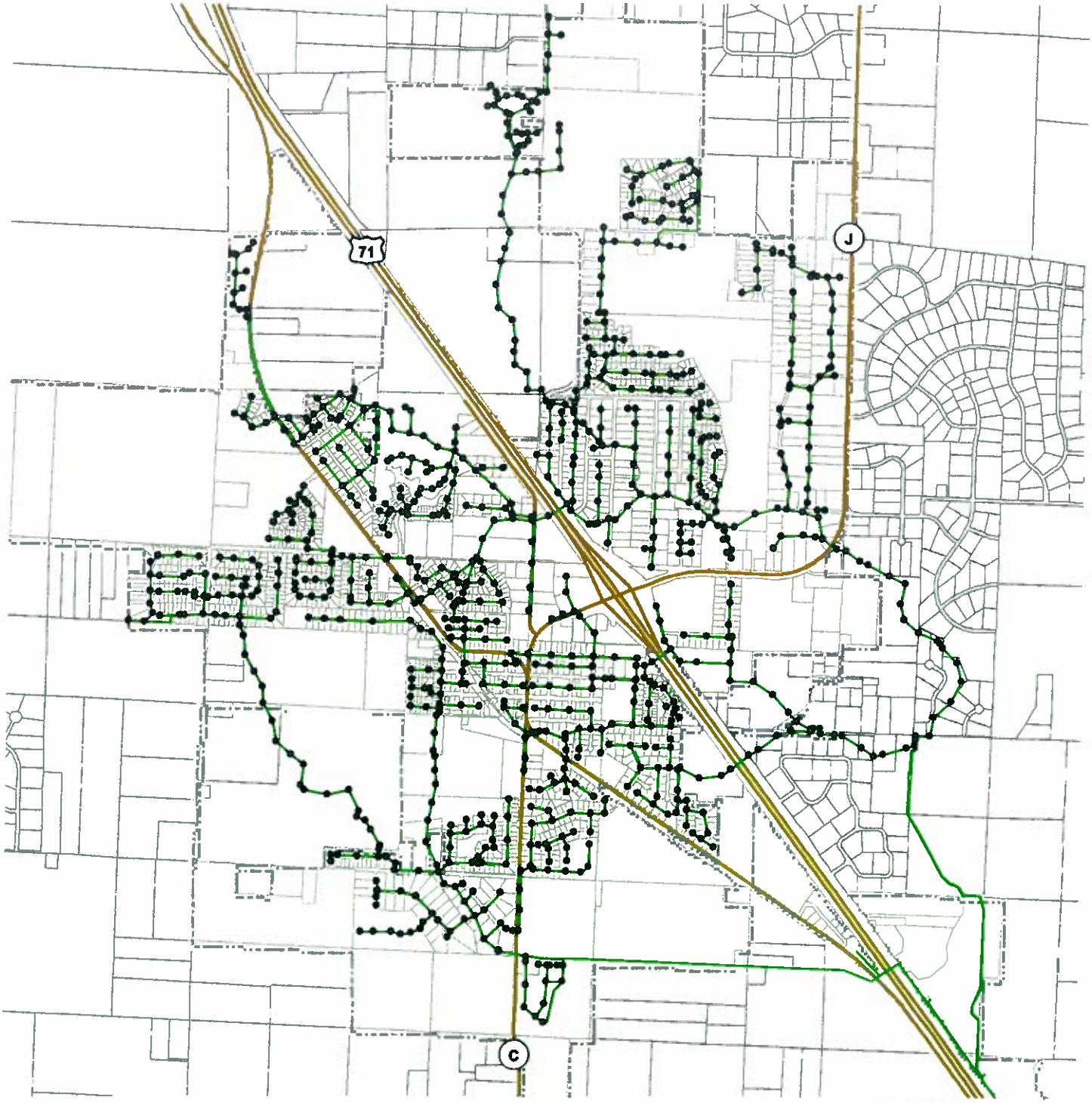
City of Peculiar, Missouri
2011 Sanitary Sewer
Evaluation & Study Report

January 2012

PN: 12323



GBA

GBA
architects
engineers

April 12, 2012

Mr. Carl Brooks, P.E.
600 Schug Avenue
Peculiar, MO 64078

SUBJECT: Submittal of Final SSES Report
2011 Wastewater Improvements
GBA PN 12323.00

creating remarkable solutions
for a higher quality of life

Dear Mr. Brooks,

Attached with this correspondence please find ten (10) copies of the Final SSES Report for your files.

We would like to thank you and your staff for your cooperation and assistance during the development of this report.

Please call me if you have any questions.

Sincerely,

GEORGE BUTLER ASSOCIATES, INC.

William C. Carter Jr

William C. Carter, Jr,, P.E.
Vice President/Project Manager

Enc.

9801 Renner Boulevard
Lenexa, Kansas
66219-9745

913.492.0400
913.577.8200 fax

GBA Companies
Lenexa, KS
Kansas City, MO
O'Fallon, MO
St. Louis, MO
St. Joseph, MO
Omaha, NE
Rock Island, IL
Chicago, IL
Cary, NC

www.gbateam.com

INDEX

TABLES

Table EX – 1 Summary of Annual Capital and O&M Costs	Page Ex - 1
Table 2 – 1 Summary of Pipe Lengths	Page 2 - 2
Table 3 – 1 Flow Meter Locations	Page 3 - 3
Table 3 – 2 Flow Basin Characteristics	Page 3 - 6
Table 3 – 3 Rainfall Summary	Page 3 - 7
Table 3 – 4 ADDF Summary	Page 3 - 8
Table 3 – 5 Infiltration Summary	Page 3 - 9
Table 3 – 6 Inflow Summary	Page 3 - 10
Table 3 – 7 Peak Flow Rates	Page 3 - 10
Table 3 – 8 Surcharge at Flow Meter Sites	Page 3 - 11
Table 3 – 9 Summary of Excessive Infiltration/Inflow Values	Page 3 - 11
Table 5 – 1 Level of Protection – Current Development	Page 5 - 4
Table 5 – 2 Level of Protection – Ultimate Development	Page 5 - 12
Table 5 – 3 Summary of Interceptor Level of Protection	Page 5 - 18
Table 5 – 4 Manholes with I/I Sources	Page 5 - 19
Table 5 – 5 Summary of Public Sector I/I Sources	Page 5 - 19
Table 5 – 6 Summary of Private Sector I/I Sources	Page 5 - 19
Table 5 – 7 Summary of Suspect Private Sector I/I Sources	Page 5 - 20
Table 5 – 8 Summary of Manhole Structural Deficiencies	Page 5 - 20
Table 6 – 1 Public Sector I/I Source Removal Recommendations	Page 6 - 4
Table 6 – 2 Internal Private Sector I/I Source Removal Recommendations	Page 6 - 6
Table 6 – 3 External Private Sector I/I Source Removal Recommendations	Page 6 – 7
Table 6 – 4 Estimated Relief Sewer Cost – Current Development	Page 6 – 10
Table 6 – 5 Estimated Relief Sewer Cost – Ultimate Development	Page 6 – 11
Table 6 – 6 Summary of Relief Sewer Costs	Page 6 – 12
Table 6 – 7 Summary of Annual Capital and O&M Costs	Page 6 – 17

FIGURES

Figure 2 – 1 Map Showing Collection System and ¼ Section Grid	Page 2 - 3
Figure 3 – 1 Wastewater Flow Parameters	Page 3 - 2
Figure 3 – 2 Flow Meter & Rainfall Gauge Locations	Page 3 - 4
Figure 3 – 3 Basin Flow Diagram	Page 3 - 5
Figure 3 – 4 Average Monthly Rainfall (Flow Monitoring Period)	Page 3 - 6
Figure 4 – 1 Map of Manhole Inspections	Page 4 - 6
Figure 4 – 2 Map of Building Inspections	Page 4 - 7
Figure 4 – 3 Map of Smoke Testing	Page 4 - 8
Figure 4 – 4 Map of Dyed Water Testing	Page 4 - 9
Figure 4 – 5 Map of CCTV Inspections	Page 4 – 10
Figure 5 – 1 Map of Main Interceptors & Watershed Boundaries	Page 5 - 2
Figure 5 – 2 Interceptor Level of Storm Protection – Current Development	Page 5 - 3
Figure 5 – 3 Interceptor Level of Storm Protection – Ultimate Development	Page 5 - 11
Figure 6 – 1 Proposed Relief Sewers @ 10 Yr Level of Protection – Current	Page 6 - 8
Figure 6 – 2 Proposed Relief Sewers @ 10 Yr Level of Protection – Ultimate	Page 6 - 9

EXECUTIVE SUMMARY

Background

For approximately 20 years, the City experienced a significant rate of growth. In 2007, a sewer capacity study was commissioned by the City to determine what improvements would be necessary to adequate transport and treat the wastewater from the growth areas to the City's wastewater treatment plant. This study identified capacity improvements to portions of the sewage collection system and to two (2) main sewage pumping stations.

In late 2009, the Missouri Department of Natural Resources (MDNR) requested that the City develop an Infiltration and Inflow (I/I) Assessment and Reduction Plan to address the overloading of the sewer system by rain and groundwater after large rainfall events. I/I is typically described as rain and groundwater that can enter a sanitary sewer system. In March of 2010, the City's engineering staff submitted the requested plan, which was subsequently approved by MDNR.

The City selected George Butler Associates, Inc. (GBA) in 2010 to assist them with design and implementation of capacity improvements to the sanitary sewer system and to conduct a more comprehensive sanitary sewer evaluation study (SSES). Based on cost estimates for the improvements the City approved the sale of $3.125 million dollars to finance the design and construction of the proposed improvements and the SSES. The average monthly sewer bill was increased by $12 per customer to pay off the debt. The project was advertised for bids and on October 4, 2011 the low bid of $1,764,482.00 was awarded to Leath and Sons Inc.

From March 2011 to December 2011 GBA designed the capacity improvements and studied the sanitary sewer system. The comprehensive study began with the creation of computerized maps of the sewer system, establishment of a hydraulic capacity model and the installation of flow meters and rainfall monitors. During the spring and summer

months GBA field crews began inspecting manholes and buildings and testing the system with smoke to identify sources of I/I.

Findings

It is our pleasure to report that the majority of the City's sanitary sewer system is in good condition. Over 75% of the City's sanitary sewer system is constructed with modern materials. Although most people would conclude that since the sewer system is fairly new and should be in good condition this is not the case for many of the cities that GBA has studied. Our flow monitoring study results show that although there are some areas that have greater than normal flows after a rainfall event, the majority of the system is resistant to inflow and infiltration of ground and rainwater. A number of active leaks were found during the manhole investigation and smoke testing portion of this project. These flows reduce the City's wastewater treatment plant's ability to properly handle the wastewater flows from the homes and businesses.

In our opinion the most significant finding was the flow carrying capacity of the City's main trunk sewers. As identified in the previously mentioned 2007 sewer capacity study and verified by GBA's hydraulic models, the main trunk sewers (See Chapter 6, Figure 6-1 Proposed Relief Sewers – Existing Development) that carry flow east across US 71 Highway to the East Lift Station have insufficient flow carrying capacity. We believe that there is a high probability that these trunk sewers will become overloaded during and after moderate to heavy rain events. We also believe the cause of this problem originated with the sizing of the interceptors when they were originally installed. Based on the City's current land use many of the sewer line segments are likely to surcharge 1 to 2 times per year. When residential and commercial growth returns the frequency of surcharging (flowing greater than full) will increase. This overloading causes system backups, overflows of sewage into area streams, backups into nearby basements and treatment issues at the wastewater treatment plant.

Recommendations – Capital Improvements

We recommend a three part approach to improving the City's sanitary sewer system. In the first part we recommend that interceptor enhancement or relief sewers be designed and constructed. The estimated capital cost for these improvements is $3.3 million. The relief sewer projects should be broken up into three (3) phases with the strategy of providing immediate relief to the areas that have historically experienced overflows and backups. Looking further into the future (2020 and beyond) another $1.5 M to $2.0M should be funded to improve the trunk sewer's branch lines that serve large tributary areas north of the current city boundaries (See Chapter 6, Figure 6-2, Proposed Relief Sewers - Ultimate Development). In addition, one line segment behind the homes on the southwest side of Soryl Ave and north of Hillcrest was found to be in very bad structural condition. It is recommended that a liner be installed to repair this segment for approximately $24,000.

In the second part we recommend that repairs to manholes found to be actively leaking and building service cleanouts, which were found without caps, be funded. The estimated initial capital cost for the manhole repairs is $135,000. Once the entire system has been inspected we believe another $250,000 will be needed to fix the structural problems and I/I sources that are found in the manholes. The estimated initial capital cost to disconnect the active sump pumps, add caps to the building line cleanouts and repair the leaking building service lines is $33,000. Once the entire system has been inspected we believe another $150,000 will be needed to remove the private sector I/I sources.

In the third and final part we recommend that the City continue with it assessment of the sewer system to identify cost effective sources of I/I. This sewer assessment work was required by the Missouri Department of Natural Resources in 2010. The estimated cost to complete this work is $300,000.

Table ES -1 shows the capital funding that would be required in the next ten years to accomplish the goal of reducing of sewer backups and overflows and improving the

level of service to the City's citizens. The 10 year total capital cost is estimated to be $5,327,000.

Recommendations – Operations and Maintenance

Another important issue is the level of maintenance the system should be receiving. Many of the communities of the City's size we work with have 5 to 7 employees devoted to ongoing operations and maintenance of their wastewater infrastructure (gravity sewers, force mains and pumping stations, and treatment plant)

We understand the cost to add employees can make staff expansion a difficult decision. We would propose that at a minimum of two (2) persons be added to the existing two (2) person team. This will allow the more routine maintenance tasks to be handed off to the less experienced workers and your most experience employees can perform valuable preventative maintenance on the City's thirteen (13) pumping stations and treatment plant.

The addition of the two additional people will also allow the City to conduct condition inspections and perform system repairs. A large number of manholes were found needing minor repairs that would reduce I/I and extend the service life of the City's treatment plant. I/I repairs are now being considered a "green" solution since minimizing the pumping of I/I flows reduces electrical consumption and creates a sustainable infrastructure for your citizens. As the City grows and receives additional revenue one or more additional maintenance staff should be added. The City staff has estimated the annual cost for two additional maintenance staff to be $75,000.

Our last recommendation is in regards to the inspection and cleaning of the City's sanitary sewer system. To maintain an acceptable level of service the underground infrastructure needs to be inspected and cleaned on a routine basis. It is our recommendation that the City contract yearly with a sewer cleaning company to perform high pressure water cleaning of twenty percent (20%) of the sewer system. The estimated annual cost to perform this work is $140,000. It is also our recommendation the City contract yearly with a sewer cleaning company to perform internal television inspection of ten percent (10%) of the sewer system. The estimated annual cost to perform this work is $44,000.

Table ES-1 summarizes the annual costs associated with the recommendations associated with operations and maintenance. The recommended additional annual cost to the maintenance portion of the City's budget is estimated to be $259,000.

Tab[illegible]S -1
Summary of Annual Capital and O and M Costs

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Capital Improvements	(expressed as 1,000's of dollars)										
Phase 1 Relief Sewers			$1,300								
Phase 2 Relief Sewers					$980						
Phase 3 Relief Sewers							$1,009				
Phase 4 Relief Sewers									$608		
Phase 5 Relief Sewers											$540
MH Rehabilitation Phase 1 and 2		$135		$125		$125					
Line E06-005 to E06-012 Repair		$22									
Private Sector I/I Removal			$33	$50	$50	$50					
Phase 2 - Sewer Assessment		$150	$150								
Total Capital Cost	$0	$307	$1,483	$175	$1,030	$175	$1,009	$0	$608	$0	$540
Debt Payment (4% - 20 years)		$23	$109	$13	$76	$13	$74	$0	$45	$0	$40
Accumulating Annual Debt Cost		$23	$132	$145	$221	$234	$308	$308	$353	$353	$393
Annual Maintenance Costs											
New Employees (2)	$75	$75	$75	$75	$75	$75	$75	$75	$75	$75	$75
Annual Line Cleaning	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140
Annual TV Inspection	$44	$44	$44	$44	$44	$44	$44	$44	$44	$44	$44
Total Maintenance Cost	$259	$259	$259	$259	$259	$259	$259	$259	$259	$259	$259
Total Annual Cost	$259	$282	$391	$404	$480	$493	$567	$567	$612	$612	$652
Annual Cost Factor (A/P, 4%, 20yrs) = .07358											

CHAPTER NO. 1 INTRODUCTION

A. Introduction and Background

Since 2002, the City of Peculiar, Missouri, located in Cass County, has adopted a long term strategy for improving the City's sanitary sewer infrastructure. An initial infiltration and inflow (I/I) study was conducted in 2002 by Larkin Engineering which resulted in improvements to sanitary sewer manholes. In 2007, Larkin completed a wastewater capacity study that recommended capacity enhancement improvements that would reduce the number of basement backups and overflows during significant rain events. In March of 2010, the City developed an I/I Assessment and Reduction Plan which outlined a timetable for the previously recommended improvements.

After conducting a qualifications based selection (QBS) process the City selected GBA Architects and Engineers (GBA) in 2010 to assist them with design and implementation of capacity improvements to the sanitary sewer system and to conduct a more comprehensive sanitary sewer evaluation study (SSES). This report summarizes the SSES work completed during 2011. Significant findings and recommendations will be presented to address the I/I and capacity issues that remain in the City's sewer system.

B. Project Area Description

The City of Peculiar is located in the Grand River watershed. The City has approximately 4,800 residents within the 2,370 acres incorporated into the City limits. The City experienced significant growth in the last 25 years but the growth rate has flatten with the current recession.

The City of Peculiar's sanitary sewer collection system currently contains approximately 194,697 feet of gravity sewer, 856 manholes and 22,952 feet of forcemain. A total of 13 pump stations pump flow from their respective service areas to the City's 0.75 MGD wastewater treatment facility (WWTF). The WWTF (Operating Permit No. MO-0089443) is located along U.S 71 Highway on the southeast corner of the City. The WWTF discharges into the East Branch of the Grand River. This plant has a reported hydraulic capacity of 3.0 mgd and treats an average of 0.40 mgd.

C. Purpose and Scope

The purpose of the SSES was to assist the City of Peculiar in accomplishing the following goals:

- ✓ Provide the City a map of the sanitary system with the structures numbered in a GIS ARC/view format.
- ✓ Gather and populate data for critical main interceptors in the GIS system.
- ✓ Conduct rainfall and flow monitoring to identify areas in the sewer collection with excessive I/I.
- ✓ Conduct a capacity analysis for the existing system's interceptors and provide recommendations for capacity improvements.
- ✓ Determine the ability of the existing main interceptors to carry future flows from growth and development and make recommendations for capacity improvements.
- ✓ Develop recommendation for repairs to the system that would reduce I/I and structural problems

The work completed, as part of the SSES project are as follows:

- ➢ Flow and Rainfall Monitoring and Data Analysis
- ➢ GIS Sewer Mapping
- ➢ Surface Manhole Inspections
- ➢ Smoke Testing
- ➢ Dye Water Testing
- ➢ Internal and External Building Inspections
- ➢ Television Inspection
- ➢ Improvement Recommendations

CHAPTER NO. 2 – MAPPING AND INVENTORY

A. Description of Work

A comprehensive sanitary sewer map and mapping database were created from record drawing information and hand drawn sewer maps obtained from the City for the purpose of:

- ✓ collecting and organizing available data
- ✓ creating unique structure identification
- ✓ providing data storage for information gathered from field investigations
- ✓ providing data storage for future sanitary sewer improvements
- ✓ produce accurate mapping to be utilized by City staff.

A quarter section grid was created that covers thirty-six (36) square miles encompassing the City. The extent of the grid will provide sufficient coverage of the areas that will eventually be in the City limits.

A structure identification numbering system was developed utilizing a unique quarter section identifier and structure number. This unique structure identifier was then assigned to each sanitary sewer manhole. In addition, physical data such as length, diameter, and slope of the sanitary sewer piping system was gathered and used to populate the database. Figure 2 – 1 shows the currently collection system and the quarter section identifier system.

B. General Summary

Using the provided record drawings and hand drawn maps the sanitary sewer map was created and used to perform the manhole and building inspections, smoke and dyed water testing, and closed circuit television (CCTV) of the system. The City's sanitary gravity sewer system was found to be significantly larger than the 500 manholes and 116,160 LF which was initially anticipated.

Based on the inspections and coordinate values gathered during field activities, by using handheld GPS units, it was found that some record drawing information is missing and other items, particularly manhole locations, were not accurate. The sanitary sewer

system map was adjusted, based on the collected GPS data, to produce an up to date map. Record drawing data were not available for the entire sanitary sewer system.

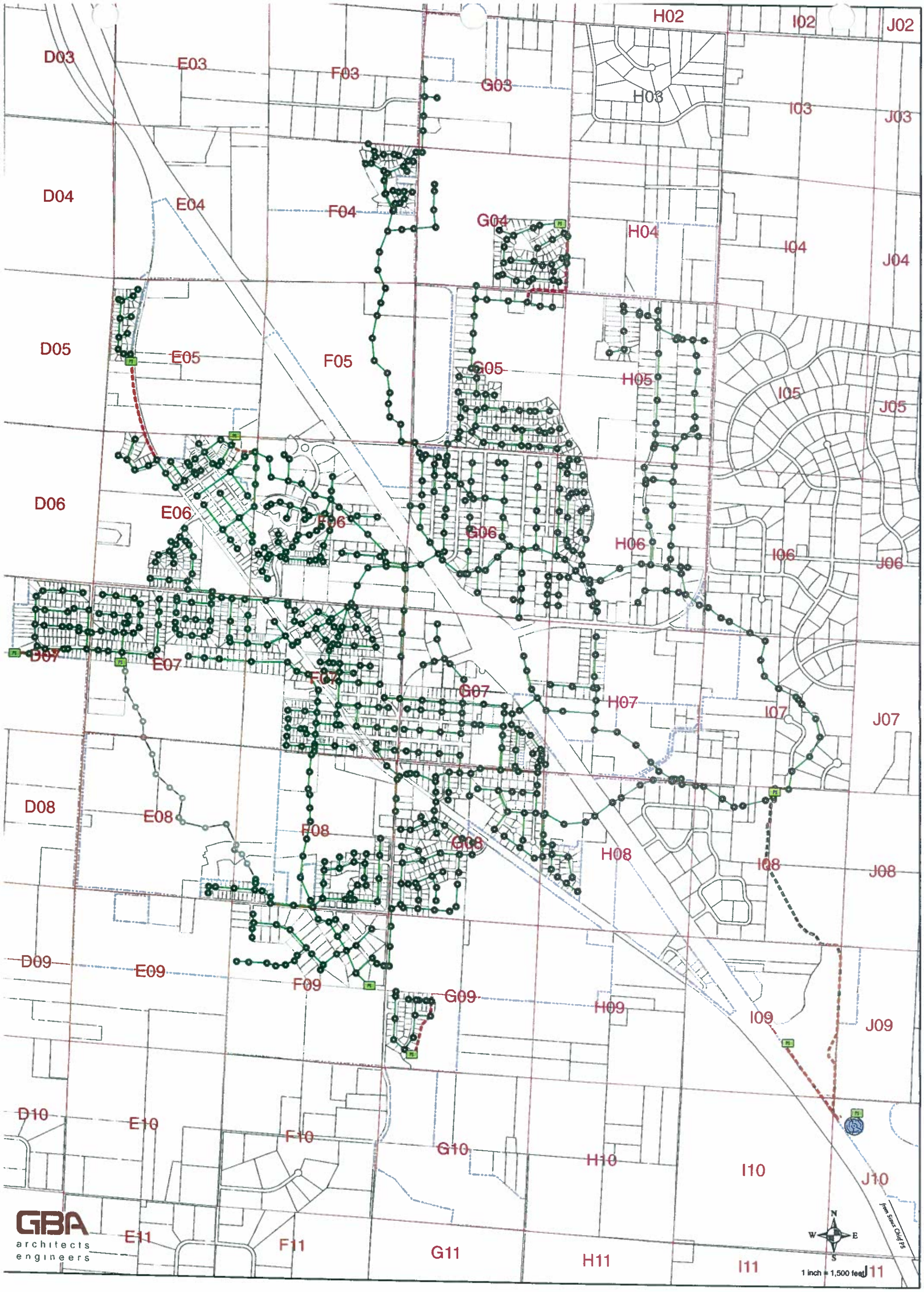
C. Significant Findings

- ✓ Record drawings are not available for the entire sanitary sewer system
- ✓ 856 sanitary manholes were identified from mapping effort
- ✓ 194,697 LF of 8" to 18" diameter – Gravity Sewers
- ✓ 22,952 LF of 4" to 12" diameter – Force Mains
- ✓ Thirteen (13) sewage pumping stations
- ✓ Twenty-three percent (23%) of the gravity sewers are vitrified clay pipe

Table 2 – 1, summarizes the footage of pipe by diameter and type (gravity / forcemain).

Table 2 – 1 Summary of Pipe Lengths

Sewer Type	Diameter (Inches) 4	6	8	10	12	15	18	Total
Force Main (ft)	6,370	1,218	0	6,205	9,159	0	0	22,952
Gravity (ft)	0	0	158,077	22,141	6,754	2,849	4,876	194,697



Lift Station
WWTP
Existing MH
Proposed MH
Quartersection Grid
Forcemain Existing
Gravity Existing
Gravity Proposed
Forcemain Proposed
Corprate Limit

City of Peculiar, Missouri
Sanitary Sewer System
Identification Grid

Figure 2-1

CHAPTER NO. 3 FLOW MONITORING AND DATA ANALYSIS

A. Introduction

This chapter presents the flow and rainfall data analysis methodology and summarizes the results of the flow monitoring that was conducted from 4/18/11 to 7/05/11. The purpose of the flow and rainfall monitoring was to determine flow rates and system response during both dry and wet weather conditions.

B. Wastewater Flow Parameters

Wastewater flows consist of three components. For the purpose of this study they are defined as follows.

1. Average Daily Dry Weather Flow (ADDF)

   ADDF is usually defined as the normal wastewater flow generated in the sewer system exclusive of infiltration and inflow. It consists of domestic, industrial, and commercial wastewater, plus, permanent infiltration. Permanent infiltration is groundwater induced flow entering the system during dry weather, low groundwater periods. The daily ADDF rate can be measured directly during dry weather conditions.

   The instantaneous ADDF rate varies throughout each day with the highest rates normally observed near 8:00 a.m. and 6:00 p.m. The ratio of peak instantaneous (15-minute) flow to total daily flow is defined as the ADDF peaking factor.

2. Infiltration

   Infiltration is defined as flows entering the wastewater collection system through defects below ground such as defective pipes, pipe joints and manholes. The rate of infiltration depends on the depth of groundwater above the defects as well as the percentage of the collection system below the groundwater table. The variation in groundwater levels and subsequent infiltration is seasonal and weather dependent. Since the groundwater levels are normally a relative constant over periods of several days, the peak infiltration can be considered as the maximum infiltration, which occurs during the maximum groundwater period of the year.

3. Inflow

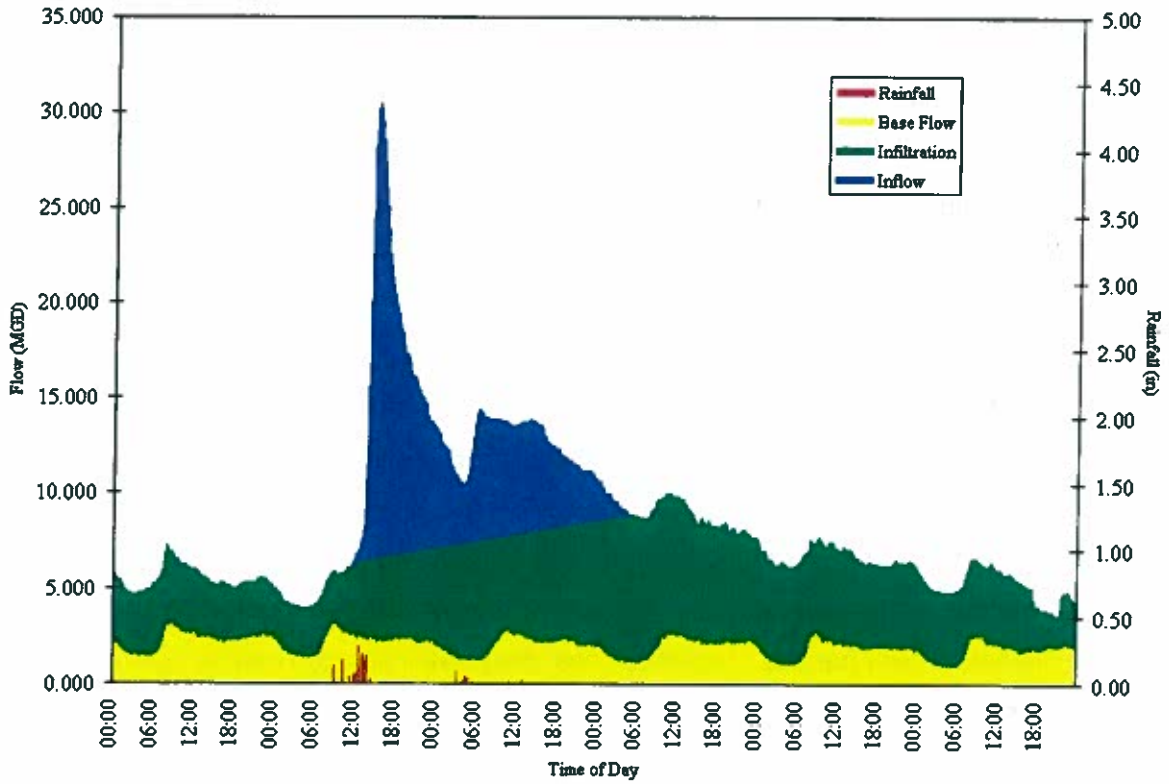
Inflow is defined as rainfall-related water entering the collection system from sources such as private sewer laterals, down spouts, foundation drains, yard and area drains, storm sump pumps, manhole covers and cross connections from storm drains. Inflow is directly influenced by the intensity and duration of a storm event and therefore is not a fixed quantity.

Figure 3 – 1 is a typical graph of wastewater flow rates for a flow basin, which shows the diurnal variations in ADDF, as well as infiltration and inflow components of the total flow.

4. Peak Flow

Peak flow is defined as the highest possible flow in a basin for a certain design storm. It is the sum of the peak ADDF, the infiltration and the peak inflow for the specific return interval.

Figure 3 - 1 Wastewater Flow Parameters



C. Analysis

A description of the methodology for determining the wastewater flow parameters and the flow monitoring results can be found in the following sections.

1. Monitoring Locations

A total of five (5) flow monitoring sites and a rain gauge site were established for this study. Flow and rainfall were monitored from 4/18/11 to 7/05/11. The flow monitoring site locations are described in Table 3 – 1.

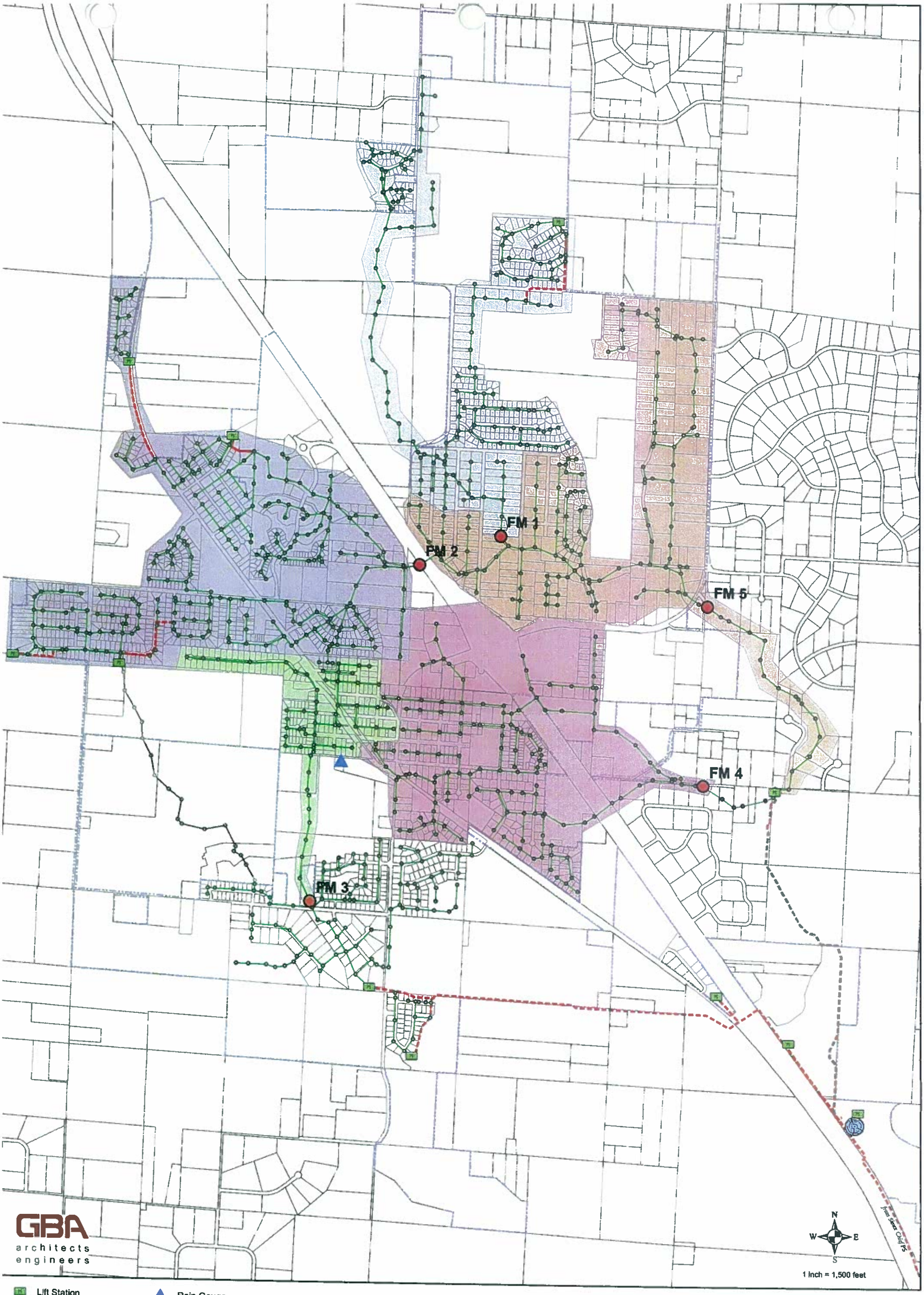
The monitoring sites were positioned to capture flow rates from the main interceptors and the majority of flow to the WWTP. Figure 3 – 2 shows the flow meter and rain gauge locations. Figure 3 – 3 is a schematic basin flow diagram showing flow routing.

2. Service Area and Sewer Inventory

The service area for this project includes all sewers owned and maintained by the City of Peculiar. Approximately 194,697 feet of gravity sewer serve the 3,700 acre service area. Table 3 – 2 contains a sanitary sewer inventory and summary of the flow meter basin characteristics. Flow data results along with the sewer inventory were used to determine where I/I removal efforts would be most effective. *Note: Some line segments were not flow monitored due to flow meter placement issues.* The total footage monitored is shown in Table 3 – 2.

Table 3 – 1 Flow Meter Locations

Subsystem	Manhole	Location	Diameter (in)	Install Date	Remove Date	Meter Type
FM-01	G06-004	841 Hargrove - Grass Easement	10	4/18/2011	7/5/2011	ISCO 2150
FM-02	G06-045	East of Intersection 218 St. and Main St near creek	10	4/18/2011	7/5/2011	ISCO 2150
FM-03	F08-002	11112 E. 227 St.	15	4/18/2011	7/5/2011	ISCO 2150
FM-04	I08-006	13202 N. Hedgewood Ln.	18	4/18/2011	7/5/2011	ISCO 2150
FM-05	I06-004	East of Intersection Hwy J and S. Oldtown Rd.	12	4/18/2011	7/5/2011	ISCO 2150
RG-1	-	Water Tower near intersection of W. 3rd and Lyons Dr.	-	4/18/2011	7/5/2011	Rain Gauge



City of Peculiar, Missouri
Sanitary Sewer System
Flow Monitoring Spring 2011

Figure 3-2

Figure 3 – 3 Basin Flow Diagram

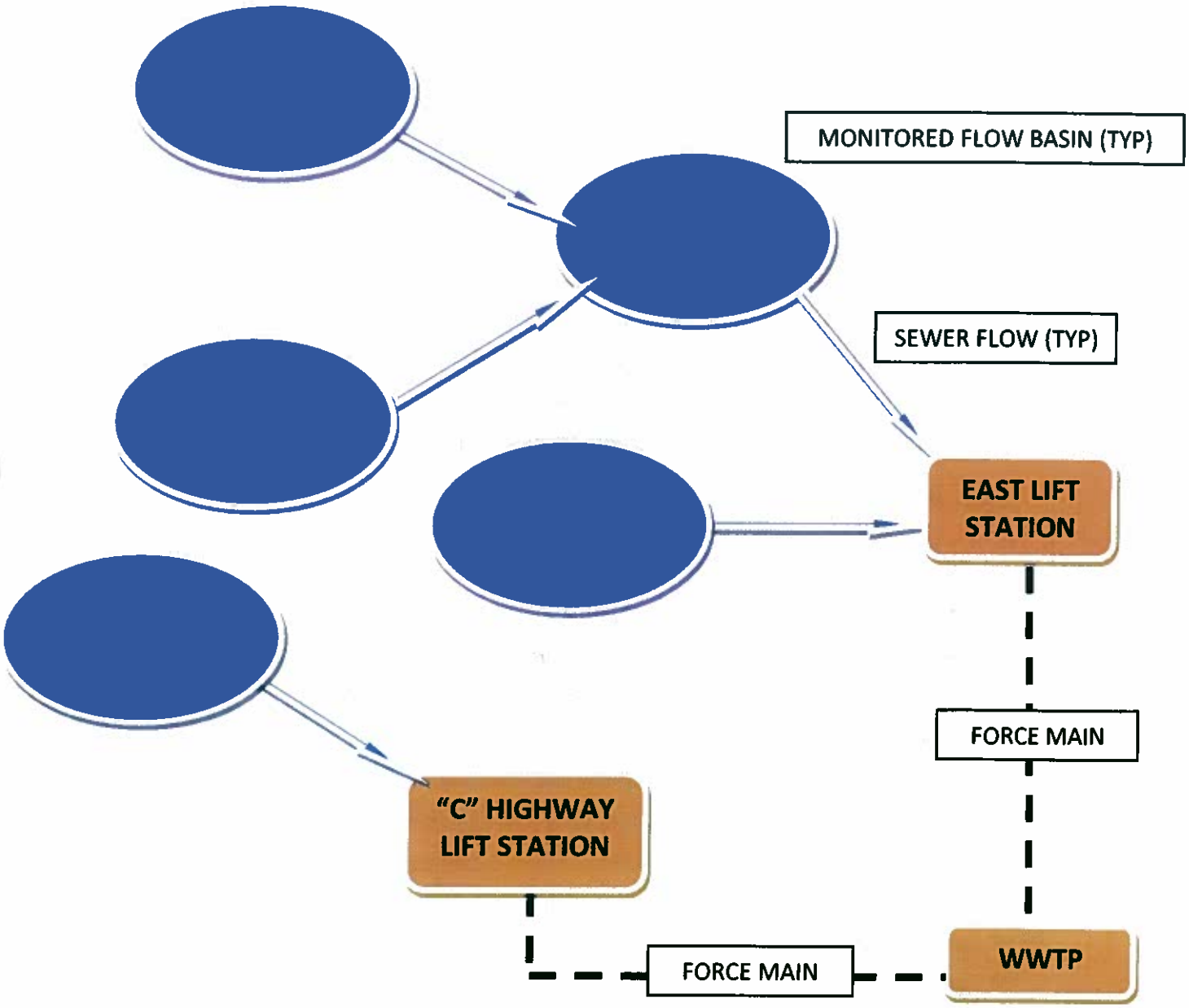


Table 3 – 2 Flow Basin Characteristics

Sub-System No.	Basin Area	Cumulative Basin Area	Length of Pipe by Diameter (Inches)					Total Basin Sewer Length	Sewer Inch Diameter-Miles
	(acres)	(acres)	8	10	12	15	18	(feet)	(IDM)
FM 01	264	264	26,278	7,279	100	971	0	34,629	56.6
FM 02	458	458	49,728	3,923	0	0	0	53,652	82.8
FM 03	100	100	11,315	0	843	1,883	0	14,041	24.4
FM 04	376	376	28,149	6,399	0	0	629	35,177	56.9
FM 05	371	1,094	25,234	5,137	5,691	0	0	36,063	60.9
	1,569	**2,292**	**140,705**	**22,739**	**6,634**	**2,854**	**629**	**173,561**	**282**

3. Rainfall Data Analysis

Data from a GBA rain gauge was used for this study. The collected rainfall data was stored in 15-minute interval distributions for analysis. The total annual average rainfall for the Peculiar area is 40.5 inches. The average monthly rainfall and rainfall received during the flow monitoring period are shown graphically in Figure 3 – 4. Table 3 – 3 summarizes the recorded rain events.

Figure 3 - 4 Average Rainfall for Peculiar, Missouri

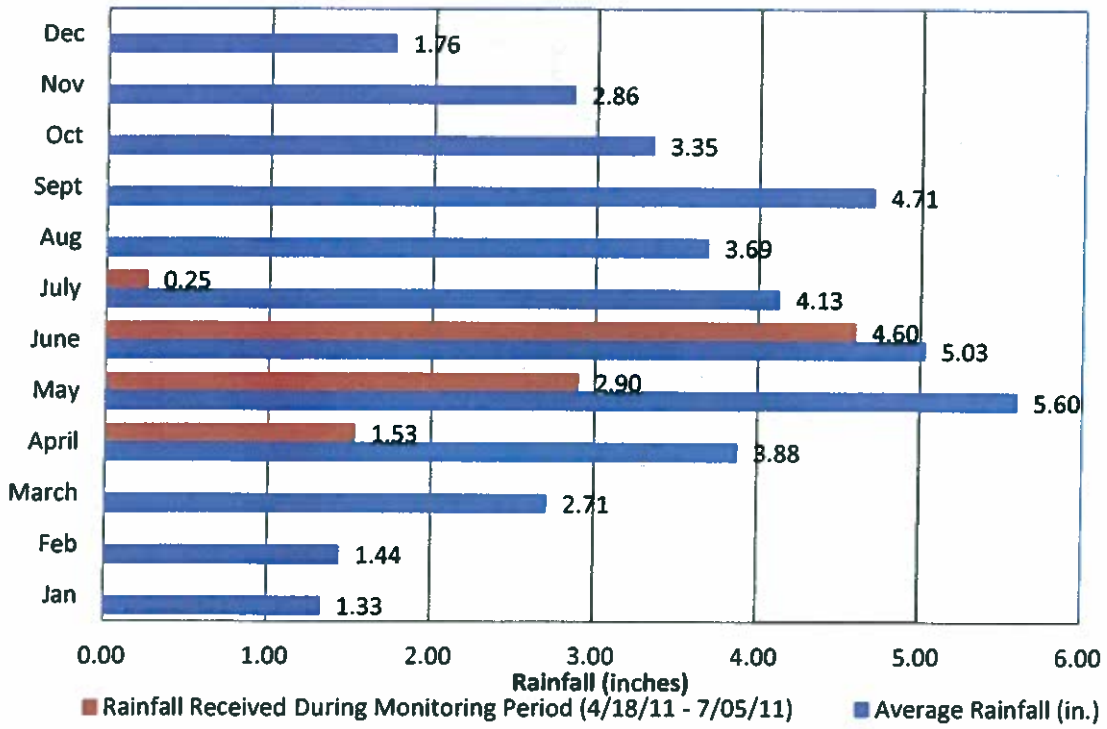


Table 3 – 3 Rainfall Summary

Peculiar Missouri 2011 Flow Monitoring Rain Summary W 3rd Street Water Tower							
Date	Total Storm Rainfall (in)	Peak 15 Min. Intensity (in/hr)	Time of Peak Rainfall	Storm Intensity (in/hr)	60 min Storm Intensity (in/hr) (1)	Storm Duration (hr)	Storm Time Start
4/21/11	0.15	0.32	4/21/11 20:45	0.02	0.08	7.00	4/21/11 16:30
4/22/11	0.12	0.16	4/22/11 6:45	0.02	0.09	5.00	4/22/11 5:15
4/25/11	0.50	0.32	4/25/11 9:00	0.09	0.28	5.50	4/25/11 5:00
4/25/11	0.71	0.76	4/25/11 23:00	0.06	0.46	11.00	4/25/11 16:30
4/27/11	0.05	0.04	4/27/11 1:30	0.01	0.03	5.25	4/27/11 1:30
5/1/11	0.14	0.08	5/1/11 13:00	0.05	0.05	2.75	5/1/11 12:30
5/2/11	0.01	0.04	5/2/11 9:00	0.04	0.01	0.25	5/2/11 9:00
5/5/11	0.38	0.16	5/5/11 11:30	0.05	0.14	7.50	5/5/11 10:30
5/6/11	0.01	0.04	5/6/11 5:45	0.04	0.01	0.25	5/6/11 5:45
5/7/11	1.08	1.04	5/7/11 3:30	0.48	0.61	2.25	5/7/11 3:15
5/11/11	0.01	0.04	5/11/11 9:15	0.04	0.01	0.25	5/11/11 9:15
5/11/11	0.57	0.56	5/11/11 21:00	0.21	0.32	2.75	5/11/11 20:00
5/19/11	0.31	0.20	5/19/11 11:00	0.04	0.14	8.00	5/19/11 3:30
5/20/11	0.10	0.16	5/20/11 11:00	0.05	0.06	2.00	5/20/11 9:45
5/24/11	0.24	0.20	5/24/11 21:45	0.04	0.14	6.25	5/24/11 21:45
5/27/11	0.02	0.08	5/27/11 12:30	0.08	0.02	0.25	5/27/11 12:30
5/28/11	0.01	0.04	5/28/11 18:00	0.04	0.01	0.25	5/28/11 18:00
5/31/11	0.02	0.04	5/31/11 5:15	0.04	0.02	0.50	5/31/11 5:15
6/1/11	0.17	0.24	6/1/11 17:45	0.10	0.15	1.75	6/1/11 17:45
6/10/11	0.01	0.04	6/10/11 9:45	0.04	0.01	0.25	6/10/11 9:45
6/11/11	0.19	0.28	6/11/11 0:15	0.07	0.15	2.75	6/11/11 0:00
6/12/11	0.04	0.04	6/12/11 6:15	0.02	0.02	2.50	6/12/11 6:15
6/14/11	0.02	0.08	6/14/11 3:15	0.08	0.02	0.25	6/14/11 3:15
6/16/11	0.37	0.84	6/16/11 12:00	0.09	0.28	4.25	6/16/11 11:45
6/17/11	0.15	0.08	6/17/11 7:00	0.05	0.06	3.25	6/17/11 5:45
6/18/11	0.65	1.00	6/18/11 1:45	0.19	0.45	3.50	6/18/11 1:30
6/18/11	2.21	2.44	6/19/11 0:15	0.44	1.77	5.00	6/18/11 22:00
6/20/11	0.20	0.24	6/20/11 22:45	0.07	0.18	3.00	6/20/11 22:45
6/25/11	0.06	0.16	6/25/11 8:30	0.06	0.06	1.00	6/25/11 8:30
6/27/11	0.53	0.80	6/27/11 3:00	0.13	0.29	4.00	6/27/11 2:45
7/3/11	0.04	0.12	7/3/11 11:00	0.08	0.04	0.50	7/3/11 10:45
7/3/11	0.21	0.84	7/3/11 15:15	0.84	0.21	0.25	7/3/11 15:15
Total	**9.28**						

(1) - The storm intensities are based on the maximum amount of rainfall for a 60-min. period for each storm event.

4. Determination of Average Daily Dry Weather Flow (ADDF)

It is difficult to completely eliminate infiltration from measured flows of sewer systems. Therefore, dry weather flows were utilized to determine ADDF, or average daily flow, since infiltration was considered to be at its lowest. To determine average daily flow, recorded instantaneous flow rates were averaged over several of these dry weather 24-hour periods. In addition to average daily flow, a peaking factor was determined by the ratio of the recorded peak (15-minute) daily flow to the recorded average daily flow:

Peaking Factor = Peak Daily Flow / Average Daily Flow

Peak ADDF was then determined by multiplying the peaking factor by average ADDF:

Peak ADDF = Peaking Factor x Average ADDF

A peak ADDF rate was calculated for each basin utilizing the flow data obtained from the flow meters. Dry weather flows were averaged and a peaking factor was calculated from the peak flows observed during this period. The ADDF flows for each basin are listed in Table 3 – 4.

Table 3 – 4 ADDF Summary

Subsystem	Cum. Area (acres)	Subsystem ADDF (mgd)	Cum. ADDF (mgd)	Cum. ADDF Peaking Factor	Cum. Peak ADDF(1)	Cum. ADDF (gpad)(2)
FM-01	264	0.037	0.037	1.889	0.071	142
FM-02	458	0.140	0.140	1.804	0.252	305
FM-03	100	0.017	0.017	1.638	0.027	167
FM-04	376	0.134	0.134	1.428	0.191	355
FM-05	1,094	0.098	0.275	1.383	0.380	251

Notes:
(1) Cumulative Peak ADDF is the product of the Cumulative ADDF and the ADDF Peaking Factor.
(2) Gallons/Acre/Day

5. Determination of Infiltration

Maximum infiltration occurs when groundwater elevation is highest. To determine high groundwater infiltration, flow data from the days following significant rainfall events were analyzed. The total flow measured during these infiltration periods included ADDF plus infiltration flow. Infiltration flow was determined by

subtracting the average dry weather flow from the total flow measured during the infiltration periods. Night flow readings often were used for the analysis since the least temporal variation in ADDF occurred during this period. Infiltration parameters are summarized in Table 3 – 5.

Table 3 – 5 Infiltration Summary

Subsystem	Cum. Sewer (ft)	Subsystem IDM	Cum. IDM	Subsystem Infiltration (mgd)	Cum. Infiltration (mgd)	Cum. Rate (gpd/1000 ft)	Cum. Rate (gpd/IDM)	IDM Ranking
FM-01	34,629	57	57	0.045	0.045	1,301	796	4
FM-02	53,652	83	83	0.137	0.137	2,550	1,652	2
FM-03	14,041	24	24	0.004	0.004	269	155	5
FM-04	35,177	57	57	0.125	0.125	3,556	2,198	1
FM-05	124,343	61	200	0.020	0.202	1,622	1,007	3

6. Determination of Inflow

A value for the inflow is not directly calculated. Instead a constant is calculated based on the storm duration, intensity and the monitored flow. This constant, "K," is then used to predict inflow values for different rainfall return intervals. The "K" coefficient accounts for rainfall that enters the sewer system as inflow.

For each selected storm, the peak rainfall, peak flow and time from peak rainfall to peak flow are used to calculate the "K" value at the flow monitoring point. A value for the ADDF and infiltration are subtracted from the peak flow to determine the peak inflow. Once the peak inflow is determined and rainfall intensity is calculated from the rainfall monitoring data, a "K" value can be determined and applied to the line segments that were monitored by the flow meter. The "K" values for each monitored storm are averaged together to arrive at a "K" value for the basin being monitored.

Utilizing the inflow coefficient, the basin area, rainfall duration equal to the basin time of concentration, and the rainfall intensity curves, a one-year and a ten-year inflow value were calculated for each basin. The results of the inflow analysis are shown in Table 3 – 6.

Table 3 – 6 Inflow Summary

Subsystem	Existing Capacity[1] (mgd)	Cumulative Peak Flows (mgd) 1 Year	2 Year	5 Year	10 Year	50 Year	Approx. Level of Protection[3]
FM-01	0.78	0.459	0.544	0.660	0.749	0.972	>10
FM-02	0.71	1.176	1.366	1.626	1.830	2.343	<1
FM-03	2.29	0.231	0.278	0.345	0.398	0.527	>50
FM-04	6.70	1.098	1.285	1.549	1.756	2.262	>50
FM-05	2.63	1.639	1.900	2.252	2.526	3.218	>10

Notes:
(1) Capacities taken from HGL analysis at the flow monitoring site unless otherwise noted. It should be noted that the capacity at the monitoring sites may not represent the capacity of sewers upstream or downstream of the monitoring location.
(2) Capacity calculated using the effective hydraulic slope.
(3) Level of protection = storm recurrence interval which will overload the system.

7. Peak Flow

The peak flow was determined by combining the peak ADDF, infiltration, and peak inflow. The peak flow for each subsystem is shown in Table 3 – 7.

Table 3 – 7 Peak Flow Rates

Subsystem	Cum. Area (acres)	Cum. ADDF (mgd)	Cum. Peak ADDF (mgd)	Cum. Infiltration (mgd)	Cum. K	Cum. 1-Year Inflow (mgd)	Cum. 50-Year Inflow (mgd)	Cum. 1-Year Peak Flow[1] (mgd)	Cum. 50-Year Peak Flow[1] (mgd)	1-Year Ratio[2]	50-Year Ratio[2]
FM-01	264	0.037	0.071	0.045	0.00226	0.343	0.857	0.459	0.972	12	26
FM-02	458	0.140	0.252	0.137	0.00266	0.788	1.954	1.176	2.343	8	17
FM-03	100	0.017	0.027	0.004	0.00236	0.200	0.496	0.231	0.527	14	32
FM-04	376	0.134	0.191	0.125	0.00285	0.783	1.946	1.098	2.262	8	17
FM-05	1,094	0.275	0.380	0.202	0.00185	1.057	2.636	1.639	3.218	6	12

Notes:
(1) Peak Flow = Peak ADDF + Infiltration + Inflow

(2) 1-Year and 50-Year Ratio = $\frac{\text{Peak Flow}}{\text{Cumulative ADDF}}$

8. Surcharge at Flow Metering Manholes

Gravity sewers are usually designed to flow no more than full at peak flow. Surcharge is the depth of water in a sewer that exceeds the top of the pipe. In other words, the water level in the manhole is higher than the top of the pipe, and the pipe is flowing full. Table 3 - 8 summarizes the surcharging that occurred during the flow monitoring period. The cause of surcharge at these sites is believed to be caused by backup from downstream restrictions.

Table 3 – 8 Summary of Surcharges

Site ID	MH Number	Diameter (in)	Start Date	Stop Date	Max Level (in.)	Level of Surcharge (in.)	Surcharge Duration (hrs)	Cause of Surcharge
FM-01	G06-004	10	6/19/11 1:00	6/19/11 6:00	121.7	111.7	5.00	Backup
FM-02	G06-045	10	6/19/11 1:00	6/19/11 2:15	11.1	1.1	1.25	Backup
FM-04	I08-006	18	6/19/11 1:15	6/19/11 3:45	63.0	45.0	2.50	Backup
FM-05	I06-004	12	6/19/11 1:30	6/19/11 7:00	108.0	96.0	5.50	Backup

9. Excessive Infiltration and Inflow

Subsystems with excessive infiltration and inflow (I/I) were determined using the following criteria:

"K" Coefficient > 0.005
1-Yr Inflow Rate > 25,000 gpd/1000ft
Infiltration Rate > 4,500 gpd/IDM
1-Yr Peak Flow Ratio > 10

The "K" Coefficient, 1-year Inflow Rate, Infiltration Rate, and 1-year Peak Flow Ratio criteria are based on previous flow studies conducted by GBA.

Table 3 – 9 presents the flow values listed above for each subsystem. Only in the category of 1-Yr Peak Flow Ratio did subsystems FM-01 and FM-03 exhibited excessive I/I rates.

Table 3 – 9 Summaries of Excessive Inflow/Infiltration Values

Subsystem	"K" Coefficient	1-Year Inflow Rate (gpd/1,000 ft)	Infiltration Rate (gpd/IDM)	1-Year Peak Flow Ratio
FM-01	0.0023	9,917	796	12
FM-02	0.0027	14,684	1,652	8
FM-03	0.0024	14,272	155	14
FM-04	0.0029	22,249	2,198	8
FM-05	0.0018	8,501	1,007	6

CHAPTER NO. 4 – FIELD INVESTIGATIONS

A. Manhole Inspections

a. Description of Work. Non-entry (surface) manhole inspections were performed city wide between February 15th and March 17th and December 15th and 16th, 2011 in an attempt to determine the location, overall condition, and possible sources of inflow/infiltration (I/I) entering the City's sanitary system. The older parts of the City were avoided since the manholes in these locations had been previously inspected. Utilizing the newly created GIS map, manholes were located, GPS data points (2-5 meter accuracy) obtained for more accurate location, and a surface inspection was performed. The inspection process consisted of noting the surface type and ground conditions, runoff/ponding evidence, visual inspection of all components of the structure, and any evidence of leaking groundwater into the structure. Due to the larger than budgeted number of manholes only 62% of the City's manholes were visited. These manholes were selected for their proximity to areas known to experience significant I/I, as well as being a general overall representation of the City's sanitary sewer system. See Figure 4 - 1 for manhole inspection locations and status. Appendix A contains the complete summary of the manhole inspection data.

b. General Summary Inspections were attempted on 531 manholes. 87 manholes could not be found and may not exist. During the course of the inspections 12 manholes were found to be buried. 112 manholes were found but could not be inspected due to many factors. In some cases the manholes had bolt down covers or the covers were seized in place and could not be opened. In neighborhoods where a sampling of the manholes revealed no significant I/I sources only GPS locations were taken. The majority of inspections (98%) were of precast manholes built within the last 20 years. The general structural condition of these manholes was found to be in good condition and considered typical for the type of construction materials used and the age of the collection system. In general, amounts of I/I leakage from manhole sources can be considered non-excessive.

c. Significant Findings.

- 856 manholes identified from mapping
- 531 inspections attempted

- 320 inspections completed
- 12 manholes buried
- 87 manholes not found
- 112 manholes not inspected
- A small percentage of manholes are identified as having significant I/I sources

B. Building Inspections

a. Description of Work. Building inspections are performed, both exterior and interior, to document the presence of exterior or interior I/I sources. A sample of the City's residential buildings were selected for inspection by pre-determining where sewer backups had occurred in the past, where the smoke testing was to be performed, and the different ages of the buildings. Three to five buildings were selected in each subdivision or neighborhood so that a good sampling could be achieved. The inspection consists of an exterior visual inspection of the building, an interior visual inspection to locate the building service location and exit point and the presence of any and all sump pumps and their discharge locations. A series of questions accompanies the visual inspection process. Homeowners were notified via door hangers of the testing in their areas. The two person crew then returned to the notified buildings to perform the inspection. In the event the homeowners were not available 3 attempts were made. In addition, a letter was sent to potential inspection locations asking the owner to schedule an appointment. Due to budget constraints and lack of homeowner availability the 120 completed building inspection goal was not reached. Appendix B contains the complete summary of the smoke inspection data. See Figure 4 - 2 for attempted/completed building inspection locations.

b. General Summary. Building inspections were completed between June 16th and July 23rd. A total of 147 inspections were attempted, with 59% being completed.

c. Significant Findings.

- 80 building inspections completed
- 5 building owners refused entry
- 1 vacant structure was found

- 5 prohibited storm water sump pumps discharging to the sanitary sewer were documented

C. Smoke Testing

a. Description of Work. Between July 11th and August 3rd, 2011 smoke testing was performed on 505 sewer line segments or the equivalent of 120,000 LF of the City's existing gravity sanitary sewer system. The total footage smoke tested was 61.6% of the 194,697 LF in the City's system. The testing was conducted to document evidence of smoke on public and private property that would indicate both potential and active I/I sources and not illegal connections. Line segments identified for smoke testing were chosen based on information obtained during the flow monitoring work. In addition, sewer backup and overloaded line information provided by the City was used to better focus the line segments for smoke testing. An extensive public notification effort was made to inform the residents of the work being performed including door hangers prior to the work being initiated. An example of the door hanger can be found in the Appendix C. Smoke testing crews coordinate with the local Fire Department the identification of the areas where smoke testing was to occur.

To perform the testing a gas powered blower was set on an open manhole and a smoke (vapor) producing liquid was fed into the smoke blower. This smoke or vapor, which is white in color, is forced through the sanitary sewer and connected building service laterals. If there are leaks in the underground sewer system the smoke migrated to the surface and was noted and photographed. Homes and businesses were walked around, noting any suspect sources (sources that did not smoke but their drainage daylight point could not be found). A map showing all sanitary sewer lines that were smoke tested can be found on Figure 4 - 3. Appendix C contains the complete summary of the smoke inspection data.

b. General Summary. Overall, the main sewer lines appeared to be in good shape. The majority of positive sources identified, that is, the sources that actually smoked and would allow I/I into the sanitary sewer system were private service line cleanouts. These cleanouts had broken or missing caps. The other major I/I source identified were manhole frame seals. A total of 302 sources were identified, of which 51% percent were positive and 49%

suspect. In addition, two properties appeared to be on septic service and four houses showed no vent smoke at the time of testing.

c. Significant Findings

- 90 Manhole Frame Seals Leaked
- 50 cleanouts on building service lines smoked
- 2 main sewer segments smoked
- A large number of suspect I/I sources were identified

D. Dyed Water Testing

a. Description of Work. Dyed water testing is utilized to quantify leakage and verify a direct connection to the City's sanitary sewer system by testing confirmed or suspected I/I sources. These sources were identified by analyzing the results from the previously performed smoke testing. Dyed water testing consists of introducing water and a green or red non-harmful dye into the source identified for testing. Sanitary sewer manholes, yards, drainage ditches, and a general area near the source are monitored for visible signs of dye to confirm where the source drains to. See Figure 4 - 4 for dyed water testing source locations. Appendix D contains the complete summary of the dye testing data.

b. General Summary. A total of 21 dye tests were performed on a variety of source types including stairwell drains, window well drains, and downspouts. None of these tests provided positive results.

c. Significant Findings.

- None of the suspect sources tested showed up as being connected
- A large number of window well drains were observed that maybe connected to the sanitary sewer system via directly or indirectly connected foundation drains

E. TV Inspection

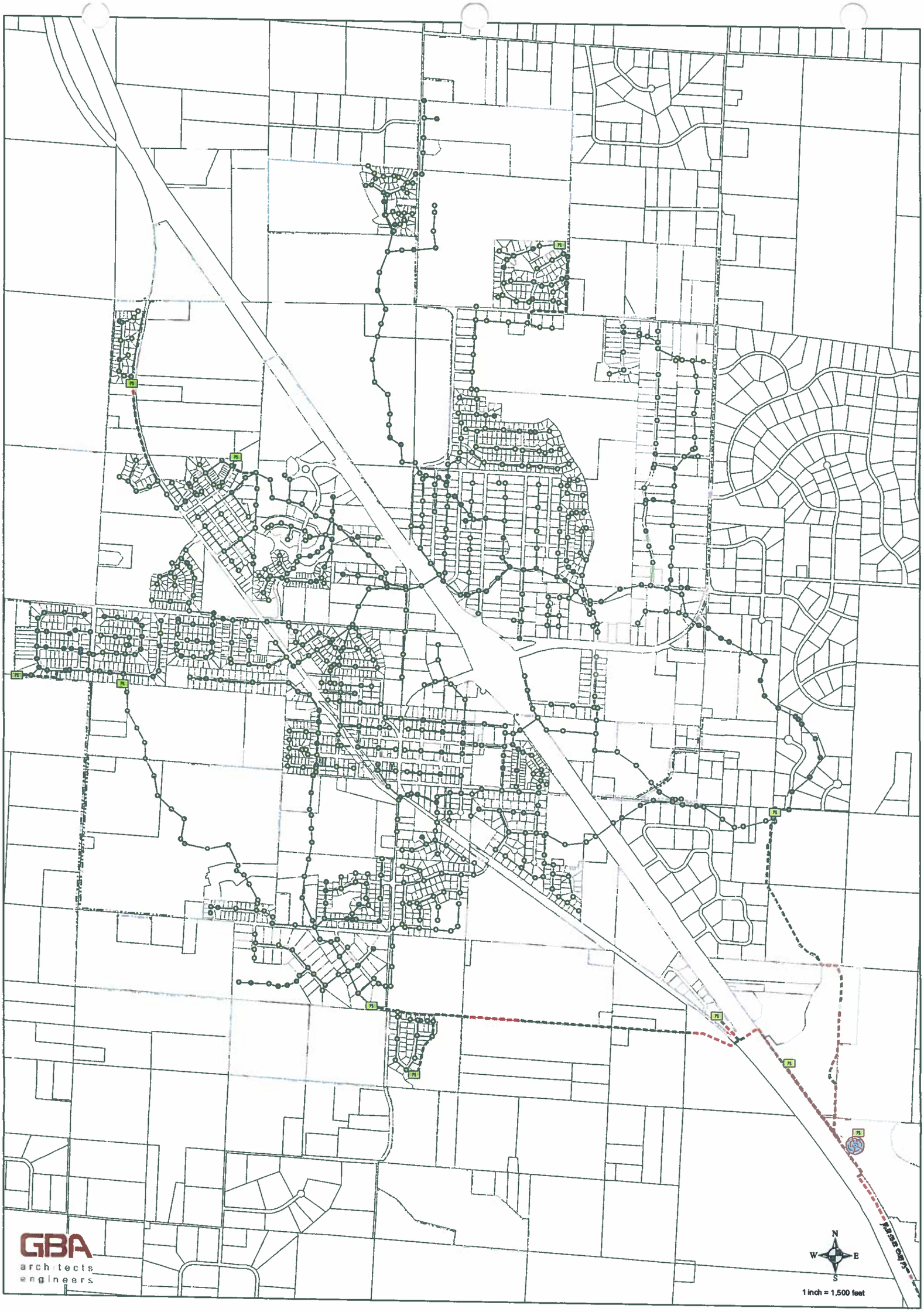
a. Description of Work. Televising sanitary sewer systems by the use of closed circuit television equipment aids in evaluating the structural condition of the piping and identifying potential I/I sources. The sewer lines segments selected to be televised were chosen randomly across the city. The budget

for televising was limited to approximately 5,000 LF. A map showing all sanitary sewer lines that were televised can be found on Figure 4 - 5.

b. General Summary. Between September 22, 2011 and September 27, 2011 17 line segments (5,239 LF) were clean and televised. All but one line segment was eight inches (8") in diameter.

c. Significant Findings

- 91 active services were found
- 19 of the active services were "break-in" taps
- No line segments had active groundwater leakage
- 3 line segments were constructed with Vitrified Clay Pipe (VCP)
- 9 line segments showed evidence of grease buildup.
- 5 line segments had small to medium sags along their alignment
- 1 line segment is in very poor condition Line E06-005 to E06-012 (Soryl Street)



Inspection Status

- Not Visited - 334
- Buried - 12
- Not Found - 87
- Not Inspected - 112
- Surface Inspection - 320
- Proposed - 18

- Lift Station
- WWTP
- Forcemain Existing
- Gravity Existing
- Gravity Proposed
- Forcemain Proposed
- Corprate Limit

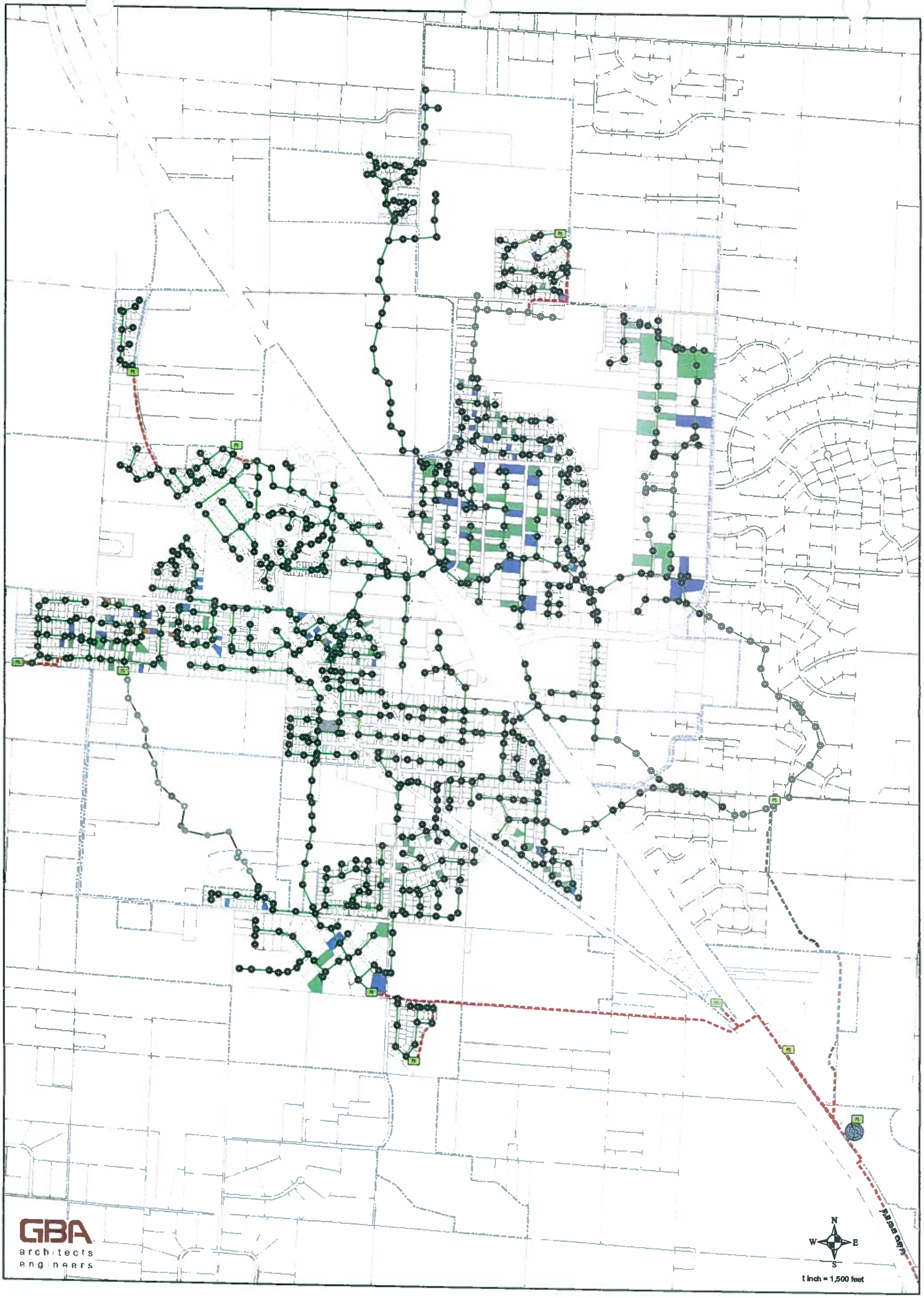
City of Peculiar, Missouri

Sanitary Sewer System

Manhole Inspections Spring & Fall 2011

THE CITY OF PECULIAR

Figure 4-1 4-6



Building Inspections

- Completed
- Not Home
- Refused Entry
- Lift Station
- WWTP
- Existing MH
- Proposed MH
- Forcemain Existing
- Gravity Existing
- Gravity Proposed
- Forcemain Proposed
- Corprate Limit

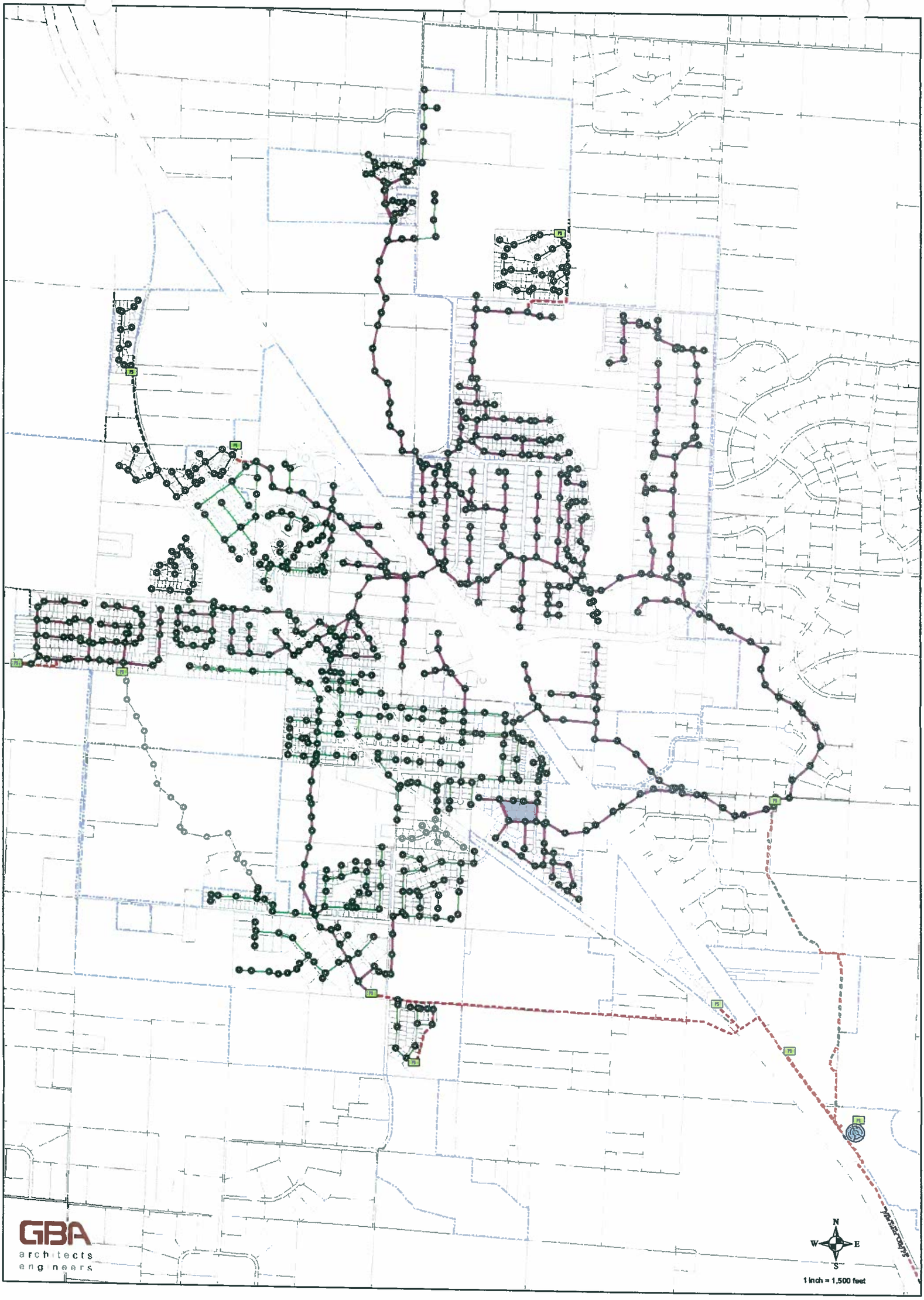
City of Peculiar, Missouri

Sanitary Sewer System

Building Inspections Summer 2011

THE CITY OF PECULIAR

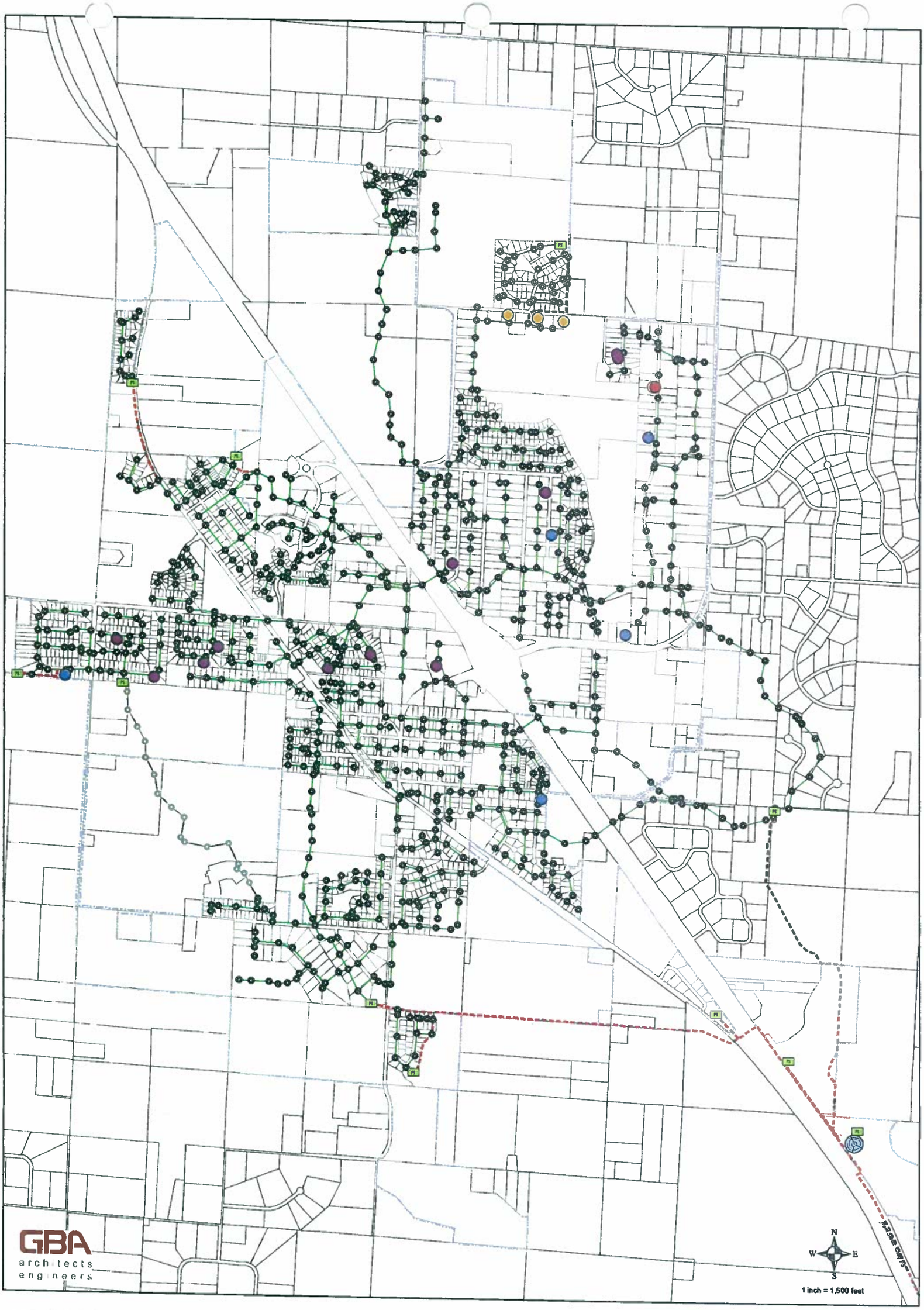
Figure 4-2



Completed Smoke Testing
Lift Station
WWTP
Existing MH
Proposed MH
Forcemain Existing
Gravity Existing
Gravity Proposed
Forcemain Proposed
Corprate Limit

City of Peculiar, Missouri
Sanitary Sewer System
Smoke Testing Summer 2011

Figure 4-3



Dye Testing Sources

- Area Drain
- Downspout
- Stairwell Drain
- Sump Pump
- Lift Station
- WWTP

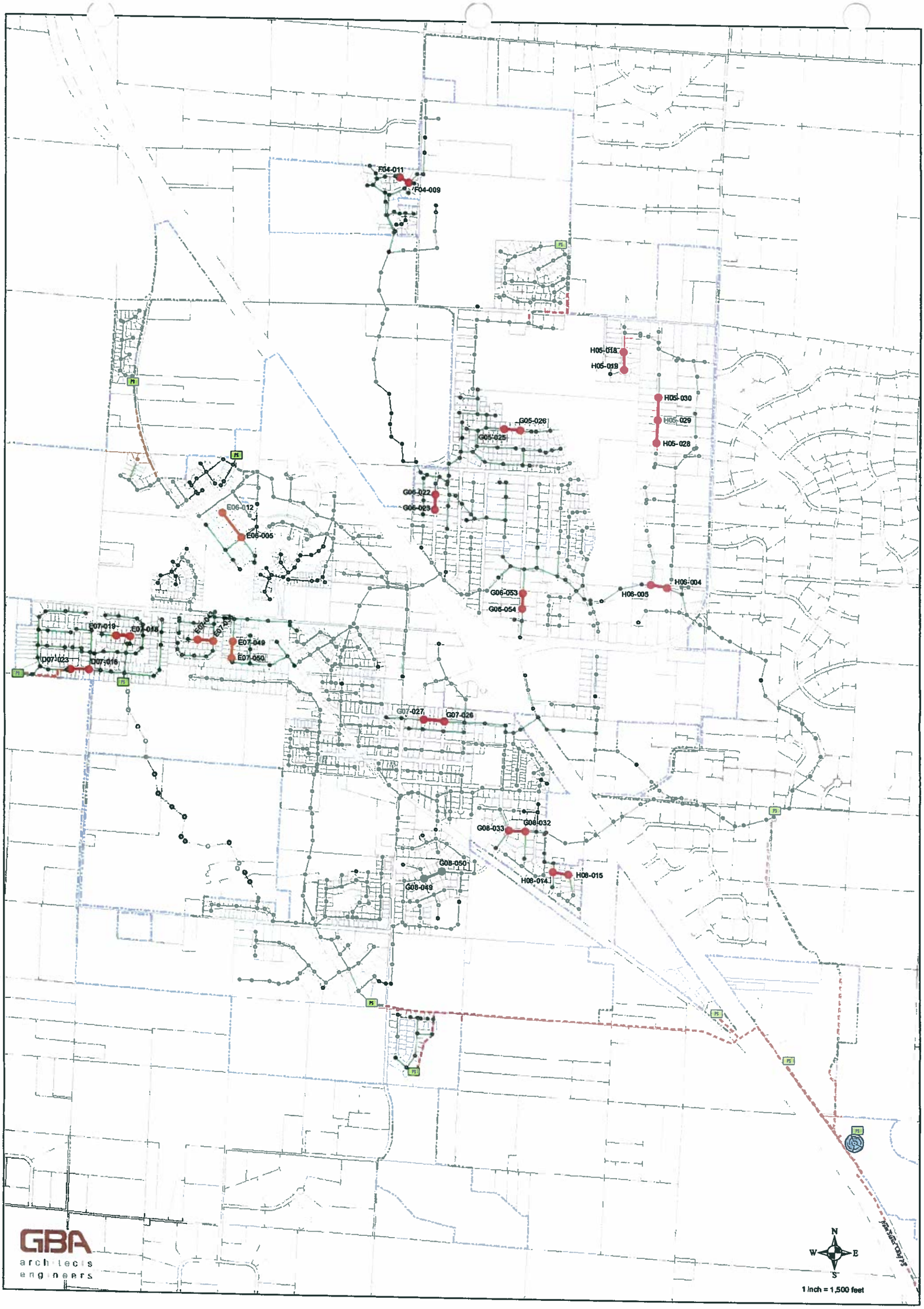
- Existing MH
- Proposed MH
- Forcemain Existing
- Gravity Existing
- Gravity Proposed
- Forcemain Proposed
- Corprate Limit

City of Peculiar, Missouri

Sanitary Sewer System

Dyed Water Testing Summer 2011

Figure 4-4



GBA
architects
engineers

- CCTV Manholes
- CCTV SewerLines
- Lift Station
- WWTP
- Existing MH
- Proposed MH
- Forcemain Existing
- Gravity Existing
- Gravity Proposed
- Forcemain Proposed
- Corprate Limit

City of Peculiar, Missouri
Sanitary Sewer System
CCTV Inspection Summer 2011

THE CITY OF PECULIAR

Figure 4-5

CHAPTER NO. 5 – FINDINGS

A. General

During 2011 GBA performed field surveys of the City's sanitary sewers (See Chapter 3) and analyzed the as-built sewer records to determine the hydraulic capacity of the main interceptors.

B. Interceptor Capacity Evaluation

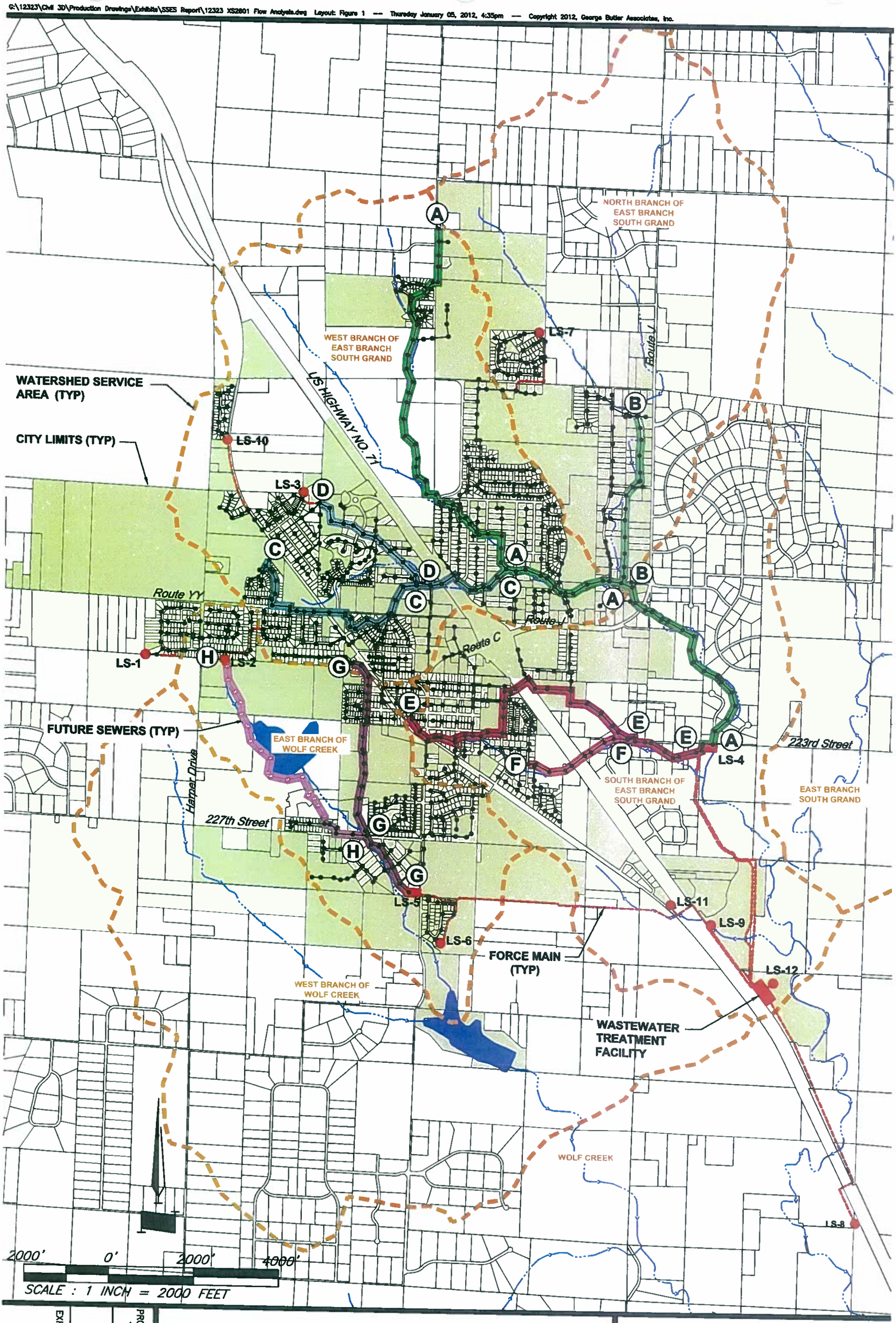
a. Existing Land Development

Figure 5 – 1 shows the City's main interceptor sewers and the individual watersheds that are tributary to the interceptors. On Figure 5 – 1 the main interceptors were divided up into 8 reaches and labeled A through H. Using pipe diameter and slope data, gathered from the sanitary record drawings, and assuming a Manning's pipe friction value of 0.013, a capacity evaluation model was developed. Table 5 -1 summarizes the following key attributes for the City's interceptors by reach:

- peak base flow (cfs/acre)
- peak infiltration flows (cfs/acre)
- cumulative tributary acres
- time of concentration for cumulative tributary area
- current acres of tributary land development
- existing pipe diameter
- slope of line segment
- full flow capacity of the existing pipe
- level of storm protection

Using the total peak flow arrived at by summing the cumulative peak base flow, peak infiltration flow, and the peak inflow generated by a range of rainfall intensities and comparing it to the full flow capacity of the existing pipe a level of storm protection was projected. A review of current aerial photograph established the current level of land development. Figure 5 – 2 shows graphically the level of differing storm protection that currently existing within the City's system.

G:\12323\Civil 3D\Production Drawings\Exhibits\SSES Report\12323 XS2601 Flow Analysis.dwg Layout: Figure 1 — Thursday January 05, 2012, 4:35pm — Copyright 2012, George Butler Associates, Inc.



CITY OF PECULIAR, MISSOURI

SEWER INTERCEPTORS

FIGURE 5-1

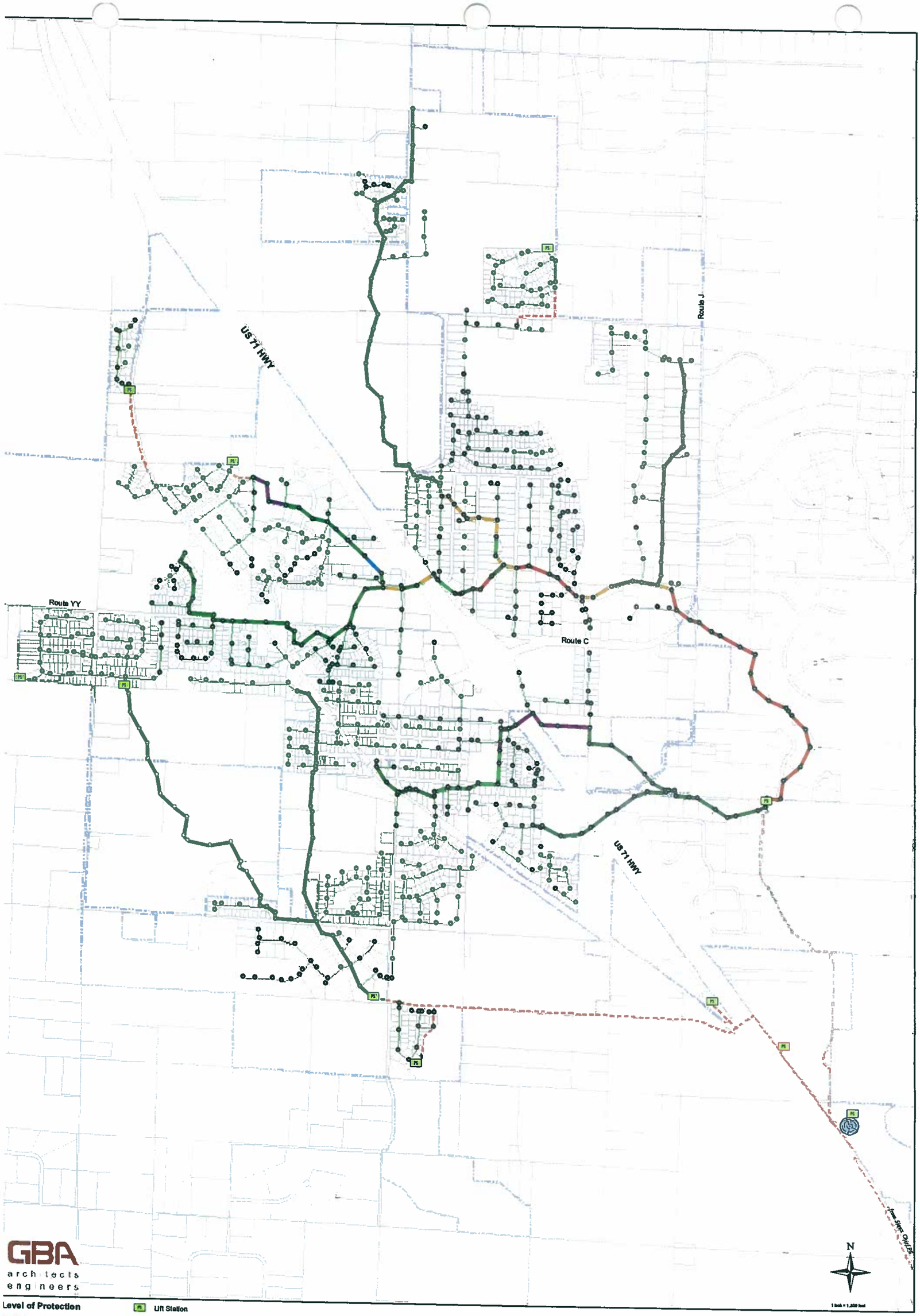
GBA architects engineers
9801 Renner Boulevard
Lenexa, Kansas 66219
913.492.0400
www.gbsteam.com

PROJECT NUMBER 12323.00

DATE

EXHIBIT NUMBER 5-1

5-2



Level of Protection Current Load on Sanitary Sewer System

THE CITY OF PECULIAR

Figure 5-2

Table 5 - 1
Level of Protection - Current Land Development

Upstream MH	Downstream MH	Upstream Node	Downstream Node	Pipe Diameter (inches)	Developable Tributary Area (acres)	Developable Tributary Area Percent Developed	Pump Station Flow (gpm)	Developed Tributary Area (acres)	Cumulated Developed Tributary Area (acres)	Cumulative Peak Base Flow (cfs/acre)	Cumulative Infiltration (cfs/acre)	Peak Base Flow + Infiltration (cfs)	Cumulative K Value	Cumulative K * Tributary Area	Time of Concentration Using GBA Formula (minutes)	Pipe Slope (%)	Mannings Coefficient (n)	Full Flow Capacity (cfs)	Maximum Rainfall Intensity (in/hr)	Level Of Protection
Northeast Side Tributary A to East Lift Station																				
A-01	E-LS	I08-008	I08-LS1	12					1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.14%	0.013	1.333	0.22	<1
A-02	A-01	I08-009	I08-008	12	59	0%		0	1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.14%	0.013	1.333	0.22	<1
A-03	A-02	I07-001	I08-009	12					1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.22%	0.013	1.671	0.38	<1
A-04	A-03	I07-002	I07-001	12					1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.22%	0.013	1.671	0.38	<1
A-05	A-04	I07-003	I07-002	12					1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.22%	0.013	1.671	0.38	<1
A-06	A-05	I07-004	I07-003	12					1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.22%	0.013	1.671	0.38	<1
A-07	A-06	I07-005	I07-004	12	80	0%		0	1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.22%	0.013	1.671	0.38	<1
A-08	A-07	I07-006	I07-005	12					1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.22%	0.013	1.671	0.38	<1
A-09	A-08	I07-007	I07-006	12					1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.22%	0.013	1.671	0.38	<1
A-10	A-09	I07-008	I07-007	12					1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.49%	0.013	2.494	0.75	<1
A-11	A-10	I07-009	I07-008	12					1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.22%	0.013	1.671	0.38	<1
A-12	A-11	I07-010	I07-009	12					1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.22%	0.013	1.671	0.38	<1
A-13	A-12	I07-011	I07-010	12	266	0%		0	1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.22%	0.013	1.671	0.38	<1
A-14	A-13	I06-001	I07-011	12					1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.22%	0.013	1.671	0.38	<1
A-15	A-14	I06-002	I06-001	12					1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.22%	0.013	1.671	0.38	<1
A-16	A-15	I06-003	I06-002	12	80	0%		0	1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.22%	0.013	1.671	0.38	<1
A-17	A-16	I06-004	I06-003	12					1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.44%	0.013	2.363	0.69	<1
A-18	A-17	H06-001	I06-004	12					1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.17%	0.013	1.469	0.28	<1
A-19	A-18	H06-002	H06-001	12	48	5%		2	1232	0.00039	0.00029	0.83744	0.0018	2.21675	112	0.22%	0.013	1.671	0.38	<1
A-20	A-19	H06-003	H06-002	12					1229	0.00039	0.00029	0.83582	0.0018	2.21245	112	0.22%	0.013	1.671	0.38	<1
A-21	A-20	H06-004	H06-003	12	1194	40%		478	1229	0.00039	0.00029	0.83582	0.0018	2.21245	112	0.76%	0.013	3.106	1.03	1.8
A-22	A-21	H06-005	H06-004	10					752	0.00039	0.00029	0.5111	0.0018	1.35292	99	0.28%	0.013	1.159	0.48	<1
A-23	A-22	H06-006	H06-005	10					752	0.00039	0.00029	0.5111	0.0018	1.35292	99	0.28%	0.013	1.159	0.48	<1
A-24	A-23	H06-007	H06-006	10					752	0.00039	0.00029	0.5111	0.0018	1.35292	99	0.28%	0.013	1.159	0.48	<1
A-25	A-24	H06-008	H06-007	10					752	0.00039	0.00029	0.5111	0.0018	1.35292	99	1.18%	0.013	2.380	1.38	3.9
A-26	A-25	H06-009	H06-008	10					752	0.00039	0.00029	0.5111	0.0018	1.35292	99	1.18%	0.013	2.380	1.38	3.9
A-27	A-26	H06-010	H06-009	10					752	0.00039	0.00029	0.5111	0.0018	1.35292	99	1.18%	0.013	2.380	1.38	3.9
A-28	A-27	H06-011	H06-010	10	118	20%		24	752	0.00039	0.00029	0.5111	0.0018	1.35292	99	0.45%	0.013	1.470	0.71	<1
A-29	A-28	H06-012	H06-011	10					728	0.00039	0.00029	0.49503	0.0018	1.31036	98	0.28%	0.013	1.159	0.51	<1
A-30	A-29	H06-013	H06-012	10					728	0.00039	0.00029	0.49503	0.0018	1.31036	98	0.28%	0.013	1.159	0.51	<1
A-31	A-30	G06-001	H06-013	10					728	0.00039	0.00029	0.49503	0.0018	1.31036	98	0.28%	0.013	1.159	0.51	<1
A-32	A-31	G06-002	G06-001	10					728	0.00039	0.00029	0.49503	0.0018	1.31036	98	0.28%	0.013	1.159	0.51	<1
A-33	A-32	G06-003	G06-002	10	770	50%		385	728	0.00039	0.00029	0.49503	0.0018	1.31036	98	0.79%	0.013	1.947	1.11	1.7
A-34	A-33	G06-004	G06-003	10					343	0.00022	0.00026	0.1647	0.0023	0.7892	81	0.28%	0.013	1.159	1.26	1.7
A-35	A-34	G06-005	G06-004	10					343	0.00022	0.00026	0.1647	0.0023	0.7892	81	0.73%	0.013	1.872	2.16	15.8
A-36	A-35	G06-006	G06-005	10					343	0.00022	0.00026	0.1647	0.0023	0.7892	81	0.40%	0.013	1.386	1.55	3.5
A-37	A-36	G06-007	G06-006	10					343	0.00022	0.00026	0.1647	0.0023	0.7892	81	0.40%	0.013	1.386	1.55	3.5
A-38	A-37	G06-008	G06-007	10	76	90%		68	343	0.00022	0.00026	0.1647	0.0023	0.7892	81	0.40%	0.013	1.386	1.55	3.5
A-39	A-38	G06-009	G06-008	10					275	0.00022	0.00026	0.13209	0.0023	0.63291	77	0.39%	0.013	1.368	1.95	8.1
A-40	A-39	G06-010	G06-009	10					275	0.00022	0.00026	0.13209	0.0023	0.63291	77	0.28%	0.013	1.159	1.62	3.7
A-41	A-40	G06-011	G06-010	10					275	0.00022	0.00026	0.13209	0.0023	0.63291	77	0.28%	0.013	1.159	1.62	3.7
A-42	A-41	G06-012	G06-011	10					275	0.00022	0.00026	0.13209	0.0023	0.63291	77	0.28%	0.013	1.159	1.62	3.7

Table 5 - 1
Level of Protection - Current Land Development

Upstream MH	Downstream MH	Upstream Node	Downstream Node	Pipe Diameter (inches)	Developable Tributary Area (acres)	Developable Tributary Area Percent Developed	Pump Station Flow (gpm)	Developed Tributary Area (acres)	Cumulated Developed Tributary Area (acres)	Cumulative Peak Base Flow (cfs/acre)	Cumulative Infiltration (cfs/acre)	Peak Base Flow + Infiltration (cfs)	Cumulative K Value	Cumulative K * Tributary Area	Time of Concentration Using GBA Formula (minutes)	Pipe Slope (%)	Mannings Coefficient (n)	Full Flow Capacity (cfs)	Maximum Rainfall Intensity (in/hr)	Level Of Protection
A-43	A-42	G06-013	G06-012	10					275	0.00022	0.00026	0.13209	0.0023	0.63291	77	0.28%	0.013	1.159	1.62	3.7
A-44	A-43	G06-014	G06-013	10	465	50%		232	275	0.00022	0.00026	0.13209	0.0023	0.63291	77	0.28%	0.013	1.159	1.62	3.7
A-45	A-44	G06-015	G06-014	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.28%	0.013	1.159	11.53	100+
A-46	A-45	G06-016	G06-015	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	1.50%	0.013	2.683	26.97	100+
A-47	A-46	G06-017	G06-016	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.66%	0.013	1.780	17.82	100+
A-48	A-47	G05-045	G06-017	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.64%	0.013	1.753	17.54	100+
A-49	A-48	F05-001	G05-045	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.66%	0.013	1.780	17.82	100+
A-50	A-49	F05-002	F05-001	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.66%	0.013	1.780	17.82	100+
A-51	A-50	F05-003	F05-002	10	218	0%		0	43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.66%	0.013	1.780	17.82	100+
A-52	A-51	F05-004	F05-003	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.28%	0.013	1.159	11.53	100+
A-53	A-52	F05-005	F05-004	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.28%	0.013	1.159	11.53	100+
A-54	A-53	F05-006	F05-005	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.38%	0.013	1.351	13.47	100+
A-55	A-54	F05-007	F05-006	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.30%	0.013	1.200	11.95	100+
A-56	A-55	F05-008	F05-007	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.41%	0.013	1.403	14.00	100+
A-57	A-56	F05-009	F05-008	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.50%	0.013	1.549	15.48	100+
A-58	A-57	F05-010	F05-009	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.68%	0.013	1.807	18.09	100+
A-59	A-58	F05-011	F05-010	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.28%	0.013	1.159	11.53	100+
A-60	A-59	F04-001	F05-011	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.28%	0.013	1.159	11.53	100+
A-61	A-60	F04-002	F04-001	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	0.28%	0.013	1.159	11.53	100+
A-62	A-61	F04-003	F04-002	10					43	0.00022	0.00026	0.02061	0.0023	0.09874	48	1.45%	0.013	2.638	26.51	100+
A-63	A-62	F04-004	F04-003	8	147	10%		15	43	0.00022	0.00026	0.02061	0.0023	0.09874	48	1.47%	0.013	1.465	14.63	100+
A-64	A-63	F04-005	F04-004	8					28	0.00022	0.00026	0.01357	0.0023	0.06504	43	1.47%	0.013	1.465	22.32	100+
A-65	A-64	F04-006	F04-005	8	141	10%		14	28	0.00022	0.00026	0.01357	0.0023	0.06504	43	0.92%	0.013	1.159	17.61	100+
A-66	A-65	F04-007	F04-006	8					14	0.00022	0.00026	0.00681	0.0023	0.03261	36	1.46%	0.013	1.460	44.56	100+
A-67	A-66	F04-008	F04-007	8					14	0.00022	0.00026	0.00681	0.0023	0.03261	36	1.50%	0.013	1.480	45.17	100+
A-68	A-67	F04-009	F04-008	8					14	0.00022	0.00026	0.00681	0.0023	0.03261	36	1.07%	0.013	1.250	38.12	100+
A-69	A-68	F04-010	F04-009	8					14	0.00022	0.00026	0.00681	0.0023	0.03261	36	1.07%	0.013	1.250	38.12	100+
A-70	A-69	G04-032	F04-010	8					14	0.00022	0.00026	0.00681	0.0023	0.03261	36	1.24%	0.013	1.346	41.05	100+
A-71	A-70	G03-001	G04-032	8					14	0.00022	0.00026	0.00681	0.0023	0.03261	36	1.82%	0.013	1.630	49.78	100+
A-72	A-71	G03-002	G03-001	8					14	0.00022	0.00026	0.00681	0.0023	0.03261	36	3.31%	0.013	2.199	67.20	100+
A-73	A-72	G03-003	G03-002	8					14	0.00022	0.00026	0.00681	0.0023	0.03261	36	0.96%	0.013	1.184	36.09	100+
A-74	A-73	G03-004	G03-003	8	71	20%		14	14	0.00022	0.00026	0.00681	0.0023	0.03261	36	3.90%	0.013	2.386	72.96	100+
Tributaries B, C & D into A																				
B-01	A-21	H06-048	H06-004	8					87	0.00039	0.00029	0.05935	0.0018	0.15711	57	2.56%	0.013	1.933	11.93	100+
B-02	B-01	H06-049	H06-048	8					87	0.00039	0.00029	0.05935	0.0018	0.15711	57	0.40%	0.013	0.764	4.49	100+
B-03	B-02	H06-050	H06-049	8					87	0.00039	0.00029	0.05935	0.0018	0.15711	57	0.40%	0.013	0.764	4.49	100+
B-04	B-03	H06-051	H06-050	8					87	0.00039	0.00029	0.05935	0.0018	0.15711	57	0.40%	0.013	0.764	4.49	100+
B-05	B-04	H06-052	H06-051	8	95	0%		0	87	0.00039	0.00029	0.05935	0.0018	0.15711	57	0.35%	0.013	0.715	4.17	100+
B-06	B-05	H06-057	H06-052	8					87	0.00039	0.00029	0.05935	0.0018	0.15711	57	0.40%	0.013	0.764	4.49	100+
B-07	B-06	H05-001	H06-057	8					87	0.00039	0.00029	0.05935	0.0018	0.15711	57	0.40%	0.013	0.764	4.49	100+
B-08	B-07	H05-002	H05-001	8					87	0.00039	0.00029	0.05935	0.0018	0.15711	57	0.60%	0.013	0.936	5.58	100+
B-09	B-08	H05-003	H05-002	8					87	0.00039	0.00029	0.05935	0.0018	0.15711	57	0.40%	0.013	0.764	4.49	100+
B-10	B-09	H05-004	H05-003	8					87	0.00039	0.00029	0.05935	0.0018	0.15711	57	0.40%	0.013	0.764	4.49	100+

Table 5 - 1
Level of Protection - Current Land Development

Upstream MH	Downstream MH	Upstream Node	Downstream Node	Pipe Diameter (inches)	Developable Tributary Area (acres)	Developable Tributary Area Percent Developed	Pump Station Flow (gpm)	Developed Tributary Area (acres)	Cumulated Developed Tributary Area (acres)	Cumulative Peak Base Flow (cfs/acre)	Cumulative Infiltration (cfs/acre)	Peak Base Flow + Infiltration (cfs)	Cumulative K Value	Cumulative K * Tributary Area	Time of Concentration Using GBA Formula (minutes)	Pipe Slope (%)	Mannings Coefficient (n)	Full Flow Capacity (cfs)	Maximum Rainfall Intensity (in/hr)	Level Of Protection
B-11	B-10	H05-005	H05-004	8					87	0.00039	0.00029	0.05935	0.0018	0.15711	57	0.40%	0.013	0.764	4.49	100+
B-12	B-11	H05-006	H05-005	8	218	40%		87	87	0.00039	0.00029	0.05935	0.0018	0.15711	57	0.40%	0.013	0.764	4.49	100+
B-13	B-12	H05-007	H05-006	8					0	0.00039	0.00029	5.5E-05	0.0018	0.00015	10	0.40%	0.013	0.764	> 100	100+
B-14	B-13	H05-008	H05-007	8					0	0.00039	0.00029	5.5E-05	0.0018	0.00015	10	0.40%	0.013	0.764	> 100	100+
B-15	B-14	H05-009	H05-008	8	810	0%		0	0	0.00039	0.00029	5.5E-05	0.0018	0.00015	10	0.40%	0.013	0.764	> 100	100+
C-01	A-33	G06-033	G06-003	10					314	0.00047	0.00046	0.2923	0.0027	0.84863	79	1.86%	0.013	2.988	3.18	100+
C-02	C-01	G06-034	G06-033	10					314	0.00047	0.00046	0.2923	0.0027	0.84863	79	0.28%	0.013	1.159	1.02	<1
C-03	C-02	G06-035	G06-034	10					314	0.00047	0.00046	0.2923	0.0027	0.84863	79	0.28%	0.013	1.159	1.02	<1
C-04	C-03	G06-036	G06-035	10					314	0.00047	0.00046	0.2923	0.0027	0.84863	79	1.90%	0.013	3.020	3.21	100+
C-05	C-04	G06-037	G06-036	10					314	0.00047	0.00046	0.2923	0.0027	0.84863	79	1.90%	0.013	3.020	3.21	100+
C-06	C-05	G06-038	G06-037	10					314	0.00047	0.00046	0.2923	0.0027	0.84863	79	2.80%	0.013	3.666	3.98	100+
C-07	C-06	G06-039	G06-038	10					314	0.00047	0.00046	0.2923	0.0027	0.84863	79	0.97%	0.013	2.158	2.20	15.8
C-08	C-07	G06-040	G06-039	10	52	95%		49	314	0.00047	0.00046	0.2923	0.0027	0.84863	79	0.28%	0.013	1.159	1.02	<1
C-09	C-08	G06-045	G06-040	10					265	0.00047	0.00046	0.24672	0.0027	0.71627	76	0.28%	0.013	1.159	1.27	1.5
C-10	C-09	F06-001	G06-045	10					265	0.00047	0.00046	0.24672	0.0027	0.71627	76	1.47%	0.013	2.656	3.36	100+
C-11	C-10	F06-002	F06-001	10	537	30%		161	265	0.00047	0.00046	0.24672	0.0027	0.71627	76	0.40%	0.013	1.386	1.59	3.3
C-12	C-11	F06-057	F06-002	10					104	0.00047	0.00046	0.09684	0.0027	0.28114	60	1.36%	0.013	2.555	8.74	100+
C-13	C-12	F06-058	F06-057	8					104	0.00047	0.00046	0.09684	0.0027	0.28114	60	1.06%	0.013	1.244	4.08	100+
C-14	C-13	F06-059	F06-058	8					104	0.00047	0.00046	0.09684	0.0027	0.28114	60	1.53%	0.013	1.495	4.97	100+
C-15	C-14	F07-050	F06-059	8					104	0.00047	0.00046	0.09684	0.0027	0.28114	60	1.14%	0.013	1.290	4.24	100+
C-16	C-15	F07-051	F07-050	8	96	50%		48	104	0.00047	0.00046	0.09684	0.0027	0.28114	60	1.47%	0.013	1.465	4.87	100+
C-17	C-16	F07-063	F07-051	8					56	0.00047	0.00046	0.0521	0.0027	0.15127	51	2.60%	0.013	1.949	12.54	100+
C-18	C-17	F07-064	F07-063	8					56	0.00047	0.00046	0.0521	0.0027	0.15127	51	1.15%	0.013	1.296	8.22	100+
C-19	C-18	F07-065	F07-064	8					56	0.00047	0.00046	0.0521	0.0027	0.15127	51	1.00%	0.013	1.208	7.64	100+
C-20	C-19	F07-066	F07-065	8					56	0.00047	0.00046	0.0521	0.0027	0.15127	51	1.80%	0.013	1.621	10.37	100+
C-21	C-20	F07-067	F07-066	8					56	0.00047	0.00046	0.0521	0.0027	0.15127	51	0.80%	0.013	1.081	6.80	100+
C-22	C-21	F07-068	F07-067	8					56	0.00047	0.00046	0.0521	0.0027	0.15127	51	0.80%	0.013	1.081	6.80	100+
C-23	C-22	F07-069	F07-068	8					56	0.00047	0.00046	0.0521	0.0027	0.15127	51	0.81%	0.013	1.088	6.85	100+
C-24	C-23	E07-031	F07-069	8					56	0.00047	0.00046	0.0521	0.0027	0.15127	51	0.79%	0.013	1.074	6.76	100+
C-25	C-24	E07-032	E07-031	8					56	0.00047	0.00046	0.0521	0.0027	0.15127	51	0.75%	0.013	1.047	6.57	100+
C-26	C-25	E07-033	E07-032	8					56	0.00047	0.00046	0.0521	0.0027	0.15127	51	0.75%	0.013	1.047	6.57	100+
C-27	C-26	E07-034	E07-033	8					56	0.00047	0.00046	0.0521	0.0027	0.15127	51	0.78%	0.013	1.067	6.71	100+
C-28	C-27	E06-041	E07-034	8					56	0.00047	0.00046	0.0521	0.0027	0.15127	51	0.40%	0.013	0.764	4.71	100+
C-29	C-28	E06-042	E06-041	8	75	75%		56	56	0.00047	0.00046	0.0521	0.0027	0.15127	51	0.40%	0.013	0.764	4.71	100+
C-30	C-29	E06-043	E06-042	8					0	0.00047	0.00046	9.3E-07	0.0027	2.7E-06	3	0.40%	0.013	0.764	> 100	100+
C-31	C-30	E06-044	E06-043	8					0	0.00047	0.00046	9.3E-07	0.0027	2.7E-06	3	0.40%	0.013	0.764	> 100	100+
C-32	C-31	E06-045	E06-044	8					0	0.00047	0.00046	9.3E-07	0.0027	2.7E-06	3	0.40%	0.013	0.764	> 100	100+
C-33	C-32	E06-046	E06-045	8					0	0.00047	0.00046	9.3E-07	0.0027	2.7E-06	3	0.40%	0.013	0.764	> 100	100+
C-34	C-33	E06-047	E06-046	8					0	0.00047	0.00046	9.3E-07	0.0027	2.7E-06	3	0.40%	0.013	0.764	> 100	100+
C-35	C-34	E06-048	E06-047	8					0	0.00047	0.00046	9.3E-07	0.0027	2.7E-06	3	0.40%	0.013	0.764	> 100	100+
C-36	C-35	E06-056	E06-048	8	10	0%		0	0	0.00047	0.00046	9.3E-07	0.0027	2.7E-06	3	0.58%	0.013	0.920	> 100	100+
D-01	C-11	F06-003	F06-002	8					98	0.00047	0.00046	0.09114	0.0027	0.2646	59	0.40%	0.013	0.764	2.54	12.1
D-02	D-01	F06-004	F06-003	8					98	0.00047	0.00046	0.09114	0.0027	0.2646	59	0.40%	0.013	0.764	2.54	12.1
D-03	D-02	F06-005	F06-004	8					98	0.00047	0.00046	0.09114	0.0027	0.2646	59	0.74%	0.013	1.040	3.58	81.4

Table 5 - 1
Level of Protection - Current Land Development

Upstream MH	Downstream MH	Upstream Node	Downstream Node	Pipe Diameter (inches)	Developable Tributary Area (acres)	Developable Tributary Area Percent Developed	Pump Station Flow (gpm)	Developed Tributary Area (acres)	Cumulated Developed Tributary Area (acres)	Cumulative Peak Base Flow (cfs/acre)	Cumulative Infiltration (cfs/acre)	Peak Base Flow + Infiltration (cfs)	Cumulative K Value	Cumulative K * Tributary Area	Time of Concentration Using GBA Formula (minutes)	Pipe Slope (%)	Mannings Coefficient (n)	Full Flow Capacity (cfs)	Maximum Rainfall Intensity (in/hr)	Level Of Protection
D-04	D-03	F06-006	F06-005	8					98	0.00047	0.00046	0.09114	0.0027	0.2646	59	2.05%	0.013	1.730	6.19	100+
D-05	D-04	F06-007	F06-006	8					98	0.00047	0.00046	0.09114	0.0027	0.2646	59	2.02%	0.013	1.717	6.15	100+
D-06	D-05	F06-008	F06-007	8					98	0.00047	0.00046	0.09114	0.0027	0.2646	59	1.40%	0.013	1.430	5.06	100+
D-07	D-06	F06-009	F06-008	8					98	0.00047	0.00046	0.09114	0.0027	0.2646	59	1.11%	0.013	1.273	4.47	100+
D-08	D-07	F06-010	F06-009	8	182	5%		9	98	0.00047	0.00046	0.09114	0.0027	0.2646	59	2.00%	0.013	1.709	6.11	100+
D-09	D-08	F06-011	F06-010	8					89	0.00047	0.00046	0.0827	0.0027	0.2401	58	1.14%	0.013	1.290	5.03	100+
D-10	D-09	F06-012	F06-011	8					89	0.00047	0.00046	0.0827	0.0027	0.2401	58	0.60%	0.013	0.936	3.55	72.0
D-11	D-10	F06-013	F06-012	8					89	0.00047	0.00046	0.0827	0.0027	0.2401	58	0.60%	0.013	0.936	3.55	72.0
D-12	D-11	E06-001	F06-013	8	356	25%		89	89	0.00047	0.00046	0.0827	0.0027	0.2401	58	0.60%	0.013	0.936	3.55	72.0
Southwest Tributaries E & F to East Lift Station																				
E-01	E-LS	I08-001	I08-LS1	18	83	0%		0	226	0.00055	0.00051	0.23953	0.0029	0.65531	73	0.39%	0.013	6.560	9.64	100+
E-02	E-01	I08-002	I08-001	18					226	0.00055	0.00051	0.23953	0.0029	0.65531	73	0.46%	0.013	7.124	10.51	100+
E-03	E-02	I08-003	I08-002	18					226	0.00055	0.00051	0.23953	0.0029	0.65531	73	0.31%	0.013	5.849	8.56	100+
E-04	E-03	I08-004	I08-003	18					226	0.00055	0.00051	0.23953	0.0029	0.65531	73	0.40%	0.013	6.644	9.77	100+
E-05	E-04	I08-005	I08-004	18					226	0.00055	0.00051	0.23953	0.0029	0.65531	73	0.30%	0.013	5.753	8.41	100+
E-06	E-05	I08-006	I08-005	18	103	5%		5	226	0.00055	0.00051	0.23953	0.0029	0.65531	73	0.85%	0.013	9.685	14.41	100+
E-07	E-06	I08-007	I08-006	18					221	0.00055	0.00051	0.23408	0.0029	0.64041	72	0.97%	0.013	10.346	15.79	100+
E-08	E-07	H08-001	I08-007	18					221	0.00055	0.00051	0.23408	0.0029	0.64041	72	2.07%	0.013	15.113	23.23	100+
E-09	E-08	H07-001	H08-001	18					221	0.00055	0.00051	0.23408	0.0029	0.64041	72	0.50%	0.013	7.428	11.23	100+
E-10	E-09	H07-002	H07-001	18					221	0.00055	0.00051	0.23408	0.0029	0.64041	72	0.50%	0.013	7.428	11.23	100+
E-11	E-10	H07-003	H07-002	18	121	50%		61	221	0.00055	0.00051	0.23408	0.0029	0.64041	72	0.50%	0.013	7.428	11.23	100+
E-12	E-11	H07-004	H07-003	10					160	0.00055	0.00051	0.16974	0.0029	0.46438	67	0.83%	0.013	1.996	3.93	100+
E-13	E-12	H07-005	H07-004	10					160	0.00055	0.00051	0.16974	0.0029	0.46438	67	0.72%	0.013	1.859	3.64	100+
E-14	E-13	H07-006	H07-005	10	76	0%		0	160	0.00055	0.00051	0.16974	0.0029	0.46438	67	1.60%	0.013	2.771	5.60	100+
E-15	E-14	H07-007	H07-006	10					160	0.00055	0.00051	0.16974	0.0029	0.46438	67	1.22%	0.013	2.420	4.85	100+
E-16	E-15	H07-008	H07-007	10					160	0.00055	0.00051	0.16974	0.0029	0.46438	67	1.75%	0.013	2.898	5.88	100+
E-17	E-16	H07-009	H07-008	10					160	0.00055	0.00051	0.16974	0.0029	0.46438	67	4.47%	0.013	4.632	9.61	100+
E-18	E-17	H07-018	H07-009	10					160	0.00055	0.00051	0.16974	0.0029	0.46438	67	0.50%	0.013	1.549	2.97	44.1
E-19	E-18	G07-001	H07-018	10					160	0.00055	0.00051	0.16974	0.0029	0.46438	67	0.50%	0.013	1.549	2.97	44.1
E-20	E-19	G07-002	G07-001	10	98	10%		10	160	0.00055	0.00051	0.16974	0.0029	0.46438	67	0.50%	0.013	1.549	2.97	44.1
E-21	E-20	G07-003	G07-002	10					150	0.00055	0.00051	0.15932	0.0029	0.43587	66	0.50%	0.013	1.549	3.19	63.6
E-22	E-21	G07-004	G07-003	10					150	0.00055	0.00051	0.15932	0.0029	0.43587	66	0.50%	0.013	1.549	3.19	63.6
E-23	E-22	G07-005	G07-004	10					150	0.00055	0.00051	0.15932	0.0029	0.43587	66	0.50%	0.013	1.549	3.19	63.6
E-24	E-23	G07-006	G07-005	8	90	80%		72	150	0.00055	0.00051	0.15932	0.0029	0.43587	66	2.38%	0.013	1.864	3.91	100+
E-25	E-24	G07-014	G07-006	8					78	0.00055	0.00051	0.083	0.0029	0.22707	56	0.50%	0.013	0.854	3.40	48.2
E-26	E-25	G07-015	G07-014	8					78	0.00055	0.00051	0.083	0.0029	0.22707	56	0.40%	0.013	0.764	3.00	23.8
E-27	E-26	G-08-001	G07-015	8					78	0.00055	0.00051	0.083	0.0029	0.22707	56	0.40%	0.013	0.764	3.00	23.8
E-28	E-27	G-08-002	G-08-001	8					78	0.00055	0.00051	0.083	0.0029	0.22707	56	0.40%	0.013	0.764	3.00	23.8
E-29	E-28	G-08-003	G-08-002	8					78	0.00055	0.00051	0.083	0.0029	0.22707	56	0.40%	0.013	0.764	3.00	23.8
E-30	E-29	G-08-004	G-08-003	8					78	0.00055	0.00051	0.083	0.0029	0.22707	56	0.40%	0.013	0.764	3.00	23.8
E-31	E-30	G-08-005	G-08-004	8					78	0.00055	0.00051	0.083	0.0029	0.22707	56	0.40%	0.013	0.764	3.00	23.8
E-32	E-31	G-08-006	G-08-005	8	90	80%		72	78	0.00055	0.00051	0.083	0.0029	0.22707	56	0.40%	0.013	0.764	3.00	23.8
E-33	E-32	G-08-007	G-08-006	8					6	0.00055	0.00051	0.00668	0.0029	0.01827	30	0.40%	0.013	0.764	41.47	100+

Table 5 - 1
Level of Protection - Current Land Development

Upstream MH	Downstream MH	Upstream Node	Downstream Node	Pipe Diameter (inches)	Developable Tributary Area (acres)	Developable Tributary Area Percent Developed	Pump Station Flow (gpm)	Developed Tributary Area (acres)	Cumulated Developed Tributary Area (acres)	Cumulative Peak Base Flow (cfs/acre)	Cumulative Infiltration (cfs/acre)	Peak Base Flow + Infiltration (cfs)	Cumulative K Value	Cumulative K * Tributary Area	Time of Concentration Using GBA Formula (minutes)	Pipe Slope (%)	Mannings Coefficient (n)	Full Flow Capacity (cfs)	Maximum Rainfall Intensity (in/hr)	Level Of Protection
E-34	E-33	G08-019	G-08-007	8					6	0.00055	0.00051	0.00668	0.0029	0.01827	30	2.67%	0.013	1.975	> 100	100+
E-35	E-34	G08-020	G08-019	8					6	0.00055	0.00051	0.00668	0.0029	0.01827	30	1.00%	0.013	1.208	65.78	100+
E-36	E-35	G08-021	G08-020	8					6	0.00055	0.00051	0.00668	0.0029	0.01827	30	0.50%	0.013	0.854	46.40	100+
E-37	E-36	G08-022	G08-021	8					6	0.00055	0.00051	0.00668	0.0029	0.01827	30	0.50%	0.013	0.854	46.40	100+
E-38	E-37	F08-044	G08-022	8					6	0.00055	0.00051	0.00668	0.0029	0.01827	30	1.72%	0.013	1.585	86.38	100+
E-39	E-38	F07-045	F08-044	8					6	0.00055	0.00051	0.00668	0.0029	0.01827	30	0.50%	0.013	0.854	46.40	100+
E-40	E-39	F07-046	F07-045	8	6	100%		6	6	0.00055	0.00051	0.00668	0.0029	0.01827	30	0.50%	0.013	0.854	46.40	100+
F-01	E-11	H07-019	H07-003	10					61	0.00055	0.00051	0.06434	0.0029	0.17603	52	0.28%	0.013	1.159	6.22	100+
F-02	F-01	H08-002	H07-019	10					61	0.00055	0.00051	0.06434	0.0029	0.17603	52	0.28%	0.013	1.159	6.22	100+
F-03	F-02	H08-003	H08-002	10					61	0.00055	0.00051	0.06434	0.0029	0.17603	52	0.28%	0.013	1.159	6.22	100+
F-04	F-03	H08-004	H08-003	10					61	0.00055	0.00051	0.06434	0.0029	0.17603	52	2.04%	0.013	3.129	17.41	100+
F-05	F-04	H08-005	H08-004	10					61	0.00055	0.00051	0.06434	0.0029	0.17603	52	2.59%	0.013	3.526	19.67	100+
F-06	F-05	H08-006	H08-005	10					61	0.00055	0.00051	0.06434	0.0029	0.17603	52	1.31%	0.013	2.508	13.88	100+
F-07	F-06	H08-007	H08-006	10					61	0.00055	0.00051	0.06434	0.0029	0.17603	52	0.67%	0.013	1.793	9.82	100+
F-08	F-07	H08-008	H08-007	10					61	0.00055	0.00051	0.06434	0.0029	0.17603	52	1.45%	0.013	2.638	14.62	100+
F-09	F-08	H08-009	H08-008	10					61	0.00055	0.00051	0.06434	0.0029	0.17603	52	1.47%	0.013	2.656	14.73	100+
F-10	F-09	G08-031	H08-009	10	121	50%		61	61	0.00055	0.00051	0.06434	0.0029	0.17603	52	0.28%	0.013	1.159	6.22	100+
Southwest Tributaries G & H to C Highway Lift Station																				
G-01	C-LS	F09-001	F09-LS1	18					271	0.00026	0.00006	0.0868	0.0024	0.65098	76	0.40%	0.013	6.644	10.07	100+
G-02	G-01	F09-002	F09-001	18					271	0.00026	0.00006	0.0868	0.0024	0.65098	76	0.40%	0.013	6.644	10.07	100+
G-03	G-02	F09-003	F09-002	18	62	20%		12	271	0.00026	0.00006	0.0868	0.0024	0.65098	76	0.49%	0.013	7.353	11.16	100+
G-04	G-03	F09-004	F09-003	18					259	0.00026	0.00006	0.08285	0.0024	0.62136	75	0.59%	0.013	8.069	12.85	100+
G-05	G-04	F09-005	F09-004	18	91	10%		9	259	0.00026	0.00006	0.08285	0.0024	0.62136	75	0.62%	0.013	8.271	13.18	100+
G-06	G-05	F09-006	F09-005	18					250	0.00026	0.00006	0.07994	0.0024	0.59954	75	0.56%	0.013	7.861	12.98	100+
G-07	G-06	F09-007	F09-006	18					250	0.00026	0.00006	0.07994	0.0024	0.59954	75	0.65%	0.013	8.469	13.99	100+
G-08	G-07	F08-001	F09-007	18	395	40%		158	250	0.00026	0.00006	0.07994	0.0024	0.59954	75	0.58%	0.013	8.000	13.21	100+
G-09	G-08	F08-002	F08-001	18					92	0.00026	0.00006	0.02938	0.0024	0.22034	58	0.58%	0.013	8.000	36.17	100+
G-10	G-09	F08-003	F08-002	15					92	0.00026	0.00006	0.02938	0.0024	0.22034	58	0.85%	0.013	5.956	26.90	100+
G-11	G-10	F08-004	F08-003	15					92	0.00026	0.00006	0.02938	0.0024	0.22034	58	0.85%	0.013	5.956	26.90	100+
G-12	G-11	F08-005	F08-004	15					92	0.00026	0.00006	0.02938	0.0024	0.22034	58	0.79%	0.013	5.742	25.92	100+
G-13	G-12	F08-006	F08-005	15					92	0.00026	0.00006	0.02938	0.0024	0.22034	58	0.87%	0.013	6.025	27.21	100+
G-14	G-13	F08-007	F08-006	15					92	0.00026	0.00006	0.02938	0.0024	0.22034	58	0.79%	0.013	5.742	25.92	100+
G-15	G-14	F08-008	F08-007	15					92	0.00026	0.00006	0.02938	0.0024	0.22034	58	0.90%	0.013	6.128	27.68	100+
G-16	G-15	F08-009	F08-008	12	52	0%		0	92	0.00026	0.00006	0.02938	0.0024	0.22034	58	2.19%	0.013	5.272	23.79	100+
G-17	G-16	F08-010	F08-009	12					92	0.00026	0.00006	0.02938	0.0024	0.22034	58	2.01%	0.013	5.051	22.79	100+
G-18	G-17	F08-011	F08-010	12					92	0.00026	0.00006	0.02938	0.0024	0.22034	58	2.04%	0.013	5.089	22.96	100+
G-19	G-18	F07-001	F08-011	12					92	0.00026	0.00006	0.02938	0.0024	0.22034	58	2.36%	0.013	5.473	24.71	100+
G-20	G-19	F07-002	F07-001	12	60	90%		54	92	0.00026	0.00006	0.02938	0.0024	0.22034	58	2.28%	0.013	5.380	24.28	100+
G-21	G-20	F07-003	F07-002	8					38	0.00026	0.00006	0.0121	0.0024	0.09074	46	0.60%	0.013	0.936	10.18	100+
G-22	G-21	F07-004	F07-003	8					38	0.00026	0.00006	0.0121	0.0024	0.09074	46	1.97%	0.013	1.696	18.56	100+
G-23	G-22	F07-005	F07-004	8					38	0.00026	0.00006	0.0121	0.0024	0.09074	46	1.97%	0.013	1.696	18.56	100+
G-24	G-23	F07-026	F07-005	8					38	0.00026	0.00006	0.0121	0.0024	0.09074	46	2.17%	0.013	1.780	19.48	100+
G-25	G-24	F07-027	F07-026	8					38	0.00026	0.00006	0.0121	0.0024	0.09074	46	2.17%	0.013	1.780	19.48	100+

Table 5 - 1
Level of Protection - Current Land Development

Upstream MH	Downstream MH	Upstream Node	Downstream Node	Pipe Diameter (inches)	Developable Tributary Area (acres)	Developable Tributary Area Percent Developed	Pump Station Flow (gpm)	Developed Tributary Area (acres)	Cumulated Developed Tributary Area (acres)	Cumulative Peak Base Flow (cfs/acre)	Cumulative Infiltration (cfs/acre)	Peak Base Flow + Infiltration (cfs)	Cumulative K Value	Cumulative K * Tributary Area	Time of Concentration Using GBA Formula (minutes)	Pipe Slope (%)	Mannings Coefficient (n)	Full Flow Capacity (cfs)	Maximum Rainfall Intensity (in/hr)	Level Of Protection
G-26	G-25	F07-028	F07-027	8					38	0.00026	0.00006	0.0121	0.0024	0.09074	46	2.17%	0.013	1.780	19.48	100+
G-27	G-26	F07-029	F07-028	8					38	0.00026	0.00006	0.0121	0.0024	0.09074	46	0.40%	0.013	0.764	8.29	100+
G-28	G-27	F07-030	F07-029	8	40	95%		38	38	0.00026	0.00006	0.0121	0.0024	0.09074	46	0.40%	0.013	0.764	8.29	100+
H-01	G-08	F08-033	F08-001	18					72	0.00026	0.00006	0.02291	0.0024	0.17179	55	0.60%	0.013	8.137	47.23	100+
H-02	H-01	F08-034	F08-033	18					72	0.00026	0.00006	0.02291	0.0024	0.17179	55	2.59%	0.013	16.905	98.27	100+
H-03	H-02	F08-035	F08-034	18					72	0.00026	0.00006	0.02291	0.0024	0.17179	55	0.60%	0.013	8.137	47.23	100+
H-04	H-03	F08-036	F08-035	18					72	0.00026	0.00006	0.02291	0.0024	0.17179	55	0.60%	0.013	8.137	47.23	100+
H-05	H-04	F08-037	F08-036	18	20	50%		10	72	0.00026	0.00006	0.02291	0.0024	0.17179	55	0.60%	0.013	8.137	47.23	100+
H-06	H-05	F08-038	F08-037	18					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.60%	0.013	8.137	55.10	100+
H-07	H-06	F08-039	F08-038	18					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.20%	0.013	4.698	31.76	100+
H-08	H-07	F08-040	F08-039	18					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.20%	0.013	4.698	31.76	100+
H-09	H-08	F08-041	F08-040	15					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.30%	0.013	3.538	23.88	100+
H-10	H-09	E08-004	F08-041	15					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.30%	0.013	3.538	23.88	100+
H-11	H-10	F08-043	E08-004	15					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.30%	0.013	3.538	23.88	100+
H-12	H-11	E08-005	F08-043	15					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.30%	0.013	3.538	23.88	100+
H-13	H-12	E08-006	E08-005	15					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.30%	0.013	3.538	23.88	100+
H-14	H-13	E08-007	E08-006	15	96	0%		0	61	0.00026	0.00006	0.01964	0.0024	0.14731	52	2.00%	0.013	9.136	61.88	100+
H-15	H-14	E08-008	E08-007	15					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.30%	0.013	3.538	23.88	100+
H-16	H-15	E08-009	E08-008	15					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.30%	0.013	3.538	23.88	100+
H-17	H-16	E08-010	E08-009	15					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.30%	0.013	3.538	23.88	100+
H-18	H-17	E08-011	E08-010	15					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.30%	0.013	3.538	23.88	100+
H-19	H-18	E08-012	E08-011	15					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.50%	0.013	4.568	30.87	100+
H-20	H-19	E07-001	E08-012	15					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.50%	0.013	4.568	30.87	100+
H-21	H-20	E07-002	E07-001	15	133	0%		0	61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.50%	0.013	4.568	30.87	100+
H-22	H-21	E07-003	E07-002	12					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.50%	0.013	2.519	16.97	100+
H-23	H-22	E07-004	E07-003	12					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.50%	0.013	2.519	16.97	100+
H-24	H-23	E07-005	E07-004	10					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.98%	0.013	2.169	14.59	100+
H-25	H-24	E07-006	E07-005	10					61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.89%	0.013	2.067	13.90	100+
H-26	H-25	E07-007	E07-006	10	68	90%		61	61	0.00026	0.00006	0.01964	0.0024	0.14731	52	0.53%	0.013	1.595	10.69	100+

b. Ultimate Land Development

Table 5 – 2 summarizes the capacity evaluation model inputs used to predict the level of storm protection for individual line segments when the entire watershed is completely developed. The future ultimate land development acreages were based on the assumption that the entire tributary area would become developed (residential and commercial) at some point in the future.

c. Current and Future Land Development

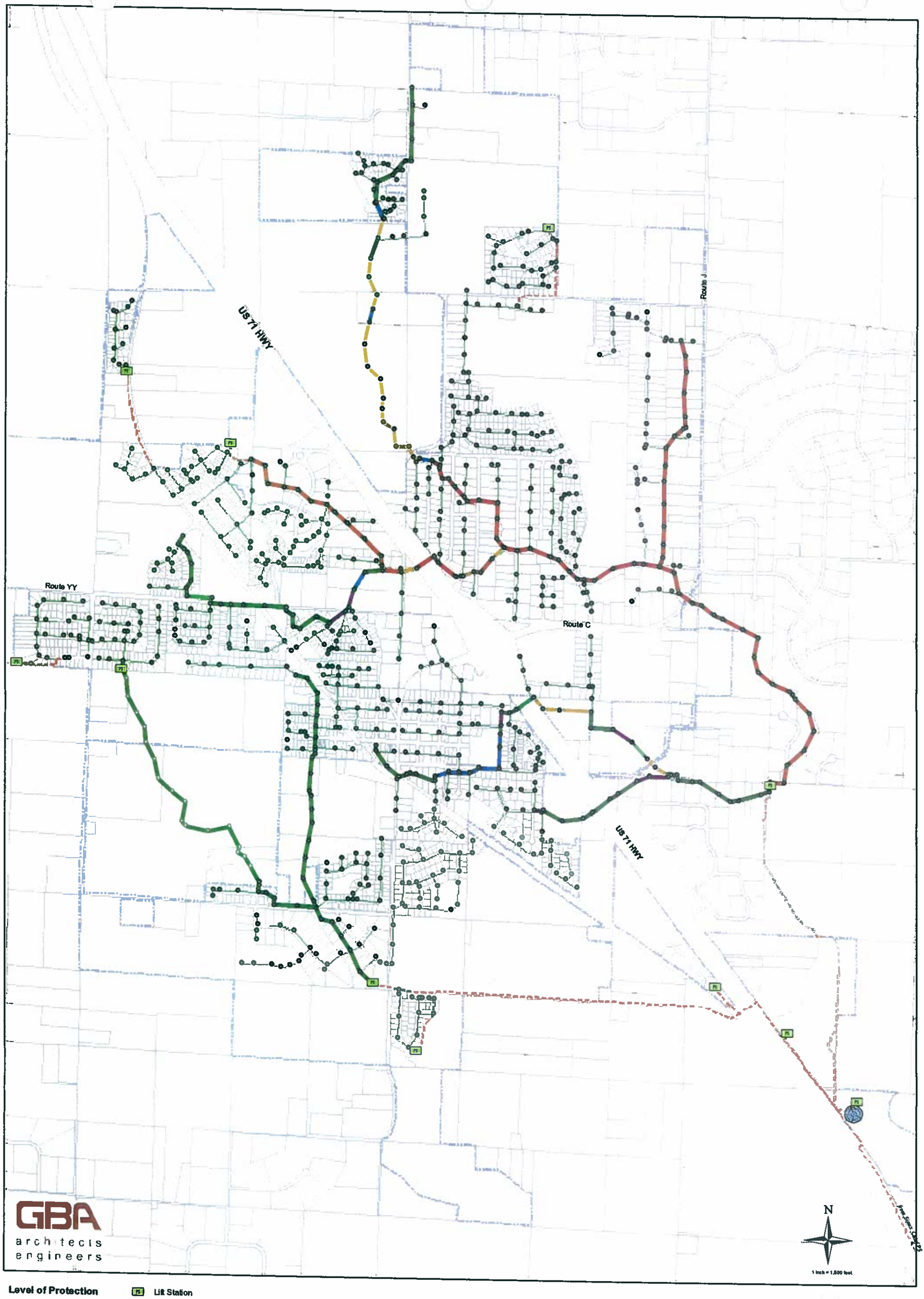
Table 5 – 3 summarizes the number of line segments and the level of storm protection they provide for two different land development conditions. At the current level of land development 73% of the line segments have protection against surcharge or overflow during storm events that have a 1% chance of occurring any given year (100 year storm). 13% of the line segments have a greater than 100% chance (1 year storm) of surcharge or overflow in any given year.

When the watershed reaches ultimate development the model predicts that 48% of the line segments will have a 100 year level of storm protection and 32% of the line segments will have a greater than 100% chance of surcharging.

C. Infiltration and Inflow Sources

a. General. Chapter 4 described the inspection and testing that was performed on the City's public and private sector sewer system in 2011. Due to budget constraints the entire public and private system was not evaluated. However, a large portion of the public system was smoke tested. This type of testing will generally find the largest significant sources of extraneous water in a sewer system.

b. Public Sector. The inspection of 320 manholes and the smoke testing of 120,000 feet of public sewer system produced a list of I/I sources that contribute groundwater and rainwater to the sewer system. Tables 5 – 4 and 5 – 5 summarize the types and number of sources that were identified. Also during the smoke testing and building inspections potential I/I sources were noted. These "suspect" sources should be further tested to verify if the source



Level of Protection
- Less than 1 Year
- 1 to 5 Years
- 6 to 10 Years
- 11 to 25 Years
- 26 to 100 Years
- Greater than 100 Years
- Corprate Limit

- Lift Station
- WWTP
- Existing MH
- Proposed MH
- Forcemain Existing
- Gravity Existing
- Gravity Proposed
- Forcemain Proposed

Level of Protection Ultimate Growth Load on Sanitary Sewer System

THE CITY OF PECULIAR

Figure 5-3 5-11

Table 5 - 2
Level of Protection - Ultimate Land Development

Upstream MH	Downstream MH	Upstream Node	Downstream Node	Pipe Diameter (inches)	Developable Tributary Area (acres)	Developable Tributary Area Percent Developed	Pump Station Flow (gpm)	Developed Tributary Area (acres)	Cumulated Developed Tributary Area (acres)	Cumulative Peak Base Flow (cfs/acre)	Cumulative Infiltration (cfs/acre)	Peak Base Flow + Infiltration (cfs)	Cumulative K Value	Cumulative K * Tributary Area	Time of Concentration Using GBA Formula (minutes)	Pipe Slope (%)	Mannings Coefficient (n)	Full Flow Capacity (cfs)	Maximum Rainfall Intensity (in/hr)	Level Of Protection
Northeast Side Tributary A to East Lift Station																				
	E-LS	#N/A	I08-LS1	12					3731	0.00039	0.00029	2.53719	0.0018	6.71609	148	0.14%	0.013	1.333	-0.18	<1
A-02	A-01	I08-009	I08-008	12				59	3731	0.00039	0.00029	2.53719	0.0018	6.71609	148	0.14%	0.013	1.333	-0.18	<1
A-03	A-02	I07-001	I08-009	12					3673	0.00039	0.00029	2.49734	0.0018	6.61061	147	0.22%	0.013	1.671	-0.12	<1
A-04	A-03	I07-002	I07-001	12					3673	0.00039	0.00029	2.49734	0.0018	6.61061	147	0.22%	0.013	1.671	-0.12	<1
A-05	A-04	I07-003	I07-002	12					3673	0.00039	0.00029	2.49734	0.0018	6.61061	147	0.22%	0.013	1.671	-0.12	<1
A-06	A-05	I07-004	I07-003	12					3673	0.00039	0.00029	2.49734	0.0018	6.61061	147	0.22%	0.013	1.671	-0.12	<1
A-07	A-06	I07-005	I07-004	12				80	3673	0.00039	0.00029	2.49734	0.0018	6.61061	147	0.22%	0.013	1.671	-0.12	<1
A-08	A-07	I07-006	I07-005	12					3592	0.00039	0.00029	2.44267	0.0018	6.46589	147	0.22%	0.013	1.671	-0.12	<1
A-09	A-08	I07-007	I07-006	12					3592	0.00039	0.00029	2.44267	0.0018	6.46589	147	0.22%	0.013	1.671	-0.12	<1
A-10	A-09	I07-008	I07-007	12					3592	0.00039	0.00029	2.44267	0.0018	6.46589	147	0.49%	0.013	2.494	0.01	<1
A-11	A-10	I07-009	I07-008	12					3592	0.00039	0.00029	2.44267	0.0018	6.46589	147	0.22%	0.013	1.671	-0.12	<1
A-12	A-11	I07-010	I07-009	12					3592	0.00039	0.00029	2.44267	0.0018	6.46589	147	0.22%	0.013	1.671	-0.12	<1
A-13	A-12	I07-011	I07-010	12				266	3592	0.00039	0.00029	2.44267	0.0018	6.46589	147	0.22%	0.013	1.671	-0.12	<1
A-14	A-13	I06-001	I07-011	12					3326	0.00039	0.00029	2.26165	0.0018	5.98673	144	0.22%	0.013	1.671	-0.10	<1
A-15	A-14	I06-002	I06-001	12					3326	0.00039	0.00029	2.26165	0.0018	5.98673	144	0.22%	0.013	1.671	-0.10	<1
A-16	A-15	I06-003	I06-002	12				80	3326	0.00039	0.00029	2.26165	0.0018	5.98673	144	0.22%	0.013	1.671	-0.10	<1
A-17	A-16	I06-004	I06-003	12					3246	0.00039	0.00029	2.20712	0.0018	5.84237	143	0.44%	0.013	2.363	0.03	<1
A-18	A-17	H06-001	I06-004	12					3246	0.00039	0.00029	2.20712	0.0018	5.84237	143	0.17%	0.013	1.469	-0.13	<1
A-19	A-18	H06-002	H06-001	12				48	3246	0.00039	0.00029	2.20712	0.0018	5.84237	143	0.22%	0.013	1.671	-0.09	<1
A-20	A-19	H06-003	H06-002	12					3198	0.00039	0.00029	2.17461	0.0018	5.75633	142	0.22%	0.013	1.671	-0.09	<1
A-21	A-20	H06-004	H06-003	12				1194	3198	0.00039	0.00029	2.17461	0.0018	5.75633	142	0.76%	0.013	3.106	0.16	<1
A-22	A-21	H06-005	H06-004	10					2004	0.00039	0.00029	1.36283	0.0018	3.60749	126	0.28%	0.013	1.159	-0.06	<1
A-23	A-22	H06-006	H06-005	10					2004	0.00039	0.00029	1.36283	0.0018	3.60749	126	0.28%	0.013	1.159	-0.06	<1
A-24	A-23	H06-007	H06-006	10					2004	0.00039	0.00029	1.36283	0.0018	3.60749	126	0.28%	0.013	1.159	-0.06	<1
A-25	A-24	H06-008	H06-007	10					2004	0.00039	0.00029	1.36283	0.0018	3.60749	126	1.18%	0.013	2.380	0.28	<1
A-26	A-25	H06-009	H06-008	10					2004	0.00039	0.00029	1.36283	0.0018	3.60749	126	1.18%	0.013	2.380	0.28	<1
A-27	A-26	H06-010	H06-009	10					2004	0.00039	0.00029	1.36283	0.0018	3.60749	126	1.18%	0.013	2.380	0.28	<1
A-28	A-27	H06-011	H06-010	10				118	2004	0.00039	0.00029	1.36283	0.0018	3.60749	126	0.45%	0.013	1.470	0.03	<1
A-29	A-28	H06-012	H06-011	10					1886	0.00039	0.00029	1.28245	0.0018	3.39473	125	0.28%	0.013	1.159	-0.04	<1
A-30	A-29	H06-013	H06-012	10					1886	0.00039	0.00029	1.28245	0.0018	3.39473	125	0.28%	0.013	1.159	-0.04	<1
A-31	A-30	G06-001	H06-013	10					1886	0.00039	0.00029	1.28245	0.0018	3.39473	125	0.28%	0.013	1.159	-0.04	<1
A-32	A-31	G06-002	G06-001	10					1886	0.00039	0.00029	1.28245	0.0018	3.39473	125	0.28%	0.013	1.159	-0.04	<1
A-33	A-32	G06-003	G06-002	10				770	1886	0.00039	0.00029	1.28245	0.0018	3.39473	125	0.79%	0.013	1.947	0.20	<1
A-34	A-33	G06-004	G06-003	10					1116	0.00022	0.00026	0.53582	0.0023	2.56749	109	0.28%	0.013	1.159	0.24	<1
A-35	A-34	G06-005	G06-004	10					1116	0.00022	0.00026	0.53582	0.0023	2.56749	109	0.73%	0.013	1.872	0.52	<1
A-36	A-35	G06-006	G06-005	10					1116	0.00022	0.00026	0.53582	0.0023	2.56749	109	0.40%	0.013	1.386	0.33	<1
A-37	A-36	G06-007	G06-006	10					1116	0.00022	0.00026	0.53582	0.0023	2.56749	109	0.40%	0.013	1.386	0.33	<1
A-38	A-37	G06-008	G06-007	10				76	1116	0.00022	0.00026	0.53582	0.0023	2.56749	109	0.40%	0.013	1.386	0.33	<1
A-39	A-38	G06-009	G06-008	10					1041	0.00022	0.00026	0.49958	0.0023	2.39384	107	0.39%	0.013	1.368	0.36	<1
A-40	A-39	G06-010	G06-009	10					1041	0.00022	0.00026	0.49958	0.0023	2.39384	107	0.28%	0.013	1.159	0.28	<1
A-41	A-40	G06-011	G06-010	10					1041	0.00022	0.00026	0.49958	0.0023	2.39384	107	0.28%	0.013	1.159	0.28	<1
A-42	A-41	G06-012	G06-011	10					1041	0.00022	0.00026	0.49958	0.0023	2.39384	107	0.28%	0.013	1.159	0.28	<1

Table 5 - 2
Level of Protection - Ultimate Land Development

Upstream MH	Downstream MH	Upstream Node	Downstream Node	Pipe Diameter (inches)	Developable Tributary Area (acres)	Developable Tributary Area Percent Developed	Pump Station Flow (gpm)	Developed Tributary Area (acres)	Cumulated Developed Tributary Area (acres)	Cumulative Peak Base Flow (cfs/acre)	Cumulative Infiltration (cfs/acre)	Peak Base Flow + Infiltration (cfs)	Cumulative K Value	Cumulative K * Tributary Area	Time of Concentration Using GBA Formula (minutes)	Pipe Slope (%)	Mannings Coefficient (n)	Full Flow Capacity (cfs)	Maximum Rainfall Intensity (in/hr)	Level Of Protection
A-43	A-42	G06-013	G06-012	10					1041	0.00022	0.00026	0.49958	0.0023	2.39384	107	0.28%	0.013	1.159	0.28	<1
A-44	A-43	G06-014	G06-013	10				465	1041	0.00022	0.00026	0.49958	0.0023	2.39384	107	0.28%	0.013	1.159	0.28	<1
A-45	A-44	G06-015	G06-014	10					576	0.00022	0.00026	0.27662	0.0023	1.32549	92	0.28%	0.013	1.159	0.67	<1
A-46	A-45	G06-016	G06-015	10					576	0.00022	0.00026	0.27662	0.0023	1.32549	92	1.50%	0.013	2.683	1.82	10.5
A-47	A-46	G06-017	G06-016	10					576	0.00022	0.00026	0.27662	0.0023	1.32549	92	0.66%	0.013	1.780	1.13	1.5
A-48	A-47	G05-045	G06-017	10					576	0.00022	0.00026	0.27662	0.0023	1.32549	92	0.64%	0.013	1.753	1.11	1.5
A-49	A-48	F05-001	G05-045	10					576	0.00022	0.00026	0.27662	0.0023	1.32549	92	0.66%	0.013	1.780	1.13	1.5
A-50	A-49	F05-002	F05-001	10					576	0.00022	0.00026	0.27662	0.0023	1.32549	92	0.66%	0.013	1.780	1.13	1.5
A-51	A-50	F05-003	F05-002	10				218	576	0.00022	0.00026	0.27662	0.0023	1.32549	92	0.66%	0.013	1.780	1.13	1.5
A-52	A-51	F05-004	F05-003	10					358	0.00022	0.00026	0.17203	0.0023	0.82432	82	0.28%	0.013	1.159	1.20	1.4
A-53	A-52	F05-005	F05-004	10					358	0.00022	0.00026	0.17203	0.0023	0.82432	82	0.28%	0.013	1.159	1.20	1.4
A-54	A-53	F05-006	F05-005	10					358	0.00022	0.00026	0.17203	0.0023	0.82432	82	0.38%	0.013	1.351	1.43	2.7
A-55	A-54	F05-007	F05-006	10					358	0.00022	0.00026	0.17203	0.0023	0.82432	82	0.30%	0.013	1.200	1.25	1.7
A-56	A-55	F05-008	F05-007	10					358	0.00022	0.00026	0.17203	0.0023	0.82432	82	0.41%	0.013	1.403	1.49	3.1
A-57	A-56	F05-009	F05-008	10					358	0.00022	0.00026	0.17203	0.0023	0.82432	82	0.50%	0.013	1.549	1.67	4.9
A-58	A-57	F05-010	F05-009	10					358	0.00022	0.00026	0.17203	0.0023	0.82432	82	0.68%	0.013	1.807	1.98	10.7
A-59	A-58	F05-011	F05-010	10					358	0.00022	0.00026	0.17203	0.0023	0.82432	82	0.28%	0.013	1.159	1.20	1.4
A-60	A-59	F04-001	F05-011	10					358	0.00022	0.00026	0.17203	0.0023	0.82432	82	0.28%	0.013	1.159	1.20	1.4
A-61	A-60	F04-002	F04-001	10					358	0.00022	0.00026	0.17203	0.0023	0.82432	82	0.28%	0.013	1.159	1.20	1.4
A-62	A-61	F04-003	F04-002	10					358	0.00022	0.00026	0.17203	0.0023	0.82432	82	1.45%	0.013	2.638	2.99	100+
A-63	A-62	F04-004	F04-003	8				147	358	0.00022	0.00026	0.17203	0.0023	0.82432	82	1.47%	0.013	1.465	1.57	3.8
A-64	A-63	F04-005	F04-004	8					212	0.00022	0.00026	0.10171	0.0023	0.48737	72	1.47%	0.013	1.465	2.80	41.7
A-65	A-64	F04-006	F04-005	8				141	212	0.00022	0.00026	0.10171	0.0023	0.48737	72	0.92%	0.013	1.159	2.17	10.8
A-66	A-65	F04-007	F04-006	8					71	0.00022	0.00026	0.03403	0.0023	0.16307	54	1.46%	0.013	1.460	8.75	100+
A-67	A-66	F04-008	F04-007	8					71	0.00022	0.00026	0.03403	0.0023	0.16307	54	1.50%	0.013	1.480	8.87	100+
A-68	A-67	F04-009	F04-008	8					71	0.00022	0.00026	0.03403	0.0023	0.16307	54	1.07%	0.013	1.250	7.46	100+
A-69	A-68	F04-010	F04-009	8					71	0.00022	0.00026	0.03403	0.0023	0.16307	54	1.07%	0.013	1.250	7.46	100+
A-70	A-69	G04-032	F04-010	8					71	0.00022	0.00026	0.03403	0.0023	0.16307	54	1.24%	0.013	1.346	8.04	100+
A-71	A-70	G03-001	G04-032	8					71	0.00022	0.00026	0.03403	0.0023	0.16307	54	1.82%	0.013	1.630	9.79	100+
A-72	A-71	G03-002	G03-001	8					71	0.00022	0.00026	0.03403	0.0023	0.16307	54	3.31%	0.013	2.199	13.27	100+
A-73	A-72	G03-003	G03-002	8					71	0.00022	0.00026	0.03403	0.0023	0.16307	54	0.96%	0.013	1.184	7.05	100+
A-74	A-73	G03-004	G03-003	8				71	71	0.00022	0.00026	0.03403	0.0023	0.16307	54	3.90%	0.013	2.386	14.43	100+
Tributaries B, C & D into A																				
B-01	A-21	H06-048	H06-004	8					1123	0.00039	0.00029	0.76391	0.0018	2.02212	109	2.56%	0.013	1.933	0.58	<1
B-02	B-01	H06-049	H06-048	8					1123	0.00039	0.00029	0.76391	0.0018	2.02212	109	0.40%	0.013	0.764	0.00	<1
B-03	B-02	H06-050	H06-049	8					1123	0.00039	0.00029	0.76391	0.0018	2.02212	109	0.40%	0.013	0.764	0.00	<1
B-04	B-03	H06-051	H06-050	8					1123	0.00039	0.00029	0.76391	0.0018	2.02212	109	0.40%	0.013	0.764	0.00	<1
B-05	B-04	H06-052	H06-051	8				95	1123	0.00039	0.00029	0.76391	0.0018	2.02212	109	0.35%	0.013	0.715	-0.02	<1
B-06	B-05	H06-057	H06-052	8					1028	0.00039	0.00029	0.69911	0.0018	1.85058	107	0.40%	0.013	0.764	0.04	<1
B-07	B-06	H05-001	H06-057	8					1028	0.00039	0.00029	0.69911	0.0018	1.85058	107	0.40%	0.013	0.764	0.04	<1
B-08	B-07	H05-002	H05-001	8					1028	0.00039	0.00029	0.69911	0.0018	1.85058	107	0.60%	0.013	0.936	0.13	<1
B-09	B-08	H05-003	H05-002	8					1028	0.00039	0.00029	0.69911	0.0018	1.85058	107	0.40%	0.013	0.764	0.04	<1
B-10	B-09	H05-004	H05-003	8					1028	0.00039	0.00029	0.69911	0.0018	1.85058	107	0.40%	0.013	0.764	0.04	<1
B-11	B-10	H05-005	H05-004	8					1028	0.00039	0.00029	0.69911	0.0018	1.85058	107	0.40%	0.013	0.764	0.04	<1

Table 5 - 2
Level of Protection - Ultimate Land Development

Upstream MH	Downstream MH	Upstream Node	Downstream Node	Pipe Diameter (inches)	Developable Tributary Area (acres)	Developable Tributary Area Percent Developed	Pump Station Flow (gpm)	Developed Tributary Area (acres)	Cumulated Developed Tributary Area (acres)	Cumulative Peak Base Flow (cfs/acre)	Cumulative Infiltration (cfs/acre)	Peak Base Flow + Infiltration (cfs)	Cumulative K Value	Cumulative K * Tributary Area	Time of Concentration Using GBA Formula (minutes)	Pipe Slope (%)	Mannings Coefficient (n)	Full Flow Capacity (cfs)	Maximum Rainfall Intensity (in/hr)	Level Of Protection
B-12	B-11	H05-006	H05-005	8				218	1028	0.00039	0.00029	0.69911	0.0018	1.85058	107	0.40%	0.013	0.764	0.04	<1
B-13	B-12	H05-007	H05-006	8					810	0.00039	0.00029	0.55087	0.0018	1.45818	101	0.40%	0.013	0.764	0.15	<1
B-14	B-13	H05-008	H05-007	8					810	0.00039	0.00029	0.55087	0.0018	1.45818	101	0.40%	0.013	0.764	0.15	<1
B-15	B-14	H05-009	H05-008	8				810	810	0.00039	0.00029	0.55087	0.0018	1.45818	101	0.40%	0.013	0.764	0.15	<1
C-01	A-33	G06-033	G06-003	10					770	0.00047	0.00046	0.71582	0.0027	2.07819	99	1.86%	0.013	2.988	1.09	1.6
C-02	C-01	G06-034	G06-033	10					770	0.00047	0.00046	0.71582	0.0027	2.07819	99	0.28%	0.013	1.159	0.21	<1
C-03	C-02	G06-035	G06-034	10					770	0.00047	0.00046	0.71582	0.0027	2.07819	99	0.28%	0.013	1.159	0.21	<1
C-04	C-03	G06-036	G06-035	10					770	0.00047	0.00046	0.71582	0.0027	2.07819	99	1.90%	0.013	3.020	1.11	1.7
C-05	C-04	G06-037	G06-036	10					770	0.00047	0.00046	0.71582	0.0027	2.07819	99	1.90%	0.013	3.020	1.11	1.7
C-06	C-05	G06-038	G06-037	10					770	0.00047	0.00046	0.71582	0.0027	2.07819	99	2.80%	0.013	3.666	1.42	4.4
C-07	C-06	G06-039	G06-038	10					770	0.00047	0.00046	0.71582	0.0027	2.07819	99	0.97%	0.013	2.158	0.69	<1
C-08	C-07	G06-040	G06-039	10				52	770	0.00047	0.00046	0.71582	0.0027	2.07819	99	0.28%	0.013	1.159	0.21	<1
C-09	C-08	G06-045	G06-040	10					718	0.00047	0.00046	0.66783	0.0027	1.93887	98	0.28%	0.013	1.159	0.25	<1
C-10	C-09	F06-001	G06-045	10					718	0.00047	0.00046	0.66783	0.0027	1.93887	98	1.47%	0.013	2.656	1.03	1.3
C-11	C-10	F06-002	F06-001	10				537	718	0.00047	0.00046	0.66783	0.0027	1.93887	98	0.40%	0.013	1.386	0.37	<1
C-12	C-11	F06-057	F06-002	10					181	0.00047	0.00046	0.16824	0.0027	0.48843	69	1.36%	0.013	2.555	4.89	100+
C-13	C-12	F06-058	F06-057	8					181	0.00047	0.00046	0.16824	0.0027	0.48843	69	1.06%	0.013	1.244	2.20	10.0
C-14	C-13	F06-059	F06-058	8					181	0.00047	0.00046	0.16824	0.0027	0.48843	69	1.53%	0.013	1.495	2.72	30.0
C-15	C-14	F07-050	F06-059	8					181	0.00047	0.00046	0.16824	0.0027	0.48843	69	1.14%	0.013	1.290	2.30	12.4
C-16	C-15	F07-051	F07-050	8				96	181	0.00047	0.00046	0.16824	0.0027	0.48843	69	1.47%	0.013	1.465	2.66	26.5
C-17	C-16	F07-063	F07-051	8					85	0.00047	0.00046	0.07877	0.0027	0.22869	57	2.60%	0.013	1.949	8.18	100+
C-18	C-17	F07-064	F07-063	8					85	0.00047	0.00046	0.07877	0.0027	0.22869	57	1.15%	0.013	1.296	5.32	100+
C-19	C-18	F07-065	F07-064	8					85	0.00047	0.00046	0.07877	0.0027	0.22869	57	1.00%	0.013	1.208	4.94	100+
C-20	C-19	F07-066	F07-065	8					85	0.00047	0.00046	0.07877	0.0027	0.22869	57	1.80%	0.013	1.621	6.74	100+
C-21	C-20	F07-067	F07-066	8					85	0.00047	0.00046	0.07877	0.0027	0.22869	57	0.80%	0.013	1.081	4.38	100+
C-22	C-21	F07-068	F07-067	8					85	0.00047	0.00046	0.07877	0.0027	0.22869	57	0.80%	0.013	1.081	4.38	100+
C-23	C-22	F07-069	F07-068	8					85	0.00047	0.00046	0.07877	0.0027	0.22869	57	0.81%	0.013	1.088	4.41	100+
C-24	C-23	E07-031	F07-069	8					85	0.00047	0.00046	0.07877	0.0027	0.22869	57	0.79%	0.013	1.074	4.35	100+
C-25	C-24	E07-032	E07-031	8					85	0.00047	0.00046	0.07877	0.0027	0.22869	57	0.75%	0.013	1.047	4.23	100+
C-26	C-25	E07-033	E07-032	8					85	0.00047	0.00046	0.07877	0.0027	0.22869	57	0.75%	0.013	1.047	4.23	100+
C-27	C-26	E07-034	E07-033	8					85	0.00047	0.00046	0.07877	0.0027	0.22869	57	0.78%	0.013	1.067	4.32	100+
C-28	C-27	E06-041	E07-034	8					85	0.00047	0.00046	0.07877	0.0027	0.22869	57	0.40%	0.013	0.764	3.00	25.3
C-29	C-28	E06-042	E06-041	8				74.7	85	0.00047	0.00046	0.07877	0.0027	0.22869	57	0.40%	0.013	0.764	3.00	25.3
C-30	C-29	E06-043	E06-042	8					10	0.00047	0.00046	0.0093	0.0027	0.027	33	0.40%	0.013	0.764	27.96	100+
C-31	C-30	E06-044	E06-043	8					10	0.00047	0.00046	0.0093	0.0027	0.027	33	0.40%	0.013	0.764	27.96	100+
C-32	C-31	E06-045	E06-044	8					10	0.00047	0.00046	0.0093	0.0027	0.027	33	0.40%	0.013	0.764	27.96	100+
C-33	C-32	E06-046	E06-045	8					10	0.00047	0.00046	0.0093	0.0027	0.027	33	0.40%	0.013	0.764	27.96	100+
C-34	C-33	E06-047	E06-046	8					10	0.00047	0.00046	0.0093	0.0027	0.027	33	0.40%	0.013	0.764	27.96	100+
C-35	C-34	E06-048	E06-047	8					10	0.00047	0.00046	0.0093	0.0027	0.027	33	0.40%	0.013	0.764	27.96	100+
C-36	C-35	E06-056	E06-048	8				10	10	0.00047	0.00046	0.0093	0.0027	0.027	33	0.58%	0.013	0.920	33.74	100+
D-01	C-11	F06-003	F06-002	8					537	0.00047	0.00046	0.4996	0.0027	1.45044	91	0.40%	0.013	0.764	0.18	<1
D-02	D-01	F06-004	F06-003	8					537	0.00047	0.00046	0.4996	0.0027	1.45044	91	0.40%	0.013	0.764	0.18	<1
D-03	D-02	F06-005	F06-004	8					537	0.00047	0.00046	0.4996	0.0027	1.45044	91	0.74%	0.013	1.040	0.37	<1
D-04	D-03	F06-006	F06-005	8					537	0.00047	0.00046	0.4996	0.0027	1.45044	91	2.05%	0.013	1.730	0.85	<1
D-05	D-04	F06-007	F06-006	8					537	0.00047	0.00046	0.4996	0.0027	1.45044	91	2.02%	0.013	1.717	0.84	<1

Table 5 - 2
Level of Protection - Ultimate Land Development

Upstream MH	Downstream MH	Upstream Node	Downstream Node	Pipe Diameter (inches)	Developable Tributary Area (acres)	Developable Tributary Area Percent Developed	Pump Station Flow (gpm)	Developed Tributary Area (acres)	Cumulated Developed Tributary Area (acres)	Cumulative Peak Base Flow (cfs/acre)	Cumulative Infiltration (cfs/acre)	Peak Base Flow + Infiltration (cfs)	Cumulative K Value	Cumulative K * Tributary Area	Time of Concentration Using GBA Formula (minutes)	Pipe Slope (%)	Mannings Coefficient (n)	Full Flow Capacity (cfs)	Maximum Rainfall Intensity (in/hr)	Level Of Protection
D-06	D-05	F06-008	F06-007	8					537	0.00047	0.00046	0.4996	0.0027	1.45044	91	1.40%	0.013	1.430	0.64	<1
D-07	D-06	F06-009	F06-008	8					537	0.00047	0.00046	0.4996	0.0027	1.45044	91	1.11%	0.013	1.273	0.53	<1
D-08	D-07	F06-010	F06-009	8				182	537	0.00047	0.00046	0.4996	0.0027	1.45044	91	2.00%	0.013	1.709	0.83	<1
D-09	D-08	F06-011	F06-010	8					356	0.00047	0.00046	0.3308	0.0027	0.96039	82	1.14%	0.013	1.290	1.00	<1
D-10	D-09	F06-012	F06-011	8					356	0.00047	0.00046	0.3308	0.0027	0.96039	82	0.60%	0.013	0.936	0.63	<1
D-11	D-10	F06-013	F06-012	8					356	0.00047	0.00046	0.3308	0.0027	0.96039	82	0.60%	0.013	0.936	0.63	<1
D-12	D-11	E06-001	F06-013	8				355.7	356	0.00047	0.00046	0.3308	0.0027	0.96039	82	0.60%	0.013	0.936	0.63	<1
Southwest Tributaries E & F to East Lift Station																				
E-01	E-LS	I08-001	I08-LS1	18				83	668	0.00055	0.00051	0.70766	0.0029	1.93604	96	0.39%	0.013	6.560	3.02	100+
E-02	E-01	I08-002	I08-001	18					585	0.00055	0.00051	0.61999	0.0029	1.69621	93	0.46%	0.013	7.124	3.83	100+
E-03	E-02	I08-003	I08-002	18					585	0.00055	0.00051	0.61999	0.0029	1.69621	93	0.31%	0.013	5.849	3.08	100+
E-04	E-03	I08-004	I08-003	18					585	0.00055	0.00051	0.61999	0.0029	1.69621	93	0.40%	0.013	6.644	3.55	100+
E-05	E-04	I08-005	I08-004	18					585	0.00055	0.00051	0.61999	0.0029	1.69621	93	0.30%	0.013	5.753	3.03	100+
E-06	E-05	I08-006	I08-005	18				102.8	585	0.00055	0.00051	0.61999	0.0029	1.69621	93	0.85%	0.013	9.685	5.34	100+
E-07	E-06	I08-007	I08-006	18					482	0.00055	0.00051	0.51103	0.0029	1.39809	88	0.97%	0.013	10.346	7.03	100+
E-08	E-07	H08-001	I08-007	18					482	0.00055	0.00051	0.51103	0.0029	1.39809	88	2.07%	0.013	15.113	10.44	100+
E-09	E-08	H07-001	H08-001	18					482	0.00055	0.00051	0.51103	0.0029	1.39809	88	0.50%	0.013	7.428	4.95	100+
E-10	E-09	H07-002	H07-001	18					482	0.00055	0.00051	0.51103	0.0029	1.39809	88	0.50%	0.013	7.428	4.95	100+
E-11	E-10	H07-003	H07-002	18				121	482	0.00055	0.00051	0.51103	0.0029	1.39809	88	0.50%	0.013	7.428	4.95	100+
E-12	E-11	H07-004	H07-003	10					361	0.00055	0.00051	0.38234	0.0029	1.04603	82	0.83%	0.013	1.996	1.54	3.5
E-13	E-12	H07-005	H07-004	10					361	0.00055	0.00051	0.38234	0.0029	1.04603	82	0.72%	0.013	1.859	1.41	2.5
E-14	E-13	H07-006	H07-005	10				76	361	0.00055	0.00051	0.38234	0.0029	1.04603	82	1.60%	0.013	2.771	2.28	21.9
E-15	E-14	H07-007	H07-006	10					285	0.00055	0.00051	0.30168	0.0029	0.82534	77	1.22%	0.013	2.420	2.57	33.2
E-16	E-15	H07-008	H07-007	10					285	0.00055	0.00051	0.30168	0.0029	0.82534	77	1.75%	0.013	2.898	3.15	100+
E-17	E-16	H07-009	H07-008	10					285	0.00055	0.00051	0.30168	0.0029	0.82534	77	4.47%	0.013	4.632	5.25	100+
E-18	E-17	H07-018	H07-009	10					285	0.00055	0.00051	0.30168	0.0029	0.82534	77	0.50%	0.013	1.549	1.51	2.8
E-19	E-18	G07-001	H07-018	10					285	0.00055	0.00051	0.30168	0.0029	0.82534	77	0.50%	0.013	1.549	1.51	2.8
E-20	E-19	G07-002	G07-001	10				98.3	285	0.00055	0.00051	0.30168	0.0029	0.82534	77	0.50%	0.013	1.549	1.51	2.8
E-21	E-20	G07-003	G07-002	10					186	0.00055	0.00051	0.19748	0.0029	0.54027	69	0.50%	0.013	1.549	2.50	19.0
E-22	E-21	G07-004	G07-003	10					186	0.00055	0.00051	0.19748	0.0029	0.54027	69	0.50%	0.013	1.549	2.50	19.0
E-23	E-22	G07-005	G07-004	10					186	0.00055	0.00051	0.19748	0.0029	0.54027	69	0.50%	0.013	1.549	2.50	19.0
E-24	E-23	G07-006	G07-005	8				90	186	0.00055	0.00051	0.19748	0.0029	0.54027	69	2.38%	0.013	1.864	3.09	63.0
E-25	E-24	G07-014	G07-006	8					96	0.00055	0.00051	0.10208	0.0029	0.27927	59	0.50%	0.013	0.854	2.69	16.1
E-26	E-25	G07-015	G07-014	8					96	0.00055	0.00051	0.10208	0.0029	0.27927	59	0.40%	0.013	0.764	2.37	8.7
E-27	E-26	G-08-001	G07-015	8					96	0.00055	0.00051	0.10208	0.0029	0.27927	59	0.40%	0.013	0.764	2.37	8.7
E-28	E-27	G-08-002	G-08-001	8					96	0.00055	0.00051	0.10208	0.0029	0.27927	59	0.40%	0.013	0.764	2.37	8.7
E-29	E-28	G-08-003	G-08-002	8					96	0.00055	0.00051	0.10208	0.0029	0.27927	59	0.40%	0.013	0.764	2.37	8.7
E-30	E-29	G-08-004	G-08-003	8					96	0.00055	0.00051	0.10208	0.0029	0.27927	59	0.40%	0.013	0.764	2.37	8.7
E-31	E-30	G-08-005	G-08-004	8					96	0.00055	0.00051	0.10208	0.0029	0.27927	59	0.40%	0.013	0.764	2.37	8.7
E-32	E-31	G-08-006	G-08-005	8				90	96	0.00055	0.00051	0.10208	0.0029	0.27927	59	0.40%	0.013	0.764	2.37	8.7
E-33	E-32	G-08-007	G-08-006	8					6	0.00055	0.00051	0.00668	0.0029	0.01827	30	0.40%	0.013	0.764	41.47	100+
E-34	E-33	G08-019	G-08-007	8					6	0.00055	0.00051	0.00668	0.0029	0.01827	30	2.67%	0.013	1.975	107.71	100+
E-35	E-34	G08-020	G08-019	8					6	0.00055	0.00051	0.00668	0.0029	0.01827	30	1.00%	0.013	1.208	65.78	100+
E-36	E-35	G08-021	G08-020	8					6	0.00055	0.00051	0.00668	0.0029	0.01827	30	0.50%	0.013	0.854	46.40	100+

Table 5 - 2
Level of Protection - Ultimate Land Development

Upstream MH	Downstream MH	Upstream Node	Downstream Node	Pipe Diameter (inches)	Developable Tributary Area (acres)	Developable Tributary Area Percent Developed	Pump Station Flow (gpm)	Developed Tributary Area (acres)	Cumulated Developed Tributary Area (acres)	Cumulative Peak Base Flow (cfs/acre)	Cumulative Infiltration (cfs/acre)	Peak Base Flow + Infiltration (cfs)	Cumulative K Value	Cumulative K * Tributary Area	Time of Concentration Using GBA Formula (minutes)	Pipe Slope (%)	Mannings Coefficient (n)	Full Flow Capacity (cfs)	Maximum Rainfall Intensity (in/hr)	Level Of Protection
E-37	E-36	G08-022	G08-021	8					6	0.00055	0.00051	0.00668	0.0029	0.01827	30	0.50%	0.013	0.854	46.40	100+
E-38	E-37	F08-044	G08-022	8					6	0.00055	0.00051	0.00668	0.0029	0.01827	30	1.72%	0.013	1.585	86.38	100+
E-39	E-38	F07-045	F08-044	8					6	0.00055	0.00051	0.00668	0.0029	0.01827	30	0.50%	0.013	0.854	46.40	100+
E-40	E-39	F07-046	F07-045	8				6	6	0.00055	0.00051	0.00668	0.0029	0.01827	30	0.50%	0.013	0.854	46.40	100+
F-01	E-11	H07-019	H07-003	10					121	0.00055	0.00051	0.12868	0.0029	0.35206	62	0.28%	0.013	1.159	2.93	30.3
F-02	F-01	H08-002	H07-019	10					121	0.00055	0.00051	0.12868	0.0029	0.35206	62	0.28%	0.013	1.159	2.93	30.3
F-03	F-02	H08-003	H08-002	10					121	0.00055	0.00051	0.12868	0.0029	0.35206	62	0.28%	0.013	1.159	2.93	30.3
F-04	F-03	H08-004	H08-003	10					121	0.00055	0.00051	0.12868	0.0029	0.35206	62	2.04%	0.013	3.129	8.52	100+
F-05	F-04	H08-005	H08-004	10					121	0.00055	0.00051	0.12868	0.0029	0.35206	62	2.59%	0.013	3.526	9.65	100+
F-06	F-05	H08-006	H08-005	10					121	0.00055	0.00051	0.12868	0.0029	0.35206	62	1.31%	0.013	2.508	6.76	100+
F-07	F-06	H08-007	H08-006	10					121	0.00055	0.00051	0.12868	0.0029	0.35206	62	0.67%	0.013	1.793	4.73	100+
F-08	F-07	H08-008	H08-007	10					121	0.00055	0.00051	0.12868	0.0029	0.35206	62	1.45%	0.013	2.638	7.13	100+
F-09	F-08	H08-009	H08-008	10					121	0.00055	0.00051	0.12868	0.0029	0.35206	62	1.47%	0.013	2.656	7.18	100+
F-10	F-09	G08-031	H08-009	10				121	121	0.00055	0.00051	0.12868	0.0029	0.35206	62	0.28%	0.013	1.159	2.93	30.3
Southwest Tributaries G & H to C Highway Lift Station																				
G-01	C-LS	F09-001	F09-LS1	18					1124	0.00026	0.00006	0.35955	0.0024	2.69664	109	0.40%	0.013	6.644	2.33	78.8
G-02	G-01	F09-002	F09-001	18					1124	0.00026	0.00006	0.35955	0.0024	2.69664	109	0.40%	0.013	6.644	2.33	78.8
G-03	G-02	F09-003	F09-002	18				62	1124	0.00026	0.00006	0.35955	0.0024	2.69664	109	0.49%	0.013	7.353	2.59	100+
G-04	G-03	F09-004	F09-003	18					1062	0.00026	0.00006	0.33981	0.0024	2.54856	108	0.59%	0.013	8.069	3.03	100+
G-05	G-04	F09-005	F09-004	18				91	1062	0.00026	0.00006	0.33981	0.0024	2.54856	108	0.62%	0.013	8.271	3.11	100+
G-06	G-05	F09-006	F09-005	18					971	0.00026	0.00006	0.31072	0.0024	2.3304	105	0.56%	0.013	7.861	3.24	100+
G-07	G-06	F09-007	F09-006	18					971	0.00026	0.00006	0.31072	0.0024	2.3304	105	0.65%	0.013	8.469	3.50	100+
G-08	G-07	F08-001	F09-007	18				395	971	0.00026	0.00006	0.31072	0.0024	2.3304	105	0.58%	0.013	8.000	3.30	100+
G-09	G-08	F08-002	F08-001	18					576	0.00026	0.00006	0.18432	0.0024	1.3824	92	0.58%	0.013	8.000	5.65	100+
G-10	G-09	F08-003	F08-002	15					576	0.00026	0.00006	0.18432	0.0024	1.3824	92	0.85%	0.013	5.956	4.17	100+
G-11	G-10	F08-004	F08-003	15					576	0.00026	0.00006	0.18432	0.0024	1.3824	92	0.85%	0.013	5.956	4.17	100+
G-12	G-11	F08-005	F08-004	15					576	0.00026	0.00006	0.18432	0.0024	1.3824	92	0.79%	0.013	5.742	4.02	100+
G-13	G-12	F08-006	F08-005	15					576	0.00026	0.00006	0.18432	0.0024	1.3824	92	0.87%	0.013	6.025	4.23	100+
G-14	G-13	F08-007	F08-006	15					576	0.00026	0.00006	0.18432	0.0024	1.3824	92	0.79%	0.013	5.742	4.02	100+
G-15	G-14	F08-008	F08-007	15					576	0.00026	0.00006	0.18432	0.0024	1.3824	92	0.90%	0.013	6.128	4.30	100+
G-16	G-15	F08-009	F08-008	12				52	576	0.00026	0.00006	0.18432	0.0024	1.3824	92	2.19%	0.013	5.272	3.68	100+
G-17	G-16	F08-010	F08-009	12					524	0.00026	0.00006	0.16755	0.0024	1.25664	90	2.01%	0.013	5.051	3.89	100+
G-18	G-17	F08-011	F08-010	12				424	524	0.00026	0.00006	0.16755	0.0024	1.25664	90	2.04%	0.013	5.089	3.92	100+
G-19	G-18	F07-001	F08-011	12					100	0.00026	0.00006	0.03194	0.0024	0.23952	59	2.36%	0.013	5.473	22.72	100+
G-20	G-19	F07-002	F07-001	12				60	100	0.00026	0.00006	0.03194	0.0024	0.23952	59	2.28%	0.013	5.380	22.33	100+
G-21	G-20	F07-003	F07-002	8					40	0.00026	0.00006	0.01274	0.0024	0.09552	47	0.60%	0.013	0.936	9.67	100+
G-22	G-21	F07-004	F07-003	8					40	0.00026	0.00006	0.01274	0.0024	0.09552	47	1.97%	0.013	1.696	17.62	100+
G-23	G-22	F07-005	F07-004	8					40	0.00026	0.00006	0.01274	0.0024	0.09552	47	1.97%	0.013	1.696	17.62	100+
G-24	G-23	F07-026	F07-005	8					40	0.00026	0.00006	0.01274	0.0024	0.09552	47	2.17%	0.013	1.780	18.50	100+
G-25	G-24	F07-027	F07-026	8					40	0.00026	0.00006	0.01274	0.0024	0.09552	47	2.17%	0.013	1.780	18.50	100+
G-26	G-25	F07-028	F07-027	8					40	0.00026	0.00006	0.01274	0.0024	0.09552	47	2.17%	0.013	1.780	18.50	100+
G-27	G-26	F07-029	F07-028	8					40	0.00026	0.00006	0.01274	0.0024	0.09552	47	0.40%	0.013	0.764	7.87	100+
G-28	G-27	F07-030	F07-029	8				40	40	0.00026	0.00006	0.01274	0.0024	0.09552	47	0.40%	0.013	0.764	7.87	100+
H-01	G-08	F08-033	F08-001	18					318	0.00026	0.00006	0.10163	0.0024	0.76224	79	0.60%	0.013	8.137	10.54	100+

Table 5 - 2
Level of Protection - Ultimate Land Development

Upstream MH	Downstream MH	Upstream Node	Downstream Node	Pipe Diameter (inches)	Developable Tributary Area (acres)	Developable Tributary Area Percent Developed	Pump Station Flow (gpm)	Developed Tributary Area (acres)	Cumulated Developed Tributary Area (acres)	Cumulative Peak Base Flow (cfs/acre)	Cumulative Infiltration (cfs/acre)	Peak Base Flow + Infiltration (cfs)	Cumulative K Value	Cumulative K * Tributary Area	Time of Concentration Using GBA Formula (minutes)	Pipe Slope (%)	Mannings Coefficient (n)	Full Flow Capacity (cfs)	Maximum Rainfall Intensity (in/hr)	Level Of Protection
H-02	H-01	F08-034	F08-033	18					318	0.00026	0.00006	0.10163	0.0024	0.76224	79	2.59%	0.013	16.905	22.04	100+
H-03	H-02	F08-035	F08-034	18					318	0.00026	0.00006	0.10163	0.0024	0.76224	79	0.60%	0.013	8.137	10.54	100+
H-04	H-03	F08-036	F08-035	18					318	0.00026	0.00006	0.10163	0.0024	0.76224	79	0.60%	0.013	8.137	10.54	100+
H-05	H-04	F08-037	F08-036	18				20	318	0.00026	0.00006	0.10163	0.0024	0.76224	79	0.60%	0.013	8.137	10.54	100+
H-06	H-05	F08-038	F08-037	18					297	0.00026	0.00006	0.0951	0.0024	0.71328	78	0.60%	0.013	8.137	11.27	100+
H-07	H-06	F08-039	F08-038	18					297	0.00026	0.00006	0.0951	0.0024	0.71328	78	0.20%	0.013	4.698	6.45	100+
H-08	H-07	F08-040	F08-039	18					297	0.00026	0.00006	0.0951	0.0024	0.71328	78	0.20%	0.013	4.698	6.45	100+
H-09	H-08	F08-041	F08-040	15					297	0.00026	0.00006	0.0951	0.0024	0.71328	78	0.30%	0.013	3.538	4.83	100+
H-10	H-09	E08-004	F08-041	15					297	0.00026	0.00006	0.0951	0.0024	0.71328	78	0.30%	0.013	3.538	4.83	100+
H-11	H-10	F08-043	E08-004	15					297	0.00026	0.00006	0.0951	0.0024	0.71328	78	0.30%	0.013	3.538	4.83	100+
H-12	H-11	E08-005	F08-043	15					297	0.00026	0.00006	0.0951	0.0024	0.71328	78	0.30%	0.013	3.538	4.83	100+
H-13	H-12	E08-006	E08-005	15					297	0.00026	0.00006	0.0951	0.0024	0.71328	78	0.30%	0.013	3.538	4.83	100+
H-14	H-13	E08-007	E08-006	15				96	297	0.00026	0.00006	0.0951	0.0024	0.71328	78	2.00%	0.013	9.136	12.67	100+
H-15	H-14	E08-008	E08-007	15					201	0.00026	0.00006	0.06432	0.0024	0.4824	71	0.30%	0.013	3.538	7.20	100+
H-16	H-15	E08-009	E08-008	15					201	0.00026	0.00006	0.06432	0.0024	0.4824	71	0.30%	0.013	3.538	7.20	100+
H-17	H-16	E08-010	E08-009	15					201	0.00026	0.00006	0.06432	0.0024	0.4824	71	0.30%	0.013	3.538	7.20	100+
H-18	H-17	E08-011	E08-010	15					201	0.00026	0.00006	0.06432	0.0024	0.4824	71	0.30%	0.013	3.538	7.20	100+
H-19	H-18	E08-012	E08-011	15					201	0.00026	0.00006	0.06432	0.0024	0.4824	71	0.50%	0.013	4.568	9.34	100+
H-20	H-19	E07-001	E08-012	15					201	0.00026	0.00006	0.06432	0.0024	0.4824	71	0.50%	0.013	4.568	9.34	100+
H-21	H-20	E07-002	E07-001	15				133	201	0.00026	0.00006	0.06432	0.0024	0.4824	71	0.50%	0.013	4.568	9.34	100+
H-22	H-21	E07-003	E07-002	12					68	0.00026	0.00006	0.02182	0.0024	0.16368	54	0.50%	0.013	2.519	15.26	100+
H-23	H-22	E07-004	E07-003	12					68	0.00026	0.00006	0.02182	0.0024	0.16368	54	0.50%	0.013	2.519	15.26	100+
H-24	H-23	E07-005	E07-004	10					68	0.00026	0.00006	0.02182	0.0024	0.16368	54	0.98%	0.013	2.169	13.12	100+
H-25	H-24	E07-006	E07-005	10					68	0.00026	0.00006	0.02182	0.0024	0.16368	54	0.89%	0.013	2.067	12.49	100+
H-26	H-25	E07-007	E07-006	10				68	68	0.00026	0.00006	0.02182	0.0024	0.16368	54	0.53%	0.013	1.595	9.61	100+

Table 5 - 3
Summary of Interceptor Level of Storm Protection

Existing Land Development							
Line Designation	Total # of Segments	No. of Line Segments with a Level of Storm Protection					
		<1	>1 & < 5	>5 & <10	>10 & < 50	> 50 & < 100	> 100
NE - Line A	74	28	12	1	1	0	32
NE - Line B	15	0	0	0	0	0	15
NE - Line C	36	3	2	0	0	0	31
NE - Line D	12	0	0	0	2	4	6
NE - Line E	40	0	0	0	11	3	26
NE - Line F	10	0	0	0	0	0	10
SW - Line G	28	0	0	0	0	0	28
SW - Line H	26	0	0	0	0	0	26
Total	241	31	14	1	14	7	174

Ultimate Land Development							
Line Designation	Total # of Segments	No. of Line Segments with a Level of Storm Protection					
		<1	>1 & < 5	>5 & <10	>10 & < 50	> 50 & < 100	> 100
NE - Line A	74	45	15	0	1	0	13
NE - Line B	15	15	0	0	0	0	0
NE - Line C	36	6	5	0	0	0	25
NE - Line D	12	12	0	0	0	0	0
NE - Line E	40	0	5	7	6	1	21
NE - Line F	10	0	0	0	4	0	6
SW - Line G	28	0	0	0	0	2	26
SW - Line H	26	0	0	0	0	0	26
Total	241	78	25	7	11	3	117

is actually connected to the sewer system. The suspect I/I sources are listed in Table 5 – 7.

c. Private Sector. An internal and external inspection was conducted on 80 building throughout the City. The inspections were conducted to identify actual and potential I/I sources on private property. Table 5 – 6 summarizes the findings.

Table 5 - 4 Manholes with I/I Sources

Manhole Component	Evidence of Leakage	Active Leakage
Cover	36	0
Frame	26	0
Frame Seal	58	10
Grade Adjustment	49	9
Cone	10	8
Wall	30	20
Bench	12	27
Trough	0	0

Note: A Total of 320 Manholes Inspected

Table 5 - 5 Summary of Public I/I Sources

Manhole	Smoke Density		
Component	Light	Medium	Heavy
Frame Seal	45	33	13
Main Sewer	2	0	0
Wall Defect	0	0	3

Table 5 - 6 Summary of Private I/I Sources

	Smoke Density		
Component	Light	Medium	Heavy
Cleanout	7	12	30
Service Lateral	7	2	0

Table 5 - 7 Suspect Private I/I Sources

Component	No. of Sources
Window Well Drains	136
Stairwell Drains	5
Downspouts	1
Sump Pumps	1

D. Structural Conditions

a. General. When the inspections of the manholes were done the inspection crews noted structural deficiencies that could be seen from the surface.

b. Structural Ratings. When inspections are performed on a manhole, eight (8) components are evaluated for structural deficiencies and the percentage of the manhole component that is deficient is recorded. Table 5 – 8 summarizes the number of deficient manhole components and the percentages of deficiency that were recorded.

Table 5 - 8 Summary of Structural MH Defects

Manhole	Rating of Defect			Percent of Component Deficiency			
Component	Mild	Moderate	Severe	< 10%	10% to 25%	25% to 50%	> 50%
Cover	1	1	1	0	2	0	1
Frame	2	4	2	3	2	3	0
Frame Seal	3	7	6	0	3	1	12
Grade Adjustment	17	2	6	3	10	8	4
Cone	2	2	1	2	1	0	2
Wall	2	1	0	2	0	0	1
Bench	2	2	0	1	1	2	1
Trough	2	2	0	0	2	1	1

CHAPTER 6 RECOMMENDATIONS

A. I/I Reduction Chapter 3 Rainfall Monitoring ranked the watersheds on amount of I/I that was documented during the spring of 2011. Field investigations identified both actual and potential I/I sources in the public and private sector's sewer system. The following sections identify the manhole, line segment or address of the I/I source's location.

1. Public Sector Improvements
   i. Manhole Repairs. Table 6 – 1 identifies the manhole I/I sources that were actively leaking at the time of the inspection or evidence (staining, mineral buildup) indicates that leakage has occur during periods of high ground water table. They have been listed in order of priority of repair. The estimated capital cost for the manhole repairs (Phase 1) is $ 135,000. Once inspections on the remaining manholes are completed it is estimated the capital cost for the Phase 2 will be $250,000.
   ii. Line Repairs. The CCTV work produced one line segment that needs repair or replacement. The line segment is Line E06-005 to E06-012. The estimated capital cost to repair this line segments is $24,000.
   iii. Phase 2 SSES. It is recommended that the City complete the sanitary sewer evaluation study (SSES) of the system that was not included in Phase 1. The estimated capital cost to complete the SSES for the remaining system is $300,000. See Section C of Page 6 – 4 for more detail breakdown of the activities recommended for completion.
2. Private Sector Improvements
   i. Internal I/I Source Removal. The internal building inspections identified several prohibited storm/ground water connections to the sanitary sewer. Table 6 – 2 identifies the properties and the type of source that is recommended for removal. The estimated capital cost for the removal of the identified internal private I/I sources is $ 8,000.
   ii. External I/I Source Removal. The external building inspections identified several prohibited storm/ground water connections to the sanitary sewer. Table 6 – 3 identifies the properties and the type of source that is recommended for removal. The estimated capital cost for the removal of the indentified external private I/I sources is $ 25,000.
   iii. Projected Private Sector Sources. Once the Phase 2 SSES is completed it is projected that the capital cost to remove the internal and external private I/I sources will be $150,000.
   iv. Service Line Repairs. Although the investigation of building service lines were not part of this project's scope of work studies throughout the country suggest that a policy for

renewing this asset be adopted. Significant I/I reduction, due to service line renewal, has been reported by cities and sewer agencies in the Private Property Virtual Library database maintained by the Water Environment Federation.

B. Capacity Improvements.

1. Level of Storm Protection. A comparison of the project's flow monitoring data results with over a 100 flow monitoring projects that GBA has performed for other Midwestern cities would reveal that the City's sewer system does not have extremely high levels of I/I. The amount of new sewers (75% of entire system) is in generally good condition and constructed with precast concrete manholes and PVC sewer pipe. We believe the main cause of the backups and overflows, during and after large rain events, is the capacity of the main interceptors. At the present level of land use 46 of the 241 (19%) interceptor line segments have a level of storm protection less than a 10 year storm. When ultimate development of the watershed is reached 110 of the 241 (46%) interceptor line segments will have a level of storm protection less than a 10 year storm. It is recommended that City provide a minimum of 10 year storm protection for its interceptor sewer system in the next 10 to 15 years.
2. Existing Development Scenario. It is recommended that the City include in its Capital Improvement Program (CIP) a series of projects to increase the capacity of the sewer interceptors in the East Branch of the Grand River watersheds. The completion of these projects would provide 10 year storm protection or greater for all line segments with the watershed at existing development. Table 6 – 4 summarizes the estimated capital cost to construction an interceptor sewer system for the current development. Figure 6 – 1 shows the proposed improvements discussed below.
   i. First Phase. The first project (No. 1) would be located in the middle 1/3 of the watershed. The relief sewer would run from the 11409 218th St on the east side of US 71 Highway (MH F06-002) to near E 218th Street and Old Town Road (MH H06-001). The project would require a new tunnel under US 71 Highway. This project would provide immediate relief to the developments that have been having basement backups and overflows. The interceptor downstream of this project runs through large areas of undeveloped ground with homes on septic tanks. The risk of creating basement backups in this downstream area would be minimal. The capital cost for the project is estimate to be $997,000.
   ii. Second Phase. The second project (No. 2) would connect midway on the first project and would run from Elm and E 1st Street (MH F06-014) to east of Hurley St and south

of Kayla Drive (MH G06-003). The capital cost for the project is estimate to be $287,000.

iii. Third Phase. The third project (No. 3) would be located immediately downstream of the first project and would run from E. 218th and Old Town Road (MH H06-001) to the East Lift Station (E 223rd Street). The capital cost for the project is estimate to be $737,000.

3. Future Development Scenario. It is recommended that the City include in its Capital Improvement Program (CIP) a series of projects to increase the capacity of the sewer interceptors in the East Branch of the Grand River watersheds. The completion of these projects would provide 10 year storm protection or greater for all line segments when watershed development reaches ultimate build out. Table 6 – 5 summarizes the estimated capital cost to construction an interceptor sewer system for the future development scenario. Figure 6 – 2 shows the proposed improvements discussed below. Table 6 – 6 summarizes the total cost for the existing and ultimate development scenarios.

   i. First Phase. The first project would be located in the middle 1/3 of the watershed. The relief sewer would run from the 11409 218th St on the east side of US 71 Highway (MH F06-002) to near E 218th Street and Old Town Road (MH H06-001). Figure 6 – 2 shows the proposed improvements. The project would require a new tunnel under US 71 Highway. The capital cost for the project is estimate to be $1,311,000.

   ii. Second Phase. The second project would connect midway on the first project and would run from approximately 209th and S School Road (MH F04-004) to east of Hurley St and south of Kayla Drive (MH G06-003). The capital cost for the project is estimate to be $979,000.

   iii. Third Phase. The third project would be begin immediately downstream of the first project and would run from E. 218th Street and Old Town Road (MH H06-001) to the East Lift Station (E 223rd Street). The capital cost for the project is estimate to be $1,009,000.

   iv. Fourth Phase. The fourth project would connect to the upstream portion of the first project and run from 21523 Soryl Ave (MH E06-001) to 11409 218th St (MH F06-002). The capital cost for the project is estimate to be $608,000.

   v. Fifth Phase. The fifth project would be located upstream of the first project and would run from (H05-009) to (H06-004). The capital cost for the project is estimate to be $541,000.

Table 6 - 1
Public Sector I/I Removal Sources

Line Segment	Sector	Source Type	Severity	Surface	Comments
I07-002.I07-001	Public	Upstream MH	Heavy	Non Paved	holes in ground around mh
I07-001.I08-009	Public	Upstream MH	Heavy	Non Paved	lg. hole surrounding mh
H06-008.H06-007	Public	Upstream MH	Heavy	Non Paved	lg. holes around structure
G06-056.G06-055	Public	Upstream MH	Heavy	Non Paved	lid does not fit frame
F06-017.F06-016	Public	Upstream MH	Heavy	Non Paved	frame is broken, pieces missing
F05-001.G05-045	Public	Upstream MH	Heavy	Non Paved	frame seal
F06-006.F06-005	Public	Upstream MH	Heavy	Non Paved	frame seal
F06-052.F06-051	Public	Upstream MH	Heavy	Non Paved	frame seal
F09-030.F09-003	Public	Upstream MH	Heavy	Non Paved	frame seal
G06-011.G06-010	Public	Upstream MH	Heavy	Non Paved	frame seal
G06-057.G06-055	Public	Upstream MH	Heavy	Non Paved	frame seal
G08-042.H08-021	Public	Upstream MH	Heavy	Non Paved	frame seal
G08-046.G08-045	Public	Upstream MH	Heavy	Non Paved	frame seal
H06-001.I06-004	Public	Upstream MH	Heavy	Non Paved	frame seal
H06-021.H06-018	Public	Upstream MH	Heavy	Non Paved	frame seal
H08-021.H08-012	Public	Upstream MH	Heavy	Non Paved	frame seal
E07-016.E07-008	Public	Upstream MH	Medium	Non Paved	frame seal
E07-019.E07-018	Public	Upstream MH	Medium	Non Paved	frame seal
F05-006.F05-005	Public	Upstream MH	Medium	Non Paved	frame seal
F05-007.F05-006	Public	Upstream MH	Medium	Non Paved	frame seal
F05-010.F05-009	Public	Upstream MH	Medium	Non Paved	frame seal
F06-051.F06-006	Public	Upstream MH	Medium	Non Paved	frame seal
F06-060.F06-001	Public	Upstream MH	Medium	Non Paved	frame seal
F07-050.F06-059	Public	Upstream MH	Medium	Non Paved	frame seal
F07-054.F07-053	Public	Upstream MH	Medium	Non Paved	frame seal
F07-055.F07-054	Public	Upstream MH	Medium	Non Paved	frame seal
F07-065.F07-064	Public	Upstream MH	Medium	Non Paved	frame seal
F07-072.F07-071	Public	Upstream MH	Medium	Non Paved	frame seal
F07-074.F07-073	Public	Upstream MH	Medium	Paved	frame seal
F07-083.F07-050	Public	Upstream MH	Medium	Non Paved	frame seal
F08-001.F09-007	Public	Upstream MH	Medium	Non Paved	frame seal
G06-003.G06-002	Public	Upstream MH	Medium	Non Paved	frame seal
G06-017.G06-016	Public	Upstream MH	Medium	Non Paved	frame seal
G06-019.G06-018	Public	Upstream MH	Medium	Non Paved	frame seal
G06-054.G06-053	Public	Upstream MH	Medium	Non Paved	frame seal
G06-055.G06-054	Public	Upstream MH	Medium	Non Paved	frame seal
G07-020.G07-019	Public	Upstream MH	Medium	Non Paved	frame seal
G08-036.G08-034	Public	Upstream MH	Medium	Non Paved	frame seal
G08-037.G08-033	Public	Upstream MH	Medium	Non Paved	frame seal
G08-038.G08-032	Public	Upstream MH	Medium	Non Paved	frame seal
H05-001.H06-057	Public	Upstream MH	Medium	Non Paved	frame seal
H06-015.H06-014	Public	Upstream MH	Medium	Non Paved	frame seal
H06-025.H06-011	Public	Upstream MH	Medium	Paved	frame seal
H06-028.H06-027	Public	Upstream MH	Medium	Non Paved	frame seal
H06-036.H06-035	Public	Upstream MH	Medium	Non Paved	frame seal
H07-011.H07-010	Public	Upstream MH	Medium	Non Paved	frame seal
H08-011.H08-010	Public	Upstream MH	Medium	Non Paved	frame seal
I06-001.I07-011	Public	Upstream MH	Medium	Non Paved	frame seal

Table 6 - 1
Public Sector I/I Removal Sources

I07-010.I07-009	Public	Upstream MH	Medium	Non Paved	frame seal
G06-058.G06-001	Public	Main Sewer	Light	Non Paved	
G07-001.H07-018	Private	Main Sewer	Light	Non Paved	driving range
E06-041.E07-034	Public	Upstream MH	Light	Non Paved	frame seal
E07-014.E07-013	Public	Upstream MH	Light	Non Paved	frame seal
E07-021.E07-008	Public	Upstream MH	Light	Non Paved	frame seal
E07-023.E07-022	Public	Upstream MH	Light	Non Paved	frame seal
E07-041.E07-040	Public	Upstream MH	Light	Non Paved	frame seal
E07-051.F07-059	Public	Upstream MH	Light	Paved	frame seal
F04-007.F04-006	Public	Upstream MH	Light	Non Paved	frame seal
F05-003.F05-002	Public	Upstream MH	Light	Non Paved	frame seal
F05-004.F05-003	Public	Upstream MH	Light	Non Paved	frame seal
F05-008.F05-007	Public	Upstream MH	Light	Non Paved	frame seal
F05-009.F05-008	Public	Upstream MH	Light	Non Paved	frame seal
F06-053.F06-003	Public	Upstream MH	Light	Non Paved	frame seal
F07-070.F07-050	Public	Upstream MH	Light	Non Paved	frame seal
F07-089.F07-088	Public	Upstream MH	Light	Non Paved	frame seal
F09-031.F09-030	Public	Upstream MH	Light	Non Paved	frame seal
G05-005.G05-004	Public	Upstream MH	Light	Non Paved	frame seal
G05-007.G05-006	Public	Upstream MH	Light	Paved	frame seal
G05-010.G05-009	Public	Upstream MH	Light	Paved	frame seal
G05-031.G05-005	Public	Upstream MH	Light	Paved	frame seal
G05-037.G05-036	Public	Upstream MH	Light	Non Paved	frame seal
G06-026.G06-025	Public	Upstream MH	Light	Non Paved	frame seal
G06-031.G06-030	Public	Upstream MH	Light	Non Paved	frame seal
G06-040.G06-039	Public	Upstream MH	Light	Non Paved	frame seal
G06-062.H06-024	Public	Upstream MH	Light	Non Paved	frame seal
G07-002.G07-001	Public	Upstream MH	Light	Non Paved	frame seal
G07-040.G07-002	Public	Upstream MH	Light	Non Paved	frame seal
G07-041.G07-040	Public	Upstream MH	Light	Non Paved	frame seal
G08-031.H08-009	Public	Upstream MH	Light	Non Paved	frame seal
G08-040.G08-039	Public	Upstream MH	Light	Non Paved	frame seal
G08-041.G08-039	Public	Upstream MH	Light	Non Paved	frame seal
H05-024.H05-009	Public	Upstream MH	Light	Non Paved	frame seal
H06-030.H06-029	Public	Upstream MH	Light	Paved	frame seal
H06-035.H06-026	Public	Upstream MH	Light	Non Paved	frame seal
H07-012.H07-011	Public	Upstream MH	Light	Non Paved	frame seal
H07-013.H07-012	Public	Upstream MH	Light	Non Paved	frame seal
H07-014.H07-013	Public	Upstream MH	Light	Non Paved	frame seal
H07-016.H07-012	Public	Upstream MH	Light	Non Paved	frame seal
H08-016.H08-015	Public	Upstream MH	Light	Paved	frame seal
H08-020.H08-014	Public	Upstream MH	Light	Paved	frame seal
I06-002.I06-001	Public	Upstream MH	Light	Non Paved	frame seal
I06-003.I06-002	Public	Upstream MH	Light	Non Paved	frame seal
I07-004.I07-003	Public	Upstream MH	Light	Non Paved	frame seal
I07-005.I07-004	Public	Upstream MH	Light	Non Paved	frame seal
G06-043.G06-042	Public	Upstream MH	Light	Non Paved	frameseal

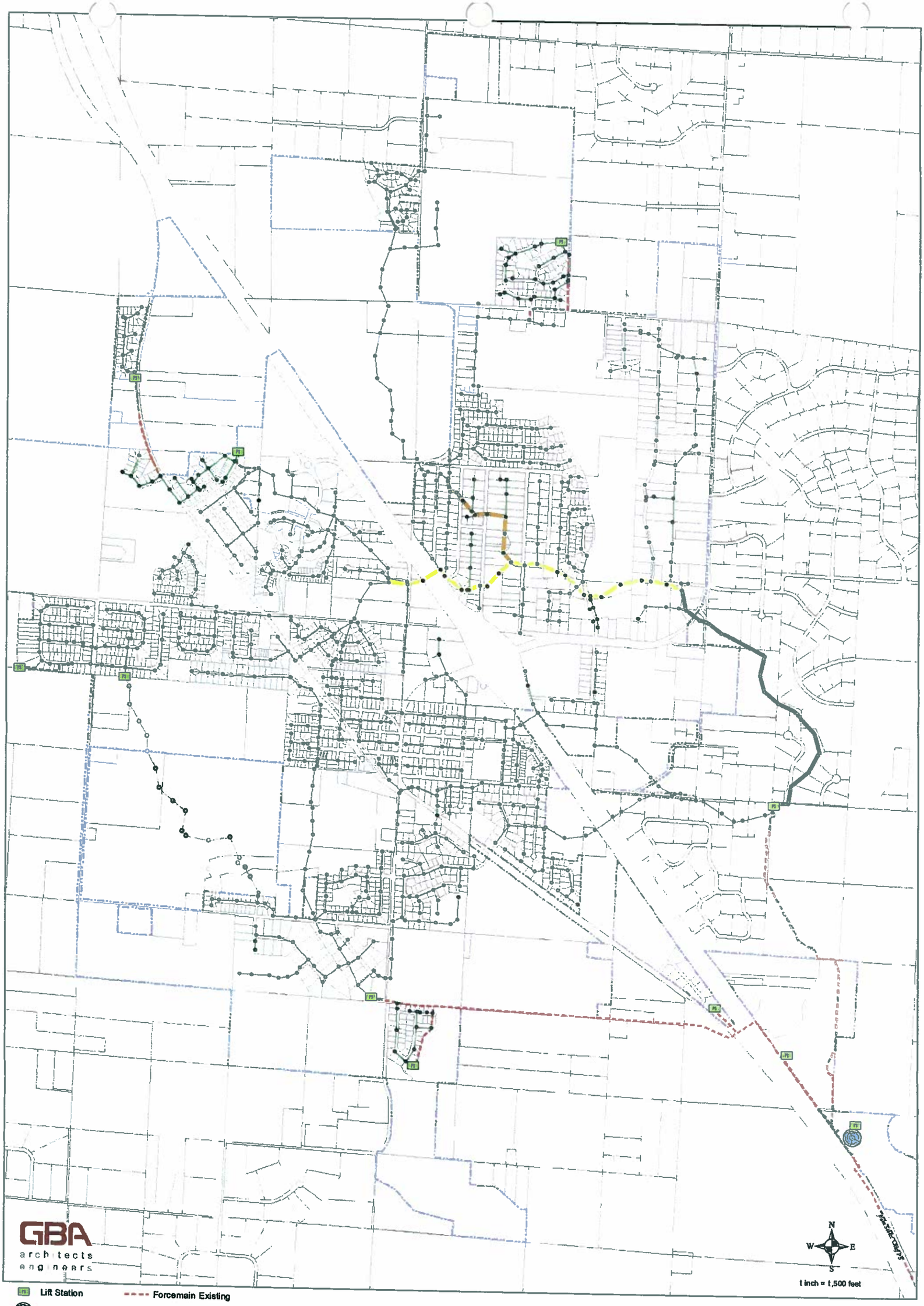
Table 6 - 2
Internal Private Sector I/I Sources

House No.	Street Name Name	Owner's Name	Owner's Phone #	No of Sumps	Connection Point	Comments
901	E. 1st St.	not given		1	Sanitary	
983	E. 1st St.	Donald Stafford	816 779 6914	2	Sanitary	primary pump goes outside, secondary goes to sanitary
844	E. 1st St.	Marlin Sexton	816 258 1280	1	Sanitary	direct connect to service
809	S. Kendall Rd.	Ronald Paskon	816 779 5455	1	Sanitary	wouldn't let us in, but confirmed discharge to sanitary
706	Sivley St.	Jim Earley	816 607 4548	2	Sanitary	1 outside, 1 to sanitary

Table 6 - 3

Exterior Private Sector I and I Source Removal

USMH - DSMH	House #	Street Name	Source Type	Comments
G06-019.G06-018	958	School Rd.	Cleanout	cap has poor seal
G06-042.G06-041	100	217th St.	Cleanout	hole in cap
G06-051.G06-050	904	Glengera Dr.	Cleanout	holes in cap
G06-049.G06-037	884	Glengera Dr.	Cleanout	capped
G06-050.G06-049	876	Glengera Dr.	Cleanout	
G06-028.G06-027	971	Hurley St.	Cleanout	vented cap
G06-029.G06-008	712	Sicklebar Dr.	Cleanout	no cap
G06-029.G06-008	708	Shishir Rd.	Cleanout	vented cap
G06-031.G06-030	976	Hurley St.	Cleanout	no cap
G06-006.G06-005	918	Hurley St.	Cleanout	no cap
G06-006.G06-005	911	Harr Grove Rd.	Cleanout	no cap
G06-033.G06-003	779	Harr Grove Rd.	Cleanout	no cap
G06-057.G06-055	700	Harr Grove Rd.	Cleanout	capped
H06-017.H06-016	986	Gregory St.	Cleanout	no cap
H06-006.H06-005	801	Cindy	Cleanout	no cap
H06-046.H06-045	833	Kendall	Cleanout	no cap
H05-031.H05-030	953	Kendall	Cleanout	no cap
H05-029.H05-028	929	Kendall	Cleanout	sump pump discharges into c.o.
H05-026.H05-001	890	Kendall	Cleanout	no cap
H06-051.H06-050	847	J Hwy	Cleanout	no cap
H06-059.H06-058	811	J Hwy	Cleanout	unsure about cap...dog in yard
H06-004.H06-003	138	Cindy	Cleanout	capped
I06-003.I06-002	21807	J Hwy	Cleanout	broken cap
G07-042.G07-041	700	J Hwy	Cleanout	non sealed cover
G08-035.G08-034	508	Arena Dr.	Cleanout	capped
H08-021.H08-012	709	Sivley St.	Cleanout	broken cap
F06-017.F06-016	21520	Main St.	Cleanout	capped
E07-033.E07-032	702	YY Hwy	Cleanout	no cap
F07-069.F07-068	650	Trackside Dr.	Cleanout	
F07-059.F07-058	619b	Willow Ln.	Cleanout	capped
G06-019.G06-018	970	School Rd.	Cleanout	point 20feetnorth of c.o. dog
G06-031.G06-030	976	Hurley St.	Cleanout	capped
G06-030.G06-006	947	Harr Grove Rd.	Cleanout	no cap
G06-030.G06-006	946	Hurley St.	Cleanout	
G06-005.G06-004	840	Hurley St.	Cleanout	capped
H06-056.H06-054	875	Kendall	Cleanout	capped
H06-055.H06-054	881	Kendall	Cleanout	pt 25' n/o c.o. dog
H08-004.H08-003	12801	E. 223rd St.	Cleanout	not capped
E07-053.F07-059	625	Willow Ln.	Cleanout	capped
F07-059.F07-058	620b	Willow Ln.	Cleanout	no cap
F07-058.F07-057	613b	Willow Ln.	Cleanout	
F07-059.F07-058	615	Willow Ln.	Cleanout	capped
G05-020.G05-019	12205	School Rd.	Cleanout	vented cover
G05-021.G05-020	12305	School Rd.	Cleanout	capped
G06-004.G06-003	812	Hurley St.	Cleanout	capped
G06-006.G06-005	911	Harr Grove Rd.	Cleanout	capped
H05-008.H05-007	971	J Hwy	Cleanout	broken cap
G07-001.H07-018	22115	E. Outer Rd.	Cleanout	capped
H08-011.H08-010	701	Sivley St.	Cleanout	capped
G06-051.G06-050	912	Glengera Dr.	Service Lateral	Light Smoke
G06-029.G06-008	708	Shishir Rd.	Service Lateral	Medium Smoke
H06-017.H06-016	960	Gregory St.	Service Lateral	Light Smoke
H06-063.H06-062	739	J Hwy	Service Lateral	Light Smoke
G08-039.G08-031	607	Sivley St.	Service Lateral	Light Smoke
G08-039.G08-031	607	Sivley St.	Service Lateral	Light Smoke
G08-035.G08-034	505	Arena Dr.	Service Lateral	Light Smoke
E07-049.E07-032	727	Meadow Ln.	Service Lateral	Medium Smoke
F07-080.F07-079	421	Trigger St.	Service Lateral	Light Smoke

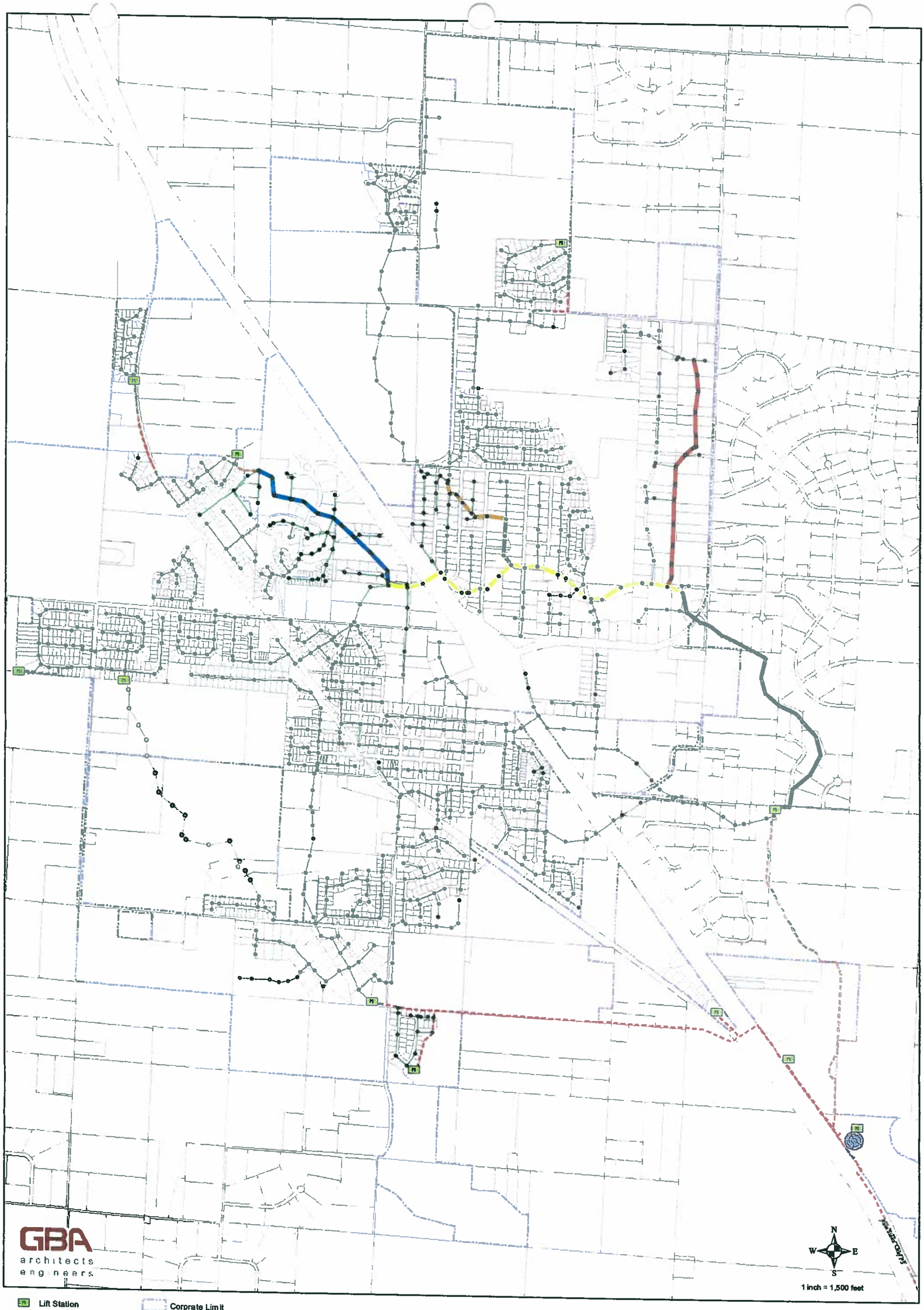


Lift Station
WWTP
Existing MH
Proposed MH
Forcemain Existing
Gravity Existing
Gravity Proposed
Forcemain Proposed
Corprate Limit
Relief Sewers Phase 1
Relief Sewers Phase 2
Relief Sewers Phase 3

Proposed Relief Sewers
(10 Year Protection)
Existing Development

THE CITY OF PECULIAR

Figure 6-1



Lift Station
WWTP
Existing MH
Proposed MH
Forcemain Existing
Gravity Existing
Gravity Proposed
Forcemain Proposed
Corprate Limit
Relief Sewers Phase 1
Relief Sewers Phase 2
Relief Sewers Phase 3
Relief Sewers Phase 4
Relief Sewers Phase 5

Proposed Relief Sewers
(10 Year Protection)
Ultimate Development

THE CITY OF PECULIAR

Figure 6-2

Table No. 6 - 4
Estimated Relief Sewer Cost - Existing Development

Project No. 1

Item No.	Description of Item	Quantity	Unit	Unit Price	Construction Cost
1	Pipe - 12" Diameter PVC	1,941	LF	$90.00	$174,690
2	Pipe - 15" Diameter PVC	2,953	LF	$95.00	$280,535
3	Pipe - 18" Diameter PVC	818	LF	$105.00	$85,890
4	48" Diameter Tunnel w/ 12" PVC Carrier	243	LF	$750.00	$182,250
5	4ft Diameter Precast Manholes	27	Ea	$2,750.00	$74,250
6	Subtotal Construction Cost				$797,615
7	Contingency (25%)				$199,404
8	Estimated Total Capital Cost				$997,019

Project No. 2

Item No.	Description of Item	Quantity	Unit	Unit Price	Construction Cost
1	Pipe - 12" Diameter PVC	2,212	LF	$90.00	$199,080
2	4ft Diameter Precast Manholes	11	Ea	$2,750.00	$30,250
3	Subtotal Construction Cost				$229,330
4	Contingency (25%)				$57,333
5	Estimated Total Capital Cost				$286,663

Project No. 3

Item No.	Description of Item	Quantity	Unit	Unit Price	Construction Cost
1	Pipe - 18" Diameter PVC	4,658	LF	$105.00	$489,090
2	Pipe - 21" Diameter PVC	350	LF	$125.00	$43,750
3	Connection to Existing Wetwell	1	LS	$7,500.00	$7,500
4	4ft Diameter Precast Manholes	18	Ea	$2,750.00	$49,500
5	Subtotal Construction Cost				$589,840
6	Contingency (25%)				$147,460
7	Estimated Total Capital Cost				$737,300

Project No. 1

Item No.	Description of Item	Quantity	Unit	Unit Price	Construction Cost
1	Pipe - 15" Diameter PVC	678	LF	$95.00	$64,410
2	Pipe - 18" Diameter PVC	1,888	LF	$105.00	$198,240
3	Pipe - 21" Diameter PVC	3,192	LF	$125.00	$399,000
4	Pipe - 24" Diameter PVC	818	LF	$145.00	$118,610
5	48" Diameter Tunnel w/ 18" PVC Carrier	243	LF	$800.00	$194,400
6	4ft Diameter Precast Manholes	27	Ea	$2,750.00	$74,250
7	Subtotal Construction Cost				$1,048,910
8	Contingency (25%)				$262,228
9	Estimated Total Capital Cost				$1,311,138

Project No. 2

Item No.	Description of Item	Quantity	Unit	Unit Price	Construction Cost
1	Pipe - 12" Diameter PVC	5,045	LF	$90.00	$454,050
2	Pipe - 15" Diameter PVC	146	LF	$95.00	$13,870
3	Pipe - 18" Diameter PVC	2,217	LF	$105.00	$232,785
2	4ft Diameter Precast Manholes	30	Ea	$2,750.00	$82,500
3	Subtotal Construction Cost				$783,205
4	Contingency (25%)				$195,801
5	Estimated Total Capital Cost				$979,006

Project No. 3

Item No.	Description of Item	Quantity	Unit	Unit Price	Construction Cost
1	Pipe - 24" Diameter PVC	4,658	LF	$145.00	$675,410
2	Pipe - 30" Diameter PVC	350	LF	$175.00	$61,250
3	Connection to Existing Wetwell	1	LS	$7,500.00	$7,500
4	5ft Diameter Precast Manholes	18	Ea	$3,500.00	$63,000
5	Subtotal Construction Cost				$807,160
6	Contingency (25%)				$201,790
7	Estimated Total Capital Cost				$1,008,950

Project No. 4

Item No.	Description of Item	Quantity	Unit	Unit Price	Construction Cost
1	Pipe - 12" Diameter PVC	4,349	LF	$90.00	$391,410
2	Pipe - 15" Diameter PVC	655	LF	$95.00	$62,225
2	4ft Diameter Precast Manholes	12	Ea	$2,750.00	$33,000
3	Subtotal Construction Cost				$486,635
4	Contingency (25%)				$121,659
5	Estimated Total Capital Cost				$608,294

Project No. 5

Item No.	Description of Item	Quantity	Unit	Unit Price	Construction Cost
1	Pipe - 15" Diameter PVC	4,119	LF	$95.00	$391,305
2	4ft Diameter Precast Manholes	15	Ea	$2,750.00	$41,250
3	Subtotal Construction Cost				$432,555
4	Contingency (25%)				$108,139
5	Estimated Total Capital Cost				$540,694

Table No. 6 - 6
Summary of Relief Sewer Costs

Phase No.	Existing Development	Ultimate Development
1	$997,019	$1,311,138
2	$286,663	$979,006
3	$737,300	$1,008,950
4	$0	$608,294
5	$0	$540,694
Total	$2,020,981	$4,448,081

C. Additional Investigations

1. Manhole Inspections. 320 of the system's 865 manholes (37%) were inspected as part of this project. It is recommended that the remaining manholes be inspected from the surface to determine if significant I/I sources exist or if structural deficiencies have reached a critical state. A number of manholes may not exist so the GIS quarter section maps should be updated as the information is gathered. Several manholes have been located but are buried. These should be raised prior to the system line cleaning effort.
2. Smoke Testing. 120,000 feet (69%) of the system's 194,697 feet were smoke tested as part of this project. It is recommended that the remaining line segments be smoke tested to determine if significant I/I sources exist. The smoke testing should occur during the summer months after a significant period of no rainfall.
3. Building Inspections. Only 5 significant sources (sump pumps discharging to the sanitary service line) were identified in the 80 homes that were internally inspected. Due to the low discovery rate (6%) of I/I sources during building inspections it is recommended that in watersheds that have been identified as having higher levels of infiltration and inflow that exterior only building inspection be performed. A public information notice should also be sent to all connected property owners explaining the importance of removing all private property I/I sources.
4. Dyed Water Testing. A large number of suspect I/I sources were identified during smoke testing and building inspections. In the watersheds with high inflow rates it is recommended that a statistically significant number of suspect sources be dyed water tested to determine if further testing is warranted. Dyed water testing of window well drains has been shown to be difficult because of the volume of water in will take to activate an actually connection to the building lateral and eventually the presence of dyed water in the public main.
5. Rim and Invert Elevation Surveys. For the interceptor line segments that have been identified as needing additional capacity rim and pipe invert elevation surveys are recommended. This information will be essential in determining existing pipe slopes and for the estimation of peak flow capacities. This effort will likely be included in the design phase of the recommended interceptor improvements.
6. Hydraulic Grade Line Analysis. For the interceptor line segments that have been identified as needing additional capacity and are already close to providing the chosen level of storm protection a hydraulic grade line analysis is recommended. This analysis will give guidance on the acceptable levels of surcharge in marginally line segments.

The analysis can also be used to determine the relative distance from the lowest floor elevations of buildings, adjacent to the interceptor, and the maximum water depth expected in the interceptor during peak flow events. This effort will likely be included in the design phase of the recommended interceptor improvements.

7. CCTV Inspection. During the SSES only approximately three percent (3%) of the system was inspected. In the watersheds that have been identified as having high levels of infiltration and inflow CCTV inspection is recommended. The CCTV should be scheduled during periods of high groundwater (to identify significant infiltration sources) and building service lines should be inspected concurrently (to establish the overall structural and maintenance condition).

D. Maintenance Improvements

a. Increased Maintenance Personnel. Many of the communities of the City's size we work with have 5 to 7 employees devoted to ongoing operations and maintenance of their wastewater infrastructure (gravity sewers, force mains and pumping stations, and treatment plant). It is recommended that two (2) persons be added to the existing two (2) person team. This will allow the more routine maintenance tasks to be handed off to the less experienced workers and your most experience employees can perform valuable preventative maintenance on the City's thirteen (13) pumping stations and treatment plant. It is further recommended that the additional manpower be used to establish a manhole repair crew. The crew would replace broken and damage covers and frames, repair damage grade adjustments and seal the frame to grade adjustment connections. In areas where active infiltration was observed the crew could drill and inject chemical grout into the I/I sources. The inspection of manholes noted that a number of manholes had poorly shaped inverts that inhibit flows and collect debris. The manhole crew could be used to reshape the inverts in these areas to improve system flows and prevent backups from debris build up. It is estimated that the annual cost for two additional workers to be $75,000.

b. Line Cleaning

1. Frequency. It is recommended that 20% of the sewer system be clean each year. A five year cleaning frequency for the entire system is considered adequate preventative maintenance on most sanitary sewer systems. If the system has not been cleaned recently, expected a higher cost per foot for "heavy cleaning". "Heavy cleaning" adds about $4/LF to normal cleaning rates. We would recommend some time is spent with the cleaning crews to verify if debris removal amounts (light or

heavy) and to request CCTV on random line segments that have been cleaned (to verify they are being cleaned properly).

2. Problem Areas. If a review of your backup records show problem areas then the lines involved in the problem areas should have a maintenance frequency of 6 months. CCTV inspection of the problem areas should be completed as soon as possible. The CCTV information will give you some idea of the problems (roots, grease, rags, structural failures, etc.). This will allow you to schedule rehabilitation (root treatment, CIPP, etc.) or replacement of the line segments in an orderly and cost efficient manner. If after repeated cleaning the lines are found to clean the frequency of cleaning can be reduced.
3. New Neighborhoods. During manhole inspection it was observed that the City has several subdivision that been recently been built and only partially developed. If the City's risk manager agrees the cleaning of sewer lines in these subdivisions could be postponed until development reaches 50% of full development.
4. Area Wide Cleaning Contract. Several cities in the KC Metro area have evaluated sewer cleaning companies and have entered into contracts that allow other cities or agencies to use the maintenance provider at the previously negotiated terms. This should be investigated to determine if the terms and conditions of the contract are acceptable to the City. The estimated annual cost to perform this work is $140,000.

c. Televising. The use of closed circuit television (CCTV) equipment to determine the condition of the sanitary sewer is a very useful preventative maintenance measure. It is recommended that ten percent (10%) of the system be inspected each year. As noted in Paragraph D.b.2 the use of CCTV is an important preventative maintenance measure for lines that have a history of repeated backups. The estimated annual cost to perform the CCTV work is $44,000. It is recommended that the City hire a CCTV contractor to conduct inspection of the following line segments in the following priority:

- Lines in areas with backup complaints
- The interceptor sewers shown in Chapter 5
- In the watersheds that show the highest I/I rates
- Lines segments that were constructed using vitrified clay pipe (VCP)

E. Long Term Capital Improvement Plan

For the City to accomplish the above recommendations in a reasonable time frame a ten year schedule for completion is recommended. Table 6 – 7 shows the capital funding that would be required in the next ten years to accomplish the goal of reducing of sewer backups

and overflows and improving the level of service to the City's citizens. The 10 year total capital cost is estimated to be $5,327,000. It addition to the capital expenditures, additional recommended annual maintenance costs are estimated to be $259,000.

Table 6 - 7
Summary of Annual Capital
and O and M Costs

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Capital Improvements	(expressed as 1,000's of dollars)										
Phase 1 Relief Sewers			$1,300								
Phase 2 Relief Sewers					$980						
Phase 3 Relief Sewers							$1,009				
Phase 4 Relief Sewers									$608		
Phase 5 Relief Sewers											$540
MH Rehabilitation Phase 1 and 2		$135		$125		$125					
Line E06-005 to E06-012 Repair		$22									
Private Sector I/I Removal			$33	$50	$50	$50					
Phase 2 - Sewer Assessment		$150	$150								
Total Capital Cost	$0	$307	$1,483	$175	$1,030	$175	$1,009	$0	$608	$0	$540
Debt Payment (4% - 20 years)		$23	$109	$13	$76	$13	$74	$0	$45	$0	$40
Accumulating Annual Debt Cost		$23	$132	$145	$221	$234	$308	$308	$353	$353	$393
Annual Maintenance Costs											
New Employees (2)	$75	$75	$75	$75	$75	$75	$75	$75	$75	$75	$75
Annual Line Cleaning	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140	$140
Annual TV Inspection	$44	$44	$44	$44	$44	$44	$44	$44	$44	$44	$44
Total Maintenance Cost	$259	$259	$259	$259	$259	$259	$259	$259	$259	$259	$259
Total Annual Cost	$259	$282	$391	$404	$480	$493	$567	$567	$612	$612	$652
Annual Cost Factor (A/P, 4%, 20yrs) = .07358											

APPENDIX A --- Manhole Inspection Results

IDIX A

Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
D07-001	NOT FOUND														
D07-002	NOT INSPECTED	DRIVEWAY	GRAVEL	GOOD		24									
D07-003	NOT FOUND														
D07-004	SURFACE	GRASS	DIRT/GRASS	GOOD	3	24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	16.9	
D07-005	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.2	
D07-006	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	PRECAST	POURED	PLASTIC	8.75	
D07-007	SURFACE	GRASS	DIRT/GRASS	GOOD	0	24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.5	
D07-008	SURFACE	GRASS	DIRT/GRASS	GOOD	0	24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.2	
D07-009	NOT FOUND														
D07-010	NOT FOUND														
D07-011	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
D07-012	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
D07-013	NOT INSPECTED														
D07-014	NOT FOUND														
D07-015	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
D07-016	SURFACE	GRASS	DIRT/GRASS				PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.07	0
D07-017	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.0	
D07-018	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	15.38	2'
D07-019	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
D07-020	NOT INSPECTED														
D07-021	NOT INSPECTED														
D07-022	NOT INSPECTED														
D07-023	NOT FOUND														
D07-LS1	NOT INSPECTED	GRASS	DIRT/GRASS												
E05-001	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	14.99	
E05-002															
E05-003	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.0	
E05-004	NOT FOUND														
E05-005															
E05-006	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	16.6	
E05-007															
E05-008															
E05-009	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
E05-010															
E05-011															
E05-LS1	NOT INSPECTED														
E05-LS2	NOT INSPECTED														
E06-001	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	NONE	POURED	POURED	NONE	3.4	
E06-002	NOT FOUND														
E06-003	NOT FOUND														

APPENDIX A
Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
E06-004															
E06-005	SURFACE	STREET	ASPHALT	LOOSE		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	10.3	
E06-006	SURFACE	STREET	ASPHALT	LOOSE		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	13.6	
E06-007	SURFACE	GRASS	DIRT/GRASS	GOOD	12	24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	8.05	
E06-008															
E06-009															
E06-010	NOT FOUND														
E06-011	NOT FOUND														
E06-012															
E06-013	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.0	
E06-014	NOT INSPECTED														
E06-015															
E06-016															
E06-017	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.2	
E06-018	NOT INSPECTED														
E06-019	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.1	
E06-020															
E06-021	NOT FOUND														
E06-022	NOT FOUND														
E06-023	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	13.0	
E06-024	NOT INSPECTED														
E06-025	SURFACE	STORM DITCH	DIRT/GRASS	GOOD	36	24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.1	
E06-026															
E06-027	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.8	
E06-028	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	14.1	
E06-029	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.6	
E06-030	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.2	
E06-031															
E06-032															
E06-033															
E06-034	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.4	
E06-035															
E06-036	NOT INSPECTED	DRIVEWAY	CONCRETE	GOOD		24									
E06-037															
E06-038															
E06-039	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.0	
E06-040															
E06-041	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
E06-042															
E06-043	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.9	

A DIX A

Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
E06-044	SURFACE	SIDEWALK	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.6	
E06-045															
E06-046	SURFACE	SIDEWALK	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.9	
E06-047	NOT INSPECTED	DRIVEWAY	CONCRETE	GOOD		24									
E06-048	SURFACE	SIDEWALK	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	14.0	
E06-049															
E06-050	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.00	
E06-051															
E06-052															
E06-053															
E06-054															
E06-055															
E06-056															
E06-057	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.05	
E06-058															
E07-001	Proposed														
E07-002	Proposed														
E07-003	Proposed														
E07-004	Proposed														
E07-005	Proposed														
E07-006	NOT INSPECTED														
E07-007	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.35	
E07-008	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.5	
E07-009	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.4	
E07-010	NOT FOUND														
E07-011	NOT FOUND														
E07-012	NOT FOUND														
E07-013	NOT FOUND														
E07-014	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.3	
E07-015	NOT INSPECTED														
E07-016															
E07-017															
E07-018	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.2	
E07-019	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.7	
E07-020															
E07-021	SURFACE	GRASS	DIRT/GRASS				PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.22	0
E07-022															
E07-023	SURFACE	STORM DITCH	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.7	
E07-024	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.0	
E07-025	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.83	0

APPENDIX A
Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
E07-026	NOT FOUND														
E07-027	BURIED														
E07-028	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.2	
E07-029	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
E07-030	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.1	
E07-031															
E07-032	SURFACE	GRASS	DIRT/GRASS				NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.1	6'
E07-033	NOT INSPECTED														
E07-034	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.1	2.0
E07-035	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.7	
E07-036	NOT INSPECTED	SIDEWALK	CONCRETE	TIGHT		24									
E07-037															
E07-038	SURFACE	GRASS	DIRT/GRASS				PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.84	
E07-039	BURIED	GRASS	DIRT/GRASS												
E07-040	NOT INSPECTED	GRASS	DIRT/GRASS	TIGHT		24									
E07-041															
E07-042	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.8	3.0
E07-043	SURFACE	SIDEWALK	DIRT/GRASS	GOOD			PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.62	1'
E07-044															
E07-045	SURFACE	GRASS	DIRT/GRASS	GOOD			PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.85	0
E07-046	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.7	
E07-047															
E07-048	NOT INSPECTED														
E07-049	SURFACE	SIDEWALK	CONCRETE	LOOSE		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.7	
E07-050															
E07-051	SURFACE	SIDEWALK	CONCRETE	GOOD			PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.3	0
E07-052															
E07-053															
E07-054	NOT FOUND														
E07-055	NOT INSPECTED	STREET	ASPHALT	TIGHT		24									
E07-056															
E08-001	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
E08-002	NOT FOUND														
E08-003	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.5	
E08-004	Proposed														
E08-005	Proposed														
E08-006	Proposed														
E08-007	Proposed														
E08-008	Proposed														
E08-009	Proposed														

A DIX A

Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
E08-010	Proposed														
E08-011	Proposed														
E08-012	Proposed														
F04-001	NOT INSPECTED	GRASS	DIRT/GRASS	TIGHT		24									
F04-002	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	14.7	
F04-003	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.3	
F04-004	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.5	
F04-005	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	13.5	
F04-006															
F04-007	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.5	
F04-008	SURFACE	STREET	ASPHALT	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.9	
F04-009															
F04-010	NOT FOUND														
F04-011															
F04-012	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.3	
F04-013															
F04-014															
F04-015															
F04-016															
F04-017															
F04-018															
F04-019	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
F04-020															
F04-021															
F04-022	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
F04-023	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.5	
F04-024	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.4	
F04-025	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.4	
F04-026	BURIED	GRASS	DIRT/GRASS												
F04-027															
F04-028															
F04-029															
F04-030	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.7	
F04-031	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.2	
F04-032	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
F05-001	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.3	
F05-002	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
F05-003	NOT INSPECTED	GRASS	DIRT/GRASS	TIGHT		24									
F05-004	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.8	
F05-005	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.5	

APPENDIX A
Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
F05-006	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.2	
F05-007	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.5	
F05-008	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.5	
F05-009	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	13.0	
F05-010	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	14.8	
F05-011	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	16.5	
F06-001	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.75	
F06-002	NOT FOUND														
F06-003	NOT FOUND														
F06-004	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.7	
F06-005	NOT FOUND														
F06-006	NOT FOUND														
F06-007	NOT FOUND														
F06-008	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.4	
F06-009	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	13.8	
F06-010	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.7	
F06-011	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	13.0	
F06-012	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	16.1	
F06-013	NOT FOUND														
F06-014	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.5	
F06-015	NOT FOUND														
F06-016	NOT FOUND														
F06-017	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
F06-018															
F06-019	SURFACE	GRASS	DIRT/GRASS	GOOD	15	24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	NONE	4.9	
F06-020	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	NONE	3.3	
F06-021	NOT INSPECTED	GRASS	DIRT/GRASS	TIGHT	9	24									
F06-022	SURFACE	SIDEWALK	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.5	
F06-023															
F06-024															
F06-025	SURFACE	SIDEWALK	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.8	
F06-026	SURFACE	SIDEWALK	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.4	
F06-027	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.8	
F06-028	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.95	
F06-029	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.35	
F06-030															
F06-031															
F06-032															
F06-033															
F06-034															

A DIX A

Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
F06-035	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.00	
F06-036															
F06-037	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.1	
F06-038															
F06-039	BURIED	GRASS	DIRT/GRASS												
F06-040															
F06-041															
F06-042															
F06-043	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
F06-044	SURFACE	GRASS	DIRT/GRASS	LOOSE		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	NONE	2.6	
F06-045	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.8	
F06-046															
F06-047	NOT INSPECTED	GRASS	DIRT/GRASS	TIGHT		24									
F06-048	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	NONE	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.85	
F06-049															
F06-050															
F06-051	NOT INSPECTED														
F06-052	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	6.3	
F06-053	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.5	
F06-054	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	7.0	
F06-055	NOT INSPECTED														
F06-056	NOT FOUND														
F06-057	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	8.1	
F06-058	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.5	
F06-059	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	13.5	
F06-060	SURFACE	STORM DITCH	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	4.5	
F07-001	NOT FOUND														
F07-002	SURFACE	STREET	ASPHALT	TIGHT		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.8	
F07-003	NOT INSPECTED	STREET	ASPHALT	TIGHT		24									
F07-004															
F07-005	NOT INSPECTED														
F07-006															
F07-007															
F07-008	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	10.9	
F07-009	SURFACE	STREET	ASPHALT	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	11.6	
F07-010	SURFACE	STREET	ASPHALT	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	VCP	PLASTIC	8.6	
F07-011	SURFACE	STREET	ASPHALT	GOOD		24	BRICK	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	5.7	
F07-012	SURFACE	STREET	ASPHALT	GOOD		24	BRICK	BLOCK	4 FT RND	BLOCK	POURED	VCP	CAST IRON	7.4	
F07-013															
F07-014															

APPENDIX A
Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
F07-015	NOT FOUND														
F07-016															
F07-017	SURFACE	STREET	ASPHALT	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	9.5	
F07-018															
F07-019	SURFACE	STREET	ASPHALT	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	11.1	
F07-020	SURFACE	STREET	ASPHALT	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	VCP	CAST IRON	12.1	
F07-021															
F07-022	SURFACE	STREET	GRAVEL	GOOD		24	BRICK	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	9.3	
F07-023	SURFACE	STREET	ASPHALT	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	VCP	CAST IRON	11.9	
F07-024															
F07-025															
F07-026	SURFACE	STREET	ASPHALT	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	VCP	PLASTIC	7.4	
F07-027	NOT INSPECTED	STREET	ASPHALT	TIGHT		24									
F07-028	NOT INSPECTED	STREET	ASPHALT	TIGHT		24									
F07-029	SURFACE	GRASS	DIRT/GRASS	GOOD		24	BRICK	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	6.8	
F07-030	NOT FOUND														
F07-031	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	NONE	POURED	POURED	CAST IRON	3.0	
F07-032	SURFACE	STREET	ASPHALT	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	VCP	CAST IRON	6.5	
F07-033															
F07-034															
F07-035															
F07-036															
F07-037															
F07-038															
F07-039															
F07-040															
F07-041															
F07-042															
F07-043															
F07-044															
F07-045	SURFACE	STREET	ASPHALT	GOOD		24	BRICK	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	7.7	
F07-046	NOT FOUND														
F07-047															
F07-048															
F07-049															
F07-050	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.9	
F07-051	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.0	
F07-052	NOT INSPECTED														
F07-053															
F07-054	SURFACE	GRASS	DIRT/GRASS	GOOD			PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.38	0

A DIX A

Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
F07-055	SURFACE	GRASS	DIRT/GRASS	LOOSE		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.4	
F07-056	NOT INSPECTED														
F07-057	BURIED	GRASS	DIRT/GRASS												
F07-058	NOT FOUND														
F07-059	SURFACE	DRIVEWAY	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.2	
F07-060															
F07-061															
F07-062															
F07-063	NOT FOUND														
F07-064	SURFACE	DRIVEWAY	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.2	
F07-065															
F07-066	NOT FOUND														
F07-067															
F07-068															
F07-069	SURFACE	GRASS	DIRT/GRASS				PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.44	0
F07-070	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.0	
F07-071	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.9	
F07-072															
F07-073	SURFACE	SIDEWALK	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.4	
F07-074	SURFACE	SIDEWALK	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.13	0
F07-075															
F07-076	SURFACE	SIDEWALK	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.7	
F07-077	NOT FOUND														
F07-078															
F07-079															
F07-080															
F07-081															
F07-082															
F07-083	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.0	
F07-084	SURFACE	SIDEWALK	CONCRETE	GOOD			NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.4	0
F07-085															
F07-086															
F07-087															
F07-088															
F07-089															
F08-001	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.3	
F08-002	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.6	
F08-003	SURFACE	DRIVEWAY	GRAVEL	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.0	
F08-004	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	13.8	
F08-005	SURFACE	GRASS	DIRT/GRASS	LOOSE		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	14.2	

APPENDIX A
Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
F08-006	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	14.9	
F08-007	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	13.2	
F08-008	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.3	
F08-009	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.9	
F08-010	NOT FOUND														
F08-011	NOT FOUND														
F08-012	SURFACE	STREET	ASPHALT	LOOSE		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.0	
F08-013	NOT INSPECTED	SIDEWALK	CONCRETE	GOOD		24									
F08-014	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
F08-015	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.7	
F08-016	NOT INSPECTED	STREET	ASPHALT	TIGHT		24									
F08-017															
F08-018															
F08-019															
F08-020															
F08-021	NOT INSPECTED														
F08-022															
F08-023	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.1	
F08-024	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
F08-025															
F08-026															
F08-027	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.5	
F08-028															
F08-029															
F08-030															
F08-031															
F08-032	NOT INSPECTED														
F08-033	BURIED	GRASS	DIRT/GRASS												
F08-034	SURFACE	STORM DITCH	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.4	
F08-035	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	13.55	
F08-036	NOT FOUND														
F08-037	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	18.5	
F08-038															
F08-039															
F08-040	Proposed														
F08-041	Proposed														
F08-042	BURIED	GRASS	DIRT/GRASS												
F08-043	Proposed														
F08-044	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	11.8	6.0
F09-001	NOT INSPECTED	DRIVEWAY	GRAVEL	GOOD		24									

A DIX A

Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
F09-002	NOT INSPECTED	DRIVEWAY	GRAVEL	GOOD		24									
F09-003	NOT FOUND														
F09-004	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.4	
F09-005	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.7	
F09-006	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.6	
F09-007	SURFACE	GRASS	DIRT/GRASS	TIGHT		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.6	
F09-008	NOT FOUND														
F09-009	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.3	
F09-010	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
F09-011	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
F09-012															
F09-013	NOT FOUND														
F09-014	NOT FOUND														
F09-015	NOT FOUND														
F09-016	NOT FOUND														
F09-017															
F09-018	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	16.7	
F09-019															
F09-020															
F09-021															
F09-022	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	15.6	
F09-023	NOT INSPECTED														
F09-024	NOT INSPECTED														
F09-025	NOT INSPECTED														
F09-026	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.5	
F09-027	NOT INSPECTED														
F09-028	NOT FOUND														
F09-029															
F09-030	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.0	
F09-031	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.4	
F09-032															
F09-LS1	NOT INSPECTED	DRIVEWAY	GRAVEL												
G03-001	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.1	
G03-002	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.2	
G03-003	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	15.5	
G03-004	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
G03-005	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
G04-001														0	
G04-002															
G04-003	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									

APPENDIX A
Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
G04-004	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.3	
G04-005	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.3	
G04-006	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD											
G04-007															
G04-008															
G04-009	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.1	
G04-010	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
G04-011	NOT FOUND														
G04-012	NOT FOUND														
G04-013															
G04-014	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	13.8	
G04-015	NOT FOUND														
G04-016	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.7	
G04-017															
G04-018															
G04-019															
G04-020															
G04-021	SURFACE	GRASS	DIRT/GRASS	GOOD		25	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.8	
G04-022	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.3	
G04-023	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.7	
G04-024	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.8	
G04-025															
G04-026	BURIED	GRASS	DIRT/GRASS												
G04-027															
G04-028	NOT FOUND														
G04-029															
G04-030															
G04-031															
G04-032	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.5	
G04-033															
G04-LS1	NOT INSPECTED														
G05-001	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.9	
G05-002															
G05-003															
G05-004	SURFACE	SIDEWALK	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.8	
G05-005															
G05-006															
G05-007															
G05-008	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.3	
G05-009	SURFACE	SIDEWALK	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.3	

DIX A
Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
G05-010															
G05-011															
G05-012															
G05-013															
G05-014															
G05-015															
G05-016															
G05-017															
G05-018															
G05-019															
G05-020															
G05-021															
G05-022															
G05-023															
G05-024	NOT INSPECTED														
G05-025															
G05-026	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	14.4	
G05-027	NOT FOUND														
G05-028	NOT FOUND														
G05-029															
G05-030															
G05-031															
G05-032															
G05-033															
G05-034	SURFACE	SIDEWALK	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.4	
G05-035	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.2	
G05-036															
G05-037															
G05-038															
G05-039	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	13.6	
G05-040															
G05-041															
G05-042	BURIED	GRASS	DIRT/GRASS												
G05-043	SURFACE	SIDEWALK	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.9	
G05-044															
G05-045	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.8	
G06-001	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		26									
G06-002	NOT FOUND														
G06-003	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		26									
G06-004	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.7	9.7

APPENDIX A
Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
G06-005	NOT FOUND														
G06-006	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	17.9	6.0
G06-007	NOT FOUND														
G06-008	SURFACE	GRASS	DIRT/GRASS	GOOD		26	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.5	3.5
G06-009	SURFACE	GRASS	DIRT/GRASS	GOOD		26	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.9	7.5
G06-010	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		26									
G06-011	NOT INSPECTED	STORM DITCH	DIRT/GRASS	GOOD		26									
G06-012	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.0	
G06-013	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.8	
G06-014	NOT INSPECTED														
G06-015	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.2	
G06-016	SURFACE	STORM DITCH	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.1	
G06-017	SURFACE	STORM DITCH	DIRT/GRASS	TIGHT		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.7	
G06-018	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.8	
G06-019															
G06-020															
G06-021	SURFACE	STREET	ASPHALT	LOOSE		24	NONE	PRECAST	4 FT RND	PRECAST	PRECAST	POURED	PLASTIC	4.3	
G06-022	SURFACE	STREET	ASPHALT	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	4.44	
G06-023	SURFACE	STREET	ASPHALT	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	4.44	
G06-024	NOT INSPECTED														
G06-025	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.4	
G06-026															
G06-027															
G06-028															
G06-029	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
G06-030	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	NONE	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.34	
G06-031															
G06-032															
G06-033	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		26									
G06-034	NOT FOUND														
G06-035	SURFACE	GRASS	DIRT/GRASS	LOOSE		26	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.3	9.0
G06-036	NOT FOUND														
G06-037	SURFACE	GRASS	DIRT/GRASS	GOOD		26	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.8	8.5
G06-038	SURFACE	GRASS	DIRT/GRASS	GOOD		26	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.6	
G06-039	NOT FOUND														
G06-040	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	16.2	
G06-041	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	4.5	
G06-042	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.5	
G06-043															
G06-044															

APPENDIX A
Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
G06-045	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.2	
G06-046	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.7	
G06-047	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.15	
G06-048															
G06-049															
G06-050															
G06-051															
G06-052	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	5.7	
G06-053	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.1	
G06-054	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	14.9	
G06-055	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.3	
G06-056	SURFACE	GRASS	DIRT/GRASS	LOOSE		24	PRECAST	PRECAST	4 FT RND	PRECAST	NONE	NONE	PLASTIC	9.1	
G06-057	NOT INSPECTED	GRASS	DIRT/GRASS												
G06-058	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.0	
G06-059															
G06-060	SURFACE	GRASS	DIRT/GRASS	GOOD	2	24	PRECAST	NONE	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.6	
G06-061															
G06-062															
G06-063	SURFACE	GRASS	DIRT/GRASS	GOOD	2	24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.4	
G06-064															
G06-065	SURFACE	GRASS	DIRT/GRASS	GOOD	0	24	NONE	NONE	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.7	
G07-001	SURFACE	GRASS	DIRT/GRASS	TIGHT	3"		PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	NONE	5.01	0
G07-002															
G07-003	NOT FOUND														
G07-004	SURFACE	STORM DITCH	GRAVEL		2.5'		NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.74	0
G07-005	SURFACE	STORM DITCH	GRAVEL		2'		NONE	PRECAST	4 FT RND	PRECAST	PRECAST	POURED	CAST IRON	6.68	5.5
G07-006	SURFACE	STREET	ASPHALT	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	VCP	CAST IRON	12.0	
G07-007	SURFACE	STREET	ASPHALT				BRICK	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	12.55	00
G07-008															
G07-009	NOT INSPECTED														
G07-010	SURFACE	STREET	ASPHALT	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	7.8	
G07-011	NOT INSPECTED														
G07-012	SURFACE	STREET	ASPHALT	GOOD		24	BRICK	PRECAST	4 FT RND	BRICK	POURED	VCP	CAST IRON	5.8	
G07-013															
G07-014	SURFACE	STREET	ASPHALT	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	VCP	PLASTIC	14.8	
G07-015	NOT INSPECTED	STREET	ASPHALT	TIGHT		24									
G07-016															
G07-017	SURFACE	GRASS	DIRT/GRASS		2"		NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	6.28	2'
G07-018	NOT INSPECTED														
G07-019															

APPENDIX A
Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
G07-020															
G07-021															
G07-022															
G07-023															
G07-024															
G07-025															
G07-026	SURFACE	STREET	ASPHALT	LOOSE		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	VCP	CAST IRON	5.6	
G07-027	NOT INSPECTED	STREET	ASPHALT	TIGHT		24									
G07-028	SURFACE	STREET	ASPHALT	GOOD		24	BRICK	PRECAST	4 FT RND	NONE	POURED	POURED	CAST IRON	4.8	
G07-029	NOT INSPECTED														
G07-030	BURIED	STREET	ASPHALT												
G07-031															
G07-032	NOT FOUND														
G07-033	NOT FOUND														
G07-034	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.0	
G07-035															
G07-036	SURFACE	GRASS	DIRT/GRASS		2 inches		NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.60	0
G07-037															
G07-038	NOT FOUND														
G07-039															
G07-040															
G07-041	SURFACE	GRASS	DIRT/GRASS		10"		PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	5.7	2'
G07-042															
G07-043	SURFACE	STREET	ASPHALT	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	9.5	
G07-044	NOT INSPECTED	STREET	ASPHALT												
G07-045	SURFACE	STREET	ASPHALT	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	VCP	CAST IRON	12.7	
G07-046															
G07-047															
G07-048	SURFACE	GRASS	DIRT/GRASS				PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.0	0
G07-049															
G08-001															
G08-002	SURFACE	DRIVEWAY	CONCRETE	GOOD	0		BRICK	PRECAST	4 FT RND	PRECAST	POURED	POURED	BAR	9.78	5'
G08-003															
G08-004	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	NONE	POURED	POURED	CAST IRON	4.8	
G08-005	SURFACE	GRASS	DIRT/GRASS	GOOD	2'		NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	7.58	3'
G08-006															
G08-007	NOT INSPECTED														
G08-008															
G08-009															
G08-010															

A DIX A

Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
G08-011	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.2	
G08-012	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.5	
G08-013	SURFACE	GRASS	DIRT/GRASS	GOOD	2 inches		NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.83	0
G08-014															
G08-015	NOT INSPECTED														
G08-016															
G08-017	SURFACE	GRASS	DIRT/GRASS	GOOD			NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.87	
G08-018															
G08-019	NOT INSPECTED														
G08-020	SURFACE	GRASS	DIRT/GRASS	TIGHT	4"		NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	7.68	2'
G08-021	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	7.7	
G08-022	NOT INSPECTED														
G08-023	SURFACE	STORM DITCH	DIRT/GRASS	GOOD	-1		BRICK	PRECAST	4 FT RND	PRECAST	POURED	POURED	CAST IRON	7.96	3'
G08-024															
G08-025															
G08-026															
G08-027															
G08-028															
G08-029	SURFACE	GRASS	DIRT/GRASS	GOOD	1"		BRICK	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.57	1'
G08-030	SURFACE	GRASS	DIRT/GRASS	GOOD	10"		NONE	PRECAST	4 FT RND	PRECAST	NONE	NONE	PLASTIC	4.92	1'
G08-031	SURFACE	GRASS	DIRT/GRASS	LOOSE		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.2	
G08-032	SURFACE	GRASS	DIRT/GRASS	LOOSE		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.0	
G08-033	SURFACE	GRASS	DIRT/GRASS	LOOSE		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.1	
G08-034	SURFACE	GRASS	DIRT/GRASS	LOOSE		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.6	
G08-035	NOT FOUND														
G08-036	SURFACE	GRASS	DIRT/GRASS	GOOD	.5"		PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.7	0
G08-037	SURFACE	GRASS	DIRT/GRASS	GOOD			PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12'	00
G08-038															
G08-039	SURFACE	GRASS	DIRT/GRASS	GOOD			PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.82	0
G08-040	SURFACE	GRASS	DIRT/GRASS		2 inches		PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.93	0
G08-041	NOT FOUND														
G08-042	SURFACE	GRASS	DIRT/GRASS		15"		PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.30	1'
G08-043															
G08-044															
G08-045															
G08-046															
G08-047															
G08-048	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.0	
G08-049															
G08-050															

APPENDIX A
Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
G08-051															
G08-052															
G08-053															
G08-054															
G08-055															
G08-056															
G08-057															
G08-058															
G08-059															
G08-060															
G08-061															
G08-062															
G08-063															
G08-064															
G08-065															
G08-066															
G08-067															
G08-068															
G08-069															
G08-070															
G09-001	SURFACE	GRASS	DIRT/GRASS	LOOSE		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.0	
G09-002															
G09-003	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.4	
G09-004															
G09-005															
G09-006															
G09-007	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	13.9	
G09-008	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.5	
G09-009															
G09-010	NOT INSPECTED														
G09-011															
G09-012															
G09-013															
G09-014															
G09-015															
G09-016															
G09-LS1	NOT INSPECTED	GRASS	DIRT/GRASS												
H05-001	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
H05-002	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	13.2	
H05-003															

A DIX A
Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
H05-004															
H05-005															
H05-006															
H05-007															
H05-008															
H05-009															
H05-010															
H05-011															
H05-012	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	13.2	
H05-013	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.0	
H05-014															
H05-015															
H05-016															
H05-017	NOT FOUND														
H05-018															
H05-019	SURFACE	STREET	ASPHALT	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.4	
H05-020															
H05-021	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.6	
H05-022	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.2	
H05-023															
H05-024															
H05-025															
H05-026	SURFACE	DRIVEWAY	GRAVEL	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.5	
H05-027	NOT INSPECTED	STREET	ASPHALT	TIGHT											
H05-028	SURFACE	STREET	ASPHALT	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.4	
H05-029	SURFACE	STREET	ASPHALT	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.3	
H05-030	SURFACE	STREET	ASPHALT	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.5	
H05-031	SURFACE	STREET	ASPHALT	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.7	
H05-032	NOT FOUND														
H05-033															
H05-034															
H06-001	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		26									
H06-002	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.1	8.0
H06-003	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.5	
H06-004	SURFACE	GRASS	DIRT/GRASS	GOOD		26	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.75	
H06-005	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.2	
H06-006	NOT FOUND														
H06-007	NOT FOUND														
H06-008	NOT FOUND														
H06-009	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	15.3	10

APPENDIX A
Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
H06-010	NOT FOUND														
H06-011	SURFACE	GRASS	DIRT/GRASS	GOOD		26	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.6	9
H06-012	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		26									
H06-013	NOT FOUND														
H06-014															
H06-015	SURFACE	GRASS	DIRT/GRASS	LOOSE	2	24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	16.6	
H06-016															
H06-017															
H06-018	SURFACE	GRASS	DIRT/GRASS	GOOD	2	24	PRECAST	NONE	4 FT RND	PRECAST	POURED	POURED	PLASTIC	17.3	
H06-019															
H06-020															
H06-021															
H06-022															
H06-023															
H06-024															
H06-025	SURFACE	SIDEWALK	CONCRETE	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.5	
H06-026	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.2	
H06-027	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
H06-028	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.0	
H06-029	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.8	
H06-030															
H06-031															
H06-032															
H06-033															
H06-034															
H06-035															
H06-036															
H06-037															
H06-038															
H06-039	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.4	
H06-040															
H06-041															
H06-042															
H06-043															
H06-044															
H06-045	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.0	
H06-046	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.0	
H06-047	NOT INSPECTED	DRIVEWAY	GRAVEL	GOOD		24									
H06-048	NOT FOUND														
H06-049	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	14.8	

APPENDIX A
Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
H06-050	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	14.6	
H06-051															
H06-052	NOT FOUND														
H06-053	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
H06-054	NOT FOUND														
H06-055	SURFACE	STREET	ASPHALT	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.5	
H06-056	SURFACE	STREET	ASPHALT	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	5.6	
H06-057															
H06-058	SURFACE	STREET	ASPHALT	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.9	
H06-059	NOT INSPECTED	STREET	ASPHALT	GOOD		24									
H06-060															
H06-061	SURFACE	GRASS	DIRT/GRASS	GOOD	2	24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	4.6	
H06-062	SURFACE	GRASS	DIRT/GRASS	GOOD	0	24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	4.3	
H06-063	SURFACE	GRASS	DIRT/GRASS	GOOD	0	24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	4.8	
H06-064															
H06-065															
H07-001	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.2	
H07-002	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	6 FT RND	PRECAST	POURED	POURED	CAST IRON	6.6	
H07-003	NOT FOUND														
H07-004	NOT FOUND														
H07-005	SURFACE	GRASS	DIRT/GRASS	GOOD		25	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	5.8	
H07-006	SURFACE	STORM DITCH	DIRT/GRASS	GOOD		25	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.4	
H07-007	SURFACE	GRASS	DIRT/GRASS	GOOD		25	BRICK	BRICK	4 FT RND	BRICK	POURED	POURED	PLASTIC	7.7	
H07-008	SURFACE	GRASS	DIRT/GRASS	GOOD		25	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.5	
H07-009															
H07-010															
H07-011	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.2	
H07-012	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.1	
H07-013	BURIED	GRASS	DIRT/GRASS												
H07-014	BURIED	GRASS	DIRT/GRASS												
H07-015															
H07-016	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.9	
H07-017	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.8	
H07-018															
H07-019	NOT FOUND														
H07-020															
H08-001	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.0	
H08-002	NOT FOUND														
H08-003	NOT FOUND														
H08-004	NOT FOUND														

APPENDIX A
Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
H08-005	SURFACE	GRASS	DIRT/GRASS	GOOD		24	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.9	
H08-006															
H08-007															
H08-008															
H08-009	SURFACE	DRIVEWAY	GRAVEL	GOOD	2"		PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.69	0
H08-010	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.7	
H08-011	SURFACE	GRASS	DIRT/GRASS		10"		PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.87	0
H08-012	SURFACE	STORM DITCH	DIRT/GRASS		12"		NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	7.25	0
H08-013	SURFACE	GRASS	DIRT/GRASS	GOOD			PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	6.25	0
H08-014	SURFACE	GRASS	DIRT/GRASS				PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	10.77	0
H08-015															
H08-016															
H08-017															
H08-018															
H08-019															
H08-020	SURFACE	SIDEWALK	CONCRETE				NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.49	0
H08-021	SURFACE	GRASS	DIRT/GRASS		6"		NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	12.3	3'
I06-001	SURFACE	GRASS	DIRT/GRASS	GOOD		26	PRECAST	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.7	
I06-002	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		26									
I06-003	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		26									
I06-004	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		26									
I07-001	NOT INSPECTED	STORM DITCH	DIRT/GRASS	GOOD		24									
I07-002	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
I07-003	NOT INSPECTED														
I07-004	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
I07-005	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
I07-006	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
I07-007	NOT FOUND														
I07-008	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		26									
I07-009	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		26									
I07-010	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		26									
I07-011	NOT FOUND														
I08-001	NOT INSPECTED	GRASS	DIRT/GRASS	GOOD		24									
I08-002	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.4	11.0
I08-003	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.5	10.0
I08-004	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	11.7	
I08-005	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	9.8	
I08-006	SURFACE	GRASS	DIRT/GRASS	GOOD		24	NONE	PRECAST	4 FT RND	PRECAST	POURED	POURED	PLASTIC	8.9	
I08-007	NOT FOUND														
I08-008	NOT FOUND														

IDIX A

Manhole Inspection Results

Manhole ID #	Inspection Status	Location	Surface Type	Cover Fit	Cover Grade	Cover Diameter	Grade Adjust	Cone Material	Wall Diameter	Wall Material	Bench Type	Invert Type	Step Type	Manhole Depth	Surcharge Evidence
I08-009	NOT FOUND														
I08-LS1	NOT INSPECTED														

IDIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
D07-001																
D07-002																
D07-003																
D07-004																
D07-005																
D07-006							Evidence									
D07-007																
D07-008																
D07-009																
D07-010																
D07-011																
D07-012																
D07-013																
D07-014																
D07-015																
D07-016							Evidence									
D07-017																
D07-018	Evidence										Evidence					
D07-019																
D07-020																
D07-021																
D07-022																
D07-023																
D07-LS1																
E05-001							Evidence		Evidence		Evidence					
E05-002																
E05-003																
E05-004																
E05-005																
E05-006																
E05-007																
E05-008																
E05-009																
E05-010																
E05-011																
E05-LS1																
E05-LS2																
E06-001																
E06-002													Evidence			
E06-003																

APPENDIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
E06-004																
E06-005	Evidence										Active Flow	0.1				
E06-006	Evidence		Evidence								Evidence		Active Flow	0.1		
E06-007											Evidence					
E06-008																
E06-009																
E06-010																
E06-011																
E06-012																
E06-013																
E06-014																
E06-015																
E06-016																
E06-017					Evidence											
E06-018																
E06-019																
E06-020																
E06-021																
E06-022																
E06-023							Evidence				Evidence					
E06-024																
E06-025											Evidence					
E06-026																
E06-027											Evidence					
E06-028																
E06-029																
E06-030																
E06-031																
E06-032																
E06-033																
E06-034					Evidence											
E06-035																
E06-036																
E06-037																
E06-038																
E06-039					Evidence											
E06-040																
E06-041																
E06-042																
E06-043					Evidence		Evidence									

A DIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
E06-044					Evidence											
E06-045																
E06-046																
E06-047																
E06-048							Evidence									
E06-049																
E06-050																
E06-051																
E06-052																
E06-053																
E06-054																
E06-055																
E06-056																
E06-057																
E06-058																
E07-001																
E07-002																
E07-003																
E07-004																
E07-005																
E07-006																
E07-007					Active Flow	0.1	Active Flow	0.1			Active Flow	0.25				
E07-008							Evidence									
E07-009											Evidence					
E07-010																
E07-011																
E07-012																
E07-013																
E07-014							Evidence		Evidence							
E07-015																
E07-016																
E07-017																
E07-018					Evidence								Active Flow	0.5		
E07-019							Evidence									
E07-020																
E07-021																
E07-022																
E07-023																
E07-024							Evidence									
E07-025	Evidence										Evidence					

APPENDIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
E07-026																
E07-027																
E07-028																
E07-029																
E07-030																
E07-031																
E07-032	Evidence															
E07-033													Evidence			
E07-034					Evidence		Evidence									
E07-035																
E07-036													Active Flow	0.75		
E07-037																
E07-038																
E07-039							Evidence						Evidence			
E07-040																
E07-041																
E07-042					Evidence		Evidence									
E07-043							Evidence						Evidence			
E07-044																
E07-045							Evidence						Evidence			
E07-046																
E07-047																
E07-048																
E07-049																
E07-050																
E07-051	Evidence						Evidence				Evidence					
E07-052																
E07-053																
E07-054																
E07-055																
E07-056																
E08-001																
E08-002																
E08-003																
E08-004																
E08-005																
E08-006																
E08-007																
E08-008																
E08-009																

APPENDIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
E08-010																
E08-011																
E08-012																
F04-001																
F04-002					Active Flow	0.25	Active Flow	3.0	Active Flow	1.0	Active Flow	1.0				
F04-003							Active Flow	0.25								
F04-004																
F04-005											Active Flow	2.5				
F04-006																
F04-007																
F04-008	Evidence															
F04-009																
F04-010																
F04-011																
F04-012					Active Flow	0.1										
F04-013																
F04-014																
F04-015																
F04-016																
F04-017																
F04-018																
F04-019																
F04-020																
F04-021																
F04-022																
F04-023					Evidence				Active Flow	0.1	Active Flow	0.1				
F04-024							Evidence				Active Flow	0.1				
F04-025											Active Flow	1.5				
F04-026																
F04-027																
F04-028																
F04-029																
F04-030																
F04-031					Active Flow	0.1	Active Flow	0.1	Active Flow	0.1	Active Flow	0.25				
F04-032																
F05-001																
F05-002																
F05-003																
F05-004																
F05-005																

APPENDIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
F05-006																
F05-007							Active Flow	0.1			Active Flow	0.25				
F05-008					Active Flow	0.1			Active Flow	0.25	Active Flow	0.25				
F05-009																
F05-010																
F05-011																
F06-001	Evidence				Evidence						Active Flow	.25				
F06-002																
F06-003																
F06-004																
F06-005																
F06-006																
F06-007																
F06-008																
F06-009													Active Flow	0.5		
F06-010																
F06-011																
F06-012																
F06-013													Active Flow	0.01		
F06-014																
F06-015																
F06-016																
F06-017																
F06-018																
F06-019																
F06-020																
F06-021																
F06-022																
F06-023																
F06-024																
F06-025					Evidence											
F06-026							Evidence									
F06-027																
F06-028					Evidence											
F06-029																
F06-030																
F06-031																
F06-032																
F06-033																
F06-034																

A DIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
F06-035																
F06-036																
F06-037																
F06-038																
F06-039																
F06-040																
F06-041																
F06-042																
F06-043																
F06-044																
F06-045																
F06-046																
F06-047																
F06-048					Evidence											
F06-049																
F06-050																
F06-051																
F06-052																
F06-053					Active Flow	0.1										
F06-054																
F06-055																
F06-056																
F06-057																
F06-058																
F06-059							Evidence									
F06-060					Active Flow	0.25										
F07-001																
F07-002																
F07-003													Active Flow	1.0		
F07-004																
F07-005																
F07-006																
F07-007																
F07-008																
F07-009	Evidence		Evidence		Evidence						Active Flow	0.25				
F07-010					Evidence											
F07-011	Evidence		Evidence		Evidence											
F07-012	Evidence		Evidence						Evidence		Evidence					
F07-013																
F07-014																

APPENDIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
F07-015																
F07-016																
F07-017	Evidence		Evidence		Evidence											
F07-018																
F07-019	Evidence		Evidence		Evidence											
F07-020	Evidence		Evidence		Evidence											
F07-021																
F07-022																
F07-023	Evidence		Evidence								Evidence					
F07-024																
F07-025																
F07-026	Evidence															
F07-027																
F07-028																
F07-029																
F07-030																
F07-031																
F07-032	Evidence		Evidence		Evidence											
F07-033																
F07-034																
F07-035																
F07-036																
F07-037																
F07-038																
F07-039																
F07-040																
F07-041																
F07-042																
F07-043																
F07-044																
F07-045	Evidence		Evidence													
F07-046																
F07-047																
F07-048																
F07-049																
F07-050																
F07-051																
F07-052																
F07-053																
F07-054	Evidence				Evidence											

A DIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
F07-055					Evidence						Active Flow	0.1				
F07-056																
F07-057																
F07-058																
F07-059					Evidence		Evidence									
F07-060																
F07-061																
F07-062																
F07-063																
F07-064	Evidence		Evidence				Evidence									
F07-065																
F07-066																
F07-067																
F07-068																
F07-069	Evidence				Evidence						Evidence					
F07-070					Evidence		Evidence									
F07-071							Evidence									
F07-072																
F07-073							Evidence									
F07-074	Evidence															
F07-075																
F07-076																
F07-077																
F07-078																
F07-079																
F07-080																
F07-081																
F07-082																
F07-083																
F07-084	Evidence				Evidence											
F07-085																
F07-086																
F07-087																
F07-088																
F07-089																
F08-001																
F08-002													Active Flow	3.0		
F08-003																
F08-004																
F08-005																

APPENDIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
F08-006																
F08-007																
F08-008																
F08-009																
F08-010																
F08-011																
F08-012																
F08-013																
F08-014																
F08-015																
F08-016																
F08-017																
F08-018																
F08-019																
F08-020																
F08-021																
F08-022																
F08-023																
F08-024																
F08-025																
F08-026																
F08-027																
F08-028																
F08-029																
F08-030																
F08-031																
F08-032																
F08-033																
F08-034																
F08-035																
F08-036																
F08-037																
F08-038																
F08-039																
F08-040																
F08-041																
F08-042																
F08-043																
F08-044																
F09-001																

A DIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
F09-002																
F09-003																
F09-004																
F09-005													Active Flow	0.25		
F09-006													Active Flow	2.0		
F09-007																
F09-008																
F09-009																
F09-010																
F09-011																
F09-012																
F09-013																
F09-014																
F09-015																
F09-016																
F09-017																
F09-018					Evidence		Evidence									
F09-019																
F09-020																
F09-021																
F09-022																
F09-023																
F09-024																
F09-025																
F09-026																
F09-027																
F09-028																
F09-029																
F09-030																
F09-031																
F09-032																
F09-LS1																
G03-001							Evidence									
G03-002							Evidence		Evidence		Evidence					
G03-003																
G03-004																
G03-005																
G04-001																
G04-002																
G04-003																

APPENDIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
G04-004																
G04-005																
G04-006																
G04-007																
G04-008																
G04-009					Evidence						Evidence					
G04-010																
G04-011																
G04-012																
G04-013																
G04-014											Evidence					
G04-015																
G04-016																
G04-017																
G04-018																
G04-019																
G04-020																
G04-021					Evidence											
G04-022																
G04-023																
G04-024																
G04-025																
G04-026																
G04-027																
G04-028																
G04-029																
G04-030																
G04-031																
G04-032																
G04-033																
G04-LS1																
G05-001																
G05-002																
G05-003																
G05-004									Active Flow	0.1	Active Flow	0.1				
G05-005																
G05-006																
G05-007																
G05-008							Evidence									
G05-009																

A DIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
G05-010																
G05-011																
G05-012																
G05-013																
G05-014																
G05-015																
G05-016																
G05-017																
G05-018																
G05-019																
G05-020																
G05-021																
G05-022																
G05-023																
G05-024																
G05-025																
G05-026							Evidence									
G05-027																
G05-028																
G05-029																
G05-030																
G05-031																
G05-032																
G05-033																
G05-034							Evidence									
G05-035																
G05-036																
G05-037																
G05-038																
G05-039											Evidence					
G05-040																
G05-041																
G05-042																
G05-043							Evidence									
G05-044																
G05-045																
G06-001																
G06-002																
G06-003																
G06-004																

APPENDIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
G06-005																
G06-006									Evidence		Evidence					
G06-007																
G06-008																
G06-009																
G06-010																
G06-011																
G06-012											Evidence					
G06-013																
G06-014																
G06-015																
G06-016																
G06-017							Evidence									
G06-018																
G06-019																
G06-020																
G06-021	Evidence															
G06-022					Evidence											
G06-023					Evidence											
G06-024																
G06-025																
G06-026																
G06-027																
G06-028																
G06-029																
G06-030					Evidence											
G06-031																
G06-032																
G06-033																
G06-034																
G06-035																
G06-036																
G06-037											Evidence					
G06-038																
G06-039																
G06-040																
G06-041																
G06-042																
G06-043																
G06-044																

/ DIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
G06-045							Active Flow	0.25								
G06-046							Evidence									
G06-047																
G06-048																
G06-049																
G06-050																
G06-051																
G06-052																
G06-053																
G06-054																
G06-055																
G06-056																
G06-057																
G06-058							Evidence									
G06-059																
G06-060																
G06-061																
G06-062																
G06-063																
G06-064																
G06-065																
G07-001	Evidence				Evidence				Evidence		Evidence		Active Flow	.25		
G07-002																
G07-003																
G07-004											Evidence		Active Flow	1		
G07-005																
G07-006	Evidence		Evidence													
G07-007					Evidence		Evidence									
G07-008																
G07-009																
G07-010	Evidence		Evidence										Active Flow	1.5		
G07-011																
G07-012	Evidence		Evidence				Evidence				Evidence					
G07-013																
G07-014									Evidence							
G07-015																
G07-016																
G07-017	Evidence												Evidence			
G07-018																
G07-019																

APPENDIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
G07-020																
G07-021																
G07-022																
G07-023																
G07-024																
G07-025																
G07-026	Evidence		Evidence		Evidence											
G07-027																
G07-028	Evidence		Evidence						Evidence				Evidence			
G07-029																
G07-030																
G07-031																
G07-032																
G07-033																
G07-034																
G07-035																
G07-036					Evidence						Evidence					
G07-037																
G07-038																
G07-039																
G07-040																
G07-041					Evidence											
G07-042																
G07-043	Evidence		Evidence						Evidence		Evidence					
G07-044																
G07-045	Evidence				Evidence						Active Flow	0.1	Active Flow	0.25		
G07-046																
G07-047																
G07-048					Evidence											
G07-049																
G08-001																
G08-002					Evidence											
G08-003																
G08-004					Evidence				Active Flow	0.1			Active Flow	0.1		
G08-005																
G08-006																
G08-007																
G08-008																
G08-009																
G08-010																

APPENDIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
G08-011																
G08-012																
G08-013																
G08-014																
G08-015																
G08-016																
G08-017																
G08-018																
G08-019																
G08-020					Evidence	.25										
G08-021																
G08-022													Evidence			
G08-023	Evidence	1			Evidence	1	Evidence	1								
G08-024																
G08-025																
G08-026																
G08-027																
G08-028																
G08-029																
G08-030			Evidence		Evidence											
G08-031													Evidence			
G08-032							Active Flow	0.1					Evidence			
G08-033																
G08-034					Active Flow	0.1					Active Flow	0.25	Active Flow	1.0		
G08-035													Active Flow	0.25		
G08-036																
G08-037					Evidence											
G08-038					Evidence											
G08-039																
G08-040							Evidence	.25	Evidence	.25						
G08-041					Evidence		Evidence									
G08-042																
G08-043					Evidence		Evidence						Evidence			
G08-044																
G08-045																
G08-046																
G08-047																
G08-048	Evidence				Evidence											
G08-049																
G08-050																

APPENDIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
G08-051																
G08-052																
G08-053																
G08-054																
G08-055																
G08-056																
G08-057																
G08-058																
G08-059																
G08-060																
G08-061																
G08-062																
G08-063																
G08-064																
G08-065																
G08-066																
G08-067																
G08-068																
G08-069																
G08-070																
G09-001																
G09-002																
G09-003																
G09-004																
G09-005																
G09-006																
G09-007																
G09-008																
G09-009																
G09-010																
G09-011																
G09-012																
G09-013																
G09-014																
G09-015																
G09-016																
G09-LS1																
H05-001																
H05-002																
H05-003																

A DIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
H05-004																
H05-005																
H05-006																
H05-007																
H05-008																
H05-009																
H05-010																
H05-011																
H05-012							Evidence						Active Flow	0.1		
H05-013																
H05-014																
H05-015																
H05-016																
H05-017																
H05-018																
H05-019																
H05-020																
H05-021																
H05-022											Evidence					
H05-023																
H05-024																
H05-025																
H05-026																
H05-027																
H05-028			Evidence													
H05-029			Evidence													
H05-030			Evidence													
H05-031			Evidence				Evidence									
H05-032																
H05-033																
H05-034																
H06-001																
H06-002																
H06-003																
H06-004							Evidence									
H06-005																
H06-006																
H06-007																
H06-008																
H06-009																

APPENDIX A
Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
H06-010																
H06-011																
H06-012													Active Flow	0.1		
H06-013																
H06-014																
H06-015			Evidence		Evidence											
H06-016																
H06-017																
H06-018							Evidence									
H06-019																
H06-020																
H06-021																
H06-022																
H06-023																
H06-024																
H06-025																
H06-026													Active Flow	0.1		
H06-027																
H06-028																
H06-029					Active Flow	0.01										
H06-030																
H06-031																
H06-032																
H06-033																
H06-034																
H06-035																
H06-036																
H06-037																
H06-038																
H06-039																
H06-040																
H06-041																
H06-042																
H06-043																
H06-044																
H06-045																
H06-046																
H06-047																
H06-048																
H06-049							Evidence				Evidence					

A DIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
H06-050					Evidence											
H06-051																
H06-052																
H06-053																
H06-054																
H06-055			Evidence													
H06-056			Evidence													
H06-057																
H06-058	Evidence		Evidence													
H06-059																
H06-060																
H06-061							Evidence									
H06-062							Active Flow	0.01	Active Flow	0.01						
H06-063																
H06-064																
H06-065																
H07-001																
H07-002											Active Flow	0.25	Active Flow	0.25		
H07-003																
H07-004																
H07-005											Active Flow	0.75				
H07-006																
H07-007									Active Flow	0.75	Active Flow	0.25	Active Flow	0.25		
H07-008																
H07-009																
H07-010																
H07-011																
H07-012													Active Flow	5.0		
H07-013																
H07-014																
H07-015																
H07-016													Active Flow	0.5		
H07-017																
H07-018																
H07-019																
H07-020																
H08-001					Active Flow	0.1	Active Flow	0.1								
H08-002																
H08-003																
H08-004																

APPENDIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
H08-005							Evidence									
H08-006																
H08-007																
H08-008																
H08-009					Evidence	.25										
H08-010											Evidence					
H08-011					Evidence						Evidence					
H08-012					Evidence						Evidence					
H08-013					Evidence		Evidence									
H08-014					Evidence		Evidence									
H08-015																
H08-016																
H08-017																
H08-018																
H08-019																
H08-020					Evidence								Evidence			
H08-021			No Evidenc		Evidence						Active Flow	3	Active Flow	1		
I06-001													Active Flow	0.1		
I06-002																
I06-003																
I06-004																
I07-001																
I07-002																
I07-003																
I07-004																
I07-005																
I07-006																
I07-007																
I07-008																
I07-009																
I07-010																
I07-011																
I08-001																
I08-002													Active Flow	0.5		
I08-003													Active Flow	0.25		
I08-004																
I08-005																
I08-006																
I08-007																
I08-008																

NDIX A

Manhole Inspection Results (Leakage)

Manhole ID #	Cover Defect	Cover Observ.	Frame Defect	Frame Observ.	Frame Seal Defect	F. Seal Observ.	Grd Adj Defect	Grd Adj Observ.	Cone Defect	Cone Observ.	Wall Defect	Wall Observ.	Bench Defect	Bench Observ.	Invert Defect	Invert Observ.
I08-009																
I08-LS1																

IDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
D07-001																
D07-002																
D07-003																
D07-004																
D07-005																
D07-006																
D07-007																
D07-008																
D07-009																
D07-010																
D07-011																
D07-012																
D07-013																
D07-014																
D07-015																
D07-016																
D07-017																
D07-018																
D07-019																
D07-020																
D07-021																
D07-022																
D07-023																
D07-LS1																
E05-001																
E05-002																
E05-003																
E05-004																
E05-005																
E05-006																
E05-007																
E05-008																
E05-009																
E05-010																
E05-011																
E05-LS1																
E05-LS2																
E06-001																
E06-002													MILD	25% - 50%		
E06-003																

APPENDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
E06-004																
E06-005																
E06-006			MODERATE	10% - 25%			MILD	25% - 50%								
E06-007			MODERATE	<10%	MODERATE	>50%										
E06-008																
E06-009																
E06-010																
E06-011																
E06-012																
E06-013					MODERATE	>50%										
E06-014																
E06-015																
E06-016																
E06-017					MODERATE	>50%										
E06-018																
E06-019																
E06-020																
E06-021																
E06-022																
E06-023																
E06-024																
E06-025																
E06-026																
E06-027																
E06-028																
E06-029																
E06-030																
E06-031																
E06-032																
E06-033																
E06-034					MODERATE	>50%										
E06-035																
E06-036																
E06-037																
E06-038																
E06-039																
E06-040																
E06-041	MILD	25% - 50%														
E06-042																
E06-043							MODERATE	25% - 50%								

IDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
E06-044																
E06-045																
E06-046																
E06-047																
E06-048																
E06-049																
E06-050																
E06-051																
E06-052																
E06-053																
E06-054																
E06-055																
E06-056																
E06-057																
E06-058																
E07-001																
E07-002																
E07-003																
E07-004																
E07-005																
E07-006																
E07-007							MILD	<10%								
E07-008																
E07-009							MILD	25% - 50%								
E07-010																
E07-011																
E07-012																
E07-013																
E07-014																
E07-015																
E07-016																
E07-017																
E07-018																
E07-019							SEVERE	>50%								
E07-020																
E07-021																
E07-022																
E07-023																
E07-024																
E07-025																

APPENDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
E07-026																
E07-027																
E07-028																
E07-029																
E07-030																
E07-031																
E07-032																
E07-033																
E07-034																
E07-035																
E07-036																
E07-037																
E07-038																
E07-039																
E07-040																
E07-041																
E07-042																
E07-043																
E07-044																
E07-045																
E07-046							MILD	10% - 25%								
E07-047																
E07-048																
E07-049							MILD	10% - 25%								
E07-050																
E07-051							SEVERE	25% - 50%								
E07-052																
E07-053																
E07-054																
E07-055																
E07-056																
E08-001																
E08-002																
E08-003																
E08-004																
E08-005																
E08-006																
E08-007																
E08-008																
E08-009																

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
E08-010																
E08-011																
E08-012																
F04-001																
F04-002																
F04-003																
F04-004																
F04-005																
F04-006																
F04-007																
F04-008																
F04-009																
F04-010																
F04-011																
F04-012																
F04-013																
F04-014																
F04-015																
F04-016																
F04-017																
F04-018																
F04-019																
F04-020																
F04-021																
F04-022																
F04-023																
F04-024																
F04-025																
F04-026																
F04-027																
F04-028																
F04-029																
F04-030																
F04-031																
F04-032																
F05-001																
F05-002																
F05-003																
F05-004																
F05-005																

APPENDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
F05-006																
F05-007																
F05-008																
F05-009																
F05-010																
F05-011																
F06-001																
F06-002																
F06-003																
F06-004																
F06-005																
F06-006																
F06-007																
F06-008									MILD	10% - 25%						
F06-009																
F06-010							MILD	10% - 25%								
F06-011																
F06-012																
F06-013																
F06-014																
F06-015																
F06-016																
F06-017																
F06-018																
F06-019																
F06-020																
F06-021																
F06-022																
F06-023																
F06-024																
F06-025																
F06-026							MILD	25% - 50%								
F06-027							MILD	25% - 50%								
F06-028			MILD	<10%												
F06-029																
F06-030																
F06-031																
F06-032																
F06-033																
F06-034																

APPENDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
F06-035																
F06-036																
F06-037																
F06-038																
F06-039																
F06-040																
F06-041																
F06-042																
F06-043																
F06-044																
F06-045																
F06-046																
F06-047																
F06-048					MODERATE	>50%										
F06-049																
F06-050																
F06-051																
F06-052							MILD	10% - 25%								
F06-053																
F06-054																
F06-055																
F06-056																
F06-057																
F06-058																
F06-059																
F06-060					SEVERE	>50%	MODERATE	25% - 50%								
F07-001																
F07-002																
F07-003																
F07-004																
F07-005																
F07-006																
F07-007																
F07-008																
F07-009																
F07-010																
F07-011					MILD	25% - 50%										
F07-012																
F07-013													NONE	<10%	MILD	25% - 50%
F07-014																

APPENDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
F07-015																
F07-016																
F07-017																
F07-018																
F07-019																
F07-020					MILD	>50%										
F07-021																
F07-022																
F07-023											MILD	<10%				
F07-024																
F07-025																
F07-026																
F07-027																
F07-028																
F07-029																
F07-030																
F07-031					SEVERE	>50%										
F07-032																
F07-033																
F07-034																
F07-035																
F07-036																
F07-037																
F07-038																
F07-039																
F07-040																
F07-041																
F07-042																
F07-043																
F07-044																
F07-045									MODERATE	>50%	MODERATE	>50%				
F07-046																
F07-047																
F07-048																
F07-049																
F07-050																
F07-051																
F07-052													MODERATE	10% - 25%	MODERATE	10% - 25%
F07-053																
F07-054																

/ DIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
F07-055					SEVERE	>50%										
F07-056																
F07-057																
F07-058																
F07-059							SEVERE	>50%								
F07-060																
F07-061																
F07-062																
F07-063																
F07-064																
F07-065																
F07-066																
F07-067																
F07-068																
F07-069																
F07-070																
F07-071																
F07-072																
F07-073							MILD	10% - 25%								
F07-074																
F07-075																
F07-076							MILD	25% - 50%					MODERATE	>50%	MODERATE	>50%
F07-077																
F07-078																
F07-079																
F07-080																
F07-081																
F07-082																
F07-083																
F07-084																
F07-085																
F07-086																
F07-087																
F07-088																
F07-089																
F08-001																
F08-002																
F08-003																
F08-004																
F08-005			MODERATE	<10%												

APPENDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
F08-006																
F08-007																
F08-008																
F08-009																
F08-010																
F08-011																
F08-012																
F08-013																
F08-014																
F08-015																
F08-016																
F08-017																
F08-018																
F08-019																
F08-020																
F08-021																
F08-022																
F08-023																
F08-024																
F08-025																
F08-026																
F08-027																
F08-028																
F08-029																
F08-030																
F08-031																
F08-032																
F08-033																
F08-034																
F08-035																
F08-036																
F08-037																
F08-038																
F08-039																
F08-040																
F08-041																
F08-042																
F08-043																
F08-044																
F09-001																

/ DIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
F09-002																
F09-003																
F09-004																
F09-005																
F09-006					MODERATE	>50%										
F09-007																
F09-008																
F09-009																
F09-010																
F09-011																
F09-012																
F09-013																
F09-014																
F09-015																
F09-016																
F09-017																
F09-018																
F09-019																
F09-020																
F09-021																
F09-022																
F09-023																
F09-024																
F09-025																
F09-026																
F09-027																
F09-028																
F09-029																
F09-030					SEVERE	>50%										
F09-031					MODERATE	10% - 25%										
F09-032																
F09-LS1																
G03-001																
G03-002																
G03-003																
G03-004																
G03-005																
G04-001																
G04-002																
G04-003																

APPENDIX A
Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
G04-004																
G04-005																
G04-006																
G04-007																
G04-008																
G04-009																
G04-010																
G04-011																
G04-012																
G04-013																
G04-014																
G04-015																
G04-016																
G04-017																
G04-018																
G04-019																
G04-020																
G04-021																
G04-022																
G04-023																
G04-024																
G04-025																
G04-026																
G04-027																
G04-028																
G04-029																
G04-030																
G04-031																
G04-032																
G04-033																
G04-LS1																
G05-001																
G05-002																
G05-003																
G05-004									MILD	<10%						
G05-005																
G05-006																
G05-007																
G05-008																
G05-009																

IDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
G05-010																
G05-011																
G05-012																
G05-013																
G05-014																
G05-015																
G05-016																
G05-017																
G05-018																
G05-019																
G05-020																
G05-021																
G05-022																
G05-023																
G05-024																
G05-025																
G05-026																
G05-027																
G05-028																
G05-029																
G05-030																
G05-031																
G05-032																
G05-033																
G05-034							MILD	<10%								
G05-035																
G05-036																
G05-037																
G05-038																
G05-039																
G05-040																
G05-041																
G05-042																
G05-043																
G05-044																
G05-045																
G06-001																
G06-002																
G06-003																
G06-004																

APPENDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
G06-005																
G06-006																
G06-007																
G06-008																
G06-009																
G06-010																
G06-011																
G06-012																
G06-013																
G06-014																
G06-015																
G06-016																
G06-017							MILD	10% - 25%								
G06-018																
G06-019																
G06-020																
G06-021																
G06-022																
G06-023																
G06-024																
G06-025																
G06-026																
G06-027																
G06-028																
G06-029																
G06-030																
G06-031																
G06-032																
G06-033																
G06-034																
G06-035			MODERATE	25% - 50%												
G06-036																
G06-037																
G06-038											MILD	<10%				
G06-039																
G06-040																
G06-041																
G06-042																
G06-043																
G06-044																

IDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
G06-045																
G06-046							MILD	<10%								
G06-047																
G06-048																
G06-049																
G06-050																
G06-051																
G06-052																
G06-053																
G06-054																
G06-055																
G06-056	MISSING	>50%					SEVERE	>50%	SEVERE	>50%						
G06-057																
G06-058							MILD	10% - 25%								
G06-059																
G06-060																
G06-061																
G06-062																
G06-063																
G06-064																
G06-065																
G07-001					SEVERE											
G07-002																
G07-003																
G07-004																
G07-005																
G07-006																
G07-007													MILD	25% - 50%	MILD	10% - 25%
G07-008																
G07-009																
G07-010																
G07-011																
G07-012																
G07-013																
G07-014																
G07-015																
G07-016																
G07-017																
G07-018																
G07-019																

APPENDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
G07-020																
G07-021																
G07-022																
G07-023																
G07-024																
G07-025																
G07-026																
G07-027																
G07-028																
G07-029																
G07-030																
G07-031																
G07-032																
G07-033																
G07-034																
G07-035																
G07-036																
G07-037																
G07-038																
G07-039																
G07-040																
G07-041																
G07-042																
G07-043																
G07-044																
G07-045																
G07-046																
G07-047																
G07-048																
G07-049																
G08-001																
G08-002																
G08-003																
G08-004																
G08-005																
G08-006																
G08-007																
G08-008																
G08-009																
G08-010																

IDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
G08-011									MODERATE	<10%						
G08-012																
G08-013																
G08-014																
G08-015																
G08-016																
G08-017																
G08-018																
G08-019																
G08-020																
G08-021																
G08-022																
G08-023																
G08-024																
G08-025																
G08-026																
G08-027																
G08-028																
G08-029																
G08-030																
G08-031																
G08-032																
G08-033																
G08-034																
G08-035																
G08-036																
G08-037																
G08-038																
G08-039																
G08-040																
G08-041																
G08-042																
G08-043																
G08-044																
G08-045																
G08-046																
G08-047																
G08-048																
G08-049																
G08-050																

APPENDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
G08-051																
G08-052																
G08-053																
G08-054																
G08-055																
G08-056																
G08-057																
G08-058																
G08-059																
G08-060																
G08-061																
G08-062																
G08-063																
G08-064																
G08-065																
G08-066																
G08-067																
G08-068																
G08-069																
G08-070																
G09-001	MODERATE	10% - 25%	SEVERE	25% - 50%												
G09-002																
G09-003																
G09-004																
G09-005																
G09-006																
G09-007																
G09-008																
G09-009																
G09-010																
G09-011																
G09-012																
G09-013																
G09-014																
G09-015																
G09-016																
G09-LS1																
H05-001																
H05-002																
H05-003																

DIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
H05-004																
H05-005																
H05-006																
H05-007																
H05-008																
H05-009																
H05-010																
H05-011																
H05-012																
H05-013																
H05-014																
H05-015																
H05-016																
H05-017																
H05-018																
H05-019																
H05-020																
H05-021																
H05-022																
H05-023																
H05-024																
H05-025																
H05-026																
H05-027																
H05-028																
H05-029							MILD	10% - 25%								
H05-030																
H05-031																
H05-032																
H05-033																
H05-034																
H06-001																
H06-002																
H06-003																
H06-004																
H06-005																
H06-006																
H06-007																
H06-008																
H06-009																

APPENDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
H06-010																
H06-011							MILD	10% - 25%								
H06-012																
H06-013																
H06-014																
H06-015	MILD	10% - 25%	SEVERE	25% - 50%	SEVERE	>50%										
H06-016																
H06-017																
H06-018																
H06-019																
H06-020																
H06-021																
H06-022																
H06-023																
H06-024																
H06-025																
H06-026																
H06-027																
H06-028																
H06-029																
H06-030																
H06-031																
H06-032																
H06-033																
H06-034																
H06-035																
H06-036																
H06-037																
H06-038																
H06-039																
H06-040																
H06-041																
H06-042																
H06-043																
H06-044																
H06-045																
H06-046																
H06-047																
H06-048																
H06-049																

APPENDIX A
Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
H06-050																
H06-051																
H06-052																
H06-053																
H06-054																
H06-055																
H06-056																
H06-057																
H06-058																
H06-059																
H06-060																
H06-061																
H06-062																
H06-063																
H06-064																
H06-065																
H07-001			MILD	10% - 25%												
H07-002																
H07-003																
H07-004																
H07-005																
H07-006																
H07-007																
H07-008					MILD	10% - 25%										
H07-009																
H07-010																
H07-011							SEVERE	10% - 25%								
H07-012							SEVERE	>50%								
H07-013																
H07-014																
H07-015																
H07-016																
H07-017																
H07-018																
H07-019																
H07-020																
H08-001																
H08-002																
H08-003																
H08-004																

APPENDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
H08-005																
H08-006																
H08-007																
H08-008																
H08-009																
H08-010																
H08-011																
H08-012																
H08-013																
H08-014																
H08-015																
H08-016																
H08-017																
H08-018																
H08-019																
H08-020																
H08-021																
I06-001																
I06-002																
I06-003																
I06-004																
I07-001																
I07-002																
I07-003																
I07-004																
I07-005																
I07-006																
I07-007																
I07-008																
I07-009																
I07-010																
I07-011																
I08-001																
I08-002																
I08-003																
I08-004																
I08-005																
I08-006																
I08-007																
I08-008																

NDIX A

Manhole Inspection Results (Structural)

Manhole ID #	Cover Severity	Density of Defect	Frame Severity	Density of Defect	Fr. Seal Severity	Density of Defect	Grade Severity	Density of Defect	Cone Severity	Density of Defect	Wall Severity	Density of Defect	Bench Severity	Density of Defect	Invert Severity	Density of Defect
I08-009																
I08-LS1																

NDIX A

Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
D07-001		Setter's Pointe	under snow					
D07-002		Setter's Pointe	good mhs in subdiv					
D07-003		Setter's Pointe						
D07-004		Setter's Pointe					Smooth Flow	
D07-005		Setter's Pointe					Smooth Flow	
D07-006		Setter's Pointe			roots frame seal		Smooth Flow	
D07-007		Setter's Pointe					Smooth Flow	
D07-008		Setter's Pointe					Smooth Flow	
D07-009		Setter's Pointe	possible under snow					
D07-010		Setter's Pointe						
D07-011		Setter's Pointe						
D07-012		Setter's Pointe						
D07-013		Setter's Pointe						
D07-014		Setter's Pointe	snow					
D07-015		Setter's Pointe						
D07-016	lite corrosion	Setter's Pointe					Debris Buildup	
D07-017		Setter's Pointe					Smooth Flow	
D07-018		Setter's Pointe					Acute Angle	
D07-019		Setter's Pointe						
D07-020		Setter's Pointe						
D07-021		Setter's Pointe						
D07-022		Setter's Pointe						
D07-023		Setter's Pointe	snow					
D07-LS1		Setter's Pointe						
E05-001		North Pointe Village					Smooth Flow	
E05-002		North Pointe Village						
E05-003		North Pointe Village					Smooth Flow	
E05-004		North Pointe Village						
E05-005		North Pointe Village						
E05-006		North Pointe Village					Smooth Flow	
E05-007		North Pointe Village						
E05-008		North Pointe Village						
E05-009		North Pointe Village						
E05-010		North Pointe Village						
E05-011		North Pointe Village						
E05-LS1	pic looking south	North Pointe Village						
E05-LS2		Sutter's Creek						
E06-001		Spencer's Addition						pipe seals leaking
E06-002		Spencer's Addition						
E06-003		Spencer's Addition						

APPENDIX A
Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
E06-004		Spencer's Addition						
E06-005		Spencer's Addition			rubber boot on grd adj		Smooth Flow	
E06-006	completely plugged.	Spencer's Addition		ring on frame	cracked		Dam/Blockage	pipe seals leaking
E06-007		Spencer's Addition			no frame seal,		Smooth Flow	
E06-008		Spencer's Addition						
E06-009		Spencer's Addition						
E06-010		Spencer's Addition						
E06-011		Spencer's Addition						
E06-012		Spencer's Addition						
E06-013		Spencer's Addition			3 in offset		Smooth Flow	
E06-014		Spencer's Addition	unable to open. no pick hole					
E06-015		Spencer's Addition						
E06-016		Spencer's Addition						
E06-017		Sutter's Creek			frame offset from cone		Smooth Flow	
E06-018		Sutter's Creek						
E06-019		Sutter's Creek					Smooth Flow	
E06-020		Sutter's Creek						
E06-021		Sutter's Creek						
E06-022		Sutter's Creek						
E06-023		Sutter's Creek					Smooth Flow	
E06-024		Tuscany Estates 1st Plat	undee dumpster					
E06-025		Tuscany Estates 1st Plat				wall joints	Smooth Flow	
E06-026		Tuscany Estates 1st Plat						
E06-027		Tuscany Estates 1st Plat					Smooth Flow	
E06-028		Tuscany Estates 1st Plat					Smooth Flow	
E06-029	appears plugged	Tuscany Estates 1st Plat					Smooth Flow	
E06-030		Tuscany Estates 1st Plat					Smooth Flow	
E06-031		Tuscany Estates 1st Plat						
E06-032		Tuscany Estates 1st Plat						
E06-033		Sutter's Creek						
E06-034		Sutter's Creek			frame offset from cone		Smooth Flow	
E06-035		Sutter's Creek						
E06-036		Sutter's Creek						
E06-037		Sutter's Creek						
E06-038		Sutter's Creek						
E06-039		Sutter's Creek					Smooth Flow	
E06-040		Sutter's Creek						
E06-041		Tuscany & Tuscany Villas		mower hit				
E06-042		Tuscany & Tuscany Villas						
E06-043	down pic looking south	Tuscany & Tuscany Villas			4 inches. can see soil		Smooth Flow	

DIX A

Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
E06-044		Tuscany & Tuscany Villas					Smooth Flow	
E06-045		Tuscany & Tuscany Villas						
E06-046		Tuscany & Tuscany Villas					Smooth Flow	
E06-047		Tuscany & Tuscany Villas						
E06-048		Tuscany & Tuscany Villas					Smooth Flow	
E06-049		Tuscany & Tuscany Villas						
E06-050		Tuscany & Tuscany Villas					Smooth Flow	
E06-051		Tuscany & Tuscany Villas						
E06-052		Tuscany & Tuscany Villas						
E06-053		Tuscany & Tuscany Villas						
E06-054		Tuscany & Tuscany Villas						
E06-055		Tuscany & Tuscany Villas						
E06-056		Tuscany & Tuscany Villas						
E06-057		Tuscany & Tuscany Villas					Smooth Flow	
E06-058		Tuscany & Tuscany Villas						
E07-001		Improvements						
E07-002		Improvements						
E07-003		Improvements						
E07-004		Improvements						
E07-005		Improvements						
E07-006								
E07-007	buildup on wall	Quail Run			small crack gr adj	wall joint leak	Smooth Flow	
E07-008		Quail Run					Smooth Flow	
E07-009		Quail Run			cracked		Smooth Flow	
E07-010		Quail Run						
E07-011		Quail Run						
E07-012		Quail Run						
E07-013		Quail Run						
E07-014		Quail Run					Smooth Flow	
E07-015								
E07-016		Quail Run						
E07-017		Quail Run						
E07-018		Quail Run			roots		Smooth Flow	pipe seals leaking
E07-019					completely 6 inches		Smooth Flow	
E07-020								
E07-021							Smooth Flow	
E07-022								
E07-023			new us structure flowing ne				Smooth Flow	
E07-024							Smooth Flow	
E07-025								

APPENDIX A
Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
E07-026			may not exist					
E07-027								
E07-028							Smooth Flow	
E07-029								
E07-030		Setter's Pointe					Smooth Flow	
E07-031		Quail Ridge						
E07-032		Westfield					Square Turn	
E07-033		Quail Ridge						
E07-034	high	Quail Ridge					Smooth Flow	
E07-035	mh concrete corrosion	Quail Ridge					Smooth Flow	pipe seals leaking
E07-036		Quail Ridge	cover seized					
E07-037		Quail Ridge						
E07-038	throughout . medium	Quail Ridge					Smooth Flow	
E07-039		Quail Ridge	3 inches					
E07-040		Quail Ridge	cover seized					
E07-041		Quail Ridge						
E07-042		Quail Ridge					Flat Bottom	
E07-043		Quail Ridge					Debris Buildup	
E07-044		Quail Ridge						
E07-045		Quail Ridge					Smooth Flow	
E07-046		Quail Ridge			cracked		Smooth Flow	
E07-047		Quail Ridge						
E07-048		Quail Ridge						
E07-049		Westfield			cracked		Smooth Flow	
E07-050		Westfield						
E07-051		Westfield					Smooth Flow	
E07-052		Westfield						
E07-053		Westfield						
E07-054								
E07-055			cover seized					
E07-056								
E08-001		Harper Farm Phase 1						
E08-002		Harper Farm Phase 1						
E08-003		Harper Farm Phase 1					Smooth Flow	
E08-004		Improvements						
E08-005		Improvements						
E08-006		Improvements						
E08-007		Improvements						
E08-008		Improvements						
E08-009		Improvements						

APPENDIX A

Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
E08-010		Improvements						
E08-011		Improvements						
E08-012		Improvements						
F04-001		Sewer Ray-Pec Extension	cover seized					
F04-002	in low point in field. all	Sewer Ray-Pec Extension	no line from east		adj/cone joint.	joints leaking	Smooth Flow	
F04-003		Sewer Ray-Pec Extension			grd adj / cone joint leaks		Smooth Flow	
F04-004		Copper Creek 2nd Plat					Smooth Flow	
F04-005		Sewer Ray-Pec Extension				badly	Smooth Flow	
F04-006		Sewer Ray-Pec Extension						
F04-007		Sewer Ray-Pec Extension					Smooth Flow	
F04-008		Sewer Ray-Pec Extension		riser ring			Dam/Blockage	backing up flow
F04-009		Copper Creek 1st Plat						
F04-010		Sewer Ray-Pec Extension	buried under new sod poss.					
F04-011		Copper Creek 1st Plat						
F04-012		Copper Creek 1st Plat					Smooth Flow	
F04-013		Copper Creek 1st Plat						
F04-014		Copper Creek 2nd Plat						
F04-015		Copper Creek 2nd Plat						
F04-016		Copper Creek 2nd Plat						
F04-017		Copper Creek 2nd Plat						
F04-018		Copper Creek 2nd Plat						
F04-019		Copper Creek 2nd Plat						
F04-020		Copper Creek 2nd Plat						
F04-021		Copper Creek 2nd Plat						
F04-022		Copper Creek 2nd Plat						
F04-023		Copper Creek 2nd Plat					Smooth Flow	
F04-024		Copper Creek 2nd Plat				wall joint leaking	Smooth Flow	
F04-025		Copper Creek 2nd Plat				wall joint leaking	Smooth Flow	
F04-026		Copper Creek 2nd Plat						
F04-027		Copper Creek 2nd Plat						
F04-028		Copper Creek 2nd Plat						
F04-029		Copper Creek 2nd Plat						
F04-030		Copper Creek 2nd Plat					Debris Buildup	b/t full of dirt 12 inches
F04-031		Sewer Ray-Pec Extension					Smooth Flow	
F04-032		Sewer Ray-Pec Extension						
F05-001		Sewer Ray-Pec Extension					Smooth Flow	
F05-002		Sewer Ray-Pec Extension	mh in standing water 12 inche					
F05-003		Sewer Ray-Pec Extension	unable to open. mh in low sp					
F05-004		Sewer Ray-Pec Extension					Smooth Flow	
F05-005		Sewer Ray-Pec Extension					Smooth Flow	

APPENDIX A
Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
F05-006		Sewer Ray-Pec Extension					Smooth Flow	
F05-007		Sewer Ray-Pec Extension				all wall joint leaks	Smooth Flow	
F05-008		Sewer Ray-Pec Extension				joints leaking	Smooth Flow	
F05-009		Sewer Ray-Pec Extension					Smooth Flow	
F05-010		Sewer Ray-Pec Extension					Smooth Flow	
F05-011		Sewer Ray-Pec Extension					Smooth Flow	
F06-001		System				wall joints leaking	Smooth Flow	
F06-002		System	2nd attempt					
F06-003		Forest Scott Industrial Park	2nd attempt					
F06-004		System					Smooth Flow	
F06-005		System						
F06-006		System	snow					
F06-007		System	snow					
F06-008		Bradley's Crossing Phase 1					Debris Buildup	all pipe seals leaking
F06-009		Bradley's Crossing Industrial					Smooth Flow	
F06-010		Bradley's Crossing Industrial			cracked		Smooth Flow	
F06-011		Bradley's Crossing Industrial					Smooth Flow	
F06-012		Bradley's Crossing Industrial					Smooth Flow	pipe seals leaking
F06-013		Bradley's Crossing Industrial						
F06-014		Bradley's Crossing Industrial					Smooth Flow	
F06-015		Bradley's Crossing Industrial	dirt bike ramp over area					
F06-016								
F06-017								
F06-018		Bradley's Crossing Phase 1						
F06-019		Bradley's Crossing Phase 1					Smooth Flow	
F06-020		Bradley's Crossing Phase 1					Smooth Flow	
F06-021		Bradley's Crossing Phase 1	cover seized					
F06-022		Bradley's Crossing Phase 1					Smooth Flow	
F06-023		Bradley's Crossing Phase 1						
F06-024		Bradley's Crossing Phase 1						
F06-025		Bradley's Crossing Phase 1					Smooth Flow	
F06-026		Bradley's Crossing Phase 1					Smooth Flow	
F06-027		Bradley's Crossing Phase 1					Smooth Flow	
F06-028		Bradley's Crossing Phase 1					Smooth Flow	
F06-029		Bradley's Crossing Phase 1					Smooth Flow	
F06-030		Bradley's Crossing Phase 1						
F06-031		Bradley's Crossing Phase 1						
F06-032		Bradley's Crossing Phase 1						
F06-033		Bradley's Crossing Phase 1						
F06-034		Bradley's Crossing Phase 1						

NDIX A

Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
F06-035		Bradley's Crossing Phase 3					Smooth Flow	
F06-036		Bradley's Crossing Phase 3						
F06-037		Bradley's Crossing Phase 3					Smooth Flow	
F06-038		Bradley's Crossing Phase 3						
F06-039		Bradley's Crossing Phase 3	3 in					
F06-040		Bradley's Crossing Phase 3						
F06-041		Bradley's Crossing Phase 3						
F06-042		Bradley's Crossing Phase 3						
F06-043		Bradley's Crossing Phase 1						
F06-044		Bradley's Crossing Phase 1					Smooth Flow	
F06-045		Bradley's Crossing Phase 1					Smooth Flow	
F06-046		Bradley's Crossing Phase 1						
F06-047		Bradley's Crossing Phase 1	cover seized					
F06-048		Bradley's Crossing Phase 1			frame offset 3 in		Smooth Flow	
F06-049		Bradley's Crossing Phase 1						
F06-050		Bradley's Crossing Phase 1						
F06-051		Kerr Industrial Park						
F06-052		Kerr Industrial Park			cracked		Smooth Flow	
F06-053		Forest Scott Industrial Park					Smooth Flow	
F06-054		Forest Scott Industrial Park					Smooth Flow	
F06-055		Forest Scott Industrial Park						
F06-056		Forest Scott Industrial Park						
F06-057		System					Smooth Flow	
F06-058		System					Smooth Flow	
F06-059		System			roots		Smooth Flow	char. flow hits bench
F06-060	frame needs reset.	Sewer N Main Extension			frame off mh		Smooth Flow	
F07-001		Station						
F07-002							Smooth Flow	pipe seals leaking
F07-003		Sewer Old System 1964	unable to open too tight					
F07-004		Sewer Old System 1964						
F07-005		Sewer Old System 1964	cover seized					
F07-006		Sewer Old System 1964						
F07-007		Sewer Old System 1964						
F07-008		Sewer Old System 1964				joint leaking	Smooth Flow	
F07-009		Sewer Old System 1964		riser ring			Smooth Flow	
F07-010		Sewer Old System 1964					Smooth Flow	
F07-011		Sewer Old System 1964		2 riser rings	frame seal offset 2 inches		Smooth Flow	
F07-012		Sewer Old System 1964		riser ring			Smooth Flow	
F07-013		Sewer Old System 1964						
F07-014		Sewer Old System 1964						

APPENDIX A
Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
F07-015		Sewer Old System 1964						
F07-016		Sewer Old System 1964						
F07-017		Sewer Old System 1964		riser ring			Smooth Flow	
F07-018		Sewer Old System 1964						
F07-019		Sewer Old System 1964		2 riser rings			Smooth Flow	
F07-020		Sewer Old System 1964		2 riser rings	frame rocks		Smooth Flow	
F07-021		Sewer Old System 1964						
F07-022		Sewer Old System 1964	under retaining wall			roots out of crack	Smooth Flow	
F07-023		Sewer Old System 1964			/ grd adj	joints	Debris Buildup	build up
F07-024		Sewer Old System 1964						
F07-025		Sewer Old System 1964						
F07-026		Sewer Old System 1964					Smooth Flow	
F07-027			cover seized					
F07-028		Sewer Old System 1964	cover seized					
F07-029		Sewer Old System 1964					Flat Bottom	
F07-030		Sewer Old System 1964						
F07-031					resting and rocking on		Smooth Flow	
F07-032				riser ring			Smooth Flow	
F07-033								
F07-034								
F07-035								
F07-036								
F07-037								
F07-038								
F07-039								
F07-040		Sewer Old System 1964						
F07-041		Sewer Old System 1964						
F07-042								
F07-043								
F07-044								
F07-045		Sewer Old System 1964		2 riser rings		on all concrete	Debris Buildup	build up. out pipe half
F07-046		Sewer Old System 1964						
F07-047		Sewer Old System 1964						
F07-048		Sewer Old System 1964						
F07-049		Sewer Old System 1964						
F07-050		System					Smooth Flow	
F07-051		Green Meadows 1st Plat					Square Turn	to wall not out pipe
F07-052		Green Meadows 1st Plat						
F07-053		Green Meadows 1st Plat						
F07-054		Green Meadows 1st Plat					Smooth Flow	

IDIX A

Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
F07-055	appear not active	Westfield			frame offset from cone		Smooth Flow	
F07-056		Westfield						
F07-057		Westfield						
F07-058		Westfield						
F07-059		Westfield			grd adj broken soil visible		Smooth Flow	
F07-060		Westfield						
F07-061		Green Meadows 1st Plat						
F07-062		Green Meadows 1st Plat						
F07-063		Green Meadows 1st Plat						
F07-064		Green Meadows 1st Plat					Smooth Flow	
F07-065		Green Meadows 1st Plat						
F07-066		Quail Ridge						
F07-067		Quail Ridge						
F07-068		Quail Ridge						
F07-069		Quail Ridge					Smooth Flow	
F07-070		Green Meadows 2nd Plat			roots		Smooth Flow	
F07-071		Green Meadows 2nd Plat					Smooth Flow	
F07-072		Green Meadows 2nd Plat						
F07-073		Green Meadows 3rd Plat			cracked		Debris Buildup	bench and debris
F07-074		Green Meadows 3rd Plat					Smooth Flow	
F07-075		Green Meadows 3rd Plat						
F07-076		Green Meadows 3rd Plat			cracked		Debris Buildup	allowing debris build
F07-077		Street						
F07-078		Street						
F07-079		Street						
F07-080		Street						
F07-081		Street						
F07-082		Green Meadows 2nd Plat						
F07-083		Green Meadows 2nd Plat					Smooth Flow	
F07-084		Green Meadows 2nd Plat					Smooth Flow	
F07-085		Green Meadows 2nd Plat						
F07-086		Green Meadows 2nd Plat						
F07-087		Sewer N Main Extension						
F07-088		Sewer N Main Extension						
F07-089		Sewer N Main Extension						
F08-001	bench/wall joint leaks	Harper Farm					Smooth Flow	
F08-002		Station					Smooth Flow	
F08-003		Station					Smooth Flow	
F08-004	8 line from east appears plugged	Sewer C Hwy & East Lift Station					Smooth Flow	
F08-005	appears plugged	Station		thru. chunk out of			Smooth Flow	

APPENDIX A

Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
F08-006	appears plugged	Station					Smooth Flow	
F08-007	appears plugged	Station					Smooth Flow	
F08-008		Station					Smooth Flow	
F08-009		Station					Smooth Flow	
F08-010		Station						
F08-011		Station						
F08-012		Windmill Country Estates					Smooth Flow	
F08-013		Windmill Country Estates						
F08-014		Plat						
F08-015		Windmill Country Estates					Smooth Flow	
F08-016		Windmill Country Estates	cover seized					
F08-017		Windmill Country Estates						
F08-018		Windmill Country Estates						
F08-019		Windmill Country Estates						
F08-020		Plat						
F08-021		Plat						
F08-022		Plat						
F08-023		Plat					Smooth Flow	
F08-024		Plat						
F08-025		Plat						
F08-026		Plat						
F08-027		Plat					Smooth Flow	
F08-028		Plat						
F08-029								
F08-030								
F08-031								
F08-032			cleanout					
F08-033		Harper Farm Phase 1	buried 1 inch					
F08-034		Harper Farm Phase 1					Smooth Flow	
F08-035		Harper Farm Phase 1					Smooth Flow	
F08-036		Harper Farm Phase 1	snow					
F08-037		Harper Farm Phase 1					Smooth Flow	
F08-038		Improvements						
F08-039		Improvements						
F08-040		Improvements						
F08-041		Improvements						
F08-042		Harper Farm Phase 1	buried 1 inch					
F08-043		Improvements						
F08-044		Sewer Old System 1964		seal			Debris Buildup	trough constricting
F09-001		Station	bolts and inside locked fence					

APPENDIX A
Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
F09-002		Station	bolts and inside locked fence					
F09-003		Shadow Glen 1st Plat						
F09-004		Shadow Glen 1st Plat					Smooth Flow	pipe seals leaking
F09-005		Shadow Glen 1st Plat					Smooth Flow	pipe seals leaking
F09-006		Shadow Glen 1st Plat			frame offset 4 inches		Smooth Flow	
F09-007	appears plugged	Shadow Glen 1st Plat					Smooth Flow	
F09-008		Shadow Glen 1st Plat	snow					
F09-009		Shadow Glen 1st Plat					Smooth Flow	
F09-010		Shadow Glen 1st Plat						
F09-011		Shadow Glen 1st Plat						
F09-012		Shadow Glen 2nd Plat						
F09-013		Shadow Glen 2nd Plat	buried under landscape					
F09-014		Shadow Glen 2nd Plat	buried under landscape					
F09-015		Shadow Glen 2nd Plat						
F09-016		Shadow Glen 2nd Plat						
F09-017		Shadow Glen 2nd Plat						
F09-018		Shadow Glen 2nd Plat					Smooth Flow	
F09-019		Shadow Glen Phase 3						
F09-020		Shadow Glen Phase 3						
F09-021		Shadow Glen 2nd Plat					Smooth Flow	
F09-022		Shadow Glen Phase 3						
F09-023		Shadow Glen Phase 3						
F09-024		Shadow Glen Phase 3						
F09-025		Shadow Glen Phase 3						
F09-026		Shadow Glen Phase 3					Smooth Flow	
F09-027		Shadow Glen Phase 3						
F09-028		Shadow Glen Phase 3						
F09-029		Shadow Glen 2nd Plat						
F09-030		Shadow Glen 1st Plat			frame offset 6 inches		Smooth Flow	
F09-031		Shadow Glen 1st Plat					Square Turn	
F09-032		Centennial Farms 1st Plat						
F09-LS1		Station						
G03-001		Sewer Ray-Pec Extension					Smooth Flow	
G03-002		Sewer Ray-Pec Extension				joint leaking	Smooth Flow	
G03-003	line in from east	Sewer Ray-Pec Extension					Flat Bottom	causing dam at north
G03-004	line in from north	Sewer Ray-Pec Extension						
G03-005			high school mh					
G04-001		Olive Branch 2nd Plat						
G04-002		Olive Branch 2nd Plat						
G04-003		Olive Branch 2nd Plat						

APPENDIX A
Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
G04-004		Olive Branch 2nd Plat					Smooth Flow	
G04-005		Olive Branch 2nd Plat					Smooth Flow	
G04-006		Olive Branch 2nd Plat						
G04-007		Olive Branch 2nd Plat						
G04-008		Olive Branch 2nd Plat						
G04-009		Olive Branch 1st Plat				joint leaking	Smooth Flow	
G04-010		Olive Branch 1st Plat						
G04-011		Olive Branch 1st Plat						
G04-012		Olive Branch 1st Plat						
G04-013		Olive Branch 1st Plat						
G04-014		Olive Branch 1st Plat				joint leaking	Debris Buildup	erratic trough
G04-015		Olive Branch 1st Plat						
G04-016		Olive Branch 1st Plat					Smooth Flow	
G04-017		Olive Branch 1st Plat						
G04-018		Olive Branch 2nd Plat						
G04-019		Olive Branch 2nd Plat						
G04-020		Olive Branch 1st Plat						
G04-021		Olive Branch 1st Plat					Dam/Blockage	built up to almost full
G04-022		Olive Branch 1st Plat					Debris Buildup	erratic trough
G04-023		Olive Branch 1st Plat					Debris Buildup	erratic trough
G04-024		Olive Branch 1st Plat					Smooth Flow	
G04-025		Olive Branch 1st Plat						
G04-026		Olive Branch 2nd Plat	2 inches					
G04-027		Olive Branch 2nd Plat						
G04-028		Sewer Ray-Pec Extension						
G04-029								
G04-030								
G04-031								
G04-032		Sewer Ray-Pec Extension					Smooth Flow	
G04-033								
G04-LS1		Olive Branch 1st Plat						
G05-001		Twin Oaks 1st Plat					Smooth Flow	
G05-002		Twin Oaks 1st Plat						
G05-003		Twin Oaks 1st Plat						
G05-004		Twin Oaks 1st Plat				broken off. wall	Debris Buildup	dam
G05-005		Twin Oaks 1st Plat						
G05-006		Twin Oaks 1st Plat						
G05-007		Twin Oaks 1st Plat						
G05-008		Twin Oaks 1st Plat					Smooth Flow	
G05-009		Twin Oaks 1st Plat					Smooth Flow	

IDIX A

Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
G05-010		Twin Oaks 1st Plat						
G05-011								
G05-012								
G05-013								
G05-014								
G05-015								
G05-016								
G05-017								
G05-018								
G05-019								
G05-020								
G05-021								
G05-022		Twin Oaks 1st Plat						
G05-023		Twin Oaks 1st Plat						
G05-024								
G05-025		Twin Oaks 2nd Plat						
G05-026		Twin Oaks 2nd Plat						
G05-027		Twin Oaks 5th Plat					Smooth Flow	
G05-028		Twin Oaks 5th Plat						
G05-029		Twin Oaks 5th Plat						
G05-030		Twin Oaks 1st Plat						
G05-031		Twin Oaks 2nd Plat						
G05-032		Twin Oaks 2nd Plat						
G05-033		Twin Oaks 1st Plat						
G05-034		Twin Oaks 2nd Plat						
G05-035		Twin Oaks 2nd Plat					Smooth Flow	
G05-036		Twin Oaks 2nd Plat					Smooth Flow	
G05-037		Twin Oaks 2nd Plat						
G05-038		Twin Oaks 3rd Plat						
G05-039		Twin Oaks 3rd Plat						
G05-040		Twin Oaks 2nd Plat					Smooth Flow	
G05-041		Twin Oaks 3rd Plat						
G05-042		Twin Oaks 3rd Plat						
G05-043		Twin Oaks 1st Plat						
G05-044		Twin Oaks 1st Plat					Smooth Flow	
G05-045		Sewer Ray-Pec Extension						
G06-001		System	boltdown				Smooth Flow	
G06-002		System						
G06-003	picture looking south	System	boltdown. mh located 3 feet f					
G06-004		System					Smooth Flow	

APPENDIX A

Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
G06-005		System						
G06-006		System				joint leaking	Smooth Flow	
G06-007		System	2nd attempt					
G06-008		System					Smooth Flow	
G06-009		System					Smooth Flow	
G06-010		System	bolts; 2nd attempt					
G06-011	pic looking west	System	bolts					
G06-012		System				joint leaking	Smooth Flow	
G06-013		System					Smooth Flow	
G06-014		System	angry dog; 2nd attempt					
G06-015		System					Debris Buildup	inches sludge in
G06-016		System	in stream bank				Smooth Flow	
G06-017	picture looking south	Sewer Ray-Pec Extension	in stream bank		mastic out of joint		Smooth Flow	
G06-018		System					Smooth Flow	
G06-019		System						
G06-020		System						
G06-021							Smooth Flow	
G06-022							Smooth Flow	
G06-023							Smooth Flow	
G06-024		Twin Oaks 1st Plat	angry dog					
G06-025		System					Smooth Flow	
G06-026		System						
G06-027		System						
G06-028		System						
G06-029		System						
G06-030		System					Smooth Flow	
G06-031		System						
G06-032		System						
G06-033		System	boltdown					
G06-034		System	probably under firepit; 2nd atte					
G06-035		System		in 2 spots. cover can't			Smooth Flow	
G06-036		Brome Hill 1st Plat	2nd attempt					
G06-037		System				piece, shows	Smooth Flow	
G06-038		System					Smooth Flow	
G06-039		System						
G06-040		System					Square Turn	
G06-041		System					Smooth Flow	
G06-042		System					Smooth Flow	
G06-043		System						
G06-044		System						

IDIX A

Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
G06-045		System			joints		Smooth Flow	debris
G06-046		System			cracks		Smooth Flow	
G06-047		System					Smooth Flow	
G06-048		System						
G06-049		Brome Hill 1st Plat						
G06-050		Brome Hill 1st Plat						
G06-051		Brome Hill 1st Plat						
G06-052		System					Smooth Flow	
G06-053		System					Smooth Flow	
G06-054		System					Smooth Flow	
G06-055		System					Smooth Flow	
G06-056			wrong cover on frame. grd a	wrong cover	grd adj knocked off cone		Standing Water	no bench trough
G06-057	picture looking south	Harr Grove Extension	cleanout					
G06-058		System			cracks		Smooth Flow	
G06-059		System						
G06-060		System					Smooth Flow	
G06-061		System						
G06-062		Irongate Plaza						
G06-063		Irongate Plaza					Smooth Flow	
G06-064		Irongate Plaza						
G06-065		Irongate Plaza						
G07-001	medium corrosion			COV_COM_0001.jpg			Smooth Flow	
G07-002								
G07-003								
G07-004		Carriage Meadows					Standing Water	
G07-005	pipes cause hydraulic	Sewer Old System 1964					Acute Angle	
G07-006		Sewer Old System 1964		riser ring			Smooth Flow	
G07-007		Sewer Old System 1964					Smooth Flow	
G07-008		Sewer Old System 1964						
G07-009		Sewer Old System 1964	cover seized					
G07-010		Sewer Old System 1964		2 riser rings			Smooth Flow	bench and pipe seals
G07-011		Sewer Old System 1964	cover seized					
G07-012		Sewer Old System 1964		2 riser rings			Smooth Flow	
G07-013		Sewer Old System 1964						
G07-014	line in from west						Smooth Flow	
G07-015		Sewer Old System 1964	cover seized					
G07-016		Sewer Old System 1964						
G07-017		Sewer Old System 1964					Smooth Flow	bench
G07-018		Sewer Old System 1964	cover seized					
G07-019								

APPENDIX A
Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
G07-020								
G07-021								
G07-022								
G07-023								
G07-024								
G07-025								
G07-026		Sewer Old System 1964		riser ring			Smooth Flow	
G07-027		Sewer Old System 1964	cover seized					
G07-028		Sewer Old System 1964		2 riser rings			Smooth Flow	
G07-029		Sewer Old System 1964	cover seized					
G07-030		Sewer Old System 1964	2 inches compacted gravel					
G07-031		Sewer Old System 1964						
G07-032		Carriage Meadows						
G07-033		Carriage Meadows						
G07-034		Carriage Meadows					Smooth Flow	
G07-035		Carriage Meadows						
G07-036		Carriage Meadows					Smooth Flow	
G07-037		Carriage Meadows						
G07-038		Carriage Meadows						
G07-039		Carriage Meadows						
G07-040								
G07-041	grease throughout						Smooth Flow	
G07-042								
G07-043		Sewer Old System 1964		4 riser rings		roots out of joints	Smooth Flow	
G07-044		Sewer Old System 1964	buried under 2 inches compac					
G07-045		Sewer Old System 1964					Smooth Flow	pipe seals leaking
G07-046		Sewer Old System 1964						
G07-047		Carriage Meadows						
G07-048		Carriage Meadows						
G07-049		Carriage Meadows						
G08-001		Rodeo Grounds						
G08-002		Rodeo Grounds			frame offset 3"		Smooth Flow	bench
G08-003		Rodeo Grounds						
G08-004		Sewer Old System 1964	cover off prior to inspection			leaking	Smooth Flow	
G08-005		Sewer Old System 1964				on cone	Acute Angle	
G08-006		Sewer Old System 1964						
G08-007		Sewer Old System 1964	dogs in yard					
G08-008		Sewer Old System 1964						
G08-009								
G08-010								

APPENDIX A
Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
G08-011					rubber boot on frame seal	broken	Debris Buildup	
G08-012							Smooth Flow	
G08-013					rubber boot			
G08-014								
G08-015	wouldn't let me near							
G08-016								
G08-017								
G08-018								
G08-019		Sewer Old System 1964						
G08-020		Sewer Old System 1964		frame -heavy corrosion		heavy corrosion	Debris Buildup	
G08-021							Smooth Flow	pipe seals roots
G08-022		Sewer Old System 1964						
G08-023		Sewer Old System 1964	n0 velocity				Standing Water	
G08-024		Sewer Old System 1964						
G08-025		Sewer Old System 1964						
G08-026		Sewer Old System 1964						
G08-027		Sewer Old System 1964						
G08-028		Sewer Old System 1964						
G08-029		Rodeo Grounds			rubber boot		Debris Buildup	
G08-030		Rodeo Grounds					Flat Bottom	
G08-031		System					Smooth Flow	pipe seals
G08-032		Rodeo Grounds					Dam/Blockage	out pipe.
G08-033		Rodeo Grounds					Smooth Flow	pipe seals leaking
G08-034		Rodeo Grounds					Smooth Flow	pipe seals leaking
G08-035		Rodeo Grounds						
G08-036		Rodeo Grounds					Standing Water	
G08-037		Rodeo Grounds					Smooth Flow	
G08-038		Rodeo Grounds						
G08-039		Rodeo Grounds					Smooth Flow	
G08-040		Rodeo Grounds						
G08-041		Rodeo Grounds	possible location under shrub					
G08-042		Rodeo Grounds					Smooth Flow	
G08-043		Rodeo Grounds						
G08-044		Rodeo Grounds						
G08-045		Centennial Farms 1st Plat						
G08-046		Centennial Farms 1st Plat						
G08-047		Centennial Farms 1st Plat						
G08-048		Centennial Farms 1st Plat					Smooth Flow	
G08-049		Centennial Farms 1st Plat						
G08-050		Centennial Farms 1st Plat						

APPENDIX A
Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
G08-051		Centennial Farms 2nd Plat						
G08-052		Centennial Farms 2nd Plat						
G08-053		Centennial Farms 2nd Plat						
G08-054		Centennial Farms 2nd Plat						
G08-055		Centennial Farms 1st Plat						
G08-056		Centennial Farms 1st Plat						
G08-057		Centennial Farms 1st Plat						
G08-058		Centennial Farms 1st Plat						
G08-059		Centennial Farms 2nd Plat						
G08-060		Centennial Farms 2nd Plat						
G08-061		Centennial Farms Phase 3						
G08-062		Centennial Farms 2nd Plat						
G08-063		Centennial Farms 2nd Plat						
G08-064		Centennial Farms 2nd Plat						
G08-065		Centennial Farms 1st Plat						
G08-066		Centennial Farms 2nd Plat						
G08-067		Centennial Farms 2nd Plat						
G08-068		Centennial Farms Phase 3						
G08-069		Centennial Farms Phase 3						
G08-070		Centennial Farms Phase 3						
G09-001		Fox's Den 1st Plat		missing			Smooth Flow	
G09-002		Fox's Den 1st Plat						
G09-003		Fox's Den 1st Plat					Smooth Flow	
G09-004		Fox's Den 1st Plat						
G09-005		Fox's Den 1st Plat						
G09-006		Fox's Den 1st Plat						
G09-007		Fox's Den 1st Plat					Smooth Flow	
G09-008		Fox's Den 1st Plat					Smooth Flow	
G09-009		Fox's Den 1st Plat						
G09-010		Fox's Den 1st Plat						
G09-011		Fox's Den 1st Plat						
G09-012		Fox's Den 1st Plat						
G09-013		Fox's Den 1st Plat						
G09-014		Centennial Farms 1st Plat						
G09-015		Centennial Farms 1st Plat						
G09-016		Centennial Farms 1st Plat						
G09-LS1	pic looking east	Fox's Den 1st Plat						
H05-001		System						
H05-002		System					Smooth Flow	
H05-003		System						

A DIX A

Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
H05-004		System						
H05-005		System						
H05-006		System						
H05-007		System						
H05-008		System						
H05-009		System						
H05-010		System						
H05-0tt		System						
H05-012		System						
H05-013		System					Smooth Flow	pipe seals leaking
H05-014		System					Smooth Flow	
H05-015								
H05-0t6								
H05-017								
H05-0t8								
H05-0t9								
H05-020							Smooth Flow	
H05-02t								
H05-022		System					Smooth Flow	
H05-023		System					Smooth Flow	
H05-024		System						
H05-025		System						
H05-026		System						
H05-027		System	cover holes asphalted over ca				Smooth Flow	
H05-028		System		riser ring on frame				
H05-029		System		riser ring on frame			Smooth Flow	
H05-030		System		riser ring on frame	cracks on multiple rings		Smooth Flow	
H05-03t		System		riser ring on frame			Smooth Flow	
H05-032		System		riser ring on frame			Smooth Flow	
H05-033		Twin Oaks 3rd Plat						
H05-034		Twin Oaks 3rd Plat						
H06-001		System	boltdown					
H06-002		System						
H06-003		System					Smooth Flow	
H06-004		System					Smooth Flow	
H06-005		System					Smooth Flow	
H06-006		System					Smooth Flow	
H06-007		System	2nd attempt					
H06-008		System	2nd attempt					
H06-009		Twin Oaks Commercial					Smooth Flow	

APPENDIX A

Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
H06-010		System	2nd attempt					
H06-011		Twin Oaks 4th Plat			cracks		Smooth Flow	pipe seals leaking
H06-012		System	boltdown					
H06-013		System	2nd attempt					
H06-014		System						
H06-015		System	mower hit frame	mower hit frame	3 in offset		Smooth Flow	
H06-016		System						
H06-017		Twin Oaks 3rd Plat						
H06-018		Twin Oaks 3rd Plat					Smooth Flow	
H06-019		Twin Oaks 3rd Plat						
H06-020		Twin Oaks 3rd Plat						
H06-021		Twin Oaks 3rd Plat						
H06-022		Twin Oaks 3rd Plat						
H06-023		Irongate Plaza						
H06-024		Irongate Plaza						
H06-025		Twin Oaks 4th Plat					Smooth Flow	pipe seals leaking
H06-026		Twin Oaks 4th Plat					Smooth Flow	
H06-027		Twin Oaks 4th Plat						
H06-028		Twin Oaks 4th Plat					Smooth Flow	
H06-029		Twin Oaks 4th Plat					Smooth Flow	
H06-030		Twin Oaks 4th Plat						
H06-031		Twin Oaks 4th Plat						
H06-032		Twin Oaks 4th Plat						
H06-033		Twin Oaks 4th Plat						
H06-034		Twin Oaks 4th Plat						
H06-035		Twin Oaks 4th Plat						
H06-036		Twin Oaks 4th Plat						
H06-037		Twin Oaks 4th Plat						
H06-038		Twin Oaks 4th Plat						
H06-039		Twin Oaks Commercial					Smooth Flow	
H06-040		Twin Oaks Commercial						
H06-041		Twin Oaks Commercial						
H06-042		Twin Oaks Commercial						
H06-043		Twin Oaks Commercial						
H06-044		Twin Oaks Commercial						
H06-045		System					Smooth Flow	
H06-046		System					Smooth Flow	
H06-047		System						
H06-048		System	buried in garden possible					
H06-049		System					Smooth Flow	

DIX A

Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
H06-050		System					Smooth Flow	
H06-051		System						
H06-052		System						
H06-053		System						
H06-054		System						
H06-055		System		2 riser ring on frame			Smooth Flow	
H06-056		System		riser ring on frame			Smooth Flow	
H06-057		System						
H06-058		System		riser ring			Smooth Flow	
H06-059		System						
H06-060		System						
H06-061		System					Smooth Flow	
H06-062		System			drips from fr seal cone jt		Smooth Flow	
H06-063		System					Smooth Flow	
H06-064		Irongate Plaza						
H06-065		Irongate Plaza						
H07-001				chunk gone			Smooth Flow	
H07-002						wall joint	Smooth Flow	pipe seals leaking
H07-003		1980						
H07-004		1980						
H07-005		1980			rubbee boot on grd adj	wall joint leaks	Smooth Flow	
H07-006		1980			rubber boot on grd adj	wall joint	Smooth Flow	
H07-007		1980			rubber boot on grd adj		Smooth Flow	
H07-008		1980			offset		Smooth Flow	
H07-009		1980						
H07-010		Peculiar Junction						
H07-011		Peculiar Junction			chunk missing		Smooth Flow	
H07-012		Peculiar Junction			inches		Smooth Flow	pipe seals leaking
H07-013		Peculiar Junction	2 inches deep					
H07-014		Peculiar Junction	1 inch					
H07-015		Peculiar Junction						
H07-016		Peculiar Junction					Smooth Flow	pipe seals leaking
H07-017		Peculiar Junction					Smooth Flow	
H07-018								
H07-019		System						
H07-020		Carriage Meadows						
H08-001	bank	Station					Smooth Flow	
H08-002		System						
H08-003		System	could be under large brush pil					
H08-004		System						

APPENDIX A

Manhole Inspection Results (Comments)

Manhole ID #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
H08-005		System					Smooth Flow	
H08-006		System						
H08-007		System						
H08-008		System						
H08-009		System						
H08-010						roots	Smooth Flow	
H08-011							Smooth Flow	
H08-012		Bridle Trail					Square Turn	
H08-013		Bridle Trail					Acute Angle	
H08-014		Bridle Trail					Smooth Flow	
H08-015		Bridle Trail						
H08-016		Bridle Trail						
H08-017		Bridle Trail						
H08-018		Bridle Trail						
H08-019		Bridle Trail						
H08-020		Bridle Trail					Smooth Flow	
H08-021							Smooth Flow	
I06-001		System	bplts missing				Smooth Flow	pipe seals leaking
I06-002		System	boltdown					
I06-003		System	boltdown					
I06-004		System	boltdown					
I07-001		System	boltdown. frame completely o					
I07-002		System	boltdown and under debri. ma					
I07-003		System	boltdown					
I07-004		System	boltdown					
I07-005		System	boltdown					
I07-006		System	boltdown					
I07-007		System	may not exist					
I07-008		System	boltdown					
I07-009		System	boltdown					
I07-010		System	boltdown					
I07-011		System						
I08-001		Station	in giant thornbush					
I08-002		Station					Smooth Flow	pipe seals leaking
I08-003		Station					Smooth Flow	pipe seals leaking
I08-004		Station					Smooth Flow	
I08-005		Station					Smooth Flow	
I08-006		Station					Smooth Flow	
I08-007		Station						
I08-008								

NDIX A

Manhole Inspection Results (Comments)

Manhole iD #	Comments	As-Built Identification	Surface Comments	Cover Comments	Frame Comments	Wall Comments	Invert Hydraulics	Bench Comments
i08-009		System						
I08-LS1		Station						

APPENDIX B --- Building Inspection Results

APP[illegible]DIX B
BUILDING INSP[illegible]CTION RESULTS

House No.	Street	Inspection Status	Building Type	Previous Flooding	Flood Source	Floor Drains	Basement Finish	Sumps	Number of Sumps	Active Sump	Sump Discharge	Outside Source	Source Type
154	Jamar Dr.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	No	
11806	Heritage Dr.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	No	
11209	Timber Creek Dr.	Completed	Single Fam	None		Yes	Partial near sum	Yes	1	Yes	Outside	Yes	Stairwell Drain
11206	Timber Creek Dr.	Completed	Single Fam	None		Yes	Full	Yes	1	Yes	Outside	No	
12202	Astor Ct.	Completed	Single Fam	None		Yes	Full	Yes	1	Yes	Outside	No	
11600	Centennial St.	Completed	Single Fam	None		Yes	Partial near sum	Yes	1	Yes	Outside	No	
987	E. 1st St.	Completed	Single Fam	None		Unknown	Full	No	0	No		No	
12501	Live Oak Cir.	Completed	Single Fam	None		Yes	Partial near sum	No	0	No		No	
22503	Settler Cir.	Completed	Single Fam	Storm Water	Wall or Floor	Yes	No	Yes	1	Yes	Outside	No	
984	Sicklebar Dr.	Completed	Single Fam	None		Yes	Full	Yes	1	Yes	Outside	No	
992	Sicklebar Dr.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	No	
12102	214th Ter.	Completed	Single Fam	None		Yes	Partial near sum	Yes	1	Yes	Outside	No	
12008	214th Ter.	Completed	Single Fam	None		Yes	Full	No	0			No	
12007	214th St.	Completed	Single Fam	None		Yes	Full	No	0	No		No	
12006	214th St.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	No	
22023	Gracie Dr.	Completed	Single Fam	None		Yes	Full	No	0			No	
22605	Vincent St.	Completed	Single Fam	None		Yes	Partial near sum	Yes	1	Yes	Outside	No	
11410	Trevor Dr.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	Yes	Window Well Drain
10103	222nd St.	Completed	Single Fam	None		Yes	Full	Yes	1	Yes	Outside	Yes	Window Well Drain
11912	213th Ter.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	No	
11806	213th Ct.	Completed	Single Fam	None		Yes	Full	No	0	No		No	
10204	222nd St.	Completed	Single Fam	None		Yes	Partial near sum	Yes	1	Yes	Outside	Yes	Window Well Drain
11805	White Oak St.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	No	
876	Hurley St.	Completed	Single Fam	Storm Water	Wall or Floor	Yes	No	No	0	No		No	
10015	220th Pl.	Completed	Single Fam	Sewer Backup	Basement Drains	Yes	Full	No	0			No	
10008	220th Pl.	Completed	Single Fam	None		Yes	Full	No	0			No	
10207	220th Pl.	Completed	Single Fam	None		Yes	Full	Yes	1	Yes	Outside	Yes	Window Well Drain
10109	220th Pl.	Completed	Single Fam	None		Yes	Full	Yes	1	Yes	Outside	No	
946	Hurley St.	Completed	Single Fam	Storm Water	Wall or Floor	Yes	Full	Yes	1	Yes	Outside	No	
10020	220th St.	Completed	Single Fam	None		Yes	Partial near sum	Yes	1	Yes	Outside	No	
838	Quail Ridge Rd.	Completed	Single Fam	None		Yes	Full	Yes	1	Yes	Outside	Yes	Window Well Drain
842	Quail Ridge Rd.	Completed	Single Fam	None		Yes	Full	Yes	1	Yes	Outside	Yes	Window Well Drain
812	Covey Dr.	Completed	Single Fam	None		Yes	Full	No	0			No	
10221	220th Pl.	Completed	Single Fam	None		Yes	Partial near sum	Yes	2	Yes	Outside	No	
811	Bobwhite Dr.	Completed	Single Fam	None		Yes	Partial near sum	Yes	1	Yes	Outside	Yes	Window Well Drain
926	Gregory St.	Completed	Single Fam	Storm Water	Basement Drains	Yes	No	No	0	No		No	
815	Hurley St.	Completed	Single Fam	Storm Water	Wall or Floor	Yes	Partial near sum	Yes	2	Yes	Outside	No	
877	Hurley St.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	No	
897	Hurley St.	Completed	Single Fam	None		Yes	Partial near sum	Yes	1	Yes	Outside	No	
908	Glengera Dr.	Completed	Single Fam	None		Yes	Full	No	1	No		No	
955	Hurley St.	Completed	Single Fam	None		Yes	Full	Yes	1	Yes	Outside	No	
887	Harr Grove Rd.	Completed	Single Fam	None		Yes	No	No	0			No	
721	Harr Grove Rd.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	No	
509	Birch St.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	No	
411	Willow St.	Completed	Single Fam	Sewer Backup	Basement Drains	Yes	Full	No	0			No	
502	Birch St.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	Yes	Window Well Drain
311	Poplar St.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	No	
411	Poplar St.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	No	
413	Poplar St.	Completed	Single Fam	Sewer Backup	Wall or Floor	Yes	No	Yes	1	Yes	Outside	No	

APPENDIX B
BUILDING INSPECTION RESULTS

House No.	Street	Inspection Status	Building Type	Previous Flooding	Flood Source	Floor Drains	Basement Finish	Sumps	Number of Sumps	Active Sump	Sump Discharge	Outside Source	Source Type
891	Glengera Dr.	Completed	Single Fam	Sewer Backup	Wall or Floor	Yes	Full	Yes	1	Yes	Outside	Yes	Window Well Drain
300	Poplar St.	Completed	Single Fam	Storm Water	Wall or Floor	Yes	Full	Yes	1	Yes	Outside	Yes	Window Well Drain
901	E. 1st St.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Sanitary	No	
604	Birch St.	Completed	Single Fam	None		Yes	Full	Yes	1	Yes	Outside	Yes	Window Well Drain
925	Gregory St.	Completed	Single Fam	None		No	Partial near sum	No	0	No		No	
908	Harr Grove Rd.	Completed	Single Fam	Storm Water	Basement Drains	Yes	No	No	0	No		No	
750	Hurley St.	Completed	Single Fam	None		Yes	Full	Unknown	0	Unknown	Unknown	No	
820	Hurley St.	Completed	Single Fam	None		Yes	Full	No	0			No	
971	J Hwy	Completed	Single Fam	None		Yes	Full	No	0	No		No	
983	J Hwy	Completed	Single Fam	None		Yes	Full	Yes	1	Yes	Outside	No	
791	Hurley St.	Completed	Single Fam	Storm Water	Wall or Floor	Yes	Partial near sum	Yes	1	Yes	Outside	No	
884	Glengera Dr.	Completed	Single Fam	None		Yes	Full	No	0			No	
983	E. 1st St.	Completed	Single Fam	None		Yes	No	Yes	2	Yes	Sanitary	No	
964	E. 1st St.	Completed	Single Fam	Storm Water	Wall or Floor	Yes	Partial near sum	Yes	2	Yes	Outside	No	
844	E. 1st St.	Completed	Single Fam	Storm Water	Basement Drains	Yes	Partial near sum	Yes	1	Yes	Sanitary	No	
105	Maverick Cir.	Completed	Single Fam	None		Yes	No	No	0			No	
944	S. Kendall Rd.	Completed	Single Fam	None		Yes	No	No	0			No	
982	S. Kendall Rd.	Completed	Single Fam	Storm Water	Wall or Floor	Yes	Full	No	0	No		No	
154	E. Cindy Ln.	Completed	Single Fam	Storm Water	Wall or Floor	Yes	No	Yes	1	Yes	Outside	No	
809	S. Kendall Rd.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Sanitary	No	
923	S. Kendall Rd.	Completed	Single Fam	None		Yes	Full	Yes	1	Yes	Outside	Yes	Stairwell Drain
985	S. Kendall Rd.	Completed	Single Fam	None		Yes	Full	No	0	No		No	
947	S. Kendall Rd.	Completed	Single Fam	None		Yes	No	Yes	2	Yes	Outside	No	
706	Sivley St.	Completed	Single Fam	None		Yes	Full	Yes	2	Yes	Sanitary	Yes	Stairwell Drain
821	Morgan Dr.	Completed	Single Fam	None		Yes	Partial near sum	Yes	1	Yes	Outside	No	
122	Jamar Dr.	Completed	Single Fam	None		Yes	No	No	0			No	
106	Jamar Dr.	Completed	Single Fam	None		Yes	Full	No	0			No	
926	S. Kendall Rd.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	No	
812	Bridle Trail Ln.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	No	
12305	White Oak St.	Completed	Single Fam	None		Yes	No	Yes	1	Yes	Outside	No	
12208	White Oak St.	Completed	Single Fam	None		Yes	Partial near sum	No	0	No		No	
10104	219th Ter.	Refused Entry							0				
12001	213th Ter.	Refused Entry							0				
21925	Murphy Ln.	Refused Entry							0				
10215	220th St.	Refused Entry							0				
504	Poplar St.	Refused Entry							0				
993	Sicklebar Dr.	Vacant							0				

APPENDIX C --- Smoke Testing Results

Appendix C
Smoke Testing Results

Line Segment	Inspection Date	Result	Comment 1	House #	Street Name	Status	Source Type	Density of Smoke	Surface Type	Comment 2
F04-009.F04-008	7/12/2011	Suspect		11511	207th St.	Private	Area Drain		Non Paved	window well
F04-011.F04-009	7/12/2011	Suspect		11508	207th Cir.	Private	Area Drain		Non Paved	window well
F04-011.F04-009	7/12/2011	Suspect		11504	207th Cir.	Private	Area Drain		Non Paved	window well
F04-007.F04-006	7/12/2011	Postive	empty lot		207th St	Public	Upstream MH	Light	Non Paved	frame seal
F05-010.F05-009	7/12/2011	Postive	farm field		s/o E. 211th St.	Public	Upstream MH	Medium	Non Paved	frame seal
F05-009.F05-008	7/12/2011	Postive	farm field		s/o E. 211th St.	Public	Upstream MH	Light	Non Paved	frame seal
F05-008.F05-007	7/12/2011	Postive	farm field		w/o School Rd.	Public	Upstream MH	Light	Non Paved	frame seal
F05-007.F05-006	7/12/2011	Postive	farm field		w/o School Rd.	Public	Upstream MH	Medium	Non Paved	frame seal
F05-006.F05-005	7/12/2011	Postive	farm field		w/o School Rd.	Public	Upstream MH	Medium	Non Paved	frame seal
G06-017.G06-016	7/12/2011	Postive		987	W. 1st St.	Public	Upstream MH	Medium	Non Paved	frame seal
F05-001.G05-045	7/12/2011	Postive	farm field		n/o School Rd.	Public	Upstream MH	Heavy	Non Paved	frame seal
F05-003.F05-002	7/12/2011	Postive	farm field		nw/o School Rd.	Public	Upstream MH	Light	Non Paved	frame seal
F05-004.F05-003	7/12/2011	Postive	farm field		w/o School Rd.	Public	Upstream MH	Light	Non Paved	frame seal
G05-018.G05-017	7/12/2011	Suspect		12108	School Rd.	Private	Downspout		Non Paved	downspout underground
G05-020.G05-019	7/12/2011	Suspect		12205	School Rd.	Private	Downspout		Non Paved	downspout underground
G05-020.G05-019	7/12/2011	Postive		12205	School Rd.	Private	Cleanout	Light	Non Paved	vented cover
G05-021.G05-020	7/12/2011	Suspect		12305	School Rd.	Private	Downspout		Non Paved	downspout underground
G05-021.G05-020	7/12/2011	Postive		12305	School Rd.	Private	Cleanout	Light	Non Paved	capped
G05-022.G05-010	7/13/2011	Suspect		11901	213th Ct.	Private	Area Drain		Non Paved	window well
G05-010.G05-009	7/13/2011	Postive		11903	213th Ct.	Public	Upstream MH	Light	Paved	frame seal
G05-024.G05-008	7/13/2011	Suspect		11912	213th Ter.	Private	Area Drain		Non Paved	window well
G05-024.G05-008	7/13/2011	Suspect		11912	213th Ter.	Private	Area Drain		Non Paved	window well
G05-025.G05-007	7/13/2011	Suspect		12004	214th St.	Private	Area Drain		Non Paved	window well
G05-007.G05-006	7/13/2011	Postive		1457	214th St.	Public	Upstream MH	Light	Paved	frame seal
G05-025.G05-007	7/13/2011	Suspect		12006	214th St.	Private	Area Drain		Non Paved	window well
G05-026.G05-025	7/13/2011	Suspect		12104	214th St.	Private	Area Drain		Non Paved	window well
G05-026.G05-025	7/13/2011	Suspect		12105	214th St.	Private	Area Drain		Non Paved	window well
G05-026.G05-025	7/13/2011	Suspect		12103	214th St.	Private	Area Drain		Non Paved	window well
G05-026.G05-025	7/13/2011	Suspect		12009	214th St.	Private	Area Drain		Non Paved	window well
G05-025.G05-007	7/13/2011	Suspect		12007	214th St.	Private	Area Drain		Non Paved	window well
G05-025.G05-007	7/13/2011	Suspect		12005	214th St.	Private	Area Drain		Non Paved	window well
G05-025.G05-007	7/13/2011	Suspect		12005	214th St.	Private	Area Drain		Non Paved	window well
G05-031.G05-005	7/13/2011	Suspect		11911	214th Ter.	Private	Area Drain		Non Paved	window well
G05-031.G05-005	7/13/2011	Postive		12207	214th Ter.	Public	Upstream MH	Light	Paved	frame seal
G05-032.G05-031	7/13/2011	Suspect		12105	214th Ter.	Private	Area Drain		Non Paved	window well
G05-032.G05-031	7/13/2011	Suspect		12104	214th Ter.	Private	Area Drain		Non Paved	window well
G05-032.G05-031	7/13/2011	Suspect		12102	214th Ter.	Private	Area Drain		Non Paved	window well
G05-032.G05-031	7/13/2011	Suspect		12100	214th Ter.	Private	Area Drain		Non Paved	window well
G05-005.G05-004	7/13/2011	Postive		1352	Red Oak Ln.	Public	Upstream MH	Light	Non Paved	frame seal
G05-037.G05-036	7/13/2011	Suspect		12201	214th St.	Private	Area Drain		Non Paved	window well

Appendix C
Smoke Testing Results

Line Segment	Inspection Date	Result	Comment 1	House #	Street Name	Status	Source Type	Density of Smoke	Surface Type	Comment 2
G05-037.G05-036	7/13/2011	Suspect		12205	214th St.	Private	Area Drain		Non Paved	window well
G05-038.G05-037	7/13/2011	Suspect		12207	214th St.	Private	Area Drain		Non Paved	window well
G05-038.G05-037	7/13/2011	Suspect		12207	214th St.	Private	Area Drain		Non Paved	window well
G05-037.G05-036	7/13/2011	Postive		1045	214th Ter.	Public	Upstream MH	Light	Non Paved	frame seal
G05-041.G05-040	7/13/2011	Suspect		12202	White Oak St.	Private	Area Drain		Non Paved	window well
H05-034.G05-042	7/13/2011	Suspect		12400	White Oak St.	Private	Area Drain		Non Paved	window well
H05-034.G05-042	7/13/2011	Suspect		12405	White Oak St.	Private	Area Drain		Non Paved	window well
G05-035.G05-034	7/13/2011	Suspect		12102	White Oak St.	Private	Area Drain		Non Paved	window well
G05-002.G05-001	7/13/2011	Suspect		21425	Pin Oak Ln.	Private	Area Drain		Non Paved	window well
G06-024.G06-014	7/13/2011	Suspect		985	Glengera Dr.	Private	Area Drain		Non Paved	window well
G06-019.G06-018	7/14/2011	Postive		970	School Rd.	Private	Cleanout	Medium	Non Paved	point 20feetnorth of c.o. dog
G06-019.G06-018	7/14/2011	Postive		962	School Rd.	Public	Upstream MH	Medium	Non Paved	frame seal
G06-019.G06-018	7/14/2011	Postive		958	School Rd.	Private	Cleanout	Heavy	Non Paved	cap has poor seal
G06-020.G06-019	7/14/2011	Suspect		931	E. 1st St.	Private	Area Drain		Non Paved	window well
G06-019.G06-018	7/14/2011	Suspect		953	E. 1st St.	Private	Area Drain		Non Paved	window well
G06-011.G06-010	7/14/2011	Postive	n/s of lot in creek bank	957	Glengera Dr.	Public	Upstream MH	Heavy	Non Paved	frame seal
G06-026.G06-025	7/14/2011	Postive		915	Glengera Dr.	Public	Upstream MH	Light	Non Paved	frame seal
G06-047.G06-046	7/14/2011	Suspect		891	Glengera Dr.	Private	Area Drain		Non Paved	window well
G06-048.G06-047	7/14/2011	Suspect		903	Glengera Dr.	Private	Area Drain		Non Paved	window well
G06-048.G06-047	7/14/2011	Suspect		903	Glengera Dr.	Private	Area Drain		Non Paved	window well
G06-048.G06-047	7/14/2011	Suspect		907	Glengera Dr.	Private	Area Drain		Non Paved	window well
G06-048.G06-047	7/14/2011	Suspect		911	Glengera Dr.	Private	Area Drain		Non Paved	window well
G06-042.G06-041	7/14/2011	Postive		100	217th St.	Private	Cleanout	Heavy	Non Paved	hole in cap
G06-043.G06-042	7/14/2011	Postive		902	E. Outer Rd.	Public	Upstream MH	Light	Non Paved	frameseal
G06-040.G06-039	7/14/2011	Postive		883	Glengera Dr.	Public	Upstream MH	Light	Non Paved	frame seal
G06-051.G06-050	7/14/2011	Postive		904	Glengera Dr.	Private	Cleanout	Heavy	Non Paved	holes in cap
G06-051.G06-050	7/14/2011	Postive		912	Glengera Dr.	Private	Service Laterals	Light	Non Paved	suspected buried c.o.
G06-051.G06-050	7/14/2011	Negative		899	Hurley St.	Private	Other		Non Paved	no vent smoke
G06-050.G06-049	7/14/2011	Suspect		877	Hurley St.	Private	Area Drain		Non Paved	window well
G06-050.G06-049	7/14/2011	Suspect		877	Hurley St.	Private	Area Drain		Non Paved	window well
G06-049.G06-037	7/14/2011	Postive		884	Glengera Dr.	Private	Cleanout	Heavy	Non Paved	capped
G06-050.G06-049	7/14/2011	Postive		876	Glengera Dr.	Private	Cleanout	Heavy	Non Paved	
G06-027.G06-009	7/15/2011	Negative		947	Hurley St.	Private	Other		Non Paved	no vent smoke
G06-028.G06-027	7/15/2011	Postive		971	Hurley St.	Private	Cleanout	Heavy	Non Paved	vented cap
G06-029.G06-008	7/15/2011	Postive		712	Sicklebar Dr.	Private	Cleanout	Heavy	Non Paved	no cap
G06-029.G06-008	7/15/2011	Postive		708	Shishir Rd.	Private	Cleanout	Heavy	Non Paved	vented cap
G06-029.G06-008	7/15/2011	Postive		708	Shishir Rd.	Private	Service Laterals	Medium	Non Paved	
G06-031.G06-030	7/18/2011	Postive		976	Hurley St.	Private	Cleanout	Heavy	Non Paved	no cap
G06-031.G06-030	7/18/2011	Postive		976	Hurley St.	Private	Cleanout	Medium	Non Paved	capped
G06-031.G06-030	7/18/2011	Postive		985	Harr Grove Rd.	Public	Upstream MH	Light	Non Paved	frame seal
G06-030.G06-006	7/18/2011	Postive		947	Harr Grove Rd.	Private	Cleanout	Medium	Non Paved	no cap
G06-030.G06-006	7/18/2011	Postive		946	Hurley St.	Private	Cleanout	Medium	Non Paved	

Appendix C
Smoke Testing Results

Line Segment	Inspection Date	Result	Comment 1	House #	Street Name	Status	Source Type	Density of Smoke	Surface Type	Comment 2
G06-006.G06-005	7/18/2011	Suspect		919	Harr Grove Rd.	Private	Area Drain		Non Paved	window well...capped
G06-006.G06-005	7/18/2011	Postive		918	Hurley St.	Private	Cleanout	Heavy	Non Paved	no cap
G06-006.G06-005	7/18/2011	Suspect		918	Hurley St.	Private	Area Drain		Non Paved	window well
G06-005.G06-004	7/18/2011	Postive		840	Hurley St.	Private	Cleanout	Medium	Non Paved	capped
G06-004.G06-003	7/18/2011	Postive		812	Hurley St.	Private	Cleanout	Light	Non Paved	capped
G06-003.G06-002	7/18/2011	Postive		841	Harr Grove Rd.	Public	Upstream MH	Medium	Non Paved	frame seal
G06-006.G06-005	7/18/2011	Postive		911	Harr Grove Rd.	Private	Cleanout	Light	Non Paved	capped
G06-006.G06-005	7/18/2011	Postive		911	Harr Grove Rd.	Private	Cleanout	Heavy	Non Paved	no cap
G06-033.G06-003	7/18/2011	Postive		779	Harr Grove Rd.	Private	Cleanout	Heavy	Non Paved	no cap
G06-054.G06-053	7/18/2011	Postive		710	Harr Grove Rd.	Public	Upstream MH	Medium	Non Paved	frame seal
G06-055.G06-054	7/18/2011	Postive		700	Harr Grove Rd.	Public	Upstream MH	Medium	Non Paved	frame seal
G06-057.G06-055	7/18/2011	Postive		700	Harr Grove Rd.	Private	Cleanout	Heavy	Non Paved	capped
G06-057.G06-055	7/18/2011	Postive		625	J Hwy	Public	Upstream MH	Heavy	Non Paved	frame seal
G06-056.G06-055	7/18/2011	Postive	mh s/o house and retaining wall	721	Harr Grove Rd.	Public	Upstream MH	Heavy	Non Paved	lid does not fit frame
G06-061.G06-060	7/18/2011	Suspect		981	Gregory St.	Private	Area Drain		Non Paved	window well
G06-058.G06-001	7/18/2011	Postive		838	Harr Grove Rd.	Public	Main Sewer	Light	Non Paved	
H06-021.H06-018	7/18/2011	Postive		12415	Bent Oak Cr.	Public	Upstream MH	Heavy	Non Paved	frame seal
H06-017.H06-016	7/18/2011	Postive		986	Gregory St.	Private	Cleanout	Heavy	Non Paved	no cap
H06-017.H06-016	7/18/2011	Postive		960	Gregory St.	Private	Service Laterals	Light	Non Paved	
H06-015.H06-014	7/18/2011	Suspect		914	Gregory St.	Private	Stairwell Drain		Paved	
H06-014.H06-013	7/18/2011	Suspect		12429	Live Oak Cir.	Private	Area Drain		Non Paved	window well
H06-016.H06-015	7/18/2011	Suspect		12415	Live Oak Cir.	Private	Area Drain		Non Paved	window well
H06-016.H06-015	7/18/2011	Suspect		12413	Live Oak Cir.	Private	Area Drain		Non Paved	window well
H06-015.H06-014	7/18/2011	Postive		915	Gregory St.	Public	Upstream MH	Medium	Non Paved	frame seal
H06-030.H06-029	7/19/2011	Postive		12424	Live Oak Cir.	Public	Upstream MH	Light	Paved	frame seal
H06-030.H06-029	7/19/2011	Suspect		12424	Live Oak Cir.	Private	Area Drain		Non Paved	window well
H06-028.H06-027	7/19/2011	Postive		12435	Live Oak Cir.	Public	Upstream MH	Medium	Non Paved	frame seal
H06-035.H06-026	7/19/2011	Postive	se cor black oak cir./twin oak pkwy		Black Oak Cir.	Public	Upstream MH	Light	Non Paved	frame seal
H06-036.H06-035	7/19/2011	Postive		12501	Black Oak Cir.	Public	Upstream MH	Medium	Non Paved	frame seal
H06-025.H06-011	7/19/2011	Postive		12505	Live Oak Cir.	Public	Upstream MH	Medium	Paved	frame seal
G06-062.H06-024	7/19/2011	Postive	125' n/o cul-de-sac		Irongate Ct.	Public	Upstream MH	Light	Non Paved	frame seal
H06-006.H06-005	7/19/2011	Postive		801	Cindy	Private	Cleanout	Heavy	Non Paved	no cap
H06-008.H06-007	7/19/2011	Postive	500' e/o twin oaks pkwy		Twin Oaks Pkwy	Public	Upstream MH	Heavy	Non Paved	lg. holes around structure
H06-046.H06-045	7/19/2011	Postive		833	Kendall	Private	Cleanout	Heavy	Non Paved	no cap
H06-047.H06-046	7/19/2011	Negative	kendall	839	Kendall	Private	Other		Non Paved	no vent smoke
H06-056.H06-054	7/19/2011	Negative		863	Kendall	Private	Other		Non Paved	no vent smoke
H06-056.H06-054	7/19/2011	Postive		875	Kendall	Private	Cleanout	Medium	Non Paved	capped
H06-055.H06-054	7/19/2011	Postive		881	Kendall	Private	Cleanout	Medium	Non Paved	pt 25' n/o c.o. dog
H05-031.H05-030	7/19/2011	Postive		953	Kendall	Private	Cleanout	Heavy	Non Paved	no cap

Appendix C
Smoke Testing Results

Line Segment	Inspection Date	Result	Comment 1	House #	Street Name	Status	Source Type	Density of Smoke	Surface Type	Comment 2
H05-031.H05-030	7/19/2011	Suspect		965	Kendall	Private	Downspout		Non Paved	downspout/sump underground
H05-031.H05-030	7/19/2011	Suspect		965	Kendall	Private	Other		Non Paved	sump pump discharge
H05-029.H05-028	7/19/2011	Postive		929	Kendall	Private	Cleanout	Heavy	Non Paved	sump pump discharges into c.o.
H05-029.H05-028	7/19/2011	Suspect		923	Kendall	Private	Stairwell Drain		Non Paved	
H05-026.H05-001	7/19/2011	Postive		890	Kendall	Private	Cleanout	Heavy	Non Paved	no cap
H05-020.H05-019	7/20/2011	Suspect		965	Sicklebar Dr.	Private	Area Drain		Non Paved	window well
H05-020.H05-019	7/20/2011	Suspect		971	Sicklebar Dr.	Private	Area Drain		Non Paved	window well
H05-020.H05-019	7/20/2011	Suspect		971	Sicklebar Dr.	Private	Area Drain		Non Paved	window well
H05-021.H05-017	7/20/2011	Suspect		994	Sicklebar Dr.	Private	Area Drain		Non Paved	window well
H05-018.H05-017	7/20/2011	Suspect		991	Sicklebar Dr.	Private	Area Drain		Non Paved	window well
H05-018.H05-017	7/20/2011	Suspect		981	Sicklebar Dr.	Private	Area Drain		Non Paved	window well
H05-019.H05-018	7/20/2011	Suspect		977	Sicklebar Dr.	Private	Area Drain		Non Paved	window well
H05-012.H05-011	7/20/2011	Cannot Test		12909	E. 211th St.	Private	Other		Non Paved	septic
H05-010.H05-009	7/20/2011	Cannot Test		13003	E. 211th St.	Private	Other		Non Paved	septic
H05-024.H05-009	7/20/2011	Postive		991	J Hwy	Public	Upstream MH	Light	Non Paved	frame seal
H05-008.H05-007	7/20/2011	Postive		971	J Hwy	Private	Cleanout	Light	Non Paved	broken cap
H05-001.H06-057	7/20/2011	Postive		117	Debbie Dr.	Public	Upstream MH	Medium	Non Paved	frame seal
H06-051.H06-050	7/20/2011	Postive		847	J Hwy	Private	Cleanout	Heavy	Non Paved	no cap
H06-059.H06-058	7/20/2011	Postive	c.o. 23' n/o point	811	J Hwy	Private	Cleanout	Heavy	Non Paved	unsure about cap...dog in yard
H06-004.H06-003	7/20/2011	Postive		138	Cindy	Private	Cleanout	Heavy	Non Paved	capped
H06-001.I06-004	7/20/2011	Postive	200' s/o j hwy and old town rd		J Hwy	Public	Upstream MH	Heavy	Non Paved	frame seal
H06-063.H06-062	7/20/2011	Postive		739	J Hwy	Private	Service Laterals	Light	Non Paved	
H06-063.H06-062	7/20/2011	Suspect		725	J Hwy	Private	Stairwell Drain		Paved	
I06-003.I06-002	7/21/2011	Postive		3981	S. Old Town Dr.	Public	Upstream MH	Light	Non Paved	frame seal
I06-003.I06-002	7/21/2011	Postive		21807	J Hwy	Private	Cleanout	Heavy	Non Paved	broken cap
I06-002.I06-001	7/21/2011	Postive		3981	S. Old Town Rd.	Public	Upstream MH	Light	Non Paved	frame seal
I06-001.I07-011	7/21/2011	Postive	farm field		e/o S. Old Town Rd.	Public	Upstream MH	Medium	Non Paved	frame seal
I07-010.I07-009	7/21/2011	Postive	farm field		e/o S. Old Town Rd.	Public	Upstream MH	Medium	Non Paved	frame seal
I07-005.I07-004	7/21/2011	Postive		22101	S. West Valley Rd.	Public	Upstream MH	Light	Non Paved	frame seal
I07-004.I07-003	7/21/2011	Postive		22111	West Valley Rd.	Public	Upstream MH	Light	Non Paved	frame seal
I07-002.I07-001	7/21/2011	Postive	field		e/o West Valley Rd.	Public	Upstream MH	Heavy	Non Paved	holes in ground around mh
I07-002.I07-001	7/21/2011	Negative	field		e/o West Valley Rd.	Public	Other		Non Paved	c.i. creek crossing in good shape
I07-002.I07-001	7/21/2011	Negative	field		e/o West Valley Rd.	Public	Other		Non Paved	c.i. creek crossing in good shape
I07-001.I08-009	7/21/2011	Postive		22218	West Valley Rd.	Public	Upstream MH	Heavy	Non Paved	lg. hole surrounding mh
H07-016.H07-012	7/25/2011	Postive		12601	221st St.	Public	Upstream MH	Light	Non Paved	frame seal

Appendix C
Smoke Testing Results

Line Segment	Inspection Date	Result	Comment 1	House #	Street Name	Status	Source Type	Density of Smoke	Surface Type	Comment 2
H07-012.H07-011	7/25/2011	Postive	empty lot		221st St.	Public	Upstream MH	Light	Non Paved	frame seal
H07-011.H07-010	7/25/2011	Postive	empty lot		221st St.	Public	Upstream MH	Medium	Non Paved	frame seal
H07-013.H07-012	7/25/2011	Postive	empty lot		Branic Dr.	Public	Upstream MH	Light	Non Paved	frame seal
H07-014.H07-013	7/25/2011	Postive	empty lot		Branic Dr.	Public	Upstream MH	Light	Non Paved	frame seal
G07-042.G07-041	7/25/2011	Postive		700	J Hwy	Private	Cleanout	Heavy	Non Paved	non sealed cover
G07-041.G07-040	7/25/2011	Postive		700	J Hwy	Public	Upstream MH	Light	Non Paved	frame seal
G07-040.G07-002	7/25/2011	Postive		22101	J Hwy	Public	Upstream MH	Light	Non Paved	frame seal
G07-002.G07-001	7/25/2011	Postive	New Manhole Location	22101	E. Outer Rd.	Public	Upstream MH	Light	Non Paved	frame seal
G07-001.H07-018	7/25/2011	Postive		22115	E. Outer Rd.	Private	Cleanout	Light	Non Paved	capped
G07-001.H07-018	7/25/2011	Postive		22115	E. Outer Rd.	Private	Main Sewer	Light	Non Paved	driving range
H08-004.H08-003	7/26/2011	Postive	223rd St not 221st	12801	E. 223rd St.	Private	Cleanout	Medium	Non Paved	not capped
G07-020.G07-019	7/25/2011	Postive		351	Legend Ln.	Public	Upstream MH	Medium	Non Paved	frame seal
G07-022.G07-021	7/25/2011	Suspect		300	Schug Ave.	Private	Area Drain		Paved	
G08-030.G08-029	7/26/2011	Suspect	served to the north	601	Sivley St.	Private	Stairwell Drain		Paved	
G08-040.G08-039	7/26/2011	Postive		603	Sivley St.	Public	Upstream MH	Light	Non Paved	frame seal
G08-041.G08-039	7/26/2011	Postive		610	Arena Dr.	Public	Upstream MH	Light	Non Paved	frame seal
G08-039.G08-031	7/26/2011	Postive		607	Sivley St.	Private	Service Laterals	Light	Non Paved	
G08-039.G08-031	7/26/2011	Postive		607	Sivley St.	Private	Service Laterals	Light	Non Paved	
G08-031.H08-009	7/26/2011	Postive		701	Sivley St.	Public	Upstream MH	Light	Non Paved	frame seal
G08-035.G08-034	7/26/2011	Postive		508	Arena Dr.	Private	Cleanout	Heavy	Non Paved	capped
G08-035.G08-034	7/26/2011	Postive		505	Arena Dr.	Private	Service Laterals	Light	Non Paved	
G08-036.G08-034	7/26/2011	Postive		608	Arena Dr.	Public	Upstream MH	Medium	Non Paved	frame seal
G08-037.G08-033	7/26/2011	Postive		704	Hurley St.	Public	Upstream MH	Medium	Non Paved	frame seal
G08-038.G08-032	7/26/2011	Postive		706	Sivley St.	Public	Upstream MH	Medium	Non Paved	frame seal
H08-011.H08-010	7/26/2011	Postive		701	Sivley St.	Private	Cleanout	Light	Non Paved	capped
H08-021.H08-012	7/26/2011	Postive		709	Sivley St.	Private	Cleanout	Heavy	Non Paved	broken cap
H08-021.H08-012	7/26/2011	Postive		709	Sivley St.	Public	Upstream MH	Heavy	Non Paved	frame seal
G08-042.H08-021	7/26/2011	Postive		709	Sivley St.	Public	Upstream MH	Heavy	Non Paved	frame seal
H08-011.H08-010	7/26/2011	Postive		705	Sivley St.	Public	Upstream MH	Medium	Non Paved	frame seal
H08-016.H08-015	7/26/2011	Postive		825	Maverick Cir.	Public	Upstream MH	Light	Paved	frame seal
H08-020.H08-014	7/26/2011	Postive		817	Bridle Trail Ln.	Public	Upstream MH	Light	Paved	frame seal
G08-046.G08-045	7/26/2011	Postive		22620	Surrey Ln.	Public	Upstream MH	Heavy	Non Paved	frame seal
F09-031.F09-030	7/26/2011	Postive		22810	Shadow Glen Dr.	Public	Upstream MH	Light	Non Paved	frame seal
F09-006.F09-005	7/26/2011	Suspect	new mh location	22710	Shadow Glen Dr.	Public	Upstream MH	Light	Non Paved	frame seal
F09-030.F09-003	7/26/2011	Postive		11407	Shadow Glen Dr.	Public	Upstream MH	Heavy	Non Paved	frame seal
F08-001.F09-007	7/27/2011	Postive	227th street	1112	227th St.	Public	Upstream MH	Medium	Non Paved	frame seal
F07-089.F07-088	7/27/2011	Postive	new location for mh	200	Main St.	Public	Upstream MH	Light	Non Paved	frame seal
F06-060.F06-001	7/27/2011	Postive		11408	Main St.	Public	Upstream MH	Medium	Non Paved	frame seal
F06-053.F06-003	7/27/2011	Postive		11409	218th St.	Public	Upstream MH	Light	Non Paved	frame seal
F06-017.F06-016	7/27/2011	Postive		21520	Main St.	Private	Cleanout	Heavy	Non Paved	capped
F06-017.F06-016	7/27/2011	Postive		21520	Main St.	Public	Upstream MH	Heavy	Non Paved	frame is broken, pieces missing
F06-006.F06-005	7/27/2011	Postive		11200	217th St.	Public	Upstream MH	Heavy	Non Paved	frame seal

Appendix C
Smoke Testing Results

Line Segment	Inspection Date	Result	Comment 1	House #	Street Name	Status	Source Type	Density of Smoke	Surface Type	Comment 2
F06-052.F06-051	7/27/2011	Postive	217th st and main st.		E. 217th St.	Public	Upstream MH	Heavy	Non Paved	frame seal
F06-051.F06-006	7/27/2011	Postive		11200	217th St.	Public	Upstream MH	Medium	Non Paved	frame seal
D07-009.D07-008	8/1/2011	Suspect		9811	219th Cir.	Private	Area Drain		Non Paved	window well
D07-008.D07-007	8/1/2011	Suspect		21900	Surry Trace	Private	Area Drain		Non Paved	window well
D07-015.D07-014	8/1/2011	Suspect		805	Sterling Ave.	Private	Stairwell Drain		Paved	
D07-015.D07-014	8/1/2011	Suspect		815	Sterling Ave.	Private	Area Drain		Non Paved	window well
D07-015.D07-014	8/1/2011	Suspect		9801	222nd St.	Private	Area Drain		Non Paved	window well
D07-015.D07-014	8/1/2011	Suspect		9801	222nd St.	Private	Area Drain		Non Paved	window well
D07-015.D07-014	8/1/2011	Suspect		9711	222nd St.	Private	Area Drain		Non Paved	window well
D07-019.D07-018	8/1/2011	Suspect		9910	220th St.	Private	Area Drain		Non Paved	window well
D07-023.D07-016	8/1/2011	Suspect		9905	222nd St.	Private	Area Drain		Non Paved	window well
D07-023.D07-016	8/1/2011	Suspect		9905	222nd St.	Private	Area Drain		Non Paved	window well
D07-023.D07-016	8/1/2011	Suspect		9903	222nd St.	Private	Area Drain		Non Paved	window well
D07-023.D07-016	8/1/2011	Suspect		9901	222nd St.	Private	Area Drain		Non Paved	window well
D07-023.D07-016	8/1/2011	Suspect		9901	222nd St.	Private	Area Drain		Non Paved	window well
D07-016.E07-030	8/1/2011	Suspect		10005	222nd St.	Private	Area Drain		Non Paved	window well
E07-030.E07-029	8/1/2011	Suspect		10007	222nd St.	Private	Area Drain		Non Paved	window well
E07-029.E07-007	8/1/2011	Suspect		10103	222nd St.	Private	Area Drain		Non Paved	window well
E07-029.E07-007	8/1/2011	Suspect		10106	222nd St.	Private	Area Drain		Non Paved	window well
E07-023.E07-022	8/1/2011	Postive		10108	220th Pl.	Public	Upstream MH	Light	Non Paved	frame seal
E07-022.E07-021	8/1/2011	Suspect		10018	220th Pl.	Private	Area Drain		Non Paved	window well
E07-016.E07-008	8/1/2011	Postive		10206	220th Pl.	Public	Upstream MH	Medium	Non Paved	frame seal
E07-021.E07-008	8/1/2011	Suspect		10201	220th Pl.	Private	Area Drain		Non Paved	window well
E07-021.E07-008	8/1/2011	Suspect		10119	220th Pl.	Private	Area Drain		Non Paved	window well
E07-021.E07-008	8/1/2011	Postive		10115	220th Pl.	Public	Upstream MH	Light	Non Paved	frame seal
E07-020.E07-019	8/1/2011	Suspect		10011	220th St.	Private	Area Drain		Non Paved	window well
E07-019.E07-018	8/1/2011	Postive		10111	220th St.	Public	Upstream MH	Medium	Non Paved	frame seal
E07-019.E07-018	8/1/2011	Suspect		10117	220th St.	Private	Area Drain		Non Paved	window well
E07-019.E07-018	8/1/2011	Suspect		10200	220th St.	Private	Area Drain		Non Paved	window well
E07-019.E07-018	8/1/2011	Suspect		10200	220th St.	Private	Area Drain		Non Paved	window well
E07-017.E07-016	8/1/2011	Suspect		10118	220th St.	Private	Area Drain		Non Paved	window well
E07-020.E07-019	8/1/2011	Suspect		10206	220th St.	Private	Area Drain		Non Paved	window well
E07-015.E07-014	8/1/2011	Suspect		10102	219th Ter.	Private	Area Drain		Non Paved	window well
E07-015.E07-014	8/1/2011	Negative		10203	219th Ter.	Private	Other		Non Paved	no vent smoke
E07-012.E07-011	8/1/2011	Suspect		10217	219th Ter.	Private	Area Drain		Non Paved	window well
E07-012.E07-011	8/1/2011	Suspect		10217	219th Ter.	Private	Area Drain		Non Paved	window well
E07-014.E07-013	8/1/2011	Suspect		10208	220th Pl.	Private	Area Drain		Non Paved	window well
E07-014.E07-013	8/1/2011	Suspect		10208	219th Ter.	Private	Area Drain		Non Paved	window well
E07-014.E07-013	8/1/2011	Postive		10202	219th Ter.	Public	Upstream MH	Light	Non Paved	frame seal
E07-015.E07-014	8/1/2011	Suspect		10202	219th Ter.	Private	Area Drain		Non Paved	window well
E07-015.E07-014	8/1/2011	Suspect		10106	219th Ter.	Private	Area Drain		Non Paved	window well
E07-015.E07-014	8/1/2011	Suspect		10208	219th Ter.	Private	Area Drain		Non Paved	window well
E07-009.E07-008	8/1/2011	Suspect		10215	220th Pl.	Private	Area Drain		Non Paved	window well

Appendix C
Smoke Testing Results

Line Segment	Inspection Date	Result	Comment 1	House #	Street Name	Status	Source Type	Density of Smoke	Surface Type	Comment 2
E07-016.E07-008	8/1/2011	Suspect		10210	222nd Pl.	Private	Area Drain		Non Paved	window well
E07-027.E07-026	8/1/2011	Suspect		21917	Gracie Dr.	Private	Area Drain		Non Paved	window well
E07-026.E07-025	8/1/2011	Suspect		22015	Gracie Dr.	Private	Area Drain		Non Paved	window well
E07-028.E07-026	8/1/2011	Suspect		21904	Gracie Dr.	Private	Area Drain		Non Paved	window well
E07-025.E07-024	8/1/2011	Suspect		22025	Gracie Dr.	Private	Area Drain		Non Paved	window well
E07-024.E07-007	8/1/2011	Suspect		10209	222nd St.	Private	Area Drain		Non Paved	window well
E07-024.E07-007	8/1/2011	Suspect		10207	222nd St.	Private	Area Drain		Non Paved	window well
E07-024.E07-007	8/1/2011	Suspect		10205	222nd St.	Private	Area Drain		Non Paved	window well
E07-024.E07-007	8/1/2011	Suspect		10203	222nd St.	Private	Area Drain		Non Paved	window well
E07-024.E07-007	8/1/2011	Suspect		10204	222nd St.	Private	Area Drain		Non Paved	window well
E07-024.E07-007	8/1/2011	Suspect		10206	222nd St.	Private	Area Drain		Non Paved	window well
E07-024.E07-007	8/1/2011	Suspect		10212	222nd St.	Private	Area Drain		Non Paved	window well
E07-024.E07-007	8/1/2011	Suspect		10212	222nd St.	Private	Area Drain		Non Paved	window well
E07-025.E07-024	8/1/2011	Suspect		22020	Gracie Dr.	Private	Area Drain		Non Paved	window well
E07-047.E07-046	8/2/2011	Suspect		844	Quail Ridge Rd.	Private	Area Drain		Non Paved	window well
E07-047.E07-046	8/2/2011	Suspect		844	Quail Ridge Rd.	Private	Area Drain		Non Paved	window well
E07-047.E07-046	8/2/2011	Suspect		842	Quail Ridge Rd.	Private	Area Drain		Non Paved	window well
E07-047.E07-046	8/2/2011	Suspect		842	Quail Ridge Rd.	Private	Area Drain		Non Paved	window well...with plastic cover
E07-045.E07-035	8/2/2011	Suspect		809	Bobwhite Dr.	Private	Area Drain		Non Paved	window well
E07-045.E07-035	8/2/2011	Suspect		809	Bobwhite Dr.	Private	Area Drain		Non Paved	window well
E07-045.E07-035	8/2/2011	Suspect		811	Bobwhite Dr.	Private	Area Drain		Non Paved	window well
E07-045.E07-035	8/2/2011	Suspect		811	Bobwhite Dr.	Private	Area Drain		Non Paved	window well
E07-034.E07-033	8/2/2011	Suspect		801	Quail Ridge Rd.	Private	Area Drain		Non Paved	window well
E07-034.E07-033	8/2/2011	Suspect		801	Quail Ridge Rd.	Private	Area Drain		Non Paved	window well
E06-041.E07-034	8/2/2011	Postive		10806	219th St.	Public	Upstream MH	Light	Non Paved	frame seal
E07-037.E07-036	8/2/2011	Suspect		813	Quail Ridge Rd.	Private	Area Drain		Non Paved	window well
E07-037.E07-036	8/2/2011	Suspect		813	Quail Ridge Rd.	Private	Area Drain		Non Paved	window well
E07-037.E07-036	8/2/2011	Suspect		815	Quail Ridge Rd.	Private	Area Drain		Non Paved	window well
E07-037.E07-036	8/2/2011	Suspect		815	Quail Ridge Rd.	Private	Area Drain		Non Paved	window well
E07-041.E07-040	8/2/2011	Postive		836	Quail Ridge Rd.	Public	Upstream MH	Light	Non Paved	frame seal
E07-039.E07-038	8/2/2011	Suspect		821	Quail Ridge Rd.	Private	Area Drain		Non Paved	window well
E07-039.E07-038	8/2/2011	Suspect		821	Quail Ridge Rd.	Private	Area Drain		Non Paved	window well...partially covered
E07-042.E07-041	8/2/2011	Suspect		838	Quail Ridge Rd.	Private	Area Drain		Non Paved	window well
E07-049.E07-032	8/2/2011	Postive		727	Meadow Ln.	Private	Service Laterals	Medium	Paved	
E07-033.E07-032	8/2/2011	Postive		702	YY Hwy	Private	Cleanout	Heavy	Non Paved	no cap
F07-069.F07-068	8/2/2011	Postive		650	Trackside Dr.	Private	Cleanout	Heavy	Non Paved	
E07-053.F07-059	8/2/2011	Postive		625	Willow Ln.	Private	Cleanout	Medium	Non Paved	capped
E07-051.F07-059	8/2/2011	Postive		704	Meadow Ct.	Public	Upstream MH	Light	Paved	frame seal
F07-059.F07-058	8/2/2011	Postive	f07-059--f07-058	620b	Willow Ln.	Private	Cleanout	Medium	Non Paved	no cap
F07-058.F07-057	8/2/2011	Postive	f07-058--f07-057	613b	Willow Ln.	Private	Cleanout	Medium	Non Paved	
F07-058.F07-057	8/2/2011	Suspect	f07-057--f07-058	611b	Willow Ln.	Private	Cleanout		Non Paved	

Appendix C
Smoke Testing Results

Line Segment	Inspection Date	Result	Comment 1	House #	Street Name	Status	Source Type	Density of Smoke	Surface Type	Comment 2
F07-059.F07-058	8/2/2011	Postive		615	Willow Ln.	Private	Cleanout	Medium	Non Paved	capped
F07-059.F07-058	8/2/2011	Postive	f07-058--f07-059	619b	Willow Ln.	Private	Cleanout	Heavy	Non Paved	capped
F07-054.F07-053	8/3/2011	Postive		1009	Poplar St.	Public	Upstream MH	Medium	Non Paved	frame seal
F07-055.F07-054	8/3/2011	Postive		530	Willow St.	Public	Upstream MH	Medium	Non Paved	frame seal
F07-080.F07-079	8/3/2011	Postive		421	Trigger St.	Private	Service Laterals	Light	Non Paved	
F07-075.F07-074	8/3/2011	Suspect		502	Birch St.	Private	Area Drain		Non Paved	window well
F07-074.F07-073	8/3/2011	Suspect		403	Poplar St.	Private	Area Drain		Non Paved	window well
F07-074.F07-073	8/3/2011	Postive		400	Poplar St.	Public	Upstream MH	Medium	Paved	frame seal
F07-075.F07-074	8/3/2011	Suspect		304	Poplar St.	Private	Area Drain		Non Paved	window well
F07-075.F07-074	8/3/2011	Suspect		302	Poplar St.	Private	Area Drain		Non Paved	window well
F07-075.F07-074	8/3/2011	Suspect		300	Poplar St.	Private	Area Drain		Non Paved	window well
F07-075.F07-074	8/3/2011	Suspect		300	Poplar St.	Private	Area Drain		Non Paved	window well
F07-078.F07-077	8/3/2011	Suspect		501	Poplar St.	Private	Area Drain		Non Paved	window well
F07-063.F07-051	8/3/2011	Suspect		509	Willow St.	Private	Area Drain		Non Paved	window well
F07-050.F06-059	8/3/2011	Postive		607	Birch St.	Public	Upstream MH	Medium	Non Paved	frame seal
F07-053.F07-052	8/3/2011	Suspect		508	Poplar St.	Private	Area Drain		Non Paved	window well
F07-061.F07-053	8/3/2011	Suspect		504	Poplar St.	Private	Area Drain		Non Paved	window well
F07-065.F07-064	8/3/2011	Postive		603	Willow Cir.	Public	Upstream MH	Medium	Non Paved	frame seal
F07-072.F07-071	8/3/2011	Postive		411	Willow St.	Public	Upstream MH	Medium	Non Paved	frame seal
F07-070.F07-050	8/3/2011	Postive		404	Willow St.	Public	Upstream MH	Light	Non Paved	frame seal
F07-086.F07-085	8/3/2011	Suspect		507	Birch St.	Private	Area Drain		Non Paved	window well
F07-086.F07-085	8/3/2011	Suspect		507	Birch St.	Private	Area Drain		Non Paved	window well
F07-083.F07-050	8/3/2011	Postive		607	Birch St.	Public	Upstream MH	Medium	Non Paved	frame seal
F07-084.F07-083	8/3/2011	Suspect		606	Birch St.	Private	Area Drain		Non Paved	window well
F07-085.F07-084	8/3/2011	Suspect		512	Birch St.	Private	Area Drain		Non Paved	window well
F07-085.F07-084	8/3/2011	Suspect		512	Birch St.	Private	Area Drain		Non Paved	window well
F07-086.F07-085	8/3/2011	Suspect		504	Birch St.	Private	Area Drain		Non Paved	window well
F07-086.F07-085	8/3/2011	Suspect		505	Birch St.	Private	Area Drain		Non Paved	window well

APPENDIX D --- Dyed Water Testing Results

Line Segment	Smoke Test Result	House Number	Street Name	Status	Surface Type	Source Type	Comments	Date Tested	Dye Test Results
D07-015.D07-014	Suspect	805	Sterling Ave.	Private	Paved	Stairwell Drain		8/4/2011	negative
E07-019.E07-018	Suspect	10117	220th St.	Private	Non Paved	Area Drain	window well	8/4/2011	negative
E07-025.E07-024	Suspect	22025	Gracie Dr.	Private	Non Paved	Area Drain	window well	8/4/2011	negative
E07-037.E07-036	Suspect	813	Quail Ridge Rd.	Private	Non Paved	Area Drain	window well	8/4/2011	negative
E07-039.E07-038	Suspect	821	Quail Ridge Rd.	Private	Non Paved	Area Drain	window well	8/4/2011	negative
F07-078.F07-077	Suspect	501	Poplar St.	Private	Non Paved	Area Drain	window well	8/4/2011	negative
F07-086.F07-085	Suspect	505	Birch St.	Private	Non Paved	Area Drain	window well	8/4/2011	negative
G05-018.G05-017	Suspect	12108	School Rd.	Private	Non Paved	Downspout	downspout underground	8/4/2011	negative
G05-020.G05-019	Suspect	12205	School Rd.	Private	Non Paved	Downspout	downspout underground	8/4/2011	negative
G05-021.G05-020	Suspect	12305	School Rd.	Private	Non Paved	Downspout	downspout underground	8/4/2011	negative
G06-047.G06-046	Suspect	891	Glengera Dr.	Private	Non Paved	Area Drain	window well	8/4/2011	negative
G06-061.G06-060	Suspect	981	Gregory St.	Private	Non Paved	Area Drain	window well	8/4/2011	negative
G07-022.G07-023	Suspect	300	Schug Ave.	Private	Paved	Area Drain		8/4/2011	negative
G08-030.G08-029	Suspect	601	Sivley St.	Private	Paved	Stairwell Drain		8/4/2011	negative
H05-018.H05-017	Suspect	981	Sicklebar Dr.	Private	Non Paved	Area Drain	window well	8/4/2011	negative
H05-019.H05-018	Suspect	977	Sicklebar Dr.	Private	Non Paved	Area Drain	window well	8/4/2011	negative
H05-029.H05-028	Suspect	923	Kendall	Private	Non Paved	Stairwell Drain		8/4/2011	negative
H05-031.H05-030	Suspect	965	Kendall	Private	Non Paved	Downspout	downspout/sump underground	8/4/2011	negative
H05-031.H05-030	Suspect	965	Kendall	Private	Non Paved	Other	sump pump discharge	8/4/2011	negative
H06-015.H06-014	Suspect	914	Gregory St.	Private	Paved	Stairwell Drain		8/4/2011	negative
H06-063.H06-062	Suspect	725	J Hwy	Private	Paved	Stairwell Drain		8/4/2011	negative

APPENDIX E – Pipe Segment Data

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
E06-001	F06-013	0	988.87	0	0		261.41
E06-002	E06-001	0	0	0	0		277.01
E06-003	E06-002	0	0	0	0		280.65
E06-004	E06-003	0	0	0	0		390.23
E06-005	E06-004	0	0	0	0		332.38
E06-006	E06-005	0	0	0	0		346.46
E06-007	E06-006	0	0	0	0		224.21
E06-008	E06-007	0	0	0	0		195.18
E06-009	E06-006	0	0	0	0		535.01
E06-010	E06-005	0	0	0	0		0.00
E06-011	E06-010	0	0	0	0		0.00
E06-012	E06-005	0	0	0	0		0.00
E06-013	E06-001	0	0	0	0		237.57
E06-014	E06-013	0	0	0	0		339.11
E06-015	E06-014	0	0	0	0		500.28
E06-016	E06-014	0	0	0	0		699.70
E07-015	E07-014	0	0	0	0		233.93
E07-019	E07-018	0	0	0	0		246.96
E07-020	E07-019	0	0	0	0		248.32
E07-021	E07-008	0	0	0	0		149.23
E07-022	E07-021	0	0	0	0		209.00
E07-023	E07-022	0	0	0	0		0.00
E07-024	E07-007	0	0	0	0		424.57
E07-025	E07-024	0	0	0	0		137.50
E07-026	E07-025	0	0	0	0		390.37
E07-027	E07-026	0	0	0	0		220.81
E07-028	E07-027	0	0	0	0		200.73
E07-029	E07-007	0	0	0	0		258.08
E07-030	E07-029	0	0	0	0		166.45
E07-054	F07-032	0	0	0	0		429.11
E07-055	E07-054	0	0	0	0		300.38
E07-056	E07-055	0	0	0	0		231.68
F06-016	F06-008	0	0	0	0		180.84
F06-017	F06-016	0	0	0	0		217.34
F07-013	F07-012	0	0	0	0		179.28
F07-014	F07-010	0	0	0	0		256.34
F07-015	F07-010	0	0	0	0		0.00
F07-031	F07-030	0	0	0	0		227.67
F07-032	F07-031	0	0	0	0		727.11
F07-033	F07-026	0	0	0	0		207.78
F07-034	F07-033	0	0	0	0		292.94
F07-035	F07-004	0	0	0	0		156.48
F07-036	F07-035	0	0	0	0		88.65
F07-037	F07-036	0	0	0	0		69.79
F07-038	F07-037	0	0	0	0		244.97

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
F07-039	F07-038	0	0	0	0		150.43
F07-042	F07-002	0	0	0	0		163.01
F07-043	F07-042	0	0	0	0		332.81
F07-044	F07-043	0	0	0	0		161.70
F08-015	F08-014	0	0	0	0		0.00
G03-005	G03-003	0	0	0	0		0.00
G04-029	G04-028	0	988.13	0	0		363.93
G04-030	G04-029	0	0	0	0		325.40
G04-031	G04-030	0	0	0	0		117.49
G04-033	G05-016	0	0	0	0		230.03
G05-012	G05-011	0	0	0	0		106.78
G05-013	G05-012	0	0	0	0		305.82
G05-014	G05-013	0	0	0	0		302.91
G05-015	G05-014	0	0	0	0		297.43
G05-016	G05-015	0	0	0	0		301.74
G05-017	G05-016	0	0	0	0		193.93
G05-018	G05-017	0	0	0	0		375.52
G05-019	G05-018	0	0	0	0		329.56
G05-020	G05-019	0	0	0	0		233.16
G05-021	G05-020	0	0	0	0		214.09
G06-021	G06-015	0	0	0	0		232.18
G06-022	G06-021	0	0	0	0		285.38
G06-023	G06-022	0	0	0	0		0.00
G06-056	G06-055	0	0	0	0		307.88
G07-014	G07-006	0	0	0	0		0.00
G07-019	G07-018	0	0	0	0		416.41
G07-020	G07-019	0	0	0	0		396.66
G07-021	G07-020	0	0	0	0		132.22
G07-022	G07-021	0	0	0	0		361.96
G07-023	G07-022	0	0	0	0		267.21
G07-024	G07-021	0	0	0	0		182.13
G07-025	G07-024	0	0	0	0		204.44
G07-040	G07-002	0	0	0	0		241.86
G07-041	G07-040	0	0	0	0		342.03
G07-042	G07-041	0	0	0	0		245.89
G08-009	G08-008	0	0	0	0		168.34
G08-010	G08-009	0	0	0	0		154.97
G08-011	G08-010	0	0	0	0		159.74
G08-012	G08-011	0	0	0	0		201.73
G08-013	G08-012	0	0	0	0		241.60
G08-014	G08-013	0	0	0	0		176.64
G08-015	G08-012	0	0	0	0		121.35
G08-016	G08-011	0	0	0	0		222.67
G08-017	G08-011	0	0	0	0		216.04
G08-018	G08-017	0	0	0	0		365.24

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
G08-021	G08-020	0	0	0	0		0.00
G08-026	G08-005	0	0	0	0		236.10
G08-027	G08-026	0	0	0	0		247.20
G08-029	G08-001	0	0	0	0		305.18
G08-030	G08-029	0	0	0	0		384.58
G08-032	G08-031	0	0	0	0		202.86
G08-033	G08-032	0	0	0	0		297.20
G08-034	G08-033	0	0	0	0		394.29
G08-035	G08-034	0	0	0	0		357.51
G08-036	G08-034	0	0	0	0		243.59
G08-037	G08-033	0	0	0	0		384.09
G08-038	G08-032	0	0	0	0		474.26
G08-039	G08-031	0	0	0	0		356.14
G08-040	G08-037	0	0	0	0		144.24
G08-041	G08-039	0	0	0	0		243.82
G08-042	H08-021	0	0	0	0		142.52
G08-043	G08-042	0	0	0	0		303.66
G08-044	G08-043	0	0	0	0		337.59
H05-015	H05-014	0	0	0	0		142.05
H05-016	H05-015	0	0	0	0		45.47
H05-017	H05-016	0	0	0	0		297.62
H05-018	H05-017	0	0	0	0		340.75
H05-019	H05-018	0	0	0	0		322.36
H05-020	H05-019	0	0	0	0		234.87
H05-021	H05-017	0	0	0	0		79.13
H06-063	H06-062	0	0	0	0		356.64
H07-001	H08-001	0	0	0	0		130.06
H07-002	H07-001	0	0	0	0		34.79
H07-003	H07-002	0	0	0	0		44.30
H07-019	H07-003	0	0	0	0		39.96
H08-002	H07-019	913.11	0	0	0		404.95
H08-011	H08-010	0	0	0	0		353.19
H08-011	H08-010	0	0	0	0		0.00
H08-012	H08-011	0	0	0	0		151.77
H08-021	H08-012	0	0	0	0		229.51
I08-008	I08-LS1	0	0	0	0		61.73
D07-LS1	D07-023	995	1012.65	0	4	PVC	1033.42
E05-LS1	E06-001	998.13	996.8	0	4		2774.96
E05-LS2	E06-001	0	987.4	0	4	CL 200 PVC	540.00
G04-LS1	G05-019	970	980.61	0	4	PVC	2022.30
G09-LS1	WWTP	930	946.4	0	6	PVC CL200	1218.00
D07-001	D07-LS1	986.46	983.95	1	8	PVC SDR 26	251.49
D07-002	D07-001	987.7	986.66	0.5	8	PVC SDR 26	208.46
D07-003	D07-002	988.64	987.9	0.5	8	PVC SDR 26	148.30
D07-004	D07-003	989.97	988.84	0.5	8	PVC SDR 26	225.93

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
D07-005	D07-004	991.5	990.17	0.5	8	PVC SDR 26	265.25
D07-006	D07-005	992.82	991.7	0.5	8	PVC	224.80
D07-007	D07-006	993.74	993.02	0.5	8	PVC	144.35
D07-008	D07-007	1001.32	993.94	2.1	8	PVC	351.56
D07-009	D07-008	1007.79	1001.52	1.8	8	PVC	348.39
D07-010	D07-005	994.1	991.7	1.5	8	PVC	159.83
D07-011	D07-010	1008.19	994.6	3.5	8	PVC	388.19
D07-012	D07-004	998.58	997.03	1	8	PVC	155.21
D07-013	D07-012	1009.49	999.08	3.3	8	PVC	315.59
D07-014	D07-002	1002.64	997.9	3.2	8	PVC	148.13
D07-015	D07-014	1010.5	1003.14	2.3	8	PVC	320.00
D07-016	E07-030	1004.31	1000.88	1.8	8	PVC	190.53
D07-017	D07-016	1008.44	1004.81	1.2	8	PVC	302.84
D07-018	D07-017	1010.84	1008.94	0.5	8	PVC	378.81
D07-019	D07-018	1013.89	1011.34	1	8	PVC	255.00
D07-020	D07-017	1009.87	1008.94	0.6	8	PVC	155.35
D07-021	D07-020	1010.72	1010.37	0.6	8	PVC	57.85
D07-022	D07-021	1012.84	1011.22	1	8	PVC	162.00
D07-023	D07-016	1010.59	1004.81	1.8	8	PVC	326.57
E05-001	E05-LS1	996.68	994	2.07	8	PVC SDR 26	129.70
E05-002	E05-001	999.71	997.18	2.31	8	PVC SDR 26	109.60
E05-003	E05-002	1002.21	999.91	1.82	8	PVC SDR 26	126.20
E05-004	E05-003	1007.17	1002.71	2.23	8	PVC SDR 26	200.10
E05-005	E05-004	1016.17	1007.67	2.49	8	PVC SDR 26	341.70
E05-006	E05-005	1024.11	1016.67	2.4	8	PVC SDR 26	310.70
E05-007	E05-006	1027.84	1024.61	1.43	8	PVC SDR 26	225.70
E05-008	E05-007	1030.89	1028.04	2	8	PVC SDR 26	142.30
E05-009	E05-006	1029.3	1024.61	9.16	8	PVC SDR 35	51.20
E05-010	E05-005	1020.21	1016.67	1.85	8	PVC SDR 35	191.60
E05-011	E05-004	0	1007.67	1.84	8	PVC SDR 35	166.10
E06-017	E05-LS2	969.79	968	1.19	8	DIP/PVC	170.00
E06-018	E06-017	971.68	970.29	0.76	8	PVC	183.00
E06-019	E06-018	974.92	972.18	0.76	8	PVC	360.00
E06-020	E06-019	976.65	975.12	0.76	8	PVC	202.00
E06-021	E06-020	978.4	976.85	1	8	PVC	155.00
E06-022	E06-021	981.04	978.59	1.84	8	PVC	133.00
E06-023	E06-022	983.76	981.54	1	8	PVC	222.00
E06-029	E06-028	996.72	995.73	0.4	8		247.73
E06-030	E06-029	997.8	996.92	0.4	8		219.20
E06-031	E06-030	998.58	998	0.4	8		146.17
E06-032	E06-030	999.46	998	0.4	8		365.07
E06-033	E06-023	988.11	984.26	1	8	PVC	385.00
E06-034	E06-022	983.72	979.4	9.6	8	PVC	45.00
E06-035	E06-034	0	0	0	8	PVC	130.00
E06-036	E06-021	979.48	978.9	1	8	PVC	58.00

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
E06-037	E06-019	977.67	975.8	1.21	8	PVC	187.00
E06-038	E06-019	981.92	975.91	2.61	8	PVC	250.00
E06-039	E06-017	978.75	969.99	2.92	8	PVC	300.00
E06-040	E06-039	983.24	978.94	3.58	8	PVC	120.00
E06-041	E07-034	1002.57	1002.2	0.4	8	PVC SDR 35	91.30
E06-042	E06-041	1004.48	1002.77	0.4	8	PVC SDR 35	428.43
E06-043	E06-042	1005.22	1004.68	0.4	8	PVC SDR 35	136.10
E06-044	E06-043	1006.02	1005.42	0.4	8		148.78
E06-045	E06-044	1007.47	1006.22	0.4	8		312.76
E06-046	E06-045	1008.51	1007.67	0.4	8		209.99
E06-047	E06-046	1009.05	1008.71	0.4	8		83.99
E06-048	E06-047	1009.76	1009.25	0.4	8		127.46
E06-049	E06-048	1011.01	1009.96	0.6	8		175.23
E06-050	E06-049	1012.01	1011.21	0.57	8		140.00
E06-051	E06-050	1016.38	1012.21	1.93	8		216.58
E06-052	E06-051	1018.9	1016.78	1.52	8		139.88
E06-053	E06-050	1013.33	1012.41	1.05	8		87.46
E06-054	E06-053	1016	1013.53	1.6	8		154.68
E06-055	E06-049	1012.08	1011.41	0.6	8		111.86
E06-056	E06-048	1010.95	1009.96	0.58	8		171.80
E06-057	E06-043	1011.62	1005.42	1.89	8		327.56
E06-058	E06-057	1021.25	1011.82	2.9	8		325.00
E07-007	E07-006	993.5	992.7	0.53	8	PVC	151.70
E07-008	E07-007	999.49	993.61	1.68	8	PVC	349.10
E07-009	E07-008	1002.83	999.87	1.78	8	PVC	166.00
E07-010	E07-009	1005.26	100.305	1.5	8	PVC	147.70
E07-011	E07-010	1008.01	1005.44	1.48	8	PVC	173.80
E07-012	E07-011	1010.42	1008.15	0.93	8	PVC	244.00
E07-013	E07-012	1012.26	1010.5	1.13	8	PVC	155.20
E07-014	E07-013	1015.55	1012.47	0.94	8	PVC	326.60
E07-016	E07-008	1003.33	999.71	2.27	8	PVC	159.60
E07-017	E07-016	1004.42	1003.53	1.82	8	PVC	48.20
E07-018	E07-017	1006.15	1004.64	1.19	8	PVC	127.40
E07-031	F07-069	995.44	992.47	0.79	8	PVC	374.50
E07-032	E07-031	0	995.64	0.75	8	PVC	0.00
E07-033	E07-032	998.57	0	0.75	8	PVC	0.00
E07-034	E07-033	1000.09	998.87	0.78	8	PVC	157.20
E07-035	E07-034	1001.62	1000.29	1.08	8	PVC	123.40
E07-036	E07-035	1005.22	1001.82	1.17	8	PVC	290.00
E07-037	E07-036	1006.28	1005.43	0.42	8	PVC	204.50
E07-038	E07-037	1007.5	1006.38	0	8	PVC	0.00
E07-039	E07-038	1008.76	1007.7	0.5	8	PVC	211.90
E07-040	E07-039	1009.99	1008.96	0.5	8	PVC	206.90
E07-041	E07-040	1011.41	1010.19	1	8	PVC	122.30
E07-042	E07-041	1013.88	1011.61	1.8	8	PVC	126.20

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
E07-043	E07-036	1010.04	1005.5	1.78	8	PVC	254.50
E07-044	E07-043	1012.03	1010.21	1.04	8	PVC	175.00
E07-045	E07-035	1006.68	1001.83	1.43	8	PVC	338.50
E07-046	E07-045	1008.47	1006.8	0.66	8	PVC	254.50
E07-047	E07-046	1014.92	1008.67	2.98	8	PVC	209.60
E07-048	E07-046	1009.32	1008.67	1.14	8	PVC	57.00
E07-049	E07-032	1003.8	997.39	1.63	8	PVC SDR 35	393.16
E07-050	E07-049	1006.25	1004	1.23	8	PVC SDR 35	300.00
E07-051	F07-059	1001.2	998.7	1.01	8	PVC SDR 35	246.60
E07-052	E07-051	1003.2	1001.4	0.79	8	PVC SDR 35	227.07
E07-053	F07-059	1004.6	998.7	1.97	8	PVC SDR 35	300.00
E08-001	F08-042	978.51	976.7	0.6	8		302.00
E08-002	E08-001	979.57	978.71	0.6	8		142.50
E08-003	E08-002	983.04	979.97	2.63	8		116.72
F04-004	F04-003	0	963.87	1.47	8	PVC	0.00
F04-005	F04-004	969.3	0	1.47	8	PVC	0.00
F04-006	F04-005	972	969.5	0.92	8	PVC	271.33
F04-007	F04-006	977.77	972.2	1.46	8	PVC	380.75
F04-008	F04-007	982.68	977.97	1.5	8	PVC	313.91
F04-009	F04-008	0	982.88	1.07	8	PVC	0.00
F04-010	F04-009	986.56	0	1.07	8	PVC	0.00
F04-011	F04-009	986.89	985.02	1.02	8	PVC SDR 26	183.62
F04-012	F04-009	984.87	984.02	1	8	PVC SDR 26	85.28
F04-013	F04-008	984.13	983.16	1.02	8	PVC SDR 26	95.00
F04-014	F04-006	975.38	972.48	2.11	8	PVC SDR 26	137.14
F04-015	F04-014	977.35	975.58	1.74	8	PVC SDR 26	101.79
F04-016	F04-015	978.65	977.55	1	8	PVC SDR 26	110.09
F04-017	F04-016	980.23	979.05	1	8	PVC SDR 26	137.84
F04-018	F04-017	981.41	980.43	1	8	PVC SDR 26	98.35
F04-019	F04-018	982.59	981.61	1	8	PVC SDR 26	98.28
F04-020	F04-016	983.45	979.05	3.5	8	PVC SDR 26	125.54
F04-028	F04-025	980.11	977.33	1.92	8	PVC SDR 26	144.82
F04-029	F04-028	983.36	980.31	1.62	8	PVC SDR 26	188.03
F04-031	F04-003	967.8	963.87	1.6	8	PVC	245.00
F04-032	F04-031	970.8	968	1.2	8	PVC	232.98
F06-003	F06-002	0	948.53	0.4	8		0.00
F06-004	F06-003	949.5	0	0.4	8		0.00
F06-005	F06-004	952.66	949.7	0.74	8	PVC	400.00
F06-006	F06-005	961.06	952.86	2.05	8	PVC	400.00
F06-007	F06-006	969.34	961.26	2.02	8	PVC	400.00
F06-008	F06-007	973.17	969.54	1.4	8	PVC	247.59
F06-018	F06-008	972.5	971.41	0.4	8		272.76
F06-019	F06-018	973.59	972.7	0.4	8		222.73
F06-020	F06-019	974.29	973.49	0.4	8		125.37
F06-021	F06-020	975.08	974.49	0.4	8		146.52

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
F06-022	F06-021	976.03	975.28	0.4	8		187.96
F06-023	F06-022	976.69	976.23	0.4	8		114.57
F06-024	F06-023	977.4	976.89	0.4	8		128.31
F06-025	F06-024	978.16	977.6	0.4	8		139.90
F06-026	F06-025	978.86	978.36	0.4	8		124.58
F06-027	F06-026	979.81	979.06	0.4	8		187.62
F06-028	F06-027	980.35	980.01	0.4	8		85.51
F06-029	F06-028	981.55	980.55	0.4	8		249.24
F06-030	F06-029	982.4	981.75	0.4	8		149.79
F06-031	F06-028	984	980.55	2.19	8		157.44
F06-032	F06-027	984.98	980.01	3.31	8		150.02
F06-033	F06-025	979.24	978.36	0.4	8		222.19
F06-034	F06-033	979.97	979.44	0.4	8		132.24
F06-035	F06-018	980.84	972.7	2.95	8	PVC SDR 35	292.99
F06-036	F06-035	983.04	981.24	1.39	8	PVC SDR 35	129.90
F06-037	F06-036	985.54	983.24	1	8	PVC SDR 35	229.53
F06-038	F06-037	989.93	985.94	2.18	8	PVC SDR 35	183.32
F06-039	F06-038	992.08	990.33	1	8	PVC SDR 35	174.52
F06-040	F06-039	993.1	992.28	1	8	PVC SDR 35	81.62
F06-041	F06-037	988.2	985.94	1	8	PVC SDR 35	225.70
F06-042	F06-035	982.27	981.24	1	8	PVC SDR 35	102.73
F06-043	F06-018	973.21	972.7	0.4	8		128.54
F06-044	F06-043	974.29	973.41	0.4	8		219.17
F06-045	F06-044	975.65	974.49	0.4	8		290.77
F06-046	F06-045	976.62	975.85	0.4	8		191.69
F06-047	F06-046	977.25	976.82	0.4	8		108.81
F06-048	F06-047	977.82	977.45	0.4	8		91.20
F06-049	F06-048	979.68	978.02	0	8		414.79
F06-050	F06-046	980.77	976.82	3.38	8		116.81
F06-051	F06-006	962.07	961.1	1	8	PVC	97.00
F06-052	F06-051	967.54	962.57	1.5	8	PVC	331.10
F06-053	F06-003	0	0	0	8	PVC	193.50
F06-054	F06-053	0	0	0	8	PVC	314.25
F06-055	F06-054	0	0	0	8	PVC	281.90
F06-056	F06-003	0	0	0	8	PVC	354.80
F06-057	F06-002	953.8	950	1.36	8	PVC	279.77
F06-058	F06-057	957.8	954	1.06	8	PVC	359.81
F06-059	F06-058	962.97	958	1.53	8	PVC	324.84
F06-060	F06-001	955	950.5	1.8	8	PVC SDR 35	332.72
F07-003	F07-002	977	0	0.6	8		47.50
F07-004	F07-003	0	977	1.97	8	VCP	0.00
F07-005	F07-004	984.36	0	1.97	8	VCP	0.00
F07-006	F07-005	986.5	984.6	0.55	8	VCP	343.00
F07-007	F07-006	988.5	986.92	0.75	8	VCP	210.00
F07-008	F07-007	990.86	989	0.84	8	VCP	150.40

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
F07-009	F07-008	992.26	990.68	0.4	8	VCP	395.60
F07-010	F07-009	0	992.26	0.4	8	VCP	155.05
F07-011	F07-010	993.36	0	0.4	8	VCP	156.08
F07-012	F07-011	0	993.36	0.4	8	VCP	358.46
F07-016	F07-009	993.18	992.3	0.4	8	VCP	220.00
F07-017	F07-009	1000.3	994	1.8	8	VCP	350.00
F07-018	F07-017	1001.96	1000.3	0.4	8	VCP	365.00
F07-019	F07-008	994.9	992	0.89	8	VCP	331.00
F07-020	F07-019	998.24	994.9	0.91	8	VCP	364.00
F07-021	F07-020	998.88	998.24	0.4	8	VCP	155.00
F07-022	F07-019	996.44	995	0.4	8	VCP	360.00
F07-023	F07-022	997.9	996.44	0.4	8	VCP	366.00
F07-024	F07-023	999	997.9	0.4	8	VCP	286.00
F07-025	F07-006	989.83	988.5	2.34	8	VCP	57.00
F07-026	F07-005	0	984.36	2.17	8	VCP	0.00
F07-027	F07-026	992.44	0	2.17	8	VCP	0.00
F07-028	F07-027	996.94	992.44	2.17	8	VCP	203.00
F07-029	F07-028	998.2	996.94	0.4	8	VCP	321.00
F07-030	F07-029	998.94	998.2	0.4	8	VCP	179.00
F07-040	F07-003	986.5	979	2.15	8	VCP	350.00
F07-041	F07-040	993	986.5	2.15	8	VCP	300.00
F07-045	F08-044	998.05	996.32	0.5	8	VCP	346.00
F07-046	F07-045	998.45	998.05	0.5	8	VCP	77.00
F07-047	F07-045	1001.29	999	0.76	8	VCP	300.00
F07-048	G07-027	993.9	986.5	1.87	8	VCP	395.00
F07-049	F07-048	999.9	994.4	2.08	8	VCP	265.00
F07-050	F06-059	964.49	963.07	1.14	8	PVC	121.25
F07-051	F07-050	969	964	1.47	8		340.00
F07-052	F07-051	970.5	969.82	1	8		68.00
F07-053	F07-052	974	971.39	1	8		261.00
F07-054	F07-053	979.62	975	2.5	8		185.00
F07-055	F07-054	0	977.38	2.13	8	PVC SDR 35	0.00
F07-056	F07-055	984.2	0	2.13	8	PVC SDR 35	0.00
F07-057	F07-056	988.5	984.4	2.05	8	PVC SDR 35	199.85
F07-058	F07-057	994.6	988.7	1.83	8	PVC SDR 35	322.41
F07-059	F07-058	998.5	994.8	0.99	8	PVC SDR 35	375.00
F07-060	F07-057	997	993.99	2.52	8	PVC SDR 35	329.58
F07-061	F07-053	978	974.59	1.3	8		262.00
F07-062	F07-052	971.93	970.7	1	8		123.00
F07-063	F07-051	976.53	970	2.6	8		251.00
F07-064	F07-063	981	976.79	1.15	8		366.00
F07-065	F07-064	982.8	981.55	1	8		125.00
F07-066	F07-065	986.42	983	1.8	8		190.00
F07-067	F07-066	988.14	987	0.8	8	PVC	143.00
F07-068	F07-067	988.85	988.34	0.8	8	PVC	63.70

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
F07-069	F07-068	992.27	989.05	0.81	8	PVC	399.60
F07-070	F07-050	971.92	965.26	1.89	8	PVC	352.30
F07-071	F07-070	972.63	972.07	0.75	8	PVC	74.40
F07-072	F07-071	978.18	973.48	4.02	8	PVC	117.00
F07-073	F07-072	978.98	978.44	0.4	8	PVC	134.50
F07-074	F07-073	986.08	980.48	2	8	PVC	280.00
F07-075	F07-074	993.33	986.28	1.84	8	PVC	383.00
F07-076	F07-073	979.71	979.18	0.6	8	PVC	88.00
F07-077	F07-076	977.78	977	1.47	8	PVC SDR 35	52.92
F07-078	F07-077	978.9	977.98	1.44	8	PVC SDR 35	77.33
F07-079	F07-078	982.7	979.1	1.48	8	PVC SDR 35	214.24
F07-080	F07-079	985.79	982.7	2	8	PVC SDR 35	164.26
F07-081	F07-079	984.96	983.5	1.64	8	PVC SDR 35	89.59
F07-082	F07-070	978.24	972.15	2.58	8	PVC	235.80
F07-083	F07-050	972.68	965.26	5.91	8	PVC	125.50
F07-084	F07-083	982.18	972.93	6.68	8	PVC	138.50
F07-085	F07-084	986.01	982.25	1.27	8	PVC	296.30
F07-086	F07-085	989.85	986.15	1.8	8	PVC	205.00
F07-087	F06-060	968.5	955.5	3.25	8	PVC SDR 35	400.00
F07-088	F07-087	976	969	1.75	8	PVC SDR 35	400.00
F07-089	F07-088	985	976.5	2.13	8	PVC SDR 35	400.00
F08-012	F08-001	947.94	943.71	1.84	8		230.00
F08-013	F08-012	957.07	948.14	2.28	8		392.00
F08-014	F08-013	960.1	957.27	1.8	8		157.00
F08-016	F08-015	962.3	960.3	0.5	8		400.00
F08-017	F08-016	971.63	962.5	2.28	8		400.00
F08-018	F08-017	973.83	971.83	0.5	8		400.00
F08-019	F08-018	975.5	974.03	0.5	8		295.00
F08-020	F08-014	961.83	959.84	1.6	8	PVC	124.67
F08-021	F08-020	966.87	962.33	2.5	8	PVC	181.64
F08-022	F08-021	972.12	967.37	3.3	8	PVC	143.95
F08-023	F08-012	952.2	948.14	1	8		254.00
F08-024	F08-023	962.84	952.7	4.5	8	PVC	225.44
F08-025	F08-024	964.62	963.34	0.5	8	PVC	256.47
F08-026	F08-025	966.49	965.12	0.5	8	PVC	273.15
F08-027	F08-026	968.03	966.99	0.5	8	PVC	207.48
F08-028	F08-027	971	968.53	1	8	PVC	247.40
F08-029	F08-027	970.33	968.53	1	8	PVC	180.00
F08-030	F08-026	971.31	966.99	2.7	8	PVC	160.00
F08-031	F08-025	971.79	965.12	3.3	8	PVC	202.00
F08-032	F08-024	972.42	966.5	4	8	PVC	148.00
F08-042	F08-037	976.5	964.87	3.14	8		370.50
F08-044	G08-022	996.32	991.5	1.72	8	VCP	280.00
F09-001	F09-LS1	0	0	0	0		12.66
F09-002	F09-001	0	0	0	0		15.51

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
F09-008	F09-006	940.71	940.3	0.89	8	PVC	46.27
F09-009	F09-005	944.75	938.57	2.75	8	PVC	225.00
F09-010	F09-004	941.52	936.38	2.4	8	PVC	214.52
F09-011	F09-010	950.36	941.67	2.17	8	PVC	399.78
F09-012	F09-004	937.72	936.58	0.76	8	PVC SDR 35	150.36
F09-013	F09-012	943.96	937.92	1.99	8	PVC SDR 35	303.57
F09-014	F09-013	947.58	944.36	1.18	8	PVC SDR 35	274.01
F09-015	F09-014	948.93	947.78	0.76	8	PVC SDR 35	151.37
F09-016	F09-015	952.17	949.33	0.76	8	PVC SDR 35	399.70
F09-017	F09-016	954.4	952.37	0.76	8	PVC SDR 26	266.93
F09-018	F09-017	957.64	954.6	0.76	8	PVC SDR 26	400.11
F09-019	F09-018	961.89	959.04	2.7	8	PVC SDR 35	0.00
F09-020	F09-019	971.5	962.09	6.29	8	PVC SDR 35	149.80
F09-021	F09-018	959.79	959.04	1	8	PVC SDR 35	174.53
F09-022	F09-015	956.07	949.13	3.11	8	PVC SDR 35	0.00
F09-023	F09-022	964.8	956.07	7.9	8	PVC SDR 35	108.00
F09-024	F09-023	967.3	965	1.31	8	PVC SDR 35	175.00
F09-025	F09-024	971.3	967.5	2.24	8	PVC SDR 35	160.90
F09-026	F09-025	974.65	971.3	2.09	8	PVC SDR 35	160.40
F09-027	F09-026	977.96	974.85	1	8	PVC SDR 35	310.50
F09-028	F09-027	980	978.16	1	8	PVC SDR 35	184.00
F09-029	F09-013	945.12	944.16	1	8	PVC SDR 35	96.35
F09-030	F09-003	939.39	934.15	1.37	8	PVC	382.49
F09-031	F09-030	943.51	939.69	3.13	8	PVC	121.91
F09-032	F09-031	949.18	943.8	4.48	8	PVC	120.06
G03-001	G04-032	994.98	988.2	1.82	8	PVC	371.68
G03-002	G03-001	1004.27	995.18	3.31	8	PVC	274.84
G03-003	G03-002	1007.5	1004.47	0.96	8	PVC	315.00
G03-004	G03-003	1018.61	1007.5	3.9	8	PVC	284.81
G04-001	G04-LS1	965.63	0	0	8	PVC	0.00
G04-002	G04-001	974.11	966.13	2.3	8	PVC/DIP	347.03
G04-003	G04-002	978.2	974.61	3	8	PVC	119.70
G04-004	G04-003	987.82	978.7	2.5	8	PVC	364.65
G04-005	G04-004	990.37	988.32	1.5	8	PVC	136.87
G04-006	G04-005	992.25	990.87	1	8	PVC	138.28
G04-007	G04-006	995.69	992.75	1	8	PVC	293.93
G04-008	G04-004	991.78	988.32	1.5	8	PVC	230.82
G04-009	G04-LS1	967.08	965.43	1	8	PVC	165.58
G04-010	G04-009	968.01	967.58	0.5	8	PVC	85.31
G04-011	G04-010	975.97	968.51	2	8	PVC	373.05
G04-012	G04-011	977.07	976.47	0.5	8	PVC	120.63
G04-013	G04-012	978.94	977.57	0.5	8	PVC	272.32
G04-014	G04-013	981.18	979.44	1.3	8	PVC	133.90
G04-015	G04-014	988.84	981.68	2.15	8	PVC	332.95
G04-016	G04-015	990.33	989.34	1	8	PVC	99.44

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
G04-017	G04-016	992.22	990.83	0.7	8	PVC	199.32
G04-018	G04-017	994.09	992.72	0.5	8	PVC	0.00
G04-019	G04-018	995.36	994.59	1	8	PVC	77.26
G04-020	G04-014	982.94	981.68	1	8	PVC	125.60
G04-021	G04-011	981.93	976.47	6.2	8	PVC	87.99
G04-022	G04-021	985.05	982.43	1.2	8	PVC	218.69
G04-023	G04-022	987.54	985.55	1.2	8	PVC	165.47
G04-024	G04-023	989.3	988.04	0.8	8	PVC	158.22
G04-025	G04-024	993.8	989.8	1	8	PVC	400.00
G04-026	G04-009	977.76	967.58	4.5	8	PVC	226.12
G04-027	G04-026	984.46	978.26	2	8	PVC	310.00
G04-028	F04-032	987.8	971	4.49	8	PVC	374.58
G04-032	F04-010	988	986.76	1.24	8	PVC	99.99
G05-001	G06-024	944	0	0.95	8	PVC SDR 35	209.34
G05-002	G05-001	946.73	944.2	1.21	8	PVC SDR 26	212.78
G05-003	G05-002	947.63	946.93	0.62	8	PVC SDR 26	117.34
G05-004	G05-003	949.15	947.83	0.63	8	PVC SDR 26	212.24
G05-005	G05-004	950.1	949.35	0.66	8	PVC SDR 35	117.34
G05-006	G05-005	952.33	950.3	0.76	8	PVC SDR 35	271.10
G05-007	G05-006	953.58	952.53	0.77	8	PVC SDR 35	140.03
G05-008	G05-007	955.58	953.78	0.76	8	PVC SDR 35	240.00
G05-009	G05-008	957	955.78	0.78	8	PVC SDR 35	160.00
G05-010	G05-009	964.25	957.2	2.7	8	PVC SDR 35	264.69
G05-011	G05-010	0	964.45	1.13	8	PVC SDR 35	0.00
G05-022	G05-010	975.7	964.45	3.7	8	PVC SDR 35	308.15
G05-023	G05-009	974	957.2	5.37	8	PVC SDR 35	316.68
G05-024	G05-008	0	955.78	1.54	8	PVC SDR 35	149.96
G05-025	G05-007	962	953.78	2.55	8	PVC SDR 35	329.79
G05-026	G05-025	964.5	962.2	0.82	8	PVC	278.83
G05-027	G05-026	967.4	964.7	1.41	8	PVC	191.69
G05-028	G05-027	967.21	966.66	0.6	8	PVC SDR 35	91.73
G05-029	G05-028	970.1	967.41	1.01	8	PVC SDR 35	267.31
G05-030	G05-006	965.5	952.53	6.65	8	PVC SDR 35	199.03
G05-031	G05-005	960.4	950.3	2.78	8	PVC SDR 35	358.61
G05-032	G05-031	962.2	960.6	0.47	8	PVC	335.00
G05-033	G05-004	954.1	949.35	1.77	8	PVC SDR 35	269.44
G05-034	G05-033	957.5	954.3	1.01	8	PVC SDR 35	320.36
G05-035	G05-034	959.4	957.7	0.5	8	PVC	340.26
G05-036	G05-035	960.93	959.6	0.5	8	PVC	265.00
G05-037	G05-036	962.55	961.13	0.5	8	PVC	284.75
G05-038	G05-037	965.94	962.55	2.9	8	PVC	117.09
G05-039	G05-038	969.57	966.14	3.1	8	PVC	110.80
G05-040	G05-035	961.36	959.6	1.41	8	PVC	125.00
G05-041	G05-040	964.31	960.8	1.75	8	PVC	200.29
G05-042	G05-041	971.99	964.51	2.34	8	PVC	320.00

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
G05-043	G05-003	960.5	0	3.35	8	PVC SDR 26	235.38
G05-044	G05-043	971	960.7	3.92	8	PVC SDR 35	266.48
G06-018	G06-016	938.57	937.31	1.8	8	PVC	70.00
G06-019	G06-018	956.91	938.77	5.86	8	PVC	309.48
G06-020	G06-019	978.98	957.11	6.75	8	PVC	324.38
G06-024	G06-014	937.5	937.16	0.4	8	PVC	85.37
G06-025	G06-012	941.5	933.77	3.87	8	PVC	199.49
G06-026	G06-025	963.5	941.7	5.74	8	PVC	379.92
G06-027	G06-009	933.56	929.72	1.7	8	PVC	226.44
G06-028	G06-027	941	935.4	1.75	8	PVC	320.18
G06-029	G06-008	940.19	930	6.37	8	PVC	160.00
G06-030	G06-006	937.74	926.68	1.11	8	PVC	393.01
G06-031	G06-030	944.8	939.25	2.44	8	PVC	227.30
G06-032	G06-031	950.35	945.45	3.59	8	PVC	136.44
G06-041	G06-040	959.8	952.5	3	8		243.26
G06-042	G06-041	965.5	960	1.81	8	PVC	303.16
G06-043	G06-042	977.22	965.7	3.07	8	PVC	374.93
G06-044	G06-043	978.4	977.42	0.4	8	PVC	244.68
G06-046	G06-039	953.3	944.5	4.75	8	PVC	185.26
G06-047	G06-046	960.55	953.5	2.19	8	PVC	321.50
G06-048	G06-047	966.5	960.75	2.17	8	PVC	264.94
G06-049	G06-036	950.6	933.65	4.17	8		398.85
G06-050	G06-049	952.4	950.8	0.4	8		400.00
G06-051	G06-050	953.4	952.6	0.4	8		201.15
G06-052	G06-035	958.56	929.25	7.88	8	PVC	372.00
G06-053	G06-002	940.98	919.75	5.4	8	PVC	392.88
G06-054	G06-053	942.5	941.18	0.4	8	PVC	330.33
G06-055	G06-054	954.5	951.25	1.24	8	PVC	262.14
G06-057	G06-055	0	0	4.68	8	PVC SDR 26	310.00
G06-058	G06-001	929.5	919.1	3.02	8	PVC	344.03
G06-059	G06-058	943.05	929.7	4.7	8	PVC	283.88
G06-060	G06-059	958.2	943.25	3.74	8	PVC	399.96
G06-061	G06-060	960	958.4	0.4	8	PVC	399.17
G06-062	H06-024	939.85	933.44	3.3	8		194.18
G06-063	G06-062	947.94	940.05	4.2	8		188.00
G06-064	G06-063	949.9	948.14	1.36	8		129.56
G06-065	G06-064	955.28	950.1	2.38	8		217.50
G07-006	G07-005	965.86	959.5	2.38	8	VCP	273.00
G07-007	G07-006	971	966.5	1.2	8	VCP	375.00
G07-008	G07-007	972.94	972.5	0.5	8	VCP	110.00
G07-009	G07-008	976.74	975.44	0.61	8	VCP	239.50
G07-010	G07-009	979	976.94	1.18	8	VCP	183.00
G07-011	G07-010	984.5	980	1.24	8	VCP	362.00
G07-012	G07-011	988.29	986	0.64	8	VCP	358.00
G07-013	G07-012	990.08	988.29	0.64	8	VCP	280.00

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
G07-015	G07-014	967.5	966	0.4	8	VCP	370.00
G07-016	G07-005	962	959.5	2.84	8	VCP	88.00
G07-017	G07-016	966	962	1.12	8	VCP	360.00
G07-018	G07-017	971.09	966	1.4	8	VCP	365.00
G07-026	G07-018	982.33	975	2.12	8	VCP	345.00
G07-027	G07-026	986	982.33	1.02	8	VCP	360.00
G07-028	G07-018	971.93	971	0.55	8	VCP	170.00
G07-029	G07-028	977.95	972	1.67	8	VCP	356.50
G07-030	G07-029	983.95	977.95	1.66	8	VCP	361.50
G07-031	G07-030	992.6	986	2.57	8	VCP	257.00
G07-032	G07-004	960.39	958.02	1.09	8	PVC	217.36
G07-033	G07-032	963.24	960.77	2.16	8	PVC	114.44
G07-034	G07-033	965.1	963.62	1.22	8	PVC	120.83
G07-035	G07-034	966.93	965.5	1.05	8	PVC	135.94
G07-036	G07-035	976.46	967.19	2.84	8	PVC	326.90
G07-037	G07-036	978.93	976.76	1.14	8	PVC	190.10
G07-038	G07-033	971.23	963.78	2.16	8	PVC	375.37
G07-039	G07-038	978.3	971.63	2.33	8	PVC	285.84
G07-043	G08-004	977	973	1.32	8	VCP	296.00
G07-044	G07-043	983	981.56	0.4	8	VCP	354.00
G07-045	G07-044	987.5	983	1.25	8	VCP	360.00
G07-046	G07-045	995.81	992	1.6	8	VCP	250.00
G07-047	G08-030	974.63	973.95	0.63	8	PVC	108.75
G07-048	G07-047	975.81	975.04	0.7	8	PVC	109.36
G07-049	G07-048	979.67	976.03	3.48	8	PVC	104.62
G08-001	G07-015	969	967.5	0.4	8	VCP	363.00
G08-002	G08-001	970.59	969.2	0.4	8	VCP	348.00
G08-003	G08-002	971.36	970.59	0.4	8	VCP	192.00
G08-004	G08-003	972.55	971.36	0.4	8	VCP	192.00
G08-005	G08-004	973.88	972.55	0.4	8	VCP	148.00
G08-006	G08-005	0	973.88	0.4	8	VCP	230.00
G08-007	G08-006	0	0	0.4	8	VCP	0.00
G08-008	G08-007	977.66	0	0.4	8	VCP	0.00
G08-019	G08-007	987	977	2.67	8	VCP	375.00
G08-020	G08-019	988	987	1	8	VCP	100.00
G08-022	G08-021	990.93	989.05	0.5	8	VCP	206.00
G08-023	G08-022	991.21	990.93	0.4	8	VCP	70.00
G08-024	G08-023	992.03	991.21	0.4	8	VCP	200.00
G08-025	G08-024	994.29	993.03	0.4	8	VCP	319.00
G08-028	G08-003	975.13	971.5	0.93	8	VCP	392.00
G08-045	G09-016	958	956.38	0.47	8	PVC	346.63
G08-046	G08-045	959.39	958.41	0.71	8	PVC	137.09
G08-047	G08-046	966.1	959.82	1.73	8	PVC	363.41
G08-048	G08-047	972.03	966.55	1.54	8	PVC	355.95
G08-049	G08-048	975.08	972.27	0.79	8	PVC	356.17

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
G08-050	G08-049	978.96	975.51	1.01	8	PVC	342.31
G08-051	G08-050	982.54	979.38	0.98	8	PVC	322.54
G08-052	G08-051	984.08	983.1	0.45	8	PVC	219.83
G08-053	G08-052	986.65	984.43	1.07	8	PVC	207.35
G08-054	G08-051	986.02	983.1	0.93	8	PVC	315.07
G08-055	G08-049	976.59	975.42	0.64	8	PVC	182.54
G08-056	G08-055	980.15	977.03	1.06	8	PVC	294.80
G08-057	G08-047	967.73	966.52	1	8	PVC	120.38
G08-058	G08-057	969.56	968.15	1.12	8	PVC	125.65
G08-059	G08-058	974.69	970.06	1.5	8	PVC	308.79
G08-060	G08-059	981.04	975.22	2.73	8	PVC	213.42
G08-061	G08-060	983.8	981.52	1	8	PVC	228.22
G08-062	G08-059	979.96	975.24	2.46	8	PVC	191.97
G08-063	G08-058	970.87	970.01	0.93	8	PVC	92.14
G08-064	G08-063	973.19	971.27	0.92	8	PVC	208.56
G08-065	G08-046	961.78	959.89	2.72	8	PVC	69.54
G08-066	G08-065	972.62	962.17	4.06	8	PVC	257.52
G08-067	G08-066	980.49	973.2	2.47	8	PVC	294.96
G08-068	G08-067	982.29	980.89	0.5	8	PVC	279.46
G08-069	G08-068	983.48	982.79	0.5	8	PVC	137.92
G08-070	G08-069	987.88	983.98	1	8	PVC	390.05
G09-001	G09-LS1	928.5	924	3.21	8		140.09
G09-002	G09-001	931.5	929	0.96	8		260.91
G09-003	G09-002	941.5	932	2.57	8		369.35
G09-004	G09-003	948	942	1.56	8		385.00
G09-005	G09-004	950.5	948.5	2.3	8		87.00
G09-006	G09-001	934.39	929	2.24	8		240.39
G09-007	G09-006	938.8	934.89	1	8		390.86
G09-008	G09-007	951	945.5	2.12	8		260.00
G09-009	G09-008	952.8	951.5	1	8		130.00
G09-010	G09-008	952	951.5	1	8		50.00
G09-011	G09-007	942	939.3	1	8		269.55
G09-012	G09-011	947	942.5	1.73	8		260.00
G09-013	G09-012	950	947.5	2.79	8		89.56
G09-014	F09-032	951.2	949.63	1.3	8	PVC	121.23
G09-015	G09-014	953.71	951.66	0.59	8	PVC	346.84
G09-016	G09-015	956.05	954.14	0.55	8	PVC	346.00
H05-001	H06-057	920.79	919.33	0.4	8	PVC	364.67
H05-002	H05-001	922.39	920.99	0.6	8	PVC	234.18
H05-003	H05-002	0	922.59	0.4	8	PVC	0.00
H05-004	H05-003	923.47	0	0.4	8	PVC	0.00
H05-005	H05-004	924.5	923.67	0.4	8	PVC	206.41
H05-006	H05-005	926.29	924.7	0.4	8	PVC	397.35
H05-007	H05-006	927.83	926.49	0.4	8	PVC	334.45
H05-008	H05-007	929.37	928.03	0.4	8	PVC	333.98

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
H05-009	H05-008	930.69	929.57	0.4	8	PVC	281.06
H05-010	H05-009	932.8	930.89	1.26	8	PVC	151.19
H05-011	H05-010	933.8	933	0.76	8	PVC	105.16
H05-012	H05-011	937.11	934	0.83	8	PVC	375.00
H05-013	H05-012	937.94	937.31	0.58	8	PVC	109.00
H05-014	H05-013	940.7	938.14	1.31	8	PVC	195.00
H05-022	H05-013	941	939.84	0.6	8	PVC	193.52
H05-023	H05-011	938	934.5	5	8	PVC	70.00
H05-024	H05-009	931.8	930.89	0.4	8	PVC	226.98
H05-025	H05-002	940	923.76	6.76	8	PVC	240.22
H05-026	H05-001	924.82	920.99	1.09	8	PVC	351.71
H05-027	H05-026	935.34	925.02	5.53	8	PVC	201.73
H05-028	H05-027	943.15	935.54	4.35	8	PVC	157.56
H05-029	H05-028	944.95	943.35	0.4	8	PVC	400.00
H05-030	H05-029	946.75	945.15	0.4	8	PVC	400.00
H05-031	H05-030	949.99	947.75	0.56	8	PVC	400.00
H05-032	H05-026	925	924.7	0.4	8	PVC	61.88
H05-033	G05-039	974.24	969.77	2.84	8	PVC	157.45
H05-034	G05-042	975.32	972.19	1.5	8	PVC	208.74
H06-014	H06-013	935.8	919.27	4.43	8	PVC	372.94
H06-015	H06-014	945	936	2.28	8	PVC	395.32
H06-016	H06-015	960.1	945.2	3.75	8	PVC	397.32
H06-017	H06-016	968	962	1.55	8	PVC	387.38
H06-018	H06-017	968.39	968	0.4	8	PVC	98.62
H06-019	H06-018	972.27	968.59	3.31	8	PVC	111.06
H06-020	H06-019	977.95	972.47	3.34	8	PVC	164.13
H06-021	H06-018	969.11	968.59	0.4	8	PVC	130.75
H06-022	H06-021	970.42	969.31	0.4	8	PVC	277.69
H06-023	H06-011	917.5	916.86	0.4	8	PVC	160.00
H06-024	H06-023	933.24	922.04	8	8		140.00
H06-025	H06-011	921.57	916.19	3.5	8	PVC	153.76
H06-026	H06-025	926.14	921.77	2.4	8	PVC	182.02
H06-027	H06-026	929.78	926.34	2	8	PVC	171.80
H06-028	H06-027	931.51	929.98	1.34	8	PVC	114.50
H06-029	H06-028	933.16	931.71	1.34	8	PVC	108.51
H06-030	H06-029	949.67	933.36	4.35	8	PVC	375.00
H06-031	H06-030	957.41	949.87	2.1	8	PVC	359.06
H06-032	H06-031	960.71	957.61	3.6	8	PVC	86.16
H06-033	H06-032	964.29	960.91	3.6	8	PVC	93.92
H06-034	H06-033	965.92	964.49	1.1	8	PVC	129.95
H06-035	H06-026	937.9	926.34	4.35	8	PVC	265.73
H06-036	H06-035	945.02	938.1	4.35	8	PVC	159.02
H06-037	H06-036	957.8	945.22	3.4	8	PVC	370.05
H06-038	H06-037	960.09	958	1.9	8	PVC	110.16
H06-039	H06-009	923.61	913.5	17.59	8	PVC	57.49

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
H06-040	H06-039	931.1	924.01	6.16	8	PVC	115.06
H06-041	H06-040	945.87	931.35	5.83	8	PVC	248.90
H06-042	H06-041	953.18	946.12	5.7	8	PVC	123.79
H06-043	H06-041	946.56	946.02	0.6	8	PVC	89.91
H06-044	H06-040	931.74	931.3	0.6	8	PVC	73.05
H06-045	H06-005	926.36	913	3.35	8	PVC	399.71
H06-046	H06-045	927.78	926.56	0.4	8	PVC	303.75
H06-047	H06-046	929	927.98	0.4	8	PVC	254.93
H06-048	H06-004	910.85	906.29	2.56	8	PVC	178.02
H06-049	H06-048	912.06	911.15	0.4	8	PVC	227.02
H06-050	H06-049	913.5	912.26	0.4	8	PVC	310.11
H06-051	H06-050	915.1	913.7	0.4	8	PVC	400.00
H06-052	H06-051	916.68	915.3	0.35	8	PVC	394.97
H06-053	H06-052	918.3	916.88	0.4	8	PVC	354.59
H06-054	H06-053	919	918.5	0.4	8	PVC	123.96
H06-055	H06-054	932.25	922.2	4.96	8	PVC	202.60
H06-056	H06-054	922.25	921.97	0.4	8	PVC	69.96
H06-057	H06-052	918.31	917.28	0.4	8	PVC	257.99
H06-058	H06-003	913.3	910.25	2.47	8	PVC	123.53
H06-059	H06-058	916.5	913.5	2.65	8	PVC	113.18
H06-060	H06-002	904.75	904.23	0.4	8	PVC	130.00
H06-061	H06-060	929.3	908	10.36	8	PVC	205.63
H06-062	H06-061	934	929.5	1.18	8	PVC	380.27
H06-064	G06-064	952.08	950.1	1	8		197.00
H06-065	G06-065	960.47	955.48	2.4	8		207.92
H07-010	H07-009	949.52	947.98	0.6	8	PVC	257.00
H07-011	H07-010	950.86	949.72	0.6	8	PVC	190.00
H07-012	H07-011	951.54	951.26	0	8	PVC	47.00
H07-013	H07-012	953.64	952.04	0.8	8	PVC	200.00
H07-014	H07-013	963.65	953.82	2.6	8	PVC	378.00
H07-015	H07-014	967.59	963.85	1.2	8	PVC	312.00
H07-016	H07-012	953.96	951.74	0.6	8	PVC	370.00
H07-017	H07-016	956.52	954.16	0.6	8	PVC	393.00
H07-020	G07-048	977.55	976.28	1.14	8	PVC	111.52
H08-013	H08-012	953.2	952.5	0.4	8	PVC	176.21
H08-014	H08-013	954.05	953.4	0.4	8	PVC	160.17
H08-015	H08-014	955.38	954.25	0.4	8	PVC	281.56
H08-016	H08-015	959.05	955.58	0.97	8	PVC	358.42
H08-017	H08-016	966.6	959.25	5.04	8	PVC	145.78
H08-018	H08-017	968	966.8	0.5	8	PVC	240.41
H08-019	H08-017	968.17	966.8	0.74	8	PVC	184.57
H08-020	H08-014	964.52	956.5	3	8	PVC	267.44
E06-024	E06-023	989.43	989.2	1.02	10		22.48
E06-025	E06-024	991.99	989.63	1.2	10	PVC	196.41
E06-026	E06-025	993.36	992.19	0.4	10		293.45

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
E06-027	E06-026	994.64	993.56	0.4	10		270.85
E06-028	E06-027	995.53	994.84	0.4	10		173.04
E07-005	E07-004	989.88	986.73	0.98	10	PVC SDR 26	320.71
E07-006	E07-005	991.7	990.08	0.89	10	PVC SDR 26	182.42
F04-001	F05-011	956.66	955.71	0.28	10	PVC	339.88
F04-002	F04-001	957.75	956.86	0.28	10	PVC	316.89
F04-003	F04-002	963.67	957.95	1.45	10	PVC	393.58
F04-025	F04-024	977.13	975.91	0.91	10	PVC SDR 26	133.77
F04-026	F04-025	978.13	977.53	0.6	10	PVC SDR 26	99.80
F04-027	F04-026	979.28	978.33	0.6	10	PVC SDR 26	157.66
F05-001	G05-045	940.72	939.19	0.66	10	PVC	231.25
F05-002	F05-001	942.89	940.92	0.66	10	PVC	298.86
F05-003	F05-002	944.59	943.09	0.66	10	PVC	227.38
F05-004	F05-003	945.44	944.79	0.28	10	PVC	231.40
F05-005	F05-004	946.5	945.64	0.28	10	PVC	182.28
F05-006	F05-005	947.68	946.35	0.38	10	PVC	346.25
F05-007	F05-006	948.8	947.88	0.3	10	PVC	307.81
F05-008	F05-007	950.62	949	0.41	10	PVC	397.29
F05-009	F05-008	952.8	950.82	0.5	10	PVC	396.52
F05-010	F05-009	954.57	953	0.68	10	PVC	231.21
F05-011	F05-010	955.51	954.77	0.28	10	PVC	263.49
F06-001	G06-046	946.35	942.4	1.47	10	PVC	268.77
F06-002	F06-001	948.33	946.82	0.4	10	PVC	377.50
F06-009	F06-008	974.48	971.31	1.11	10		286.60
F06-010	F06-009	980.83	974.88	2	10		297.40
F06-011	F06-010	984	981.23	1.14	10		242.80
F06-012	F06-011	986.17	984.4	0.6	10		293.50
F06-013	F06-012	988.47	986.57	0.6	10		316.70
F06-014	F06-011	986.75	984.4	0.64	10		367.50
F06-015	F06-014	987.78	987.15	0.6	10		105.10
G05-045	G06-017	938.99	937.77	0.64	10	PVC	189.93
G06-001	H06-013	918.69	917.57	0.28	10	PVC	399.74
G06-002	G06-001	919.55	918.89	0.28	10	PVC	233.92
G06-003	G06-002	921.64	919.87	0.79	10	PVC	238.66
G06-004	G06-003	922.38	921.84	0.28	10	PVC	191.88
G06-005	G06-004	925.1	922.58	0.73	10	PVC	346.12
G06-006	G06-005	926.48	925.3	0.4	10	PVC	295.31
G06-007	G06-006	928.05	926.68	0.4	10	PVC	341.45
G06-008	G06-007	929.01	928.25	0.4	10	PVC	190.33
G06-009	G06-008	929.52	929.21	0.39	10	PVC	80.05
G06-010	G06-009	930.62	929.99	0.28	10	PVC	226.56
G06-011	G06-010	931.35	930.82	0.28	10	PVC	188.09
G06-012	G06-011	931.87	931.55	0.28	10	PVC	115.01
G06-013	G06-012	932.59	932.07	0.28	10	PVC	184.65
G06-014	G06-013	932.95	932.79	0.28	10	PVC	58.00

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
G06-015	G06-014	933.56	933.15	0.28	10	PVC	146.15
G06-016	G06-015	937.11	933.76	1.5	10	PVC	222.95
G06-017	G06-016	937.57	936.76	0.66	10	PVC	122.09
G06-033	G06-003	927.39	922.03	1.86	10	PVC	288.31
G06-034	G06-033	928.51	927.59	0.28	10	PVC	328.69
G06-035	G06-034	929.05	928.71	0.28	10	PVC	123.18
G06-036	G06-035	0	929.25	1.9	10	PVC	239.76
G06-037	G06-036	933.8	0	1.9	10		0.00
G06-038	G06-037	936.8	934	2.8	10	PVC	99.89
G06-039	G06-038	940.33	937	0.97	10		344.97
G06-040	G06-039	941.01	940.53	0.28	10	PVC	169.88
G06-045	G06-040	942.2	941.21	0.28	10	PVC	355.03
G07-001	H07-018	0	0	0	10		301.15
G07-002	G07-001	0	0	0	10		179.96
G07-003	G07-002	0	0	0	10		372.42
G07-004	G07-003	0	0	0	10		150.47
G07-005	G07-004	0	0	0	10		138.47
G08-031	H08-009	946.32	945.87	0.28	10	PVC	160.23
H06-005	H06-004	907.61	905.5	0.76	10	PVC	277.14
H06-006	H06-005	908.29	907.81	0.28	10	PVC	169.49
H06-007	H06-006	909.54	908.49	0.28	10	PVC	375.33
H06-008	H06-007	910.8	909.74	0.28	10	PVC	376.73
H06-009	H06-008	0	911	1.18	10	PVC	0.00
H06-009	H06-010	914.7	0	1.18	10	PVC	0.00
H06-011	H06-010	915.79	914.9	0.45	10	PVC	200.27
H06-012	H06-011	916.79	915.99	0.28	10	PVC	287.29
H06-013	H06-012	917.37	916.99	0.28	10	PVC	136.17
H07-004	H07-003	910.99	908.5	0.83	10		300.00
H07-005	H07-004	912.53	911.09	0.72	10		200.00
H07-006	H07-005	919.03	912.63	1.6	10		400.00
H07-007	H07-006	924.01	919.13	1.22	10		400.00
H07-008	H07-007	932.99	925.99	1.75	10		400.00
H07-009	H07-008	946.5	939.09	4.47	10		300.00
H07-018	H07-009	0	0	0	10		553.80
H08-003	H08-002	914	913.31	0.28	10	PVC	247.71
H08-004	H08-003	922.2	914.2	2.04	10	PVC	392.84
H08-005	H08-004	927.4	922.4	2.59	10	PVC	193.06
H08-006	H08-005	932.8	927.6	1.31	10	PVC	397.06
H08-007	H08-006	934.2	933	0.67	10	PVC	180.37
H08-008	H08-007	939.8	934.4	1.45	10	PVC	373.07
H08-009	H08-008	945.67	940	1.47	10	PVC	386.80
I08-LS1	WWTP	0	0	0	10		6205.08
F09-LS1	WWTP	0	0	0	12		9159.31
E07-003	E07-002	984.64	983.23	0.5	12	PVC SDR 26	281.14
E07-004	E07-003	986.53	984.84	0.5	12	PVC SDR 26	336.51

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
F04-030	F04-024	976.49	975.91	0.6	12	PVC SDR 26	96.62
F07-001	F08-011	975.4	973.88	2.36	12	PVC	72.80
F07-002	F07-001	977.02	975.6	2.28	12	PVC	70.76
F08-009	F08-008	961.74	959.74	2.19	12	PVC	100.23
F08-010	F08-009	967.66	961.94	2.01	12	PVC	294.77
F08-011	F08-010	973.68	967.86	2.04	12	PVC	294.77
H06-001	I06-004	901.07	900.36	0.44	12	PVC	160.88
H06-002	H06-001	903.48	902.97	0.17	12	PVC	291.90
H06-003	H06-002	904.5	903.68	0.22	12	PVC	365.48
H06-004	H06-003	905.3	904.7	0.22	12	PVC	272.39
I06-001	I07-011	897.68	897	0.22	12	PVC	307.59
I06-002	I06-001	898.76	897.88	0.22	12	PVC	400.00
I06-003	I06-002	899.31	898.96	0.22	12	PVC	158.16
I06-004	I06-003	900.16	899.51	0.22	12	PVC	295.27
I07-001	I08-009	887.37	886.61	0.22	12	PVC	344.35
I07-002	I07-001	888.42	887.57	0.22	12	PVC	386.34
I07-003	I07-002	889.5	888.62	0.22	12	PVC	400.00
I07-004	I07-003	890.45	889.7	0.22	12	PVC	343.22
I07-005	I07-004	891.19	890.65	0.22	12	PVC	245.82
I07-006	I07-005	891.68	891.39	0.22	12	PVC	130.94
I07-007	I07-006	892.1	891.88	0.22	12	PVC	98.93
I07-008	I07-007	893.18	892.3	0.22	12	PVC	400.00
I07-009	I07-008	894.91	983.38	0.49	12	PVC	313.36
I07-010	I07-009	895.74	895.11	0.22	12	PVC	284.06
I07-011	I07-010	896.8	895.94	0.22	12	PVC	390.27
I08-009	I08-008	0	0	0	12	PVC	234.82
E07-001	E08-012	981.38	979.72	0.5	15	PVC SDR 26	331.44
E07-002	E07-001	983.03	981.63	0.5	15	PVC SDR 26	280.69
E08-004	F08-041	962.3	961.86	0.3	15	PVC SDR 26	146.95
E08-005	F08-043	964.37	963.17	0.3	15	PVC SDR 26	400.00
E08-006	E08-005	971.97	964.67	2	15	PVC SDR 26	365.00
E08-007	E08-006	973.37	972.17	0.3	15	PVC SDR 26	400.00
E08-008	E08-007	973.88	973.57	0.3	15	PVC SDR 26	103.67
E08-009	E08-008	975.23	974.18	0.3	15	PVC SDR 26	351.35
E08-010	E08-009	976.38	975.53	0.3	15	PVC SDR 26	282.15
E08-011	E08-010	977.58	976.58	0.3	15	PVC SDR 26	332.90
E08-012	E08-011	979.52	977.78	0.5	15	PVC SDR 26	348.75
F04-021	F04-004	970.33	968.62	0.6	15	PVC SDR 26	285.44
F04-022	F04-021	972.24	970.66	0.6	15	PVC SDR 26	262.87
F04-023	F04-022	973.58	972.64	0.6	15	PVC SDR 26	157.30
F04-024	F04-023	975.49	973.98	0.6	15	PVC SDR 26	252.28
F08-003	F08-002	947.29	943.81	0.85	15	PVC	434.88
F08-004	F08-003	950.42	947.49	0.85	15	PVC	366.48
F08-005	F08-004	952.86	950.62	0.79	15	PVC	308.79
F08-006	F08-005	955.56	953.06	0.87	15	PVC	308.79

Upstream MH	Downstream MH	USMH Elev Out	DSMH Elev In	Pipe Slope	Pipe Diameter	Pipe Material	Pipe Length
F08-007	F08-006	957.42	955.76	0.79	15	PVC	235.99
F08-008	F08-007	959.54	957.62	0.9	15	PVC	235.98
F08-041	F08-040	961.66	961.11	0.3	15	PVC SDR 26	182.71
F08-043	E08-004	962.87	962.6	0.3	15	PVC SDR 26	88.65
F08-001	F09-007	0	0	0	18	PVC	122.03
F08-002	F08-001	943.61	0	0	18	PVC	86.96
F08-033	F08-001	944.8	942.82	0.6	18		329.71
F08-034	F08-033	955.28	945	2.59	18		397.50
F08-035	F08-034	956.31	955.68	0.6	18		105.20
F08-036	F08-035	957.96	956.71	0.6	18	PVC SDR 26	207.99
F08-037	F08-036	958.83	958.16	0.6	18	PVC SDR 26	111.22
F08-038	F08-037	960.16	959.23	0.6	18	PVC SDR 26	180.35
F08-039	F08-038	960.05	959.92	0.2	18	PVC SDR 26	63.70
F08-040	F08-039	960.86	960.25	0.2	18	PVC SDR 26	306.94
F09-001	F09-LS1	0	0	0	18		12.66
F09-002	F09-001	0	0	0	18		15.51
F09-003	F09-002	934.5	0	0.49	18	PVC	309.23
F09-004	F09-003	937	934.7	0.59	18	PVC	420.38
F09-005	F09-004	938.73	937.2	0.62	18	PVC	279.24
F09-006	F09-005	940.3	938.93	0.56	18	PVc	279.24
F09-007	F09-006	941.56	940.5	0.65	18	PVC	193.50
H08-001	I08-007	904.06	898.39	2.07	18	PVC	283.67
I08-001	I08-LS1	890.42	890.21	0.39	18	PVC	79.60
I08-002	I08-001	891.12	890.62	0.46	18	PVC	152.03
I08-003	I08-002	892.37	891.32	0.31	18	PVC	402.58
I08-004	I08-003	893.01	892.57	0.44	18	PVC	144.67
I08-005	I08-004	893.81	893.21	0.3	18	PVC	265.60
I08-006	I08-005	897.03	897.01	0.85	18	PVC	377.57
I08-007	I08-006	898.19	897.23	0.97	18	PVC	119.38