APPENDIX C

Fisher Lake Sanitary Sewer Project

Review of Impacts to the Collection System and Clean Water Plant

2008

Submitted by:

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TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

EXECUTIVE SUMMARY

The purpose of this report is to provide an independent review/analysis of the proposed Fisher Lake Sanitary Sewer Project. The Fisher Lake project will comprise up to 280 residences connecting to a public sewer system which will ultimately flow to the City of Three Rivers' Clean Water Plant (CWP). This report is intended to assess both the short and long-term impacts to the collection system and the CWP, and assign appropriate 'buy-in' costs for the treatment of the additional flows from the new system.

Residential waste is more 'treatable' than commercial and industrial waste, whereby a residential treatment system typically does not deal with heavy solvents or metals. The primary treatment factors associated with residential waste are biochemical oxygen demand (BOD), total suspended solids (TSS), and fecal coliform content (e-coli). Activated sludge treatment systems, such as that employed by the CWP, have a proven track record in effectively treating for the above parameters.

There are other issues associated with residential treatment, such as odors, corrosion issues, seasonal nature of waste (i.e. septic considerations) and operation & maintenance (O&M) costs. This report addresses these items as well.

To summarize the report findings:

- The Fisher Lake community has requested to enter into an interlocal agreement with the City for being provided sewer service as a bulk (wholesale) customer with a single meter for billing purposes. Items to be stipulated in the interlocal agreement are listed in Section IV.

- The interlocal agreement applies to the 280 Fisher Lake residents and specifically listed existing commercial connections only. Future users who plan to connect to the Fisher Lake system will need to enter into a separate interlocal agreement with the City.

- This report finds no adverse impacts from the connection of the 280 residences to the City's sanitary system.

- The Fisher Lake community will pay $379,632.00 as a BOD "buy-in" rate as described in Section III.

- The Fisher Lake community will be billed bi-monthly based on its actual usage as recorded by a single magnetic flow meter. The City's sewer rates (effective April 2007) are the basis of the monthly sewer charge. Future increases to the existing rates shall be applied to the Fisher Lake community. Table 2 provides a breakdown of a typical bi-monthly sewer bill to a Fisher Lake resident.

- The discharge from the Fisher Lake community must conform to the City's existing Sewer Use Ordinance. The City reserves the right to reject flow from the community if found in violation of the Ordinance.

- The City also reserves the right to stipulate the flow rate from the Fisher Lake community based on existing and future collection system constraints.

I. INTRODUCTION

The Fisher Lake Sanitary Sewer Project has been under serious consideration since 2000. The scope of the project has taken several forms and has included various phases, but now appears focused on sewering the approximately 280 residences that comprise the Fisher Lake community. Their consultant, Wightman Petrie, Inc., has formally requested an Interlocal Agreement be executed between the Fisher Lake community and the City of Three Rivers (City).

This project had been preliminarily discussed well before 2000, culminating in the execution of a Water and Sewer Extension Agreement in 1993 which included the Lockport, Fabius and Park Townships as new service areas. The agreement provided the basic framework by which the Fisher Lake community may connect to the City's sewer system. One key element of the agreement was ensuring that the neighboring Townships would not use "excessive" capacity of the City's system; this report addresses the capacity issue.

The City realizes the importance of protecting its rights in both the short and long-term. A key item is identifying a defined customer base, with provisions for adding customers in the future. The initial defined customer base for the project is 280 residences. The City has approximately 2,600 total connections, as such the proposed Fisher Lake Sanitary Sewer Project represents approximately 10.75% of the current connections to the CWP. However one of the connections is the Village of Constantine which represents 600 connections; as such the 280 residences represent approximately 8.75% (280/3200) of the equivalent residential connections (REU's).

The City has determined that it will utilize a BOD 'buy-in' cost to equitably charge the Fisher Lake residents. This concept refers to the additional short and long-term costs to the CWP to treat the additional BOD that will be associated with the proposed 280 residences. BOD treatment cost tends to be an effective measure of plant requirements since the key treatment component of any activated sludge plant is aeration. A certain amount of pounds of oxygen is required to treat a certain amount of pounds of BOD. Therefore adding BOD to the CWP will require the addition of oxygen to the treatment scheme along with associated overall demands on the treatment system, with an increase in the corresponding treatment by-product known as waste activated sludge (WAS).

The City will also charge a minimum monthly sewer rate (i.e. bi-monthly) based on Fisher Lake being a wholesale customer of the City. The rate will cover a minimum monthly flow, and will pro-rate above the amount if the flows are exceeded. The minimum flow rate will be based on the 280 REU's multiplied by an average resident's monthly flow. A summary of a typical monthly sewer bill can be found in Table 2.

II. REVIEW AND ANALYSIS – COLLECTION SYSTEM

Prior to determining the BOD buy-in rate, the feasibility of the new system physically connecting to the City's sewer system needs to be confirmed for hydraulic compatibility. The plan is for the Fisher Lake development to pump from a lift station located near M-60/South Fisher Lake Rd to a force main proceeding westerly along South Fisher Lake Rd, then southerly along Haines Rd., connecting to the City's existing sewer system at Hov Aire Dr. (Industrial Park Rd.). Please find a location map of this routing in Appendix A.

The connecting sewer system was recently installed in the Airport Industrial Park (AIP) to handle sanitary flows from the AIP and future 20-year flows upstream of the area. The AIP sanitary system flows via gravity lines to the AIP Lift Station. This pump station has two (2) 470 gallons per minute (gpm), 7.5 horsepower (hp) pumps and a standby generator.

The AIP sewer system is an 8" gravity line installed at minimum slope (0.4'/100' or 0.4%) and can transfer 350 gpm if flowing full. Pipes are not designed to flow at full capacity, but more typically between 50% and 75% of their full capacity. As such this pipe would typically be rated at 175 to 250 gpm for design purposes. At least half of the design pipe capacity should be reserved for the AIP or 125 gpm maximum, leaving 125 gpm for Fisher Lake and 100 gpm for other future growth.

TABLE 1 - PIPE CAPACITY IN GRAVITY SEWERS
SLOPE: MINIMUM PER TEN STATES STANDARDS
MANNING'S "n": 0.013

PIPE SIZE (INCHES)	MIN. SLOPE (FT/100 FT)	MANNING'S ("n")	FLOW (MGD)	FLOW (GPM)	FLOW (CFS)
8	0.40	0.013	0.50	347	0.77
10	0.28	0.013	0.75	521	1.16
12	0.22	0.013	1.10	764	1.70
15	0.15	0.013	1.65	1146	2.54
18	0.12	0.013	2.40	1667	3.70
24	0.08	0.013	4.30	2986	6.63
30	0.06	0.013	6.50	4514	10.06
36	0.046	0.013	9.40	6527	14.49

The AIP lift station appears to be adequately sized for the long-term, and the standby generator ensures reliability to the Fisher Lake residents. Of some concern is the prospect of septic waste entering the lift station. Septic waste is a mixture of various anaerobic components, with methane and hydrogen sulfide as two (2) key components. These gases are hazardous and should not be allowed to enter the City's sanitary sewer system.

CWP staff has made it clear that they will not accept septic waste from the Fisher Lake community. There are two (2) primary methods for developing septic sewage from residential developments: {1} long force main hold/travel times which may be associated with reduced winter flows; and {2} pump station under/over sizing creating long detention times. It is important that the City be provided design information from the Fisher Lake community in this regard.

There are also obvious concerns with impacts to the sewer system capacity downstream of the AIP once the Fisher Lake community is added. These issues were considered in 2003 with the planning of the AIP.[1] A summary of this planning now follows:

> The City's sewer system computer model introduced a peak flow of 350 gpm (8" gravity line at maximum capacity) at the upstream end of the City's sewer system along S.R. M-60 near the airport to represent future flows from the then proposed AIP and airport complex pump stations. Both existing flows and a 20-year future projection of system flows were used in the analysis. The 20-year flow projection assumed an annual 0.128% increase in existing average daily flow for the City, as proposed in the *City's Project Plan* for the wastewater treatment plant improvements completed in 2000.
>
> The lift stations and associated force mains downstream of the proposed AIP were found to have adequate capacity to carry proposed flows to the CWP. The 4th St. Lift Station (first downstream station) had a current peak inflow of about 1,200 gpm and a design pumping capacity of 1,740 gpm. With the AIP constructed, initial and future peak inflow to the 4th St. Lift Station were projected to be approximately 1,300 gpm and 1,400 gpm, respectively, less than the design pumping capacity of the station.
>
> The Constantine St. Lift Station (next downstream station before discharge to the CWP) had a current peak inflow of 1,960 gpm with a design pumping capacity of 3,300 gpm. With the AIP added, initial and future peak inflow to this station will be approximately 1,975 gpm and 2,000 gpm, respectively, well below the design capacity of the lift station.
>
> While the lift stations were found to be able to handle the new AIP and future growth upstream, the gravity sewer mains downstream of the AIP were found to have adequate capacity to carry the additional proposed flows with sewer system surcharging in certain areas. The primary sewer line subject to surcharging was the 12" gravity main along the railroad between the intersection of Fourth/Pleasant Streets and Broadway Street. It was recommended at the time that the existing 12" gravity line be replaced with a 24" gravity line, which was later completed by the City.

To review, the City's sewer system is capable of handling the additional flows from the Fisher Lake community's 280 residences, and additional residences in the future. There have been certain sewers identified that may be subject to surcharging in peak flow conditions. It is recommended that the City monitor these sewers, and budget for their upgrades over a five-year planning period.

III. REVIEW AND ANALYSIS – TREATMENT SYSTEM IMPACTS/BUY-IN RATE

Fisher Lake loading estimates have been provided over the years for the various scenarios that have been presented. The most current scenario is that of 280 residences being served by primarily a gravity system that will surround Fisher Lake. The system will have a small number of single-residence, low pressure (grinder) pumps to augment the proposed five (5) primary lift stations required for servicing the community.

The most southerly (downstream) lift station in the Fisher Lake community will need to pump approximately 3 miles to the connection point at Hov Aire Dr. At that point it will enter the 8" gravity main in the AIP described previously. From there it will flow nearly 3/4 mile to the AIP lift station.

The point of entry into the system is of concern regarding the type of waste being transferred to the City's collection system and ultimately the CWP. The condition of sewage when it travels ±3 miles in a force main tends to turn septic. Septic sewage is deprived of oxygen to the point where the bacteria become oxygen starved and feed off other food sources; this is the basis of the anaerobic process. By-products of the process include sulfide gas, which forms hydrogen sulfide, methane and other gases. These gases are odorous, corrosive and can be hazardous.

It is imperative that the City requires the Fisher Lake community to not allow septic sewage to enter the collection system at the AIP. There will be a potential for odors to develop in the AIP collection system, and also the potential for hazardous methane and hydrogen sulfide gases to accumulate in the AIP Lift Station.

Regarding determining BOD loading rates, the average and peak flow rates from the 280 residences that will comprise the first phase of the Fisher Lake sewer system project must first be estimated. There are many accepted methods for estimating sewage flows from residential communities. As this community will be typical in that a gravity system will be constructed (versus a low pressure system where there can be no inflow & infiltration (I&I) by definition), general guidelines apply. Ten States Standards can act as general guidelines, but actual data are always preferred.

A figure of 100 gallons per day per capita (gpdc), or 260 gallons per residence per day are accepted average daily flow (ADF) values. This leads to a total ADF of 72,800 gallons per day (gpd) for the 280 residences. Peak ADF rates typical to the seasonal nature of lake communities tend to increase by 30%, or 94,640 gpd. Fisher Lake Association has canvassed and found 75% of homes are year round residents.

A valid estimate of peak ADF for the Fisher Lake community is 100,000 gpd. This ADF of 100,000 gpd is equivalent to 1,000 residents during peak average daily flow periods.

During prior negotiations with the Fisher Lake community, it was determined that the values of 0.22 lbs per day per capita be used for BOD and 0.25 lbs per day per capita be used for TSS. This equates to:

1000 residents = 220 lbs per day BOD

1000 residents = 250 lbs per day TSS

In 2004, it was calculated that based on the recent (2000) CWP improvement costs, the buy-in capital cost of BOD is $1,725.60 per lb.[2] This translates into $379,632.00 for reserving the BOD capacity of 280 residences at the Clean Water Plant. It is inherent in this assessment that this capacity could ultimately be assigned to another party, and therefore once an interlocal agreement is reached with the Fisher Lake community, this BOD capacity can no longer be assigned to a separate entity.

There are additional costs associated with connecting to the City's collection system. There will be increased pumping costs associated with the (3) City-owned pump stations that will be transferring the Fisher Lake sanitary flows to the CWP. These costs are primarily O&M costs, and as such are recouped via the bi-monthly sewer rate being charged the community.

The Clean Water Plant is designed to treat 5,360 pounds of BOD per day and averaged 2,878 pounds per day coming into the plant in 2007 or 54% of its BOD design capacity (see Appendix B). The increase of 220 lbs/day of BOD will increase the average influent BOD to 3100 lbs/day (57.8% of design capacity). At 95% BOD removal (CWP averages 98%), this equates to an increase of 11 lbs/day of BOD in the discharge effluent or 93 lbs/day total. The NPDES limit is 573 lbs/day, therefore the Fisher Lake community increases the usage of the NPDES available BOD discharge limit from 14.3% to 16.2%.

The Clean Water Plant is also designed to treat 4,556 pounds of TSS per day and averaged 4188 pounds per day coming into the plant in Nov & Dec. 2007 or 91.9% of its TSS design capacity. The increase of 250 lbs/day of TSS will increase the average influent TSS to 4438 lbs/day (97.4% of design capacity). At 95% TSS removal (CWP averages 98%), this equates to an increase of 12.5 lbs/day of TSS in the discharge effluent or 99 lbs/day total. The NPDES limit is 688 lbs/day, therefore the Fisher Lake community increases the usage of the NPDES available TSS discharge limit from 12.6% to 14.4%.

Regarding TSS, although the addition of 280 residences appears to push the CWP near its design limit, this is of limited concern as the CWP typically operates at half of its design capacity (i.e. CWP ADF = 1.4 MGD, CWP has ADF = 2.75 MGD design rating with MDEQ). Wastewater plants operate in their "sweet spots" when between 50% and 80% of their design flows actually enter the plant. This allows the operator flexibility in adjusting processes to maximize treatment to meet TSS (and BOD) limits, while not allowing solids breakthrough that is typical to high flow rates. With the available capacity, CWP operators will easily continue to be able to attain 98% removal rates for both TSS and BOD well into the future.

Finally, a 98% removal efficiency of 220 lbs/day of BOD equates to approximately 110 lbs/day of waste sludge. At 2% solids concentration, this equates to approximately 660 gpd of WAS developed directly from the treatment of the Fisher Lake community's sewage. This increases the average daily loading to the ATTAD Digestion process from 3642 lbs/day to 3752 lbs/day (3% increase). The design average loading rate is 5,887 lbs/day.

To summarize, the CWP can handle the addition of flow from the 280 residences to the CWP with minimal impact to the plant's ability to continue to meet its BOD and TSS permit limits; and also with limited impact to its solids handling scheme.

IV. RECOMMENDATIONS AND CONCLUSIONS

Fisher Lake's consultant requested by letter (9-24-07) to enter into a 20-year agreement with the City to provide treatment capacity at the CWP to serve the 280 residences that comprise the Fisher Lake community. They have requested to be a bulk (wholesale) customer with a single flow meter used for bi-monthly billing purposes. They have also requested a monthly user rate and a capital buy-in rate at the CWP to be determined at this time.

The BOD buy-in rate of $379,632.00 is discussed in Section III above.

The monthly user rate is determined utilizing the existing incremental usage sewer rates effective April 2007:

TABLE 2 - TYPICAL BI-MONTHLY SEWER BILL CALCULATION BASED ON 280 RESIDENCES - PRODUCING 260 GALLONS OF WASTEWATER PER DAY*			
Total Sewage Usage (per Bi-Monthly Billing Cycle in Gal):			**4,428,667**
Total Sewage Usage (per Bi-Monthly Billing Cycle in CF):			**592,027**
Usage Categories	**Rates**	**Usage Division**	**Revenue**
Minimum Use of 1,100 CF/Billing Period	$ 43.52	1,100	$ 43.52
Next Use of 48,900 CF/100 CF	$ 3.90	48,900	$ 1,907.10
Next Use of 617,000 CF/100 CF	$ 2.78	542,027	$ 15,068.34
Over 677,000 CF/100 CF	$ 0.92	-	-
Senior Citizen up to 1,100 CF (Less 15%)	$ 36.99	-	-
Bi-Monthly Billing Total for Master Meter:			**$ 17,018.96**
Estimated Bi-Monthly Sewer Bill per Residence (280 Residences):			**$ 60.78**
Estimated Monthly Sewer Bill per Residence (280 Residences):			**$ 30.39**

*100 GPD/Capita X 2.6 Individuals per Residence

An **interlocal agreement** needs to be executed between the City and the Fisher Lake community with the following stipulated terms:

- A defined customer base (Phase I) of 280 residences should be determined. Future increases to this base will require additional BOD "buy-in" capacity at the CWP. Also additional future flows will need to be considered in regards to their impacts to the City's collection system and the possibility of sewer line surcharging.

- All discharges must comply with the City's sewer use ordinances (SUO). The sewage received by the City's collection system shall not be septic or corrosive in nature. A sampling/metering manhole will be required as part of the Fisher Lake project. If the parameters of the SUO are not met, the City reserves the right, at any time, to reject the Fisher Lake sanitary sewer flows.

- The BOD buy-in rate shall be $379,632.00 for the 280 residences. Each additional user added in the future will be required to contribute a BOD buy-in prior to gaining sewer service from the City.

- The Fisher Lake community will be a bulk (wholesale) customer of the City with a single flow meter for billing purposes. The community will be subject to the existing sewer rates effective April 2007, and as amended by the City, which stipulate incremental volumetric usage billing rates as summarized in Table 2 above. The community will be billed for its actual usage, and not at a minimum monthly rate for each REU as requested.

- The City shall require a magnetic flow meter be installed at a specified location that will monitor Fisher Lake flows only. The City will monitor the meter and bill the Fisher Lake community bi-monthly based on its readings. The City requests that Fisher Lake calibrate the meter at least once per year.

- The City requests that the Fisher Lake community be limited to a 125 gpm discharge to the City's collection system at Hov Aire Dr. This is due to limiting the community to half of the design capacity of the existing 8" gravity line. This flow rate limits the size of the discharge force main to 4" in diameter.

- Design and construction shall be to City specifications (in the case that the City takes over the O&M of the sanitary system at some point).

- The City has the right to discontinue service for non-payment.

- Other issues requested to be addressed at this time by the Fisher Lake system engineer, which include the determination of a **proximity multiplier** and a **utility benefit fee** both associated with future customers, shall be determined at a later date and will not be part of the interlocal agreement.

- No storm water or subsurface drainage shall be allowed to be connected to a sanitary sewer line.

V. FISHER LAKE SANITARY COLLECTION SYSTEM SUMMARY

The system is to be maintained by the Fisher Lake community; however initially it was proposed that the City maintain the system. The City does not intend to maintain the system; however the following is a summary of considerations that were reviewed during the initial review as it cannot be ruled out that the City may inherit this system at some point in the future.

- The approximately four miles of forcemain will probably need air and/or vacuum/air relief valves. These valves need routine maintenance and must be accounted for in system costs. Some relief valves maintained by the City need maintenance once a week while others need maintenance only once per month. The number of relief valves must be available to estimate maintenance costs accurately.

- Odor control is listed in the study as using bioxide, an alternate oxygen source for anaerobic bacteria. This odor control produces nitrogen gas making air relief valves all the more necessary. The forcemain would hold 54,195 gallons of wastewater producing a detention time of 21 hours and 24 minutes at estimated year 2000 flow.

- The bioxide necessary to prevent the production of 20 mg/L of hydrogen sulfide was estimated by *US Filter* at 20 gpd for gravity or vacuum sewers and 35 gpd for low pressure sewers. An annual cost for bioxide at the current price would be $12,500.00 and $25,000.00 respectively. A pressure collection system has increased costs due to no air being allowed to mix with the wastewater during conveyance. Gravity allows some air to mix keeping the wastewater "fresher" and vacuum may even allow more air to be mixed.

- The system will have a main pump station and a dedicated generator with an automatic transfer switch in case of power failure. Maintenance of this generator, and along with it *weekly* exercising, is expected.

- One stipulation for hook-up that would be required is that anything below grade be pumped to the collection system. No gravity service to basement drains, basement sinks, etc. will be allowed.

- The distance of the system from the City and the availability of clean water for cleaning equipment increase the cost and time necessary for cleaning gravity lines.

- The five proposed pump stations add considerable maintenance to the City's existing system, nearly doubling the number of lift stations the City would be responsible for. The City has made a practice of visiting its pump station daily to maintain uninterrupted service to its customers.

- Four of the five pump stations would share a portable generator under the engineer's proposal. The generator would need to be exercised twice a year at each station to maintain assurance of its backup capability.

- Having 5 pump stations as opposed to one increases the number of electric bills and phone lines necessary for a SCADA system. The City currently has SCADA dedicated phone lines to all of its pump stations for emergency notification of failures.

- Fisher Lake system engineers have indicated that about 12 grinder stations will also be needed in areas where gravity sewers are not cost effective to install. The City currently visits grinder stations once a week to maintain them. The City has also experienced a higher maintenance requirement for grinders than is necessary for gravity service hook-ups. The City would therefore consider a separate base rate for customers serviced by grinder stations. These grinders have a 10-year life expectancy, which must be factored into the system cost or O&M costs.

- Estimated Annual Operation and Maintenance (O&M) costs of $72,000.00 were provided by the Fisher Lake system engineers. The City reviewed these costs and determined that the actual O&M cost is double this amount, or $150,000.00. Final design plans will need to be reviewed by an independent entity for determining final O&M costs.

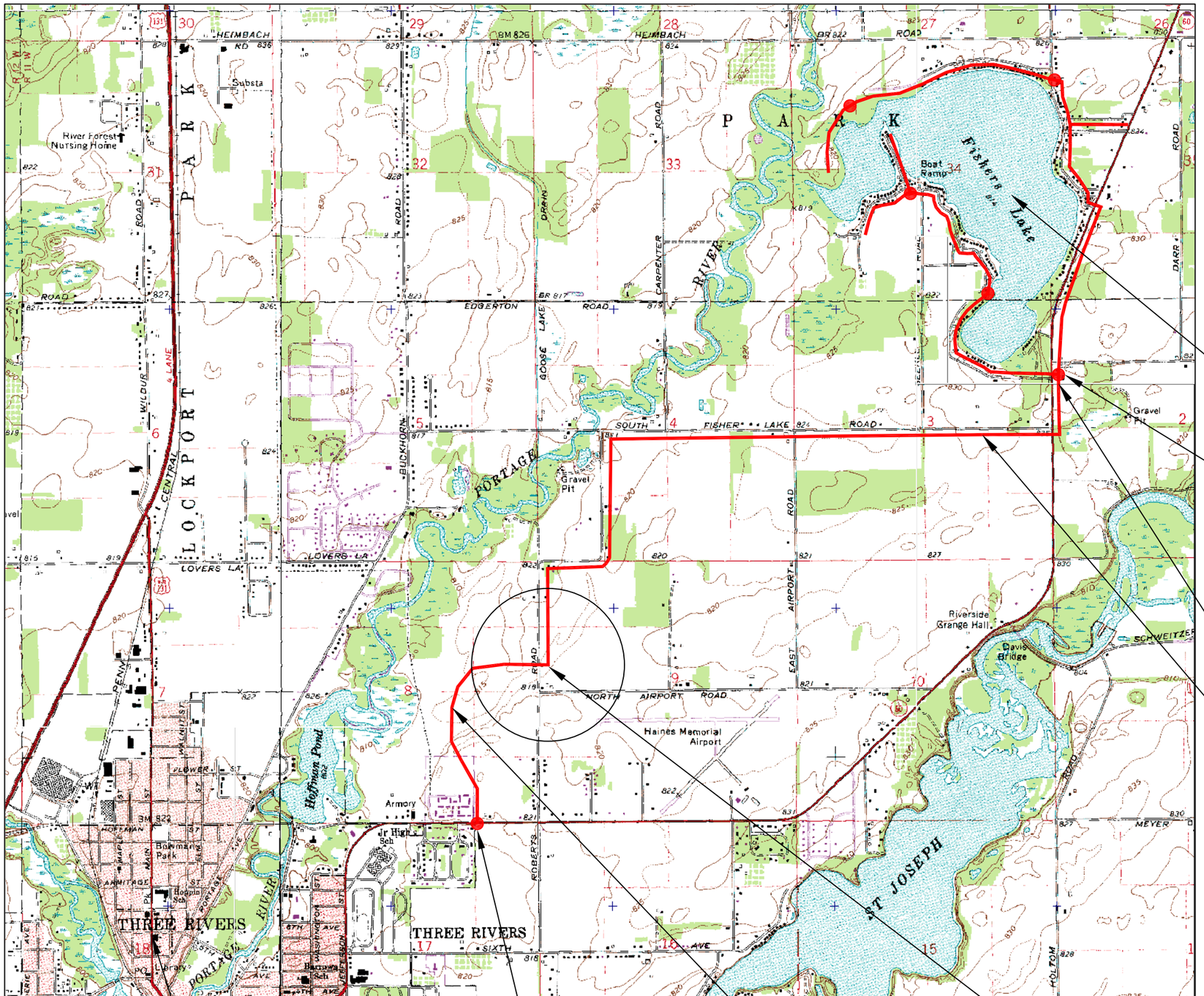
X. REFERENCES:

1. (per) Finkbeiner, Pettis & Strout, Inc. 9-17-03 Letter Report to City of Three Rivers

2. (confirmed per) Finkbeiner, Pettis & Strout, Inc. 2003 review

APPENDIX A

STUDY AREA LOCATION MAP



LEGEND

- PROPOSED LIFT STATION
- PROPOSED SANITARY SEWER

FISHER LAKE (280 RESIDENCES)

FISHER LAKE PROPOSED LIFT STATIONS (TYP)

PROPOSED FLOW METERS

PROPOSED FISHER LAKE SANITARY SEWER

THE CITY OF THREE RIVERS

AIP LIFT STATION

AIP 8" GRAVITY LINE

CONNECTION TO THREE RIVERS SEWER SYSTEM

N

0 1/2 1
Mile

CITY OF THREE RIVERS, MI
FISHER LAKE SEWER STUDY

PROPOSED FISHER LAKE SEWER MAP OF CONNECTION TO THE THREE RIVERS SEWER SYSTEM

Jones & Henry Engineers, Ltd.

FIGURE 1

THIS LINE SCALES I" WHEN PLOTTED TO NOTED SCALE

KAL-FISHER LAKE-Model-000
02/04/08 0
XREF:
Image: FISHER LAKE_1.BMP,FISHER LAKE_2.BMP,FISHER LAKE_3.BMP,FISHER LAKE_4.BMP

APPENDIX B

SANITARY FLOW DATA 2005-2007

Process Design Data Summary (Effective 2000)

Parameter	Units	Design Data			
		Current Average	Design Average	Design Max	% of Design Average
Flow (MGD)	MGD	1.4	2.75	5	50.9%
Influent					
BOD Load	lbs/day	3,400	5,360	8,365	63.4%
TSS Load	lbs/day	2,964	4,556	7,110	65.1%
Septage	lbs TSS/day	0	1,250	2,500	N/A
Primary Settling					
Surface Overflow Rate	gpd/sf	763	700	1,250	109.0%
Detention Time	hrs	2.22	2.3	1.25	96.5%
Percent BOD Removal		23%	25%	25%	92.0%
Percent TSS Removal		22%	40%	40%	55.0%
Primary Effluent					
BOD	lbs/day	2,615	4,020	6,300	65.0%
TSS	lbs/day	2,314	2,733	4,266	84.7%
Secondary Treatment					
Aeration Tanks:					
BOD Loading Rate	lbs BOD/day/1,000cf	39	30	40	130.0%
Detention Time	hrs	N/A	18.4	5.52	N/A
Aeration System:					
Minimum Process Air Flow Required	scfm	1,228	1,914	4,270	64.2%
Minimum Air Required for Mixing	scfm	N/A	1,226	1,226	N/A
Final Settling:					
SOR	gpd/sf	224	432	786	51.9%
Solids Handling					
ATTAD Digestion:					
Volume Required	gal	126,000	238,000	238,000	52.9%
SRT	day	14	14	7	100.0%
Loading	lbs/day (tons/day)	3,642 (1.8)	5,887 (2.9)	9,738 (4.9)	61.9% (62.1%)
Thermal Dryer:					
Loading	tons/day	0.9	1.5	2.4	60.0%
Capacity @ 20-24% Feed Solids	tons/day	4.3-4.8	4.3-4.8	4.3-4.8	N/A
12 Hour Days/Month Operation		11-13	19-21	N/A	57.9%-61.9%

Note: All solids loadings are on a dry weight basis.

Raw Wastewater Influent Vs. Final Effluent

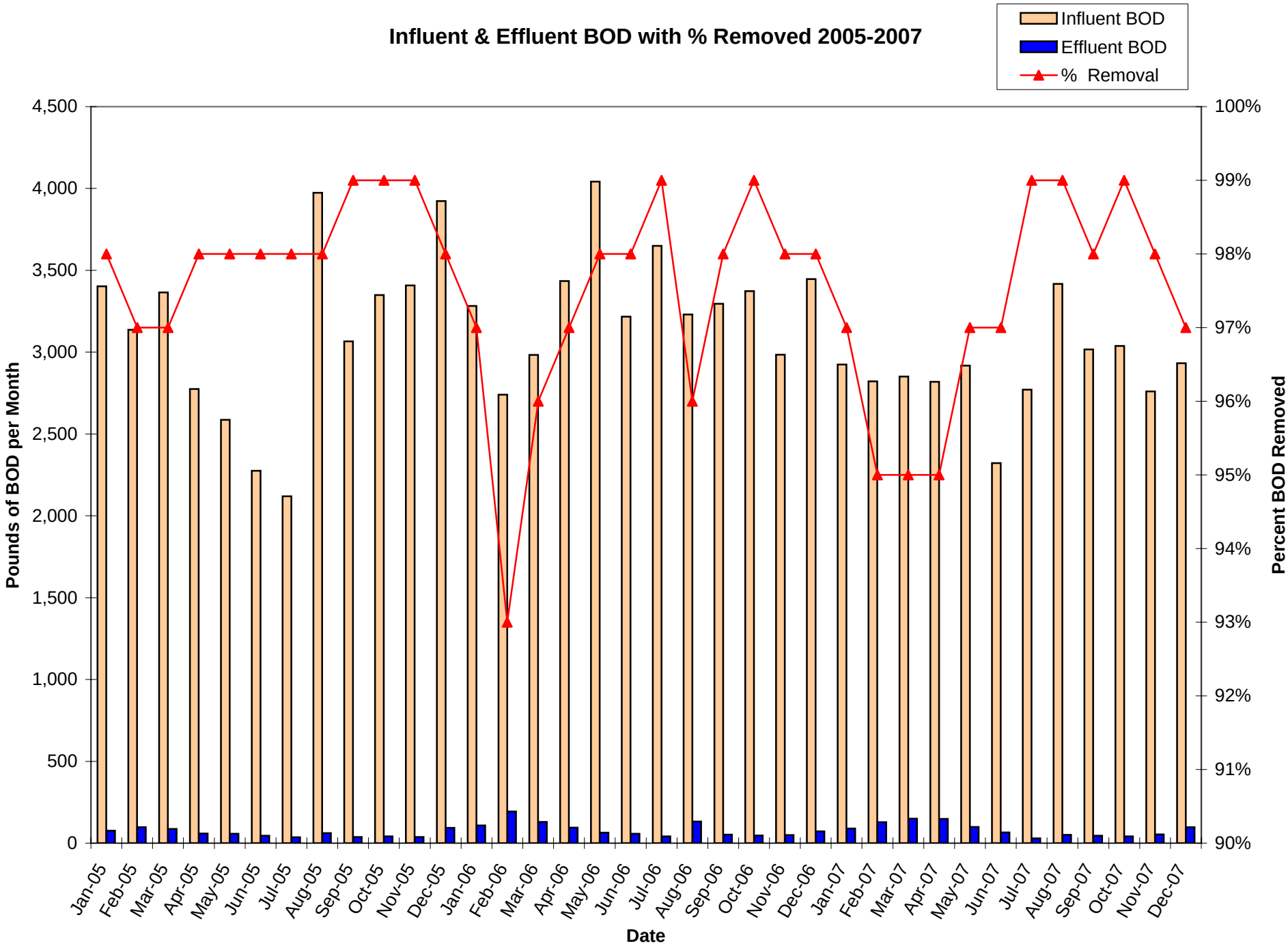
Parameter	BOD				TSS				Phosphorus	
	Nov-07		Dec-07		Nov-07		Dec-07		Nov-07	Dec-07
	mg/L	lbs	mg/L	lbs	mg/L	lbs	mg/L	lbs	mg/L	mg/L
Influent	241	2,760	235	2,932	367	4,190	336	4,186	4.8	3.9
Effluent	5	54	8	98	6	74	8	99	0.45	0.43
% Removed	97.9%		96.6%		98.4%		97.6%		90.6%	89.0%
NPDES Effluent Limits	mg/L		lbs		mg/L		lbs		mg/L	
	25		573		30		688		1.0	

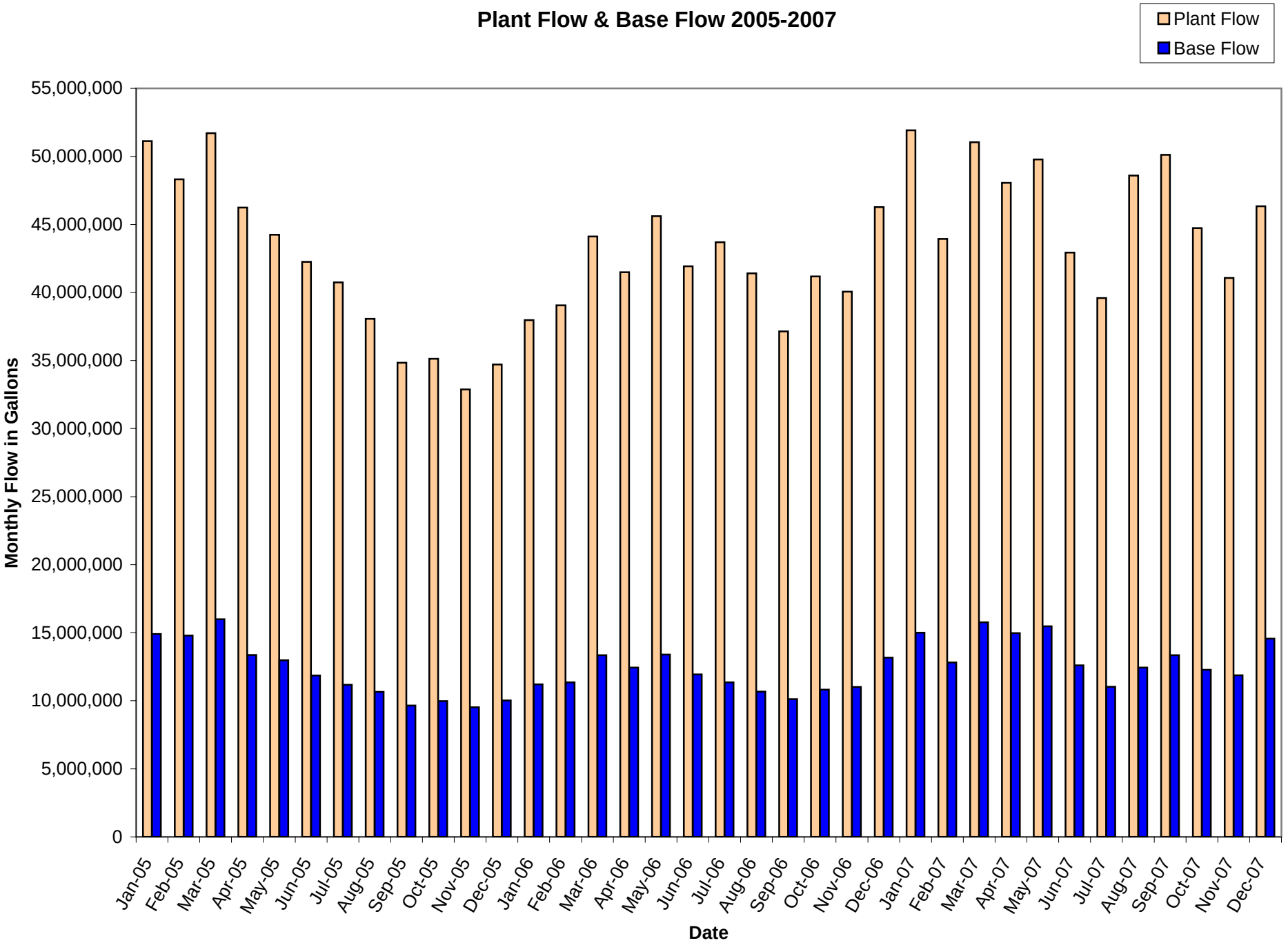
Wastewater Flows

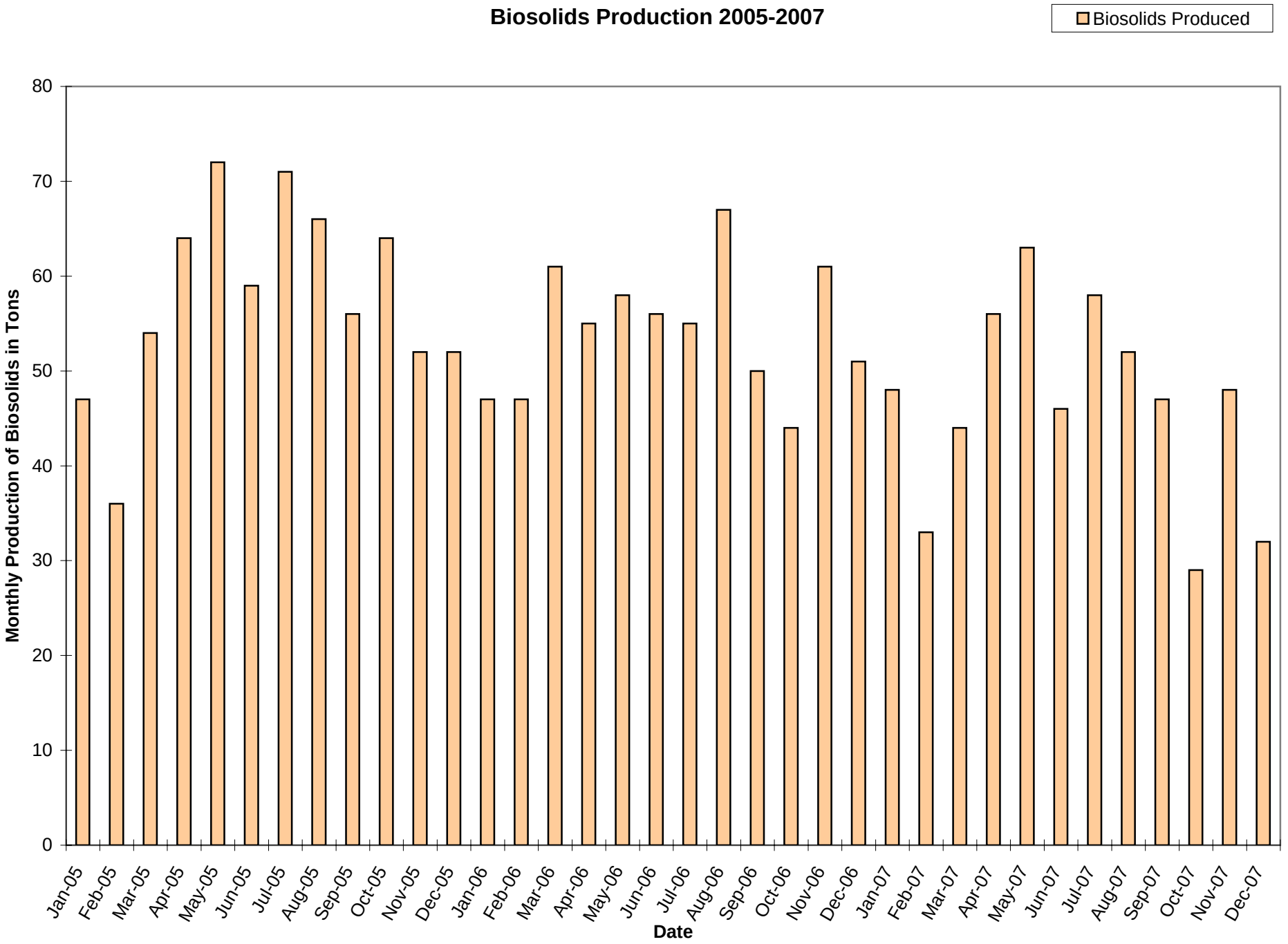
Month	Average Flow	Peak Flow	Ratio of Peak to Average
	MGD	MGD	MGD
Nov-07	1.37	2.80	0.489
Dec-07	1.49	2.82	0.528

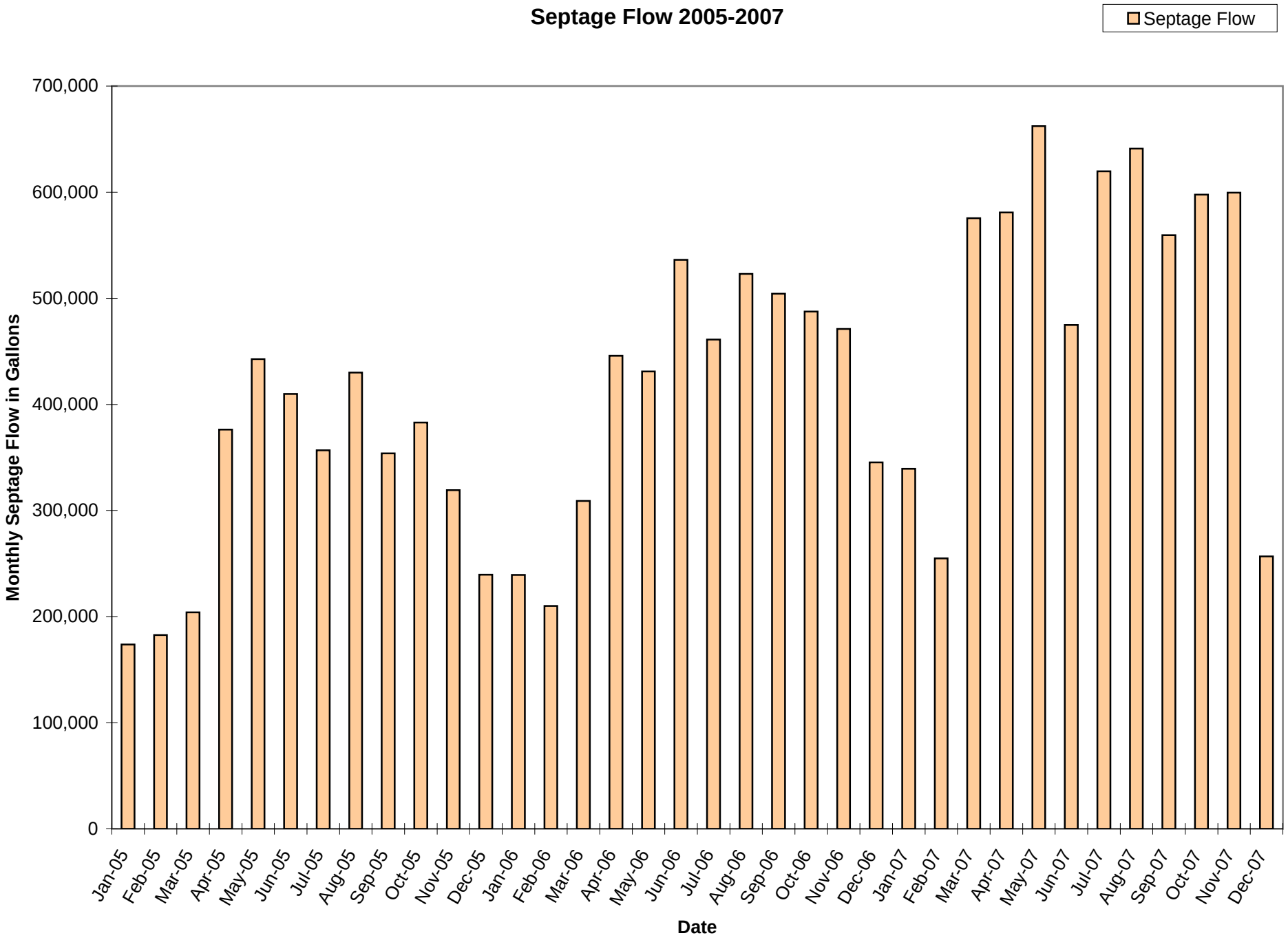
Monthly Plant Data 2005-2007

Month	Plant Flow	Base Flow	Septage Flow	Biosolids Produced	Influent BOD	Effluent BOD	% Removal
	Gallons	Gallons	Gallons	Tons	lbs	lbs	%
Jan-05	51,123,000	14,904,000	173,710	47	3,402	76	98%
Feb-05	48,323,000	14,790,000	182,554	36	3,137	97	97%
Mar-05	51,705,000	15,987,000	204,010	54	3,365	87	97%
Apr-05	46,241,000	13,365,000	376,342	64	2,775	59	98%
May-05	44,240,000	12,977,000	442,662	72	2,587	58	98%
Jun-05	42,254,000	11,853,000	409,936	59	2,275	46	98%
Jul-05	40,747,000	11,180,000	356,740	71	2,119	36	98%
Aug-05	38,065,000	10,659,000	430,086	66	3,974	61	98%
Sep-05	34,844,000	9,653,000	353,916	56	3,066	37	99%
Oct-05	35,135,600	9,971,000	382,843	64	3,349	42	99%
Nov-05	32,876,000	9,523,000	319,173	52	3,408	37	99%
Dec-05	34,707,000	10,031,000	239,540	52	3,923	94	98%
Jan-06	37,966,000	11,200,000	239,220	47	3,282	108	97%
Feb-06	39,049,000	11,355,000	209,944	47	2,740	194	93%
Mar-06	44,115,000	13,345,000	308,960	61	2,983	130	96%
Apr-06	41,487,200	12,437,000	445,830	55	3,435	95	97%
May-06	45,608,200	13,390,000	431,001	58	4,042	64	98%
Jun-06	41,934,200	11,940,000	536,259	56	3,217	58	98%
Jul-06	43,689,100	11,361,000	461,158	55	3,649	41	99%
Aug-06	41,400,800	10,667,000	522,905	67	3,230	132	96%
Sep-06	37,136,600	10,119,000	504,271	50	3,296	52	98%
Oct-06	41,180,400	10,815,000	487,442	44	3,373	47	99%
Nov-06	40,058,300	11,008,000	471,119	61	2,984	49	98%
Dec-06	46,266,100	13,176,000	345,237	51	3,447	72	98%
Jan-07	51,924,600	15,008,000	339,414	48	2,924	90	97%
Feb-07	43,931,100	12,808,000	254,943	33	2,821	128	95%
Mar-07	51,045,000	15,764,000	575,461	44	2,851	149	95%
Apr-07	48,058,900	14,977,000	580,968	56	2,819	148	95%
May-07	49,778,700	15,475,000	662,234	63	2,917	99	97%
Jun-07	42,929,700	12,610,000	474,861	46	2,322	66	97%
Jul-07	39,598,400	11,036,000	619,732	58	2,771	30	99%
Aug-07	48,591,000	12,446,000	641,062	52	3,417	51	99%
Sep-07	50,117,700	13,350,000	559,454	47	3,016	46	98%
Oct-07	44,725,800	12,270,000	597,627	29	3,038	41	99%
Nov-07	41,070,360	11,875,000	599,477	48	2,760	54	98%
Dec-07	46,332,000	14,568,000	256,686	32	2,932	98	97%


Influent & Effluent BOD with % Removed 2005-2007
Influent BOD
Effluent BOD
% Removal
Pounds of BOD per Month
Percent BOD Removed
Date
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
100%
99%
98%
97%
96%
95%
94%
93%
92%
91%
90%
Jan-05
Feb-05
Mar-05
Apr-05
May-05
Jun-05
Jul-05
Aug-05
Sep-05
Oct-05
Nov-05
Dec-05
Jan-06
Feb-06
Mar-06
Apr-06
May-06
Jun-06
Jul-06
Aug-06
Sep-06
Oct-06
Nov-06
Dec-06
Jan-07
Feb-07
Mar-07
Apr-07
May-07
Jun-07
Jul-07
Aug-07
Sep-07
Oct-07
Nov-07
Dec-07


Plant Flow & Base Flow 2005-2007
Plant Flow
Base Flow
Monthly Flow in Gallons
55,000,000
50,000,000
45,000,000
40,000,000
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
Jan-05
Feb-05
Mar-05
Apr-05
May-05
Jun-05
Jul-05
Aug-05
Sep-05
Oct-05
Nov-05
Dec-05
Jan-06
Feb-06
Mar-06
Apr-06
May-06
Jun-06
Jul-06
Aug-06
Sep-06
Oct-06
Nov-06
Dec-06
Jan-07
Feb-07
Mar-07
Apr-07
May-07
Jun-07
Jul-07
Aug-07
Sep-07
Oct-07
Nov-07
Dec-07
Date


Biosolids Production 2005-2007
Biosolids Produced
Monthly Production of Biosolids in Tons
0
10
20
30
40
50
60
70
80
Jan-05
Feb-05
Mar-05
Apr-05
May-05
Jun-05
Jul-05
Aug-05
Sep-05
Oct-05
Nov-05
Dec-05
Jan-06
Feb-06
Mar-06
Apr-06
May-06
Jun-06
Jul-06
Aug-06
Sep-06
Oct-06
Nov-06
Dec-06
Jan-07
Feb-07
Mar-07
Apr-07
May-07
Jun-07
Jul-07
Aug-07
Sep-07
Oct-07
Nov-07
Dec-07
Date


Septage Flow 2005-2007
Septage Flow
Monthly Septage Flow in Gallons
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Jan-05
Feb-05
Mar-05
Apr-05
May-05
Jun-05
Jul-05
Aug-05
Sep-05
Oct-05
Nov-05
Dec-05
Jan-06
Feb-06
Mar-06
Apr-06
May-06
Jun-06
Jul-06
Aug-06
Sep-06
Oct-06
Nov-06
Dec-06
Jan-07
Feb-07
Mar-07
Apr-07
May-07
Jun-07
Jul-07
Aug-07
Sep-07
Oct-07
Nov-07
Dec-07
Date

APPENDIX C

DEMOGRAPHIC DATA

U.S. Census Bureau
American FactFinder

POPULATION FINDER

United States | Michigan | **Three Rivers city**

city/ town, county, or zip
Three Rivers
state
Michigan GO
search by address »

Three Rivers city, Michigan

The 2006 population estimate for Three Rivers city, Michigan is 7,286.

Note: Information about challenges to population estimates data can be found on the Population Estimates Challenges page.

View population trends...

	2006	2000	1990
Population	7,286	7,328	7,413

Source: U.S. Census Bureau, 2006 Population Estimates, Census 2000, 1990 Census

View more results...

Population for all cities and towns in Michigan, 2000:

alphabetic | ranked

Map of Persons per Square Mile, City/Town by Census Tract:

2000 | 1990

See more data for Three Rivers city, Michigan on the Fact Sheet.

The letters PDF or symbol indicate a document is in the Portable Document Format (PDF). To view the file you will need the Adobe® Acrobat® Reader, which is available for **free** from the Adobe web site.

FACT SHEET

Three Rivers city, Michigan

View a Fact Sheet for a **race, ethnic, or ancestry group**

Census 2000 Demographic Profile Highlights:

General Characteristics - show more >>	Number	Percent	U.S.		
Total population	7,328			map	brief
Male	3,515	48.0	49.1%	map	brief
Female	3,813	52.0	50.9%	map	brief
Median age (years)	31.7	(X)	35.3	map	brief
Under 5 years	597	8.1	6.8%	map	
18 years and over	5,213	71.1	74.3%		
65 years and over	940	12.8	12.4%	map	brief
One race	7,160	97.7	97.6%		
White	6,182	84.4	75.1%	map	brief
Black or African American	773	10.5	12.3%	map	brief
American Indian and Alaska Native	30	0.4	0.9%	map	brief
Asian	50	0.7	3.6%	map	brief
Native Hawaiian and Other Pacific Islander	0	0.0	0.1%	map	brief
Some other race	125	1.7	5.5%	map	
Two or more races	168	2.3	2.4%	map	brief
Hispanic or Latino (of any race)	199	2.7	12.5%	map	brief
Household population	7,120	97.2	97.2%	map	brief
Group quarters population	208	2.8	2.8%	map	
Average household size	2.45	(X)	2.59	map	brief
Average family size	3.07	(X)	3.14	map	
Total housing units	3,234			map	
Occupied housing units	2,910	90.0	91.0%		brief
Owner-occupied housing units	1,880	64.6	66.2%	map	
Renter-occupied housing units	1,030	35.4	33.8%	map	brief
Vacant housing units	324	10.0	9.0%	map	

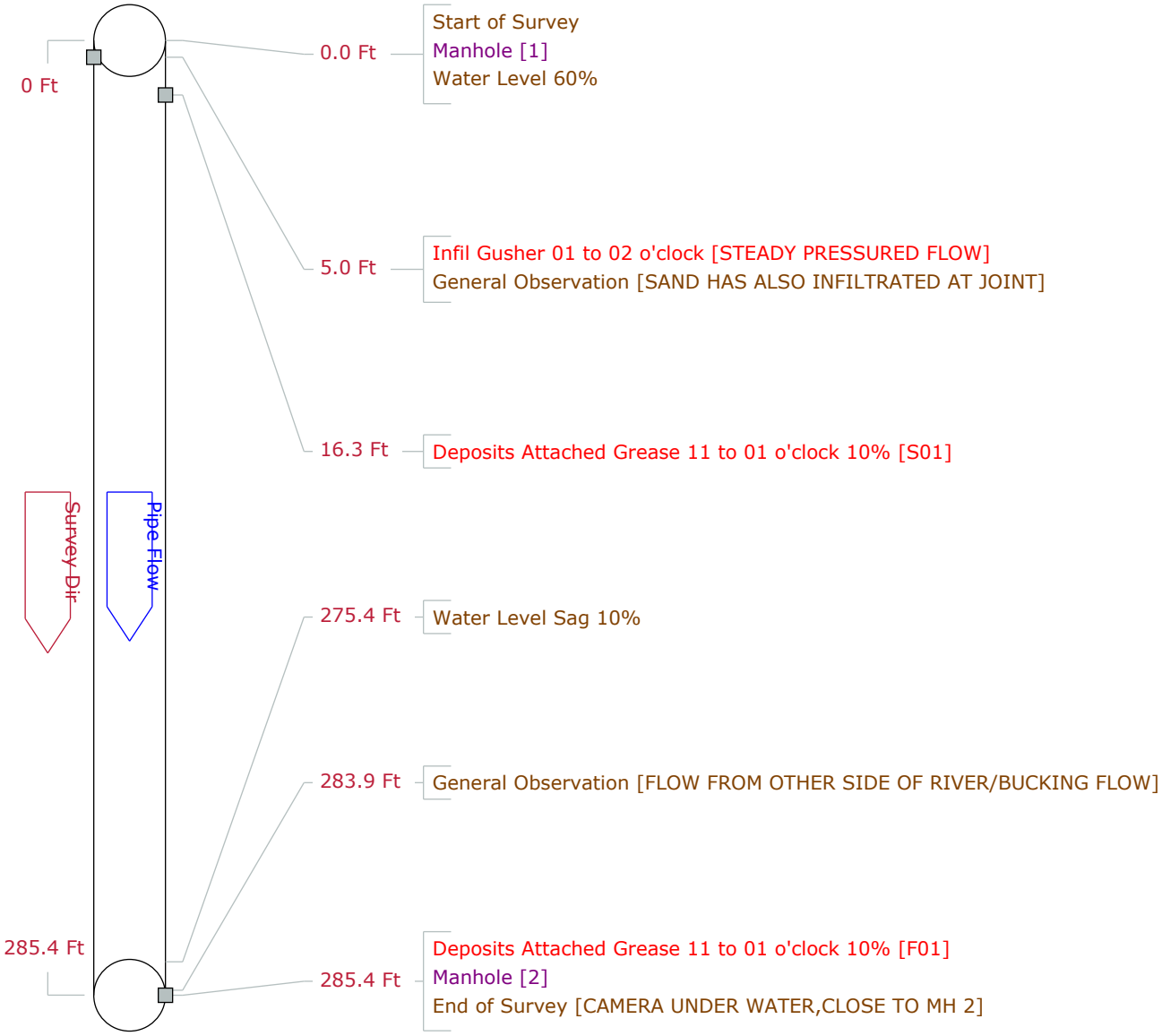
Social Characteristics - show more >>	Number	Percent	U.S.		
Population 25 years and over	4,479				
High school graduate or higher	3,399	75.9	80.4%	map	brief
Bachelor's degree or higher	435	9.7	24.4%	map	
Civilian veterans (civilian population 18 years and over)	646	12.0	12.7%	map	brief
Disability status (population 5 years and over)	1,365	20.2	19.3%	map	brief
Foreign born	223	3.0	11.1%	map	brief
Male, Now married, except separated (population 15 years and over)	1,194	43.7	56.7%		brief
Female, Now married, except separated (population 15 years and over)	1,175	39.0	52.1%		brief
Speak a language other than English at home (population 5 years and over)	391	5.7	17.9%	map	brief

Economic Characteristics - show more >>	Number	Percent	U.S.		
In labor force (population 16 years and over)	3,683	65.3	63.9%		brief
Mean travel time to work in minutes (workers 16 years and over)	20.3	(X)	25.5	map	brief
Median household income in 1999 (dollars)	32,460	(X)	41,994	map	
Median family income in 1999 (dollars)	36,272	(X)	50,046	map	
Per capita income in 1999 (dollars)	16,279	(X)	21,587	map	
Families below poverty level	297	16.2	9.2%	map	brief
Individuals below poverty level	1,413	19.3	12.4%	map	

Housing Characteristics - show more >>	Number	Percent	U.S.		
Single-family owner-occupied homes	1,682				brief
Median value (dollars)	63,400	(X)	119,600	map	brief

Pipe Graphic Report of PLR 1 X **for** CITY OF THREE RIVERS

Setup 1	**Surveyor** MRM	**Certificate #** U-107-4232	**System Owner** CITY OF THREE RIVERS		
Drainage	**Survey Customer** CITY OF THREE RIVERS				
P/O #	**Date** 2010/03/22	**Time** 4:48	**Street** BROADWAY ST. RIVER CROSSING		
City THREE RIVERS	**Further location details** CAMERA HEADING WEST				
Start 1	**Rim to invert**	**Grade to invert**	**Rim to grade**	**Ft**	
Finish 2	**Rim to invert**	**Grade to invert**	**Rim to grade**	**Ft**	
Use Sanitary	**Direction** Downstream	**Flow control** Plugged	**Media No** DVD-1		
Shape Circular	**Height** 12	**Width** **ins**	**Preclean** N	**Year Cleaned**	
Material Ductile Iron Pipe	**Joint length** 14.0 **Ft**	**Total length** 285.4 **Ft**	**Length Surveyed** 285.40		
Lining	**Year laid**	**Year rehabilitated**	**Weather** Dry		
Purpose Capital Improvement Program Assessment	**Cat**				
Additional info RIVER CROSSING OFF BROADWAY STREET	Structural	O&M	Constructional		
Location Easement/Right of Way	Miscellaneous	Hydraulic			



Tabular Report of PSR 1 X for CITY OF THREE RIVERS

Setup 1	Surveyor MRM	Certificate # U-107-4232	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/22	Time 4:48	Street BROADWAY ST. RIVER CROSSING		
City THREE RIVERS	Further location details CAMERA HEADING WEST				
Start 1	Rim to invert	Grade to invert	Rim to grade	Ft	
Finish 2	Rim to invert	Grade to invert	Rim to grade	Ft	
Use Sanitary	Direction Down	Flow control Plugged	Media No DVD-1		
Shape Circular	Height 12	Width ins	Preclean N	Year Cleaned	
Material Ductile Iron Pipe	Joint length 14.00 Ft	Total length 285.4 Ft	Length Surveyed 285.4		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info RIVER CROSSING OFF BROADWAY STREET			Structural O&M Constructional		
Location Easement/Right of Way			Miscellaneous Hydraulic		

Count	Video	CD	Code		In1	In2	%	Jnt	Fr	To	ImRef	Remarks
0.0			ST	Start of Survey								
0.0			AMH	Manhole								1
0.0			MWL	Water Level			60					
5.0			IG	Infil Gusher				J	01	02		STEADY PRESSURED FLOW
5.0			MGO	General Observation								SAND HAS ALSO INFILTRATED AT ...
16.3		S01	DAGS	Deposits Attached Grease			10	J	11	01		
275.4			MWLS	Water Level Sag			10					
283.9			MGO	General Observation								FLOW FROM OTHER SIDE OF RIVER
285.4		F01	DAGS	Deposits Attached Grease			10	J	11	01		
285.4			AMH	Manhole								2
285.4			FH	End of Survey								CAMERA UNDER WATER,CLOSE TO

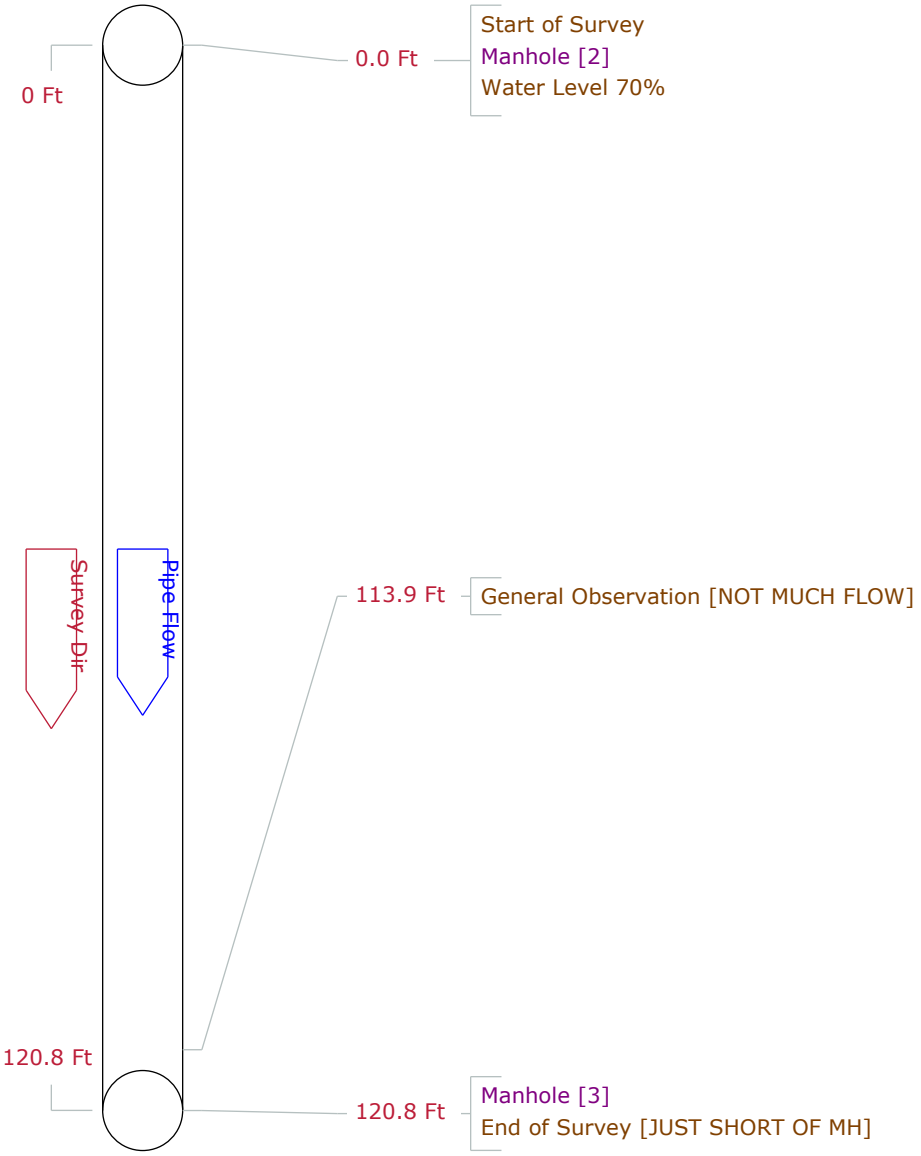
285.4 Ft Total Length Surveyed

Scores

Structural:	Total 0	Mean Defect 0	Peak 0	Mean Pipe 0
Service:	Total 117	Mean Defect 2.1	Peak 5	Mean Pipe 0.4

Pipe Graphic Report of PLR 2 X for CITY OF THREE RIVERS

Setup 2	Surveyor JMS	Certificate # U-105-538	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/22	Time 5:10	Street BROADWAY ST. RIVER CROSSING		
City THREE RIVERS	Further location details CAMERA HEADING WEST				
Start 2	Rim to invert	Grade to invert	Rim to grade	Ft	
Finish 3	Rim to invert	Grade to invert	Rim to grade	Ft	
Use Sanitary	Direction Downstream	Flow control Plugged	Media No DVD-1		
Shape Circular	Height 12	Width ins	Preclean N	Year Cleaned	
Material Ductile Iron Pipe	Joint length 14.0 Ft	Total length 120.8 Ft	Length Surveyed 120.80		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info RIVER CROSSING OFF BROADWAY ST., 2 PLUGS SET			Structural O&M Constructional		
Location Easement/Right of Way			Miscellaneous Hydraulic		



Tabular Report of PSR 2 X for CITY OF THREE RIVERS

Setup	2	Surveyor	JMS	Certificate #	U-105-538
System Owner	CITY OF THREE RIVERS				
Drainage		Survey Customer	CITY OF THREE RIVERS		
P/O #		Date	2010/03/22	Time	5:10
Street	BROADWAY ST. RIVER CROSSING				
City	THREE RIVERS	Further location details	CAMERA HEADING WEST		

Start	2	Rim to invert		Grade to invert		Rim to grade	Ft
Finish	3	Rim to invert		Grade to invert		Rim to grade	Ft

Use	Sanitary	Direction	Down	Flow control	Plugged	Media No	DVD-1
Shape	Circular	Height	12	Width	ins	Preclean	N
Year Cleaned							
Material	Ductile Iron Pipe	Joint length	14.00 Ft	Total length	120.8 Ft	Length Surveyed	120.8
Lining		Year laid		Year rehabilitated		Weather	Dry
Purpose	Capital Improvement Program Assessment			Cat			

Additional info	RIVER CROSSING OFF BROADWAY ST., 2 PLUGS SET	Structural	O&M
Constructional			
Location	Easement/Right of Way	Miscellaneous	Hydraulic

Count	Video		CD	Code		In1	In2	%	Jnt	Fr	To	ImRef	Remarks
0.0				ST	Start of Survey								
0.0				AMH	Manhole								2
0.0				MWL	Water Level			70					
113.9				MGO	General Observation								NOT MUCH FLOW
120.8				AMH	Manhole								3
120.8				FH	End of Survey								JUST SHORT OF MH

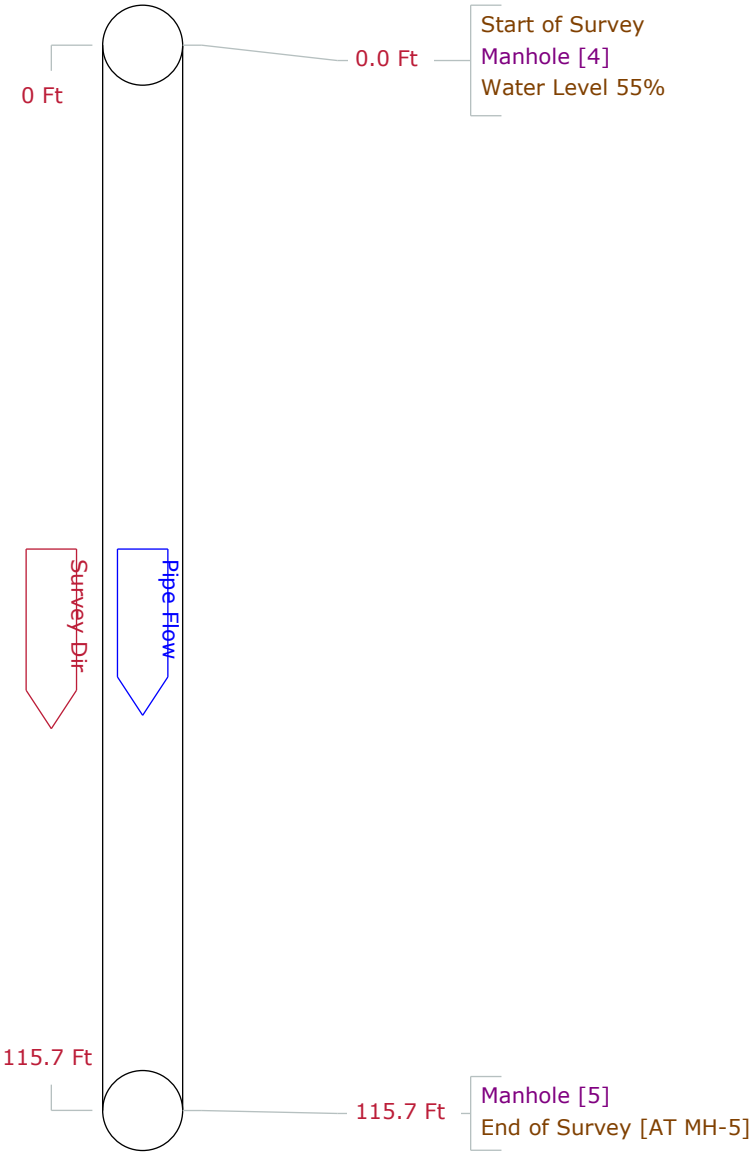
120.8 Ft Total Length Surveyed

Scores

Structural:	Total 0	Mean Defect 0	Peak 0	Mean Pipe 0	
Service:	Total 0	Mean Defect 0	Peak 0	Mean Pipe 0	

Pipe Graphic Report of PLR 4 S for CITY OF THREE RIVERS

Setup 3	Surveyor JMS	Certificate # U-105-538	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/22	Time 7:11	Street BROADWAY ST. RIVER CROSSING		
City THREE RIVERS	Further location details CAMERA HEADING WEST				
Start 4	Rim to invert	Grade to invert	Rim to grade	Ft	
Finish 5	Rim to invert	Grade to invert	Rim to grade	Ft	
Use Sanitary	Direction Downstream	Flow control Plugged	Media No DVD-1		
Shape Circular	Height 18	Width ins	Preclean N	Year Cleaned	
Material Ductile Iron Pipe	Joint length 14.0 Ft	Total length 115.7 Ft	Length Surveyed 115.70		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info RIVER CROSSING,BROADWAY ST., 1 PLUG SET AT MH-4			Structural O&M Constructional		
Location Easement/Right of Way			Miscellaneous Hydraulic		



Tabular Report of PSR 4 S for CITY OF THREE RIVERS

Setup 3	Surveyor JMS	Certificate # U-105-538	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/22	Time 7:11	Street BROADWAY ST. RIVER CROSSING		
City THREE RIVERS	Further location details CAMERA HEADING WEST				
Start 4	Rim to invert	Grade to invert	Rim to grade Ft		
Finish 5	Rim to invert	Grade to invert	Rim to grade Ft		
Use Sanitary	Direction Down	Flow control Plugged	Media No DVD-1		
Shape Circular	Height 18	Width ins	Preclean N	Year Cleaned	
Material Ductile Iron Pipe	Joint length 14.00 Ft	Total length 115.7 Ft	Length Surveyed 115.7		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info RIVER CROSSING,BROADWAY ST., 1 PLUG SET AT MH-4			Structural O&M Constructional		
Location Easement/Right of Way			Miscellaneous Hydraulic		

Count	Video		CD	Code		In1	In2	%	Jnt	Fr	To	ImRef	Remarks
0.0				ST	Start of Survey								
0.0				AMH	Manhole								4
0.0				MWL	Water Level			55					
115.7				AMH	Manhole								5
115.7				FH	End of Survey								AT MH-5

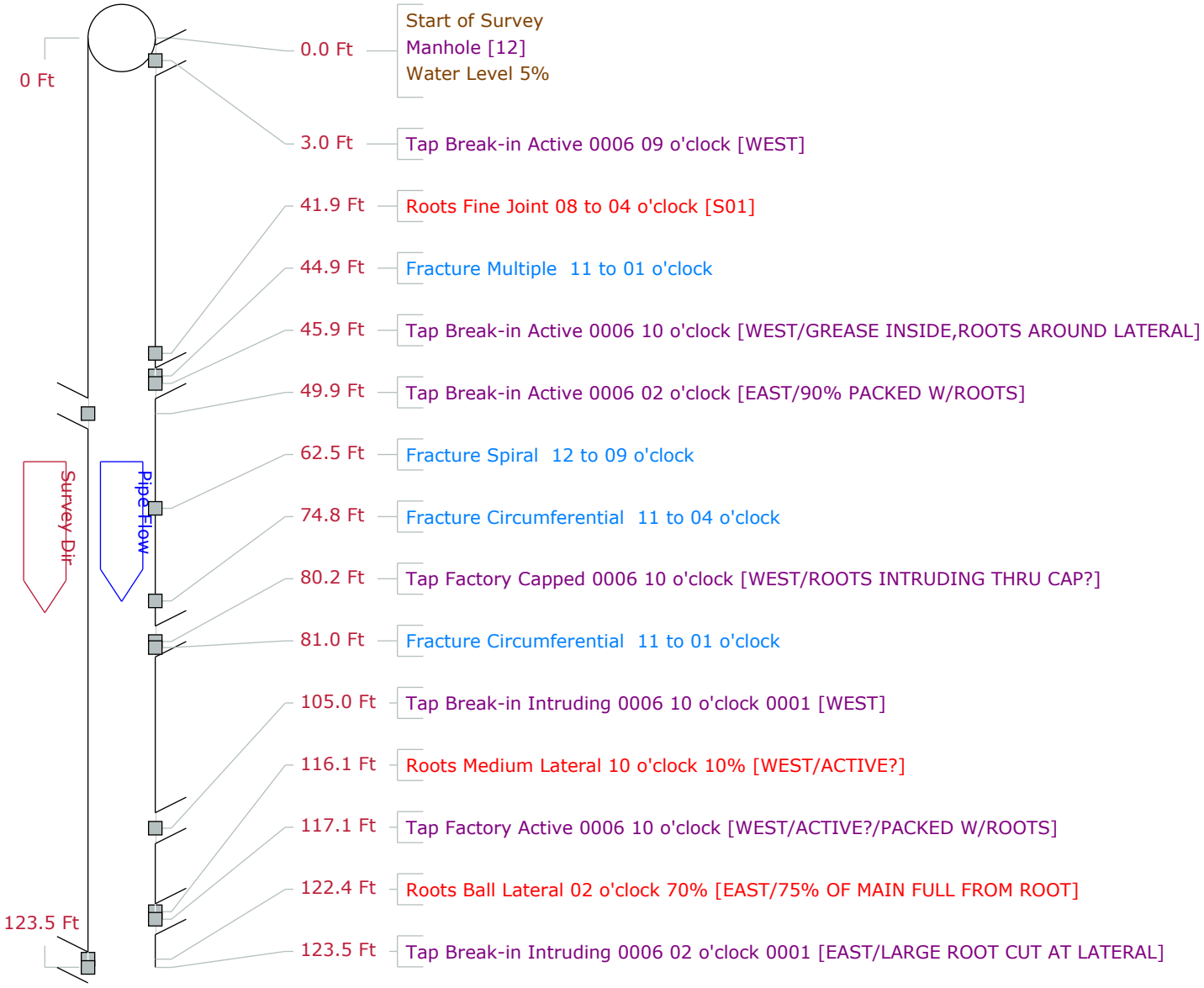
115.7 Ft Total Length Surveyed

Scores

Structural:	Total 0	Mean Defect 0	Peak 0	Mean Pipe 0	
Service:	Total 0	Mean Defect 0	Peak 0	Mean Pipe 0	

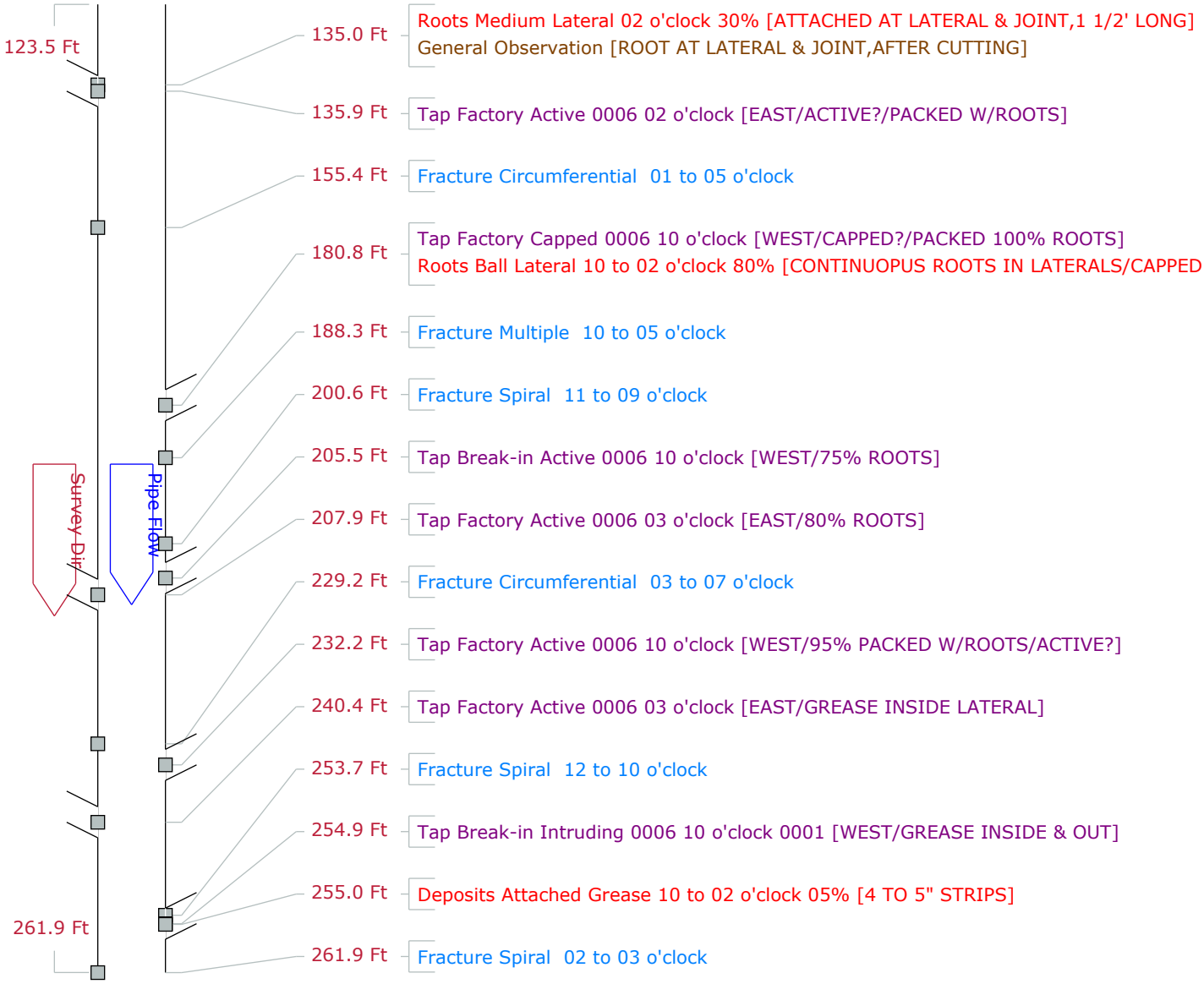
Pipe Graphic Report of PLR 12 S for CITY OF THREE RIVERS

Setup 11	Surveyor MRM	Certificate # U-107-4232	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/23	Time 9:52	Street SEVENTH STREET		
City THREE RIVERS	Further location details CAMERA HEADING NORTH				
Start 12	Rim to invert	Grade to invert	Rim to grade	Ft	
Finish 13	Rim to invert	Grade to invert	Rim to grade	Ft	
Use Sanitary	Direction Downstream	Flow control De-Watered using Jetter	Media No DVD-1		
Shape Circular	Height 8	Width ins	Preclean J	Year Cleaned	
Material Vitrified Clay Pipe	Joint length 3.0 Ft	Total length 364.0 Ft	Length Surveyed 364.00		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info MH-12 AT MICHIGAN & 7TH ST,MH-13 AT PEARL & 7TH ST	Structural	O&M	Constructional		
Location Light Highway	Miscellaneous	Hydraulic			



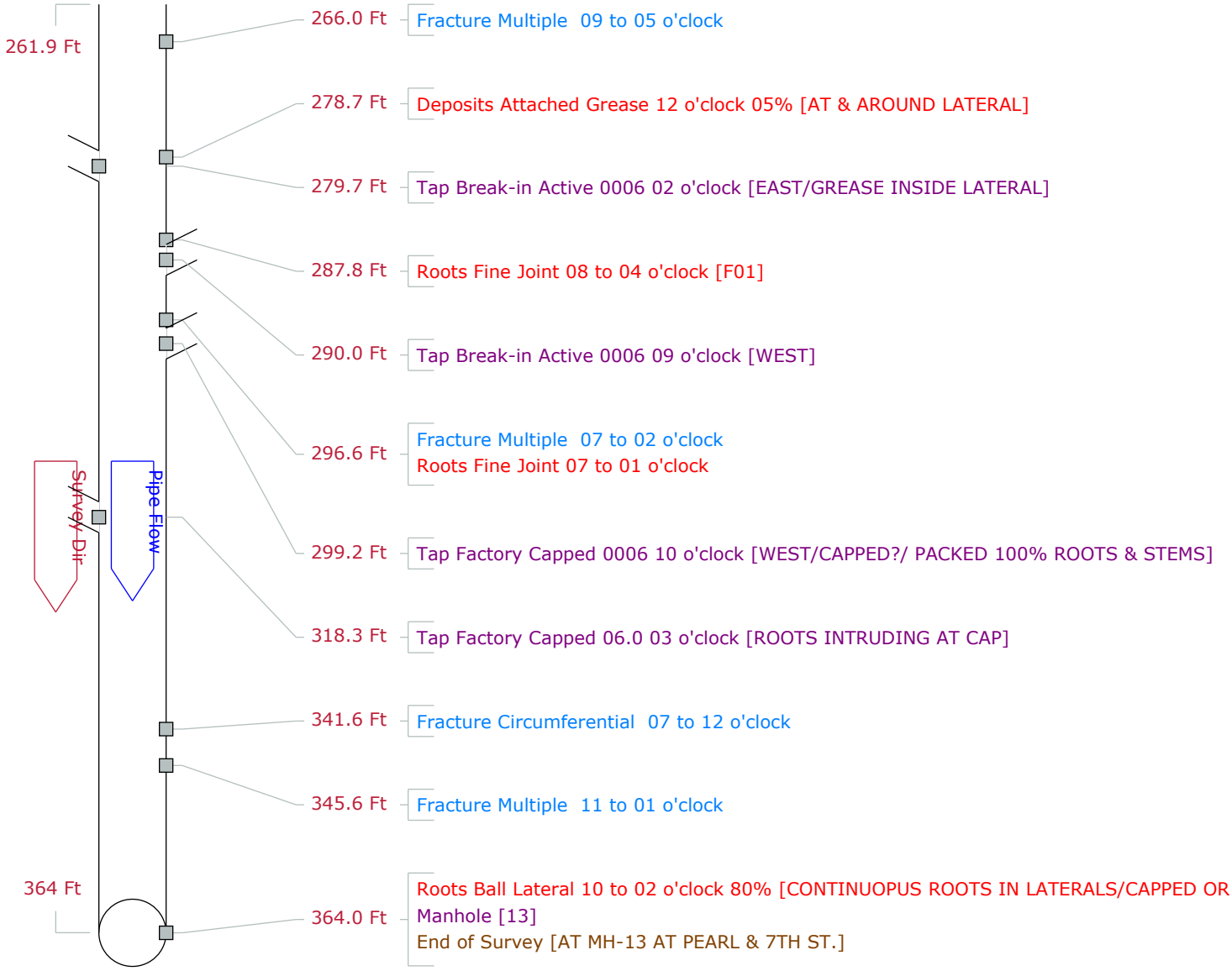
Pipe Graphic Report of PLR 12 S for CITY OF THREE RIVERS

Setup 11	Surveyor MRM	Certificate # U-107-4232	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/23	Time 9:52	Street SEVENTH STREET		
City THREE RIVERS	Further location details CAMERA HEADING NORTH				
Start 12	Rim to invert	Grade to invert	Rim to grade	Ft	
Finish 13	Rim to invert	Grade to invert	Rim to grade	Ft	
Use Sanitary	Direction Downstream	Flow control De-Watered using Jetter	Media No DVD-1		
Shape Circular	Height 8	Width ins	Preclean J	Year Cleaned	
Material Vitrified Clay Pipe	Joint length 3.0 Ft	Total length 364.0 Ft	Length Surveyed 364.00		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info MH-12 AT MICHIGAN & 7TH ST,MH-13 AT PEARL & 7TH ST	Structural	O&M	Constructional		
Location Light Highway	Miscellaneous	Hydraulic			



Pipe Graphic Report of PLR 12 S for CITY OF THREE RIVERS

Setup 11	Surveyor MRM	Certificate # U-107-4232	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/23	Time 9:52	Street SEVENTH STREET		
City THREE RIVERS	Further location details CAMERA HEADING NORTH				
Start 12	Rim to invert	Grade to invert	Rim to grade	Ft	
Finish 13	Rim to invert	Grade to invert	Rim to grade	Ft	
Use Sanitary	Direction Downstream	Flow control De-Watered using Jetter	Media No DVD-1		
Shape Circular	Height 8	Width ins	Preclean J	Year Cleaned	
Material Vitrified Clay Pipe	Joint length 3.0 Ft	Total length 364.0 Ft	Length Surveyed 364.00		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info MH-12 AT MICHIGAN & 7TH ST,MH-13 AT PEARL & 7TH ST	Structural	O&M	Constructional		
Location Light Highway	Miscellaneous	Hydraulic			



Tabular Report of PSR 12 S for CITY OF THREE RIVERS

Setup 11	Surveyor MRM	Certificate # U-107-4232	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/23	Time 9:52	Street SEVENTH STREET		
City THREE RIVERS	Further location details CAMERA HEADING NORTH				
Start 12	Rim to invert	Grade to invert	Rim to grade	Ft	
Finish 13	Rim to invert	Grade to invert	Rim to grade	Ft	
Use Sanitary	Direction Down	Flow control De-Watered using Jetter	Media No DVD-1		
Shape Circular	Height 8	Width ins	Preclean J	Year Cleaned	
Material Vitrified Clay Pipe	Joint length 3.00 Ft	Total length 364.0 Ft	Length Surveyed 364.0		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info MH-12 AT MICHIGAN & 7TH ST,MH-13 AT PEARL & 7TH ST	Structural	O&M	Constructional		
Location Light Highway	Miscellaneous	Hydraulic			

Count	Video	CD	Code		In1	In2	%	Jnt	Fr	To	ImRef	Remarks
0.0			ST	Start of Survey								
0.0			AMH	Manhole								12
0.0			MWL	Water Level			5					
3.0			TBA	Tap Break-in Active	06				09			WEST
41.9		S01	RFJ	Roots Fine Joint				J	08	04		
44.9			FM	Fracture Multiple				J	11	01		
45.9			TBA	Tap Break-in Active	06				10			WEST/GREASE INSIDE,ROOTS ARO
49.9			TBA	Tap Break-in Active	06				02			EAST/90% PACKED W/ROOTS
62.5			FS	Fracture Spiral				J	12	09		
74.8			FC	Fracture Circumferential				J	11	04		
80.2			TFC	Tap Factory Capped	06				10			WEST/ROOTS INTRUDING THRU CA
81.0			FC	Fracture Circumferential				J	11	01		
105.0			TBI	Tap Break-in Intruding	06	01			10			WEST
116.1			RML	Roots Medium Lateral			10		10			WEST/ACTIVE?
117.1			TFA	Tap Factory Active	06				10			WEST/ACTIVE?/PACKED W/ROOTS
122.4			RBL	Roots Ball Lateral			70		02			EAST/75% OF MAIN FULL FROM RO..
123.5			TBI	Tap Break-in Intruding	06	01			02			EAST/LARGE ROOT CUT AT LATERA
135.0			RML	Roots Medium Lateral			30		02			ATTACHED AT LATERAL & JOINT,1...
135.0			MGO	General Observation								ROOT AT LATERAL & JOINT,AFTER..
135.9			TFA	Tap Factory Active	06				02			EAST/ACTIVE?/PACKED W/ROOTS
155.4			FC	Fracture Circumferential				J	01	05		
180.8			TFC	Tap Factory Capped	06				10			WEST/CAPPED?/PACKED 100% ROO
180.8		S02	RBL	Roots Ball Lateral			80		10	02		CONTINUOPUS ROOTS IN LATERALS
188.3			FM	Fracture Multiple				J	10	05		
200.6			FS	Fracture Spiral				J	11	09		
205.5			TBA	Tap Break-in Active	06				10			WEST/75% ROOTS
207.9			TFA	Tap Factory Active	06				03			EAST/80% ROOTS
229.2			FC	Fracture Circumferential				J	03	07		
232.2			TFA	Tap Factory Active	06				10			WEST/95% PACKED W/ROOTS/ACTI
240.4			TFA	Tap Factory Active	06				03			EAST/GREASE INSIDE LATERAL
253.7			FS	Fracture Spiral				J	12	10		
254.9			TBI	Tap Break-in Intruding	06	01			10			WEST/GREASE INSIDE & OUT
255.0			DAGS	Deposits Attached Grease			05	J	10	02		4 TO 5" STRIPS
261.9			FS	Fracture Spiral				J	02	03		
266.0			FM	Fracture Multiple				J	09	05		
278.7			DAGS	Deposits Attached Grease			05	J	12			AT & AROUND LATERAL
279.7			TBA	Tap Break-in Active	06				02			EAST/GREASE INSIDE LATERAL
287.8		F01	RFJ	Roots Fine Joint				J	08	04		

Tabular Report of PSR 12 S for CITY OF THREE RIVERS

Setup	11	Surveyor	MRM	Certificate #	U-107-4232
System Owner	CITY OF THREE RIVERS				
Drainage		Survey Customer	CITY OF THREE RIVERS		
P/O #		Date	2010/03/23	Time	9:52
Street	SEVENTH STREET				
City	THREE RIVERS	Further location details	CAMERA HEADING NORTH		

Start	12	Rim to invert		Grade to invert		Rim to grade	Ft
Finish	13	Rim to invert		Grade to invert		Rim to grade	Ft

Use	Sanitary	Direction	Down	Flow control	De-Watered using Jetter	Media No	DVD-1
Shape	Circular	Height	8	Width	ins	Preclean	J
Year Cleaned							
Material	Vitrified Clay Pipe	Joint length	3.00 Ft	Total length	364.0 Ft	Length Surveyed	364.0
Lining		Year laid		Year rehabilitated		Weather	Dry
Purpose	Capital Improvement Program Assessment			Cat			

Additional info	MH-12 AT MICHIGAN & 7TH ST,MH-13 AT PEARL & 7TH ST	Structural	O&M	Constructional
Location	Light Highway	Miscellaneous	Hydraulic	

Count	Video		CD	Code		In1	In2	%	Jnt	Fr	To	ImRef	Remarks
290.0				TBA	Tap Break-in Active	06				09			WEST
296.6				FM	Fracture Multiple				J	07	02		
296.6				RFJ	Roots Fine Joint				J	07	01		
299.2				TFC	Tap Factory Capped	06				10			WEST/CAPPED?/ PACKED 100% ROC
318.3				TFC	Tap Factory Capped	06			J	03			ROOTS INTRUDING AT CAP
341.6				FC	Fracture Circumferential				J	07	12		
345.6				FM	Fracture Multiple				J	11	01		
364.0			F02	RBL	Roots Ball Lateral			80		10	02		CONTINUOPUS ROOTS IN LATERALS
364.0				AMH	Manhole								13
364.0				FH	End of Survey								AT MH-13 AT PEARL & 7TH ST.

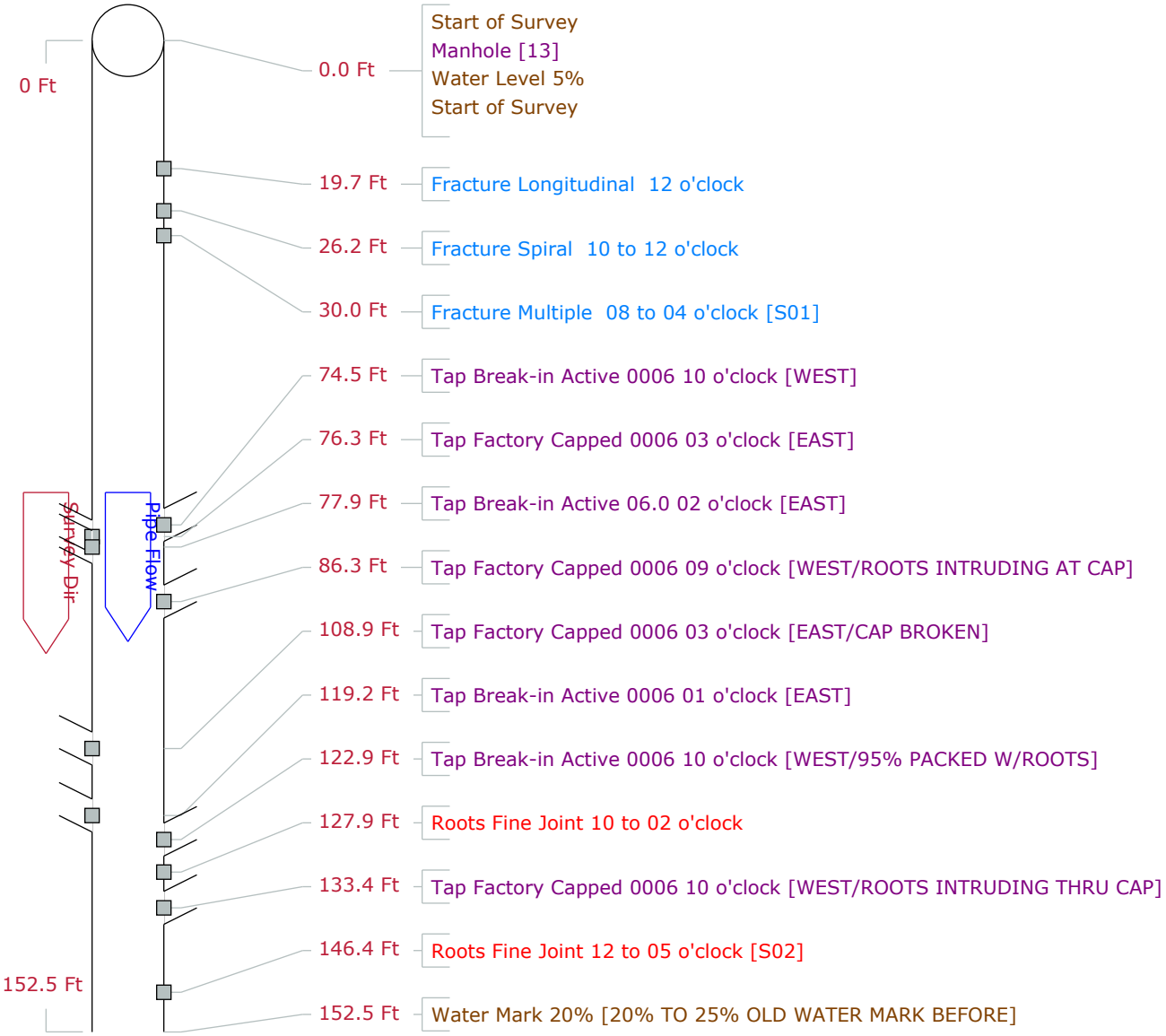
364.0 Ft Total Length Surveyed

Scores

Structural:	Total 42	Mean Defect 3	Peak 4	Mean Pipe 0.1	
Service:	Total 251	Mean Defect 2.6	Peak 8	Mean Pipe 0.7	

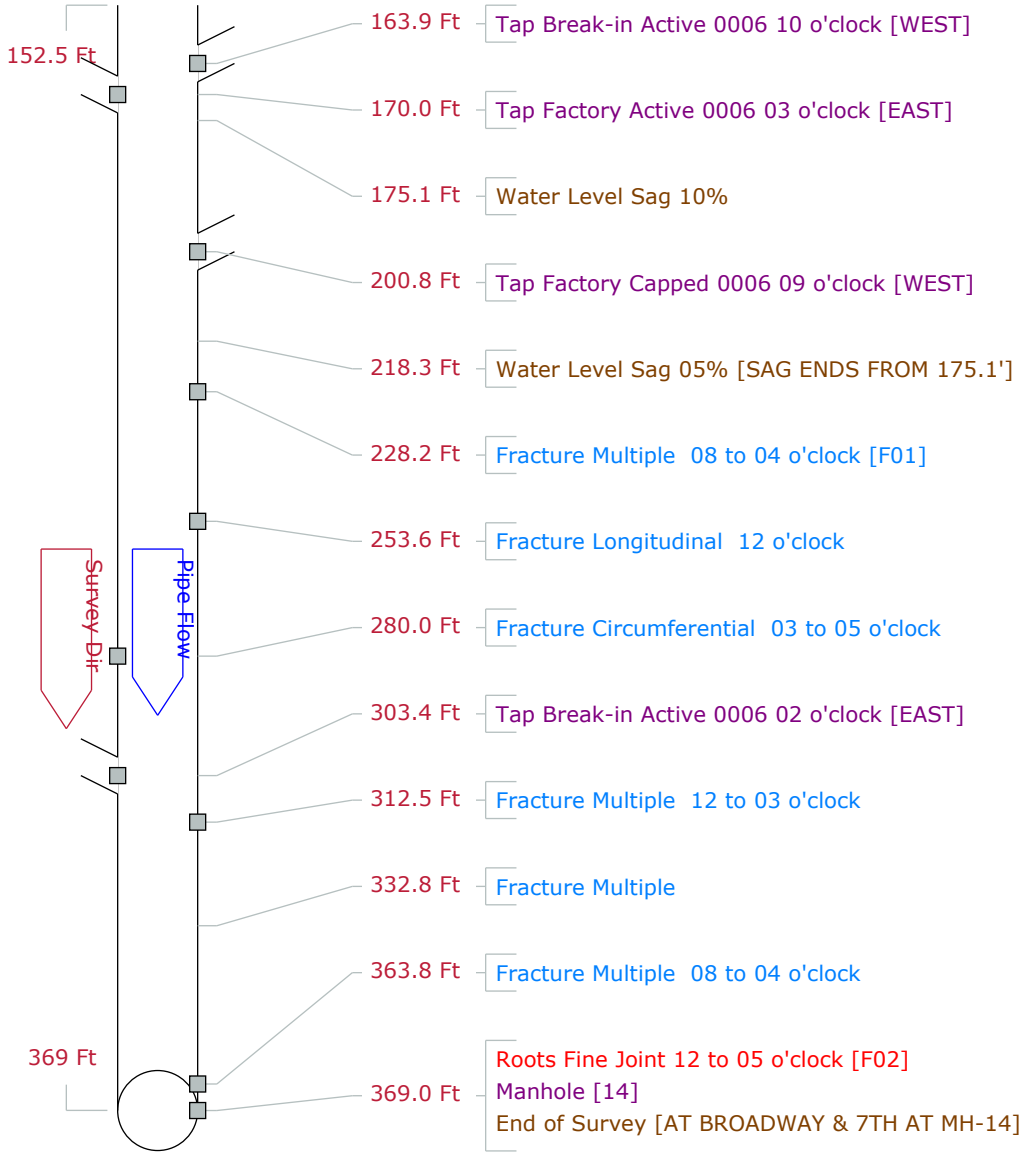
Pipe Graphic Report of PLR 13 S for CITY OF THREE RIVERS

Setup 12	Surveyor MRM	Certificate # U-107-4232	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/23	Time 10:58	Street SEVENTH STREET		
City THREE RIVERS	Further location details CAMERA HEADING NORTH				
Start 13	Rim to invert	Grade to invert	Rim to grade	Ft	
Finish 14	Rim to invert	Grade to invert	Rim to grade	Ft	
Use Sanitary	Direction Downstream	Flow control De-Watered using Jetter	Media No DVD-1		
Shape Circular	Height 8	Width ins	Preclean J	Year Cleaned	
Material Vitrified Clay Pipe	Joint length 3.0 Ft	Total length 369.0 Ft	Length Surveyed 369.00		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info MH-13 AT PEARL & 7TH ST,MH-14 AT BROADWAY & 7TH ST	Structural	O&M	Constructional		
Location Light Highway	Miscellaneous	Hydraulic			



Pipe Graphic Report of PLR 13 S for CITY OF THREE RIVERS

Setup 12	Surveyor MRM	Certificate # U-107-4232	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/23	Time 10:58	Street SEVENTH STREET		
City THREE RIVERS	Further location details CAMERA HEADING NORTH				
Start 13	Rim to invert	Grade to invert	Rim to grade	Ft	
Finish 14	Rim to invert	Grade to invert	Rim to grade	Ft	
Use Sanitary	Direction Downstream	Flow control De-Watered using Jetter	Media No DVD-1		
Shape Circular	Height 8	Width ins	Preclean J	Year Cleaned	
Material Vitrified Clay Pipe	Joint length 3.0 Ft	Total length 369.0 Ft	Length Surveyed 369.00		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info MH-13 AT PEARL & 7TH ST,MH-14 AT BROADWAY & 7TH ST	Structural	O&M	Constructional		
Location Light Highway	Miscellaneous	Hydraulic			



Tabular Report of PSR 13 S for CITY OF THREE RIVERS

Setup 12	Surveyor MRM	Certificate # U-107-4232	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/23	Time 10:58	Street SEVENTH STREET		
City THREE RIVERS	Further location details CAMERA HEADING NORTH				
Start 13	Rim to invert	Grade to invert	Rim to grade	Ft	
Finish 14	Rim to invert	Grade to invert	Rim to grade	Ft	
Use Sanitary	Direction Down	Flow control De-Watered using Jetter	Media No DVD-1		
Shape Circular	Height 8	Width ins	Preclean J	Year Cleaned	
Material Vitrified Clay Pipe	Joint length 3.00 Ft	Total length 369.0 Ft	Length Surveyed 369.0		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info MH-13 AT PEARL & 7TH ST,MH-14 AT BROADWAY & 7TH ST	Structural	O&M	Constructional		
Location Light Highway	Miscellaneous	Hydraulic			

Count	Video	CD	Code		In1	In2	%	Jnt	Fr	To	ImRef	Remarks
0.0			ST	Start of Survey								
0.0			AMH	Manhole								13
0.0			MWL	Water Level			5					
0.0			ST	Start of Survey								
19.7			FL	Fracture Longitudinal				J	12			
26.2			FS	Fracture Spiral				J	10	12		
30.0		S01	FM	Fracture Multiple				J	08	04		
74.5			TBA	Tap Break-in Active	06				10			WEST
76.3			TFC	Tap Factory Capped	06				03			EAST
77.9			TBA	Tap Break-in Active	06				02			EAST
86.3			TFC	Tap Factory Capped	06				09			WEST/ROOTS INTRUDING AT CAP
108.9			TFC	Tap Factory Capped	06				03			EAST/CAP BROKEN
119.2			TBA	Tap Break-in Active	06				01			EAST
122.9			TBA	Tap Break-in Active	06				10			WEST/95% PACKED W/ROOTS
127.9			RFJ	Roots Fine Joint				J	10	02		
133.4			TFC	Tap Factory Capped	06				10			WEST/ROOTS INTRUDING THRU CA
146.4		S02	RFJ	Roots Fine Joint				J	12	05		
152.5			MWM	Water Mark			20					20% TO 25% OLD WATER MARK BEF
163.9			TBA	Tap Break-in Active	06				10			WEST
170.0			TFA	Tap Factory Active	06				03			EAST
175.1			MWLS	Water Level Sag			10					
200.8			TFC	Tap Factory Capped	06				09			WEST
218.3			MWLS	Water Level Sag			05					SAG ENDS FROM 175.1'
228.2		F01	FM	Fracture Multiple				J	08	04		
253.6			FL	Fracture Longitudinal				J	12			
280.0			FC	Fracture Circumferential				J	03	05		
303.4			TBA	Tap Break-in Active	06				02			EAST
312.5			FM	Fracture Multiple				J	12	03		
332.8			FM	Fracture Multiple								
363.8			FM	Fracture Multiple				J	08	04		
369.0		F02	RFJ	Roots Fine Joint				J	12	05		
369.0			AMH	Manhole								14
369.0			FH	End of Survey								AT BROADWAY & 7TH AT MH-14

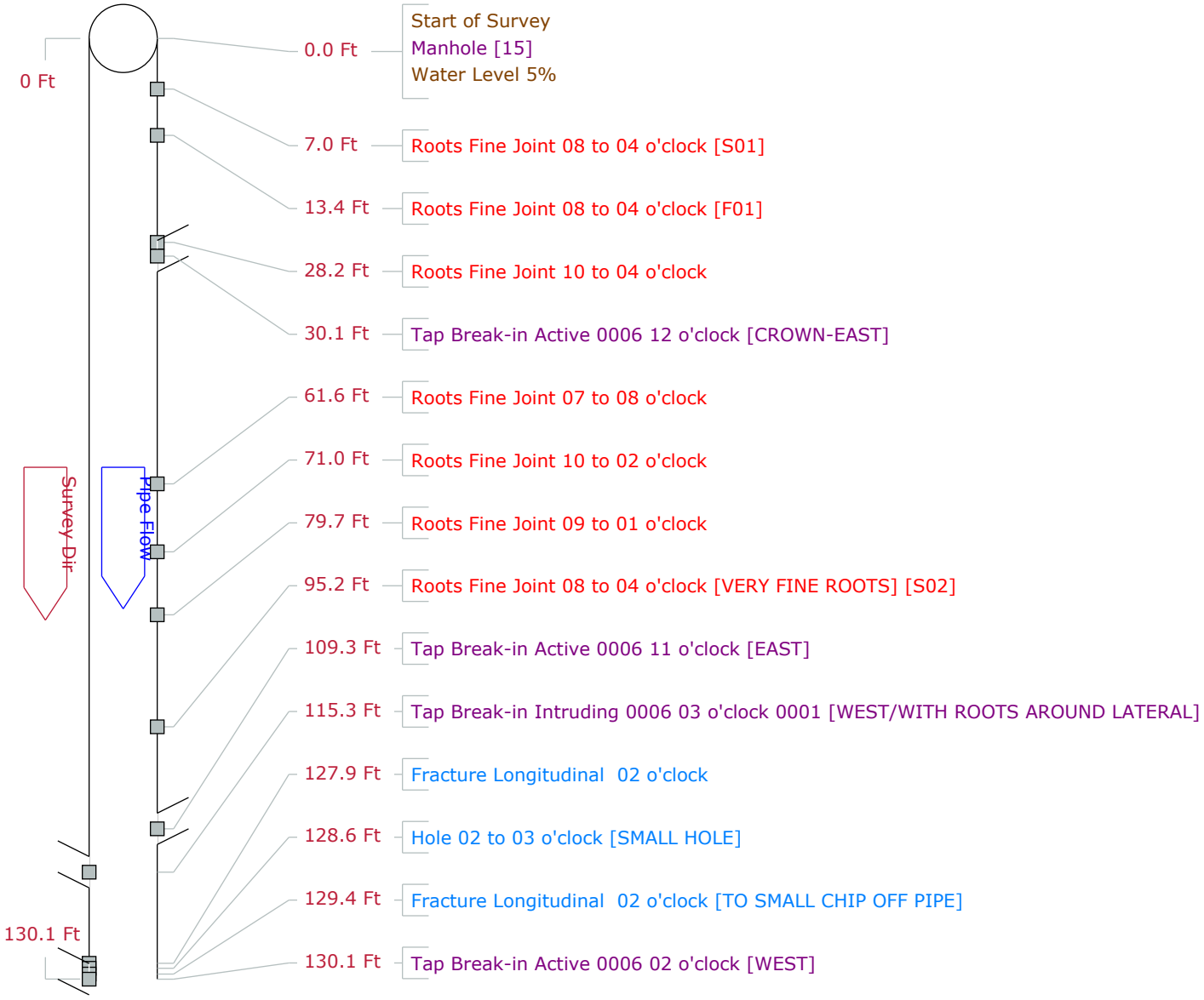
369.0 Ft Total Length Surveyed

Scores

Structural:	Total 183	Mean Defect 3.9	Peak 4	Mean Pipe 0.5
Service:	Total 52	Mean Defect 1.1	Peak 3	Mean Pipe 0.1

Pipe Graphic Report of PLR 15 A for CITY OF THREE RIVERS

Setup 13	Surveyor MRM	Certificate # U-107-4232	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/23	Time 14:54	Street SEVENTH STREET		
City THREE RIVERS	Further location details CAMERA HEADING SOUTH				
Start 15	Rim to invert	Grade to invert	Rim to grade	Ft	
Finish 16	Rim to invert	Grade to invert	Rim to grade	Ft	
Use Sanitary	Direction Downstream	Flow control De-Watered using Jetter	Media No DVD-1		
Shape Circular	Height 8	Width ins	Preclean J	Year Cleaned	
Material Vitrified Clay Pipe	Joint length 3.0 Ft	Total length 332.0 Ft	Length Surveyed 332.00		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info MH-15 IS TOP END AT MICHIGAN,MH-16 AT LIBERTY &7TH	Structural	O&M	Constructional		
Location Light Highway	Miscellaneous	Hydraulic			



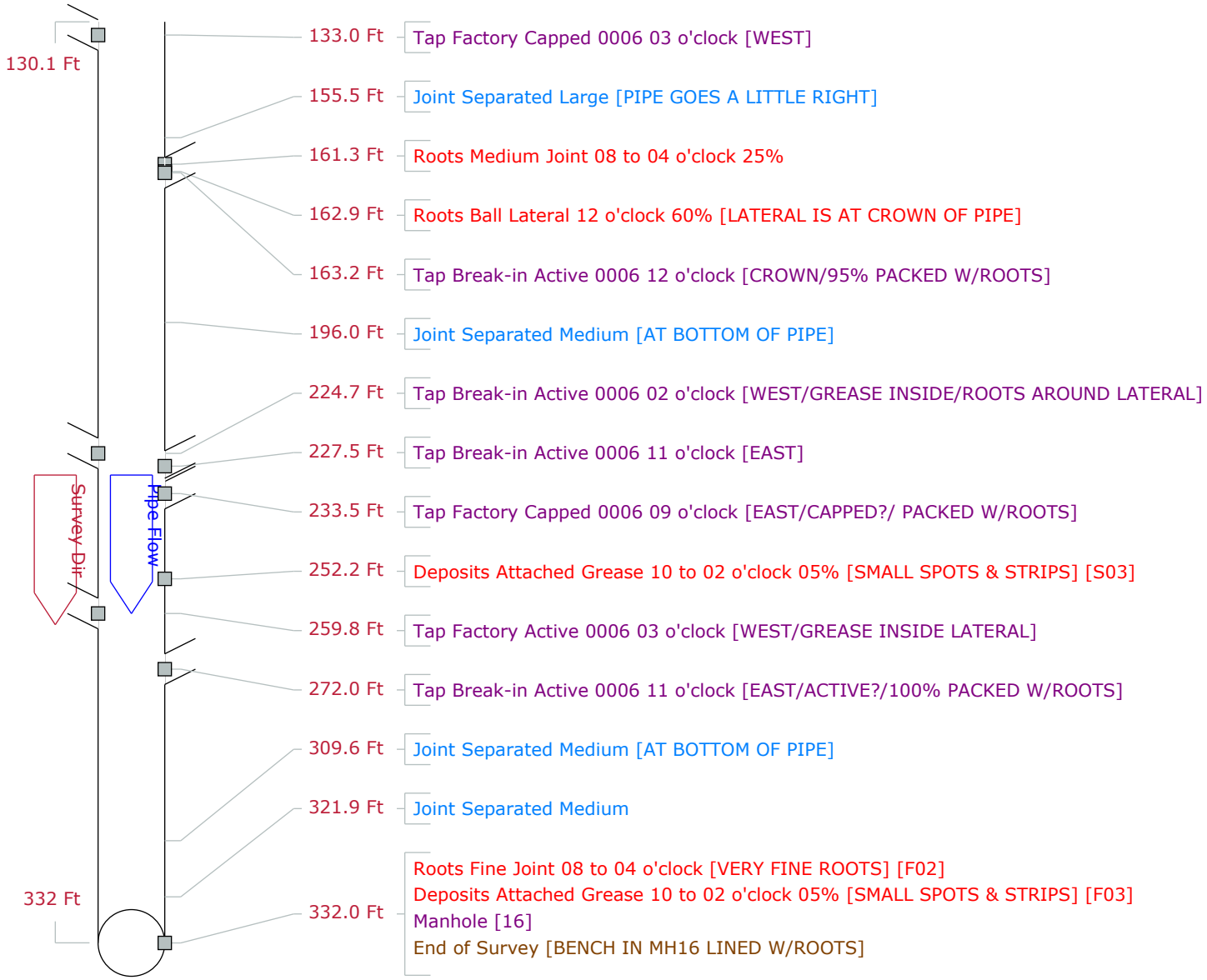
Pipe Graphic Report of PLR 15 A for CITY OF THREE RIVERS

Setup	13	Surveyor	MRM	Certificate #	U-107-4232
System Owner	CITY OF THREE RIVERS				
Drainage		Survey Customer	CITY OF THREE RIVERS		
P/O #		Date	2010/03/23	Time	14:54
Street	SEVENTH STREET				
City	THREE RIVERS	Further location details	CAMERA HEADING SOUTH		

Start	15	Rim to invert		Grade to invert		Rim to grade	Ft
Finish	16	Rim to invert		Grade to invert		Rim to grade	Ft

Use	Sanitary	Direction	Downstream	Flow control	De-Watered using Jetter	Media No	DVD-1		
Shape	Circular	Height	8	Width	ins	Preclean	J	Year Cleaned	
Material	Vitrified Clay Pipe	Joint length	3.0 Ft	Total length	332.0 Ft	Length Surveyed	332.00		
Lining		Year laid		Year rehabilitated		Weather	Dry		
Purpose	Capital Improvement Program Assessment			Cat					

Additional info	MH-15 IS TOP END AT MICHIGAN,MH-16 AT LIBERTY &7TH	Structural	O&M	Constructional
Location	Light Highway	Miscellaneous	Hydraulic	



Tabular Report of PSR 15 A for CITY OF THREE RIVERS

Setup 13	Surveyor MRM	Certificate # U-107-4232	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/23	Time 14:54	Street SEVENTH STREET		
City THREE RIVERS	Further location details CAMERA HEADING SOUTH				
Start 15	Rim to invert	Grade to invert	Rim to grade	Ft	
Finish 16	Rim to invert	Grade to invert	Rim to grade	Ft	
Use Sanitary	Direction Down	Flow control De-Watered using Jetter	Media No DVD-1		
Shape Circular	Height 8	Width ins	Preclean J	Year Cleaned	
Material Vitrified Clay Pipe	Joint length 3.00 Ft	Total length 332.0 Ft	Length Surveyed 332.0		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info MH-15 IS TOP END AT MICHIGAN,MH-16 AT LIBERTY &7TH	Structural	O&M	Constructional		
Location Light Highway	Miscellaneous	Hydraulic			

Count	Video	CD	Code		In1	In2	%	Jnt	Fr	To	ImRef	Remarks
0.0			ST	Start of Survey								
0.0			AMH	Manhole								15
0.0			MWL	Water Level			5					
7.0		S01	RFJ	Roots Fine Joint				J	08	04		
13.4		F01	RFJ	Roots Fine Joint				J	08	04		
28.2			RFJ	Roots Fine Joint				J	10	04		
30.1			TBA	Tap Break-in Active	06				12			CROWN-EAST
61.6			RFJ	Roots Fine Joint				J	07	08		
71.0			RFJ	Roots Fine Joint				J	10	02		
79.7			RFJ	Roots Fine Joint				J	09	01		
95.2		S02	RFJ	Roots Fine Joint				J	08	04		VERY FINE ROOTS
109.3			TBA	Tap Break-in Active	06				11			EAST
115.3			TBI	Tap Break-in Intruding	06	01			03			WEST/WITH ROOTS AROUND LATER
127.9			FL	Fracture Longitudinal				J	02			
128.6			H	Hole					02	03		SMALL HOLE
129.4			FL	Fracture Longitudinal				J	02			TO SMALL CHIP OFF PIPE
130.1			TBA	Tap Break-in Active	06				02			WEST
133.0			TFC	Tap Factory Capped	06				03			WEST
155.5			JSL	Joint Separated Large								PIPE GOES A LITTLE RIGHT
161.3			RMJ	Roots Medium Joint			25	J	08	04		
162.9			RBL	Roots Ball Lateral			60		12			LATERAL IS AT CROWN OF PIPE
163.2			TBA	Tap Break-in Active	06				12			CROWN/95% PACKED W/ROOTS
196.0			JSM	Joint Separated Medium								AT BOTTOM OF PIPE
224.7			TBA	Tap Break-in Active	06				02			WEST/GREASE INSIDE/ROOTS ARO
227.5			TBA	Tap Break-in Active	06				11			EAST
233.5			TFC	Tap Factory Capped	06				09			EAST/CAPPED?/ PACKED W/ROOTS
252.2		S03	DAGS	Deposits Attached Grease			05	J	10	02		SMALL SPOTS & STRIPS
259.8			TFA	Tap Factory Active	06				03			WEST/GREASE INSIDE LATERAL
272.0			TBA	Tap Break-in Active	06				11			EAST/ACTIVE?/100% PACKED W/RO
309.6			JSM	Joint Separated Medium								AT BOTTOM OF PIPE
321.9			JSM	Joint Separated Medium								
332.0		F02	RFJ	Roots Fine Joint				J	08	04		VERY FINE ROOTS
332.0		F03	DAGS	Deposits Attached Grease			05	J	10	02		SMALL SPOTS & STRIPS
332.0			AMH	Manhole								16
332.0			FH	End of Survey								BENCH IN MH16 LINED W/ROOTS

332.0 Ft Total Length Surveyed

Tabular Report of PSR 15 A for CITY OF THREE RIVERS

Setup	13	Surveyor	MRM	Certificate #	U-107-4232
System Owner	CITY OF THREE RIVERS				
Drainage		Survey Customer	CITY OF THREE RIVERS		
P/O #		Date	2010/03/23	Time	14:54
Street	SEVENTH STREET				
City	THREE RIVERS	Further location details	CAMERA HEADING SOUTH		

Start	15	Rim to invert		Grade to invert		Rim to grade	Ft
Finish	16	Rim to invert		Grade to invert		Rim to grade	Ft

Use	Sanitary	Direction	Down	Flow control	De-Watered using Jetter	Media No	DVD-1
Shape	Circular	Height	8	Width	ins	Preclean	J
Year Cleaned							
Material	Vitrified Clay Pipe	Joint length	3.00 Ft	Total length	332.0 Ft	Length Surveyed	332.0
Lining		Year laid		Year rehabilitated		Weather	Dry
Purpose	Capital Improvement Program Assessment			Cat			

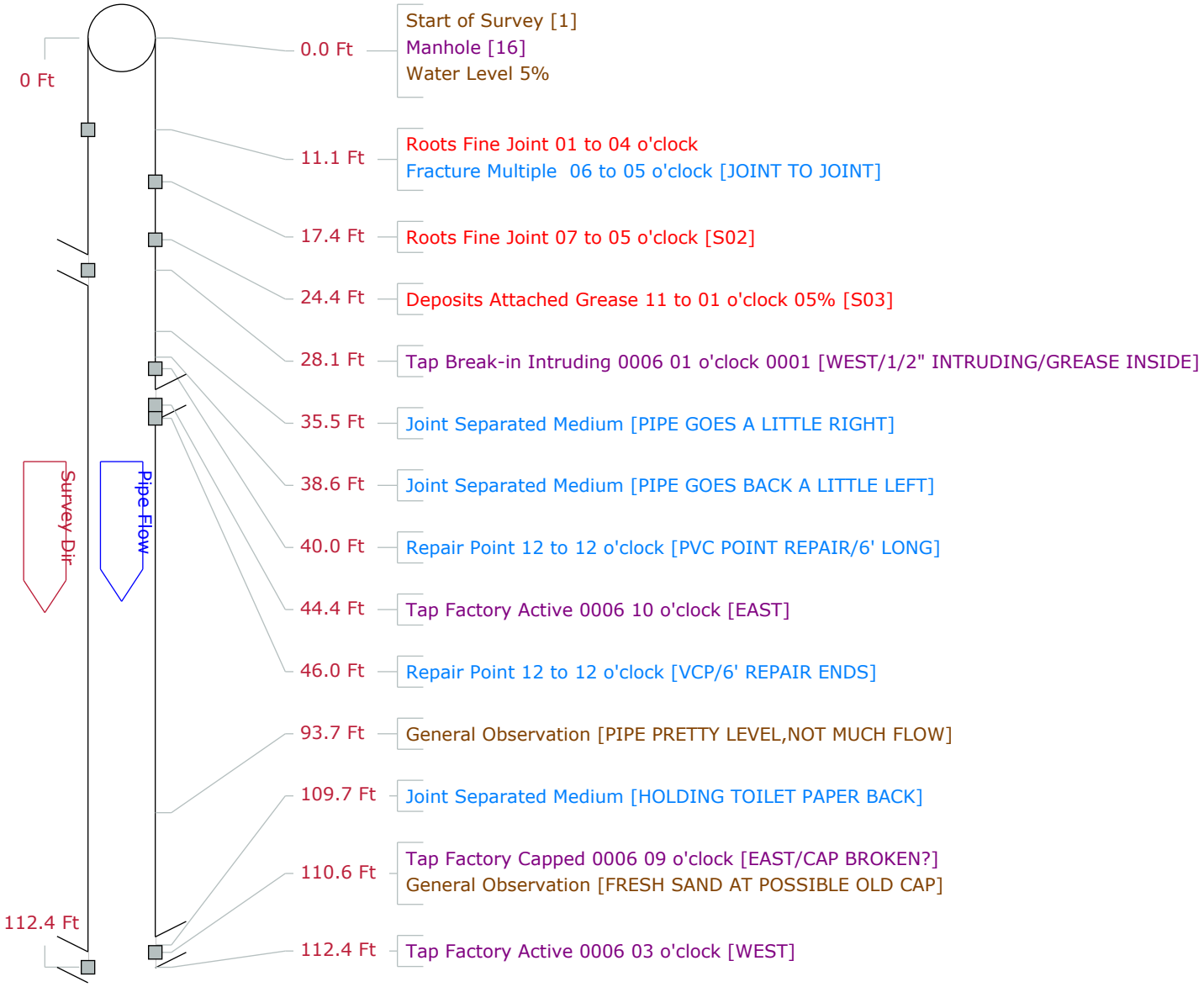
Additional info	MH-15 IS TOP END AT MICHIGAN,MH-16 AT LIBERTY &7TH	Structural	O&M Constructional
Location	Light Highway	Miscellaneous	Hydraulic

Scores

Structural:	Total	16	Mean Defect	2.3	Peak	5	Mean Pipe 0
Service:	Total	100	Mean Defect	1.4	Peak	5	Mean Pipe 0.3

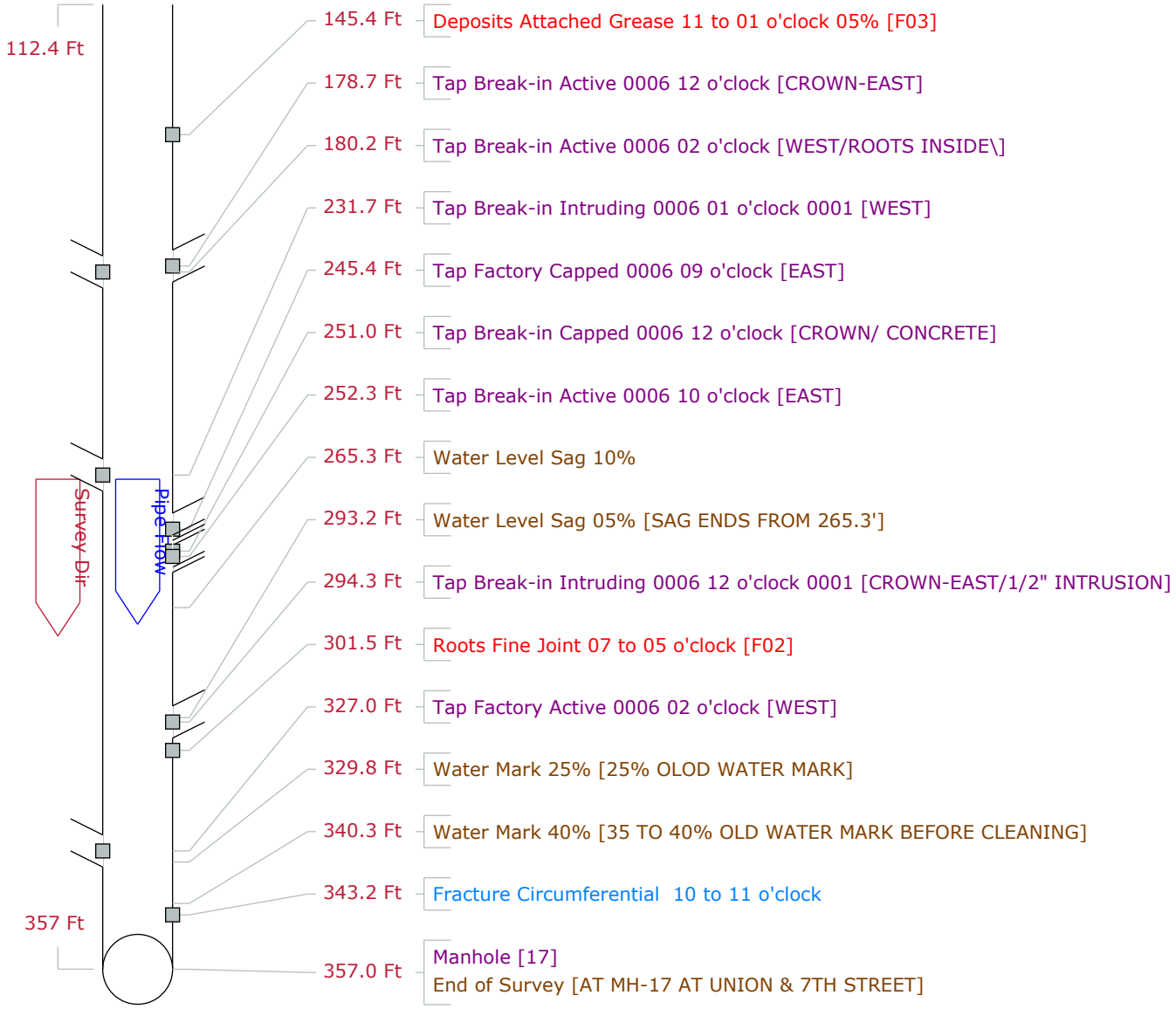
Pipe Graphic Report of PLR 16 A for CITY OF THREE RIVERS

Setup 14	Surveyor MRM	Certificate # U-107-4232	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/31	Time 12:17	Street SEVENTH STREET		
City THREE RIVERS	Further location details CAMERA HEADING SOUTH,AFTER POINT REPAIR				
Start 16	Rim to invert	Grade to invert	Rim to grade	Ft	
Finish 17	Rim to invert	Grade to invert	Rim to grade	Ft	
Use Sanitary	Direction Downstream	Flow control De-Watered using Jetter	Media No DVD-1		
Shape Circular	Height 8	Width ins	Preclean J	Year Cleaned	
Material Vitrified Clay Pipe	Joint length 3.0 Ft	Total length 357.0 Ft	Length Surveyed 357.00		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info MH-16 AT LIBERTY &7TH,MH-17 IS AT UNION & 7TH ST.		Structural O&M Constructional			
Location Light Highway		Miscellaneous Hydraulic			



Pipe Graphic Report of PLR 16 A for CITY OF THREE RIVERS

Setup 14	Surveyor MRM	Certificate # U-107-4232	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/31	Time 12:17	Street SEVENTH STREET		
City THREE RIVERS	Further location details CAMERA HEADING SOUTH,AFTER POINT REPAIR				
Start 16	Rim to invert	Grade to invert	Rim to grade	Ft	
Finish 17	Rim to invert	Grade to invert	Rim to grade	Ft	
Use Sanitary	Direction Downstream	Flow control De-Watered using Jetter	Media No DVD-1		
Shape Circular	Height 8	Width ins	Preclean J	Year Cleaned	
Material Vitrified Clay Pipe	Joint length 3.0 Ft	Total length 357.0 Ft	Length Surveyed 357.00		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info MH-16 AT LIBERTY &7TH,MH-17 IS AT UNION & 7TH ST.			Structural O&M Constructional		
Location Light Highway			Miscellaneous Hydraulic		



Tabular Report of PSR 16 A for CITY OF THREE RIVERS

Setup 14	Surveyor MRM	Certificate # U-107-4232	System Owner CITY OF THREE RIVERS		
Drainage	Survey Customer CITY OF THREE RIVERS				
P/O #	Date 2010/03/31	Time 12:17	Street SEVENTH STREET		
City THREE RIVERS	Further location details CAMERA HEADING SOUTH,AFTER POINT REPAIR				
Start 16	Rim to invert	Grade to invert	Rim to grade	Ft	
Finish 17	Rim to invert	Grade to invert	Rim to grade	Ft	
Use Sanitary	Direction Down	Flow control De-Watered using Jetter	Media No DVD-1		
Shape Circular	Height 8	Width ins	Preclean J	Year Cleaned	
Material Vitrified Clay Pipe	Joint length 3.00 Ft	Total length 357.0 Ft	Length Surveyed 357.0		
Lining	Year laid	Year rehabilitated	Weather Dry		
Purpose Capital Improvement Program Assessment	Cat				
Additional info MH-16 AT LIBERTY &7TH,MH-17 IS AT UNION & 7TH ST.	Structural	O&M	Constructional		
Location Light Highway	Miscellaneous	Hydraulic			

Count	Video	CD	Code		In1	In2	%	Jnt	Fr	To	ImRef	Remarks
0.0		1	ST	Start of Survey								
0.0			AMH	Manhole								16
0.0			MWL	Water Level			5					
11.1			RFJ	Roots Fine Joint				J	01	04		
11.1			FM	Fracture Multiple				J	06	05		JOINT TO JOINT
17.4		S02	RFJ	Roots Fine Joint				J	07	05		
24.4		S03	DAGS	Deposits Attached Grease			05	J	11	01		
28.1			TBI	Tap Break-in Intruding	06	01			01			WEST/1/2" INTRUDING/GREASE IN...
35.5			JSM	Joint Separated Medium								PIPE GOES A LITTLE RIGHT
38.6			JSM	Joint Separated Medium								PIPE GOES BACK A LITTLE LEFT
40.0			RPR	Repair Point				J	12	12		PVC POINT REPAIR/6' LONG
44.4			TFA	Tap Factory Active	06				10			EAST
46.0			RPR	Repair Point				J	12	12		VCP/6' REPAIR ENDS
93.7			MGO	General Observation								PIPE PRETTY LEVEL,NOT MUCH FL...
109.7			JSM	Joint Separated Medium								HOLDING TOILET PAPER BACK
110.6			TFC	Tap Factory Capped	06				09			EAST/CAP BROKEN?
110.6			MGO	General Observation								FRESH SAND AT POSSIBLE OLD CA...
112.4			TFA	Tap Factory Active	06				03			WEST
145.4		F03	DAGS	Deposits Attached Grease			05	J	11	01		
178.7			TBA	Tap Break-in Active	06				12			CROWN-EAST
180.2			TBA	Tap Break-in Active	06				02			WEST/ROOTS INSIDE\
231.7			TBI	Tap Break-in Intruding	06	01			01			WEST
245.4			TFC	Tap Factory Capped	06				09			EAST
251.0			TBC	Tap Break-in Capped	06				12			CROWN/ CONCRETE
252.3			TBA	Tap Break-in Active	06				10			EAST
265.3			MWLS	Water Level Sag			10					
293.2			MWLS	Water Level Sag			05					SAG ENDS FROM 265.3'
294.3			TBI	Tap Break-in Intruding	06	01			12			CROWN-EAST/1/2" INTRUSION
301.5		F02	RFJ	Roots Fine Joint				J	07	05		
327.0			TFA	Tap Factory Active	06				02			WEST
329.8			MWM	Water Mark			25					25% OLOD WATER MARK
340.3			MWM	Water Mark			40					35 TO 40% OLD WATER MARK BEFO
343.2			FC	Fracture Circumferential				J	10	11		
357.0			AMH	Manhole								17
357.0			FH	End of Survey								AT MH-17 AT UNION & 7TH STREE...

357.0 Ft Total Length Surveyed

Tabular Report of PSR 16 A for CITY OF THREE RIVERS

Setup	14	Surveyor	MRM	Certificate #	U-107-4232
System Owner	CITY OF THREE RIVERS				
Drainage		Survey Customer	CITY OF THREE RIVERS		
P/O #		Date	2010/03/31	Time	12:17
Street	SEVENTH STREET				
City	THREE RIVERS	Further location details	CAMERA HEADING SOUTH,AFTER POINT REPAIR		

Start	16	Rim to invert		Grade to invert		Rim to grade		Ft	
Finish	17	Rim to invert		Grade to invert		Rim to grade		Ft	
Use	Sanitary	Direction	Down	Flow control	De-Watered using Jetter	Media No	DVD-1		
Shape	Circular	Height	8	Width	ins	Preclean	J	Year Cleaned	
Material	Vitrified Clay Pipe	Joint length	3.00 Ft	Total length	357.0 Ft	Length Surveyed	357.0		
Lining		Year laid		Year rehabilitated		Weather	Dry		
Purpose	Capital Improvement Program Assessment			Cat					

Additional info	MH-16 AT LIBERTY &7TH,MH-17 IS AT UNION & 7TH ST.	Structural	O&M Constructional
Location	Light Highway	Miscellaneous	Hydraulic

Scores

Structural:	Total	9	Mean Defect	1.3	Peak	4	Mean Pipe 0
Service:	Total	133	Mean Defect	1.5	Peak	6	Mean Pipe 0.4