detention facilities in most new developments. The city also maintains and add open spaces, to the extent possible, to provide the greatest area of pervious surfaces thus reducing the volume of overland flow.

5.5.2.2 *Strategies to Address Quantity Issues*

The SWMP recommends that the use of detention facilities be reconsidered. At the discharge of Ash Creek into the Willamette River, flooding occurs during moderate storm events. The flooding occurs since the peak of the discharge from the Independence system is restrained so as to more closely coincide with the peak flow of the Willamette. When the Willamette peak flow has reached the Ash Creek discharge point, the Willamette water surface elevation is also at its peak and hence restricts this discharge point. Allowing stormwater to flow unimpeded will result in a large portion of the peak flow from Independence to be released prior to the peak flow of the Willamette reaching the Ash Creek discharge point.

Stormwater generated from upstream basins discharging to Ash Creek contribute the vast majority of stormwater volume to this tributary system. It would be advantageous to allow stormwater generated from within the UBG to reach the Willamette River before this upstream runoff reaches the city. Eliminating city wide detention facilities would ensure that stormwater is routed as quickly as possible to Ash Creek and ultimately the Willamette River.

5.5.2.3 *Quantity Policies*

- Discontinue detention requirements for new developments.
- Require new developments to consider the downstream capacity of piping systems and improve any deficiencies that are a direct result of the development.
- Remove flow controls from existing detention facilities as the opportunities arise.
- Encourage practices that enhance groundwater recharge to maintain or increase stream flow during dry periods.
- Differentiate between natural flooding and urban created flooding and allow for natural flooding to occur while minimizing urban created flooding.
- Encourage the use of pervious pavements in parking lots and other areas that do not degrade groundwater quality.

5.5.3 Uplands Natural Resources and Wetlands Management

Uplands natural resources are the natural features and areas outside of the stream corridor and 100-year floodplain. They include wetlands, uplands, vegetation, swales, and groundwater zones. Upland natural resources and wetlands are an integral component of the stormwater functions within the overall watershed. Human and natural activities in these areas have a significant influence on stormwater and how it affects downstream areas.

5.5.3.1 *Upland and Wetland Issues*

The City of Independence has a significant interest in the management of upland resources within the watershed areas of Ash Creek. Upland resources include areas outside the 100-year floodplain. As storms develop in the upper regions of the watershed, wetlands, swales, groundwater regions and other natural detainment systems moderate the peak flows during storm events and thus impacts the volume of flow through the city. Proper management of the watershed system also reduces sediment loads and introduction of pollutants, thus delivering a higher quality stream to the city.

The Division of State Lands (DSL) and the Army Corps of Engineers permit and enforce the laws that govern wetlands and waterways in Oregon. All development that affects natural resources and / or wetlands is required to obtain approval and permitting from the DSL and the Corp of Engineers.

5.5.3.2 *Strategies to Address Upland and Wetland Issues*

Protection and enhancement of upland natural resources and wetlands maintains and re-establishes hydrological functions and improves water quality. Compliance with DSL and Army Corps of Engineers regulations will ensure that development activities are in conformance with federal and state regulations.

5.5.3.3 *Upland and Wetland Policies*

- Ensure that operation and maintenance practices protect, enhance, and restore upland natural areas.
- Encourage the Division of State lands to fully implement and enforce wetland protection goals and regulations within the UGB.
- Encourage developers and property owners to protect, enhance, and re-establish upland natural resources and wetlands.
- Encourage mitigation of wetlands to occur in the same basin.
- Wetland mitigation should not compromise the existing stormwater functions of the land being used for the mitigation.
- Ensure that new development and re-development will not significantly impair the quality and quantity of water reaching wetlands.

5.5.4 Floodplain Management

Floodplains accommodate and manage flows at times when the water volume within streams and rivers exceeds capacity. As urbanization expands, flooding typically occurs more frequently and with greater consequences. The floodplain must be managed so that these hydrological modifications may be accommodated.

5.5.4.1 *Floodplain Management Issues*

The Federal Emergency Management Agency (FEMA) regulates activities within the floodplain issuing permits for floodplain development. The National Flood Insurance Program (NFIP) provide guidelines for construction within the floodplain. FEMA regulations recognized the importance of managing the 100-year floodplain for floodwater storage and transport.

5.5.4.2 *Strategies to Address Floodplain Management Issues*

All development within the urban growth boundary will be planned and implemented so that each project will be examined to determine its impact on the overall stormwater and floodplain management system. Activities that jeopardize floodplain functions should be discouraged and activities that protect and enhance water quality and habitat should be encouraged. Currently, the City enforces floodplain development permitting through FEMA and a City permitting process.

5.5.4.3 *Floodplain Management Policies*

- Enforce compliance with FEMA floodplain regulations
- Continue the City's permitting process
- Acknowledge and accommodate natural flooding within the floodplain while avoiding or minimizing urban created flooding patterns.
- New City infrastructure such as streets and sewer systems should be located beyond the 100-year floodplain unless it can be demonstrated that such activities will not cause harm to the proper functioning of the stream and that no other reasonable alternative is available.
- Encourage floodplain protection, enhancement, and restoration as part of the development process.

5.5.5 Stream System Management

Stream systems include intermittent streams and stream reaches, perennial streams, and major rivers. A stream system includes the channel, banks, and a corridor of land along the channel. Management of stream systems for stormwater includes proper design of infrastructure such as bridges, use of Best Management Practices, and designation of appropriate stream corridors. Stream system management provides for reducing flood potential that result from stream blockages, controls erosion from urban runoff, and improve water quality and habitat.

5.5.5.1 *Stream System Management Issues*

Typically, the health of a stream system is inversely related to the degree of urbanization. The regulations relating to stream system management are addressed through several state and federal agencies and programs including the flood insurance program, the endangered species act, the clean water act, the Division of State Lands, and the Army Corps of Engineers.

5.5.5.2 *Strategies to Address Stream System Management Issues*

Every reasonable effort will be utilized to maintain and reestablish, where necessary, the riparian areas of Ash Creek so that it can remain a viable natural resource for the city. Healthy stream systems are very effective in promoting higher quality natural water systems.

5.5.5.3 *Stream System Management Policies*

- Developments along stream corridors with inadequate shading shall include planting of trees and/or other vegetation to provide for adequate shading.
- Work to enhance or restore degraded channels, riparian areas, and floodplains.
- Minimize stream crossings of roads, utilities, and other development activities.
- Allow public access along stream corridors only if it does not adversely impact the proper functioning condition of the streams.
- Encourage individuals, neighborhoods, and organizations to participate in stream corridor stewardship.
- Work to develop maintenance practices that enhance and protect stream conditions.

5.5.6 Cross Jurisdictional Stormwater Management

Oregon's waterways typically have cross jurisdictional boundaries and as such activities upstream impact those downstream. It is in everyone's interest to maintain high quality waterways for the benefit of all. This requires thoughtful interaction between various parties so that good communication practices result in a coordinated effort to protect and manage the waterways.

5.5.6.1 *City of Monmouth*

The cities of Monmouth and Independence abut each other with Monmouth to the west and upstream of Independence. A portion of the Stormwater runoff from Monmouth enters the Independence stormwater system. Currently there is no formal agreement between Independence and Monmouth concerning shared stormwater management responsibilities. This SWMP recommends that such an agreement be pursued. Since Independence is the downstream neighbor, receiving and conveying stormwater from Monmouth, it is recommended that Independence take a proactive role and pursue a mutually beneficial agreement with Monmouth. Any stormwater management agreement should provide a detailed methodology to address future development and its impacts on the stormwater system.

5.5.6.2 *POLK COUNTY*

Polk County will encourage the implementation of the water quality management plans of governmental agencies and may seek implementation measures at the County level that provide for the management of stream corridors, erosion, sedimentation and water quality.

5.5.6.3 *OREGON DEPARTMENT OF TRANSPORTATION*

Oregon Department of Transportation (ODOT) plays an important role in maintaining roads and roadway drainage to allow for proper stormwater runoff. They have responsibility for providing and maintaining roadside vegetation and for keeping the drainage ditches and piping free from flow obstruction. These maintenance efforts have an impact on the quality of runoff which may enter the City's stormwater system. Proper roadside drainage systems provide vegetative buffers, filtration, infiltration and runoff detention; all proven management practices which improve the quality and quantity of stormwater runoff.

5.5.6.4 *WATERSHED COUNCILS AND CONSERVATION DISTRICT*

The City of Independence will work with local watershed councils and the Polk Soil and Water Conservation District to insure that the surface waters of the state are protected from excessive pollutants. These organizations have a great deal of experience and expertise in protecting the natural resources of the area and can provide assistance in planning activities affecting stormwater runoff.

CHAPTER 6
STORMWATER ANALYSIS

6.1 EXISTING STORMWATER SYSTEM

6.1.1 SYSTEM INVENTORY

The existing stormwater conveyance system has been field surveyed, with every structure and pipe end collected that lies within the public right-of-way. The city wide system inventory is listed in Appendix A. Pipe slopes have been calculated for each pipe within the system when possible. Occasionally, pipe ends were found to be buried either in catch basins or at a discharge location. If the slope could not be calculated, the reason is shown in the system inventory tables under the invert column of the pipe end that was not retrievable.

6.1.2 SYSTEM MAPS

All surveyed data has been incorporated into AutoCAD incorporated with other spatial data such as tax maps and aerial base maps. The resulting city maps have been compiled on a series of 18" x 18" sheets that label each structure, pipe, and culvert. The numbering system shown on the system maps corresponds to the numbers listed in the system inventory. System maps are not included with each SWMP, and can be obtained from the Independence Public Works Department for a fee.

Maps showing the sub-basins used to model stormwater routing are included with this SWMP. The sub-basin delineation maps show, and number, each sub-basin modeled throughout the city limits and urban growth boundary. Each deficiency listed in this section also lists the sub-basin where the deficiency is located, which corresponds to the numbering system shown on the sub-basin maps.

6.2 MODELING RESULTS

Stormwater modeling identified a number of system deficiencies for both the existing system and deficiencies that are expected as growth continues throughout the UGB. The stormwater conveyance system throughout Independence is comprised of multiple independent sub-systems that discharge to Ash Creek. Each of these sub-systems was analyzed individually routing the design storm events to verify capacity.

6.3 SYSTEM DEFICIENCIES

Deficient system components are identified in this Chapter in four separate categories based on system ownership and existing and UGB build out scenarios. The City of Independence owns the majority of the stormwater infrastructure while ODOT owns and maintains storm systems within ODOT right-of-way. The following four categories are presented identifying system deficiencies.

1) Existing Deficiencies Maintained by Independence
2) Existing Deficiencies Maintained by ODOT
3) UGB Build Out Deficiencies Maintained by Independence
4) UGB Build Out Deficiencies Maintained by ODOT

6.3.1 EXISTING DEFICIENCIES

A number of existing stormwater conveyance pipes, culverts, and ditches have been identified to fail during the 25-year storm event, have been constructed with deficient longitudinal slopes, or have a pipe diameter smaller than the recommended minimum existing pipe diameter of 8-inches. The following list summarizes all identified existing deficiencies and a recommended remedy. Although 8-inches is the minimum size for existing pipes, 10-inches is the recommended size for all new piping.

6.3.1.1 *EXISTING DEFICIENCIES - INDEPENDENCE*

IEX-1: The existing ditch from Hoffman Street to Ash Creek running along the west side of the lagoons is overgrown with vegetation and undersized. Re-grade this ditch from the culvert outlets at Hoffman road to Ash Creek and increase the area of the typical cross section. Typical cross section shall be trapezoidal with a 5-ft base, 7-ft depth, and 3 (H) : 1 (V) side slopes.

Alternatively this ditch could be replaced with 4-ft diameter ADS N-12 pipe at the same average slope of the existing ditch. If this solution is implemented then all the outlets along the ditch from the developments to the west will have to be tied into this new pipe with at least 96-inch manholes.

This improvement involves approximately 3500 lineal feet.

IEX-2: The existing ditch running along the east side of Stryker Road is undersized. Replace this ditch conveyance system with a 30-inch ADS N-12 pipe conveyance system. This project is located in sub-basin 4 and involves approximately 3500 lineal feet.

IEX-3: Re-grade ditch along west side of the Southern Pacific Rail Road (SPRR) tracks from Stryker to a box culvert crossing beneath the tracks, or replace ditch with a 15-inch ADS N-12 pipe at the same average slope as the existing ditch. This project is located in sub-basin 4 and involves approximately 560 lineal feet of improvements.

IEX-4: Widen the box culvert crossing beneath SPRR tracks from 3-ft to 4.5-ft, maintain the existing box culvert depth. This project is located in sub-basin 4.

IEX-5: Pipe ditch from the box culvert under Project **EX-4** to the culvert crossing at Highway 51 (Culvert C-12) with a 30-inch ADS N-12 pipe at the same average slope as the existing ditch. This project is located in sub-basin 5A and involves approximately 570 lineal feet of improvements.

IEX-6: Replace ditch from outlet at Conasir Dr. to UBG with a 30-inch ADS N-12 pipe. This project is located in sub-basin 2 and involves approximately 500 lineal feet of improvements.

IEX-7: Upsize 30-inch culvert, Culvert C-61, crossing beneath Ash Street at Williams Street intersection to a 36-inch ADS N-12 pipe, or ad a parallel 18" ADS N-12 pipe. This project is located in sub-basin 31 and involves approximately 95 lineal feet of improvements.

IEX-8: Pipe ditch from 48" outlet near Boat Landing and Cabin Street to culvert crossing beneath Williams Street with a 60-inch reinforced concrete pipe. This project is located in sub-basin 23 and involves approximately 460 lineal feet of improvements.

IEX-9: Pipe ditch from culvert crossing at Williams Street south to Ash Creek with a 60-inch concrete pipe. This project is located in sub-basin 32 and involves approximately 700 lineal feet of improvements.

IEX-10: Pipe ditch along east side of Ash Street from Hoffman Road to Polk Street with a 36-inch ADS N-12 pipe. This project is located in sub-basin 17 and involves approximately 180 lineal feet of improvements.

IEX-11: An existing drainage 'Area' between the SPRR tracks and Main St, and between Albert St. and 'A' St. is a shallow open area that acts as a ditch. The hydraulics in this area cause flooding. This area should be cleared of existing vegetation and a defined ditch re-graded. This project is located in sub-basin 39 and involve approximately 500 lineal feet of improvements.

IEX-12: Upsize 8- inch pipe, P-405, from 'Tee' at the Butler / Log Cabin intersection to the outlet with a 12-inch ADS N-12 pipe. Construct a manhole at the existing 'Tee'. This project is located in sub-basin 51 and involves approximately 100 lineal feet of improvements.

IEX-13: Pipe the existing ditch along north side of the Boise site from Stryker Road to the Railroad Bed with a 24-inch ADS N-12 pipe. This project is located in sub-basin 4 and involves approximately 950 lineal feet of improvements.

IEX-14: Existing 12-inch pipe, P-702, is undersized and needs to be replaced with an 18-inch ADS N-12 pipe. This project is located in sub-basin 58 and involves approximately 250 lineal feet of improvements.

IEX-15: Existing 8-inch pipe, P-723, is undersized and needs to be replaced with a 12-inch ADS N-12 pipe. This project is located in sub-basin 58 and involves approximately 160 lineal feet of improvements.

IEX-16: The existing ditch running parallel to the SPRR tracks south of 'I' Street is undersized and is recommended to be replaced with a 15-inch ADS N-12 pipe. This project is located in sub-basin 93 and involves approximately 230 lineal feet of improvements.

IEX-17: The area south of the apartment complex on 'I' Street and Corvallis Highway floods regularly and remediation efforts should be made to improve the hydrology in this area. This project is located in sub-basin 94.

IEX-18: Existing 12-inch pipe, P-763, running along 'D' Street between 3rd and Main is under sized and is recommended to be replaces with a 24-inch ADS N-12 pipe. This project is located in sub-basin 65A and involves approximately 760 lineal feet of improvements.

IEX-19: Existing 42-inch Corrugated Metal Pipe, C-78, running from north of Beckman Road to the Log Pond on Ash Creek is known to have 'bellies in it from die tests conducted by PWE. The pipe size and slope are sufficient to convey runoff from the design storm, although the bellies diminish the capacity of this pipe. Recommend replacement with an equal size ADS N-12 pipe at the existing slope. This project is located in sub-basin 83 and involves approximately 780 lineal feet of improvements.

IEX-20: Existing 15-inch pipe P-622 is under sized and needs to be replaced with a 24-inch pipe. This project is located in sub-basin 73 and involves approximately 320 lineal feet of improvements.

IEX-21: Existing 15-inch pipe P-679 is under sized and needs to be replaces with a 24-inch pipe. This project is located in sub-basin 73 and involves approximately 380 lineal feet of improvements.

IEX-22: Existing 15-inch pipe P-684 is under sized and needs to be replaced with an 18-inch pipe. This project is located in sub-basin 74 and involves approximately 430 lineal feet of improvements.

IEX-23: Existing 10-inch pipe P-690 is under sized and needs to be replaced with an 18-inch pipe. This project is located in sub-basin 74 and involves approximately 200 lineal feet of improvements.

IEX-24: Existing 10-inch pipe P-691 is undersized and needs to be replaced with a 15-inch pipe. This project is located in sub-basin 74 and involves approximately 380 lineal feet of improvements.

IEX-25: Existing 6-inch pipe P-662 is undersized and needs to be replaced with a 12-inch pipe. This project is located in sub-basin 64 and involves approximately 310 lineal feet of improvements.

IEX-26: Existing 6-inch pipe P-672 is under sized and needs to be replaced with a 12-inch pipe. This project is located in sub-basin 74 and involves approximately 330 lineal feet of improvements.

IEX-27: Existing 15" Pipe, P-620 is undersized and needs to be replaced with an 18-inch pipe. This project is located in sub-basin 72 and involves approximately 375 lineal feet of improvements.

IEX-28: Existing 15" Pipe, P-621 is undersized and needs to be replaced with an 18-inch pipe. This project is located in sub-basin 72 and involves approximately 410 lineal feet of improvements.

IEX-29: Pipe existing ditch from 'F Street to culvert at UGB. Use 60-inch pipe to match existing culverts on either end. This project is located in sub-basin 68 and involves approximately 440 lineal feet of improvements.

IEX-30: Pipe ditch on Gun Club Road from I-376 to I-383 with a 10-inch pipe. This project is located in sub-basin 53 and involves approximately 150 lineal feet of improvements.

IEX-31: Pipe ditch on Gun Club Road from I-369 to I-363 with a 12-inch pipe. This project is located in sub-basin 45 and involves approximately 85 lineal feet of improvements.

IEX-32: Construct manhole at pipe ends (C-57, P-36, C-56, & C-58) on Gun Club Road. This project is located in sub-basin 45.

IEX-33: Pipe ditch on Gun Club Road from C-51 to Ash Creek with an 18-inch pipe. This project is located in sub-basin 26 and involves approximately 400 lineal feet of improvements.

IEX-34: Pipe ditch along west side of Gun Club Road with a 12-inch pipe. This project is located in sub-basin 19 and involves approximately 1400 lineal feet of improvements.

IEX-35: Existing 21-inch pipe P-11 has an adverse slope and is recommended to be removed and replaced to ensure positive drainage. This project is located in sub-basin 2A and involves approximately 400 lineal feet of improvements.

IEX-36: Existing 24-inch pipe P-152 has an adverse slope and is recommended to be removed and replaced to ensure positive drainage. This project is located in sub-basin 19A and involves approximately 270 lineal feet of improvements.

IEX-37: Existing 6-inch pipe P-937 is smaller than the minimum recommended size of 10-inch and is recommended to be removed and replaced with a 10-inch pipe. This project is located in sub-basin 78 and involves approximately 415 lineal feet of improvements.

IEX-38: Existing 36-inch pipe P-805A has an adverse slope and is recommended to be removed and replaced to ensure positive drainage. This project is located in sub-basin 80 and involves approximately 150 lineal feet of improvements.

IEX-39: Existing 12-inch pipe P-914 has an adverse slope and is recommended to be removed and replaced to ensure positive drainage. This project is located in sub-basin 87 and involves approximately 400 lineal feet of improvements.

IEX-40: Existing 12-inch pipe P-971 has an adverse slope and is recommended to be removed and replaced to ensure positive drainage. This project is located in sub-basin 90 and involves approximately 600 lineal feet of improvements.

IEX-41: Existing 30-inch pipe P-991A has an adverse slope and is recommended to be removed and replaced to ensure positive drainage. This project is located in sub-basin 94 and involves approximately 255 lineal feet of improvements.

IEX-42: Existing 30-inch pipe P-995 has an adverse slope and is recommended to be removed and replaced to ensure positive drainage. This project is located in sub-basin 95 and involves approximately 365 lineal feet of improvements.

IEX-43: Existing 12-inch pipe P-1062A has an adverse slope and is recommended to be removed and replaced to ensure positive drainage. This project is located in sub-basin 97 and involves approximately 375 lineal feet of improvements.

IEX-44: Pipe ditch on Stryker Road from C-1 to P-39 with a 12-inch pipe. This project is located in sub-basin 5B and involves approximately 750 lineal feet of improvements.

IEX-45: 'F' Street Bridge – There is an existing weir at this location that serves to control the flow of stormwater and create a shallow upstream log pond. . The existing log pond located directly upstream of the weir has accumulated sedimentation over the years since it is no longer used as originally intended and has not been maintained. Due to sedimentation in this log pond, there is a loss of storage capacity that also contributes to upstream flooding. A previous analysis of the weir indicated that the weir could be removed, but as a result most of the flood control would be eliminated. This implies that a downstream analysis of Ash Creek needs to be conducted to ensure safe passage of the 100-year storm event without the weir. It is recommended that an analysis is conducted of Ash Creek as stated above and that the weir is removed if the analysis supports this alternative.

IEX 46: Gun Club Road Bridge – The existing bridge located at the Gun Club Road crossing of Ash Creek is undersized and causes flooding during moderate to severe storm events. A detailed engineering analysis, beyond the scope of this report, needs to be completed providing a box culvert or new bridge design that considers safe passage of the 100-year storm event without overtopping Gun Club Road.

IEX-47: General Maintenance – Many existing pipes throughout the city are either smaller than the recommended 10-inch minimum size, or have adverse slopes. These pipes are recommended to be removed and replaces as per **Appendix C**.

6.3.1.2 *EXISTING DEFICIENCIES - ODOT*

OEX-1: Up-Size culvert crossing, Culvert C-12, across Highway 51 from 24-inch to 30-inch diameter pipe, pipe material is dependent on available cover. Construct a field inlet to collect drainage from the surrounding field area. This project is located in sub-basin 5A and involves approximately 60 lineal feet of improvements.

OEX-2: Existing pipe run, P-774A, along Main Street between D Street and E Street transitions from 12-inch PVC to 24-inch Clay Tile pipe. The size and slope of the 24-inch pipe is sufficient, although all Clay Tile pipe is recommended for replacement and the 12-inch pipe is undersized. This entire run should be replaced with 24-inch ADS N-12. This project is located in sub-basin 65 and involves approximately 370 lineal feet of improvements.

OEX-3: Pipe ditch from P-41 to C-11 and tie into C-10 with a 12-inch pipe. This project is located in sub-basin 5B and involves approximately 345 lineal feet of improvements.

OEX-4: Pipe ditch from C-13 to approximately 240-feet north of C-12 with a 12-inch pipe. This project is located in sub-basin 5A and involves approximately 660 lineal feet of improvements.

OEX-5: Pipe ditch from 270-feet south of C-30A to c-25 with a 12-inch pipe. This project is located in sub-basin 5C and involves approximately 760 lineal feet of improvements.

OEX-6: Pipe ditch from C-25 to C-22 with a 18-inch pipe. This project is located in sub-basin 5C and involves approximately 420 lineal feet of improvements.

OEX-7: General Maintenance – Many existing pipes throughout the city are either smaller than the recommended 10-inch minimum size, or have adverse slopes. These pipes are recommended to be removed and replaces as per **Appendix D**.

6.3.2 UGB BUILD-OUT DEFICIENCIES

6.3.2.1 *UGB DEFICIENCIES - INDEPENDENCE*

IUGB-1: Upsize pipe run under **EX-3** from 15-inch to 18-inch. This project is located in sub-basin 4 and involves approximately 560 lineal feet of improvements.

IUGB-2: Widen box culvert under **EX-4** from 4.5 feet to 5.5 feet. This project is located in sub-basin 4.

IUGB-3: Upsize pipe run under **EX-5** from 30-inch to 36-inch. This project is located in sub-basin 5A and involves approximately 570 lineal feet of improvements.

IUGB-4: Construct 36-inch pipe on Gun Club road to convey build out stormwater from sub-basin UG1. This analysis assumed the likely entrance to the subdivision would be near North Gate Drive at which point this new pipe run would replace a portion of the improvements under **EX-36**. This pipe run would continue to the southern boundary of UG1. This project involves approximately 1180 lineal feet of improvements.

IUGB-5: Construct 42-inch pipe from the southern boundary of UG1 to Ash Creek in Gun Club Road. This project is a continuation of UGB-9 and would replace a portion of the improvements under **EX-35**. This project is located in sub-basin 26 and involves approximately 1130 lineal feet of improvements.

IUGB-6: Construct 18-inch pipe on Talamadge Road to convey build out stormwater from sub-basin 66. This project involves approximately 450 lineal feet of improvements.

IUGB-7: Construct 24-inch pipe on Talamadge Road to convey build out stormwater from sub-basin UG3. This pipe run is a continuation of improvements described under UGB-11. Discharge stormwater to existing ditches south of the UGB. This project involves approximately 400 lineal feet of improvements.

IUGB-8: Construct 12-inch pipe along the extension of 3rd Street in sub-basin 67. This project involves approximately 1070 lineal feet of improvements.

IUGB-9: Construct 12-inch pipe along Hanna Road (1/2 Street Improvement) with the build out of sub-basin UG2. This project involves approximately 1130 lineal feet of improvements.

IUGB-10: Construct 24-inch pipe along the eastern extension of Mt. Fir Ave. This project is located in UG4 and involves approximately 500 lineal feet of improvements.

IUGB-11: Construct 36-inch pipe along the eastern extension of Mt. Fir Ave from the termination of UGB-15 to a point discharging to the Willamette River. This project is located in sub-basin UG5 and involves approximately 1500 lineal feet of improvements.

IUGB-12: Construct 12-inch pipe in Corvallis Road from the southern boundary of the UBG to approximately sub-basin 98. This project replaces roadside ditches when Corvallis Road is improved. This project involves approximately 2080 lineal feet of improvements.

IUGB-13: Construct 18-inch pipe in Corvallis Road from the termination of project UGB-17 to a discharge point near existing culvert C-81. This project replaces road side ditches when Corvallis Road is improved and conveys additional stormwater when sub-basin 98 is built out. This project involves approximately 1420 lineal feet of improvements.

6.3.2.2 *UGB DEFICIENCIES - ODOT*

OUGB-1: Upsize culvert under **EX-6** from 30-inch to 36-inch. This project is located in sub-basin 5A and involves approximately 60 lineal feet of improvements.

OUGB-2: Upsize pipe run under **EX-47** from 12-inch to 18-inch. This project is located in sub-basin 5B and involves approximately 345 lineal feet of improvements.

OUGB-3: Upsize pipe run under **EX-48** from 12-inch to 18-inch. This project is located in sub-basin 5A and involves approximately 660 lineal feet of improvements.

OUGB-4: Upsize pipe run under **EX-49** from 12-inch to 18-inch. This project is located in sub-basin 5C and involves approximately 760 lineal feet of improvements.

OUGB-5: The outlet at existing culvert C-20 is an 18-inch pipe and needs to be upsized to 24-inches. This project is located in sub-basin 5C and involves approximately 90 lineal feet of improvements.

6.4 IMPROVEMENT COST ESTIMATES

6.4.1 EXISTING DEFICIENCIES ESTIMATE

The following sections provide cost estimates for all recommended projects divided into Independence or ODOT ownership categories.

6.4.1.1 *EXISTING DEFICIENCIES ESTIMATE - INDEPENDENCE*

Table 6.4.1: Existing Deficiencies Cost Estimate - Independence

Project	Description	Cost
IEX-1	Construct New: 3500 Lineal Feet of 48-inch Pipe	$ 840,000
IEX-2	Construct New: 3500 Lineal Feet of 30-inch Pipe	$ 525,000
IEX-3	Construct New: 560 Lineal Feet of 15-inch Pipe	$ 42,000
IEX-4	Widen Box Culvert under SPRR Tracks	$ 10,500
IEX-5	Construct New: 570 Lineal Feet of 30-inch Pipe	$ 85,500
IEX-6	Construct New: 500 Lineal Feet of 30-inch Pipe	$ 75,000
IEX-7	Construct New: Bore 95 Lineal Feet of 18-inch Pipe	$ 12,000
IEX-8	Construct New: 460 Lineal Feet of 60-inch Pipe	$ 138,000
IEX-9	Construct New: 700 Lineal Feet of 60-inch Pipe	$ 210,000
IEX-10	Construct New: 180 Lineal Feet of 36-inch Pipe	$ 32,400
IEX-11	Hydrological Improvements	$ 75,000
IEX-12	Remove & Replace: 100 Lineal Feet of 12-inch Pipe	$ 6,000
IEX-13	Construct New: 950 Lineal Feet of 24-inch Pipe	$ 114,000
IEX-14	Remove & Replace: 250 Lineal Feet of 18-inch Pipe	$ 22,500
IEX-15	Remove & Replace: 160 Lineal Feet of 12-inch Pipe	$ 9,600
IEX-16	Construct New: 230 Lineal Feet of 15-inch Pipe	$ 17,250
IEX-17	Hydrological Improvements	$ 22,500
IEX-18	Remove & Replace: 760 Lineal Feet of 24-inch Pipe	$ 91,200
IEX-19	Remove & Replace: 780 Lineal Feet of 42-inch Pipe	$ 163,800
IEX-20	Remove & Replace: 320 Lineal Feet of 24-inch Pipe	$ 38,400
IEX-21	Remove & Replace: 380 Lineal Feet of 24-inch Pipe	$ 45,600
IEX-22	Remove & Replace: 430 Lineal Feet of 18-inch Pipe	$ 38,700
IEX-23	Remove & Replace: 200 Lineal Feet of 18-inch Pipe	$ 18,000
IEX-24	Remove & Replace: 380 Lineal Feet of 15-inch Pipe	$ 28,500
IEX-25	Remove & Replace: 310 Lineal Feet of 12-inch Pipe	$ 18,600
IEX-26	Remove & Replace: 330 Lineal Feet of 12-inch Pipe	$ 19,800
IEX-27	Remove & Replace: 375 Lineal Feet of 18-inch Pipe	$ 33,750
IEX-28	Remove & Replace: 410 Lineal Feet of 18-inch Pipe	$ 36,900
IEX-29	Construct New: 440 Lineal Feet of 60-inch Pipe	$ 132,000
IEX-30	Construct New: 150 Lineal Feet of 10-inch Pipe	$ 7,500
IEX-31	Construct New: 85 Lineal Feet of 12-inch Pipe	$ 5,100
IEX-32	Construct New: 96-inch Manhole	$ 9,600
IEX-33	Construct New: 400 Lineal Feet of 18-inch Pipe	$ 36,000
IEX-34	Construct New: 1400 Lineal Feet of 12-inch Pipe	$ 84,000
IEX-35	Remove & Replace: 400 Lineal Feet of 21-inch Pipe	$ 40,000
IEX-36	Remove & Replace: 270 Lineal Feet of 24-inch Pipe	$ 32,700
IEX-37	Remove & Replace: 415 Lineal Feet of 10-inch Pipe	$ 20,800
IEX-38	Remove & Replace: 150 Lineal Feet of 36-inch Pipe	$ 26,500

IEX-39	Remove & Replace: 400 Lineal Feet of 12-inch Pipe	$ 24,000
IEX-40	Remove & Replace: 600 Lineal Feet of 12-inch Pipe	$ 36,000
IEX-41	Remove & Replace: 255 Lineal Feet of 30-inch Pipe	$ 38,100
IEX-42	Remove & Replace: 365 Lineal Feet of 30-inch Pipe	$ 54,700
IEX-43	Remove & Replace: 375 Lineal Feet of 12-inch Pipe	$ 22,600
IEX-44	Construct New: 750 Lineal Feet of 12-inch Pipe	$ 45,000
IEX-45	'F' Street Bridge Weir	$ 240,000
IEX-46	Gun Club Road Box Culvert	$ 300,000
IEX-47	General Maintenance: See Appendix C	$ 722,673
	Total	**$ 4,647,773**

6.4.1.2 *EXISTING DEFICIENCIES ESTIMATE - ODOT*

Table 6.4.2: Existing Deficiencies Cost Estimate - ODOT

Project	**Description**	**Cost**
OEX-1	Remove & Replace: 60 Lineal Feet of 30-inch Pipe	$ 9,000
OEX-2	Remove & Replace: 370 Lineal Feet of 24-inch Pipe	$ 44,400
OEX-3	Construct New: 345 Lineal Feet of 24-inch Pipe	$ 20,700
OEX-4	Construct New: 660 Lineal Feet of 24-inch Pipe	$ 39,600
OEX-5	Construct New: 760 Lineal Feet of 24-inch Pipe	$ 45,600
OEX-6	Construct New: 420 Lineal Feet of 30-inch Pipe	$ 37,800
OEX-7	General Maintenance: See Appendix D	$ 202,741
	Total	**$ 399,841**

6.4.2 UGB BUILD-OUT DEFICIENCIES ESTIMATE

The following sections provide cost estimates for all recommended projects divided into Independence or ODOT ownership categories.

6.4.2.1 *UGB BUILD OUT DEFICIENCIES ESTIMATE - INDEPENDENCE*

Table 6.4.3: UGB Build Out Deficiencies Cost Estimate – Independence

Project	**Description**	**Total Cost**	**Existing Component**	**Build Out Component**
IUGB-1	Upsize 560 Lineal Feet from 15-inch to 18-inch	$ 50,400	$ 42,000	$ 8,400
IUGB-2	Upsize Box Culvert	$ 12,000	$ 10,500	$ 1,500
IUGB-3	Upsize 570 Lineal Feet from 30-inch to 36-inch	$ 102,600	$ 85,500	$ 17,100
IUGB-4	Upsize 1180 Lineal Feet from 12-inch to 36-inch	$ 212,400	$ 70,800	$ 141,600
IUGB-5	Upsize 1130 Lineal Feet from 18-inch to 42-inch	$ 237,300	$ 101,700	$ 135,600
IUGB-6	Construct New: 450 Lineal Feet of 18-inch Pipe	$ 40,500		$ 40,500

IUGB-7	Construct New: 400 Lineal Feet of 24-inch Pipe	$ 48,000		$ 48,000
IUGB-8	Construct New: 1070 Lineal Feet of 12-inch Pipe	$ 64,200		$ 64,200
IUGB-9	Construct New: 1130 Lineal Feet of 12-inch Pipe	$ 67,800		$ 67,800
IUGB-10	Construct New: 500 Lineal Feet of 24-inch Pipe	$ 60,000		$ 60,000
IUGB-11	Construct New: 1500 Lineal Feet of 36-inch Pipe	$ 270,000		$ 270,000
IUGB-12	Construct New: 2080 Lineal Feet of 12-inch Pipe	$ 124,800	$ 124,800	
IUGB-13	Construct New: 1420 Lineal Feet of 18-inch Pipe	$ 127,800	$ 85,200	$ 42,600
	Total	**$1,417,800**	**$ 520,500**	**$ 897,300**

6.4.2.2 *UGB BUILD OUT DEFICIENCIES ESTIMATE - ODOT*

Table 6.4.4: UGB Build Out Deficiencies Cost Estimate - ODOT

Project	Description	Total Cost	Existing Component	Build Out Component
OUGB-1	Upsize 60 Lineal Feet from 30-inch to 36-inch	$ 10,800	$ 9,000	$ 1,800
OUGB-2	Upsize 345 Lineal Feet from 12-inch to 18-inch	$ 31,050	$ 20,700	$ 10,350
OUGB-3	Upsize 660 Lineal Feet from 12-inch to 18-inch	$ 59,400	$ 39,600	$ 19,800
OUGB-4	Upsize 760 Lineal Feet from 12-inch to 18-inch	$ 68,400	$ 45,600	$ 22,800
OUGB-5	Upsize 90 Lineal Feet from 18-inch to 24-inch	$ 10,800	$ 8,100	$ 2,700
	Total	**$ 180,450**	**$ 123,000**	**$ 57,450**

6.5 IMPROVEMENT SCHEDULE

The existing deficiencies of the stormwater conveyance system have varying degrees of severity and impacts on the safe passage of stormwater during the 25-year design storm event. This section recommends when each improvement project should be scheduled for design and construction. Improvements have been divided into three distinct categories depending on the severity of the deficiency. The following table lists the three improvement categories and the corresponding time frame for planning purposes.

Table X: Implementation Categories

Category	Deficiency Severity	Implementation Horizon
Short	Critical	0 – 5 years
Medium	Severe	5 – 10 Years
Long	Moderate	10 – 20 Years

The following sections list each existing deficiency project and the corresponding implementation category.

6.5.1 Improvement Schedule - Independence

Table 6.5.1: Existing Deficiencies Implementation Schedule		
Project	**Description**	**Priority**
IEX-1	Construct New: 3500 Lineal Feet of 48-inch Pipe	Short
IEX-2	Construct New: 3500 Lineal Feet of 30-inch Pipe	Short
IEX-3	Construct New: 560 Lineal Feet of 15-inch Pipe	Short
IEX-4	Widen Box Culvert under SPRR Tracks	Short
IEX-5	Construct New: 570 Lineal Feet of 30-inch Pipe	Short
IEX-6	Construct New: 500 Lineal Feet of 30-inch Pipe	Short
IEX-7	Construct New: Bore 95 Lineal Feet of 18-inch Pipe	Short
IEX-8	Construct New: 460 Lineal Feet of 60-inch Pipe	Short
IEX-9	Construct New: 700 Lineal Feet of 60-inch Pipe	Short
IEX-10	Construct New: 180 Lineal Feet of 36-inch Pipe	Short
IEX-11	Hydrological Improvements	Short
IEX-12	Remove & Replace: 100 Lineal Feet of 12-inch Pipe	Short
IEX-13	Construct New: 950 Lineal Feet of 24-inch Pipe	Short
IEX-14	Remove & Replace: 250 Lineal Feet of 18-inch Pipe	Short
IEX-15	Remove & Replace: 160 Lineal Feet of 12-inch Pipe	Short
IEX-16	Construct New: 230 Lineal Feet of 15-inch Pipe	Short
IEX-17	Hydrological Improvements	Short
IEX-18	Remove & Replace: 760 Lineal Feet of 24-inch Pipe	Short
IEX-19	Remove & Replace: 780 Lineal Feet of 42-inch Pipe	Medium
IEX-20	Remove & Replace: 320 Lineal Feet of 24-inch Pipe	Short
IEX-21	Remove & Replace: 380 Lineal Feet of 24-inch Pipe	Short
IEX-22	Remove & Replace: 430 Lineal Feet of 18-inch Pipe	Short
IEX-23	Remove & Replace: 200 Lineal Feet of 18-inch Pipe	Short
IEX-24	Remove & Replace: 380 Lineal Feet of 15-inch Pipe	Short
IEX-25	Remove & Replace: 310 Lineal Feet of 12-inch Pipe	Short
IEX-26	Remove & Replace: 330 Lineal Feet of 12-inch Pipe	Short
IEX-27	Remove & Replace: 375 Lineal Feet of 18-inch Pipe	Short
IEX-28	Remove & Replace: 410 Lineal Feet of 18-inch Pipe	Short
IEX-29	Construct New: 440 Lineal Feet of 60-inch Pipe	Long
IEX-30	Construct New: 150 Lineal Feet of 10-inch Pipe	Long
IEX-31	Construct New: 85 Lineal Feet of 12-inch Pipe	Long
IEX-32	Construct New: 96-inch Manhole	Long
IEX-33	Construct New: 400 Lineal Feet of 18-inch Pipe	Long
IEX-34	Construct New: 1400 Lineal Feet of 12-inch Pipe	Long
IEX-35	Remove & Replace: 400 Lineal Feet of 21-inch Pipe	Medium
IEX-36	Remove & Replace: 270 Lineal Feet of 24-inch Pipe	Medium
IEX-37	Remove & Replace: 415 Lineal Feet of 10-inch Pipe	Long
IEX-38	Remove & Replace: 150 Lineal Feet of 36-inch Pipe	Medium

IEX-39	Remove & Replace: 400 Lineal Feet of 12-inch Pipe	Medium
IEX-40	Remove & Replace: 600 Lineal Feet of 12-inch Pipe	Medium
IEX-41	Remove & Replace: 255 Lineal Feet of 30-inch Pipe	Medium
IEX-42	Remove & Replace: 365 Lineal Feet of 30-inch Pipe	Medium
IEX-43	Remove & Replace: 375 Lineal Feet of 12-inch Pipe	Medium
IEX-44	Construct New: 750 Lineal Feet of 12-inch Pipe	Long
IEX-45	'F' Street Bridge Weir	Short
IEX-46	Gun Club Road Box Culvert	Short
IEX-47	General Maintenance: See Appendix C	Long

6.5.2 IMPROVEMENT SCHEDULE - ODOT

Table 6.5.2: Existing Deficiencies Implementation Schedule		
Project	**Description**	**Priority**
OEX-1	Remove & Replace: 60 Lineal Feet of 30-inch Pipe	Short
OEX-2	Remove & Replace: 370 Lineal Feet of 24-inch Pipe	Short
OEX-3	Construct New: 345 Lineal Feet of 24-inch Pipe	Long
OEX-4	Construct New: 660 Lineal Feet of 24-inch Pipe	Long
OEX-5	Construct New: 760 Lineal Feet of 24-inch Pipe	Long
OEX-6	Construct New: 420 Lineal Feet of 30-inch Pipe	Long
OEX-7	General Maintenance: See Appendix D	Long

Any project listed that is within an area scheduled for street rehabilitation should be completed as part of that improvement. Projects listed under UGB build-out deficiencies that increase the size of a pipe listed in Section 6.3.2 should be considered for implementation if SDC funding has become available.

Deficiencies that are predicted to occur as growth continues throughout the UGB should be improved as SDC funding becomes available.

6.6 MANAGEMENT AND MAINTENANCE ANALYSIS

6.6.1 CURRENT MANAGEMENT ORGANIZATION

The Independence Public Works Department is currently organized with management over site from the Community Development Director and operational over site from the Public Works Superintendent. Field staff is loosely responsible for the different components Public Works is responsible for including storm drainage, sanitary sewer, water system, transportation, and parks and recreation. Current staff includes individuals possessing a wealth of first hand knowledge concerning the existing stormwater conveyance system.

6.6.2 CURRENT MAINTENANCE EFFORT

The current maintenance effort is limited by staff personnel resulting from a limited budget. As a result of this SWMP, maintenance efforts will increase requiring one additional staff member in the near term.

6.6.3 ORGANIZATIONAL RECOMMENDATIONS

The current organization varies from a more traditional structure with a public works director. The current model has been cost effective while meeting the requirements of a Public Works Department. This SWMP recommends that the current organizational structure remain in place for as long as key personnel are in place.

6.6.4 MAINTENANCE RECOMMENDATIONS

Operational Best Management Practices (BMPs) covered in Appendix F list several maintenance recommendations. In addition to those recommendations, records of all catch basin and pipe cleaning activities should be kept to ensure timely and appropriate levels of effort. Further, while catch basins are cleaned on a yearly basis, field crews should note any pipes that are not scheduled for cleaning that have evidence of siltation so that these additional pipes may be cleaned in a timely fashion.

6.6.5 STAFFING RECOMMENDATIONS

The addition of one staff member in the near term is recommended due to the increased level of work resulting from this SWMP.

CHAPTER 7
FINANCIAL ANALYSIS

7.1 STRATEGY FOR INFRASTRUCTURE IMPROVEMENTS

7.1.1 EXISTING SYSTEM NEEDS

The existing system needs are broken down into three main categories, short, medium, and long term. Project priorities are listed for each project in Chapter 6.6. Table 7.1.1 summarizes estimated costs for each of these three categories for both Independence and ODOT owned facilities. The existing component of UGB Build Out costs, shown in Table 6.5.3 and 6.5.4, are included in the long term cost estimates.

Table 7.1.1: Implementation Horizon Costs

Category	Implementation Horizon	Independence Costs	ODOT Costs
Short Term	0-5 Years	$ 3,146,700	$ 53,400
Medium Term	5-10 Years	$ 438,400	$ 0
Long Term	10-20 Years	$ 1,583,173	$ 469,441
	Total	**$ 5,168,273**	**$ 522,841**

7.1.2 SYSTEM GROWTH REQUIREMENTS

System growth funding requirements for projects concerning Urban Growth Build Out are covered in Chapter 6.6. Growth related costs are those costs that are required to improve stormwater facilities to accommodate population growth. The growth related component of an improvement is the difference between the total project cost and the cost for replacing the existing facility. Table 7.1.2 summarizes these funding requirements for both Independence and ODOT owned facilities.

Table 7.1.2: UGB Build out Costs

System Owner	Cost
Independence	$ 897,300
ODOT	$ 57,450
Total	**$ 954,750**

7.2 FUNDING

7.2.1 FUNDING ALTERNATIVES

There exist several funding alternatives that can be implemented independently or in conjunction with one another to achieve the funding requirements of this SWMP. Funding sources include loans, grants, bonds, system development charges, assessments, and service connection fees. In addition to these sources, a storm water utility will generate a major source of funding for the proposed improvements.

7.2.1.1 *GENERAL OBLIGATION BONDS*

A general obligation (G.O.) bond is one that is backed by the full credit of the issuer, for the payment of which the issuer can levy as valorem taxes (taxes levied in proportion to property values). The issuer can make the required payments on the bonds solely from the tax levy or may instead use revenues from assessments, user charges or some other source. Since the bonds are secured by the municipal or special service district power to tax, this usually justifies a lower interest rate than other types of bonds. G.O. bonds lend themselves readily to competitive pubic sale at a reasonable interest rate because of their high degree of security, their tax exempt status and their general acceptance.

These bonds can be revenue supported because a portion of the user fee can be pledged toward payment of the debt sercice. This can eliminate the need to collect additional property taxes to retire the G.O. bonds. Such revenue supported G.O. bonds have most of the advantages of revenue bonds, but also maintain the lower interest rate and ready marketability of G.O. bonds.

Oregon Revised Statutes (ORS) do not limit either the total amount or the percentage of general obligation bonds which a community can issue. The financial capabilities of the residents of a community generally limit proposed developments to a maximum of 3 percent of the ture cash value of the area. The ORS limit the maximum term of G.O. bonds to 40 years. However, the realistic term for which general obligation bonds should be issued is 20 to 30 years or for the life expectancy of the improvements. Under the present economic climate, lower interest rates will be associated with the shorter terms.

Financing of sewer system improvements by G.O. bonds is usually accomplished by the following procedures:

1. Determination of the capital costs required for the proposed improvement, including engeering design fees.
2. A general election must be held for the tax payers to authorize the sale of the G.O. bonds.
3. Following voter approval, the G.O. bonds are advertised and offered for sale to banks and other investors.

4. The revenue from the bond sale is used to pay the capital costs associated with the project including design fees.
5. G.O. bond authorization must be approved by a majority vote, this generally limits proposals to projects benefiting all or the majority of the voters of a community.

Some of the advantages of G.O. bonds over other types of bonds are as follows:

1. The laws authorizing G.O. bonds are less restrictive than those governing Improvement Bonds under the Bancroft Act. G.O. bond interest rates are not affected by the Bancroft limitations, and costly assessment procedures are not required.
2. Taxes paid in the retirement of G.O. bonds are deductible.
3. G.O. bonds can be sold prior to the beginning of construction; therefore G.O. bonds provide operating funds for engineering and legal before construction expenses begin accruing.

7.2.1.2 *AD VALOREM TAX*

The use of an ad valorem tax is a common method of repaying general obligation bonds for utility improvements. This method of financing results in the participation of all private property owners within the benefited area whether the property is developed or not. The construction costs for the project are shared proportionally among all property owners based on the assessed value of each property.

7.2.1.3 *REVENUE BONDS*

A revenue bond is one that is payable solely from charges made for the services provided. Such bonds cannot be paid from tax levies or special assessments, and their only security is the borrower's promise to operate the system in a way that will provide sufficient net revenues to meet the obligations of repayment of the bond issue. Revenue bonds are most commonly retired with revenue from monthly user fees.

Successful issuance of revenue bonds depends on the bond market evaluation of the dependability of the revenue pledged. Normally, there are no legal limitations on the amount of revenue bonds that can be issued, but excessive issue amounts are generally unattractive to bond buyers because they represent a high investment risk. In rating revenue bonds, buyers consider the economic justification for the project, reputation of the borrower, methods for billing and collecting, rate structures, and the degree to which forecasts of net revenues are realistic.

7.2.1.4 *LOCAL IMPROVEMENT DISTRICTS*

Local Improvement Districts (LID) utilize Improvement (Bancroft) Bonds that can be issued under an Oregon law called the Bancroft Act. Cities and special service districts are limited to improvement bonds not exceeding three percent of the true cash value within the City or District. For a specific improvement, all property within the assessment area is assessed on an equal basis, regardless of whether it is developed or not. This assessment becomes a direct lien against the property; the property owners have the option of either paying the assessment in cash or applying for improvement bonds. If the improvement bond option is taken, the City or District sells Bancroft Improvement Bonds to finance the construction, and the assessment is paid over not more than 20 years in 40 semi-annual principal with interest installments.

With LID financing, an improvement district is formed, the bond boundaries are established, and the benefited properties and property owners are determined. The engineer usually determines an approximate assessment, either on a square foot or a lineal feet of frontage basis. Property owners are then given an opportunity to remonstrate against the project. The assessments against the properties are usually not levied until the actual total cost of the project is determined. Since this determination is normally not possible until the project is completed, funds are not available from assessments for the purpose of retaining an engineer or making monthly payments to the contractor. Therefore, some method of interim financing must be arranged, or a pre-assessment program must be adopted that is based on the estimated total costs. It is common practice to issue warrants to cover debts, with the warrants to be paid when the project is complete.

The primary disadvantages to this source of revenue are:

1. The property to be assessed must have a true cash value at least equal to 50 percent of the total assessments to be levied. This usually requires a substantial cash payment by owners of undeveloped property.
2. General obligation bonds can be issued in lieu of a LID formation, and they are usually more favorable.

The LID program should be considered for initial developments, and for future expansions to annexations or property developments. The construction of sewerage facilities though the formation of LID's is viable when the properties bordering or served by the LID are specifically benefited. The establishment of a LID should be based on a thorough evaluation of the long range plan for the entire area. Following is a summary for the development of a LID.

1. Receive written request or petition form the affected property owners for the improvement. If there is any question regarding the feasibility or approval of the project, the petitioners should provide sufficient funds to cover the engineering, legal and administrative costs associated with preliminary planning and establishing the LID.
2. Establish an assessment district and preliminary cost estimates. The cost estimates presented in this report will be the basis for projecting the assessments; however, some revision may be necessary depending on the final scope of the particular selected project.

3. If the project is approved by the public, authorize the preparation of plans and specifications by a consulting engineer.
4. Publicly advertise for construction bids.
5. Award construction contact to the lowest responsible bidder.
6. Construct improvements.

7.2.1.5 *CAPITAL CONSTRUCTION (SINKING) FUND*

Capital construction (sinking) funds are often established in City or special service district budgets for a particular planned construction purpose. Additional budgeted amounts from each years annual budget are placed in a sinking fund until sufficient revenues have accumulated and are available for the needed project. Such funds can also be developed with revenue derived from system development charges or serial levies.

7.2.1.6 *SYSTEM DEVELOPMENT CHARGE*

A System Development Charge (SDC) is a single fee for each utility required as each piece of property is developed and requires services. This fee goes directly into a capital construction fund and is used to pay for system improvements that are a result of increased development requiring additional system capacity.

7.2.1.7 *ASSESSMENTS*

Levying of assessments is a typical method for retiring G.O. bonds used to fund projects benefiting limited areas. Although G.O. bonds are normally associated with the financing of facilities which benefit an entire community, they are occasionally used to finance limited benefit improvements. The advantage in using this type of bonding is that it allows the governing body to make its own arrangements and thus is not bound by the Bancroft Act.

The levying of assessments is a satisfactory method of repaying G.O. bonds, especially in instances where the benefit is limited to specific areas.

7.2.1.8 *UTILITY FEES*

Monthly charges are made to all residences, businesses, schools, etc. that are connected the storm system. Storm sewer charges are normally established by resolution, and can be modified as needed to serve increases or decreases in operating costs. Rates are established depending on the various classes of users and the anticipated flows appurtenant to their connection.

7.2.1.9 *GRANTS AND LOANS*

Two sources of loans and grants are discussed in this section, The Oregon Economic & Community Development Program and the Rural Utilities Service Program. Both of these sources provide funding in the form of Loans and Grants for storm sewer improvement projects.

Oregon Economic & Community Development

There are currently two sources of funding through the Oregon Economic & Community Development Department. The following list summarizes these programs and describes funding limits and eligible projects.

1) Water / Wastewater Financing Program

   Project Funding:

   - Maximum direct loan is $1,000,000.
   - Maximum loan funded through a State Revenue Bond is $10,000,000 for entities determined to be 'Credit Worthy' by the department.
   - Loans are typically repaid with utility revenues or voter approved bonds.
   - A limited tax general obligation bond is required.
   - Maximum Grant is $750,000. This is in addition to the cost of issuance and debt service reserve in the case of a bonded loan.
   - Grant and loan amounts are determined by a financial analysis of the applicant's ability to afford additional loans.

   Eligible Projects

   - Systems that have received, or are likely to receive, a notice of Non-Compliance with the Safe Drinking Water Act or the Clean Water Act.
   - Project needed to meet other state or federal water quality statutes and standards.

   Eligible Activities

   - Storm Drainage Systems.
   - Purchase of right-of-way and easements required for infrastructure.
   - Design and Construction Engineering.

Grants and loans are available to finance preliminary planning, engineering studies, and economic investigations needed to determine project feasibility. Up to $10,000 is available for grants and $20,000 for loans for eligible applicants with populations of less than 5000.

This program will not fund costs incurred prior to award of loans or grants except for engineering and other support activities required for construction.

2) Special Public Works Fund

Project Funding:

- Low interest loans on 20-year terms which can be extended to 25-year terms.
- Maximum loan of $11,000,000.
- Municipalities are required to match 25% of the loan amount.
- Costs associated with debt issuance such as bond counsel and insurance are absorbed by the department.
- Grants cannot exceed 85% of the total project cost
- Grants, for approved projects, are based primarily on applicant need.

Eligible Activities

- Stormwater Drainage Facilities.
- Purchase of right-of-way and easements required for infrastructure improvements.
- Buildings and Associated Equipment.

Grants and loans are available to finance preliminary planning, engineering studies, and economic investigations needed to determine project feasibility. Up to 85% of project costs is available for grants and for loans with 7-year repayment terms.

Entities interested in the Oregon Economic & Community Development Program are required to write a letter of interest which will be rated and ranked for the Department priority list. The project priority list is based on criteria such as health risks, environmental compatibility, and affordability. Letters of interest are evaluated and ranked once a year. Each applicant must show the financial, managerial, and technical capacity to maintain compliance with the Safe Water Drinking Act. Also, an underwriting is conducted to ensure creditworthiness.

Rural Utilities Service

Project Funding:

- Grants may be provided to reduce project costs to a reasonable level. Grants can cover up to 75% of project costs.
- Loan guarantees may be available for up to 90% of any eligible loss incurred by the lender.
- Maximum loan term is 40-years although this term may not exceed the useful life of the improvements.
- Collateral is required such as bonds, note pledging taxes, assessments, or revenues.

- Direct loans of up to $797,567
- Guaranteed loans of up to $75,000
- Grants of up to $425,000

Eligible Activities

- Construction, repair, modify, expand, or otherwise improve water storm drainage systems.
- Acquire needed land, water sources, and water rights.
- Associated costs such as legal and engineering fees.

7.2.2 FUNDING RECOMMENDATIONS

Two project classifications require funding as a result of this SWMP. Existing deficiencies and UGB build out deficiencies have distinct funding methodologies.

Existing Deficiency Funding

Fees collected from a stormwater utility will comprise the foundation for project funding. Fees collected from a stormwater utility can be leveraged to obtain government loans and grants by providing any required matching funds. If additional funds are required beyond any loans or grants that are gained, then Revenue Bonds are recommended as an alternative source.
Urban Growth Boundary Build Out Deficiency Funding

SDC revenue is the primary source of funding for implementing growth related improvements detailed in this SWMP. SDC funding may be used to leverage matching funds for grants or loans, or to back issuance of Revenue Bonds.

7.2.3 FUNDING PLAN

7.2.3.1 *EXISTING DEFICIENCIES FUNDING*

The funding plan for existing deficiencies addresses short, medium, and long term projects. The primary source of funding is from stormwater utility fees. Stormwater utility fees are based on Equivalent Residential Units (ERU) that convert impervious area to standardized units that will be assessed a unit cost. The stormwater utility will have a base fee of $1 per user and an initial fee of $4 per ERU. There are currently 1988 users and 3248 ERU's that would be charged this stormwater utility fee. The base rate of $1 per user would remain constant throughout Urban Growth Boundary build out. The $4 fee per ERU would increase %10 annually until the rate peaks at $10 per ERU 11 years from implementation of the stormwater utility. Table 7.2.1

illustrates revenue generated from the stormwater utility through a 20-year growth horizon. The number of users and ERU's increase %2 per year, the projected population growth.

Table 7.2.1: Stormwater Utility Revenues

Year	2% Growth Users	ERU	Rate $/User	Rate $/ERU	Monthly Revenue	Annual Revenue
1	1988	3248	$ 1	$ 4	$ 14,980	**$ 179,760**
2	2028	3313	$ 1	$ 4.40	$ 16,605	**$ 199,257**
3	2068	3379	$ 1	$ 4.84	$ 18,424	**$ 221,085**
4	2110	3447	$ 1	$ 5.32	$ 20,460	**$ 245,526**
5	2152	3516	$ 1	$ 5.86	$ 22,741	**$ 272,897**
6	2195	3586	$ 1	$ 6.44	$ 25,296	**$ 303,557**
7	2239	3658	$ 1	$ 7.09	$ 28,159	**$ 337,904**
8	2284	3731	$ 1	$ 7.79	$ 31,366	**$ 376,388**
9	2329	3806	$ 1	$ 8.57	$ 34,959	**$ 419,513**
10	2376	3882	$ 1	$ 9.43	$ 38,987	**$ 467,842**
11	2423	3959	$ 1	$ 10.00	$ 42,016	**$ 504,196**
12	2472	4038	$ 1	$ 10.00	$ 42,857	**$ 514,280**
13	2521	4119	$ 1	$ 10.00	$ 43,714	**$ 524,565**
14	2572	4202	$ 1	$ 10.00	$ 44,588	**$ 535,056**
15	2623	4286	$ 1	$ 10.00	$ 45,480	**$ 545,758**
16	2676	4371	$ 1	$ 10.00	$ 46,389	**$ 556,673**
17	2729	4459	$ 1	$ 10.00	$ 47,317	**$ 567,806**
18	2784	4548	$ 1	$ 10.00	$ 48,264	**$ 579,162**
19	2839	4639	$ 1	$ 10.00	$ 49,229	**$ 590,745**
20	2896	4732	$ 1	$ 10.00	$ 50,213	**$ 602,560**

Collections from the stormwater utility would be used as the primary funding source for existing deficiency projects. Table 7.2.2 compares required funding and available funding for short, medium, and long term projects.

Table 7.2.2: Utility Fee Revenue vs. Estimated Costs

Category	Implementation Horizon	Estimated Cost	Utility Fee Revenue	Difference
Short	0-5 Years	$ 3,146,700	$ 1,118,525	($ 2,028,175)
Medium	5-10 Years	$ 438,400	$ 1,905,205	$ 1,466,805
Long	10-20 Years	$ 1,583,173	$ 5,520,801	$ 3,937,628

As shown in Table 7.2.2, short term project funding is projected to be deficient $2,028,175 below the estimated cost of the improvements. Utility fee revenue for both Medium and Long term projects exceeds the estimated costs for improvements. In order to fund the short term projects, the City would spend one half of the utility fee revenues on improvement projects. The remaining utility fee revenues would be used as matching fund for a public grant or loan, or to back a revenue bond. Utility fee revenues from year 6 through year 20 would be used to pay off a loan or revenue bond.

7.2.3.2 *UGB Build Out Deficiencies Funding*

The primary source of funding for the growth component of UGB Build Out deficiencies is System Development Charges (SDC). Table 7.2.3 lists the growth component of improvement costs for both Independence and ODOT owned systems.

Table 7.2.3: UGB Build Out Growth Component

	Independence	ODOT
Category	**Costs**	**Costs**
As Needed	$ 897,300	$ 57,450

If additional funding is required to implement required system improvements, then a portion of the SDC revenues would be used as matching fund for a public grant or loan, or to back a revenue bond. Public loans or a revenue bond would be paid off as additional SDC's became available.

7.3 IMPLEMENTATION PLAN

7.3.1 Existing Deficiencies Implementation

The City will propose a stormwater utility fee based on the recommendations of this report. Upon approval of a utility fee, available funding will begin to be used for design and construction of recommended improvements as per the implementation schedule presented in Chapter 6.

7.3.2 UGB Build Out Deficiencies Implementation

Stormwater SDC rates will be updated to reflect improvement costs estimated in this report. SDC funding will be used for growth related improvements as funding from SDC's becomes available. Projects that are recommended for improvements under existing deficiencies that are also recommended for further improvements under UGB Build Out, will be considered for the ultimate Build Out improvement if funding is available.

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-1	M-1	M-2	N-12	168.07	167.39	230.15	12	0.30	FAIR
P-2	I-1	M-2	N-12	168.55	167.39	21.04	10	5.51	GOOD
P-3	I-2	M-2	N-12	168.33	167.39	12.88	10	7.30	GOOD
P-4	M-2	M-3	N-12	167.39	166.93	299.6	18	0.15	GOOD
P-5	I-3	M-3	N-12	168.44	166.93	20.88	10	7.23	GOOD
P-6	I-4	M-3	N-12	167.73	166.93	13.29	10	6.02	GOOD
P-7	I-12	I-11	N-12	169.29	169.11	34.42	10	0.52	GOOD
P-8	I-11	I-13	N-12	169.06	166.76	237.1	12	0.97	GOOD
P-9	I-14	I-13	N-12	167.93	166.66	34.39	10	3.69	GOOD
P-9A	I-13	I-15	N-12	165.86	165.54	202.54	20	0.16	GOOD
P-10	I-16	I-15	N-12	167.93	166.66	34.31	10	3.70	GOOD
P-11	I-15	I-17	N-12	165.50	165.67	400.19	20	-0.04	GOOD
P-12	I-22	I-21	N-12	168.72	167.32	34.29	10	4.08	GOOD
P-13	I-21	I-23	N-12	167.22	166.33	315.69	12	0.28	GOOD
P-14	I-24	I-23	N-12	167.59	166.33	34.22	10	3.68	GOOD
P-15	I-23	I-25	N-12	166.23	165.01	320.11	12	0.38	GOOD
P-16	M-3	M-4	N-12	166.93	166.39	299.52	18	0.18	GOOD
P-17	I-5	M-4	N-12	166.83	166.14	21.47	10	3.21	GOOD
P-18	I-6	M-4	N-12	166.85	166.14	12.66	10	5.61	GOOD
P-19	M-4	M-5	N-12	166.14	165.37	308.49	24	0.25	GOOD
P-20	M-5	OUT	PVC	165.37	165.15	22.53	30	0.98	GOOD
P-21	M-6	M-5	N-12	165.44	165.37	172.43	30	0.04	GOOD
P-22	IN	M-6	N-12	165.58	165.44	75	24	0.19	GOOD
P-23	I-19	M-6	PVC	165.47	165.44	186.52	30	0.02	GOOD
P-24	I-18	I-17	N-12	167.03	166.17	34.29	10	2.51	GOOD
P-25	I-17	I-19	N-12	165.67	165.47	270.47	24	0.07	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-26	I-20	I-19	N-12	165.87	165.47	44.58	12	0.90	GOOD
P-27	J-1	I-20	N-12	167.80	166.37	210.4	10	0.68	GOOD
P-28	IN	J-1	N-12	168.20	167.95	47.44	10	0.53	GOOD
P-29	J-2	J-3	N-12	166.39	165.82	84.02	8	0.68	GOOD
P-29A	J-1	J-3	N-12	167.50	166.02	36.48	12	4.06	GOOD
P-30	I-29	J-3	N-12	164.88	165.12	15.48	10	-1.55	GOOD
P-31	J-3	I-27	N-12	165.02	163.41	230.16	12	0.70	GOOD
P-32	I-26	I-25	N-12	165.95	165.11	34.42	12	2.44	GOOD
P-33	I-25	I-27	N-12	164.71	163.41	320.48	12	0.41	GOOD
P-34	I-27	I-28	N-12	163.83	163.46	36.71	12	1.01	GOOD
P-35	I-28	J-4	CONC	166.29	165.99	159	12	0.19	GOOD
P-36	I-30	J-4	CONC	166.03	165.99	2.41	15	1.66	FAIR
P-37	J-4	OUT	CONC	165.89	165.66	33.59	12	0.68	GOOD
P-38	J-5	J-4	CONC	165.05	164.82	120	12	0.19	GOOD
P-39	IN	I-7	CONC	164.07	164.02	119.1	12	0.04	GOOD
P-40	I-7	I-8	CONC	164.02	163.64	201	12	0.19	GOOD
P-41	I-8	OUT	CONC	162.98	162.75	7.89	12	2.92	FAIR
P-42	I-9	OUT	PVC	162.55	160.93	53.57	6	3.02	GOOD
P-43	I-10	OUT	PVC	160.95	156.74	21.41	8	19.66	POOR
P-44	I-31	M-7	N-12	177.44	174.90	72.04	12	3.53	GOOD
P-45	I-33	M-7	N-12	176.04	175.60	28.53	12	1.54	GOOD
P-46	I-32	M-7	N-12	176.24	175.58	12.83	12	5.14	GOOD
P-47	M-7	M-8	N-12	174.80	175.03	309.16	12	-0.07	GOOD
P-48	I-34	M-8	N-12	176.63	175.68	25.93	12	3.66	GOOD
P-49	I-35	M-8	N-12	174.87	175.03	7.79	12	-2.05	GOOD
P-50	M-8	M-9	N-12	174.98	174.01	300.68	12	0.32	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-50A	I-37	M-9	N-12	174.82	174.01	8.77	12	9.24	GOOD
P-51	I-36	M-9	N-12	175.90	174.01	26.13	12	7.23	GOOD
P-52	M-9	M-10	N-12	173.96	173.56	299.54	15	0.13	GOOD
P-53	I-38	M-10	N-12	174.46	174.51	35.55	12	-0.14	GOOD
P-54	I-39	M-10	N-12	173.79	173.61	7.52	12	2.39	GOOD
P-55	M-10	M-11	N-12	173.41	173.40	298.94	15	0.00	GOOD
P-56	I-40	OUT	N-12	174.90	174.54	10.29	12	3.50	GOOD
P-57	I-41	M-11	N-12	173.32	173.50	11.77	12	-1.53	GOOD
P-58	I-43	I-42	CONC	169.02	168.45	32.25	8	1.77	FAIR
P-59	I-42	I-44	CONC	168.25	167.55	370	10	0.19	GOOD
P-60	I-45	I-44	CONC	167.34	166.95	32.29	8	1.21	GOOD
P-61	I-44	OUT	CONC	166.90	Private	Private	12	Private	GOOD
P-62	I-47	I-46	CONC	166.25	165.77	32.16	8	1.49	FAIR
P-63	I-46	J-6	CONC	165.57	166.21	94.44	10	-0.68	GOOD
P-64	J-6	OUT	CONC	165.91	166.22	34.8	10	-0.89	FAIR
P-65	I-48	J-6	PVC	167.78	167.31	8.19	8	5.74	FAIR
P-66	IN	I-50	CONC	166.40	166.49	37.71	12	-0.24	GOOD
P-67	I-51	I-52	CONC	167.49	167.35	32.17	8	0.44	GOOD
P-68	I-52	I-54	CONC	166.95	165.73	365.55	10	0.33	GOOD
P-69	I-53	I-54	CONC	165.79	165.73	32.15	8	0.19	GOOD
P-70	I-54	I-55	CONC	165.63	165.84	29.67	12	-0.71	GOOD
P-71	I-50	I-55	CONC	166.39	165.99	102.01	15	0.39	GOOD
P-72	I-55	I-56	CONC	165.94	165.09	147.85	15	0.57	GOOD
P-73	I-56	OUT	CONC	165.09	165.01	57.9	15	0.14	GOOD
P-74	J-7	OUT	CONC	165.13	164.76	53.09	15	0.70	GOOD
P-75	J-8	J-7	CONC	165.57	165.23	226.98	12	0.15	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-76	I-58	I-57	CONC	167.05	166.95	32.14	8	0.31	GOOD
P-77	I-57	I-59	CONC	166.95	166.32	116.58	10	0.54	GOOD
P-78	I-60	I-59	CONC	166.47	166.32	32.2	8	0.47	GOOD
P-79	I-59	J-8	CONC	166.17	165.67	35.94	10	1.39	GOOD
P-80	J-9	J-8	CONC	166.53	165.62	84	12	1.08	GOOD
P-81	J-9	OUT	CONC	166.43	166.95	33.31	10	-1.56	POOR
P-82	I-61	J-9	CONC	167.47	167.13	4.91	10	6.92	FAIR
P-83	I-62	I-63	CONC	167.75	167.44	32.37	8	0.96	GOOD
P-84	I-63	I-65	CONC	167.44	166.52	459.96	10	0.20	GOOD
P-85	I-64	I-65	CONC	166.75	166.52	32.38	8	0.71	GOOD
P-86	I-66	J-10	DI	166.92	166.93	3.4	10	-0.29	GOOD
P-87	J-10	OUT	CONC	166.38	166.53	33.33	10	-0.45	GOOD
P-88	J-11	J-10	CONC	166.40	166.13	47.81	12	0.56	GOOD
P-89	I-65	J-11	CONC	166.57	166.40	34.82	10	0.49	GOOD
P-90	IN	I-67	DI	167.65	167.59	37.99	10	0.16	GOOD
P-91	I-67	J-12	CONC	167.44	166.99	111.22	12	0.40	GOOD
P-92	J-12	I-71	CONC	164.64	166.11	138.5	12	-1.06	GOOD
P-93	IN	J-13	CONC	166.33	166.03	4.65	10	6.45	GOOD
P-94	PRIVATE	IN	CMP	Buried	165.56	Buried	12	Buried	GOOD
P-95	J-13	OUT	CONC	165.83	165.63	29.37	12	0.68	GOOD
P-96	I-71	J-13	DI	166.06	165.93	38.47	12	0.34	GOOD
P-97	I-69	I-68	DI	166.57	166.56	30.58	12	0.03	GOOD
P-98	I-68	I-131	CONC	166.51	165.85	340.62	12	0.19	GOOD
P-99	I-70	I-131	DI	165.90	165.85	30.72	12	0.16	GOOD
P-100	I-71	I-132	CONC	166.11	167.56	300.5	12	-0.48	GOOD
P-103	I-72	OUT	PVC	177.49	176.16	25.16	8	5.29	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-104	I-73	OUT	PVC	176.76	176.30	25.05	8	1.84	GOOD
P-105	I-75	M-12	PVC	177.48	177.12	21.27	10	1.69	GOOD
P-106	I-74	M-13	PVC	176.43	175.12	222.37	12	0.59	GOOD
P-107	I-76	M-13	PVC	175.42	175.22	15.53	12	1.29	GOOD
P-108	I-77	M-13	PVC	175.10	175.22	24.22	12	-0.50	GOOD
P-109	M-13	M-15	N-12	175.02	174.11	246.23	12	0.37	GOOD
P-110	I-78	P-111	PVC	177.47	176.49	20.79	10	4.71	GOOD
P-111	M-12	M-14	PVC	177.02	176.09	338.45	12	0.27	GOOD
P-112	M-14	M-15	N-12	175.99	173.96	129.51	12	1.57	GOOD
P-113	M-15	M-16	N-12	173.86	173.66	267.33	24	0.07	GOOD
P-114	I-79	P-113	DI	174.61	173.73	17.00	10	5.18	GOOD
P-115	I-80	P-113	PVC	174.45	173.73	17.00	12	4.24	GOOD
P-117	M-16	M-17	N-12	173.56	173.11	140.52	24	0.32	GOOD
P-118	M-17	M-18	N-12	173.06	172.67	139.59	30	0.28	GOOD
P-119	I-82	M-18	PVC	173.55	172.67	31.48	12	2.80	GOOD
P-120	I-81	M-18	PVC	173.49	172.87	32.31	12	1.92	GOOD
P-121	I-83	I-82	PVC	174.29	173.65	34.45	10	1.86	GOOD
P-122	M-18	M-19	N-12	172.57	172.26	243.63	30	0.13	GOOD
P-123	I-85	M-19	PVC	172.91	172.46	23.34	10	1.93	GOOD
P-124	I-84	M-19	PVC	173.21	172.76	11.86	10	3.79	GOOD
P-125	M-19	M-20	N-12	172.16	172.34	62.16	30	-0.29	GOOD
P-126	M-20	M-35A	N-12	172.24	171.64	405.25	30	0.15	GOOD
P-127	M-21	M-14	PVC	176.90	176.19	146.79	12	0.48	GOOD
P-128	I-86	M-21	PVC	177.17	176.95	21.25	10	1.04	GOOD
P-129	I-87	M-22	PVC	176.87	176.52	24.13	10	1.45	GOOD
P-130	M-22	M-24	PVC	176.47	174.52	158.07	12	1.23	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-131	I-90	P-130	DI	175.74	174.93	17.55	8	4.62	GOOD
P-132	I-91	M-24	PVC	175.28	174.82	32.45	10	1.42	GOOD
P-134	M-24	M-31	PVC	174.42	172.78	149.39	12	1.10	GOOD
P-135	I-92	I-91	PVC	175.27	175.33	34.21	10	-0.18	GOOD
P-136	I-93	I-94	PVC	175.22	175.18	34.74	10	0.12	GOOD
P-137	I-94	M-25	DI	175.13	174.65	59.43	12	0.81	GOOD
P-138	M-25	M-26	DI	174.55	173.37	248.93	16	0.47	GOOD
P-139	I-96	P-142	DI	173.99	173.23	44	10	1.73	GOOD
P-140	I-95	I-96	DI	174.31	174.19	34.96	10	0.34	GOOD
P-141	I-97	P-142	DI	174.55	173.23	12.00	10	11.00	GOOD
P-142	M-26	M-27	DI	173.27	172.73	257.96	24	0.21	GOOD
P-143	I-99	M-27	PVC	173.39	172.73	27.71	10	2.38	GOOD
P-144	I-98	M-27	PVC	173.38	172.93	12.82	10	3.51	GOOD
P-145	M-27	M-28	DI	172.63	172.49	88.90	24	0.16	GOOD
P-146	I-101	M-28	PVC	173.30	172.54	29.99	10	2.53	GOOD
P-147	I-100	M-28	PVC	173.61	172.64	12.86	10	7.54	GOOD
P-148	M-28	M-29	DI	172.44	169.24	211.69	24	1.51	GOOD
P-149	I-88	M-23	PVC	173.47	173.13	27.14	10	1.25	GOOD
P-150	I-89	M-23	PVC	173.48	173.13	32.57	10	1.07	GOOD
P-151	M-23	M-29	DI	173.08	169.29	257.34	14	1.47	GOOD
P-152	M-29	M-30	DI	169.19	171.50	272.32	24	-0.85	GOOD
P-153	I-129	I-102	PVC	172.01	171.78	34.89	10	0.66	GOOD
P-154	I-102	M-30	PVC	171.58	171.50	46.55	10	0.17	GOOD
P-155	M-31	I-104	PVC	172.68	171.99	18.31	10	3.77	GOOD
P-156	I-104	I-103	CONC	171.64	171.67	33.39	12	-0.09	GOOD
P-157	I-103	IN	CONC	171.91	171.67	4.99	12	4.81	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-158	I-103	OUT	PVC	171.47	166.83	224.06	12	2.07	POOR
P-159	I-105	OUT	CONC	167.18	166.44	41.95	12	1.76	GOOD
P-160	I-106	I-105	CONC	172.70	167.28	227	6	2.39	GOOD
P-161	I-107	I-106	CONC	172.70	172.91	42	6	-0.50	GOOD
P-162	I-109	I-108	CONC	171.79	171.76	48.14	8	0.06	GOOD
P-163	I-108	I-111	PVC	171.71	171.28	42.91	8	1.00	GOOD
P-164	I-110	I-111	CONC	171.76	171.08	46.68	8	1.46	GOOD
P-165	I-111	I-112	CONC	170.78	169.29	227.97	12	0.65	GOOD
P-166	I-112	I-216	CONC	169.19	168.78	254.38	15	0.16	GOOD
P-167	M-11	M-32	N-12	173.30	173.12	130.33	15	0.14	GOOD
P-168	I-113	M-32	N-12	172.96	173.17	6.96	12	-3.02	GOOD
P-169	M-32	M-33	N-12	173.07	173.87	65.42	15	-1.22	GOOD
P-170	M-33	M-34	N-12	173.77	172.48	87	15	1.48	GOOD
P-171	M-34	OUT	N-12	172.38	172.93	41.90	18	-1.31	GOOD
P-172	IN	M-34	CONC	172.70	172.48	68.33	18	0.32	GOOD
P-173	M-35	M-34	N-12	172.84	172.48	108.78	15	0.33	GOOD
P-174	I-114	M-35	N-12	173.09	173.04	13.82	12	0.36	GOOD
P-174A	M-35A	OUT	CONC	171.54	171.46	22.5	30	0.36	GOOD
P-175	I-115	OUT	N-12	173.67	173.36	12.74	12	2.43	GOOD
P-175A	IN	M-35B	N-12	173.24	170.57	12	24	22.25	GOOD
P-176	I-116	OUT	N-12	173.46	171.66	15.73	12	11.44	GOOD
P-176A	M-35B	OUT	N-12	173.57	170.57	32.5	24	9.23	GOOD
P-177	I-117	OUT	N-12	173.12	171.66	16	12	9.13	GOOD
P-178	I-118	OUT	N-12	171.19	170.55	15.78	12	4.06	GOOD
P-179	I-120	P-180	N-12	170.74	168.91	43.43	12	4.21	GOOD
P-180	I-119	I-124	N-12	169.02	167.96	217.50	15	0.49	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-181	I-121	M-36	N-12	166.60	166.62	10.42	15	-0.19	GOOD
P-182	I-122	M-36	N-12	170.54	169.02	29.83	12	5.10	GOOD
P-183	I-123	M-36	N-12	169.77	167.22	31.88	12	8.00	GOOD
P-184	I-124	M-37	N-12	167.66	165.60	57.45	15	3.59	GOOD
P-184A	M-36	M-37	N-12	166.52	165.65	52.97	24	1.64	GOOD
P-185	M-38	M-37	N-12	168.72	168.70	15.51	12	0.13	GOOD
P-186	M-37	M-39	N-12	165.50	165.22	150.56	30	0.19	GOOD
P-187	I-126	M-39	N-12	167.25	166.97	28.04	12	1.00	GOOD
P-188	I-125	M-37	N-12	167.50	165.65	51.55	12	3.59	GOOD
P-189	IN	I-125	DI	169.96	168.20	66.53	8	2.65	GOOD
P-190	I-127	M-39	N-12	167.16	166.72	5.26	12	8.37	GOOD
P-191	I-128	OUT	DI	165.37	165.35	13.38	12	0.15	GOOD
P-192	M-39	M-44	N-12	165.17	163.91	298.68	30	0.42	GOOD
P-193	M-30	OUT	DI	171.40	171.34	45.59	24	0.13	GOOD
P-194	M-40	OUT	N-12	170.68	170.58	15.29	15	0.65	GOOD
P-195	I-130	M-40	N-12	170.51	170.68	10.00	15	-1.70	GOOD
P-196	IN	OUT	PVC	PRIVATE	171.84	Private	10	Private	GOOD
P-198	I-131	M-41	CONC	165.75	165.40	183.23	18	0.19	GOOD
P-199	I-132	OUT	DI	167.06	167.69	36.48	10	-1.73	GOOD
P-200	I-133	I-134	DI	165.96	166.03	30.63	12	-0.23	GOOD
P-201	I-134	I-136	CONC	165.93	165.37	322.83	12	0.17	GOOD
P-202	I-135	I-136	DI	165.51	165.42	30.52	10	0.29	GOOD
P-203	M-41	M-42	CONC	165.35	165.12	204.09	24	0.11	GOOD
P-204	I-136	M-42	CONC	165.32	165.07	95.20	12	0.26	GOOD
P-205	IN	I-137	CONC	166.22	166.25	36.80	15	-0.08	GOOD
P-206	I-137	I-144	CONC	166.25	164.83	305.63	12	0.46	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-207	M-42	M-43	CONC	164.97	164.68	207.26	24	0.14	GOOD
P-208	IN	M-43	CONC	164.81	164.88	66.36	18	-0.11	GOOD
P-209	M-43	OUT	CONC	164.68	164.55	40.83	30	0.32	GOOD
P-210	I-139	M-44	N-12	165.38	164.76	24.78	12	2.50	GOOD
P-211	I-140	M-44	N-12	166.08	164.76	8.44	12	15.64	GOOD
P-212	M-44	M-45	N-12	163.86	162.79	291.91	30	0.37	GOOD
P-213	I-141	M-45	N-12	165.19	164.34	91.00	12	0.93	GOOD
P-214	I-42	M-45	N-12	164.94	164.89	8.29	12	0.60	GOOD
P-215	IN	I-143	DI	164.06	164.15	9.97	10	-0.90	GOOD
P-216	I-138	OUT	DI	164.66	164.43	9.99	12	2.30	GOOD
P-217	M-45	M-46	N-12	162.69	161.62	164.98	30	0.65	GOOD
P-218	M-46	M-47	N-12	161.42	160.80	118.07	36	0.53	GOOD
P-219	I-143	M-46	CONC	164.12	163.92	82.44	24	0.24	GOOD
P-220	IN	P-221A	CONC	165.24	164.35	64	15	1.39	POOR
P-221	I-144	J-14	CONC	164.83	164.67	24	12	0.67	GOOD
P-221A	J-14	OUT	CONC	164.47	162.33	238	24	0.90	POOR
P-222	I-146	M-47	N-12	164.97	164.75	11.59	12	1.90	GOOD
P-223	M-47	M-48	N-12	160.60	160.37	49.71	36	0.46	GOOD
P-224	I-145	M-47	N-12	164.44	162.65	27.45	12	6.52	GOOD
P-225	I-147	M-48	N-12	163.05	162.67	29.1	12	1.31	GOOD
P-226	I-148	M-48	N-12	164.07	163.92	10.07	12	1.49	GOOD
P-227	M-48	M-49	N-12	160.17	159.41	156.4	36	0.49	GOOD
P-228	M-49	M-52	N-12	159.01	158.54	389.91	36	0.12	GOOD
P-229	I-150	P-228	N-12	163.71	158.88	37.86	12	12.76	GOOD
P-230	I-149	P-228	DI	162.75	158.92	11.31	12	33.86	GOOD
P-231	IN	POND	PVC	Private	161.60	Private	12	Private	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-232	IN	POND	PVC	Private	162.12	Private	12	Private	GOOD
P-233	IN	M-58	PVC	161.40	161.39	21.66	15	0.05	GOOD
P-234	M-58	I-169	PVC	161.19	159.46	309.99	15	0.56	GOOD
P-236	I-157	M-52	N-12	159.96	159.74	30.24	12	0.73	GOOD
P-237	IN	I-152	CMP	Private	162.13	Private	24	Private	GOOD
P-238	IN	M-50	N-12	163.07	162.91	85	12	0.19	GOOD
P-239	I-155	P-251	PVC	161.48	160.78	7.4	6	9.46	GOOD
P-240	M-51	M-53	N-12	159.67	159.08	43.67	36	1.35	GOOD
P-241	I-158	M-52	N-12	161.61	161.34	16.11	12	1.68	GOOD
P-242	M-52	M-53	N-12	158.44	158.28	82.48	36	0.19	GOOD
P-243	I-164	M-56	N-12	160.10	160.11	23.66	12	-0.04	GOOD
P-244	M-56	M-59	N-12	158.31	157.66	203.53	36	0.32	GOOD
P-245	I-169	M-59	N-12	159.16	159.11	23.33	12	0.21	GOOD
P-246	I-170	M-59	N-12	159.22	159.26	9.09	12	-0.44	GOOD
P-247	M-59	M-60	N-12	157.61	156.86	265.36	30	0.28	GOOD
P-248	M-60	M-80	N-12	156.81	155.96	265.16	30	0.32	GOOD
P-249	I-152	M-50	CMP	161.93	161.85	42	24	0.19	GOOD
P-250	M-50	OUT	N-12	161.12	161.07	25.65	36	0.19	GOOD
P-251	I-156	OUT	PVC	161.45	160.26	58.20	6	2.04	GOOD
P-252	IN	M-51	N-12	160.05	159.67	40.12	36	0.95	GOOD
P-253	IN	M-51	N-12	162.99	161.27	28.45	12	6.05	GOOD
P-254	I-159	M-54	PVC	160.87	160.80	14.27	12	0.49	GOOD
P-255	M-54	M-53	N-12	158.50	158.38	21.76	36	0.55	GOOD
P-256	M-53	M-56	N-12	158.68	158.41	110.80	36	0.24	GOOD
P-257	I-165	M-56	N-12	160.22	160.11	8.71	12	1.26	GOOD
P-258	M-54	M-55	N-12	159.60	159.32	249.69	36	0.11	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-259	I-153	I-154	N-12	162.80	162.69	60.43	12	0.18	FAIR
P-260	I-154	I-161	CONC	162.69	161.48	186.35	12	0.65	GOOD
P-261	I-161	I-160	DI	161.43	160.89	33.69	12	1.60	GOOD
P-262	I-160	M-55	PVC	160.79	159.97	13.85	12	5.92	GOOD
P-263	M-55	V-1	N-12	159.12	158.04	29.19	36	3.70	GOOD
P-264	I-166	V-1	PVC	160.75	160.49	7.62	8	3.41	GOOD
P-265	I-168	P-270	PVC	159.22	157.69	8.67	12	17.65	GOOD
P-266	I-162	OUT	CONC	162.12	Buried	Buried	10	Buried	GOOD
P-268	I-163	I-166	PVC	161.91	160.95	69.95	8	1.37	GOOD
P-269	I-167	P-270	PVC	158.59	157.76	7.11	12	11.67	GOOD
P-270	V-1	M-57	N-12	157.94	157.49	152.55	36	0.29	GOOD
P-271	M-57	OUT	CONC	157.44	Buried	Buried	48	Buried	GOOD
P-272	I-171	I-172	CONC	162.06	160.90	130.5	12	0.89	GOOD
P-273	I-172	I-173	CONC	161.50	161.76	142.6	12	-0.18	FAIR
P-274	I-173	I-174	CONC	161.66	161.39	231.11	12	0.12	FAIR
P-275	I-174	M-61	CONC	161.34	161.35	10.37	12	-0.10	POOR
P-276	M-61	J-15	CONC	161.35	161.46	13.67	12	-0.80	POOR
P-277	J-15	I-175	CONC	161.41	160.97	284.73	12	0.15	FAIR
P-278	M-66	M-63	DI	157.66	157.02	36.64	18	1.75	GOOD
P-279	IN	M-64	N-12	163.28	160.73	70.06	12	3.64	GOOD
P-280	M-64	M-63	N-12	160.73	160.32	23.39	12	1.75	GOOD
P-281	M-62	M-63	N-12	157.85	157.37	36.56	12	1.31	GOOD
P-282	I-177	M-62	N-12	161.84	160.65	22.4	12	5.31	GOOD
P-283	I-178	M-62	N-12	162.89	161.85	11	12	9.45	GOOD
P-284	I-179	M-65	N-12	160.94	160.75	30.2	15	0.63	GOOD
P-285	I-180	M-65	N-12	161.33	160.85	8.41	12	5.71	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-286	M-65	M-66	N-12	160.75	160.26	22.7	15	2.16	GOOD
P-286A	M-66	M-67	N-12	157.61	156.27	39.35	18	3.41	GOOD
P-287	I-182	I-183	PVC	161.64	161.15	42	8	1.17	FAIR
P-289	I-187	I-188	CONC	161.64	161.25	38.92	8	1.00	FAIR
P-290	I-188	OUT	CONC	161.25	Buried	Buried	8	Buried	POOR
P-291	I-181	M-67	N-12	160.31	160.37	8.77	12	-0.68	GOOD
P-292	I-183	P-302	CONC	161.10	160.13	129.85	18	0.75	FAIR
P-293	I-184	P-302	CONC	160.72	160.09	5.86	8	10.75	GOOD
P-294	I-186	P-302	CONC	161.28	160.15	54.48	12	2.07	GOOD
P-295	I-185	P-302	N-12	160.33	160.20	4.97	12	2.62	GOOD
P-296	I-189	I-190	N-12	161.61	160.82	97.47	12	0.81	GOOD
P-297	M-67	M-69	N-12	156.22	155.39	252.11	18	0.33	GOOD
P-298	IN	I-183	PVC	Private	161.40	Private	8	Private	GOOD
P-299	I-191	M-68	N-12	160.47	159.29	89	12	1.33	GOOD
P-300	I-193	M-68	N-12	160.00	159.84	17.63	12	0.91	GOOD
P-301	I-190	M-68	N-12	160.82	160.10	103.26	12	0.70	GOOD
P-302	I-175	M-71	CONC	160.92	158.19	565.96	12	0.48	GOOD
P-304	J-16	I-198	PVC	159.93	159.89	14.12	4	0.28	GOOD
P-305	J-17	J-16	PVC	160.17	159.98	78.52	10	0.24	GOOD
P-307	I-199	P-305	PVC	160.58	160.17	38.85	8	1.06	GOOD
P-308	I-200	J-17	PVC	160.83	160.17	40	8	1.65	FAIR
P-309	I-192	I-191	N-12	161.82	160.72	29	12	3.79	GOOD
P-310	I-194	M-68	N-12	160.93	159.74	24.16	12	4.93	GOOD
P-311	M-69	M-70	N-12	155.34	155.30	21.61	18	0.19	GOOD
P-312	I-196	P-302	CONC	160.32	158.86	7.83	8	18.65	GOOD
P-313	M-68	M-69	DI	158.79	158.29	33.63	18	1.49	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-314	I-195	M-70	N-12	160.78	159.95	9.79	12	8.48	GOOD
P-315	I-197	P-302	CONC	160.50	158.60	8.1	8	23.46	GOOD
P-315A	M-71	M-71A	CONC	158.09	156.27	47.2	18	3.86	GOOD
P-316	I-201	OUT	PVC	161.47	161.04	47.33	8	0.91	GOOD
P-317	I-202	I-203	N-12	162.19	161.08	104.59	12	1.06	GOOD
P-318	M-70	M-82	N-12	155.25	154.38	295.46	18	0.29	GOOD
P-319	M-87	M-71	CONC	160.15	158.29	482.04	12	0.39	GOOD
P-319A	M-71A	M-70A	CONC	156.17	154.56	80.75	24	1.99	GOOD
P-320	I-204	OUT	PVC	165.77	165.40	43.8	12	0.84	GOOD
P-321	I-205	I-204	DI	165.91	165.82	33.53	10	0.27	GOOD
P-322	I-207	OUT	PVC	165.49	165.30	40.66	8	0.47	GOOD
P-323	I-208	OUT	DI	165.71	165.30	42.46	10	0.97	GOOD
P-324	I-209	I-208	DI	166.01	165.76	33.5	10	0.75	GOOD
P-325	I-206	M-72	PVC	163.10	162.06	338.24	15	0.31	GOOD
P-326	M-72	M-73	PVC	161.96	161.62	129.49	15	0.26	GOOD
P-327	M-73	OUT	N-12	161.52	161.07	75	15	0.60	GOOD
P-328	M-75	OUT	PVC	159.61	156.23	20	12	16.90	GOOD
P-329	I-210A	M-75	PVC	161.38	159.71	109.67	12	1.52	GOOD
P-329A	I-210	I-210A	PVC	161.33	161.48	15.11	6	-0.99	GOOD
P-330	IN	M-75	PVC	Private	159.71	Private	12	Private	GOOD
P-331	M-74	OUT	N-12	163.16	163.24	25.92	15	-0.31	GOOD
P-332	M-76	M-74	PVC	163.87	163.26	177.35	15	0.34	GOOD
P-333	M-77	M-76	PVC	165.12	163.97	180.11	15	0.64	GOOD
P-334	I-212	M-77	N-12	166.05	165.32	25.22	10	2.89	GOOD
P-335	I-213	M-77	N-12	165.89	165.32	13.58	10	4.20	GOOD
P-336	M-78	M-77	PVC	167.51	165.17	292.45	15	0.80	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-337	I-214	M-78	PVC	170.63	169.61	10.48	10	9.73	GOOD
P-338	I-215	M-78	PVC	170.50	169.71	23.35	10	3.38	GOOD
P-339	M-97	M-78	PVC	169.01	167.61	306.68	15	0.46	GOOD
P-341	I-247	OUT	CONC	168.68	167.76	480	15	0.19	GOOD
P-342	I-218	I-219	CONC	171.61	171.58	30.89	8	0.10	GOOD
P-343	I-219	I-220	CONC	171.48	171.84	195.61	8	-0.18	GOOD
P-344	I-222	I-221	CONC	171.97	171.62	36.49	8	0.96	GOOD
P-345	I-221	I-223	CONC	171.52	171.64	44.79	8	-0.27	GOOD
P-346	I-223	I-224	CONC	171.54	169.61	236.69	12	0.82	GOOD
P-347	I-226	P-349	FLEX PIPE	170.65	169.50	7	6	16.43	GOOD
P-348	I-225	P-349	CONC	170.22	169.50	38	8	1.89	GOOD
P-349	I-224	OUT	CONC	169.61	168.72	467	12	0.19	GOOD
P-350	I-220	I-227	CONC	171.74	171.03	284.76	8	0.25	GOOD
P-351	I-227	I-228	CONC	170.93	170.25	271.47	8	0.25	GOOD
P-352	I-228	I-229	CONC	169.95	169.13	47.88	8	1.71	GOOD
P-353	I-230	I-229	CONC	169.83	169.33	33.66	8	1.49	GOOD
P-354	I-229	I-231	CONC	169.03	164.09	211.44	8	2.34	GOOD
P-355	I-231	I-234	CONC	163.99	162.45	141.62	10	1.09	GOOD
P-356	I-234	I-236	CONC	162.45	160.83	77.07	10	2.10	GOOD
P-357	I-232	P-358	PVC	159.64	157.49	155.75	8	1.38	GOOD
P-358	I-233	OUT	PVC	157.70	157.08	49.91	8	1.24	GOOD
P-359	I-237	OUT	DI	160.91	160.85	34	18	0.18	GOOD
P-360	I-363	OUT	CONC	161.02	160.57	27.09	12	1.66	GOOD
P-361	M-79A	M-79	CONC	158.52	158.79	217.25	15	-0.12	GOOD
P-362	I-235	MH-79A	CONC	161.79	161.56	120	15	0.19	GOOD
P-363	I-236	I-235	CONC	161.79	161.79	31.8	10	0.00	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-363A	I-238	I-239	PVC	159.79	159.24	33.71	12	1.63	GOOD
P-364	I-239	I-240	PVC	159.24	159.03	36.57	12	0.57	GOOD
P-365	I-240	M-79	PVC	159.03	158.79	65.74	12	0.37	GOOD
P-366	I-241	I-242	PVC	160.69	160.41	31.77	8	0.88	GOOD
P-367	I-242	I-243	PVC	160.41	160.29	16.66	10	0.72	GOOD
P-368	M-79	OUT	CONC	158.59	157.57	147	15	0.69	GOOD
P-369	I-244	I-243	PVC	160.87	160.29	33.91	12	1.71	GOOD
P-370	I-243	I-245	PVC	160.19	159.12	162.94	12	0.66	GOOD
P-371	I-245	I-246	PVC	159.07	159.01	32.74	12	0.18	GOOD
P-372	I-246	OUT	PVC	158.81	158.48	165	10	0.20	GOOD
P-374	I-248	P-349	CONC	169.26	169.03	15	8	1.53	GOOD
P-375	I-249	OUT	CONC	163.53	163.20	174	8	0.19	GOOD
P-376	I-250	OUT	DI	163.28	162.94	180	12	0.19	GOOD
P-377	I-251	OUT	DI	162.67	162.32	183	6	0.19	GOOD
P-378	I-252	M-80	N-12	158.76	158.56	26.42	12	0.76	GOOD
P-379	I-253	M-80	N-12	158.89	158.81	6.49	12	1.23	GOOD
P-380	I-253A	I-257	DI	160.15	160.13	37.15	10	0.05	GOOD
P-381	M-80	OUT	N-12	155.91	155.53	72.53	30	0.52	GOOD
P-382	I-257	I-254	DI	160.08	159.31	44.99	10	1.71	GOOD
P-383	I-259	J-19	CONC	156.41	155.61	25.35	10	3.16	GOOD
P-384	J-18	OUT	PVC	159.15	158.23	15.24	10	6.04	GOOD
P-385	I-260	I-261	DI	157.85	157.63	34.27	10	0.64	GOOD
P-386	I-261	I-262	DI	157.23	157.03	10.81	12	1.85	GOOD
P-387	I-255	I-254	CONC	159.02	158.71	70.5	12	0.44	GOOD
P-388	I-256	I-254	DI	159.25	159.01	11.08	10	2.17	GOOD
P-389	I-254	J-19	CONC	158.51	155.86	153.62	15	1.73	GOOD

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-390	J-19	I-258	CONC	155.71	155.61	9.5	15	1.05	GOOD
P-391	I-258	OUT	CONC	155.51	155.38	14.39	18	0.90	GOOD
P-392	I-264	I-263	CONC	160.50	160.45	34.45	10	0.15	GOOD
P-393	I-263	OUT	CONC	159.40	157.80	175.38	12	0.91	GOOD
P-394	I-265	OUT	PVC	163.92	153.95	30	6	33.23	GOOD
P-395	I-266	OUT	CONC	160.18	157.78	98.79	15	2.43	GOOD
P-396	I-267	I-266	CONC	160.58	160.28	33.22	15	0.90	GOOD
P-397	I-269	I-267	CONC	162.18	161.33	127.82	15	0.66	GOOD
P-398	I-268	I-269	CONC	163.45	162.38	34.47	8	3.10	GOOD
P-399	I-271	I-269	CONC	163.06	162.23	186.31	15	0.45	GOOD
P-400	I-270	I-271	CONC	164.39	163.21	33.86	10	3.48	GOOD
P-400A	I-273	I-271	CONC	163.82	163.21	99.94	12	0.61	GOOD
P-401	I-272	I-273	CONC	164.58	163.87	35.04	10	2.03	GOOD
P-402	I-275	I-274	CONC	165.26	165.11	28.25	6	0.53	FAIR
P-403	I-274	I-276	CONC	164.76	165.07	44.47	6	-0.70	FAIR
P-404	I-277	P-403	CONC	165.26	164.96	23.71	8	1.27	FAIR
P-405	I-276	OUT	CONC	165.17	156.28	387.98	8	2.29	FAIR
P-406	I-278	I-279	CONC	165.17	164.86	36.21	10	0.86	GOOD
P-406A	I-279	I-273	CONC	164.91	163.87	248.9	12	0.42	GOOD
P-407	I-203	M-81	N-12	159.93	159.57	35.04	12	1.03	GOOD
P-408	I-281	M-82	N-12	161.09	160.83	9.33	12	2.79	GOOD
P-409	I-283	P-415	CONC	158.64	158.01	25	8	2.52	FAIR
P-411	I-280	M-81	N-12	160.96	160.82	11.75	12	1.19	GOOD
P-412	I-284	M-81	N-12	160.88	160.62	42.57	12	0.61	GOOD
P-412A	M-81	M-82	DI	159.02	158.23	36.03	16	2.19	GOOD
P-413	I-282	P-319	CONC	161.69	158.96	9.46	6	28.86	FAIR

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-414	I-285	P-319	CONC	161.48	159.10	9.27	8	25.67	GOOD
P-415	P-319	I-286	CONC	159.04	157.70	210	10	0.64	GOOD
P-416	I-286	OUT	CONC	157.60	Buried	Buried	10	Buried	FAIR
P-417	I-287	I-284	N-12	161.91	161.13	60.55	12	1.29	GOOD
P-419	I-288	I-289	CONC	157.92	157.74	34.6	10	0.52	FAIR
P-420	M-82	M-86	N-12	154.33	153.78	228	18	0.24	GOOD
P-421	I-296	M-86	N-12	161.47	159.48	13.42	12	14.83	GOOD
P-422	M-83	C-62	CONC	156.42	154.33	133.61	15	1.56	GOOD
P-423	I-289	M-83	CONC	157.69	156.52	53.58	12	2.18	GOOD
P-424	I-290	M-83	CONC	161.26	159.57	18.36	10	9.20	GOOD
P-425	I-291	M-83	CONC	160.24	156.47	31.57	10	11.94	GOOD
P-426	I-292	I-293	DI	163.95	163.75	35	10	0.57	GOOD
P-427	I-293	M-84	DI	163.65	162.45	53	10	2.26	GOOD
P-428	I-295	I-294	N-12	161.88	161.26	66.48	12	0.93	GOOD
P-429	I-294	M-84	N-12	161.16	158.95	48.79	12	4.53	GOOD
P-430	M-86	M-85	N-12	153.73	153.44	68.27	18	0.42	GOOD
P-431	I-297	M-87	DI	161.48	160.55	27.32	10	3.40	GOOD
P-432	I-297A	M-87	DI	161.07	160.55	28.98	10	1.79	GOOD
P-433	M-84	M-85	DI	158.85	158.34	37.28	16	1.37	GOOD
P-434	M-85	M-90	N-12	153.44	152.63	271.1	24	0.30	GOOD
P-435	I-300	M-88	DI	160.05	158.12	36.08	12	5.35	GOOD
P-435A	I-298	I-299	N-12	160.44	157.96	29.5	12	8.41	GOOD
P-435B	I-299	M-88	N-12	157.76	157.57	57.61	12	0.33	GOOD
P-436	I-301	M-90	N-12	160.02	159.73	8.49	12	3.42	GOOD
P-437	M-90	M-89	N-12	152.68	156.35	34.91	24	-10.51	GOOD
P-438	I-303	M-91	CONC	159.88	159.16	20.43	8	3.52	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-439	I-304	M-91	CONC	159.65	159.16	20.88	8	2.35	GOOD
P-440	I-305	M-91	CONC	160.21	159.06	45.25	8	2.54	GOOD
P-440A	M-87	M-91	CONC	160.10	158.71	299.51	12	0.46	GOOD
P-441	I-308	M-91	CONC	159.36	Buried	Buried	8	Buried	GOOD
P-442	M-88	M-89	DI	157.52	157.25	36.51	16	0.74	GOOD
P-443	M-89	M-92	N-12	156.30	150.77	284.59	24	1.94	GOOD
P-444	I-306	I-307	N-12	158.21	157.60	13.23	12	4.61	GOOD
P-445	I-307	M-93	N-12	157.05	155.87	17.93	12	6.58	GOOD
P-446	M-92	M-93	N-12	150.72	150.62	24.36	24	0.41	GOOD
P-447	M-93	M-94	N-12	150.57	150.11	112.82	24	0.41	GOOD
P-448	M-94	M-95	N-12	150.01	148.79	258.66	24	0.47	GOOD
P-449	M-95	OUT	N-12	148.69	148.44	72.58	24	0.34	GOOD
P-450	I-309	OUT	PVC	159.19	157.75	250	12	0.58	GOOD
P-451	I-311	OUT	CMP	154.13	147.65	50	12	12.96	FAIR
P-452	I-310	I-311	CONC	157.05	155.68	135.34	12	1.01	GOOD
P-453	I-312	I-311	CONC	156.08	155.68	34.08	12	1.17	GOOD
P-454	I-313	OUT	CMP	157.89	147.65	50	6	20.48	GOOD
P-455	I-524	P-405	CONC	164.91	158.52	333	6	1.92	GOOD
P-456	I-314	OUT	CMP	PLUGGED	147.65	50	6	#VALUE!	POOR
P-457	I-463	P-455	CONC	165.08	161.76	210	6	1.58	FAIR
P-459	I-523	P-457	CONC	164.94	162.37	163	6	1.58	FAIR
P-460	I-315	OUT	CMP	160.11	147.65	50	6	24.92	GOOD
P-461	I-322	I-321	CONC	175.09	174.92	181.97	12	0.09	GOOD
P-462	I-323	I-322	CONC	175.06	175.19	221.26	12	-0.06	GOOD
P-463	I-317	I-318	CONC	175.32	175.38	12.47	12	-0.48	GOOD
P-463A	I-319	I-318	PVC	176.09	175.48	12.51	6	4.88	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-464	M-96	OUT	CONC	171.70	Buried	Buried	10	Buried	GOOD
P-465	I-318	M-96	CONC	175.28	171.80	63	10	5.52	GOOD
P-466	I-323	I-324	CONC	175.45	175.21	70.24	12	0.34	GOOD
P-468	I-324	I-344	CONC	175.21	174.97	70.24	12	0.34	GOOD
P-469	I-320	I-331	CONC	175.29	174.80	179.22	12	0.27	GOOD
P-470	I-326	M-97	N-12	171.62	171.11	23.03	10	2.21	GOOD
P-471	I-325	M-97	N-12	171.60	171.11	11.29	10	4.34	GOOD
P-472	M-98	M-97	PVC	170.56	169.11	300.23	15	0.48	GOOD
P-473	I-327	M-98	PVC	172.67	171.86	12.07	10	6.71	GOOD
P-474	I-328	M-98	PVC	172.45	171.86	22.23	10	2.65	GOOD
P-475	I-329	I-330	CONC	173.73	173.26	42.97	8	1.09	GOOD
P-476	I-344	I-345	CONC	175.21	174.97	163.3	12	0.15	GOOD
P-477	I-331	I-331A	CONC	174.70	174.80	76.89	15	-0.13	GOOD
P-478	I-331A	I-333	CONC	174.70	174.83	143.69	15	-0.09	GOOD
P-479	I-332	P-478	CONC	174.51	174.74	30.13	4	-0.76	GOOD
P-480	I-133	M-99	CONC	173.83	173.48	17.47	12	2.00	GOOD
P-481	I-348	I-333	CONC	174.72	174.43	41.96	15	0.69	GOOD
P-482	I-334	I-333	CONC	175.53	174.53	45.17	12	2.21	GOOD
P-483	I-335	I-334	CONC	175.22	175.19	80.56	12	0.04	GOOD
P-484	I-336	I-335	CONC	174.93	175.32	174.86	12	-0.22	GOOD
P-485	I-337	I-336	CONC	175.02	174.93	53.17	12	0.17	GOOD
P-486	I-338	I-337	CONC	175.71	175.02	121.58	12	0.57	GOOD
P-487	I-356	I-338	CONC	176.38	176.21	41.51	8	0.41	GOOD
P-488	I-339	I-338	CONC	178.34	175.81	228.46	12	1.11	GOOD
P-489	I-340	I-339	CONC	177.76	178.44	96.83	12	-0.70	GOOD
P-490	I-341	I-342	CONC	177.52	177.89	127.5	12	-0.29	POOR

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-491	I-342	I-343	CONC	177.89	177.03	74	12	1.16	FAIR
P-492	I-343	I-386	CONC	176.83	176.15	295.55	12	0.23	GOOD
P-493	I-345	I-346	CONC	174.87	175.19	96.38	12	-0.33	GOOD
P-494	I-346	I-347	CONC	175.19	174.78	28.66	12	1.43	GOOD
P-495	I-347	I-348	CONC	174.78	174.82	57.04	12	-0.07	GOOD
P-496	I-349	I-348	CONC	174.83	174.83	12.37	12	0.00	GOOD
P-496A	I-350	I-349	CONC	174.78	174.83	35.07	12	-0.14	GOOD
P-497	IN	I-350	CONC	175.55	174.98	15.35	12	3.71	GOOD
P-498	I-351	I-350	CONC	174.78	174.88	53.53	12	-0.19	GOOD
P-499	IN	I-351	CONC	175.71	174.88	31.73	12	2.62	GOOD
P-500	I-352	I-351	CONC	175.80	174.98	232.78	12	0.35	GOOD
P-500A	I-353	I-352	DI	176.54	176.50	13.56	8	0.29	GOOD
P-501	I-354	I-352	DI	175.83	175.80	67	12	0.04	GOOD
P-502	I-361	I-354	N-12	177.23	175.93	178.55	8	0.73	GOOD
P-503	I-355	I-354	DI	176.03	175.93	53	8	0.19	GOOD
P-504	IN	I-355	DI	176.38	176.13	22.56	8	1.11	GOOD
P-505	I-357	I-356	CONC	176.86	176.58	227.71	12	0.12	GOOD
P-505A	M-100	I-357	DI	177.87	177.96	14.6	4	-0.62	FAIR
P-506	I-358	I-357	CONC	178.00	176.96	60.76	12	1.71	GOOD
P-507	I-359	I-360	CONC	177.81	176.76	378.2	12	0.28	GOOD
P-508	I-360	I-407	CONC	176.76	175.95	239.27	12	0.34	GOOD
P-509	I-362	I-597	N-12	175.04	174.38	350	12	0.19	GOOD
P-510	I-364	I-363	DI	161.65	161.33	33.09	12	0.97	GOOD
P-511	IN	I-363	CONC	165.97	160.93	188.24	12	2.68	GOOD
P-512	I-365	P-511	PVC	161.87	164.33	67.18	8	-3.66	GOOD
P-513	I-366	I-365	PVC	163.37	162.17	34.27	8	3.50	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-515	I-367	OUT	PVC	172.70	Buried	Buried	6	Buried	POOR
P-516	I-368	I-367	PVC	173.59	172.80	36.05	6	2.19	POOR
P-518	I-369	OUT	N-12	172.95	171.81	81.08	12	1.41	GOOD
P-519	I-370	I-369	CONC	173.42	173.05	47.28	10	0.78	GOOD
P-520	I-371	I-370	DI	173.93	173.52	34.06	8	1.20	GOOD
P-521	I-372	I-373	DI	174.10	173.34	46.72	8	1.63	POOR
P-522	I-375	I-374	DI	173.14	172.91	31.8	8	0.72	GOOD
P-523	I-374	PRIVATE	DI	172.71	Buried	Buried	8	Buried	GOOD
P-524	I-376	I-369	N-12	174.21	173.15	339.08	12	0.31	GOOD
P-525	I-377	I-376	DI	174.38	174.31	34.25	12	0.20	GOOD
P-526	I-378	I-377	DI	174.51	174.48	24.02	12	0.12	GOOD
P-527	I-379	I-378	DI	174.82	174.61	35.54	12	0.59	GOOD
P-528	I-380	I-382	CONC	173.09	172.74	225.1	10	0.16	GOOD
P-529	I-382	I-381	CONC	172.64	172.45	30.97	12	0.61	GOOD
P-530	I-381	PRIVATE	CONC	172.35	Buried	Buried	12	Buried	GOOD
P-531	I-386	I-387	CONC	176.10	175.93	98.71	12	0.17	GOOD
P-532	I-387	I-388	CONC	175.83	175.52	119.24	12	0.26	GOOD
P-533	I-388	I-389	CONC	175.42	175.72	168.49	12	-0.18	GOOD
P-534	IN	I-383	CONC	175.30	174.96	8.16	10	4.17	GOOD
P-535	I-383	I-385	CONC	174.86	175.07	99.32	12	-0.21	GOOD
P-536	I-385	I-389	CONC	175.02	174.42	48.04	12	1.25	GOOD
P-536A	I-389	I-390	CONC	173.62	173.22	47.38	18	0.84	GOOD
P-537	I-384	I-390	CONC	175.28	174.72	86.03	12	0.65	GOOD
P-538	I-409	I-390	CONC	174.21	174.02	40.06	12	0.47	GOOD
P-539	I-390	I-392	CONC	173.12	172.39	116.2	18	0.63	GOOD
P-540	I-391	P-539	PVC	175.20	172.90	24.41	6	9.42	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-541	I-392	I-394	CONC	172.39	171.88	155.66	18	0.33	GOOD
P-542	I-393	P-541	PVC	175.57	172.28	27.24	6	12.08	GOOD
P-543	I-395	P-544	PVC	175.33	171.57	24.08	6	15.61	GOOD
P-544	I-394	I-398	CONC	171.88	169.85	264.61	18	0.77	GOOD
P-545	I-396	P-544	PVC	174.92	170.99	24.89	6	15.79	GOOD
P-546	I-397	P-544	PVC	174.78	170.42	23.51	6	18.55	GOOD
P-547	I-399	I-398	PVC	173.23	172.65	22.06	10	2.63	GOOD
P-548	I-398	I-401	CONC	169.75	170.26	55.65	18	-0.92	GOOD
P-549	I-400	I-401	PVC	173.37	172.46	23.17	12	3.93	GOOD
P-550	I-415	I-398	CONC	172.74	171.65	40.82	12	2.67	GOOD
P-551	I-402	I-403	CONC	173.80	173.77	12	6	0.25	FAIR
P-551A	I-401	I-403	CONC	169.66	170.17	179.85	18	-0.28	GOOD
P-552	I-403	I-405	CONC	169.97	167.08	198.05	12	1.46	GOOD
P-553	I-404	I-405	PVC	173.07	172.83	9.72	6	2.47	GOOD
P-554	I-405	I-406	CONC	167.03	166.54	34.2	18	1.43	GOOD
P-555	I-406	J-23	CONC	166.44	160.02	401.74	24	1.60	GOOD
P-557	I-408	I-407	CONC	174.83	176.15	244.39	12	-0.54	GOOD
P-558	I-408	I-409	CONC	175.03	174.41	60.78	12	1.02	GOOD
P-559	I-410	I-394	CONC	174.55	173.78	42.02	12	1.83	GOOD
P-560	I-411	I-412	DI	172.93	172.69	60.4	12	0.40	GOOD
P-561	I-413	I-412	DI	172.91	172.69	32.5	12	0.68	GOOD
P-562	I-414	I-413	DI	173.13	173.01	39.07	12	0.31	GOOD
P-563	I-412	I-415	CONC	172.59	172.94	51.41	12	-0.68	GOOD
P-564	I-416	I-415	DI	173.37	172.84	67.81	12	0.78	GOOD
P-565	I-417	J-19	CONC	172.83	171.32	225.82	12	0.67	GOOD
P-566	J-19	J-20	CONC	171.12	165.27	211.49	12	2.77	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-567	I-418	J-21	DI	166.74	166.44	18.05	6	1.66	GOOD
P-568	I-419	J-21	DI	166.51	166.34	15.03	6	1.13	GOOD
P-568A	J-21	I-423	DI	166.24	165.13	75.53	6	1.47	GOOD
P-569	I-421	I-422	PVC	166.29	166.15	36.44	4	0.38	FAIR
P-570	I-426	I-427	PVC	166.68	166.24	36.74	4	1.20	FAIR
P-571	I-426	I-427	PVC	166.68	166.24	36.74	4	1.20	FAIR
P-572	I-428	I-427	DI	165.85	165.64	7.54	10	2.79	GOOD
P-572A	I-427	I-422	PVC	165.54	165.25	96.66	12	0.30	GOOD
P-573	I-420	I-424	DI	165.89	165.62	27.85	8	0.97	GOOD
P-574	I-425	I-424	CONC	166.23	165.32	72.33	8	1.26	GOOD
P-575	I-423	I-424	PVC	165.03	165.02	24.01	12	0.04	GOOD
P-576	I-422	I-423	PVC	165.15	164.93	8.47	12	2.60	GOOD
P-577	I-429	OUT	PVC	166.25	166.28	37.86	12	-0.08	GOOD
P-578	I-431	I-429	PVC	167.28	166.45	127.88	8	0.65	GOOD
P-579	J-25	P-578	PVC	170.50	167.02	387.68	8	0.90	GOOD
P-581	I-430	I-431	CONC	167.13	167.18	37.47	8	-0.13	GOOD
P-582	J-23	I-433	CONC	159.82	159.90	59.13	24	-0.14	GOOD
P-583	I-432	I-433	CONC	163.01	162.50	16.29	12	3.13	GOOD
P-584	I-433	I-434	CONC	159.85	158.60	188.07	24	0.66	GOOD
P-585	I-435	P-586	PVC	163.03	157.70	22.5	8	23.69	GOOD
P-586	I-434	I-436	CONC	158.40	157.77	98.88	24	0.64	GOOD
P-587	I-436	M-101	CONC	157.67	156.77	151.25	24	0.60	GOOD
P-588	M-101	M-102	CONC	156.57	156.38	47.71	30	0.40	GOOD
P-589	M-102	OUT	CONC	156.08	Buried	Buried	36	Buried	GOOD
P-590	I-437	M-102	CONC	157.73	157.68	4.7	12	1.06	GOOD
P-591	I-447	M-101	CONC	158.91	159.57	47.52	18	-1.39	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-592	I-448	P-610	CONC	161.67	161.42	12	8	2.08	GOOD
P-593	I-450	I-449	DI	162.08	162.25	26.62	12	-0.64	GOOD
P-594	I-438	OUT	N-12	165.04	162.59	50.81	12	4.82	GOOD
P-595	I-483	OUT	CONC	162.77	Buried	Buried	12	Buried	GOOD
P-596	I-452	I-451	N-12	164.26	164.07	3.3	12	5.76	GOOD
P-597	I-451	OUT	CONC	162.17	Buried	Buried	12	Buried	GOOD
P-598	I-484	OUT	CONC	163.80	Buried	Buried	12	Buried	GOOD
P-599	J-20	J-22	CONC	165.17	164.08	184.48	12	0.59	GOOD
P-600	J-22	J-24	CONC	163.98	162.68	43.42	10	2.99	GOOD
P-601	I-441	J-24	DI	163.41	162.73	26.72	12	2.54	GOOD
P-602	I-440	I-441	DI	163.65	163.41	31.89	10	0.75	GOOD
P-603	I-454	I-440	DI	163.65	163.35	104.16	8	0.29	GOOD
P-604	J-24	I-442	PVC	162.63	160.49	263.61	10	0.81	GOOD
P-605	I-442	I-443	CONC	160.39	159.43	110.55	12	0.87	GOOD
P-606	I-444	P-607	DI	159.41	159.24	90.68	6	0.19	GOOD
P-607	I-443	I-445	CONC	159.28	159.04	62.83	18	0.38	GOOD
P-608	I-445	I-447	CONC	158.99	158.96	24.13	18	0.12	GOOD
P-609	I-446	I-447	DI	161.28	161.26	7.93	6	0.25	GOOD
P-610	I-449	I-447	DI	162.25	159.17	208.27	12	1.48	GOOD
P-611	I-455	I-456	DI	171.11	171.09	28.45	10	0.07	GOOD
P-612	I-456	J-25	DI	170.99	170.90	36.4	12	0.25	GOOD
P-613	I-457	J-25	CONC	170.38	170.50	13.24	8	-0.91	GOOD
P-614	I-458	I-457	CONC	170.70	170.58	47.19	8	0.25	GOOD
P-615	I-460	I-459	N-12	170.56	169.94	34.15	12	1.82	GOOD
P-616	I-459	M-103	N-12	170.34	170.27	7.11	12	0.98	GOOD
P-617	M-103	M-104	N-12	167.32	165.52	336.4	15	0.54	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-618	I-462	M-104	N-12	168.20	166.92	8	12	16.00	GOOD
P-619	I-461	I-462	N-12	168.62	168.50	34.02	12	0.35	GOOD
P-620	M-104	M-105	N-12	165.42	163.76	374.33	15	0.44	GOOD
P-621	M-105	OUT	N-12	163.71	162.94	407	15	0.19	GOOD
P-622	M-110	OUT	CONC	155.83	155.23	319	15	0.19	GOOD
P-624	I-465	P-624A	CONC	157.89	157.40	263	8	0.19	FAIR
P-624A	M-106A	OUT	CONC	152.93	Buried	Buried	12	Buried	GOOD
P-625	I-466	M-106A	PVC	158.07	152.97	320	15	1.59	GOOD
P-626	I-467	I-466	CONC	158.01	158.32	27.82	8	-1.11	GOOD
P-627	I-470	I-466	PVC	161.90	158.27	327.93	15	1.11	GOOD
P-628			Buried	Buried	Buried	Buried	Buried	Buried	POOR
P-629			Buried	Buried	Buried	Buried	Buried	Buried	POOR
P-630	I-471	I-470	PVC	165.08	164.70	35	6	1.09	FAIR
P-631	I-480	I-470	PVC	163.03	161.90	299.19	12	0.38	GOOD
P-632	I-472	P-643	CONC	166.96	157.09	22	6	44.86	FAIR
P-632A		OUT	Buried	Buried	Buried	Buried	Buried	Buried	
P-633	I-473	P-643	CONC	166.84	157.09	22	6	44.32	FAIR
P-634		OUT	CONC	157.77	156.61	612	10	0.19	FAIR
P-635	I-474	P-634	CONC	167.08	157.76	25	6	37.28	FAIR
P-636	I-477	OUT	PVC	167.63	Buried	Buried	4	Buried	FAIR
P-637	I-476	P-634	CONC	167.13	157.76	25	6	37.48	FAIR
P-639A			Buried	Buried	Buried	Buried	Buried	Buried	
P-639	I-475	P-634	CONC	167.35	157.76	25	6	38.36	FAIR
P-640	I-478	OUT	N-12	163.03	Buried	Buried	10	Buried	FAIR
P-641	I-479	I-478	N-12	163.78	163.53	33.83	10	0.74	FAIR
P-641A			Buried	Buried	Buried	Buried	Buried	Buried	FAIR

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-642A	I-481		Buried	164.02	Buried	Buried	Buried	Buried	FAIR
P-642B			Buried	Buried	Buried	Buried	Buried	Buried	FAIR
P-642	1-480		N-12	163.02	Buried	Buried	Buried	Buried	GOOD
P-644	I-485	P-643	CLAY	165.02	Buried	32	8	Buried	GOOD
P-644A	M-106A	OUT	Buried	Buried	Buried	Buried	Buried	Buried	GOOD
P-645	I-486	P-643	CLAY	163.92	Buried	17	8	Buried	GOOD
P-645A	M-106B	M-106A	Buried	Buried	Buried	Buried	Buried	Buried	GOOD
P-646	I-487	M-106B	Buried	Buried	Buried	Buried	Buried	Buried	GOOD
P-646A	M-106B	M-106	Buried	Buried	Buried	Buried	Buried	Buried	GOOD
P-647	I-488	M-106	CONC	167.41	166.38	25.84	6	3.99	GOOD
P-648	I-490	P-646	CONC	167.21	166.20	9.42	6	10.72	GOOD
P-648A	M-106C	M-106B	CONC	Buried	Buried	Buried	Buried	Buried	GOOD
P-649	I-489	M-106	CONC	167.32	166.78	7.19	6	7.51	GOOD
P-650	I-493	I-491	CLAY	167.56	166.83	42.06	4	1.74	GOOD
P-651	I-491	P-653	CLAY	166.78	Buried	Buried	6	Buried	FAIR
P-652	I-492	P-653	CLAY	166.71	Buried	Buried	6	Buried	FAIR
P-653	M-106C	M-127	Buried	Buried	Buried	Buried	Buried	Buried	
P-654	I-494	P-653	CONC	165.81	Buried	Buried	6	Buried	GOOD
P-655	I-495	P-653	CONC	166.36	Buried	Buried	6	Buried	GOOD
P-656	I-496		CONC	166.87	Buried	Buried	6	Buried	FAIR
P-657	M-109	P-653	CONC	163.83	163.20	332	6	0.19	GOOD
P-658	I-497	P-643	CONC	162.94	Buried	Buried	6	Buried	FAIR
P-659	I-498	M-107	CONC	162.97	160.99	30.64	6	6.46	FAIR
P-660	I-499	P-643	CONC	163.16	Buried	Buried	6	Buried	FAIR
P-661	I-500	M-107	CONC	163.19	160.99	11.14	6	19.75	FAIR
P-662	M-106	M-108	CONC	165.78	164.33	307.66	6	0.47	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-663	I-501		CLAY	167.63	Buried	Buried	6	Buried	GOOD
P-664	I-503	P-668	CONC	167.14	163.92	20	6	16.10	FAIR
P-665	I-504	P-668	CONC	167.14	163.92	20	6	16.10	FAIR
P-666	I-505	P-668	CONC	167.34	163.78	37	6	9.62	FAIR
P-667	I-502	P-668	CONC	167.24	163.78	25	6	13.84	FAIR
P-668		M-113	CONC	163.92	163.23	332	6	0.21	GOOD
P-669	I-506	I-507	CONC	167.03	166.67	28.22	6	1.28	GOOD
P-670	I-508	P-761	CONC	166.37	Buried	13.5	6	Buried	GOOD
P-670A	I-509	P-761	CONC	166.07	Buried	13.5	6	Buried	GOOD
P-671	M-107	M-111	CONC	160.59	158.85	326.12	6	0.53	GOOD
P-672	M-108	M-112	CONC	164.43	162.83	327.61	6	0.49	GOOD
P-673	I-507	M-114	CONC	166.57	163.90	325.69	6	0.82	GOOD
P-674	M-109	M-115	CONC	163.93	162.01	329.37	6	0.58	GOOD
P-676	M-111	M-110	CONC	156.25	155.93	30.5	15	1.05	GOOD
P-677	I-511	P-679	CONC	164.24	156.39	5.65	6	138.94	GOOD
P-678	I-510	P-851	CONC	164.25	161.12	28.49	6	10.99	GOOD
P-679	M-112	M-111	CONC	157.73	156.35	376.56	15	0.37	GOOD
P-680	I-513	P-672	CONC	165.52	162.88	25.94	6	10.18	GOOD
P-681	I-512	P-672	CONC	165.52	162.88	8.5	6	31.06	GOOD
P-683	I-514	M-112	CONC	166.41	164.43	24.77	6	7.99	GOOD
P-684	M-113	M-112	CONC	159.33	157.83	426.13	15	0.35	GOOD
P-685	I-517	P-668	CONC	167.13	Buried	Buried	6	Buried	GOOD
P-686	I-516	M-113	CONC	167.04	163.23	35.61	6	10.70	GOOD
P-687	I-515	M-113	CONC	166.69	165.93	24.11	6	3.15	GOOD
P-689	I-518	M-113	CONC	165.42	163.93	36.35	6	4.10	GOOD
P-690	M-114	M-113	CONC	160.30	159.43	200.97	10	0.43	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-691	M-115	M-114	CONC	161.61	160.40	378.08	10	0.32	GOOD
P-692	I-519	P-691	CONC	166.01	160.98	24.5	6	20.53	GOOD
P-693	I-520	P-691	CONC	166.04	160.95	8.05	6	63.23	GOOD
P-694	I-522	M-115	CONC	165.58	161.71	5.82	6	66.49	GOOD
P-694A	I-521	P-674	CONC	165.26	162.11	2	6	157.50	GOOD
P-695	I-591	P-777	CONC	165.99	162.35	43.93	6	8.29	GOOD
P-696	I-592	P-777	CONC	165.88	162.39	12.73	6	27.42	GOOD
P-697	M-158	M-115	CONC	164.19	162.71	340.02	6	0.44	GOOD
P-698	I-523		CONC	164.94	Buried	Buried	6	Buried	FAIR
P-699	I-464	I-523	CONC	165.41	164.99	28.37	6	1.48	FAIR
P-700	I-525	I-526	CONC	165.03	164.59	30.25	6	1.45	FAIR
P-701	I-527	OUT	CONC	164.66	Buried	Buried	6	Buried	GOOD
P-702	M-117	OUT	CONC	158.41	Buried	Buried	12	Buried	GOOD
P-703	M-118	OUT	CONC	160.36	Buried	Buried	12	Buried	GOOD
P-704	I-534	OUT	CMP	161.21	157.32	45	12	8.64	GOOD
P-705	M-116	OUT	PVC	161.49	161.33	21.05	12	0.76	GOOD
P-706	I-533	M-116	PVC	161.42	161.49	60.86	8	-0.12	GOOD
P-708	I-528	M-117	CONC	163.87	159.91	26.49	12	14.95	GOOD
P-709	I-529	M-117	CONC	164.88	159.81	38.99	12	13.00	GOOD
P-710	I-530	M-118	CONC	Buried	160.46	81.27	12	Buried	GOOD
P-711	I-531	P-713	PVC	162.17	161.62	50	8	1.10	GOOD
P-712	I-532	P-713	PVC	162.49	161.69	40	8	2.00	GOOD
P-713		I-533	N-12	161.69	161.52	65	12	0.26	GOOD
P-714	I-535	M-119	PVC	162.91	162.34	41.18	8	1.38	GOOD
P-715	M-119	I-536	PVC	162.19	162.15	13.04	12	0.31	GOOD
P-716	M-121	M-117	CONC	160.21	158.41	330.4	12	0.54	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-717	I-541	I-543	Buried	Buried	Buried	Buried	Buried	Buried	
P-717A	I-542	I-541	CONC	165.98	164.65	32.84	12	4.05	POOR
P-718	I-543	M-120	DI	165.19	161.80	220	6	1.54	GOOD
P-719	I-482	I-543	DI	164.69	165.29	36	6	-1.67	GOOD
P-720	I-544	I-545	CONC	164.86	164.79	31	8	0.23	FAIR
P-721	I-545	M-120	CONC	164.79	161.80	40	8	7.47	GOOD
P-722	I-556	M-120	PVC	163.32	162.30	92.57	8	1.10	GOOD
P-723	M-120	M-121	CONC	161.75	161.11	155.12	8	0.41	GOOD
P-724	I-546	M-121	CLAY	165.02	162.91	25.72	8	8.20	GOOD
P-724A	M-127	M-121	Buried	Buried	Buried	Buried	Buried	Buried	FAIR
P-725	M-123	M-122	CONC	161.80	156.78	15.91	8	31.55	FAIR
P-725A	I-547	M-122	CONC	Buried	156.78	61.1	10	Buried	FAIR
P-727	I-538	I-537	PVC	164.06	162.93	41.36	8	2.73	GOOD
P-728	I-539	M-124	PVC	163.86	162.26	35.91	8	4.46	GOOD
P-729	I-537	M-119	PVC	163.03	162.29	53.89	8	1.37	GOOD
P-730	I-536	M-124	PVC	162.10	162.06	137.3	12	0.03	GOOD
P-731	I-540	M-124	PVC	163.39	162.26	16.99	8	6.65	GOOD
P-733	M-124	M-126	PVC	162.01	162.05	71.05	12	-0.06	GOOD
P-734	I-548	I-549	PVC	165.25	164.71	26	8	2.08	GOOD
P-735	I-550	M-126	PVC	163.66	162.75	34.7	8	2.62	GOOD
P-737	Manhole Overlain								
P-738	Manhole Overlain								
P-739	Manhole Overlain								
P-740	I-557	I-556	PVC	164.14	163.42	72.19	8	1.00	GOOD
P-741	I-555	P-722	PVC	165.72	163.15	52.76	4	4.87	GOOD
P-743	Manhole Overlain								

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-744	Manhole Overlain								
P-746	I-559	M-123	CONC	Buried	161.90	54.31	8	Buried	POOR
P-747	M-128	I-562	CONC	163.10	Buried	79.4	10	Buried	POOR
P-748	I-560	I-561	Buried	Buried	Buried	26.79	Buried	Buried	POOR
P-749	I-551	I-550	PVC	164.34	163.81	32.62	8	1.62	FAIR
P-750	M-126	M-131	PVC	161.95	156.19	384.19	15	1.50	GOOD
P-751	I-574	P-750	PVC	162.44	158.46	34.94	8	11.39	GOOD
P-752	I-573	P-750	PVC	163.21	157.87	27.57	8	19.37	GOOD
P-753	M-129	M-128	PVC	163.14	163.15	35.39	12	-0.03	GOOD
P-754	I-571	I-572	PVC	163.49	162.86	44.77	8	1.41	GOOD
P-755	I-576	P-757	CONC	165.59	164.30	13.38	8	9.64	FAIR
P-756	I-569	M-129	PVC	166.00	163.14	171.52	12	1.67	GOOD
P-757	M-132	P-756	PVC	164.58	163.97	161.72	8	0.38	GOOD
P-759	I-572	M-131	PVC	162.66	160.79	74.59	12	2.51	GOOD
P-760	I-575	M-131	PVC	163.36	161.39	11.19	8	17.61	GOOD
P-762	I-580		Buried	Buried	Buried	Buried	Buried	Buried	
P-763	I-579		Buried	Buried	Buried	Buried	Buried	Buried	
P-764	I-582		Buried	Buried	Buried	Buried	Buried	Buried	
P-765	I-581		Buried	Buried	Buried	Buried	Buried	Buried	
P-766	I-584	M-132	DI	166.39	164.68	116.11	6	1.47	GOOD
P-767	I-583	M-132	DI	165.43	164.68	43.12	6	1.74	GOOD
P-767A	I-585	P-763	DI	165.94	Buried	74	6	Buried	GOOD
P-769	I-588	I-586	PVC	166.06	165.40	38.7	6	1.71	GOOD
P-769A	I-586	OUT	Buried	Buried	Buried	Buried	Buried	Buried	GOOD
P-770	I-587	P-774A	PVC	164.18	155.47	24.27	8	35.89	GOOD
P-772	I-578	M-131	PVC	163.13	161.39	36.24	8	4.80	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-772A	M-131	M-133	PVC	156.09	155.63	210.29	15	0.22	GOOD
P-773	I-589	M-133	PVC	164.17	161.03	19	8	16.53	GOOD
P-774	I-590	P-774A	CONC	165.65	155.20	25.78	8	40.54	GOOD
P-774A	M-133	J-26	PVC	155.53	154.50	360.33	12	0.29	GOOD
P-775	I-594	P-777	PVC	165.60	162.64	21.96	6	13.48	GOOD
P-776	I-593	P-777	PVC	165.55	162.59	8.66	6	34.18	GOOD
P-777	M-134	M-115	CONC	163.31	161.71	375.08	8	0.43	GOOD
P-778	M-134	STUB	CONC	163.61	Buried	Buried	18	Buried	GOOD
P-779	I-596	I-595	CONC	166.06	165.20	41.49	8	2.07	GOOD
P-779A	I-595	OUT	CLAY	164.50	Buried	Buried	8	Buried	GOOD
P-781	J-26	M-135	CLAY	154.40	153.60	44.53	24	1.80	GOOD
P-782	M-135	OUT	N-12	153.50	142.38	388.87	15	2.86	GOOD
P-783	I-554	OUT	Buried	Buried	Buried	Buried	Buried	Buried	POOR
P-784	I-552	I-553	CONC	155.31	155.17	39.14	12	0.36	GOOD
P-785	I-553	OUT	CONC	154.77	149.15	169.9	12	3.31	GOOD
P-787	I-597	I-598	N-12	174.38	175.15	34.02	12	-2.26	GOOD
P-788	I-599	M-136	PVC	169.29	165.30	59.24	12	6.74	GOOD
P-789	I-600	M-136	PVC	168.96	165.30	38.03	12	9.62	GOOD
P-790	M-136	M-137	CMP	165.30	165.50	191.23	36	-0.10	GOOD
P-791	M-137	M-138	CMP	165.30	165.22	196.56	36	0.04	GOOD
P-792	M-138	M-139	CMP	165.02	164.93	110.78	36	0.08	GOOD
P-793	I-601	M-139	PVC	167.62	164.93	44.61	12	6.03	GOOD
P-794	I-602	I-601	PVC	167.76	167.62	36.21	12	0.39	GOOD
P-795	M-139	M-140	CMP	164.83	164.18	217.75	36	0.30	GOOD
P-796			Buried	Buried	Buried	Buried	Buried	Buried	POOR
P-797	I-604	OUT	PVC	165.98	165.48	25.49	12	1.96	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-798	I-603	I-604	PVC	165.96	166.08	32.47	12	-0.37	GOOD
P-799	I-605	OUT	PVC	166.83	166.36	34.24	12	1.37	GOOD
P-799A	M-140A	OUT	CONC	163.65	163.36	25	12	1.16	GOOD
P-801	I-606	M-142A	PVC	167.35	165.09	323	8	0.70	GOOD
P-802	M-142A	M-140A	PVC	165.00	163.75	498.75	18	0.25	GOOD
P-803	I-607	M-141	PVC	166.92	165.71	10.3	10	11.75	GOOD
P-804	I-608	M-141	PVC	166.13	165.71	22.32	10	1.88	GOOD
P-805	M-141	M-142	CONC	165.61	165.39	146.92	36	0.15	GOOD
P-805A	M-142	M-142A	CONC	163.25	165.04	147	36	-1.22	GOOD
P-806	I-624	M-142	PVC	165.04	165.39	298.04	12	-0.12	FAIR
P-807	I-609	I-610	CONC	166.62	166.35	32.05	8	0.84	GOOD
P-808	I-613	M-143	PVC	168.66	165.36	95.37	12	3.46	GOOD
P-809	I-610		CONC	166.25	Buried	Buried	8	Buried	GOOD
P-810	I-611	M-143	PVC	166.13	165.36	5.34	12	14.42	GOOD
P-811	I-612	M-143	PVC	167.95	165.36	29.05	12	8.92	GOOD
P-812	M-143	M-147	PVC	165.26	164.88	320.19	12	0.12	GOOD
P-813	I-614	I-615	PVC	166.98	166.83	34.16	12	0.44	GOOD
P-814	I-615	M-144	PVC	166.78	166.66	36.77	12	0.33	GOOD
P-815	I-616	M-144	PVC	167.15	166.66	74.34	12	0.66	GOOD
P-816	M-144	I-617	PVC	166.61	166.42	37.17	12	0.51	GOOD
P-817	I-617	I-628	PVC	166.37	165.90	219.18	12	0.21	GOOD
P-818	I-621	P-819	CONC	165.62	164.21	160.73	8	0.88	GOOD
P-819	I-619	OUT	CONC	164.96	157.13	400.65	8	1.95	FAIR
P-820	I-618	M-145	PVC	162.89	161.51	278.53	12	0.50	GOOD
P-821	I-620	P-819	CONC	166.05	164.21	41.83	6	4.40	POOR
P-823	M-145	OUT	N-12	161.41	157.56	122.03	12	3.15	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-824	I-623	M-145	N-12	162.70	161.51	9.45	12	12.59	GOOD
P-825	I-622	I-623	N-12	164.28	163.60	28.14	12	2.42	GOOD
P-826	M-146	OUT	N-12	156.06	155.44	57.66	36	1.08	GOOD
P-827	M-148	M-146	N-12	157.07	156.06	248.11	36	0.41	GOOD
P-828	M-159	M-148	N-12	160.13	158.07	309.86	36	0.66	GOOD
P-830	I-625	I-624	CONC	165.16	165.04	31.84	12	0.38	GOOD
P-830A	I-624	M-147A	PVC	165.04	165.21	147	12	-0.12	GOOD
P-831	I-626	M-147	PVC	165.65	164.88	4.95	12	15.56	GOOD
P-831A	I-625A	I-625	CONC	165.50	165.26	125.3	12	0.19	GOOD
P-832	I-627	M-147	PVC	167.48	164.98	29.33	12	8.52	GOOD
P-833	I-628	I-629	PVC	165.90	165.03	349.27	12	0.25	GOOD
P-834	I-633	I-629	PVC	166.54	166.63	32.7	6	-0.28	POOR
P-835	OUT	M-150	PVC	164.47	164.21	68.83	15	0.38	GOOD
P-836	OUT	M-150	PVC	167.08	166.81	54.33	15	0.50	GOOD
P-837	M-149	OUT	PVC	163.62	162.62	285	24	0.35	GOOD
P-838	M-150	M-149	PVC	164.01	163.62	35.9	24	1.09	GOOD
P-838A	M-147	M-150	PVC	164.78	164.21	296.5	12	0.19	GOOD
P-839	I-630	P-840	PVC	167.91	164.49	11.65	6	29.36	GOOD
P-840	M-151	M-150	PVC	164.72	164.21	313.35	12	0.16	GOOD
P-841	I-631	P-840	PVC	167.48	164.61	11.65	6	24.64	GOOD
P-842	I-629	M-151	PVC	164.83	164.87	10.44	12	-0.38	GOOD
P-843	I-632	M-151	PVC	167.86	165.02	30.41	6	9.34	GOOD
P-844	IN	M-148	N-12	158.66	157.17	473.46	24	0.31	GOOD
P-845	M-161	OUT	CONC	162.37	160.23	286.19	15	0.75	GOOD
P-846			Buried	Buried	Buried	Buried	Buried	Buried	POOR
P-847	M-153	OUT	PVC	163.47	163.20	85	12	0.32	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-848	M-152	I-634	PVC	163.61	163.43	69.67	12	0.26	GOOD
P-849	I-686	M-152	PVC	164.96	163.91	308.13	12	0.34	GOOD
P-850	I-634	M-153	PVC	163.52	163.47	60	12	0.08	GOOD
P-851	M-154	M-111	CONC	162.74	161.05	309.17	6	0.55	GOOD
P-852	M-155	M-112	CONC	160.98	159.43	307.8	6	0.50	GOOD
P-854	M-157	M-114	CONC	164.69	162.60	306.53	6	0.68	GOOD
P-855	I-636	M-154	CONC	165.41	164.54	26.89	6	3.24	GOOD
P-856	M-154		CONC	163.00	162.84	36.5	6	0.44	GOOD
P-857	I-635	P-856	CONC	165.30	163.00	27	6	8.52	GOOD
P-858	I-637	P-856	CONC	164.71	163.00	15	6	11.40	GOOD
P-859	I-638	P-682	CONC	164.17	160.80	26.56	6	12.69	GOOD
P-860	I-639	P-861	CONC	163.65	161.23	15	6	16.13	GOOD
P-861		M-155	CONC	161.88	161.08	182	6	0.44	GOOD
P-862	I-647	P-861	CONC	165.18	161.88	20	6	16.50	GOOD
P-863	Overlain Manhole								
P-864	I-640	P-861	CONC	165.30	161.31	8	6	49.88	GOOD
P-865	PRIVATE	M-156	CONC		162.69		6	#DIV/0!	GOOD
P-866	Overlain Manhole								
P-867	Overlain Manhole								
P-868	Overlain Manhole								
P-869	Overlain Manhole								
P-870	I-645	M-157	CONC	166.46	165.99	4.81	6	9.77	GOOD
P-871	I-646	M-157	CONC	166.69	164.79	27.9	6	6.81	GOOD
P-873	I-703	M-158	CONC	166.64	164.49	206.96	6	1.04	GOOD
P-875	I-649	M-159	CONC	164.56	162.23	26.22	10	8.89	FAIR
P-876	M-160	M-159	N-12	161.43	160.23	401.34	24	0.30	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-877	I-651	I-650	DI	166.03	165.98	34.2	12	0.15	GOOD
P-878	I-650	I-649	DI	165.08	164.46	78.1	12	0.79	GOOD
P-879	I-652	M-160	PVC	165.33	162.33	30.14	6	9.95	GOOD
P-880	I-648	P-861	CONC	164.97	161.88	10	6	30.90	GOOD
P-881	I-655	M-160	N-12	161.70	161.53	60.25	18	0.28	GOOD
P-882	I-653	M-160	CONC	163.55	162.53	13.55	12	7.53	GOOD
P-883	I-654	I-655	DI	163.33	163.10	33.49	12	0.69	GOOD
P-884	I-656	I-655	CONC	162.69	161.90	340.46	15	0.23	GOOD
P-885	I-659	I-656	CONC	162.78	162.79	63.94	15	-0.02	GOOD
P-887	I-657	I-656	DI	165.93	165.69	35.77	12	0.67	GOOD
P-888	I-658	I-659	DI	166.04	166.08	37.27	12	-0.11	GOOD
P-888A	I-661	I-659	CONC	163.34	162.88	191.39	15	0.24	GOOD
P-889	Overlain Manhole								
P-890	Overlain Manhole								
P-891	I-662	I-661	CONC	163.57	163.44	128.53	15	0.10	GOOD
P-892	I-660	I-661	DI	165.92	165.94	33.99	12	-0.06	GOOD
P-893	I-663	I-662	DI	165.99	164.97	35.68	12	2.86	GOOD
P-894	I-662	I-665	DI	163.07	163.14	57.17	12	-0.12	GOOD
P-895	I-664	I-665	DI	165.82	165.34	36.18	12	1.33	GOOD
P-896	I-665	I-666	DI	163.04	163.42	118.44	12	-0.32	GOOD
P-897	I-667	I-666	DI	165.75	164.72	34.27	10	3.01	GOOD
P-897A	I-666	I-668	DI	163.32	163.81	190.31	12	-0.26	GOOD
P-898	I-668	I-669	DI	164.91	164.60	34.35	10	0.90	GOOD
P-899	I-669	J-27	DI	164.50	164.52	29.5	12	-0.07	GOOD
P-901	I-673	M-161	CONC	162.26	162.57	8.17	18	-3.79	FAIR
P-902	M-161A	I-674	CONC	163.45	162.36	178.15	12	0.61	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-902A	I-674A	M-161A	CONC	163.67	163.73	39.18	8	-0.15	GOOD
P-903	M-163	P-902	CONC	163.99	162.90	330	12	0.33	GOOD
P-903A	I-675A	I-674A	CONC	164.30	163.67	54.51	8	1.16	GOOD
P-904	I-675	I-673	CONC	163.63	162.36	72.51	12	1.75	FAIR
P-905	I-679	M-162	CONC	166.90	165.26	141.59	8	1.16	GOOD
P-906	I-678	I-680	PVC	168.34	167.99	34.22	4	1.02	GOOD
P-907	I-679	P-907A	CONC	168.80	167.40	60	8	2.33	GOOD
P907A	I-680	M-164	CONC	167.69	163.70	415	12	0.96	GOOD
P-908	I-672	M-164	CONC	168.64	163.70	305	8	1.62	GOOD
P-909	I-681	M-164	CONC	165.00	163.70	53.53	8	2.43	GOOD
P-910	I-696	M-164	CONC	165.71	163.70	270	8	0.74	GOOD
P-911	I-683	P-971	CONC	167.89	163.55	32.93	8	13.18	GOOD
P-911A	I-683		Buried	Buried	Buried	Buried	Buried	Buried	GOOD
P-912	I-682	P-971	CONC	167.10	163.55	22.45	8	15.81	GOOD
P-913	I-684	I-722	Buried	Buried	Buried	Buried	Buried	Buried	POOR
P-914	M-165A	M-163	CONC	163.90	164.09	400	12	-0.05	GOOD
P-915	I-676	P-914	CONC	166.60	163.35	20	12	16.25	GOOD
P-915A	M-163A	M-165A	CONC	164.52	163.90	200	12	0.31	GOOD
P-916	I-677	P-914	CONC	166.78	163.35	11	12	31.18	GOOD
P-917	M-166	M-176	CONC	161.94	160.47	387.36	18	0.38	GOOD
P-919	I-685	I-686	PVC	165.43	165.06	26.35	12	1.40	GOOD
P-921	I-688	I-685	PVC	165.80	165.53	76.05	12	0.36	GOOD
P-922	I-687	I-688	PVC	165.95	165.80	34.31	10	0.44	GOOD
P-923	I-690	I-688	PVC	166.77	165.80	175	10	0.55	GOOD
P-924	I-689	I-690	PVC	167.15	166.87	34.57	10	0.81	GOOD
P-925	I-691	P-927	CONC	166.53	164.50	49.52	6	4.10	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-925A	M-166A	M-163A	CONC	166.07	164.46	611	12	0.26	GOOD
P-926	M-179	M-165	CONC	164.09	163.91	211.11	12	0.09	GOOD
P-927	I-692	M-165	CONC	165.14	163.91	39.97	10	3.08	GOOD
P-927A	I-693	M-166A	CONC	166.53	166.11	171.6	12	0.24	GOOD
P-928	I-693	P-927	CONC	166.83	164.50	44.93	8	5.19	GOOD
P-929	M-165	M-167	CONC	163.81	163.04	271	15	0.28	GOOD
P-930	M-167	M-166	CONC	162.84	162.34	192.59	18	0.26	GOOD
P-931	I-694	P-930	CONC	166.33	162.44	15.12	8	25.73	GOOD
P-931A	IN	M-166	CONC	168.12	162.34	158.91	15	3.64	GOOD
P-932	I-695	I-696	CONC	166.29	165.81	40	8	1.20	GOOD
P-933	M-181	M-167	CONC	163.65	162.94	511.62	18	0.14	GOOD
P-934	I-698	P-917	CONC	163.58	160.60	79.46	8	3.75	GOOD
P-935	I-697	I-698	CONC	164.92	163.68	31.13	8	3.98	GOOD
P-936	I-700	I-701	PVC	167.48	167.95	23.91	6	-1.97	GOOD
P-936A	I-701A	I-700A	Buried	Buried	Buried	Buried	Buried	Buried	POOR
P-937	I-701	M-170	PVC	167.04	165.42	416.04	6	0.39	GOOD
P-938	I-704	OUT	DI	164.79	Buried	Buried	Buried	Buried	POOR
P-938A	I-700A	I-704	Buried	Buried	Buried	Buried	Buried	Buried	POOR
P-939	I-699	P-873	CONC	166.42	166.29	32.55	6	0.40	GOOD
P-940	I-702	P-873	CONC	166.64	166.05	10.4	6	5.67	GOOD
P-942	I-706	J-27	DI	164.74	164.52	47.04	12	0.47	GOOD
P-943	I-705	I-706	DI	166.78	166.24	34.42	10	1.57	GOOD
P-944	I-709	I-710	N-12	165.47	165.63	33.57	12	-0.48	GOOD
P-945	IN	I-708	N-12	166.63	165.54	17.09	12	6.38	GOOD
P-946	I-708	I-707	N-12	165.04	164.69	34.08	12	1.03	GOOD
P-946A	I-707	OUT	N-12	164.59	164.65	26.24	12	-0.23	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-947	IN	I-711	N-12	164.36	163.98	52.91	15	0.72	GOOD
P-948	I-710	M-168	N-12	165.63	164.74	25.53	12	3.49	GOOD
P-949	IN	M-168	N-12	166.43	164.74	64.88	15	2.60	GOOD
P-950	IN	M-169	N-12	166.17	162.33	58.64	15	6.55	GOOD
P-951	M-168	I-711	N-12	164.64	164.18	36.99	15	1.24	GOOD
P-952	I-711	I-712	N-12	163.88	163.59	56.77	15	0.51	GOOD
P-953	IN	I-712	N-12	166.40	164.99	29.05	15	4.85	GOOD
P-954	I-712	M-169	N-12	163.49	162.33	42.57	15	2.72	GOOD
P-954A	M-169	I-713	N-12	162.23	162.10	116.97	24	0.11	GOOD
P-955	I-714	I-713	DI	165.38	165.20	33.53	12	0.54	GOOD
P-956	I-715	I-716	N-12	163.52	162.02	33.62	15	4.46	GOOD
P-957	I-713	I-716	N-12	162.00	162.02	54.86	24	-0.04	GOOD
P-958	I-716	M-170	N-12	161.92	161.62	35.79	24	0.84	GOOD
P-959	M-170	M-171	N-12	161.52	161.49	52.1	24	0.06	GOOD
P-960	I-718	M-171	DI	164.79	164.79	27.39	10	0.00	GOOD
P-961	I-717	M-171	DI	164.75	164.69	6.9	10	0.87	GOOD
P-961A	M-171	M-172	N-12	161.39	160.81	118.61	24	0.49	GOOD
P-962	M-172	M-173	N-12	160.71	160.68	30.84	24	0.10	GOOD
P-963	M-173	OUT	N-12	160.58	160.07	45.83	24	1.11	GOOD
P-964	I-719	OUT	CONC	164.30	163.54	59.95	12	1.27	GOOD
P-965	I-720	I-719	CONC	165.47	164.70	52.84	8	1.46	GOOD
P-966	IN	I-721	PVC	167.84	167.77	6.16	10	1.14	GOOD
P-967	I-721	I-723	CONC	167.87	166.26	33.66	6	4.78	GOOD
P-968	IN	I-721	PVC	167.76	167.67	8.82	10	1.02	GOOD
P-970	I-722	I-723	CONC	166.16	166.91	48	6	-1.56	GOOD
P-971	M-164	M-174	CONC	163.70	164.38	600	12	-0.11	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-972	IN	M-175	PVC	PRIVATE	164.69	Buried	8	Buried	GOOD
P-973	M-174	OUT	CONC	164.38	Buried	Buried	12	Buried	GOOD
P-974	M-175	M-174	PVC	164.59	164.58	85.34	8	0.01	GOOD
P-975	I-724	M-174	CONC	165.33	164.38	254.51	8	0.37	GOOD
P-975A	PRIVATE	OUT	CONC	Buried	164.16	Buried	15	Buried	GOOD
P-976	I-725	I-724	CONC	165.48	164.46	32.04	8	3.18	GOOD
P-977	I-727	OUT	N-12	165.67	159.10	69.98	12	9.39	GOOD
P-978	BRIDGE								
P-979	I-726	OUT	DI	165.59	160.84	72.83	8	6.52	GOOD
P-980	BRIDGE								
P-981	BRIDGE								
P-982	BRIDGE								
P-983	BRIDGE								
P-984	BRIDGE								
P-985	BRIDGE								
P-986	BRIDGE								
P-987	BRIDGE								
P-988	BRIDGE								
P-989	BRIDGE								
P-990	BRIDGE								
P-991	M-165	I-721A	CONC	160.27	161.25	184	18	-0.53	GOOD
P-991A	I-721A	OUT	CONC	161.25	161.40	254	30	-0.06	GOOD
P-992	I-747	M-177	N-12	166.04	165.72	336.98	30	0.09	GOOD
P-993	M-177	OUT	N-12	165.72	166.02	101.6	30	-0.30	GOOD
P-994	M-178	OUT	N-12	164.20	165.69	74.42	30	-2.00	GOOD
P-995	M-182	M-178	N-12	165.74	166.00	364.55	30	-0.07	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-996	I-742	P-926	CONC	165.14	163.95	25.55	10	4.66	GOOD
P-997	I-743	P-926	CONC	164.13	163.95	6.65	10	2.71	GOOD
P-999	I-744	M-179	CONC	165.45	164.19	28.31	10	4.45	GOOD
P-1000	I-745	M-179	CONC	164.52	164.29	7.61	10	3.02	GOOD
P-1001	I-746	M-179	CONC	164.93	164.19	71.48	10	1.04	GOOD
P-1002	IN	I-746	CONC	Private	165.53	Private	6	Private	GOOD
P-1004	I-759	P-933	CONC	166.05	163.49	3.86	10	66.32	GOOD
P-1005	I-760	I-759	CONC	165.92	166.15	32.62	10	-0.71	GOOD
P-1007	I-748	I-747	N-12	166.47	166.34	34.56	12	0.38	GOOD
P-1008	I-750	I-749	N-12	166.88	166.97	34.52	12	-0.26	GOOD
P-1009	I-749	I-751	N-12	166.87	166.41	117.85	12	0.39	GOOD
P-1010	I-752	I-751	N-12	166.61	166.41	57.53	12	0.35	GOOD
P-1011	I-753	I-755	CONC	166.87	166.46	43.35	8	0.95	GOOD
P-1012		M-180	CONC	165.94	165.22	212	10	0.34	GOOD
P-1013	I-755	P-1012	CONC	166.36	164.61	30	8	5.83	GOOD
P-1014	I-758	P-1012	CONC	165.07	165.30	37	8	-0.62	GOOD
P-1015	I-756	P-1012	CONC	165.00	165.30	22	8	-1.36	GOOD
P-1016	I-757	P-1017	CONC	165.29	165.00	29.86	8	0.97	GOOD
P-1017	I-771	M-180	CONC	164.95	165.22	313.18	8	-0.09	GOOD
P-1018	M-180	M-181	CONC	165.12	163.75	469.47	10	0.29	GOOD
P-1019	I-761	P-933	CONC	166.45	163.60	4.15	8	68.67	GOOD
P-1020	I-764	M-181	CONC	164.59	163.75	99.87	8	0.84	GOOD
P-1021	I-763	I-764	CONC	164.64	164.69	32.06	6	-0.16	GOOD
P-1022		M-181	CONC	164.62	163.75	475	18	0.18	GOOD
P-1023	I-772	I-773	CONC	165.59	165.51	31.94	8	0.25	GOOD
P-1024	I-773	Private	CONC	165.11	Private	Private	8	Private	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-947	IN	I-711	N-12	164.36	163.98	52.91	15	0.72	GOOD
P-948	I-710	M-168	N-12	165.63	164.74	25.53	12	3.49	GOOD
P-949	IN	M-168	N-12	166.43	164.74	64.88	15	2.60	GOOD
P-950	IN	M-169	N-12	166.17	162.33	58.64	15	6.55	GOOD
P-951	M-168	I-711	N-12	164.64	164.18	36.99	15	1.24	GOOD
P-952	I-711	I-712	N-12	163.88	163.59	56.77	15	0.51	GOOD
P-953	IN	I-712	N-12	166.40	164.99	29.05	15	4.85	GOOD
P-954	I-712	M-169	N-12	163.49	162.33	42.57	15	2.72	GOOD
P-954A	M-169	I-713	N-12	162.23	162.10	116.97	24	0.11	GOOD
P-955	I-714	I-713	DI	165.38	165.20	33.53	12	0.54	GOOD
P-956	I-715	I-716	N-12	163.52	162.02	33.62	15	4.46	GOOD
P-957	I-713	I-716	N-12	162.00	162.02	54.86	24	-0.04	GOOD
P-958	I-716	M-170	N-12	161.92	161.62	35.79	24	0.84	GOOD
P-959	M-170	M-171	N-12	161.52	161.49	52.1	24	0.06	GOOD
P-960	I-718	M-171	DI	164.79	164.79	27.39	10	0.00	GOOD
P-961	I-717	M-171	DI	164.75	164.69	6.9	10	0.87	GOOD
P-961A	M-171	M-172	N-12	161.39	160.81	118.61	24	0.49	GOOD
P-962	M-172	M-173	N-12	160.71	160.68	30.84	24	0.10	GOOD
P-963	M-173	OUT	N-12	160.58	160.07	45.83	24	1.11	GOOD
P-964	I-719	OUT	CONC	164.30	163.54	59.95	12	1.27	GOOD
P-965	I-720	I-719	CONC	165.47	164.70	52.84	8	1.46	GOOD
P-966	IN	I-721	PVC	167.84	167.77	6.16	10	1.14	GOOD
P-967	I-721	I-723	CONC	167.87	166.26	33.66	6	4.78	GOOD
P-968	IN	I-721	PVC	167.76	167.67	8.82	10	1.02	GOOD
P-970	I-722	I-723	CONC	166.16	166.91	48	6	-1.56	GOOD
P-971	M-164	M-174	CONC	163.70	164.38	600	12	-0.11	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-972	IN	M-175	PVC	PRIVATE	164.69	Buried	8	Buried	GOOD
P-973	M-174	OUT	CONC	164.38	Buried	Buried	12	Buried	GOOD
P-974	M-175	M-174	PVC	164.59	164.58	85.34	8	0.01	GOOD
P-975	I-724	M-174	CONC	165.33	164.38	254.51	8	0.37	GOOD
P-975A	PRIVATE	OUT	CONC	Buried	164.16	Buried	15	Buried	GOOD
P-976	I-725	I-724	CONC	165.48	164.46	32.04	8	3.18	GOOD
P-977	I-727	OUT	N-12	165.67	159.10	69.98	12	9.39	GOOD
P-978	BRIDGE								
P-979	I-726	OUT	DI	165.59	160.84	72.83	8	6.52	GOOD
P-980	BRIDGE								
P-981	BRIDGE								
P-982	BRIDGE								
P-983	BRIDGE								
P-984	BRIDGE								
P-985	BRIDGE								
P-986	BRIDGE								
P-987	BRIDGE								
P-988	BRIDGE								
P-989	BRIDGE								
P-990	BRIDGE								
P-991	M-165	I-721A	CONC	160.27	161.25	184	18	-0.53	GOOD
P-991A	I-721A	OUT	CONC	161.25	161.40	254	30	-0.06	GOOD
P-992	I-747	M-177	N-12	166.04	165.72	336.98	30	0.09	GOOD
P-993	M-177	OUT	N-12	165.72	166.02	101.6	30	-0.30	GOOD
P-994	M-178	OUT	N-12	164.20	165.69	74.42	30	-2.00	GOOD
P-995	M-182	M-178	N-12	165.74	166.00	364.55	30	-0.07	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-996	I-742	P-926	CONC	165.14	163.95	25.55	10	4.66	GOOD
P-997	I-743	P-926	CONC	164.13	163.95	6.65	10	2.71	GOOD
P-999	I-744	M-179	CONC	165.45	164.19	28.31	10	4.45	GOOD
P-1000	I-745	M-179	CONC	164.52	164.29	7.61	10	3.02	GOOD
P-1001	I-746	M-179	CONC	164.93	164.19	71.48	10	1.04	GOOD
P-1002	IN	I-746	CONC	Private	165.53	Private	6	Private	GOOD
P-1004	I-759	P-933	CONC	166.05	163.49	3.86	10	66.32	GOOD
P-1005	I-760	I-759	CONC	165.92	166.15	32.62	10	-0.71	GOOD
P-1007	I-748	I-747	N-12	166.47	166.34	34.56	12	0.38	GOOD
P-1008	I-750	I-749	N-12	166.88	166.97	34.52	12	-0.26	GOOD
P-1009	I-749	I-751	N-12	166.87	166.41	117.85	12	0.39	GOOD
P-1010	I-752	I-751	N-12	166.61	166.41	57.53	12	0.35	GOOD
P-1011	I-753	I-755	CONC	166.87	166.46	43.35	8	0.95	GOOD
P-1012		M-180	CONC	165.94	165.22	212	10	0.34	GOOD
P-1013	I-755	P-1012	CONC	166.36	164.61	30	8	5.83	GOOD
P-1014	I-758	P-1012	CONC	165.07	165.30	37	8	-0.62	GOOD
P-1015	I-756	P-1012	CONC	165.00	165.30	22	8	-1.36	GOOD
P-1016	I-757	P-1017	CONC	165.29	165.00	29.86	8	0.97	GOOD
P-1017	I-771	M-180	CONC	164.95	165.22	313.18	8	-0.09	GOOD
P-1018	M-180	M-181	CONC	165.12	163.75	469.47	10	0.29	GOOD
P-1019	I-761	P-933	CONC	166.45	163.60	4.15	8	68.67	GOOD
P-1020	I-764	M-181	CONC	164.59	163.75	99.87	8	0.84	GOOD
P-1021	I-763	I-764	CONC	164.64	164.69	32.06	6	-0.16	GOOD
P-1022		M-181	CONC	164.62	163.75	475	18	0.18	GOOD
P-1023	I-772	I-773	CONC	165.59	165.51	31.94	8	0.25	GOOD
P-1024	I-773	Private	CONC	165.11	Private	Private	8	Private	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-1026	I-777	M-182	N-12	166.33	165.84	257.99	12	0.19	GOOD
P-1027	M-183	M-182	N-12	166.62	165.84	262.52	30	0.30	GOOD
P-1028	I-765	M-183	N-12	167.55	166.52	41.16	12	2.50	GOOD
P-1028A	I-767A	M-183	N-12	167.26	166.52	18.58	12	3.98	GOOD
P-1029	I-766	M-183	N-12	166.39	166.62	44.04	15	-0.52	GOOD
P-1030	I-768	I-769	CONC	165.74	165.50	33.33	8	0.72	GOOD
P-1031	I-769	I-770	CONC	165.40	165.26	198.08	8	0.07	GOOD
P-1032	I-770	I-771	CONC	165.16	165.05	32.66	8	0.34	GOOD
P-1033	I-774	P-1022	CONC	164.18	163.64	15	8	3.60	GOOD
P-1034	I-775	I-776	CONC	166.62	162.58	59.76	8	6.76	GOOD
P-1035	I-776	I-774	CONC	164.38	164.28	34.35	8	0.29	GOOD
P-1037	I-778	I-777	N-12	167.20	166.43	33.2	12	2.32	GOOD
P-1038	I-795	I-766	N-12	167.32	166.29	400.92	15	0.26	GOOD
P-1039	I-789	I-790	CONC	166.23	166.18	32.42	8	0.15	FAIR
P-1040	I-792	I-791	CONC	165.37	165.15	32.81	8	0.67	GOOD
P-1041	I-793	OUT	PVC	167.96	167.74	6	12	3.67	GOOD
P-1042	I-798	I-797	PVC	169.76	167.92	81.67	6	2.25	GOOD
P-1043	I-797	I-796	N-12	167.42	167.48	33.88	12	-0.18	GOOD
P-1044	I-796	I-795	N-12	167.38	167.42	56.56	12	-0.07	GOOD
P-1045	I-799	I-796	N-12	168.19	167.78	81.81	12	0.50	GOOD
P-1046	I-801	I-800	N-12	168.10	168.00	33.61	12	0.30	GOOD
P-1047	I-800	M-185	N-12	167.90	167.45	184.96	12	0.24	GOOD
P-1048	IN	I-793	PVC	167.89	167.86	6.12	12	0.49	GOOD
P-1049	I-794	OUT	PVC	168.00	167.80	39.89	12	0.50	GOOD
P-1050	I-802	OUT	N-12	166.40	165.56	50.64	12	1.66	GOOD
P-1051	I-805	I-806	N-12	166.76	166.90	183	10	-0.08	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-1052	I-809	I-805	DI	167.41	167.08	360.43	8	0.09	GOOD
P-1053	I-806	I-808	PVC	166.70	166.70	56.98	10	0.00	GOOD
P-1054	I-808	I-802	N-12	166.65	166.50	183.43	12	0.08	GOOD
P-1055	I-803	I-804	CONC	165.25	165.56	43.37	10	-0.71	GOOD
P-1056	I-807	I-808	PVC	166.95	166.70	48.67	10	0.51	GOOD
P-1057	IN	I-808	PVC	166.84	166.80	11.42	10	0.35	GOOD
P-1058	I-804	OUT	CONC	165.46	165.55	96.65	10	-0.09	GOOD
P-1059	I-810	I-809	DI	166.49	167.64	59.67	8	-1.93	GOOD
P-1060	I-811	I-809	DI	167.61	167.64	58.9	10	-0.05	GOOD
P-1061	I-812	I-814	DI	166.82	166.91	56.63	12	-0.16	POOR
P-1062	I-813	I-814	DI	166.88	166.81	49.02	12	0.14	POOR
P-1062A	I-814	I-808	N-12	166.61	166.70	377.02	12	-0.02	GOOD
P-1063	I-815	I-794	DI	168.19	168.10	36.39	8	0.25	GOOD
P-1064	I-816	I-815	DI	168.42	168.29	60.13	8	0.22	GOOD
P-1065	I-817	I-818	DI	167.88	167.77	75.64	8	0.15	GOOD
P-1066	I-818	I-819	DI	167.77	167.61	58.12	8	0.28	GOOD
P-1067	I-820	I-819	DI	167.99	167.71	37.04	8	0.76	GOOD
P-1067A	I-819	I-821	PVC	167.51	167.70	202.08	12	-0.09	GOOD
P-1068	I-822	I-823	DI	167.02	167.12	36.67	8	-0.27	GOOD
P-1068A	I-823	I-821	PVC	167.02	167.60	128.17	12	-0.45	GOOD
P-1069	I-824	I-825	DI	168.33	168.27	34.55	8	0.17	GOOD
P-1070	I-825	OUT	PVC	168.17	166.07	118.85	12	1.77	GOOD
P-1071	I-821	OUT	PVC	167.50	165.77	189.41	12	0.91	GOOD
P-1072	IN	I-826	PVC	165.43	164.39	9.57	12	10.87	GOOD
P-1073	I-826	I-827	PVC	164.39	165.02	117.41	15	-0.54	GOOD
P-1074	I-827	I-828	PVC	164.92	164.32	42.67	15	1.41	GOOD

Appendix A: Closed Conduit Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condition
P-1075	I-828	OUT	PVC	164.32	163.34	222.72	15	0.44	GOOD
P-1076	M-184	OUT	N-12	166.81	167.15	6.46	36	-5.26	GOOD
P-1077	M-185	M-184	N-12	167.35	167.15	138.92	36	0.14	GOOD
P-1078	M-186	M-185	N-12	167.80	167.45	243.44	15	0.14	GOOD
P-1079	I-831	M-186	N-12	168.01	167.85	22.41	12	0.71	GOOD
P-1080	I-832	M-186	N-12	167.98	167.85	35.84	12	0.36	GOOD
P-1081	I-830	M-186	N-12	168.09	167.85	51.12	12	0.47	GOOD
P-1082	I-829	M-185	N-12	167.64	167.45	56.74	12	0.33	GOOD
P-1083	M-187	M-185	N-12	167.61	167.45	309.35	24	0.05	GOOD
P-1084	I-833	M-187	N-12	167.86	167.81	8.29	12	0.60	GOOD
P-1085	I-834	M-187	N-12	167.89	167.81	25	12	0.32	GOOD
P-1086	I-837	M-189	N-12	168.20	168.31	38.18	12	-0.29	GOOD
P-1087	I-841	I-842	PVC	172.13	171.75	61.06	6	0.62	GOOD
P-1088	I-840	M-189	N-12	168.49	168.31	53.95	12	0.33	GOOD
P-1089	Private	M-188	N-12	Private	167.96	Private	15	Private	GOOD
P-1090	I-835	M-188	N-12	168.03	167.96	30.64	12	0.23	GOOD
P-1091	Private	M-188	N-12	Private	167.96	Private	12	Private	GOOD
P-1092	I-836	M-188	N-12	167.94	167.96	37.92	12	-0.05	GOOD
P-1093	M-189	M-188	N-12	168.21	167.96	249.11	15	0.10	GOOD
P-1094	I-838	M-189	N-12	168.20	168.41	29.87	12	-0.70	GOOD
P-1095	Private	M-189	N-12	Private	168.41	Private	12	Private	GOOD
P-1096	I-839	M-189	N-12	168.32	168.41	39.44	12	-0.23	GOOD
P-1097	M-190	M-189	N-12	168.42	168.31	131.61	12	0.08	GOOD
P-1098	I-842	M-190	N-12	168.85	168.61	26.58	12	0.90	GOOD
P-1099	I-843	M-190	N-12	168.70	168.61	22.63	12	0.40	GOOD

Appendix B: Culverts Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condidtion
C-1	NORTH	SOUTH	CONC	165.42	165.39	58.55	12	0.05	GOOD
C-2	WEST	EAST	CMP	166.22	165.91	33.03	8	0.94	GOOD
C-3	WEST	EAST	PVC	163.89	163.79	40.32	30	0.25	GOOD
C-4	WEST	EAST	CONC	165.64	165.61	18.71	12	0.16	GOOD
C-5	WEST	EAST	CONC	165.68	165.21	42.94	12	1.09	GOOD
C-6	WEST	EAST	CONC	165.12	165.12	29.96	12	0.00	GOOD
C-7	NORTH	SOUTH	CONC	162.50	162.26	56.12	18	0.43	FAIR
C-8	NORTH	SOUTH	CONC	161.87	161.48	38.4	18	1.02	FAIR
C-9	NORTH	SOUTH	CONC	162.16	161.52	41.33	18	1.55	FAIR
C-10	EAST	WEST	CONC	155.14	151.83	59.72	36	5.54	GOOD
C-11	SOUTH	NORTH	CONC	160.27	159.73	31	12	1.74	POOR
C-12	WEST	EAST	CONC	151.05	150.91	57.33	24	0.24	GOOD
C-13	NORTH	SOUTH	CONC	161.82	160.93	70.64	12	1.26	GOOD
C-16	SOUTH	NORTH	N-12	178.01	177.94	27.92	12	0.25	GOOD
C-17	WEST	EAST	CONC	177.01	176.99	92.67	15	0.02	GOOD
C-18	WEST	EAST	CONC	176.02	175.97	39.28	15	0.13	GOOD
C-19	EAST	WEST	N-12	174.95	174.87	39.41	15	0.20	GOOD
C-20	SOUTH	NORTH	N-12	157.83	156.86	90	18	1.08	GOOD
C-21	NORTH	SOUTH	CONC	158.12	157.69	40.62	12	1.06	GOOD
C-22	WEST	EAST	CONC	156.88	156.19	40.95	12	1.68	FAIR
C-23	NORTH	SOUTH	CONC	158.20	158.14	37.46	12	0.16	FAIR
C-24	SOUTH	NORTH	CONC	160.04	159.15	104.28	12	0.85	FAIR
C-25	SOUTH	NORTH	CONC	160.38	160.16	99.68	12	0.22	GOOD
C-26	SOUTH	NORTH	CONC	160.79	160.17	48.47	12	1.28	GOOD
C-27	SOUTH	NORTH	CONC	161.00	160.69	37.07	12	0.84	FAIR
C-28	NORTH	SOUTH	CONC	160.58	160.55	55.12	12	0.05	FAIR
C-29	SOUTH	NORTH	CONC	160.50	160.46	44.5	12	0.09	FAIR

Appendix B: Culverts Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condidtion
C-30	NORTH	SOUTH	CONC	160.78	159.64	145.55	12	0.78	FAIR
C-30A	SOUTH	NORTH	CONC	161.73	160.60	271.53	12	0.42	FAIR
C-31	SOUTH	NORTH	CONC	160.98	160.88	53.44	12	0.19	FAIR
C-32	EAST	WEST	CMP/CONC	161.22	160.73	45.28	18	1.08	FAIR
C-33	WEST	EAST	CONC	166.20	166.17	58.38	18	0.05	GOOD
C-34	WEST	EAST	CONC	166.13	166.06	58.38	18	0.12	GOOD
C-35	NORTH	SOUTH	DI	167.83	167.49	80.24	12	0.42	GOOD
C-36	NORTH	SOUTH	CONC	166.98	166.68	52.2	15	0.57	GOOD
C-37	NORTH	SOUTH	CONC	177.89	177.80	22.72	12	0.40	FAIR
C-38	NORTH	SOUTH	DI	178.29	178.20	26.59	8	0.34	POOR
C-39	NORTH	SOUTH	CONC	177.77	177.74	43.83	12	0.07	FAIR
C-40	NORTH	SOUTH	CONC	177.73	177.72	40.13	12	0.02	FAIR
C-41	NORTH	SOUTH	CONC	177.27	177.03	40.46	12	0.59	FAIR
C-42	NORTH	SOUTH	CONC	176.87	176.72	60.8	12	0.25	FAIR
C-43	NORTH	SOUTH	CONC	170.99	170.54	79.31	36	0.57	GOOD
C-44	NORTH	SOUTH	N-12	171.62	170.90	80.53	30	0.89	GOOD
C-45	SOUTH	NORTH	CONC	167.89	167.87	28.97	12	0.07	POOR
C-46	SOUTH	NORTH	CONC	167.35	166.90	57.13	12	0.79	POOR
C-47	WEST	EAST	N-12/CMP	163.39	163.22	101.13	24	0.17	POOR
C-48	WEST	EAST	CONC	163.14	162.63	66.5	24	0.77	GOOD
C-49	EAST	WEST	CMP	162.98	162.92	18.17	24	0.33	FAIR
C-51	NORTH	SOUTH	CONC	158.01	157.73	40.27	24	0.70	GOOD
C-52	NORTH	SOUTH	N-12	156.56	156.06	41.71	15	1.20	GOOD
C-53	NORTH	SOUTH	N-12	157.01	156.74	19.54	12	1.38	FAIR
C-54	SOUTH	NORTH	CONC	157.22	156.70	24.26	12	2.14	FAIR
C-55	NORTH	SOUTH	N-12	156.27	156.27	21.71	15	0.00	FAIR
C-56	SOUTH	NORTH	N-12/CMP	159.91	159.75	376.39	12	0.04	GOOD

Appendix B: Culverts Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condidtion
C-57	SOUTH	NORTH	N-12	161.21	160.64	29.23	12	1.95	GOOD
C-59	WEST	EAST	DI	161.25	160.90	30.05	10	1.16	POOR
C-60	NORTH	SOUTH	N-12	158.18	157.73	23.77	15	1.89	GOOD
C-61	WEST	EAST	N-12	155.74	155.11	100.8	30	0.62	GOOD
C-62	NORTH	SOUTH	CONC/CMP	153.29	151.63	72.71	60	2.28	FAIR
C-63	WEST	EAST	CONC/PVC	166.55	166.03	152.3	6	0.34	GOOD
C-64	EAST	WEST	PVC	160.82	Buried	Buried	12	Buried	POOR
C-66	SOUTH	NORTH	CONC	177.32	177.07	28.62	12	0.87	POOR
C-67	SOUTH	NORTH	DI	178.27	177.86	52.65	8	0.78	GOOD
C-68	NORTH	SOUTH	CONC	177.74	177.01	25.78	12	2.83	GOOD
C-69	NORTH	SOUTH	CONC	176.75	175.94	43.18	12	1.88	GOOD
C-70	EAST	WEST	CMP	172.29	172.13	55.81	48	0.29	FAIR
C-71	SOUTH	NORTH	CMP	172.41	172.15	81.2	48	0.32	GOOD
C-72	WEST	EAST	N-12/CONC	174.60	173.38	55.97	12	2.18	FAIR
C-73	SOUTH	NORTH	CONC	176.77	176.29	29.85	12	1.61	FAIR
C-74	SOUTH	NORTH	N-12	178.84	178.44	68.26	12	0.59	GOOD
C-75	NORTH	SOUTH	CMP	164.40	163.65	78.28	48	0.96	FAIR
C-76	WEST	EAST	CONC	Buried	162.36	Buried	60	Buried	POOR
C-77	NORTH	SOUTH	CONC	169.29	168.54	82.23	12	0.91	FAIR
C-78	EAST	WEST	CMP	162.34	161.48	305.87	42	0.28	GOOD
C-79	WEST	EAST	CONC	168.10	167.75	29.87	10	1.17	GOOD
C-80	SOUTH	NORTH	CONC	167.83	167.58	40.78	8	0.61	POOR
C-81	WEST	EAST	CMP	155.45	151.18	94.79	36	4.50	POOR
C-83	SOUTH	NORTH	N-12	166.32	166.14	132.52	30	0.14	GOOD
C-84	EAST	WEST	CMP	169.18	168.76	39.75	24	1.06	GOOD
C-85	SOUTH	NORTH	CONC	165.72	165.65	24.92	12	0.28	GOOD

Appendix B: Culverts Inventory

Pipe ID	Upstream Structure ID	Downstream Structure ID	Conduit Material	US Invert Elev (ft)	DS Invert Elev (ft)	Length (ft)	Diameter (in)	Slope (%)	Pipe Condidtion
C-86	SOUTH	NORTH	CONC	166.23	165.47	190.94	18	0.40	GOOD
C-87	SOUTH	NORTH	N-12	166.96	166.30	50.83	12	1.30	GOOD
C-88	SOUTH	NORTH	CONC/N-12	167.11	166.66	92.06	12	0.49	GOOD
C-89	SOUTH	NORTH	CONC	166.69	166.27	29.66	12	1.42	FAIR
C-90	SOUTH	NORTH	CONC	167.44	166.81	165.77	12	0.38	FAIR
C-91	SOUTH	NORTH	CONC	167.11	166.91	22.06	12	0.91	FAIR
C-92	SOUTH	NORTH	CONC	167.20	166.79	24.44	12	1.68	GOOD
C-93	NORTH	SOUTH	CONC	167.79	167.69	96.66	12	0.10	GOOD
C-94	WEST	EAST	CONC	159.90	158.00	54.91	18	3.46	FAIR
C-95	SOUTH	NORTH	CONC	161.87	161.49	31.76	30	1.20	GOOD
C-96	SOUTH	NORTH	N-12	162.75	162.02	30.27	24	2.41	GOOD
C-97	SOUTH	NORTH	N-12	162.56	161.84	21.91	24	3.29	GOOD
C-98	WEST	EAST	N-12	166.29	162.37	270	12	1.45	GOOD
C-99	SOUTH	NORTH	PVC	165.28	164.75	28	8	1.89	GOOD

Appendix C: Deficient Pipes - Independence

Pipe ID	Sub-Basin	Location	Length (ft)	Existing Diameter (in)	Proposed Diameter (in)	Existing Slope (%)	Pipe Condition	Estimated Cost
P-30	3	Stryker Road	15	10	10	-1.55	GOOD	$ 774.00
P-63	3A	Cessna Street	94	10	10	-0.68	GOOD	$ 4,722.00
P-64	3A	Stryker Road	35	10	10	-0.89	FAIR	$ 1,740.00
P-42	5B	Stryker Road	54	6	10	3.02	GOOD	$ 2,678.50
P-66	7	Stryker Road	38	12	12	-0.24	GOOD	$ 2,262.60
P-70	7	Stinson Street	30	12	12	-0.71	GOOD	$ 1,780.20
P-81	8	Stryker Road	33	10	10	-1.56	POOR	$ 1,665.50
P-86	9	Stryker Road	3	10	10	-0.29	GOOD	$ 170.00
P-87	9	Stryker Road	33	10	10	-0.45	GOOD	$ 1,666.50
P-92	10	Stryker Road	139	12	12	-1.06	GOOD	$ 8,310.00
P-100	10	Stryker Road	301	12	12	-0.48	GOOD	$ 18,030.00
P-199	10	Stryker Road	36	10	10	-1.73	GOOD	$ 1,824.00
P-200	10A	Luscombe Street	31	12	12	-0.23	GOOD	$ 1,837.80
P-205	10A	Stryker Road	37	15	15	-0.08	GOOD	$ 2,760.00
P-208	10A	Bellanca Taxiway	66	18	18	-0.11	GOOD	$ 5,972.40
P-195	14	West of lagoons	10	15	15	-1.70	GOOD	$ 750.00
P-215	15	Hoffman Road	10	10	10	-0.90	GOOD	$ 498.50
P-239	17	Ash Street	7	6	10	9.46	GOOD	$ 370.00
P-251	17	Ash Street	58	6	10	2.04	GOOD	$ 2,910.00
P-108	19	Wild Rose Court	24	12	12	-0.50	GOOD	$ 1,453.20
P-125	19	Northgate Drive	62	30	30	-0.29	GOOD	$ 9,324.00
P-135	19A	Marigold Drive	34	10	10	-0.18	GOOD	$ 1,710.50
P-156	19A	Gun Club Road	33	12	12	-0.09	GOOD	$ 2,003.40
P-160	25	Picture Street	227	6	10	2.39	GOOD	$ 11,350.00

Appendix C: Deficient Pipes - Independence

Pipe ID	Sub-Basin	Location	Length (ft)	Existing Diameter (in)	Proposed Diameter (in)	Existing Slope (%)	Pipe Condition	Estimated Cost
P-161	25	Picture Street	42	6	10	-0.50	GOOD	$ 2,100.00
P-345	27	Williams Street	45	8	10	-0.27	GOOD	$ 2,239.50
P-347	27	12th Street	7	6	10	16.43	GOOD	$ 350.00
P-343	29	Williams Street	196	8	10	-0.18	GOOD	$ 9,780.50
P-361	29	Dawn Court	217	15	15	-0.12	GOOD	$ 16,293.75
P-291	33	Marsh Street	9	12	12	-0.68	GOOD	$ 526.20
P-437	33	Marsh Street	35	24	24	-10.51	GOOD	$ 4,189.20
P-394	37A	Ash Street	30	6	10	33.23	GOOD	$ 1,500.00
P-512	45	Gun Club Road	67	8	10	-3.66	GOOD	$ 3,359.00
P-515	46	Northway Street	Buried	6	12	Buried	POOR	$ 5,000.00
P-516	46	Northway Street	36	6	10	2.19	POOR	$ 1,802.50
P-402	51	Butler Street	28	6	10	0.53	FAIR	$ 1,412.50
P-403	51	Walnut Street	44	6	10	-0.70	FAIR	$ 2,223.50
P-455	51	Log Cabin Street	333	6	10	1.92	GOOD	$ 16,650.00
P-457	51	Log Cabin Street	210	6	10	1.58	FAIR	$ 10,500.00
P-459	51	Log Cabin Street	163	6	10	1.58	FAIR	$ 8,150.00
P-698	51	3rd Street	Buried	6	10	Buried	FAIR	$ 5,000.00
P-699	51	3rd Street	28	6	10	1.48	FAIR	$ 1,418.50
P-700	52	A Street	30	6	10	1.45	FAIR	$ 1,512.50
P-632	55	C Street	22	6	10	44.86	FAIR	$ 1,100.00
P-633	55	C Street	22	6	10	44.32	FAIR	$ 1,100.00
P-635	55	C Street	25	6	10	37.28	FAIR	$ 1,250.00
P-636	55	C Street	Buried	4	10	Buried	FAIR	$ 5,000.00
P-637	55	C Street	25	6	10	37.48	FAIR	$ 1,250.00
P-639	55	C Street	25	6	10	38.36	FAIR	$ 1,250.00

Appendix C: Deficient Pipes - Independence

Pipe ID	Sub-Basin	Location	Length (ft)	Existing Diameter (in)	Proposed Diameter (in)	Existing Slope (%)	Pipe Condition	Estimated Cost
P-640	56	5th Street	Buried	10	10	Buried	FAIR	$ 5,000.00
P-626	57	B Street	28	8	10	-1.11	GOOD	$ 1,391.00
P-630	57	4th Street	35	6	10	1.09	FAIR	$ 1,750.00
P-701	58	2nd Street	Buried	6	10	Buried	GOOD	$ 5,000.00
P-718	58	3rd Street	220	6	10	1.54	GOOD	$ 11,000.00
P-719	58	3rd Street	36	6	10	-1.67	GOOD	$ 1,800.00
P-741	58	Alley	53	4	10	4.87	GOOD	$ 2,638.00
P-563	62	D Street	51	12	12	-0.68	GOOD	$ 3,084.60
P-657	64	Alley	332	6	10	0.19	GOOD	$ 16,600.00
P-663	64	D Street	Buried	6	10	Buried	GOOD	$ 5,000.00
P-672	64	6th Street	328	6	10	0.49	FAIR	$ 16,400.00
P-747	64	Alley	79	10	10	Plugged	POOR	$ 3,970.00
P-748	64	Alley	27	Buried	10	Buried	POOR	$ 1,339.50
P-766	64	Alley	116	6	10	1.47	GOOD	$ 5,805.50
P-767	64	Alley	43	6	10	1.74	GOOD	$ 2,156.00
P-767A	64	Alley	74	6	10	Buried	GOOD	$ 3,700.00
P-725A	65	C Street	61	10	10	Plugged	FAIR	$ 3,055.00
P-670	65A	D Street	14	6	10	Buried	GOOD	$ 675.00
P-670A	65A	D Street	14	6	10	Buried	GOOD	$ 675.00
P-787	66	16th Street	34	12	12	-2.26	GOOD	$ 2,041.20
P-798	68	Falcon Loop	32	12	12	-0.37	GOOD	$ 1,948.20
P-567	71	12th Street	18	6	10	1.66	GOOD	$ 902.50
P-568	71	12th Street	15	6	10	1.13	GOOD	$ 751.50
P-568A	71	12th Street	76	6	10	1.47	GOOD	$ 3,776.50
P-569	71	12th Street	36	4	10	0.38	FAIR	$ 1,822.00

Appendix C: Deficient Pipes - Independence

Pipe ID	Sub-Basin	Location	Length (ft)	Existing Diameter (in)	Proposed Diameter (in)	Existing Slope (%)	Pipe Condition	Estimated Cost
P-570	71	12th Street	37	4	10	1.20	FAIR	$ 1,837.00
P-571	71	12th Street	37	4	10	1.20	FAIR	$ 1,837.00
P-572A	71	12th Street	97	12	12	0.30	GOOD	$ 5,799.60
P-577	71	12th Street	38	12	12	-0.08	GOOD	$ 2,271.60
P-581	71	12th Street	37	8	10	-0.13	GOOD	$ 1,873.50
P-613	71	11th Street	13	8	10	-0.91	GOOD	$ 662.00
P-658	73	7th Street	Buried	6	10	Buried	FAIR	$ 5,000.00
P-659	73	7th Street	31	6	10	6.46	FAIR	$ 1,532.00
P-660	73	7th Street	Buried	6	10	Buried	FAIR	$ 5,000.00
P-661	73	7th Street	11	6	10	19.75	FAIR	$ 557.00
P-671	73	7th Street	326	6	10	0.53	GOOD	$ 16,306.00
P-677	73	E Street	6	6	10	138.94	GOOD	$ 282.50
P-678	73	E Street	28	6	10	10.99	GOOD	$ 1,424.50
P-851	73	7th Street	309	6	10	0.55	GOOD	$ 15,458.50
P-855	73	F Street	27	6	10	3.24	GOOD	$ 1,344.50
P-856	73	F Street	37	6	10	0.44	GOOD	$ 1,825.00
P-857	73	F Street	27	6	10	8.52	GOOD	$ 1,350.00
P-858	73	F Street	15	6	10	11.40	GOOD	$ 750.00
P-664	74	5th Street	20	6	10	16.10	FAIR	$ 1,000.00
P-665	74	5th Street	20	6	10	16.10	FAIR	$ 1,000.00
P-666	74	5th Street	37	6	10	9.62	FAIR	$ 1,850.00
P-667	74	5th Street	25	6	10	13.84	FAIR	$ 1,250.00
P-668	74	5th Street	332	6	10	0.21	GOOD	$ 16,600.00
P-669	74	D Street	28	6	10	1.28	GOOD	$ 1,411.00
P-673	74	Alley	326	6	10	0.82	GOOD	$ 16,284.50

Appendix C: Deficient Pipes - Independence

Pipe ID	Sub-Basin	Location	Length (ft)	Existing Diameter (in)	Proposed Diameter (in)	Existing Slope (%)	Pipe Condition	Estimated Cost
P-674	74	Alley	329	6	10	0.58	GOOD	$ 16,468.50
P-680	74	E Street	26	6	10	10.18	GOOD	$ 1,297.00
P-681	74	E Street	9	6	10	31.06	GOOD	$ 425.00
P-683	74	E Street	25	6	10	7.99	GOOD	$ 1,238.50
P-685	74	5th Street	Buried	6	10	Buried	GOOD	$ 5,000.00
P-686	74	E Street	36	6	10	10.70	GOOD	$ 1,780.50
P-687	74	E Street	24	6	10	3.15	GOOD	$ 1,205.50
P-689	74	E Street	36	6	10	4.10	GOOD	$ 1,817.50
P-692	74	E Street	25	6	10	20.53	GOOD	$ 1,225.00
P-693	74	E Street	8	6	10	63.23	GOOD	$ 402.50
P-694	74	E Street	6	6	10	66.49	GOOD	$ 291.00
P-694A	74	E Street	2	6	10	157.50	GOOD	$ 100.00
P-695	74	E Street	44	6	10	8.29	GOOD	$ 2,196.50
P-696	74	E Street	13	6	10	27.42	GOOD	$ 636.50
P-697	74	Alley	340	6	10	0.44	GOOD	$ 17,001.00
P-775	74	E Street	22	6	10	13.48	GOOD	$ 1,098.00
P-776	74	E Street	9	6	10	34.18	GOOD	$ 433.00
P-852	74	6th Street	308	6	10	0.50	GOOD	$ 15,390.00
P-854	74	Alley	307	6	10	0.68	GOOD	$ 15,326.50
P-859	74	6th Street	27	6	10	12.69	GOOD	$ 1,328.00
P-860	74	F Street	15	6	10	16.13	GOOD	$ 750.00
P-861	74	6th Street	182	6	10	0.44	GOOD	$ 9,100.00
P-862	74	6th Street	20	6	10	16.50	GOOD	$ 1,000.00
P-864	74	6th Street	8	6	10	49.88	GOOD	$ 400.00
P-865	74	F Street		6	10	Buried	GOOD	$ 5,000.00

Appendix C: Deficient Pipes - Independence

Pipe ID	Sub-Basin	Location	Length (ft)	Existing Diameter (in)	Proposed Diameter (in)	Existing Slope (%)	Pipe Condition	Estimated Cost
P-870	74	F Street	5	6	10	9.77	GOOD	$ 240.50
P-871	74	F Street	28	6	10	6.81	GOOD	$ 1,395.00
P-880	74	6th Street	10	6	10	30.90	GOOD	$ 500.00
P-821	76	9th Street	42	6	10	4.40	POOR	$ 2,091.50
P-873	77	F Street	207	6	10	1.04	GOOD	$ 10,348.00
P-939	77	3rd Street	33	6	10	0.40	GOOD	$ 1,627.50
P-940	77	F Street	10	6	10	5.67	GOOD	$ 520.00
P-936	78	Alley	24	6	10	-1.97	GOOD	$ 1,195.50
P-944	78	G Street	34	12	12	-0.48	GOOD	$ 2,014.20
P-946A	78	G Street	26	12	12	-0.23	GOOD	$ 1,574.40
P-957	78	G Street	55	24	24	-0.04	GOOD	$ 6,583.20
P-806	80	Sweet Cherry Lane	298	12	12	-0.12	FAIR	$ 17,882.40
P-830A	80	11th Street	147	12	12	-0.12	GOOD	$ 8,820.00
P-834	81	10th Street	33	6	10	-0.28	POOR	$ 1,635.00
P-838A	81	Tyler Place	297	12	12	0.19	GOOD	$ 17,790.00
P-839	81	Easement	12	6	10	29.36	GOOD	$ 582.50
P-841	81	Easement	12	6	10	24.64	GOOD	$ 582.50
P-842	81	10th Street	10	12	12	-0.38	GOOD	$ 626.40
P-843	81	10th Street	30	6	10	9.34	GOOD	$ 1,520.50
P-879	84	6th Street	30	6	10	9.95	GOOD	$ 1,507.00
P-885	84	G Street	64	15	15	-0.02	GOOD	$ 4,795.50
P-888	85	G Street	37	12	12	-0.11	GOOD	$ 2,236.20
P-892	85	G Street	34	12	12	-0.06	GOOD	$ 2,039.40
P-894	85	G Street	57	12	12	-0.12	GOOD	$ 3,430.20
P-896	85	G Street	118	12	12	-0.32	GOOD	$ 7,106.40

Appendix C: Deficient Pipes - Independence

Pipe ID	Sub-Basin	Location	Length (ft)	Existing Diameter (in)	Proposed Diameter (in)	Existing Slope (%)	Pipe Condition	Estimated Cost
P-897A	85	G Street	190	12	12	-0.26	GOOD	$ 11,418.60
P-899	85	G Street	30	12	12	-0.07	GOOD	$ 1,770.00
P-901	87	7th Street	8	18	18	-3.79	FAIR	$ 735.30
P-902A	87	Arbor Court	39	8	10	-0.15	GOOD	$ 1,959.00
P-906	88	5th Street	34	4	10	1.02	GOOD	$ 1,711.00
P-967	90	3rd Street	34	6	10	4.78	GOOD	$ 1,683.00
P-970	90	I Street	48	6	10	-1.56	GOOD	$ 2,400.00
P-993	95	Pond	102	30	30	-0.30	GOOD	$ 15,240.00
P-994	95	Ditch	74	30	30	-2.00	GOOD	$ 11,163.00
P-1008	95	6th Street	35	12	12	-0.26	GOOD	$ 2,071.20
P-1029	95	6th Street	44	15	15	-0.52	GOOD	$ 3,303.00
P-925	96A	Maple Court	50	6	10	4.10	GOOD	$ 2,476.00
P-1002	96A	Maple Drive	Private	6	10	Private	GOOD	$ 5,000.00
P-991	96B	Easement	184	18	18	-0.53	GOOD	$ 16,560.00
P-1005	96B	4th Street	33	10	10	-0.71	GOOD	$ 1,631.00
P-1021	96B	Spruce Court	32	6	10	-0.16	GOOD	$ 1,603.00
P-1014	96C	Spruce Avenue	37	8	10	-0.62	GOOD	$ 1,850.00
P-1015	96C	Spruce Avenue	22	8	10	-1.36	GOOD	$ 1,100.00
P-1017	96D	Pine Court	313	8	10	-0.09	GOOD	$ 15,659.00
P-1051	97	Briar Road	183	10	10	-0.08	GOOD	$ 9,150.00
P-1059	97	Briar Road	60	8	10	-1.93	GOOD	$ 2,983.50
P-1060	97	Alder Street	59	10	10	-0.05	GOOD	$ 2,945.00
P-1061	97	River Oak Road	57	12	12	-0.16	POOR	$ 3,397.80
P-1055	98	Corvallis Road	43	10	10	-0.71	GOOD	$ 2,168.50
P-1058	98	Corvallis Road	97	10	10	-0.09	GOOD	$ 4,832.50

Appendix C: Deficient Pipes - Independence

Pipe ID	Sub-Basin	Location	Length (ft)	Existing Diameter (in)	Proposed Diameter (in)	Existing Slope (%)	Pipe Condition	Estimated Cost

Total $ 722,673.15