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PUBLIC NOTICE OF A COMMITTEE MEETING OF THE COMMON COUNCIL OF THE CITY OF WATERLOO

Pursuant to Section 19.84 Wisconsin Statutes, notice is hereby given to the public and to the news media, that the following meeting will be held:

COMMITTEE: FINANCE, INSURANCE & PERSONNEL COMMITTEE

DATE: Thursday, August 15, 2013 **TIME:** 6:30 p.m.

LOCATION: Council Chamber of the Municipal Building
136 N. Monroe Street

to consider the following:

1. CALL TO ORDER AND ROLL CALL
2. APPROVAL OF PREVIOUSLY UNAPPROVED MEETING MINUTES
3. CITIZEN INPUT
4. UNFINISHED BUSINESS
5. NEW BUSINESS
   a. Payroll For July, 2013 - $58,364.28 ***
   b. Pay Vouchers – July 19, 2013 through August 15, 2013 ***
   c. Treasurer's Report & Budget Reports For July 2013
   d. Sanitary Sewer Inflow & Infiltration Study
   e. Recommending To Council A Library Board Recommendation To Permit Sick Leave To Be Used To Acquire Health Insurance For A Retiring Employee Having Served Less Thank Fifteen Years -- Cecilia Wiltzius
   f. Snap Fitness Corporate Plan
6. FUTURE AGENDA ITEMS AND ANNOUNCEMENTS
7. ADJOURN

Mo Hansen
Clerk/Treasurer

[* See Council Packet]**

Committee Members: Springer, Quimby and Cotting

Posted, Emailed & Distributed: August 9, 2013

PLEASE NOTE: It is possible that members of and possibly a quorum of members of other governmental bodies of the municipality may be in attendance at the above meeting(s) to gather information. No action will be taken by any governmental body other than that specifically noticed. Also, upon reasonable notice, efforts will be made to accommodate the needs of disabled individuals through appropriate aids and services. For additional information or to request such services please contact the clerk's office at the above location.

Waterloo - Sanitary Sewer
Inflow/Infiltration Projects
Ranking by Groups

Group	Location	Sewer Repair Replacement Costs	GROUP Sewer Repair Replacement Costs	Infiltration Rate(gpd/in/mi)	GROUP Infiltration Rate(gpd/in/mi)	Rank	I/I Contribution (gpd)	Notes
1	STH 89 / East Madison Street	$200,322	$373,338	111,734	232,395	1	122,400	Grouped because of proximity.
1	Railroad Avenue	$116,850		66,040			66,040	
1	Pierce Street	$56,166		54,621			54,621	
2	Adams Street Railroad Crossing	$28,540	$101,010	86,561	181,099	2	70,560	Grouped because of ability to batch together for slip-line repair
2	Jackson Street Railroad Crossing	$46,490		65,295			65,295	
2	Jefferson Street Railroad Crossing	$25,980		29,243			29,243	
3	Mill Street (upstream /southern segment, MH 11 to MH 6	$99,730	$546,602	72,182	119,171	3	12,637	Grouped because of proximity.
3	Cleveland Street	$164,554		34,352			34,352	
3	Mill Street (downstream/northern segment, MH 6- WWTP)	$282,318		12,637			12,637	
4	West Madison Street	$34,529	$34,529	48,154	48,154	4	48,154	Incorporated into DOT 2017 Reconstruct
5	OTHER: Sealing Manhole Covers [qty. 20@ $500 per]	$10,000	$10,000			5		Coordination required between Dennis and DPW
	TOTALS	**$1,065,479**	**$1,065,479**	**580,819**	**580,819**		**515,939**	

Town & County estimates:
With implementation of the above a favorable outcome would be a 50% reduction in the I/I Contribution (gpd)
from these sources to the treatment plant [roughly an improvement from 515,393 gpd to 257,696 gpd.

I. Executive Summary

Waterloo Water and Light has requested an investigation of sanitary sewer system in the City of Waterloo. The City of Waterloo has had continual issues with inflow and infiltration (I/I). I/I is clear water which enters the sanitary system and is transported to the wastewater treatment plant.

Waterloo conveys wastewater to the treatment plant using a network of pipes and pumping stations. The City of Waterloo has many areas of old clay pipe which are susceptible to cracking, and therefore, are a large source of I/I.

Lift stations are used to pump wastewater from areas that cannot be serviced by gravity sewer. Waterloo operates six lift stations. Five of the lift stations are connected to the Utility's radio based SCADA system. These lift stations record pump run to times, which can then be used to calculate flow through the lift station. Problem areas found through lift station run to time analysis include the Streator lift station drainage area and the Portland lift station drainage area.

Problems occur when the I/I in a treatment system becomes so great that the hydraulic capacity of the wastewater treatment plant is compromised. The Waterloo wastewater treatment plant has an average hydraulic design capacity of 0.458 MGD, a maximum daily flow of 1.21 MGD, and a peak hydraulic design capacity of 2.34 MGD.

I/I can be quantified based on water use records and season evaluations of influent flow to the wastewater treatment plant. Wastewater influent flows can be divided into base flow, which is based on residential, commercial, and industrial water use, dry weather infiltration, which is the average wastewater influent flow during January, February, November, and December of each year, wet weather infiltration, which is the maximum weekly average influent flow, and inflow, which is the maximum daily flow in the treatment plant. The Waterloo wastewater treatment plant experiences a base flow of 0.253 MGD, a dry weather infiltration of 0.222 MGD, a wet weather infiltration of 0.669 MGD, and an inflow of 1.284 MGD.

Lift station runtime analysis, nighttime flow monitoring, and smoke testing were utilized to locate and quantify areas of significant I/I. Lift station analysis was used to isolate drainage areas that may have increases in flow during wet weather events. Nighttime flow monitoring was used to further isolate areas where significant I/I is being contributed. Smoke testing was used to located potential areas of inflow that may not be specifically located by lift station analysis or nighttime flow monitoring.

Areas of concern identified in the analyses described above include:

- State Highway 89/East Madison Street sanitary sewer
- Sanitary sewer railroad crossings at Adams, Jefferson, and Jackson Streets
- Mill and Cleveland Streets' sanitary sewer
- Railroad Avenue sanitary sewer
- Pierce Street sanitary sewer
- West Madison Street sanitary sewer
- The abandoned meat processing facility located in the industrial park near Industrial Drive
- 740 Railroad Avenue
- The Portland Sanitary District

These areas were found to contribute as much as 650,000 gallons per day of clearwater flow and should be addressed to minimize impact upon the City's wastewater treatment plant and future discharge limits that will be imposed by the Wisconsin Department of Natural Resources.

II. Introduction

The City of Waterloo's sanitary sewer system collects and conveys wastewater from residencies, commercial and industrial establishments, and public buildings and institutions to the wastewater treatment facilities. The wastewater discharged by users to the collection system also carries a portion of clear water, called inflow and infiltration (I/I). Infiltration is groundwater which enters the collection system, generally underground, through defective pipes or joints, defective connections, or manhole walls. Infiltration is usually more of a steady flow which varies throughout the year dependent on the season, level of soil saturation, groundwater levels, and physical integrity of the collection system. Inflow is defined as clear water which directly enters the collection system, which may include roof drains, area surface drains, manhole covers, cross connections or overflows between storm sewers and sanitary sewers, sump pumps, or other direct flow sources. The volume of inflow entering the collection system at any time is highly variable, but is generally proportional to the magnitude of any precipitation or snowmelt event.

I/I flow quantities create an additional demand on all facilities involved in wastewater collection and treatment. I/I occupies a portion of the hydraulic capacity of the collection system. When I/I entry to the collection system is greatest, detrimental conditions such as flooding and backups into buildings could occur when sewers are over capacity, potentially causing property damage and personal health risks. During extreme conditions, overflows from manholes and bypasses may allow sewage to overflow onto the ground or into rivers and drainage ways. There is an additional economic cost to pump, convey, and treat the extra volume of water if not kept under control. So, it is desirable to minimize inflow and infiltration into the collection system to the extent that is cost effective.

This I/I report is being prepared as an update to the City of Waterloo and the Waterloo Utilities as to the current status of the sanitary sewer collection system. The purpose of this report is to provide a summary of the data and findings observed during this study. This report contains the following major items:

- Provide a description of the existing system and documents the conditions that are known to exist based on discussions with maintenance staff
- Flow conditions and capacity experienced at plant
- Evaluation of lift station run data
- Summary and evaluation of data collected from nighttime flow monitoring
- Summary and evaluation of smoke testing data
- Evaluate repairs to the Mill and Cleveland Streets sanitary sewer drainage area
- Provide a summary of data, areas of concern, relative severity of the I/I, and cost effectiveness of repair

The proposals establishing scope of work for the I/I study can be found in Appendix A.

III. Collection and Treatment System

The City of Waterloo sanitary sewer system consists of a network of underground sewage conveyance pipelines and pumping facilities responsible for transporting (mostly by gravity) all of the wastewater produced within the City and regional areas to the treatment plant. The existing treatment plant, located next to the Maunesha River and Fireman's Park, provides advanced treatment of the wastewater to permitted standards before discharge to the Maunesha River. A map of Waterloo's sanitary sewage collection system facilities, which includes the service area breakout, is provided in Appendix B.

1. Sanitary Sewer System

   The sanitary sewer system in Waterloo is composed of clay pipe, slip lined clay pipe, and PVC pipe. Clay pipe commonly has problems with infiltration due to its susceptibility to cracking and collapse with age. Slip lining is sometimes used to remedy these problems, however is not an ideal solution. Manholes are installed between lengths of pipe to provide access for maintenance and cleaning. Waterloo has manholes made of brick, strong sealed brick, block, and precast concrete. Manholes can also be a significant source of infiltration, especially when made of brick or block where water can seep through the joints as mortar loosens with age. All manholes can prove to be a significant source of inflow when stormwater entry occurs through the top casting or adjustment rings.

   A good indicator of the condition of the sanitary sewer system is maintenance and sewer backup records. The map in Appendix B shows sewer maintenance and a list of sewer maintenance can be found in Appendix C. Areas which require regular maintenance include:

   - Lum Street
   - Dickenson Street
   - Edison Street
   - Pierce Street
   - Polk Street

2. Lift Stations

   Lift (or pumping) stations provide service to areas which cannot be serviced by gravity and the stations lift the wastewater to discharge at higher elevations so that flow can continue by gravity. Waterloo Water and Light currently maintains six lift stations which are listed in Table 3-1:

Table 3-1
Summary of Sewage Lift Stations

Lift Station	Location	Design Pumping Capacity (gpm)
West Madison (LS 1)	West Madison Street	350
Treyburn (LS 2)	Lexington Way	150
Streator Lane (LS 3)	Streator Lane	110
Portland SD (LS 4)	Portland Road	200
Fireman's Park	Fireman's Park	Single pump design
DeYoung (LS 5)	McKay Way	200

With the exception of the Fireman Park location, all the lift station locations are of the duplex submersible pump station design type and are connected to the Utilities radio based SCADA control system. The Fireman Park location is equipped with a single pump design and is seasonally used to serve the park concession and restroom facilities. There are no records of equipment run time or starts available for the Fireman Park station location.

The De Young station is the most recent addition to the collection system lift stations. Based on the new construction completed in 2008 and the limited connected users at this time, there was no further evaluation of this collection area.

3. Treatment Plant

Wastewater Treatment Plant Hydraulic Design

The wastewater treatment plant continuously measures and records the wastewater and clear water influent flow received from the sanitary sewer collection system. The plant is designed with hydraulic and treatment unit process design capacities that are selected to best promote the intended treatment of influent sanitary sewer waste flow. Although the influent waste strength also plays an important role in these considerations of capacity, the plant hydraulic capacity indicates what rates of flow though the plant can be provided with favorable plant treatment performance. The existing plant hydraulic design capacities are summarized in Table 3-2 as follows:

Table 3-2
WWTP Hydraulic Design Conditions

Hydraulic Design Parameter	Flow Rate (MGD)	Flow Rate (gpm)
Average Daily Flow	0.458	318
Maximum Daily Flow	1.212	871
Peak Daily Flow	2.34	1,621

Flow records presented in the following sections generally indicate that the treatment plant is approaching or operating beyond the intended hydraulic design conditions and would benefit from reductions of clear water flow. The following sections detail the standard methods used to identify and evaluate the portion of clear water flow estimated present within the sanitary sewer waste stream.

IV. Inflow and Infiltration Quantification

Water Use Records

The City of Waterloo water use records are used to establish an approximate value for a base flow to the wastewater treatment facility. The base flow generally reflects the water that is served to the user estimated to flow to the sanitary sewer. These base flows are evaluated for the years 2006 through 2009 and are based on water use billing records summarized in Table 4-1.

Table 4-1
Wastewater Base Flows (Residential, Commercial, Industrial, and Public Water Use)

Year	Estimated Population	Total Daily Water Consumption* (gpd)	Total Per Capita Use (gpcd)	Residential / Commercial Use (gpd)	Per Capita Residential / Commercial Use (gpcd)
2006	3,417	264,512	77.4	218,070	63.8
2007	3,470	258,665	74.5	220,825	63.6
2008	3,523	253,876	72.1	214,998	61.0
2009	3,569	236,119	66.2	205,142	57.5
Average	3,495	253,293	72.5	214,759	61.5

**Includes residential, commercial, public, and industrial.*

The historical values outlined in Table 4-1 are very typical values on water use for the size community and region of the country. The industrial use metered (included within the total water use) accounts for approximately 15% of the total water use. The base waste water flow rate is estimated to be 70 gallons per capita per day (gpcd) for continued flow evaluation.

Daily Infiltration Quantities

Infiltration is separated into dry weather and wet weather infiltration. Dry weather infiltration shall be defined as total wastewater flow observed at the treatment facility during period of minimum precipitation and snow melt minus the base flow. Wet weather infiltration is the total observed wastewater flow during periods of high ground water or saturated soil conditions with minimal concurrent precipitation minus the base flow. Typically, wet weather infiltration is evaluated over a 7 to 14 day time period to minimize the influence of rainfall or drainage (inflow) which may occur during to the evaluation period.

Dry weather infiltration is typically considered to occur during the months of January, February, November, and December each year. An average of these months is calculated for each year and Appendix E presents the supporting data. Based on the range of these values, an average of these annual conditions from 2006 to 2009 were used to estimate the dry weather flow (DWF) condition. The DWF condition is estimated to be 437,000 gpd.

Wet weather infiltration can be estimated by further evaluating the maximum weekly average flow conditions that occur each year. The maximum annual weekly average condition is calculated for each year and Appendix E presents the supporting data. The maximum seven day average flow of 2.324 MGD is found (in June, 2008). The Year 2008 event is considered to be an extreme wet flow condition when a total of 10 inches of rainfall occurred during that week of record. The remaining maximum weekly flow averages are more repeatable at lower levels. Based on this range, an average of annual conditions from 2006 to 2009, excluding Year 2008, were used to estimate the wet weather flow (WWF) condition. The WWF condition is estimated to be 884,000 gpd.

The estimated DWF and WWF flow conditions are used to further evaluate and compare against the EPA per capita day standards established for reasonable levels of infiltration. This comparison relies on the DWF and WWF conditions presented as the portion of flow found to be greater than the base flow as further detailed in Section 3.3.2.4. Both the dry and wet weather flow determinations are made in the following Table 4-2.

Table 4-2
Infiltration Determination

2006 to 2009 Data		
Dry Weather Infiltration (DWF)	=	DWF to Base Flow
	=	437,000 gpd – 214,759 gpd
	=	222,241 gpd
Per Capita Rate (DWF)	=	222,241 gpd ÷ 3,495 = 63.6 gpcd
	=	Use 70 gpcd
2005 to 2009 Data		
Wet Weather Infiltration (WWF)	=	Max Weekly Flow to Base Flow
	=	884,000 – 214,759 gpd
	=	669,241 gpd
Per Capita Rate	=	669,241 gpd ÷ 3,495 = 191.5 gpcd
	=	Use 200 gpcd

Daily Inflow Quantities

The maximum daily flow (MDF) on record will be evaluated to determine the maximum daily inflow conditions. To account for the infiltration flow present, the inflow portion of daily flow shall be maximum daily flow less the wet weather daily flow (WWF). The maximum daily flow on record for Years 2006 through 2009 was 3,523,700 gallons (June 9, 2008) which previously was considered an extreme weather event. The average of all years evaluated (2,168,000 gpd) would appear to be more representative of the expected conditions. So, by subtracting the WWF (884,000 gpd) from this flow, the inflow component of 1,284,000 gpd inflow is estimated. Using the average population of 3,495 persons of the time period, a per capita inflow rate of 367.0 gpcd is then calculated.

Infiltration and Inflow Evaluation

The infiltration and inflow rates established above will be evaluated to determine if they are excessive per the criteria established in the EPA manual "I/I Analysis and Project Certification". These criteria are summarized as follows:

Maximum Per Capita Flow (w/infiltration)		= 130 gpcd
Maximum Per Capita Peak Daily Flow (w/inflow)		= 275 gpcd
Existing Per Capita Flows (2005 to 2009)		
Base Wastewater Flow + Wet Weather Infiltration		= 70 + 200
		= 270 gpcd
Above + Inflow	= 270 + 367	= 637 gpcd

Based on comparison with EPA criteria, both infiltration and inflow appear to be problems in the collection system. The State of Wisconsin makes independent determination of acceptability, although the EPA guidelines are considered sound baseline for consideration, and thus could approve this condition as acceptable. However, the magnitude of the apparent issue is such that further analysis was completed to determine areas and scope of the specific issues in order to evaluate if rehabilitation or repair is economically viable at this time.

Unavoidable Infiltration and Inflow

A certain amount of I/I is unavoidable, even in new construction. 200 gallons per day per inch mile (gpd/in*mi) (an inch mile is defined as the length of pipe in miles multiplied by the diameter of the pipe) is used as a standard for allowable infiltration for construction of new sanitary sewers. Based upon the size of Waterloo's collection system, Waterloo has 31,500 gpd of unavoidable I/I.

V. Collection System Evaluation

A. Lift Station Evaluation

Each of the lift stations connected to the control system have the respective pump run times and starts automatically recorded on a daily basis. In addition, the respective local control systems continuously estimate a daily flow rate discharged from each respective station based on the monitoring of wet well levels and operating time of each pumping cycle. When these records are compared against rainfall and wet weather events, there can be useful indications of lift station collection areas that are significantly affected by infiltration and inflow. This data was used to further investigate and isolate areas of high I/I in the sanitary sewer system.

The duplex type pump station design intends that a single pump unit provide for the pumping capacity needed as indicated in Table 3-1. If there is flow to the station beyond pumping capacity of a single pump unit, the second pump unit then automatically activates and runs until such time the station pumps down and service can resume with a single pump unit alone, or all station pumps are shut off. The records of sustained time periods when both pump units are activated can indicate there is a problem at the station or there are times when there is more flow to the station than anticipated by design. When these time periods correlate closely to rainfall events, this would further suggests the additional flow to the station relates to increased infiltration and inflow flow that exceed the station peak pumping design.

A summary of the station both pumps on condition run time are presented in Appendix D. Evaluation of the both pumps running condition is summarized as follows:

- In 2007 and 2008 at the West Madison station, there are extended time periods when both pumps were required to operate. Modifications to this station and discharge force main were completed in 2008 and the need for both pumps to operate has been corrected. Subsequently, there is no pronounced impact of rainfall events on this station.
- The Treyburn station has not been impacted by rainfall conditions.
- The Streator station had some corrective work completed in 2008 and has not been impacted by rainfall conditions.
- The Portland SD station appears to be impacted by rainfall conditions. This is seen with rainfall events periodically.

Whereas run time conditions recorded can simply indicate a problem at the station, the estimated daily flow from each station can also be used to further clarify the flow conditions that occur during rainfall events. Under these

circumstances, there may be an increase of flow to the station that a single pump unit can handle. A summary of the station flow weekly average flow conditions and total rainfall are presented in Appendix D. Evaluation of these flow conditions is summarized as follows:

- In 2008 at the West Madison station, the Briess Malting Company had connected and increased flow to the station. Comparison of the daily flow totals at the connected industries (Van Holten and Briess) would suggest the station estimates of flow were reported lower than occurred. The evaluation of changes in flow attributed to rainfall events does not indicate any impact.
- The Treyburn Station has not been impacted by rainfall conditions. However, recent increases of flow to the station, since April of 2010 warrant additional checking of the collection area. There appears to be a 5,000 gallons per day (gpd) increase since April of 2010. Additional review of data from 2012 and 2013 confirm that the Treyburn Lift Station is not greatly impacted by rain events. The minor magnitude of flow increase in 2010 prohibits effective flow monitoring during nighttime hours. This area should be targeted for televising to locate potential issues.
- The Streator station appears to be impacted by rainfall conditions. Periodic increases of 5,000 to 10,000 gpd can be observed during increases of rainfall. Additional review of data from 2012 and 2013 confirms the impact of wet weather on the Streator Lift Station. Nighttime flow monitoring and smoke testing were unable to identify any sources of I/I. This area should be monitored for potential sump pump connections. Repair or replacement of sanitary sewer should be performed if any major utility projects are undertaken.
- The Portland Sanitary District Lift Station appears to be heavily impacted by wet weather events. Data from 2008 through 2010 indicates from increases between 15,000 and 20,000 (approximately 100% increase) gallons per day. More recent data from spring of 2013 shows that flows from the Portland Sanitary District increased from nearly 15,000 gallons per day to nearly 140,000 gallons per day, an increase of almost 1,000%. Because the Portland Sanitary District is a separate entity of the Waterloo Utilities, they are charged based upon wastewater flow to the Waterloo WWTP. High flow events, such as what occurred in 2013, result in excessive wastewater changes. The Portland Sanitary District should evaluate their clearwater issues to alleviate I/I issues for the City as well as reduce unnecessary changes due to high flows.

Based on the evaluation of run time and flow conditions record by the control system, it is apparent that the Treyburn, Streator and Portland SD lift station collection areas should be evaluated further for inflow and infiltration observed during rainfall events.

B. Nighttime Flow Monitoring

Spot flow monitoring during the nighttime hours was utilized in an attempt to determine areas of relatively high I/I and to eliminate areas from future I/I investigation. Nighttime flow monitoring is used to quantify the clean water entering the system because residential and industrial usage is greatly reduced during nighttime hours. Monitoring was performed through the night and early morning hours of July 23 to 24, 2010, July 27 to 28, 2010, and April 10 to 11, 2013. These were periods following large rain events. The average daily flow at the treatment plant during this monitoring was 1.426 million gpd, 0.812 million gpd, and 1.155 million gpd, respectively. The actual flow over the monitoring periods, which was during the nighttime (12 a.m. to 5 a.m.), were 824 gallons per minute (1.186 million gpd), 450 gallons per minute (0.648 million gpd), and 844 gallons per minute (1.215 million gpd), respectively.

The flow in selected manholes throughout the City was measured using an ISCO Model 2150 Area Velocity Flow Module and Sensor. A portable laptop computer provided real to time indication of depth and velocity of flow used to calculate the flow rate.

The data collected during the nighttime flow monitoring were divided into large drainage basins. Flow balances were created to quantify the water entering the sanitary sewer system for discrete areas within each drainage basin. Summaries of the data collected during the nighttime flow monitoring sessions are described below.

<u>July, 2010 Findings</u>

1. Industrial Park and Portland Sanitary District

   Another separate section of sanitary sewer drains directly into the wastewater treatment plant, collecting the Industrial Park and the discharge from the Portland Sanitary District lift station. This sanitary sewer is newer near the Industrial Drive area, however is known to have low spots along Commercial Avenue. The sewer passes through a commercial building area, agriculture use land and under a drainage ditch before entering the wastewater treatment plant.

   Flow monitoring was performed during the July 23 to 24 monitoring period. A flow rate of 63 to 67 gallons per minute was measured at the wastewater treatment plant manhole coming from the Industrial Park. The manhole itself leaked at a rate estimated between 5 and 10 gallons per minute. A flow rate of 16 gallons per minute was measured at the end of Industrial Lane in the Industrial Park. The Portland Sanitary District lift station flows increased by approximately 100% during the monitoring period. Because of this increase in flow during this monitoring period, excessive pumping from the lift station may have skewed the

measurements at the wastewater treatment plant as compared with the manhole on Industrial Drive.

Flow balances revealed an increase of 47 to 51 gallons per minute between the manhole at the wastewater treatment plant and Manhole 70 on Industrial Lane, although this may have been skewed by the Portland Lift Station.

The remainder of the sanitary sewer system drains to a 21-inch PVC interceptor sewer which follows Hendricks Street. The interceptor sewer collects from Madison Street east of Hendricks Street and Madison Street West of Hendricks Street. For the remainder of this report Eastern Madison Street will refer to the sanitary sewer collection system east of Hendricks Street and Western Madison Street will refer to the sanitary sewer collection system west of Hendricks Street, regardless of street names.

2. Mill Street and Cleveland Street

Mill Street and Cleveland Street sanitary sewer systems drain directly into the wastewater treatment plant, servicing an older neighborhood. The furthest upstream portion of the Mill Street sewer system has been slip lined according records maintained by the City. An inverted siphon is located on Cleveland Street, passing under a drainage ditch.

Flow monitoring was performed early during the July 23 to 24 monitoring period, while the treatment plant flow was near 860 gallons per minute. A flow rate of 94 gallons per minute was measured entering the treatment plant in manhole (Manhole) 4 from this drainage area. Flow was measured at the convergence of Cleveland Street onto Mill Street in Manhole 6, with 20 to 28 gallons per minute from Cleveland Street and 45 gallons per minute upstream from Mill Street. Because of low velocity and possible backflow from Cleveland Street up Mill Street, the Mill Street measurement could be inaccurate. The 24 to 29 gallons per minute rate was measured upstream of the inverted siphon on Cleveland Street in Manhole 8.

Flow balances between each of the manholes revealed an increase of 21 to 29 gallons per minute between Manhole 6 and the wastewater treatment plant, an increase of 45 gallons per minute upstream of Manhole 6 on Mill Street, an increase of 0 to 9 gallons per minute between Manhole 6 and Manhole 8 on Cleveland Street, and an increase of 24 to 29 gallons per minute upstream of Manhole 8 on Cleveland Street.

3. Eastern Madison Street

The Eastern Madison sanitary sewer drains Rood Avenue, eastern Pierce Street, Railroad Avenue, Gregor Street, Grove Street and State Trunk Highway 19 and 87, Hickory Lane, and Maple Drive and associated drainage area (Oak Hill Subdivision). Nighttime flow monitoring was performed in this area during the July 23 to 24, 2010 flow monitoring period. A portion of State Trunk Highway NM and eastern Pierce Street and East Madison Street between Grove Street and Maple Drive have been televised. The Eastern Madison drainage area was further subdivided for nighttime flow monitoring. The divisions included the Oak Hill subdivision, Hickory Lane, Grove Street and State Trunk Highway 89, Railroad Avenue, and Rood Avenue and eastern Pierce Street.

Flow was unable to be measured at the corner of Maple Dr. and Oak Street in Manhole 48, on Grove Street in Manhole 30, and at the corner of Hickory Lane and East Madison Street in Manhole 43. Flow was estimated to be between 5 and 10 gallons per minute at Maple Drive and Grove Street, but was unable to be estimated at Hickory Lane (due to low velocity). A flow rate of 91 to 99 gallons per minute was measured from East Madison Street (including Grove Street, Hickory Lane, and the Oak Hill Subdivision) at the corner of Railroad Avenue and East Madison Street in Manhole 26. Flow was not measured coming from Railroad Avenue at this point because the sanitary sewer dropped into the manhole (flow measurement with the ISCO flow meter will not work in this situation). Flow was measured in Manhole 27 on Railroad Avenue to be 23 gallons per minute. An additional flow entered the manhole through a 4-inch pipe from the trailer park to the west of Railroad Avenue but was not able to be measured.

No flow measurement was able to be obtained from Rood Avenue in Manhole 16 during the flow monitoring period. Rood Avenue is known to have a problem with storm sewer backups which flood the roadway and cover sanitary sewer manholes. The abandoned shoe factory on eastern Pierce Street, which flows into Rood Avenue, is suspect of having roof drains connected to the sanitary sewer system. A flow rate of 152 gallons per minute was measured in Manhole 14 at the corner of Madison Street and Hendricks Street from East Madison Street.

Flow balances revealed an estimated increase in flow of 71 to 89 gallons per minute (assuming 5 to 10 gallon per minute contribution from Grove Street and Maple Drive) between Manhole 26 on East Madison Street and Manhole 48 on Maple Drive, including Hickory Lane. Railroad Avenue was found to contribute 23 gallons per minute upstream of Manhole 27, with a significant (but immeasurable) contribution from the trailer park to the west.

4. Western Madison Street to the West Madison Lift Station

   The Western Madison Street sanitary sewer provides collection to the remainder of Waterloo which includes the area south of Madison Street and west of Hendricks Street and north of Madison Street, draining into North Monroe Street. The area to the south of Madison Street is residential. Flow monitoring was performed on West Madison Street, downstream of the West Madison Lift Station, and in the area to the south of Madison Street and west of Hendricks Street during the July 27 to 28monitoring period.

   A flow rate of 38 to 42 gallons per minute was measured at the corner of West Madison Street and Jackson Street in Manhole 39 from upstream West Madison Street (toward the lift station) while the West Madison Lift Station was not operating. Due to a large buildup of grit, flow was unable to be measured from Jackson Street. A flow measurement of 77 to 85 gallons per minute was measured upstream at Manhole 51 on the corner of Jackson Street and Taylor Street. A flow rate of 32 gallons per minute was measured upstream of the railroad tracks on Jackson Street in Manhole 76. Due to shallow flow depth, no flow rate was measured in Manhole 53 on Washington Street, which collects from parts of Pierce Street, East Polk Street, South Monroe Street, Knowlton Street, and the DeYoung lift station. A flow rate of 12 to 15 gallons per minute was measured at Manhole 16 and a flow rate of less than 5 gallons per minute was estimated at Manhole 19 on Jefferson Street. A flow rate of 59 to 65 gallons per minute was measured at Manhole 25 and a flow rate of less than 10 gallons per minute was estimated at Manhole 26 on Adams Street.

   Flow balances revealed an estimated increase of 38 to 42 gallons per minute between Manhole 39 and the discharge of the West Madison lift station, 45 to 53 gallons per minute under the railroad tracks, between Manhole 51 and Manhole 76 on Jackson Street, 12 to 15 gallons per minute between under the railroad tracks between Manhole 16 and Manhole 19 on Jefferson Street, and 49 to 55 gallons per minute under the railroad tracks between Manhole 25 and 27 on Adams Street.

5. West Madison Lift Station Drainage Area

   The West Madison Street Lift Station collects West Madison Street including Breiss Malting Company, Van Holten's Pickling Company, and Trek Bicycle, Canal Road, part of Minnetonka Way, Mohawk Court, and part of Indian Hills Drive. Flow monitoring was performed during the July 27 to 28 monitoring period.

   Flow was unable to be measured from either Minnetonka Way in Manhole 32, which drains Mohawk Court and Indian Hills, or West Madison Street in Manhole 21, which drains Breiss, Trek, Van Holten's, and Canal Road, due to low flow. This area is not considered to have excessive flows due to I/I.

6. Streator Lane Lift Station Drainage Area

   The Streator Lane Lift Station drains Riverside Drive and part of Bradford Drive. The Flow monitoring was performed during the July 27 to 28 monitoring period.

   Typically, the Streator Lane Lift Station will have a noticeable increase in starts per day following rain events. During the monitoring period, no data was collected because of low flow rates which were unable to be measured. Continued monitoring during wet weather is recommended.

7. West Dickenson Street Drainage Area

   The sanitary sewer at West Dickenson Street drains Edison Street, West Porter Street, Crestview Drive, Hiawatha Trail, Minnehaha Lane, the Streator Lane Lift Station Force Main and parts of Minnetonka Way, Indian Hills Drive, and Bradford Drive.

   Flow monitoring was performed during the July 27 to 28 monitoring period. Although flow monitoring was performed, data was found to be inaccurate due to discrepancies in flow readings. This area will require additional study.

April, 2013 Findings

Additional nighttime flow monitoring was performed after a rain event in April of 2013. Rainfall during preceding week total 3.5 inches over a 5 day period, resulting in a large increase in influent flow to the WWTP. This flow monitoring period was used to isolate areas of large I/I that had previously identified in the July, 2010 nighttime flow monitoring and smoke testing performed in 2011 (discussed in the proceeding section).

1. Industrial Park and Portland Sanitary District

   Additional flow monitoring was performed in this drainage basin as confirmation that a reduction in flow had occurred as the result of the lateral from the abandoned meat processing facility being plugged. Further discussion of the findings at the meat processing facility can be found in the smoke testing chapter of this report.

   Flow was measured at Manhole 2 at the WWTP, Manhole 70 at the end of Industrial Drive, and Manhole 72 which is located up the hill on Industrial Drive. A flow rate of 49 gallons per minute was measured in Manhole 2 at the WWTP. Flow readings at Manhole 70 and 72 became increasingly variable as the pump station was cycling pumps quite rapidly. It was thought that a large majority of the flow experienced at the WWTP was the result of the Portland Sanitary District's force main discharge into this section of sanitary sewer.

2. Mill and Cleveland Street

   Mill and Cleveland Street had been identified as a problem area during the 2010 flow monitoring events and was targeted for further investigation to try to isolate areas contributing significant I/I.

   Flow was measured at Manhole 6 at the intersection of Mill and Cleveland Streets, at Manhole 8 on Cleveland Street, and at Manhole 2 at the northern end of Mill Street. Flow balances showed approximately 30 gallons per minute was contributed on Mill Street south of the Mill and Cleveland intersection and 15 gallons per minute on Cleveland Street between the drainage ditch and Hendricks Street. Total flow from this drainage area measured at Manhole 2 was 65 gallons per minute.

3. Eastern Madison Street

   The 2010 nighttime flow monitoring investigations indicated a large increase in flow on Highway 89/East Madison Street. The nighttime flow monitoring in 2013 attempted to further isolate this I/I.

   Flow was measured at Manhole 26 at Railroad Avenue and State Trunk Highway 89, Manhole 43 at Hickory Lane and Highway 89, Manhole 41 on State Trunk Highway 89, Manhole 30 on Grove Street, and Manhole 31 at Grove Street and Portland Road. Flow measurements showed 135 gallons per minute entering Manhole 26 from the east, 30 gallons per minute entering Manhole 41 and an estimated 15 – 20 gallons per minute entering Manhole 30 (estimated as flow could not be measured). Additionally approximately 5 gallons per minute was entering Manhole 41 from a residential lateral. Flow balance indicates approximately 85 gallons per minute of I/I is contributed near the intersection of Grove Street and Highway 89 between Manholes 26 and 41 on State Trunk Highway 89 and up to Manhole 30 on Grove Street.

   Manhole 26 also had a significant flow entering from Railroad Avenue. Flow was not able to be measured from Railroad Avenue as the sewer entered the manhole with an outside drop. Investigation in Manhole 27 upstream on Railroad Avenue showed approximately 20 gallons per minute from the upstream segment of sewer and a large flow trailer park lateral. The trailer park flow was not able to be measured but was estimated to be between 15 and 20 gallons per minute.

4. Pierce Street

   Visual inspection was performed in Manholes 78 and 19 on Pierce Street. This was done to evaluate impacts by the commercial building on the southeast end of Pierce Street (known locally as the "old shoe factory". These visual inspections showed a steady flow of approximately 5 gallons per minute at the commercial building's lateral at Manhole 78 and a larger flow of

approximately 10 gallons per minute at Manhole 19. This area was identified during the smoke testing performed in 2011.

In general, the most significant nighttime flow monitoring observations are summarized as follows:

1. Industrial Park: The July, 2010 flow monitoring found a significant amount of I/I was potentially contributed by this area. Subsequent smoke testing found a direct connection to the abandoned meat processing facility that was an obvious source of inflow. This source was plugged following that finding. The April, 2013 flow monitoring found a significant quantity of I/I was generated by the Portland Sanitary District. This was summarized in the Lift Station Evaluation portion of this report. Discussions should be held with the Portland Sanitary District regarding their collection system and I/I.

2. Mill and Cleveland Street: Flow from this area was estimated to be near 95 gallons per minute during the July, 2010 monitoring period and 65 gallons per minute during the April, 2013 monitoring period. The largest amounts of the I/I in this area were associated with the southern section of sewer on Mill Street between Madison Street and Cleveland Street and with the upstream portion of Cleveland Street. The age of this infrastructure as well as the large quantity of I/I associated with this drainage area also raises concern with leaking laterals as a source of I/I. This entire drainage area should be reviewed for repair and/or replacement of the sanitary sewer and laterals.

3. Eastern Madison Street: This area includes the sanitary sewer on State Trunk Highway 89 between Railroad Avenue and Manhole 41 and Grove Street. Flow from this area was estimated to be 85 gallons per minute during the April, 2013 flow monitoring period. Additionally, City records indicated low spots in the sanitary sewer between Manhole 41 and Maple Drive on State Trunk Highway 89. This entire area should be evaluated for replacement.

4. Railroad Avenue: Flow from the Railroad Avenue sanitary sewer was estimated to be 35 to 45 gallons per minute at Manhole 27, located at the approximate halfway point of the sanitary sewer. Flow into the sanitary sewer on State Trunk Highway 89 appeared to be greater than that found in Manhole 27. This sanitary sewer should be evaluated for repairs. Additionally a large amount of I/I was found coming from the collection system of the adjacent trailer park. Smoke testing in 2011 located potential issues in this area and corrective action was reported, however April 2013 flow monitoring indicate this is still a significant source of I/I.

5. Western Madison Street: A flow increase of 40 gallons per minute was estimated to be contributed from the sanitary sewer between the discharge of the West Madison Lift Station and Manhole 39 located at the intersection of Jackson Street and Madison Street. This area should be evaluated for repair or replacement.

6. Railroad Crossings: Significant I/I was found where the sanitary sewer crosses under the railroad on Jackson Street, Jefferson Street, and Adams Street. I/I flow was estimated to be 50, 15, and 50 gallons per minute for each of these crossings, respectively. Because these are railroad crossings complete replacement of these sewers would be costly. It is recommended to evaluate repair of these sewers.

7. Pierce Street: Although flow was not able to be quantified on Pierce Street, there appeared to be a significant amount of I/I contributed in the most upstream segment. This area also appears to have a secondary sewer connection with unknown source. It is recommended that this area be televised to determine whether the sewer should be repaired or replaced. Additional consideration for replacement of this sewer should include relocating the existing lateral for 740 Railroad Avenue to storm sewer as discussed in the smoke testing section of this report.

Table 5-1 summarizes the findings of the nighttime flow monitoring. Additionally Table 5-1 provides a relative severity of I/I for each section of sewer by calculating the infiltration rate for the sanitary sewers and the relative I/I benefit for money spent in repair or replacement. Infiltration rate calculates the gallons per day per mile of sewer per inch diameter of sewer pipe, similar to the calculations performed at the end of Chapter 3 (unavoidable I/I). The costs listed in this table summarize sewer repairs or replacement costs and are not to be considered budgetary numbers for complete replacement of the street and all utilities. It should be noted that most of these sections of sanitary sewer contribute more I/I than allowable if the entire collection system were new. A map summarizing this data is located in Appendix I.

Table 5-1
I/I Assessment

Location	Sewer Repair/ Replacement Cost	Size (in)	Length (ft)	I/I Contribution (gpd)	Infiltration Rate (gpd/in/mi)	I/I Cost ($/gallon)
State Highway 89/East Madison Street	$200,000	8	723	122,400	111,734	$1.64
Adams Street Railroad Crossing	$28,540	8	538	70,560	86,561	$0.40
Mill Street (upstream/southern segment, Manhole 11 to Manhole 6)	$99,730	12	395	64,800	72,182	$1.54
Railroad Avenue	$116,850	8	331	33,120	66,040	$3.53
Jackson Street Railroad Crossing	$46,490	10	524	64,800	65,295	$0.72
Pierce Street	$56,166	8	174	14,400	54,621	$3.90
Western Madison Street	$34,529	8	750	54,720	48,154	$0.63
Cleveland Street	$164,554	8	913	47,520	34,352	$3.46
Jefferson Street Railroad Crossing	$25,980	8	390	17,280	29,243	$1.50
Mill Street (downstream/northern segment, Manhole 6 to WWTP)	$282,318	12	1,454	41,760	12,637	$6.76

C. Smoke Testing

Smoke testing can be utilized to identify potential sources of inflow to the wastewater collection system. A highly visible, nontoxic smoke is introduced into a manhole using a blower to pressurize and force the smoke into the collection system. The smoke flows through the adjoining sewer pipes and exits through any openings that are present. Typically smoke is seen exiting on rooftops through properly functioning building sewer vents; however other sources of smoke may become evident and can provide points of entry of surface water into the collection system, such as roof downspouts, yard drains, broken pipes, or cross connections to storm sewers. Limitations of smoke testing include poor coverage due to sags or structural damage in pipes that the smoke cannot penetrate. Additionally smoke testing typically does not locate infiltration in pipes, such as through cracks and flaws in sanitary sewer where groundwater enters.

Smoke testing was performed in Waterloo during August of 2011. Smoke testing focused on areas that had previously been identified as problem areas through nighttime flow monitoring or prior knowledge of the collection system. Smoke testing areas include Railroad Avenue and Pierce Street, downtown, Rood Avenue, the Streator Lift Station, Fireman's Park, and the abandoned meat processing facility at the end of Industrial Drive.

The smoke testing performed in Waterloo identified two major areas of potential inflow. The areas that were identified to be of concern are as follows:

1. The commercial building at the intersection of Pierce Street and Railroad Avenue (old shoe factory) had large amounts of smoke found interior to the structure. Smoke was found in the basement emanating from floor drains and cracks in the floor and from abandoned roof drains in the attic that were remnants of an old flat roof that the building used to have. The structure has two laterals, one discharging to the sewer on Pierce Street and one discharging to the sewer on Railroad Avenue. It is thought that the discharge to the sewer on Pierce Street is not connected to any sanitary drains and could be routed to storm sewer nearby. This should be confirmed by the City prior to disconnection from the sanitary sewer.

2. Smoke was found discharging from several floor drains and bathrooms throughout the abandoned meat processing facility. Because of a leaky room, many areas of the complex are exposed to rain water and these interior drains could be a source of significant infiltration. Additionally smoke was found discharging from a large holding tank/grease trap. The tank has partially collapsed and the pipe that passes alongside of it is broke. This area looks to drain a large portion of the site and could be the source of significant inflow. Following the smoke testing, the lateral for this facility was plugged to prevent further inflow.

A summary of all smoke testing observations and pictures can be found in Appendix F.

D. Mill and Cleveland Street Investigation

Mill and Cleveland Streets were identified in the July, 2010 nighttime flow monitoring to have a large quantity of I/I with a relatively small area served. Additionally this section of sewer is primarily composed of old clay tile pipe and brick or block manholes. As such, it was decided to perform a more detailed study of the feasibility of replacement of this section of sanitary sewer.

The sewer on Mill Street used to serve as the main interceptor to the WWTP prior to installation of a new 21-inch PVC sewer on Hendricks Street. After the installation of the new interceptor sewer on Hendricks Street the Mill Street sewer was disconnected from the interceptor sewer located on Madison Street and used only for sewage conveyance of local residences. The sewer on Mill Street is composed of approximately 1,800 feet of 12-inch clay sewer with 8 brick and block manholes.

The sewer on Cleveland Street is of a similar vintage to that on Mill Street, with approximately 830 feet of 8-inch clay sewer and 3 brick and block manholes. The sewer on Cleveland Street also includes an inverted siphon used for a creek crossing.

Records indicated that the furthest upstream portion of Mill Street (between Manhole 11 and Manhole 6) has been previously slip lined. Sewer televising was performed in 2011. Sewer televising tapes indicate the slip lined section of sanitary sewer includes a significant belly in the pipeline, resulting in sections of the pipe being completely full of water at all times. Additional sewer televising of the downstream sections of Mill Street indicate significant cracking of the clay pipe, offset joints, root intrusion, and intruding lateral connections.

Survey was completed to evaluate replacement of the sanitary sewer on Mill and Cleveland Street to correct structural and I/I related issues with the sanitary sewer. The layout was modified to reduce the depth of the sewer at the intersection of Mill and Cleveland Street where the invert was over 16' deep.

A preliminary layout was completed in an attempt to reduce the overall depth of the sanitary sewer in this area so as to minimize impact outside of the road right-of-way. The new layout directs flow from southern Mill Street sewer toward the south into the Madison Street interceptor (instead of North directly to the WWTP; while the remainder of the wastewater flow on Mill Street would continue to flow to the north, directly to the WWTP. The Cleveland Street sewer located east of the stream would be redirected to flow toward Hendricks Street (instead of under the stream toward Mill Street). A small grinder pump station would need to be

installed west of the stream on Cleveland Street to serve the two houses located west of the stream which are connected to the Cleveland Street sewer. The preliminary sewer layout for the Mill and Cleveland sanitary sewers can be found in Appendix G.

Cost estimates were developed for replacement of each section of the sanitary sewer within this drainage area. The cost estimates were developed assuming complete replacement of the sanitary sewer, water main, streets, curb and gutter, and sidewalks. No new curb and gutter or sidewalks were included. An additional estimate was performed assuming the sanitary sewer and water main were replaced on Cleveland Street with only patching of the existing pavement. A summary of these estimates can be seen in Table 5-2. A full breakout of the estimates is located in Appendix H.

Table 5-2
Mill and Cleveland Evaluation Cost Summary

	Sewer	Water	Street	Total
South Mill (Manhole 11 – Manhole 6)	$92,730	$91,963	$73,724	$258,416
North Mill (Manhole 6 – Manhole 2)	$158,787	$150,776	$148,460	$458,023
Mill Interceptor (Manhole 2 - WWTP)	$77,667			$77,667
Cleveland	$135,524	$115,880	$124,502	$375,905
Cleveland w/o full street	*$164,554*	*$115,880*		*$280,434*
Total	$464,707	$358,619	$346,685	**$1,170,011**
w/o full street on Cleveland	*$493,737*	*$358,619*	*$222,184*	*$1,074,539*

Additional consideration should be given to replacement of sanitary laterals outside of the City right-of-way on this collection system. Given the consideration of the age of this neighborhood it is likely that a significant quantity of I/I could be associated with leaky laterals. Repair to the sanitary sewer main may not be sufficient to completely reduce I/I in this area.

VI. Conclusions and Recommendations

A. General Findings

The collection system in Waterloo experiences large amounts of inflow and infiltration. In the period from 2008 through present the Waterloo Wastewater Treatment Plant has exceeded its monthly design flow of 0.458 million gallons per day 23 times. Flows at the WWTP regularly exceed 0.6-0.7 million gallons per day during wet conditions in the spring and summer. Several areas of the collection system were found to be a significant contribution of I/I; contributing as much as 370 gallons per minute or 532,000 gallons per day of clearwater flow. In addition to the City's collection system, the Portland Sanitary District contributes up to 120,000 gallons per day of I/I during wet weather events. In addition, the City's sump pump ordinance should be continuously enforced, as this can be a significant source of inflow.

B. Recommendations for High Contributing Areas

1. **State Highway 89/East Madison Street Sewer**, from Railroad Avenue (Manhole 26) to Manhole 41, should be considered for complete replacement to address an extreme quantity of I/I being contributed in this segment. Additionally the sanitary sewer upstream of this segment is recorded to have issues with low velocity due to inadequate grades and/or bellies in the sewer. Strong consideration should be given to replacing this entire section of sanitary sewer, including laterals, to correct deficiencies.

2. **Railroad Crossings** on Adams, Jefferson, and Jackson Streets should be considered for lining or repair. The crossings on Adams and Jackson Streets were found to have significant I/I contributions that need to be addressed. These segments are good candidates for lining as they likely have limited laterals in the vicinity of the crossing. Additionally, replacement of sewers under railroads is typically costly as installations typically require jack and bore, which requires a casing to be bored under the railroad. This type of construction will allow installation to grade. Also, many times the railroad requires a casing pipe.

3. **Mill and Cleveland Streets' Sewer** should be considered for complete replacement. Although segments of Mill and Cleveland Street have lower infiltration rates than other segments identified, this entire drainage area contributes over 25% of the identified I/I. Additional consideration should be

given to repair of the private portion of the residential laterals and investigation for foundation drains. Considering the age of this neighborhood and sanitary sewer it is likely that a significant portion of the I/I is contributed from laterals and/or foundation drains.

4. **Railroad Avenue Sewer** should be considered for complete replacement. This small, dead end segment of sewer was found to have significant I/I contributions, and likely has more contribution that was not able to be quantified in the downstream segment. Additional investigation should also be performed in the adjacent trailer park. Although it was not able to be quantified, the lateral from this area was found to contribute a significant flow to the Railroad Avenue sanitary sewer.

5. **Pierce Street Sewer,** from Central Avenue to Manhole 78, should be considered for replacement in conjunction with rerouting the lateral from 740 Railroad Avenue. This section of sewer should be televised to determine whether sewer in this segment is required and whether the secondary sewer line entering the manhole at Central Avenue has a connection.

6. **West Madison Street**, from Manhole 44 to Manhole 39, should be considered for repair. This area was found to contribute significant I/I and may be a good candidate for lining. Special care should be taken in sealing around residential service connections with the liner.

7. **Abandoned Meat Processing Facility** should be considered for complete disconnection from the sanitary sewer system. This facility was found to have many areas of potentially significant inflow during the smoke testing study. Since that time the lateral has been plugged to prevent inflow. Subsequent investigation has shown that the plugged lateral is full of water. To prevent any potential failure of the plug this facility should be completely disconnected until a time that sanitary sewer service may once again be required.

8. **740 Railroad Avenue ("old shoe factory")**. This structure was found to have many sources of both inflow and infiltration. Areas of the basement that have been known to flood have floor drains and other connections to the sanitary system, a sump pump is directly connected to the sanitary system, and the sump pit has an overflow that is connected to the sanitary system. Additionally it appears that the western half of the building has a foundation drain network that is connected to old roof drains (no longer used as a result of a new roof) which drains into the sanitary sewer on Pierce Street

(discussed above). The City should confirm that the lateral draining to Pierce Street has no sanitary connections and should re-route this lateral to the nearby storm sewer. The owner of this structure had been made aware of the findings and should be kept abreast of any further decisions regarding changes to his laterals.

9. **Portland Sanitary District** was found to be a significant source of I/I, contributing up to 120,000 gallons per day during wet periods. The City should begin discussions with the Portland Sanitary District to correct I/I issues within the District.

C. Additional Areas of Concern

1. **Treyburn Farms Lift Station** has been shown to have a minor increase in flow since 2009. This area should continue to be monitored for possible sump pump connections, deteriorating sewer, and sources of storm water inflow.

2. **Streator Lift Station** shows indication of a minor increase in flow during wet weather events. This area should be monitored for sump pump connections and considered for televising to determine if sewer replacement is necessary. Flow monitoring and smoke testing in this drainage area were unsuccessful in isolating flow contributions.

D. Other Considerations

1. **Laterals and Foundation Drains** can be a significant source of I/I, especially in older neighborhoods. Identification of issues with foundation drains is best determined by televising sewers during wet weather events. Prior to repair or replacement of any sanitary sewer it is recommended that televising take place to determine potential contributions from sanitary laterals. If laterals are contributing significantly to the I/I issues repair and replacement of sewers can be ineffective at reducing I/I.

2. **Manhole's and Manhole Rims** can also be significant sources of I/I. Deteriorated brick and block manholes can have significant leaks that result in 5 to 10 gallons per minute or more being contributed to the collection system. Manholes that are known to be deteriorated or leaking should be either repaired or replaced. Similarly manhole castings with open pick holes can be significant sources of I/I. Open pick holes, when located at low points in

roadways, in flood prone areas, or in gutters and valleys can contribute as much as 5 gallons per minute at each casting. The City should consider replacing open pickhole castings with gasketed castings.

3. **Sump Pumps** can be a source of significant inflow if connected to residential floor drains or sanitary drains. The City should continually remind residents of ordinances against sump pump discharges to the sanitary sewer and perform regular inspections of areas where sump pumps are considered to be a problem.

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Waterloo City Hall

From: Waterloo City Hall [cityhall@waterloowi.us]
Sent: Thursday, August 01, 2013 1:53 PM
To: 'Cecilia Wiltzius'
Subject: convert sick leave to health insurance

Cecilia Wiltzius

549 sick leave hours - balance as of July 21, 2013
X $25.14/hourly wage
$13,801.86
÷ 15 years of service at retirement sick leave conversion to health insurance per employee handbook
X 8 years of service
$7,360.96 use to pay health insurance premium (current monthly premium is $644.10) approximately 11.5 months of health insurance coverage

Employee Handbook:
Sick leave may be used to acquire paid health insurance for employees who qualify for retirement under the guidelines of the Wisconsin Retirement System, if employed by the City fifteen (15) years or longer, or other exceptions as granted by the Council. In the event of the employee's death after such retirement, accumulated sick leave shall be used to continue spouse/dependent health insurance.

Thank You

Lois A.M. Baird
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City of Waterloo
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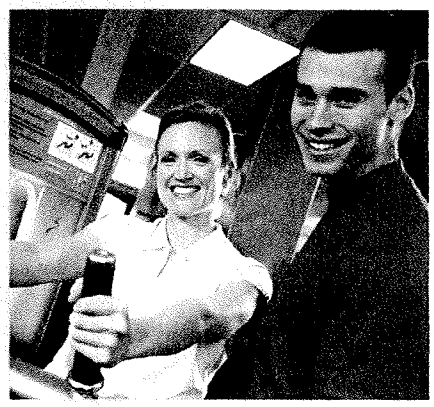

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