

DEC 05 2014



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 4  
ATLANTA FEDERAL CENTER  
61 FORSYTH STREET  
ATLANTA, GEORGIA 30303-8960

DEC 03 2014

CERTIFIED MAIL 7012 1010 0001 8097 2744  
RETURN RECEIPT REQUESTED

Ms. Alice Cannella, P.E.  
Director, Waste Resources Division  
City of Chattanooga  
455 Moccasin Bend Road  
Chattanooga, Tennessee 37405

Re: Approval of the Gravity Line Preventive Maintenance Program  
U.S. District Court Civil Action 1:12-cv-00245

Dear Ms. Cannella:

The U.S. Environmental Protection Agency Region 4 and the Tennessee Department of Environment and Conservation have reviewed and hereby approve the Gravity Line Preventive Maintenance Program (GLPMP) for the City of Chattanooga (the City) dated November 6, 2014, pursuant to Section VI.20.d of the subject Consent Decree above. The City shall implement the GLPMP in accordance with the submittal. In addition, the City shall certify the status of the implementation of the GLPMP, including its completion, in the Semi-Annual or Annual Work Progress Report pursuant to Section IX of the subject Consent Decree.

Please contact Ms. Sara Janovitz at (404) 562-9870 or via email at [janovitz.sara@epa.gov](mailto:janovitz.sara@epa.gov) if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Maurice L. Horsey, IV".

Maurice L. Horsey, IV, Chief  
Municipal & Industrial Enforcement Section  
NPDES Permitting and Enforcement Branch

cc: See Attached List

**Mailing List:**

Mr. Karl Fingerhood  
U.S. Department of Justice, Washington, D.C.

Mr. Phillip Hilliard  
Office of the Attorney General

Ms. Jessica Murphy  
Tennessee Department of Environment and Conservation

Mr. Donald L. Norris  
City of Chattanooga, Tennessee

Mr. Wade Hinton  
City of Chattanooga, Tennessee

Mr. Adam Sowatzka  
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Ms. Stephanie Matheny  
Tennessee Clean Water Network



# City of Chattanooga

Mayor Andy Berke

November 6, 2014

VIA CERTIFIED MAIL

Mrs. Sara Schiff Janovitz  
Environmental Engineer  
Clean Water Enforcement Branch  
US EPA - Region 4  
61 Forsyth Street, SW  
Atlanta, GA 30303

**Re: Review of the Gravity Line Preventive Maintenance Program U.S. District Court Civil Action 1:12-cv-00245**

Dear Ms. Janovitz:

On behalf of the City of Chattanooga, Tennessee ("City"), and in accordance with the Consent Decree entered by the United States District Court for the Eastern District of Tennessee (Southern Division), on April 24, 2013, in the case styled the *United States of America et. al. v. City of Chattanooga, No. 1:12-cv-00245* ("Consent Decree"), we are submitting to both the Environmental Protection Agency ("EPA") and the Tennessee Department of Environment and Conservation ("TDEC") the Gravity Line Preventive Maintenance ("GLPM") Program response to comments from the EPA dated July 7, 2014.

The formal resubmittal of the GLPM Program is being sent per your correspondence with the City over recent months. The comments received from the EPA and the responses to the GLPM Program are as follows:

1. EPA Comment Section 3.3: Section IV.20.d.iv of the Consent Decree (CD) requires the City include procedures the City staff or contractors will follow to conduct Level 1 and 2 manhole inspections. Will all manholes throughout the Wastewater Collection and Transmission System (WCTS) be inspected? If so, how long will it take for all manholes to be inspected?

City of Chattanooga Response: Section 3.3 of the Gravity Line Preventive Maintenance Program provides methods and approaches and Section 3.4 provides procedures for conducting manhole inspections. The City will use NASSCO standards as guidelines for conducting Level 1 and Level 2 manhole inspections. Appendix B provides standard forms and specifications for completing manhole inspections.

The City's goal is to perform manhole inspections in priority areas on manholes that are susceptible to I/I. By prioritizing manhole inspections, the City plans to inspect 33% of the manholes in the system under the Gravity Line Preventive Maintenance Program by 2020. Therefore, if the City continues on this approach, all manholes in the system will be inspected under the term of the Consent Decree.

2. EPA Comment Section 3.6: Is there a maximum length of time allowed between Level 1 and Level 2 manhole inspections?

City of Chattanooga Response: There is no limit on the length of time allowed between Level 1 and Level 2 inspections; however, the City will complete Level 2 inspections expeditiously to reach annual performance goals, as listed in Table 3-1.

3. EPA Comment Section 4.4: Section IV.20.d.i of the CD requires the City include procedures the City staff or contractors will follow to conduct hydraulic cleaning.

Section 4.4 provides procedures for conducting preventive hydraulic cleaning. Items in Appendix C provide specifications and standard forms for use in conducting hydraulic cleaning.

4. EPA Comment Section 4.6: The annual hydraulic cleaning preventative maintenance goal is approximately 15% of the system—does the 1,000,000 linear foot goal count lines that were cleaned more than once in a year multiple times toward the goal? Or, is the goal 1,000,000 linear feet of distinct lines?

City of Chattanooga Response: The goal of 1,000,000 linear feet does include sewer lines that were cleaned more than once. These lines would be included in the "hot spot" areas and may require repeated preventive hydraulic cleaning to reduce SSOs.

5. EPA Comment Section 5.3: Will the City handle preventative mechanical cleaning of pipes less than 14 inches in-house? Section IV.20.d.ii of the CD requires the City include procedures the City staff or contractors will follow to conduct preventative mechanical cleaning.

Ms. Sara Schiff-Janovitz  
November 6, 2014  
Page Three

City of Chattanooga Response: The City does not expect to utilize mechanical cleaning as defined in the Gravity Line Preventive Maintenance Program for pipes less than 24 inches (Section 5.1); however, if mechanical cleaning is needed on small diameter pipelines, this work will be contracted out to third parties.

6. EPA Comment Section 6.6: Does the City have any idea how many linear feet throughout the WCTS need annual chemical root control?

City of Chattanooga Response: The City cannot currently estimate how many linear feet of sewer need chemical root control, but as the City's sewer inspection efforts advance, it will become clearer how much chemical root control is needed.

*I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering such information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*

We look forward to receiving EPA's and TDEC's approval of the GLPM Program. In the meantime, please let me know if you have any questions regarding our submittal.

Sincerely,



Alice L. Cannella, P.E.  
Director, Waste Resources Division

cc: Karl Fingerhood, Esq., US DOJ  
Chief, Environmental Enforcement Section, US DOJ  
Chief, Clean Water Enforcement Branch, US EPA Region 4  
Bill Bush, Esq., US EPA  
Phillip Hilliard, Office of the Attorney General  
Enforcement Coordinator, Water Pollution Control, TDEC  
Stephanie Durman Matheny, Esq., TCWN  
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Adam Sowatzka, Esq., King & Spalding





# Gravity Line Preventive Maintenance Program

*Prepared for*

**United States Environmental Protection Agency  
and Tennessee Department of Environment and  
Conservation**

City of Chattanooga  
Waste Resources Division  
Consent Decree Program  
Case No. 1:12-cv-00245

*Prepared by*



**LITTLEJOHN ENGINEERING ASSOCIATES, INC.**

*Submitted by*

**JACOBS®**

Jacobs Engineering Group, Inc.  
Consent Decree Program Manager

Chattanooga, Tennessee

April 9, 2014

*Revised November 6, 2014*





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# Acronyms and Abbreviations

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CCTV	Closed-circuit-television
CFM	Cubic Feet per Minute
CITY	City of Chattanooga
CIPP	Cured in Place Pipe
CM	Corrective Maintenance
CMMS	Computerized Maintenance and Management System
CSO	Combined Sewer Overflow
CSOTF's	Combined Sewer Overflow Treatment Facilities
CSS	Combined Sewer System
DPW	Department of Public Works
EPA	United States Environmental Protection Agency
FEMA	Federal Emergency Management Agency
gpm	Gallons Per Minute
GIS	Geographic Information System
GLPM	Gravity Line Preventive Maintenance
IMS	Information Management Systems
I&I	Infiltration & Inflow
ISS	Interceptor Sewer System
LACP	Lateral Assessment and Certification Program
MACP	Manhole Assessment and Certification Program
MBWWTP	Moccasin Bend Wastewater Treatment Plant
MOM	Management, Operations and Maintenance
NASSCO	National Association of Sewer Service Companies
NPL	National Priority List
NPDES	National Pollutant Discharge Elimination System
PACP	Pipeline Assessment and Certification Program
PCB's	Polychlorinated Biphenyls
PVC	Polyvinyl Chloride

SCADA	Supervisory Control and Data Acquisition System
SOP	Standard Operating Procedure
SORP	Sanitary Overflow Response Protocol
SR	Service Request
SSES	Sanitary Sewer Evaluation Studies
SSOs	Sanitary Sewer Overflows
SSS	Sanitary Sewer System
TCWN	Tennessee Clean Water Network
TDEC	Tennessee Department of Environment and Conservation
TISCIT	Totally Integrated Sonar and CCTV Technique
TWRA	Tennessee Wildlife Resources Agency
WCTS	Wastewater Collection and Transmission System
WRD	Water Resources Division
WWTP	Wastewater Treatment Plant



# 1.0 Introduction

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## 1.1 Purpose

On April 24, 2013, the City of Chattanooga (City) entered into a consent decree with the United States and the State of Tennessee, in the case styled United States of America et. al. v. City of Chattanooga, No. 1:12-cv-00245 (“CD”). The City’s Waste Resources Division (WRD) has prepared an updated Gravity Line Preventive Maintenance (GLPM) Program for review and approval by the United States Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC), pursuant to paragraph 20(d) of the CD.

This GLPM Program will address protocols for implementing hydraulic and mechanical cleaning of gravity sewer lines (paragraph 20(d)i of the CD), a preventive hydraulic cleaning component (paragraph 20(d)ii of the CD), root control within the gravity sewer lines (paragraph 20(d)(iii) of the CD), manhole preventive maintenance and inspection activities (paragraph 20(d)iv of the CD), and a process for addressing gravity line sewer segments with repeated sanitary sewer overflows (SSOs) (Paragraph 20(d)v of the CD). The purpose of this GLPM Program is to maximize service and system reliability at minimum cost through routine cleaning and maintenance of the City’s wastewater collection and treatment system (WCTS).

## 1.1 Background

As the regional wastewater utility provider, the City, a Municipal Corporation owns and operates a network of pipes, manholes, pump stations, force mains, Combined Sewer Overflow Treatment Facilities (CSOTFs), and associated appurtenances that transports wastewaters from homes, businesses, and industries to the Moccasin Bend Wastewater Treatment Plant (MBWWTP).

Maintenance activities performed on the gravity sewer system are currently performed by both internal WRD field personnel and through third party subcontractors under the Closed Circuit Television Inspection (CCTV) Annual Blanket Contract and the Annual Blanket Contract for Cleaning Services. Additionally, preconditioning and inspection activities are performed under the Sanitary Sewer Evaluation Studies (SSES) Work Plan. This three-tiered approach was designed to maximize the City’s ability to respond to day-to-day unplanned maintenance activities, while still making progress towards achieving the goals of providing a systematic approach for regular preventive maintenance and inspection activities on priority sections of the Interceptor Sewer System (ISS).

## 1.2 Authority

Authority for this program is derived from the following:

1. The National Pollutant Discharge Elimination System (NPDES) Permit Number TN0024210;
2. The U.S. Clean Water Act;

3. Tennessee Water Quality Control Act; and
4. The CD.



# 2.0 General

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## 2.1 Objectives

This GLPM Program is designed to assist the City in developing a proper capacity, management, operations and maintenance (CMOM) program for gravity line preventive maintenance. The key elements of a successful preventive maintenance program are:

- Utility Specific – The program should be based on the needs of the service area and the customer base and provide an efficiently maintained and operated sanitary sewer system and reduce the negative impact on the environment and hazards to public health.
- Purposeful – The program should be designed to maintain the hydraulic capacity of the system while providing a structured and consistent response to reduce SSOs. It should also identify defects that require immediate attention, as well as a uniform assessment of the condition of the assets so that priorities for further investigations and rehabilitation can be prepared. The program, where possible, must provide maintenance to extend the lifecycle of the system assets.
- Goal Oriented – The program should provide structured guidance for the operation, maintenance and performance of the WCTS by developing a list of protocols for establishing the frequencies for assessing and cleaning the gravity collection system.
- Uses Performance Measures – The program should provide performance indicators by which the progress and ultimately the success of the program can be shown.
- Periodically Evaluated – The program should be reviewed annually and amended as appropriate based on the review and assessment of the previous years' performance.
- Available in Writing – The program should be maintained and kept readily available as a reference for current staff and should be used to train new personnel.
- Implemented by Trained Personnel – The performance expectations for each component of the program are the same for internal and external resources. Internal resources should follow established Standard Operating Procedures (SOPs) that have been developed. Contractors selected to perform outsourced components of the program should follow established written specifications and criteria and meet federal, state and local laws, statutes and regulations.

## 2.2 Key Elements of the GLPM Program

The key elements of the GLPM Program are addressed individually as follows:

- Section 3.0                      MANHOLE PREVENTIVE MAINTENANCE
- Section 4.0                      PREVENTIVE HYDRAULIC CLEANING
- Section 5.0                      PREVENTIVE MECHANICAL CLEANING

- Section 6.0 ROOT CONTROL PROGRAM
- Section 7.0 SSO REDUCTION PROGRAM
- Section 8.0 DISTRIBUTION AND MAINTENANCE OF GLPM PROGRAM

## 2.3 Definitions

**311 Call Center:** The City's 311 Call Center is the primary contact for customers who have utility questions or need to report a wastewater issue. The 311 Call Center is staffed 10 hours per day, 8:00 AM to 6:00 PM, Monday through Friday. Calls that come in after 4:00 PM and on the weekends revert to a recording with instructions.

**Building Backup:** A building backup occurs when wastewater backs up into buildings due to blockages or flow conditions in the City's WCTS (other than a private service lateral). A wastewater backup into a building that is caused by a blockage or other malfunction in a private service lateral is not considered to be a Building Backup for the purposes of this document.

**Closed circuit television (CCTV):** CCTV used to visually inspect the internal condition of pipes and subsurface structures.

**City of Chattanooga:** City of Chattanooga, Department of Public Works, Waste Resources Division.

**Cleanout:** A cleanout is a vertical pipe with a removable cap extending from a private service lateral to the surface of the ground. It is used for access to the private service lateral for inspection and maintenance.

**Computerized Maintenance and Management System CMMS:** A CMMS, currently Cityworks®, is used to maintain records of ISS assets, including physical properties and any maintenance and repair records. It also generates work orders and facilitates workflow to other WRD sections, or between departments.

**Combination Cleaners:** Combination cleaners are mechanical equipment with flushing and suction capabilities. This equipment is used to clear or collect wastewater and related debris from the WCTS.

**Combined Sewer System (CSS):** The combined sewer system shall mean the portion of the City's WCTS designed to convey municipal sewage (domestic, commercial, and industrial wastewater) and stormwater runoff through a single-pipe system to the WWTP or a CSO Outfall.

**Combined Sewer Overflow Treatment Facility (CSOTF):** These are permitted primary treatment facilities in the City's CSS that treat combined stormwater and sanitary sewage and discharge through the CSO Outfalls during heavy wet weather events.

**Combined Sewer Overflow Outfall or CSO Outfall:** The outfalls currently identified, or identified in the future, as a permitted combined sewer overflow outfall in any Chattanooga NPDES permit from which CSOs are discharged to waters of the United States or the State.

**Combined Sewer Overflow (CSO):** Any discharge from the CSS from any outfall currently identified, or identified in the future, as a permitted combined sewer overflow outfall in any Chattanooga NPDES permit

**Dispatcher:** A designated City employee who contacts, notifies, and sends a First Responder to respond to possible SSO events.

**Dry Weather SSO:** A discharge of untreated sewage from a SSS due to flow restrictions or system disruptions.

**EPA:** United States Environmental Protection Agency.

**First Responder:** Typically, a designated sewer maintenance employee or any qualified City employee who assumes initial responsibility for responding to an SSO event.

**Force Main:** A pressurized line that conveys wastewater from a pump station.

**Geographic Information System (GIS):** The GIS is a mapping and geographic information system created, owned, and funded by Hamilton County and the City. GIS maintains digital geographic data for all of Hamilton County, Tennessee. The GIS Office manages some of the core mapping information, including topography and aerial photography, while respective City, County, and City departments maintain other map “layers,” such as property, utility information, and address data.

**Gravity Lines:** Gravity or “main” lines represent the largest portion of the WCTS. They use changes in elevation to transport sewage between points (typically manholes or junction boxes).

**Inflow and infiltration (I&I):** I&I, or extraneous surface or ground water, that enters the WCTS.

**Impacted Areas:** Impacted areas are sites where sanitary sewage or combined sewage has collected or areas that have been affected as the result of a discharge from the WCTS.

**Infiltration:** As defined by 40 CFR § 35.2005(b)(21), Infiltration shall mean water other than wastewater that enters the WCTS (including sewer service connections) from sources such as, but not limited to, roof leaders, cellar drains, yard drains, drains from springs and swampy areas, manhole covers, cross connections between storm sewers and sanitary sewers, and catch basins, cooling towers, storm water, surface runoff, street wash waters, or drainage.

**Inflow:** Inflow is the introduction of extraneous water into the WCTS by direct or inadvertent connections with storm water infrastructure, such as gutters and roof drains, uncapped cleanouts, and cross-connections with storm drains.

**Lateral Assessment and Certification Program (LACP):** LACP is the program developed by NASSCO for the standardization of assessing sewer service laterals.

**Manhole or Junction Box:** A manhole or junction box provides a connection point for gravity lines, private service laterals, or force mains, as well as an access point for maintenance and repair activities.

**Manhole Assessment and Certification Program (MACP):** MACP is a program developed by NASSCO for the standardization of assessing sewer manholes.

**National Association of Sewer Service Companies (NASSCO):** NASSCO is a national organization comprised of utilities, contractors, engineers and software vendors committed to setting industry standards for the assessment and rehabilitation of underground infrastructure.

**Pipeline Assessment and Certification Program (PACP):** PACP is a program developed by NASSCO for the standardization of assessing pipelines and provides a standard code and training and certification of personnel for the assessment and measurement of the condition of pipelines.

**Private Service Lateral:** Private service lateral shall mean that portion of a sanitary sewer pipe, not owned or operated by the City, that extends from a structure to the point at which such pipe connects to the WCTS in the street or right-of-way. Private service laterals include the portion of the customer's service in the public street or right-of-way.

**Public System:** Public system refers to the WCTS, excluding private service laterals and connections with private systems.

**Pump Station:** A pump or lift station is a mechanical method of conveying wastewater to higher elevations.

**Sanitary Sewer Overflow (SSO):** An SSO is any discharge of wastewater to waters of the United States or the State from the City's WCTS through a point source not permitted in the NPDES permit, as well as any overflow, spill, or release of wastewater to public or private property from the sewer system that may not have reached waters of the United States or the State, including Building Backups.

**Sanitary Sewer System (SSS):** A sanitary sewer system collects, conveys, and treats residential, commercial, and industrial wastewaters through a complex network of infrastructure. It is the collection system portion of the WCTS.

**Sewer Overflow Response Protocol (SORP):** The SORP provides structured guidance, including a range of field activities to choose from, for a uniform response to overflows.

**Sewersheds:** Sewersheds or basins are small portions of the sanitary sewer system and combined sewer system defined by boundaries of natural topography or system configuration. Separating the system into sewersheds or basins allows the City to better identify and monitor system performance in those smaller areas.

**Supervisory Control and Data Acquisition System (SCADA):** SCADA is automated sensory control equipment that monitors the operation of the pump stations. The SCADA system will convey alarms when predetermined conditions occur. Monitoring parameters include, but are not limited to, power failures, high wetwell levels, and pump failures that could potentially cause overflows.

**TDEC:** Tennessee Department of Environment and Conservation.

**TWRA:** Tennessee Wildlife Resources Agency.

**Unpermitted Discharges:** A discharge of pollutants from any location within the sanitary sewer system that reaches waters of the State and which are not authorized by an NPDES Permit.

**Wastewater Collection and Transmission System (WCTS):** The WCTS is the wastewater collection, retention, and transmission systems, including all force mains, gravity sewer lines, pump stations, manholes, and other related appurtenances thereto owned or operated by the City that are designed to collect and convey municipal sewage (domestic, commercial, and industrial) to the City's WWTP or CSOs. It is comprised of the SSS and CSS.

**Waters of the State:** Waters of the State (Tennessee) shall have the same meaning as "Waters" defined under TCA § 69-3-103 (33).

**Wet Weather SSO:** A discharge of untreated sewage from a sanitary sewer system due to excessive flows during rain events or elevated ground and surface water conditions.

**Waste Resources Division (WRD):** The WRD is responsible for the planning, management, operation and maintenance of the WCTS and WWTP for the City.

## 2.4 Description of the Wastewater Collection and Transmission System

As a regional wastewater utility, the City of Chattanooga, a Municipal Corporation, owns, operates, maintains, and manages a network of pipes, manholes, pump stations, force mains, CSOTFs, and associated appurtenances that transport wastewater from homes, businesses, and industries to the Moccasin Bend Wastewater Treatment Plant (WWTP). All of this infrastructure is part of the Wastewater Collection and Transmission System (WCTS), as defined in the CD and herein, and managed by the Waste Resources Division (WRD). The City has historically classified the WRD, WWTP and the WCTS as part of the Interceptor Sewer System (ISS). With the advent of the CD and recent reorganizations within the City, the term ISS is not recognized by all stakeholders and therefore the City will refer to WCTS and WWTP as the infrastructure and WRD as the organization to manage this infrastructure going forward. However, for the purposes of this document, the term ISS may be used interchangeably with WRD and WWTP and WCTS when encountered. Property owners own the private service laterals from the served residential, commercial, and industrial structures to the public main line in the street or right-of-way, including the connection.

The City's WCTS currently serves approximately 170,000 people with approximately 61,000 customers within the City including 80 permitted industries. It also provides treatment for eight (8) regional or satellite users comprised of approximately 25,000 customers. The WCTS is composed of:

- 1,263 miles of gravity sewers (approximate), including 70 miles of combined sewers;
- 30,000 manholes (approximate);
- 70 pump stations;
- 53 miles of force main;
- Eight (8) CSOTFs;
- One (1) Combined Sewer Storage Facility;
- 192 (approximate) residential/grinder pumps; and

- One (1) Moccasin Bend WWTP

An organization chart of the WRD is provided in Appendix A.

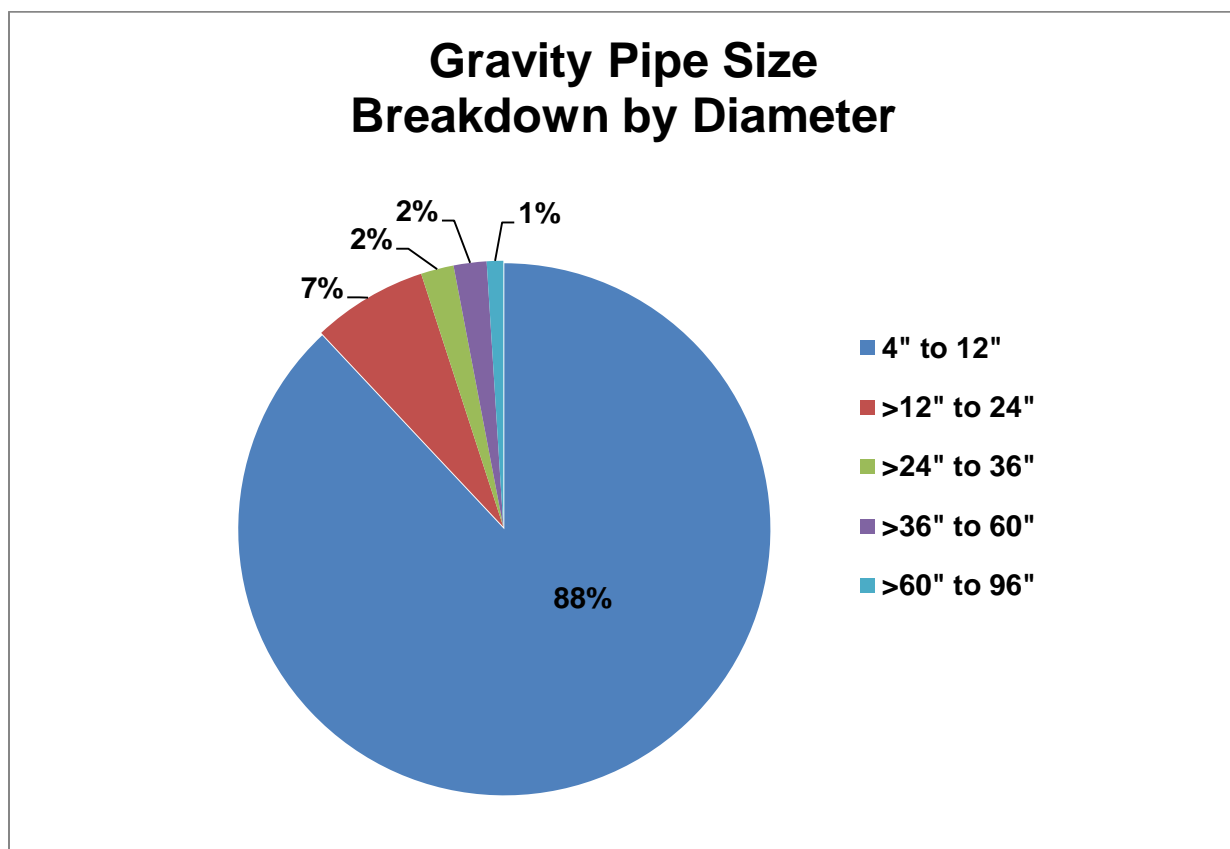
The City, through its information management system (IMS), maintains a GIS of the ISS assets in ESRI's ArcGIS software platform. The GIS contains background information such as streets, contours, parcels, hydrography, building footprints and other data.

The City has started a program to locate and survey manholes and other assets throughout the ISS. To date, approximately 77% of the system manholes have been located and mapped utilizing traditional surveying or survey grade global positioning system techniques. During this survey effort, pipe diameters, locations and connectivity of the system network was also verified. This information was then combined with the GIS to produce a map of the ISS.

An analysis of the GIS information for the gravity pipelines indicates that approximately 88% of the gravity pipelines within the ISS are between 4-inches and 12-inches in diameter. Figure 2-1 indicates the breakdown and distribution of the pipeline diameters graphically.

**Figure 2-1**

Gravity Pipe Size Breakdown by Diameter



As part of an assessment program of the ISS, the ISS was broken into 105 distinctive sanitary sewer sub-basins. A total of 108 flow meters and 12 rain gauges were installed during a temporary flow monitoring study between November 2009 and February 2010. The information derived from this study was used to determine average daily dry weather flows and responses

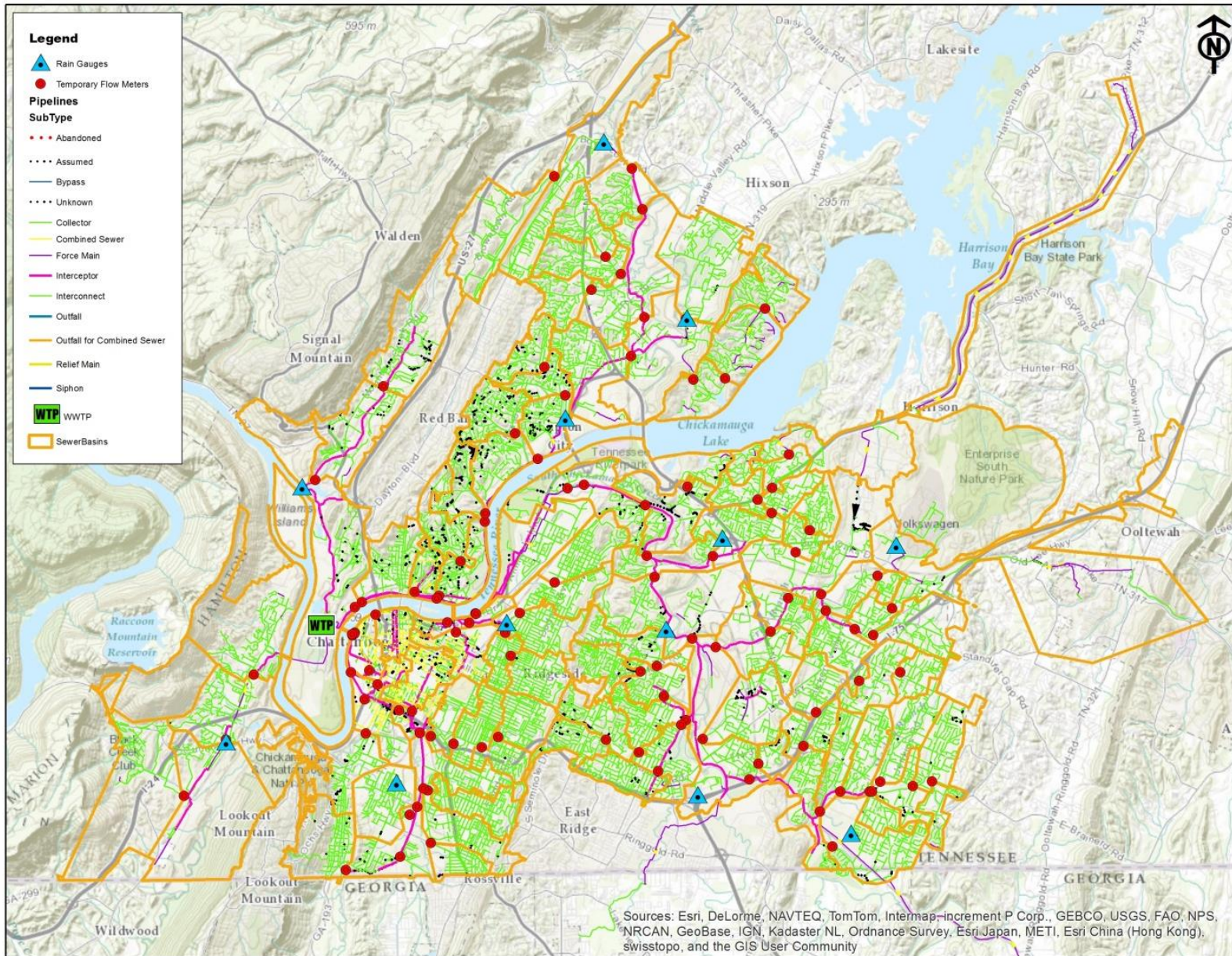
to wet weather events in order to calculate rainfall dependent I&I (RDII) for each basin. This information is also utilized to calibrate the hydraulic model of the ISS.

Along with developing a hydraulic model, the City utilizes the Cityworks® computerized maintenance management system (CMMS) to issue and track work orders for various maintenance activities performed in the ISS. SSOs are also tracked and entered into the GIS.

All of this information is utilized to prioritize preventive maintenance activities and rehabilitation projects to reduce the occurrence of SSOs and increase the hydraulic carrying capacity of the ISS.



**Figure 2-2**  
ISS Sub-basin Map





## 2.5 Organization of the ISS

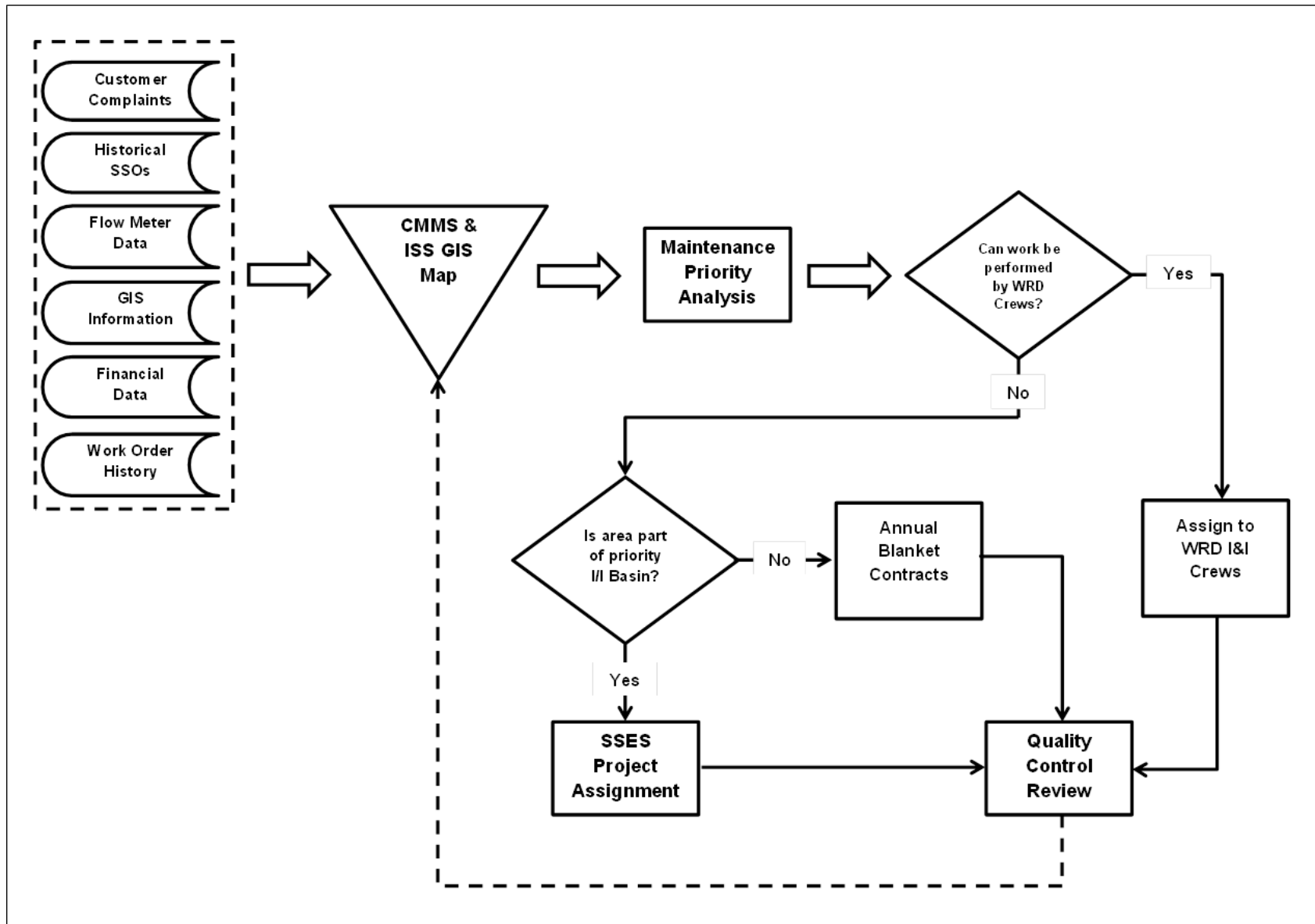
The Director of the WRD is responsible for the operations, maintenance, and management of the ISS. The System Engineer is responsible for the operations, maintenance, and management of the collection sewer portion of the WCTS system. The Plant Manager is responsible for the operations and management of the WWTP, pump stations, and CSOTFs. The Maintenance Manager is responsible for the maintenance of the WWTP, pump stations, and CSOTFs. An organizational chart is provided in Appendix A.

Preventive maintenance activities such as manhole inspections and cleaning and CCTV operations are performed by both WRD internal staff and third party contractors under the direction of the System Engineer. WRD field crews under the Sewer Construction Manager are responsible for the day to day maintenance, responding to customer complaints, sewer investigations and emergency repairs within the ISS. The I&I Work Crews operating under the Sewer Construction Manager are specifically responsible for conducting maintenance activities such as routine hydraulic cleaning and closed circuit television inspections of the gravity sanitary sewers. Information obtained from these investigations by internal WRD crews is uploaded to the CMMS and reviewed by Project Engineers working directly with the System Engineer to develop priority preventive maintenance plans, work orders for repairs and rehabilitation projects.

Additional SSES project areas have been identified and are managed by the City's Program Manager. Data from this CD work is reviewed and combined with the City's CMMS system to further provide information about ISS assets to determine future preventive maintenance and rehabilitation priorities.

The System Engineer also works with the WRD Operations Staff to review historical customer complaints, SSOs, flow monitoring data, GIS information and work order history in the CMMS and GIS to perform a priority analysis of where preventive maintenance activities should be concentrated. The determination is made whether the specific maintenance activity can be performed utilizing WRD internal crews and equipment or would be more appropriately handled by outside contractors under one of the annual blanket contracts for CCTV or cleaning services or if the assets are part of the priority basins identified in the CD program. Once this analysis is completed, work orders are prepared and assigned to the appropriate entity. Project Coordinators are assigned to manage and track the work process and perform quality control reviews of the work and ensure that the information is combined into the CMMS and GIS. Figure 2-3 delineates the decision flow chart for this process.

**Figure 2-3**  
Preventive Maintenance Decision Flow Chart



## **3.0 Manhole Preventive Maintenance**

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### **3.1 Objectives**

This portion of the GLPM Program has been established to identify specific manholes where inspections and preventive maintenance activities will be concentrated in order to identify structural deficiencies and sources of I&I. An ancillary goal of the program is to verify the location of manhole assets within the ISS and capture additional attribute information about each asset, including size, elevations, materials of construction and general conditions.

### **3.2 Needs Determination / Priority Establishment**

#### **3.2.1 Needs Determination**

A manhole is used as an access point for making connections or performing maintenance on buried sanitary sewer assets. They are the primary means of access to pipelines for maintenance, inspection and rehabilitation. As the main access point to the collection system, they should be accessible from the ground surface, and extend from the ground surface to the wastewater pipe connections. The most important aspect relating to performance of a manhole is that it must be structurally watertight, not allowing the entrance of inflow from surface runoff or infiltration from groundwater into the sewer system. The interior of a manhole should also be resistant to powerful deterioration mechanisms such as erosion, abrasion, hydrogen sulfide induced corrosion and other corrosive chemicals that occur naturally or may be introduced into the system from business or industries (NASSCO, Manhole Assessment Certification Program Version 6.0.1 November 2010). Manholes are often a system's largest source of I&I due to their location and construction. Manholes are typically located at changes in elevation or direction of the wastewater pipeline and are often installed near streams or drainage channels. Because of this they are often sources of significant I&I.

Considering the importance of these structures to the ability of WRD to access and maintain the WCTS, it is imperative that assessment of these structures in priority areas be undertaken. This assessment will lead to a prioritization plan for rehabilitating these structures to ensure the proper operation and maintenance of the gravity portion of the WCTS.

#### **3.2.2 Priority Establishment**

In 2007, the WRD began a comprehensive program of locating and surveying manholes within the ISS. As of 2013, approximately 80% of the manholes within the ISS have been located using survey grade GPS or traditional survey methods or were mapped from information obtained from record drawings.

Based upon this updated information, WRD has established an accurate map of the WCTS. Utilizing this information and combining it with other CMMS and GIS background information, priorities will be established for conducting assessments of manholes located within the gravity portion of the SSS. Criteria for establishing the priorities include historical SSO locations; results

of the flow monitoring and hydraulic modeling program indicating which basins have significant RDII response, and the proximity of manholes within those basins to such features as the 100-year floodplain as determined by FEMA. Additional criteria, such as the proximity of the manhole asset to a stream segment designated as impaired under Section 303(d) of the Clean Water Act due to *Escherichia coli* will also be used to prioritize inspections. This prioritization will be used to concentrate resources on those manholes which have the highest potential to contribute I&I, as well as affect water quality.

### 3.3 Inspection Methods & Approaches

NAASCO has developed two Manhole Assessment and Certification Program (MACP) condition assessment protocols. These are a Level 1 and a Level 2 inspection. Under a Level 1 inspection, basic condition assessment information is gathered to evaluate the general condition of a manhole. Level 1 inspections can be performed without the use of any special equipment or manned entry into the manholes. The purpose of a Level 2 inspection is to gather more detailed information to fully document all existing defects, determine the condition of the manhole and to provide specific information required to recommend or specify corrective actions. Level 2 inspections will require the use of pole-mounted camera units or entry into the manhole to document defects.

WRD internal field crews will complete Level 1 MACP inspections on manholes identified from a review of historical CMMS and GIS information for priority areas. After Level 1 MACP inspections are completed, manholes will be identified where Level 2 MACP inspections will be conducted either through annual blanket contracts for these services or through the SSES Work Plan Projects.

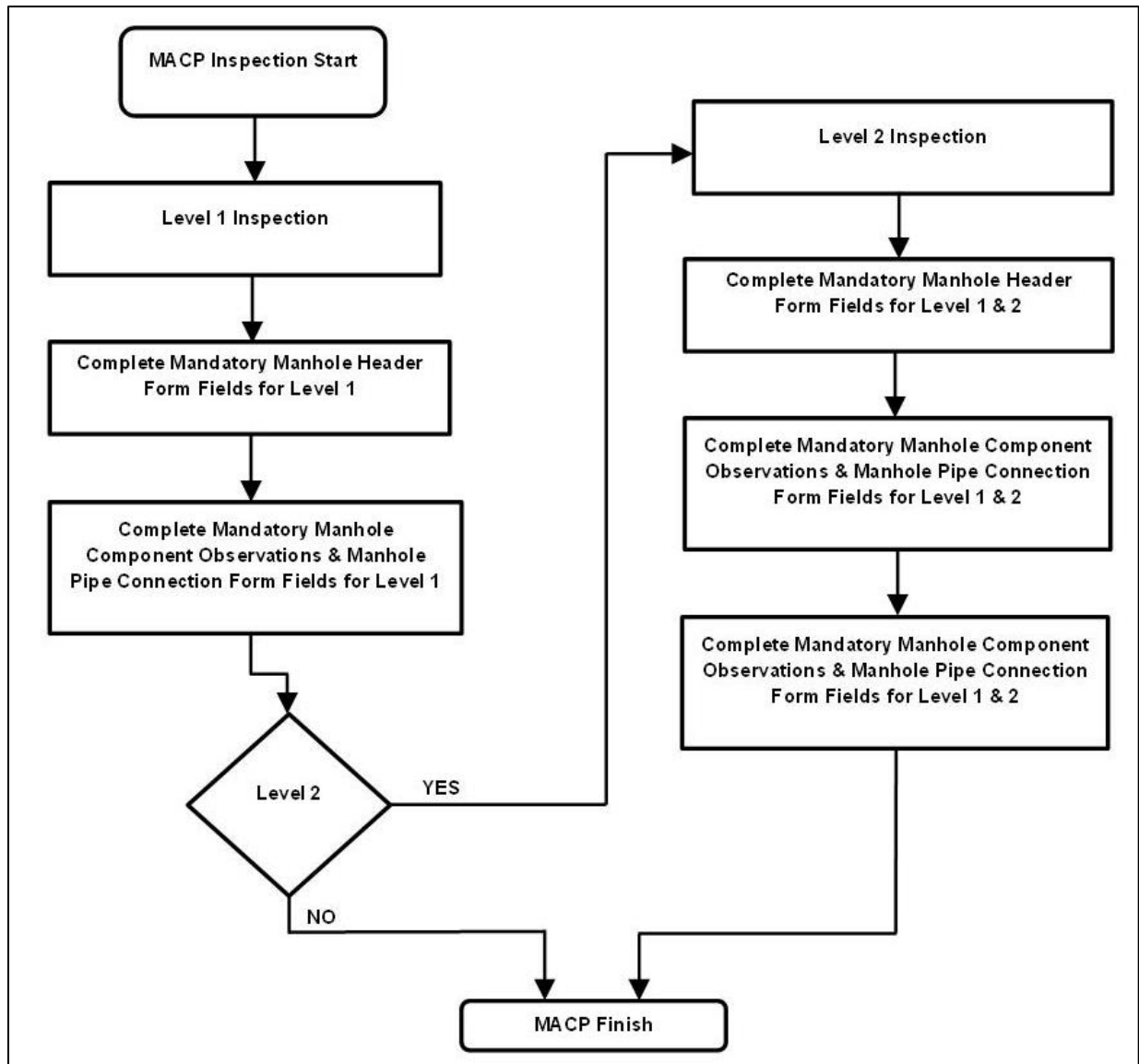
### 3.4 Procedures

The System Engineer will annually develop a list of priority areas where Level 1 MACP inspections will be performed by WRD personnel. This priority list will be based upon information from the CMMS and other historical information such as SSOs, work orders, flow monitoring and the hydraulic model of the sanitary sewer collection system. Emphasis will be placed upon inspecting those manholes that have the highest potential of contributing I&I to the collection system and subsequent SSOs.

Once the priority list has been established, specific work areas will be assigned to WRD field crews to conduct a Level 1 MACP inspection on each manhole, following MACP standards and completing the required Level 1 form. This inspection will gather basic condition assessment information for each manhole. Manholes where structural deficiencies or sources of I&I are evident from the surface investigation will be flagged for a follow up Level 2 MACP investigation. Level 2 MACP inspections will be contracted out to third party subcontractors through an annual blanket contract for these services. Progress towards completing the Level 1 MACP investigations will be tracked weekly and monthly reports will be maintained. Lists on manholes requiring a Level 2 MACP inspection will be compiled quarterly and released to contractors to perform this work. Weekly and monthly progress towards completing these inspections will be maintained. Figure 3-1 shows the decision matrix for performing these inspections.

Included in Appendix B of this report is a list of required fields with descriptors for Level 1 and Level 2 MACP inspection categories.

**Figure 3-1**  
Manhole Inspection Flowchart



### 3.5 Standard Forms

For Level 1 MACP inspections conducted by WRD internal field crews, a standard form has been developed listing the required fields for this type of inspection. This manhole inspection form is included in Appendix B-2 of this report. An example of the Level 2 MACP inspection is also included in Appendix B-3. Level 2 MACP inspections will require the use of specialized equipment and software and will be performed by third party contractors under an annual blanket contract for services. Specifications for how these inspections will be performed are included in Appendix B-4 of this report.

### 3.6 Performance Measures

The performance measures established for this program are based upon an analysis of the current GIS and CMMS information. The preliminary goals for this program are to complete 1,000 Level 1 MACP inspections per year with WRD internal field crews beginning in calendar year 2015. As the program develops and additional areas are identified, this goal will be increased in calendar year 2017 to 2,000 Level 1 inspections per year. The Level 2 MACP inspections will be undertaken through an annual blanket contract with external contractors. The City estimates that Level 2 MACP inspections will be required for approximately 90% of the manholes where Level 1 inspections have been completed through calendar year 2017. Afterwards, the City anticipates that only 60% of the manholes would require a Level 2 MACP inspection. In calendar year 2015, the performance goal will be set at 900 Level 2 inspections per year through calendar year 2017. Beginning in 2017 this goal will be increased to 1,200 Level 2 MACP inspections per year. The calendar year 2020 goal is to have 10,000 Level 1 MACP inspection completed. This represents approximately 33% of the total manholes in the WCTS.

**Table 3-1**  
Manhole Inspection Performance Goals

Calendar Year	2014	2015	2016	2017	2018	2019	2020
<b>Manhole Inspections</b>							
Number of Manholes in System	30,000						
Number of MACP Level 1 Manhole Inspections during the Calendar Year		1,000	1,000	2,000	2,000	2,000	2,000
Number of MACP Level 2 Manhole Inspections during the Calendar Year		900	900	1,200	1,200	1,200	1,200

### 3.7 Information Management

Level 1 MACP inspections performed by WRD internal field crews will be captured in hard copy format. Data from these hard copy inspections will be entered into the CMMS and any necessary corrections to the GIS maps will be coordinated through the City's IMS. Manholes requiring a Level 2 MACP inspection will be flagged in the CMMS and GIS and a scope of work and maps will be prepared for issuance to contractors through the annual blanket contract for manhole inspections. Level 2 MACP inspections will be performed utilizing MACP-certified software. Digital photographs of the exterior and invert of each inspected manhole will be captured. A digital still image of each defect will also be captured. Links to these photos will be tracked within the MACP-certified software as described in the specifications for this work located in Appendix B-4. Final data deliverables will be submitted to the System Engineer via an external hard drive once final quality control procedures have been completed by the contractor. The Project Coordinator will perform quality assurance reviews on the data prior to upload to the CMMS and GIS.

## **4.0 Preventive Hydraulic Cleaning**

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### **4.1 Objectives**

This portion of the GLPM Program has been established to provide regular cleaning maintenance to pipelines and sewer reaches in order to prevent blockages, sanitary sewer overflows, grease build-up, odor and/or corrosion problems or other capacity issues within in the collection system. An additional scope of this program is to support CCTV inspection activities so that quality video inspections are captured, as well as expedite inspection of pipelines where flow or debris would prevent the camera from traversing the entire length of the pipe or where visibility cannot be obtained without proper flow control.

### **4.2 Needs Determination / Priority Establishment**

The System Engineer, working with the Operations Staff, will identify priority areas for preventive maintenance hydraulic cleaning annually. These priority areas, also referred to as “hot spots,” will be determined from data contained in the CMMS and GIS. Data utilized to determine the location of these hot spots include historical SSO locations, work order history, customer complaint history, fats, oils, and grease (FOG) program information and the results of the flow monitoring and hydraulic modeling program. Priority will be assigned to those areas that have resulted in repeated SSOs during the previous twelve month period.

For this program, both internal WRD field crews and third party contractors working under an annual blanket contract for cleaning services will be utilized to perform cleaning operations in the hot spot areas.

### **4.3 Hydraulic Cleaning Equipment**

Under this program, preventive hydraulic cleaning will be accomplished through the use of high pressure, hydraulic sewer pipeline cleaners. Pressure jetting equipment used will be sufficient for the purposes of attaining the degree of cleanliness in sewers necessary to re-suspend sediments, deposits, grease and other debris and move it downstream where it can be removed from the pipeline via vacuum equipment or other devices. A list of equipment maintained by the I&I field crews is attached to this report in Appendix A-2. The specifications for the Annual Blanket Contract to Supply Sewer Line Cleaning Services are attached in Appendix C-1 and include specifications for equipment required for these annual services.

### **4.4 Procedures**

Once specific areas have been identified for preventive hydraulic cleaning, the System Engineer will assign specific work areas to field crews or third party contractors. Project Coordinators will be assigned to schedule and monitor the work performed by third party contractors. The field crews will receive weekly work orders indicating the areas to be cleaned that have been identified as hot spots. The field crews will track and report progress on completing each work

order assigned weekly through an Activity Work Sheet format as shown in Appendix C-2. This information will be entered into the CMMS in order to track progress towards established performance goals. Third party contractors will submit weekly progress logs as shown in the example in Appendix C-3. This information will be entered into the CMMS in order to track progress towards the established performance goals.

## **4.5 Standard Forms**

Standard forms for tracking work progress include the City's Activity Work Sheet shown in Appendix C-2 and the contractors cleaning log shown in Appendix C-3 to this report. Hard copy forms will be completed daily and returned to the System Engineer for processing and entry into the CMMS weekly.

## **4.6 Performance Measures**

Under this program, WRD has established an annual hydraulic cleaning preventive maintenance goal of 1,000,000 feet of pipeline performed by the City's field crews and third party contractors combined. Pipelines identified for preventive hydraulic cleaning will have 95% of their carrying capacity restored as a result of these maintenance activities.

## **4.7 Information Management**

Daily and weekly activity sheets and cleaning logs will be entered into the CMMS weekly by support personnel under the direction of the System Engineer. Reports indicating the progress towards completing cleaning operations in each hot spot area will be compiled and reviewed monthly. This information will be compared to work order and SSO historical information to determine if the frequency or areas cleaned should be increased. This process will also be utilized to identify additional hot spot areas on an ongoing basis. Additional areas identified through this process will be assigned to the City's field crews or the third party contractors.



## **5.0 Preventive Mechanical Cleaning**

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### **5.1 Objectives**

This portion of the GLPM Program has been established to provide preventive maintenance mechanical cleaning to those pipeline segments where routine hydraulic cleaning cannot be performed. The intent of this protocol is to provide cleaning of pipelines where hydraulic methods are ineffective. The City anticipates that mechanical cleaning will be required on those pipelines where the diameters exceed 24-inches and the accumulation of debris has exceeded more than twenty-five percent (25%) of the pipelines hydraulic carrying capacity.

### **5.2 Needs Determination / Priority Establishment**

The System Engineer will review historical work order and SSO information, as well as GIS data and flow monitoring and the results of the hydraulic modeling to prioritize pipelines where mechanical cleaning may be required. Based on this information and the results of the manhole preventive maintenance inspections, specific reaches of large diameter interceptors will be identified where significant debris may have accumulated. Totally Integrated Sonar and CCTV Technique (TISCIT) investigations or acoustic pipe inspections will be performed on these pipelines under the annual blanket contract for CCTV inspection services to determine the extent and depth of debris that may exist in the pipelines. Once specific reaches of sewers have been identified, contracts for cleaning of these pipelines will be developed annually. Priority will be placed on those pipelines and interceptors where repeated SSOs have occurred. Initial investigations will be focused on large diameter interceptors that carry CSS flow or that are immediately upstream of major wastewater pumping stations in the City's WCTS.

### **5.3 Mechanical Cleaning Equipment**

Mechanical cleaning of sewer pipelines consists of several methods depending on the diameter of the pipelines involved. For pipelines between 15-inches and 48-inches in diameter, mechanical means of cleaning will involve the use of belt driven winches and draglines and attachments such as buckets, scrapers, scoops and brushes to remove debris and sediment without the use of water. This method of cleaning typically does not require the by-pass pumping of wastewater flows during the cleaning process. For larger diameter interceptors (> 60-inches) these devices can also be used, as well as manned entry of the pipelines and the use of hand tools and smaller excavators to remove debris. Specialized hydraulic cleaning equipment mounted on flat bed trailers providing pumping and use of wastewater for hydraulic cleaning utilizing special nozzles can also be utilized. These package units typically have the capability of removing and dewatering debris cleaned from the pipelines. Because of the size and complexity involved with operating this equipment, these package units would also fall under the category of mechanical cleaning devices. Currently, the WRD does not maintain equipment for mechanical cleaning of large diameter interceptors and will contract with third party contractors to perform mechanical cleaning of large diameter pipelines.

## 5.4 Procedures

The System Engineer will review historical work order and SSO information, as well as GIS data and flow monitoring and the results of the hydraulic modeling to prioritize pipelines where mechanical cleaning may be required. Based on this information and the results of the manhole preventive maintenance inspections, specific reaches of large diameter interceptors will be identified where significant debris may have accumulated. Additional inspections will be performed on these pipelines under the annual blanket contract for CCTV inspection services to determine the extent and depth of debris that may exist in the pipelines. Annual contracts for mechanical cleaning of these pipelines will be developed and third party contractors hired to perform this work. A Project Coordinator will be assigned to monitor the work while in progress. Weekly cleaning logs will be submitted indicating the footage of pipe cleaned and the total amount and type of debris removed will be captured. The information from these logs will be entered into the CMMS. Once sections of the interceptor have been completed, follow up CCTV or TISCIT inspections or acoustic pipe inspections will be performed to verify that the pipeline has been restored to 95% carrying capacity.

## 5.5 Standard Forms

Standard forms for tracking work progress include the City's Activity Work Sheet shown in Appendix C-2 and the contractors cleaning log shown in Appendix C-3 to this report. Hard copy forms will be completed daily and returned to the System Engineer for processing and entry into the CMMS weekly.

## 5.6 Performance Measures

Approximately five percent (5%) of the sanitary sewer collection system is comprised of pipelines 24-inch or larger in diameter. Beginning in 2015, the WRD will conduct investigations of large diameter sewers subject to combined sewer flows or immediately upstream of major pumping stations to determine pipelines requiring mechanical cleaning. From these assessments, mechanical cleaning service contracts will be developed to perform the cleaning operations in 2016. The goal of the program is to complete the assessments of the larger diameter interceptors within a five year planning period and to complete mechanical cleaning of pipelines, where required, within two years of the initial assessment.

## 5.7 Information Management

Daily and weekly activity sheets and cleaning logs will be entered into the CMMS weekly by support personnel under the direction of the System Engineer. Reports indicating the progress towards completing cleaning operations in each priority area will be compiled and reviewed monthly. This information will be compared to work order and SSO historical information to determine if the frequency or areas cleaned should be increased. This process will also be utilized to identify additional priority areas on an ongoing basis.

# 6.0 Root Control Program

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## 6.1 Objectives

This portion of the GLPM Program has been established to provide chemical root control to those pipeline segments where routine hydraulic cleaning and CCTV inspections have identified significant root issues. The intent of this protocol is to prevent the accumulation of invasive roots into the pipelines and service lateral connections and causing further structural damage to the pipelines, as well as potential sources of blockages and SSOs. This program is designed to provide temporary removal and prevention of root issues until more permanent repairs can be undertaken. The purpose of the chemical root control is to apply a chemical root control agent to portions of the SSS, in order to kill the root growth present in the lines and to inhibit re-growth, without permanently damaging the vegetation producing the roots. The City anticipates that chemical root control will be required on those pipelines where the accumulation of roots has exceeded more than twenty-five percent (25%) of the pipelines internal diameter in more than two locations and CCTV investigations indicate that root intrusion is widespread within the specific areas delineated for treatment.

## 6.2 Needs Determination / Priority Establishment

The System Engineer will review historical work order and SSO information, as well as GIS data and flow monitoring and the results of the hydraulic modeling to prioritize pipelines where chemical root control may be required. Based on this information and the results of the manhole preventive maintenance inspections, specific reaches of sewers will be identified where significant root intrusion may be prevalent. CCTV investigations or acoustic pipe inspections will be performed on these pipelines under the annual blanket contract for CCTV inspection services to determine the extent of root intrusion that may exist in the pipelines. Once specific reaches of sewers have been identified, contracts for chemical root control services will be developed annually. Priority will be placed on those areas where repeated SSOs have occurred.

## 6.3 Root Control Methods & Approaches

Small root intrusions discovered during routine CCTV and hydraulic cleaning operations will be removed via root cutter nozzles utilizing hydraulic cleaning equipment by City field crews and third party contractors where necessary to allow CCTV inspection of the pipeline or to restore carrying capacity or prevent future blockages. For those pipelines where significant root intrusions have exceeded more than twenty-five percent (25%) of the pipe's radius in more than one location or have resulted in an SSO or building backup, chemical root control will be conducted. Because of the complexity involved and the specialized equipment necessary for the successful application of chemical root control agents, third party contractors will be selected to perform this work under annual blanket contracts for services.

## 6.4 Procedures

The System Engineer will review historical work order and SSO information, as well as GIS data and flow monitoring and the results of the hydraulic modeling to prioritize pipelines where chemical root control may be required. Based on this information and the results of the manhole preventive maintenance inspections, the System Engineer will identify specific reaches of sewers where significant root intrusion may be prevalent. CCTV investigations or acoustic pipe inspections will be performed on these pipelines under the annual blanket contract for CCTV inspection services to determine the extent of root intrusion that may exist in the pipelines.

Once priority areas have been determined, third party contractors will be assigned contracts to perform root control in these areas. A Project Coordinator will be assigned to monitor the progress of the contractor performing the chemical root control agent application. Guidelines for the work include:

- The work should be performed in accordance with label instructions of the chemical agent and in accordance with the best recommended practice for conditions present in the line under treatment.
- Applications should be done by foaming or other methods as provided on product labels.
- The application of the material should be performed in such a way as to contact roots within the primary main line sewer to be treated.
- Applications should penetrate secondary lateral sewers in order to contact roots residing in the “wye” connections.
- The foam should be generated through the use of air injection equipment and the foam should be pumped into the sewer under pressure as foam.
- The foam quality should be sufficient to penetrate “wye” connections and effectively treat large diameter pipelines.
- Applications of chemicals designed to generate foam “chemically” on contact with water should not be used.
- Manholes used to access a main line sewer section for treatment (Access Manholes) should be treated as part of the main line treatment.
- Steps should be taken to prevent adverse effects on wastewater treatment plant processes during large scale treatment projects located immediately upstream of the plant.
- The work under these annual contracts for chemical root control should be performed by certified pesticide applicators licensed with the Tennessee Department of Agriculture.

Weekly cleaning logs should be submitted indicating the footage of pipe treated. The information from these logs should be entered into the CMMS. Once sections of the interceptor have been completed, follow up CCTV inspections or acoustic pipe inspections should be performed to verify that the pipeline has been restored to 95% carrying capacity.

## 6.5 Standard Forms

Standard forms for tracking work progress include the City's Activity Work Sheet shown in Appendix C-2 and the contractors cleaning log shown in Appendix C-3 to this report. Hard copy forms will be completed daily and returned to the System Engineer for processing and entry into the CMMS weekly.

## 6.6 Performance Measures

Under this program, the WRD has established an annual chemical root control goal of 50,000 feet of pipeline beginning in 2016. Thereafter, this performance goal will be adjusted annually depending on system conditions.

## 6.7 Information Management

Daily and weekly activity sheets and cleaning logs will be entered into the CMMS weekly by support personnel under the direction of the System Engineer. Reports indicating the progress towards completing chemical root control operations in priority areas will be compiled and reviewed monthly. This information will be compared to work order and SSO historical information to determine if the frequency or areas treated should be expanded. This process will also be utilized to identify additional priority areas on an ongoing basis.

# 7.0 SSO Reduction Program

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## 7.1 Objectives

The goal of this portion of the GLPM Program is to establish protocols for identifying and addressing repeated SSOs in the WCTS where preventive maintenance activities can be undertaken to alleviate or eliminate SSOs.

## 7.2 Needs Determination / Priority Establishment

The System Engineer will review historical SSO locations, work order history and the results of the flow monitoring and hydraulic modeling to determine priority areas where preventive maintenance activities such as hydraulic and mechanical cleaning, CCTV investigations, and manhole inspections will be performed. Based on the results of these investigations, priority areas will be identified where frequent preventive maintenance activities will be performed. When determining the frequency at which preventive maintenance should be undertaken, factors such as the rate of blockage accumulation, pending FOG control enforcement actions, potential for upstream overflows and time since last SSO occurrence will be considered. Depending on these factors and the probability of an overflow occurring, the frequency of preventive maintenance activities will be increased or decreased. These preventive maintenance activities will be considered as short-term proactive steps that will be taken to avoid future system disruptions. These activities will be undertaken until the line segment can be rehabilitated or repaired permanently.

## 7.3 Methods & Approaches

A preventive maintenance program is a proactive activity that restores or maintains the intended function of an asset before failure. The maintenance activity is planned and scheduled periodically based on the asset condition to prevent blockage-related SSOs from occurring or recurring. The WRD has chosen to outsource the program through annual blanket contracts that will be evaluated periodically. WRD personnel will perform corrective maintenance required to mitigate blockages. A corrective maintenance is a reactive activity that occurs in response to an asset failure characterized by the loss of the intended function. Corrective maintenance is event driven, i.e., a failure event occurs before any maintenance activity is scheduled. First Responders and Sewer Maintenance Crews will have the primary responsibility for implementing the SORP, addressing customer requests, removing system disruptions that could result in SSOs, making point repairs, and other unscheduled maintenance activities. Line segments are added to the GLPM Program when its cleaning frequency under the maintenance cycle proves insufficient to prevent overflows. Each line segment included in the GLPM Program is assigned a maintenance frequency dependent upon its condition assessment and other information derived from the CMMS. Also, prescribed maintenance activities determined by the nature of the system problem (i.e. roots, grease, debris, etc.) are assigned to the line segment.

## 7.4 Procedures

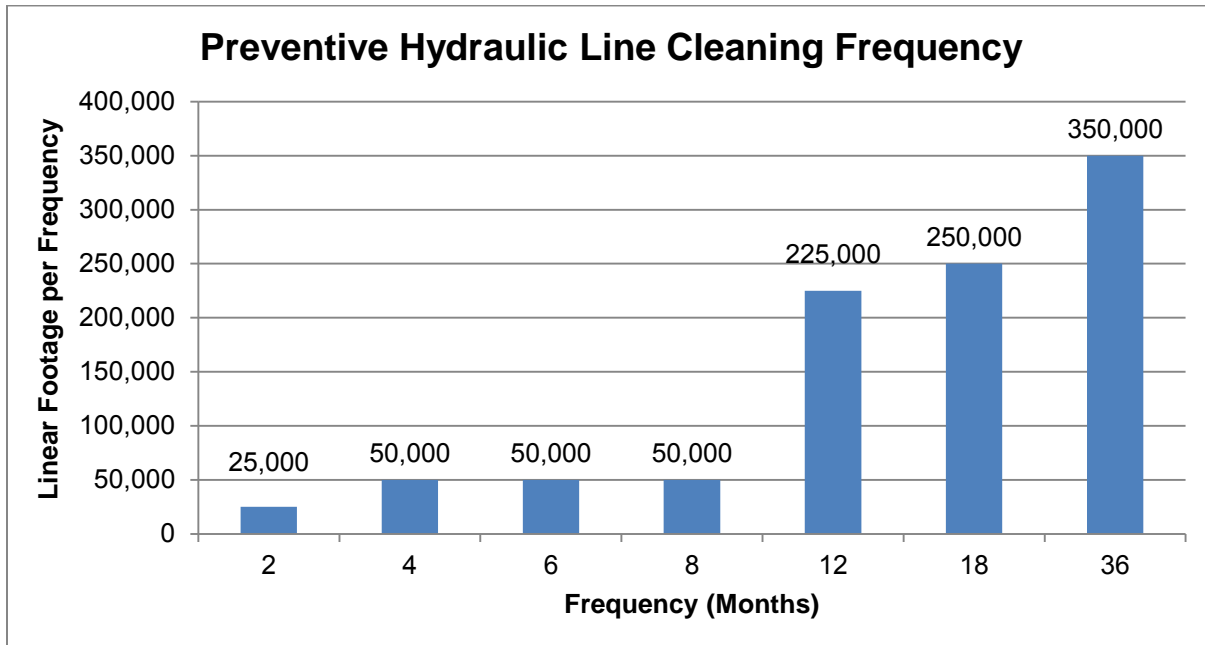
The following procedures will be followed when developing the SSO reduction program:

1. The System Engineer will review historical CMMS information such as SSO and work order history and flow monitoring and hydraulic modeling information to develop a list of priority areas where cleaning and CCTV and manhole investigations will be performed to assess the condition of the pipelines and manhole assets.
2. Based on the condition assessment of the asset, preventive maintenance activities will be assigned at frequencies required to mitigate SSOs.
3. Preventive maintenance activities will be undertaken by City field crews and third party contractors.
4. Logs of the maintenance activities will be entered into the CMMS and GIS.
5. The System Engineer will continually monitor SSOs and customer complaints and work order histories in each priority project area to determine if preventive maintenance activities have resulted in fewer blockages or SSOs. Maintenance frequencies and activities will be increased or decreased depending on the number of SSOs and blockages experienced after maintenance is performed.
6. For those line segments requiring preventive maintenance activities more frequent than every 18-24 months, a corrective action plan will be developed to rehabilitate or repair the pipeline or asset. Depending on the extent of the required repairs, this may be handled by internal City Sewer Maintenance Crews or contracted out as part of a larger rehabilitation or replacement project utilizing third party contractors.

## 7.5 Performance Measures

The performance measures established for the SSO reduction program is ultimately reduce the number of preventable SSOs caused by the build-up of debris, sediment, roots and grease in the collection system. Because I&I is a significant contributing factor of SSOs, it is important that categorization of the cause of the SSOs be properly performed under the SORP. Another specific performance measure that will be assessed annually will be the linear footage of pipelines and frequency that preventive maintenance hydraulic cleaning is performed. The goal of the program is to keep the total linear footage of pipelines receiving repetitive preventive maintenance hydraulic cleaning to the minimum required to prevent blockages and SSOs. Figure 7-1 outlines the program goals established for this specific preventive maintenance activity.

**Figure 7-1**  
Preventive Hydraulic Line Cleaning Frequency Performance Goals



## 7.6 Information Management

SSOs will be tracked and historical records maintained as established under the SORP protocols. Preventive maintenance activities will be tracked and integrated into the CMMS as described in each section of this program. The System Engineer will review this information quarterly to determine the progress towards meeting the performance measures established to ensure that preventive maintenance activities are scheduled and performed as necessary to reduce the occurrence of repeat SSOs in the WCTS.



# 8.0 Distribution and Maintenance of GLPM Program

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## 8.1 GLPM Submittal and Availability

Copies of the GLPM Program and amendments will be distributed to the following WRD sections and/or functional positions:

- Director;
- Deputy Director;
- Plant Manager;
- System Engineer; and
- Maintenance Manager.

Other personnel who may become incidentally involved in conducting maintenance activities under this program should also become familiar with the GLPM Program.

## 8.2 GLPM Review and Update

The program should be reviewed annually and amended as appropriate. The City will:

- Update the GLPM with the issuance of a revised or new NPDES permit;
- Conduct annual training sessions with appropriate personnel; and
- Review and update, as needed, the various contact person lists included in the SORP.

Those involved with the annual review will include:

- System Engineer;
- Sewer Maintenance General Supervisor;
- Plant manager;
- Plant Operations Supervisor – Pump Stations & CSOTFs;
- Plant Operations Supervisor- Liquids; and
- Maintenance Manager.

## 8.3 Training

The City will conduct training for the appropriate Dispatchers, First Responders, maintenance crews, and support staff on this GLPM Program. These training sessions will be organized based on the latest version of the program, as well as other pertinent reference materials. Training sessions will be supplemented with a practical hands-on field component so that personnel are familiar with the operation of equipment and procedures necessary to accomplish the specific maintenance activities. Supervisors will conduct refresher sessions annually or when any revisions are made to the GLPM Program. The annual training sessions will be held approximately in August of each calendar year. The System Engineer, Sewer Construction

Manager and Sewer Maintenance General Supervisor and ISS General Supervisor will oversee the GLPM Program implementation and field operations to ensure that the established procedures are being followed.

## 8.4 GLPM Implementation Schedule

The following table delineates the implementation schedule for the various components of the GLPM Program:

**Table 8-1**  
GLPM Program Implementation Schedule

Task	Start	Frequency
Identify Priority Areas for Manhole Preventive Maintenance Inspections	Aug. 2014	Annually
Conduct Staff Training and begin Manhole MACP Level 1 Inspections	Jan. 2015	
Conduct Manhole MACP Level 2 Inspections with third party contractors	July 2015	
Identify Hot Spot Areas for Preventive Hydraulic Cleaning	Aug. 2014	Semi-Annually
Identify Priority Areas for Preventive Mechanical Cleaning	Oct. 2014	Annually
Identify Priority Areas for Preventive Root Control	Oct. 2014	Annually
Review historical SSOs, Work Orders and Preventive Inspections and Cleaning for progress towards reducing SSOs	Ongoing	Quarterly

**Appendix A**  
**Waste Resources Division**  
**Organization Charts and Equipment**

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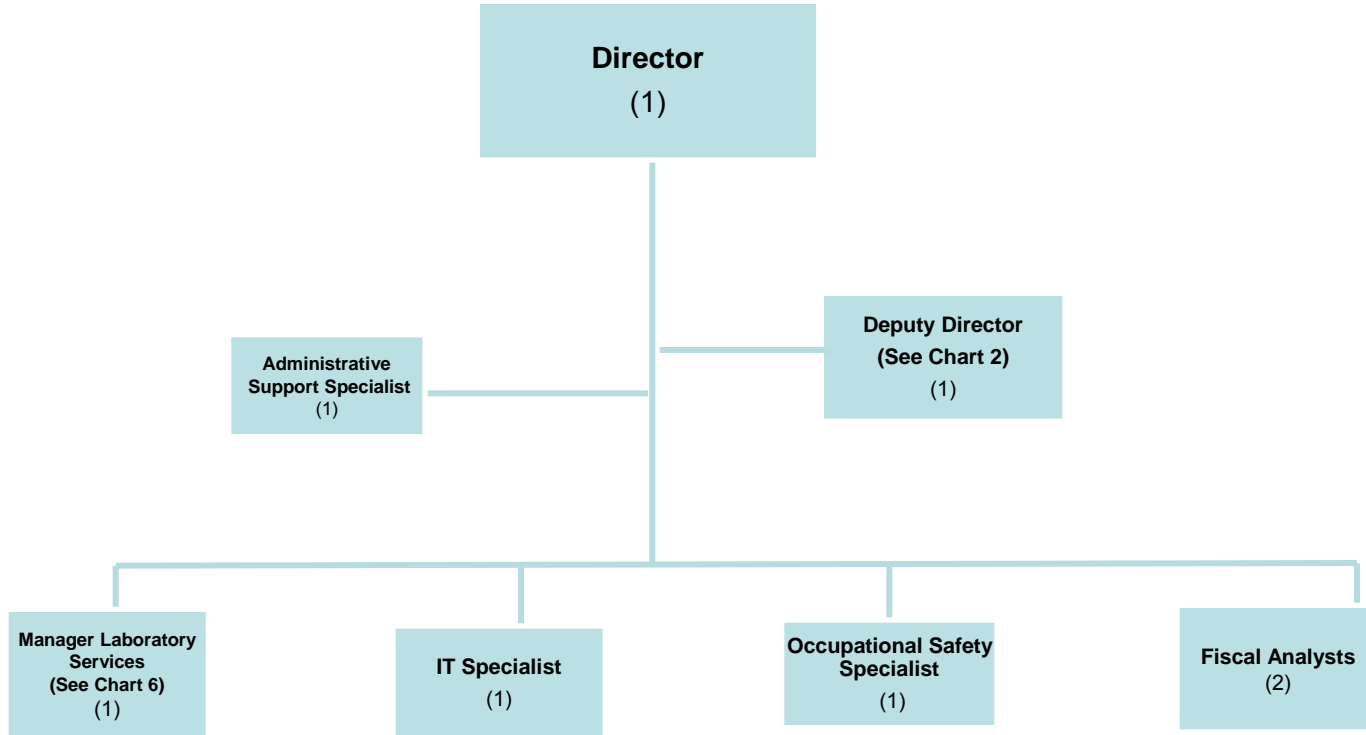
# Appendix A-1

## WRD Organization Charts

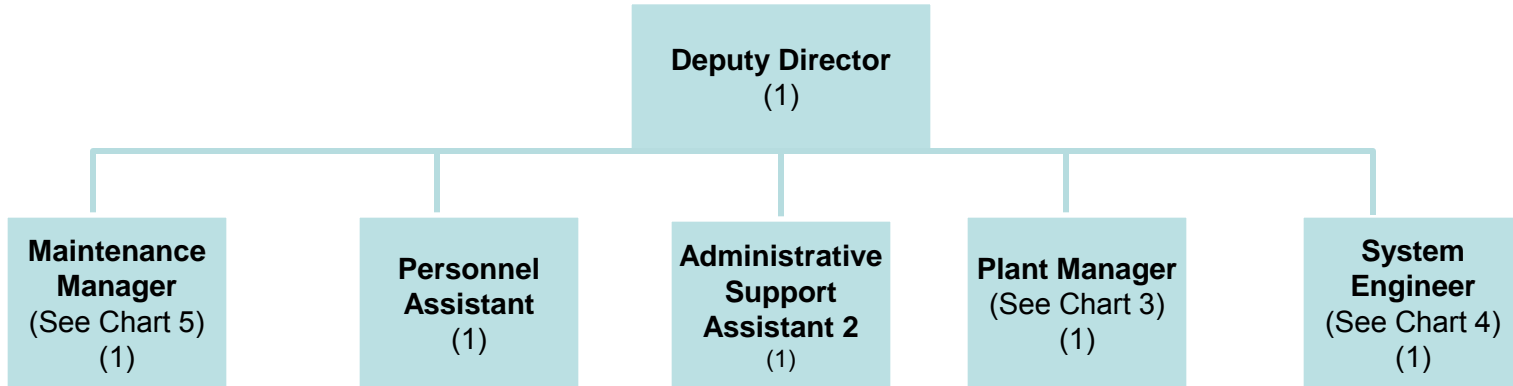
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WASTE RESOURCES DIVISION  
ORGANIZATIONAL CHART  
(September, 2014)



WASTE RESOURCES DIVISION  
ORGANIZATIONAL CHART  
Chart 2  
(September, 2014)

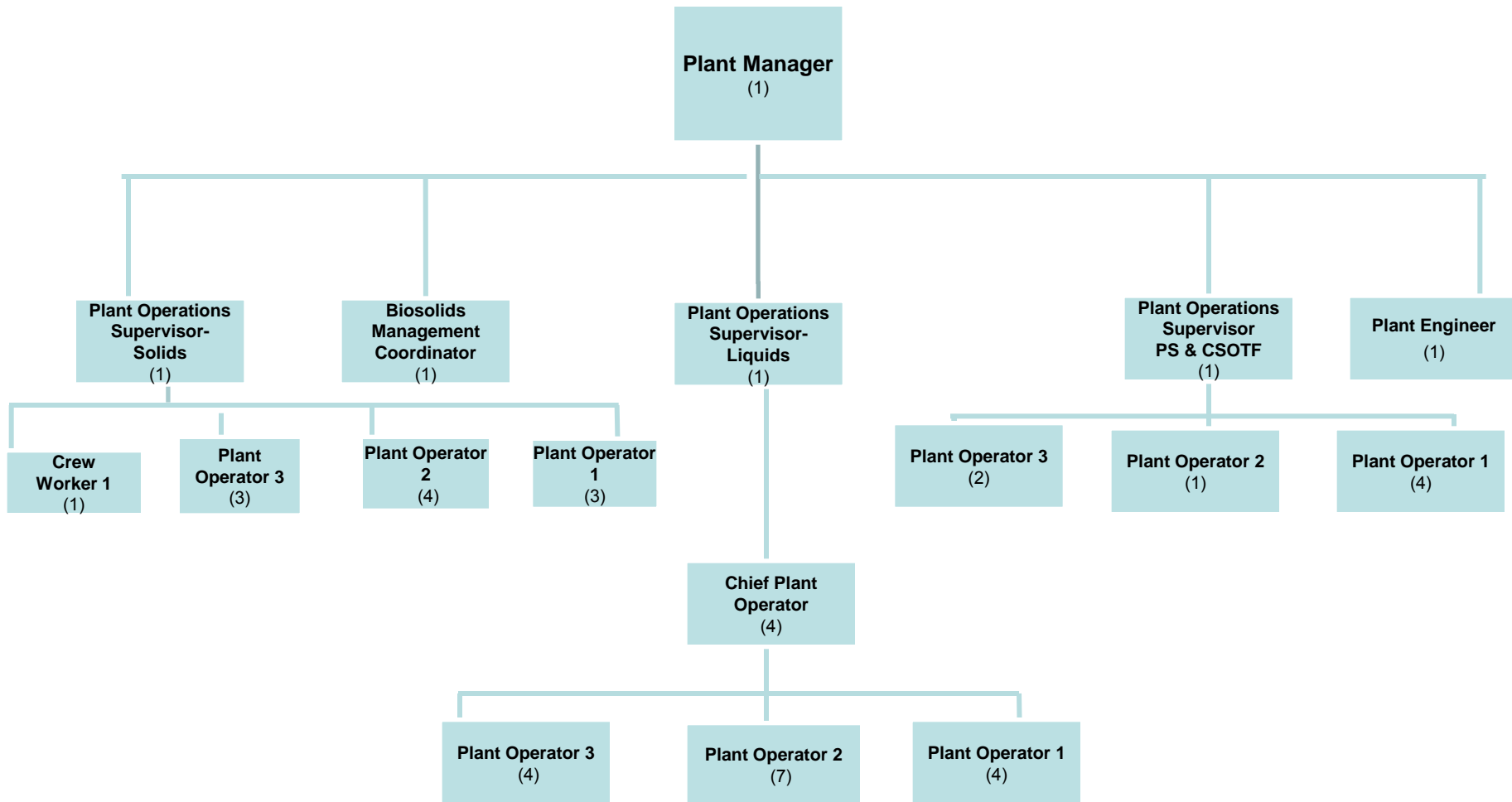




# WASTE RESOURCES DIVISION ORGANIZATIONAL CHART

## Chart 3

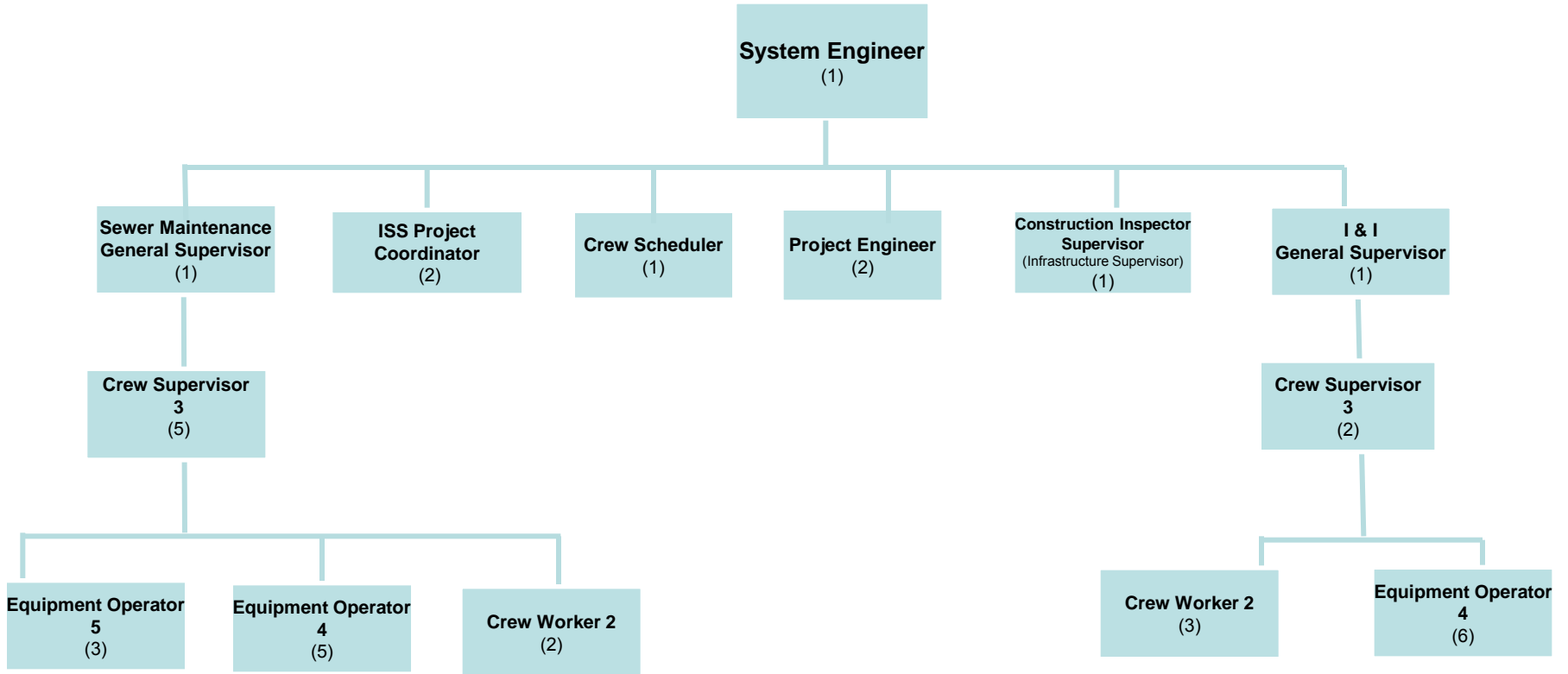
(September, 2014)



# WASTE RESOURCES DIVISION ORGANIZATIONAL CHART

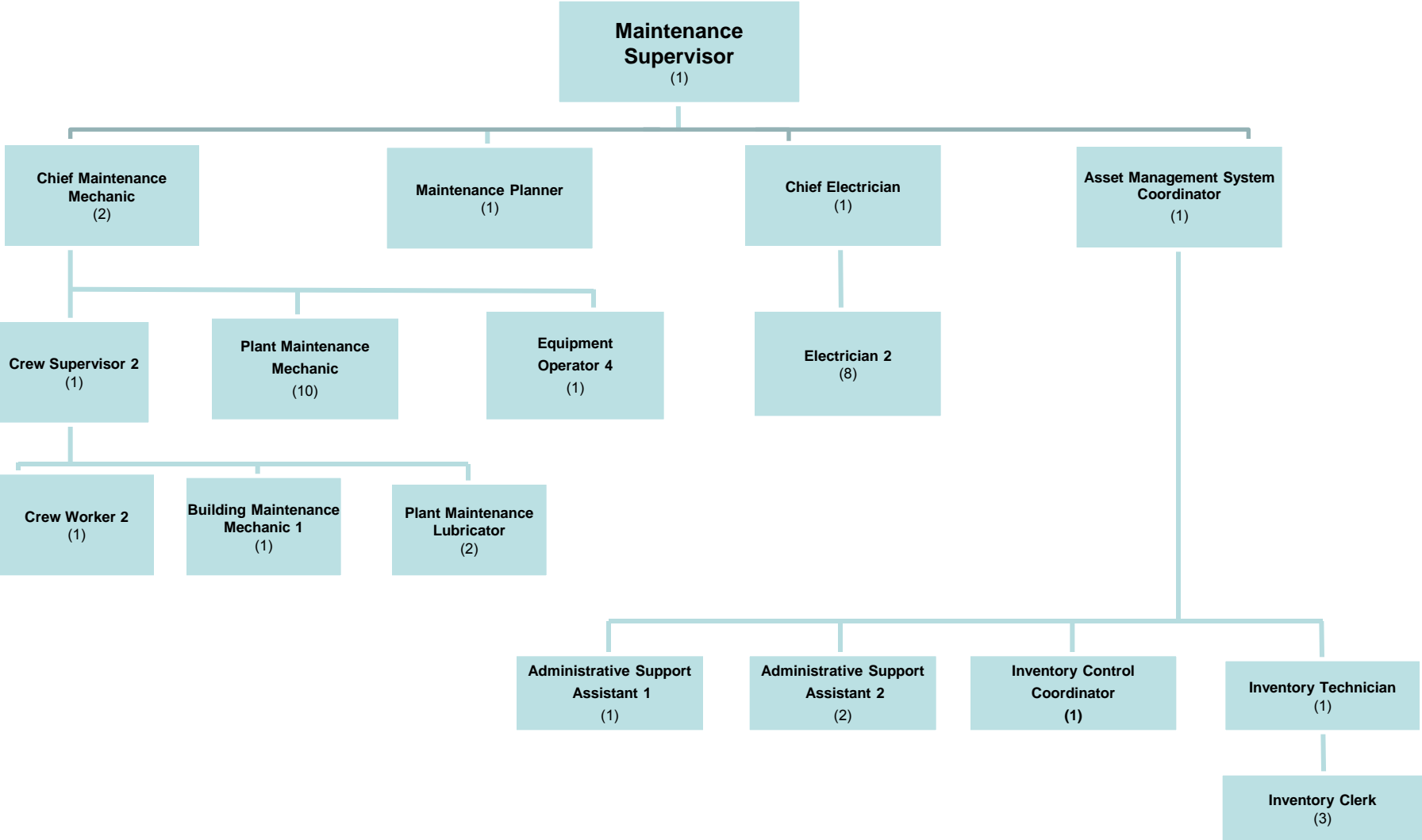
## Chart 4

(September, 2014)



# WASTE RESOURCES DIVISION ORGANIZATIONAL CHART

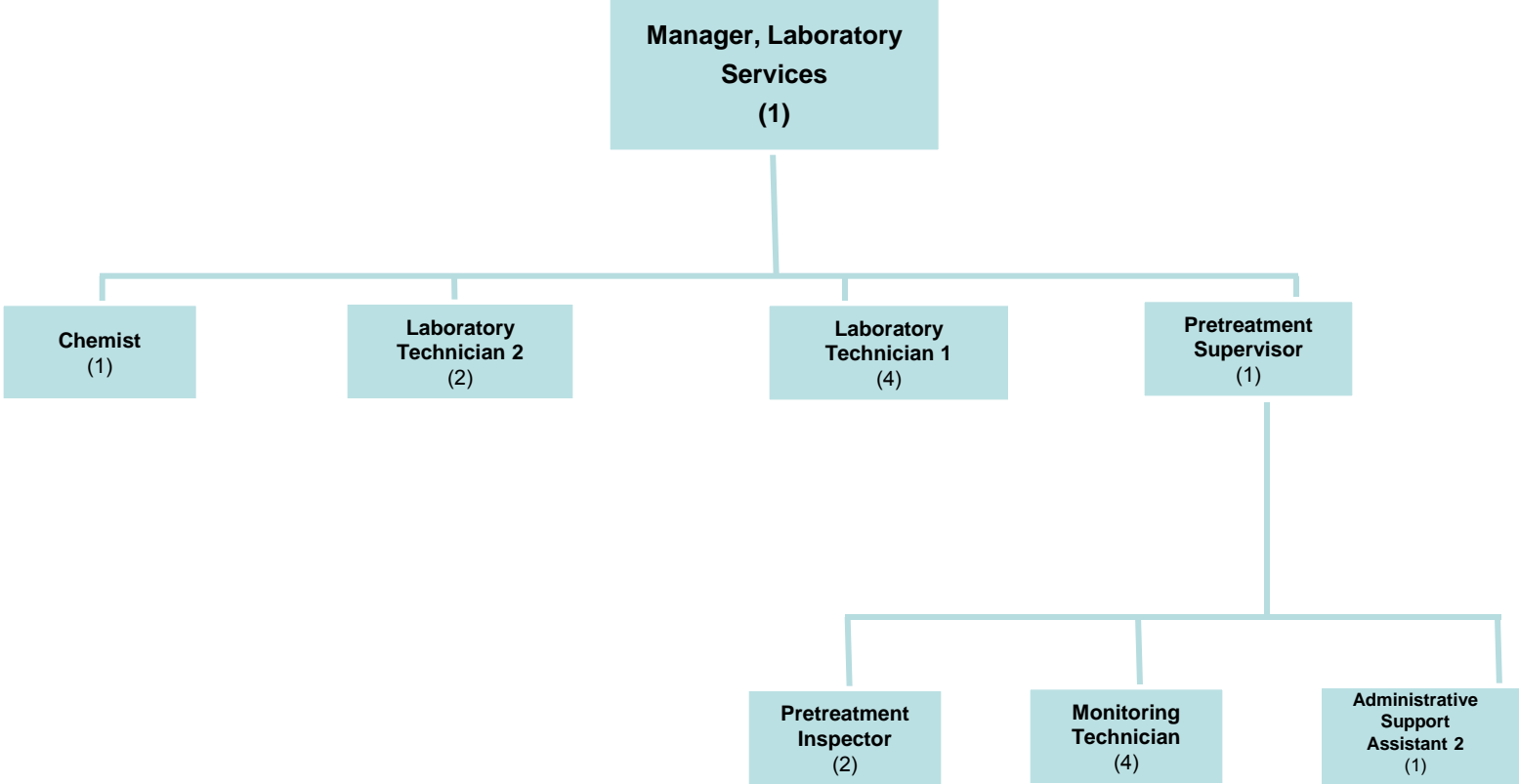
Chart 5  
(September, 2014)



# WASTE RESOURCES DIVISION ORGANIZATIONAL CHART

## Chart 6

(September, 2014)



Appendix A-2  
ISS List of Available Equipment

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## ISS List of Available Equipment

<b>Sewer Maintenance</b>					
<b>QTY</b>	<b>Equipment</b>	<b>W#</b>	<b>W#</b>	<b>W#</b>	<b>W#</b>
1	Pick Up	W6676	-	-	-
3	Crew Cab	W6674	W6675	W6677	
2	Van	W6622	WL6678	-	-
2	Flat Bed	W6630	W6609	-	-
1	Pipe Hunter	W6651	-	-	-
1	Flush Truck	W7935	-	-	-
4	Dump Truck	W6656	W6673	W656	W690
3	Track hoe	W6683	W6688	W6639	-
1	Backhoe	W651	-	-	-
2	Bobcat	W6694	W6695	-	-
4	Equipment Trailer	W644T	W283T	W6656T	W690T
3	Trailer (small)	No W#	No W#	No W#	-
2	Air Compressor	W687	W8012		
3	Generator	No W#	No W#	No W#	
2	Pump	W631	No W#		
<b>Inflow and Infiltration</b>					
<b>QTY</b>	<b>Equipment</b>	<b>W#</b>	<b>W#</b>	<b>W#</b>	<b>W#</b>
2	Pick Up	W6645	WL6673		
1	Pipe Hunter	W3839			
2	CCTV Truck	W6624	W6657		
3	Vac-Con	W6689	W6692	W7910	
<b>Plant Maintenance</b>					
<b>QTY</b>	<b>Equipment</b>	<b>W#</b>	<b>W#</b>	<b>W#</b>	<b>W#</b>
4	Portable Generator	2-at plant	1-at BR#1	1-at Egate	
1	Permanent Generator (O&C)	No W#			





**Appendix B**  
**Manhole Prevention Maintenance**  
**Support Information**

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Appendix B-1  
Level 1&2 MACP Required Data Fields

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## APPENDIX B-1

## Level 1 &amp; 2 Required Data Fields

Manhole Inspection Header Form Information				
Field No.	Field Name	Description	Req'd Level 1	Req'd Level 2
1	Surveyed By	Name or initials of person completing survey	Yes	Yes
2	Certificate Number	NASSCO Certificate # of person completing survey	Yes	Yes
3	Owner	Owner of Asset (City)	No	No
4	Customer	Who requested survey	No	No
5	Drainage Area	Common name given to drainage basin	No	No
6	Sheet Number	If multiple sheets used for survey	Yes	Yes
7	P/O Number	Customer's purchase order number	No	No
8	Date	Survey date in YYYYMMDD format	Yes	Yes
9	Time	Time in military format	No	No
10	Address	Street name and number	Yes	Yes
11	City	Name of city or town	Yes	Yes
12	Location Details	Further description of location	No	No
13	Manhole Number	Reference number for manhole	Yes	Yes
14	Rim to Invert	To nearest tenth of a foot on outgoing side	No	Yes
15	Grade to Invert	To nearest tenth of a foot on outgoing side	No	Yes
16	Rim to Grade	To nearest tenth of a foot on lowest side	No	Yes
17	MH Use	List of defined codes showing sanitary, storm, etc.	Yes	Yes
18	Year Built	Year Manhole was constructed in YYYY format	No	No
19	Year Renewed	Year manhole was rehabilitated in YYYY format	No	No
20	Media Label	If video recorded enter media number where stored	No	No
21	Purpose	List of defined codes for survey purpose	Yes	Yes
22	Category	Criticality code (A, B, or C) provided by client	No	No
23	Pre-Cleaning	List of defined codes for pre-cleaning of manhole	No	Yes
24	Date Cleaned	Date manhole cleaned in YYYYMMDD format	No	No
25	Weather	List of defined weather at time of survey	No	No
26	Location Code	List of defined location codes	Yes	Yes
27	Additional Info	Other appropriate details about survey	No	No
28	Surface Type	List of defined surface types	Yes	Yes
29	Potential for runoff	List of valid MACP surface types	No	No
30	Access Type	List of appropriate PACP access point types	Yes	Yes
31	Northing	Y Coordinate	No	No
32	Easting	X Coordinate	No	No
33	Elevation	Z Coordinate	No	No
34	Coordinate System	Required if using GPS coordinates	No	No
35	GPS Accuracy	Degree of accuracy obtained from coordinates	No	No
36	Inspection Status	List of valid MACP inspection status codes	Yes	Yes
37	Evidence of Surcharge	Yes or No	Yes	Yes
38	Inspection Level	Level 1 or Level 2	Yes	Yes
39	Sketch	Generic Field for sketch of manhole location	No	No

Notes: Field numbers in red denote mandatory fields under MACP protocols.

**APPENDIX B-1 Continued**  
**Level 1 & 2 Required Data Fields**

<b>Manhole Component Observation Form Information</b>				
<b>Field No.</b>	<b>Field Name</b>	<b>Description</b>	<b>Req'd Level 1</b>	<b>Req'd Level 2</b>
<b>40</b>	Cover Shape	Geometric Description of Cover	Yes	Yes
<b>41</b>	Cover Size	Measured to nearest tenth of an inch	Yes	Yes
<b>42</b>	Cover Size Width	For non-circular covers	Yes	Yes
<b>43</b>	Cover Material	List of appropriate MACP cover materials	Yes	Yes
<b>44</b>	Cover Type	List of defined MACP cover types	Yes	Yes
<b>45</b>	Hole Diameter	If vent holes, select from list of defined hole ranges	No	Yes
<b>46</b>	Hole Number	Number of holes in cover	Yes	Yes
47	Cover Bearing Surface	Diameter where cover rest on frame in inches	No	Yes
<b>48</b>	Cover Bearing Width	Width of cover where rests in frame in inches	No	Yes
<b>49</b>	Cover/Frame Fit	List of defined MACP cover fits	Yes	Yes
<b>50</b>	Cover Condition	List of valid MACP cover condions	Yes	Yes
<b>51</b>	Insert Type	List of valid MACP cover inserts	Yes	Yes
<b>52</b>	Insert Condition	List of valid MACP insert conditions	Yes	Yes
<b>53</b>	Adjustment Ring Type	List of valid MACP adjustment ring types	Yes	Yes
<b>54</b>	Adjst Ring Material	List of valid MACP materials	Yes	Yes
<b>55</b>	Ring Condition	List of valid MACP conditions	Yes	Yes
56	Ring Height	From top to bottom of ring in inches	No	No
<b>57</b>	Frame Material	List of valid MACP materials	Yes	Yes
<b>58</b>	Frame Bearing Width	Width of surface cover sits on	No	Yes
<b>59</b>	Frame Bearing Depth	Distance from top of frame to bearing surface	No	Yes
<b>60</b>	Frame Opening Diam	Minimum diameter of frame opening	No	Yes
<b>61</b>	Frame Condition	List of valid MACP conditions	Yes	Yes
<b>62</b>	Seal Condition	List of valid MACP conditions for frame seal	Yes	Yes
<b>63</b>	Frame Offset	Distance frame offset from cone in inches	Yes	Yes
<b>64</b>	Frame Seal Inflow	List of valid MACP inflow codes	Yes	Yes
65	Frame Depth	Distance from top of frame to bottom in inches	No	No
<b>66</b>	Chimney Material	List of valid MACP materials	Yes	Yes
<b>67</b>	Chimney I/I	List of valid MACP infiltration/inflow codes	Yes	No
68	Chimney Opening	Diameter of chimney clear opening	No	No
<b>69</b>	Chimney Depth	Measurement from top of chimney to bottom in inches	No	Yes
70	Chimney Lining Interior	List of valid MACP lining materials	No	No
71	Chimney Lining Exterior	List of valid MACP lining materials	No	No
<b>72</b>	Cone Type	List of valid MACP cone types	Yes	Yes
<b>73</b>	Cone Material	List of valid MACP materials	Yes	Yes
<b>74</b>	Cone Depth	Depth of cone to nearest tenth of a foot	No	Yes
75	Cone Lining Interior	List of valid MACP lining materials	No	No
76	Cone Lining Exterior	List of valid MACP lining materials	No	No
77	Wall Diameter	Measured to nearest inch (if box, length by width)	No	No
<b>78</b>	Wall Material	List of valid MACP materials	Yes	Yes
<b>79</b>	Wall Depth	Measured to nearest tenth of a foot	No	Yes

Notes: Field numbers in red denote mandatory fields under MACP protocols.

**APPENDIX B-1 Continued**  
**Level 1 & 2 Required Data Fields**

<b>Manhole Component Observation Form Information Continued...</b>				
<b>Field No.</b>	<b>Field Name</b>	<b>Description</b>	<b>Req'd Level 1</b>	<b>Req'd Level 2</b>
80	Wall Lining Interior	List of valid MACP lining materials	No	No
81	Wall Lining Exterior	List of valid MACP lining materials	No	No
<b>82</b>	Bench Present	Yes, Partial, None	Yes	Yes
<b>83</b>	Bench Material	List of valid MACP materials	No	Yes
84	Bench Lining	List of valid MACP lining materials	No	No
<b>85</b>	Channel Installed	Yes or No	Yes	Yes
<b>86</b>	Channel Material	List of valid MACP materials	No	Yes
<b>87</b>	Channel Type	Pipe, Formed, Precast, Insert	No	Yes
<b>88</b>	Channel Exposure	Fully Opened, Partially Opened, Closed	No	Yes
<b>89</b>	Step Number	Number of steps in manhole	Yes	Yes
<b>90</b>	Step Material	Metal, Plastic, Brick, Other	Yes	Yes

<b>Manhole Pipe Connection Form Information</b>				
<b>Field No.</b>	<b>Field Name</b>	<b>Description</b>	<b>Req'd Level 1</b>	<b>Req'd Level 2</b>
<b>91</b>	Pipe Number	Starting with outgoing moving clockwise	Yes	Yes
<b>92</b>	Clock Position	Outgoing is 6 o'clock	Yes	Yes
<b>93</b>	Rim to Invert	Measured to nearest tenth of a foot	No	Yes
<b>94</b>	Direction	In or Out	Yes	Yes
<b>95</b>	Material	List of valid PACP materials	No	Yes
<b>96</b>	Shape	List of valid PACP shapes	No	Yes
<b>97</b>	Diam 1	Diameter or nearest tenth of an inch	No	Yes
<b>98</b>	Diam 2	Pipe width is non circular pipe	No	Yes
<b>99</b>	Pipe Condition	Sound or Defective	No	Yes
<b>100</b>	Seal Condition	Sound or Defective	No	Yes
<b>101</b>	Special Condition	List of valid MACP pipe types	Yes	Yes
102	Structure ID	Pipe segment reference	No	No
103	Additional Info	Any other appropriate details	No	No

Notes: Field numbers in red denote mandatory fields under MACP protocols.





Appendix B-2  
Level 1 MACP Inspection Form

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# LEVEL 1 MANHOLE INSPECTION FORM

MANHOLE # : \_\_\_\_\_ DATE \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ SURVEYOR: \_\_\_\_\_

CERTIFICATE #: \_\_\_\_\_ SHEET #: \_\_\_\_\_ CITY: \_\_\_\_\_

LOCATION: \_\_\_\_\_

HOUSE NO. \_\_\_\_\_ STREET ADDRESS: \_\_\_\_\_

- MANHOLE USE**..... 1-SANITARY 2-STORM 3-PROCESS 4-COMBINED 5-FORCE MAIN 6-OTHER
- PURPOSE**..... 1-MAINT 2-I&I 3-POST REHAB 4-PRE REHAB 5-NEW 6-ROUTINE 7-CAP 8-SSSES 9-OTHER
- INSPECTION STATUS**..... 1-SURFACE 2-DESCENT 3-REMOTE 4-NOT FOUND 5-NO ACCESS 6-OTHER
- LOCATION**..... 1-MAIN HWY 2-LT HWY 3 EASEMENT 4-WOODS 5-SIDEWALK 6-YARD 7-OTHER
- SURFACE TYPE**..... 1-ASPHALT 2-CONCRETE 3-GRAVEL 4-DIRT/GRASS 5-OTHER
- ACCESS TYPE**..... 1-MANHOLE 2-METER 3-WET WELL 4-CLEAN OUT 5-CATCH BASIN 6-OTHER
- EVIDENCE OF SURCHARGE**..... 1-YES 2-NO
- INSPECTION LEVEL**..... 1-LEVEL 1 2-LEVEL 2
  
- COVER**
  - A. *SHAPE*..... 1-CIRCULAR 2-OVAL 3-RECTANGULAR 4-SQUARE 5-OTHER
  - B. *SIZE*..... (INCHES)
  - C. *WIDTH*..... (INCHES) FOR NON-CIRCULAR COVERS
  - D. *MATERIAL*..... 1-CAST IRON 2-CONCRETE 3-STEEL 4-PVC 5-OTHER
  - E. *COVER TYPE*..... 1-SOLID 2-VENTED 3-GASKETED 4-BOLTED 5-WATER-TIGHT 6-OTHER
  - F. *NUMBER HOLES*..... (NUMBER)
  - G. *HOLE DIAMETER*..... (INCHES)
  - H. *COVER FIT*..... 1-OVERSIZED 2-GOOD 3-UNDERSIZED 4-ROCKS/WOBBLES
  - I. *CONDITION*..... 1-SOUND 2-CRACKED 3-BROKEN 4-MISSING 5-CORRODED 6-BOLTS MISSING
  
- INSERT**
  - A. *TYPE*..... 1-PLASTIC 2-METAL 3-OTHER
  - B. *CONDITION*..... 1-SOUND 2-POOR FIT 3-CRACKED 4-LEAKING 5-FALLEN 6-CORRODED
  
- RISER**
  - A. *TYPE*..... 1-SOLID 2-ADJUSTABLE 3-NONE
  - B. *MATERIAL*..... 1-CAST IRONE 2-CONCRETE 3-PLASTIC 4-STEEL 5-OTHER
  - C. *CONDITION*..... 1-SOUND 2-CRACKED 3-BROKEN 4-CORRODED 5-LEAKING 6-POOR INSTALL
  
- FRAME**
  - A. *MATERIAL*..... 1-CAST IRON 2-CONCRETE 3-PLASTIC 4-STEEL 5-OTHER
  - B. *CONDITION*..... 1-SOUND 2-CRACKED 3-BROKEN 4-MISSING 5-CORRODED 6-COATED
  - C. *SEAL CONDITION*..... 1-SOUND 2-CRACKED 3-LOOSE 4-OFFSET 5-MISSING
  - D. *OFFSET*..... (INCHES)
  - E. *INFLOW*..... 1-NONE 2-WEEPER 3-DRIPPER 4-RUNNER 5-GUSHER 6-STAINED
  
- CHIMNEY**
  - A. *MATERIAL*..... 1-BRICK 2-CONCRETE 3-PLASTIC 4-LINED 5-METAL 6-OTHER
  - B. *INFILTRATION*..... 1-NONE 2-WEEPER 3-DRIPPER 4-RUNNER 5-GUSHER 6-STAINED
  
- CONE**
  - A. *TYPE*..... 1-FLAT TOP 2-CONICAL CENTERED 3-CONICAL OFF CENTERED
  - B. *MATERIAL*..... 1-BRICK 2-CONCRETE 3-PLASTIC 4-METAL 5-LINED 6-OTHER
  
- WALL**
  - A. *MATERIAL*..... 1-BRICK 2-CONCRETE 3-PLASTIC 4-METAL 5-LINED 6-OTHER
  - B. *DIAMETER*..... (INCHES)
  - C. *LENGTH*..... (FOR RECTANGULAR MANHOLES)
  
- BENCH TYPE**..... 1-NONE 2-PRECAST 3-BRICK 4-BLOCK 5-POURED
- CHANNEL TYPE**..... 1-NONE 2-PRECAST 3-POURED 4-VCP 5-PVC
- STEPS**
  - A. *NUMBER*..... (NUMBER OF STEPS IN MH)
  - B. *MATERIAL*..... 1-METAL 2-PLASTIC 3-BRICK 4-OTHER

**TOTAL MANHOLE DEPTH** ..... (TO NEAREST TENTH OF A FOOT)

**ADDITIONAL INFO** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



## LEVEL 2 MANHOLE INSPECTION FORM (CONTINUED)

MANHOLE # : \_\_\_\_\_ DATE \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ SURVEYOR: \_\_\_\_\_

CERTIFICATE #: \_\_\_\_\_ SHEET #: \_\_\_\_\_ CITY: \_\_\_\_\_

**PIPE CONNECTIONS**

NUMBER (CLOCKWISE FROM OUTGOING)	CLOCK POSITION (STARTING WITH OUTGOING)	DIRECTION (IN/OUT)	MATERIAL	DIAMETER	TYPE (GRAVITY, DROP, SERVICE)

**COMMENTS:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



## Appendix B-3

# Example of Level 2 MACP Inspection Report

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## MACP Inspection Report

Manhole Number	Access Type	Drainage Area	MH Use	Owner	Customer	
S127C007	Manhole	MB-05	Sanitary	City of Chattanooga, TN	Littlejohn Eng Assoc, Inc.	
Year Built	Year Renewed	City	Street Address	Location Details		
		Chattanooga, TN	Judd Rd.	Easement behind listed address		
Location Code	Surface Type: <input type="checkbox"/> Asphalt <input type="checkbox"/> Concrete Pavement <input type="checkbox"/> Concrete Collar <input checked="" type="checkbox"/> Grass/Dirt <input type="checkbox"/> Gravel <input type="checkbox"/> Other					
Woods						
Surveyor	Cert No.	Project	Work Order	PO#	Purpose	Category
ASTUTTS_CES	U-509-8673	1239			Sewer System Evaluation Survey	
Date	Time	Inspection Level	Inspection Status	Evidence of Surcharge	Weather	Potential for Runoff
2013-08-07	14:04	Level 2	Remote Inspection	Yes	Dry	Ponding
Pre-Cleaning	Date Cleaned	Rim to Invert	Grade to Invert	Rim to Grade	Additional Info	
No Pre-Cleaning		11	10.7	0.3	No chimney. Frame sits on precast cone.	
GPS Accuracy	Coordinate System	Northing	Easting	Elevation	Additional Component Info	



### Cover

Cover Type		Cover Condition
<input checked="" type="checkbox"/> Solid	Cover Shape: Circular	<input checked="" type="checkbox"/> Sound
<input type="checkbox"/> Vented	Cover Size: 28.5	<input type="checkbox"/> Cracked
<input type="checkbox"/> Gasketed	Cover Width:	<input type="checkbox"/> Broken
<input type="checkbox"/> Bolted	Cover Material: Cast Iron	<input type="checkbox"/> Corroded
<input type="checkbox"/> Inner Cover	Hole Number:	<input type="checkbox"/> Bolts Missing
<input type="checkbox"/> Locking	Hole Diameter:	<input type="checkbox"/> Missing
<input type="checkbox"/> Hatch - Single	Cover Bearing Surface Dia: 26	<input type="checkbox"/> Restraint Missing
<input type="checkbox"/> Hatch - Double	Cover Bearing Surface Width:	<input type="checkbox"/> Restraint Defective
<input type="checkbox"/> Lamphole	Cover/Frame Fit: Good	

**Cover Insert**

**Insert Condition**

Sound

Poorly Fitting

Cracked

Leaking

Insert Fell

Corroded

Insert Type: Metal

**Adjustment Ring**

**Adjustment Ring Condition**

Sound

Cracked

Broken

Corroded

Leaking

Poor Install

Ring Type: None

Ring Material:

Ring Height:

**Frame**

Material: Cast Iron	<b>Frame Condition</b>	<b>Frame Seal Condition</b>
Frame Depth: 8	<input checked="" type="checkbox"/> Sound	<input checked="" type="checkbox"/> Sound
Frame Bearing Surface Width: 1	<input type="checkbox"/> Cracked	<input type="checkbox"/> Cracked
Frame Bearing Surface Depth: 1.5	<input type="checkbox"/> Broken	<input type="checkbox"/> Loose
Frame Clear Open Diam: 26	<input type="checkbox"/> Missing	<input type="checkbox"/> Offset
Frame Offset Distance: 0	<input type="checkbox"/> Corroded	<input type="checkbox"/> Missing
Frame Seal Inflow: None	<input type="checkbox"/> Coated	

**Chimney**

Chimney Material1: Other

Chimney Material2:

Chimney I/I: None

Chimney Clear Opening:

Chimney Depth: 0.8

Chimney Lining Interior: None - No Coating

Chimney Lining Exterior:

**Cone**

Cone Type: Conical centered

Cone Material: Concrete (reinforced)

Cone Depth: 4

Cone Lining Interior: None - No Coating

Cone Lining Exterior:



**Wall**

Wall Diameter: 48

Wall By Size:

Wall Material: Concrete (reinforced)

Wall Depth: 10.2

Wall Lining Interior: None - No Coating

Wall Lining Exterior:

**Bench**

Bench Present: Yes

Bench Material: Concrete (non-reinforced)

Bench Lining: None - No Coating

**Channel**

Channel Installed: Yes

Channel Material: Concrete (non-reinforced)

Channel Type: Formed

Channel Exposure: Fully Opened

**Steps**

Step Number: 6

Step Material: Metal

**MH Connections**

Pipe #: 1      Clock: 6      Rim to Invert: 11      Direction: Out      Material: Concrete Pipe (non-reinforced)

Shape: Circular      Dia 1: 15      Dia 2      Pipe Condition: Sound

Seal Condition: Sound      Special Condition: Gravity Relief Connection      Pipe ID: S127C0009

Comments:



Pipe #: 2      Clock: 8      Rim to Invert: 5.9      Direction: In      Material: Polyvinyl Chloride

Shape: Circular      Dia 1: 6      Dia 2      Pipe Condition: Sound

Seal Condition: Sound      Special Condition: Lateral to Building      Pipe ID:

Comments:



Pipe #: 3      Clock: 3      Rim to Invert: 10.9      Direction: In      Material: Concrete Pipe (non-reinforced)  
Shape: Circular      Dia 1: 12      Dia 2      Pipe Condition: Sound  
Seal Condition: Sound      Special Condition: Gravity Relief Connection      Pipe ID: S127C008

Comments:



### MH Conditions

Distance 11      MH Component: Channel      MACP Code: Surface Aggregate Visible      Continuous:  Joint  Step  
1st Dimension:      2nd Dimension:      Percent:      At/From: 6      To: 3

Remarks:



Appendix B-4  
Manhole Inspection Specifications for Third Party  
Contractors

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## Part 1 General

### 1.01 Scope

(This section has been renumbered in the 2012 CSI format – the previous 1995 CSI format section number is 13334.) The work covered by this Section includes furnishing all labor, material, equipment and services required for performing sanitary sewer manhole inspection services, authorized by the Engineer, as shown on the Drawings and/or specified herein. The objective of manhole inspection is to detect sources of inflow and infiltration, as well as determine the structural condition of the manholes.

### 1.02 General Provisions

- A. The Contractor will provide all equipment and tools necessary to safely access and inspect the manholes.
- B. The Contractor shall perform inspections of the project manholes and record any defect discovered. The inspection shall include, at a minimum, surface, manhole cover and frame, chimney, walls, invert and all appurtenances. Unless specified otherwise, all manhole inspections shall be fully-conforming to National Association of Sewer Service Companies (NASSCO) MACP standards.
- C. The Contractor shall use a digital camera to capture all images of manhole components, defects, inflow and infiltration and observations. The Contractor may use a combination of CCTV camera equipment and field data collection software for the manhole inspections with approval by the Engineer. If a standard digital camera is used, the camera must be equipped with a strobe flash and be capable of producing high resolution digital images with minimum of 5 mega pixel resolution.
- D. The Contractor will provide current certification that operators have undergone NASSCO MACP training prior to undertaking manhole condition assessment work for Owner. Unless specified otherwise, all defect coding used throughout the project will conform to NASSCO MACP standards version 6.0.1.
- E. A diligent effort shall be made to locate all structures. Metal detectors shall be used to locate buried manholes. Once a buried manhole has been located, it shall be marked with paint and/or flagging, if necessary. All pertinent information available shall be recorded including area photo, address, etc. Contractor shall notify the Engineer weekly with a list of those manholes that could not be fully inspected due to being buried, surcharged, could not open, or otherwise unable to locate.
- F. The Contractor's personnel conducting inspections must have at least 5 years experience in the coding of the manhole condition assessments and must have reported upon more than 1,000 individual manhole inspections. Proof of such experience will be submitted prior to start of work. The Contractor must use

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Inspection of Sanitary Sewer Manholes

NASSCO certified data collection software (MACP version 6.0.1), with final approval by the Engineer prior to the start of the Contract.

- G. A GPS unit capable of sub-meter accuracy (horizontal +/- 3 feet) shall be used for documenting location of manholes not shown on the Owner's system maps.

## Part 2 Execution

### 2.01 Manhole Inspection

- A. All sanitary sewer manholes in the Project Area will be visually inspected to determine sources of inflow and infiltration and structural defects. The Contractor shall conduct a Level 1 surface inspection for every manhole and a Level 2 internal inspection shall be completed for select manholes at the direction of the Engineer. Inspections shall be done by completing MACP inspection forms as outlined in Part 3, Section 3.03 of this specification.
- B. Level 2 inspections shall be conducted for every manhole showing visible signs of infiltration or defects. If a manhole cannot be determined to be free of defects or infiltration, then a Level 2 inspection shall be performed.
- C. The Contractor shall provide for the pumping down of any surcharged manhole section and provide all bypass pumping, if required, during the inspection. The Contractor shall receive Engineer's approval prior to bypass pumping.
- D. The Contractor shall submit a comprehensive equipment list to the Engineer before commencement of the Work. The complete list, which shall include all backup and standby equipment, shall be broken down into the following categories (at a minimum):
  - 1. Safety equipment
  - 2. Flow diversion and flow control equipment
  - 3. Traffic control equipment
  - 4. All other equipment necessary for the completion of the Work
- E. Blockages in the system shall be reported to the Engineer immediately.
- F. A responsible representative of the Contractor shall be present on the site of the work, or other location approved by the Engineer, to provide supervision of the work. At all times, and especially when a change of work location is underway, the Contractor's representative shall keep the Engineer continuously aware of the location, progress, planned execution of the work, and problems encountered.
- G. Should the Contractor encounter a buried manhole during the course of inspection that cannot be readily accessed, the Contractor shall notify the Engineer.

### 2.02 Precautions

- A. The Contractor shall take all necessary precautions to ensure that water used does not flood property or buildings served by the sewer pipeline being inspected.
- B. A valved air line will be attached to bags or plugs used to control flow so that they may be deflated from the surface.
- C. The water level within structures will be observed and the minimum level that will cause flow to back up into buildings and cause property damage will be determined prior to initiating operations so that flooding of buildings and property will not occur.
- D. Remove all plugs when a setup is complete. Failure to do this may result in backup and property damage.
- E. The Contractor shall provide, operate, maintain and subsequently remove on completion, adequate ventilation apparatus in the form of blowers and/or fans. The ventilation apparatus shall introduce a fresh air supply to support a safe environment for Work in sewers, manholes and all other confined spaces, which shall be kept free from dangerous, toxic and/or explosive gases, whether generated from sewage, soil strata or other source.
- F. The Contractor shall employ the "best practicable means" to minimize and mitigate noise as well as vibration resulting from operations. Mitigation measures shall include the utilization of sound suppression devices on all equipment and machinery particularly in residential areas and in the near vicinity of hospitals and schools, especially at night.
- G. The Contractor shall inform the Engineer before the commencement of any portion of the work of any significant change in the methods of noise attenuation from those previously approved.
- H. All pumps, generators, combination cleaners or other noise emitting equipment be shall be suitably screened to minimize nuisance and noise pollution. This requirement shall not be taken as preventing or prohibiting the execution of work necessary for the saving of life, protection of property, or safety of the personnel and/or facilities. The Contractor shall notify the Engineer of such use of plant or equipment in an emergency situation as soon as practicable.

### 3.03 Data Collection

- A. The Contractor shall complete a separate Manhole Inspection Header Form, Manhole Component Observation Form, and Manhole Pipe Connection Form for each manhole inspected, both Level 1 and Level 2 inspections.
  - 1. Level 1 inspections record observations of the manhole's condition as seen from the ground surface outside of the manhole.
  - 2. In addition to the surface observations of Level 1 inspection, Level 2 inspections will identify defects of the manhole through a confined space entry of the manhole.

Inspection of Sanitary Sewer Manholes

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3. Manhole Inspection Header Forms, Manhole Component Observation Forms, and Manhole Pipe Connection Forms shall be filled out containing, at a minimum, the mandatory information required for Level 1 and/or Level 2 inspections per MACP (version 6.0.1).
- B For all Level 2 inspections, the Contractor must complete a Level 2 – Manhole Component Defect Form for each manhole inspected as directed by MACP (version 6.0.1).
    1. This form shall be used to record all defects for the chimney, cone, wall, bench and channel only. All other manhole component defects shall be recorded in the Manhole Component Observation Form.
    2. When inspecting manholes all applicable PACP coding shall be utilized, except for tap codes, camera underwater code, and line direction codes.
  - C. All inspections shall be recorded on standard manhole forms provided by or approved by the Engineer.
  - D. Unless an alternative system is approved by the Engineer, all inspections data shall be entered, by the Contractor, into a NASSCO Manhole Assessment Certification Program (MACP) compliant database (version 6.0.1 minimum).
  - E. If inspection forms are filled out manually, all forms shall be scanned to Portable Document Format (PDF), with the file name being the MH identification number (example: AB123.pdf).
  - F. Inspections database shall be fully cross-referenced to all videos, images and reports. All media file names and relative path locations shall be present in the NASSCO MACP database.
  - G. Digital photographs shall be captured of the exterior and the invert of each inspected manhole. All digital photographs captured from the exterior of the manhole shall be oriented so that the outgoing pipe connection is at the 6 o'clock position with respect to the camera view orientation.
  - H. A digital still image shall be captured for each defect. All digital still images shall be in JPEG file format. If inspections are recorded in the field electronically into a NASSCO MACP database, all digital still images of defects shall be generated using a concatenation of standard MACP database fields in the format "Manhole ID\_Condition ID\_MACP Code". If inspections are recorded manually in the field, file names of defect digital still images shall follow the convention "Manhole ID\_[sequential number]\_MACP Code".
  - I. Contractor shall maintain a copy of all report material. The contractor shall provide comments as necessary to fully describe the existing condition of the manhole on the inspection forms.
  - J. Contractor shall be responsible for modifications to equipment and/or inspection procedures to achieve reporting requirements identified in these specifications.



- K. No work shall commence prior to approval of the submitted material by the Engineer. Once accepted, the report material shall serve as a standard for the remaining work.
- L. When an unmapped manhole is discovered during an inspection, the Contractor shall assign a temporary field-assigned ID to the manhole. This temporary field ID shall be entered into the appropriate PACP database field (either "Upstream\_MH" or "Downstream\_MH"), and the comment "Unmapped MH" shall be entered in the PACP database field "Additional\_Info". The inspection shall be terminated and a new inspection shall begin, so that the unexpected manhole effectively divides the pipe into two segments. The "Total\_Length" field for the terminated inspection shall be populated with the distance in feet at which the unexpected manhole was discovered during inspection. The pipe segment receiving the next inspection shall be assigned a temporary field ID, and the newly-discovered manhole ID shall be entered into the corresponding "Upstream\_MH" or "Downstream\_MH" field. The proposed naming scheme for unmapped manholes and pipes shall be approved by the Engineer prior to start of inspections. The Contractor shall ensure that each newly-discovered manhole and pipe is given an ID that is not already assigned to another manhole or pipe. The contractor shall also ensure that the field-assigned ID of each newly-discovered manhole is consistent between PACP and MACP submittals.
- M. If the Contractor uses a Global Positioning System device (GPS), then coordinates of all uncharted manholes shall be collected with device using a coordinate system and file format approved by the Engineer prior to the start of the Contract. For recording of all uncharted manholes, coordinates and coordinate system shall be required on the Manhole Inspection Header Form at the time of inspection.
- N. The inspection photographs, report documents, and inspections database shall be in accordance with NASSCO MACP.
- O. The comments area on the Header Form can be used to record observations and information such as:
1. Previous and existing weather conditions.
  2. Soil conditions.
  3. Access for future maintenance or rehabilitation.
  4. Unusual conditions in the sanitary system and difficulties incurred in performing the inspection
  5. Catalog of photographs and videos of manhole
  6. Any other remarks/comments not covered under any form headings
- P. The Contractor must have an internal quality assurance/quality control system (QA/QC) in place, and all inspection data shall be subjected to the procedures prior to submittal to the Engineer. The Engineer will perform QA/QC audits on submitted data. Any data or files not meeting these specifications or NASSCO MACP standards will be returned to the Contractor for correction. Contractor shall present their proposed QA/QC system to the Engineer prior to the start of the Contract.

### 3.04 Manhole Inspection Deliverables

Inspection of Sanitary Sewer Manholes

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- A. All the supplied data and information will become the property of the Owner.
- B. Sample Submittal: An example of a typical Manhole Inspection final deliverable will be submitted for approval by the Engineer prior to the start of the Contract. The example deliverable will contain the following:
1. A sample NASSCO MACP Standard Exchange Database (version 6.0.1) in Microsoft Access file format (.mdb), as exported from the Contractor's data collection software (if inspections are to be recorded electronically).
  2. A proprietary database as generated by the Contractor's data collection software (if inspections were recorded electronically).
  3. Example GPS data files of all uncharted manholes (if GPS will be used for geographic reference).
  4. Example media files, including observation photos, videos, and reports; with all files consistently utilizing the required file naming conventions.
  5. The proposed viewing software to be used with the proprietary inspections database and related media.
  6. NASSCO MACP validation report in PDF format, demonstrating the sample is fully conforming to NASSCO MACP standards and conventions (if inspections are to be recorded electronically). Validation reports can be obtained by submitting a sample database to:  
  

[http://www.nassco.org/training\\_edu/te\\_database\\_upload.aspx](http://www.nassco.org/training_edu/te_database_upload.aspx)
  7. Inspections database(s) shall be fully cross-referenced to the videos, images, and reports.
  8. Example reports will be presented in both hard copy and in PDF format, and all other sample data will be presented in digital format on an external hard drive.
- C. Intermediate Submittals: No later than fourteen (14) days following the completion of a manhole inspection, the Contractor will submit the following:
1. Two (2) hard copies of full details report for each inspection.
  2. An overall summary report detailing major defects, uncharted manholes including field-assigned ID and geographic reference, and inspections that require attention.
  3. GPS data files of all uncharted manholes and/or pipe segments that were identified during inspections but were not shown on field maps. This list shall include the field-assigned ID and a geographic reference or description (street address, intersection, etc.).
  4. At regular agreed intervals, an external hard drive will be submitted to the Engineer containing a single NASSCO MACP Standard Exchange Database

(version 6.0.1) containing all inspections to date, encoded videos, observation photos, inspection reports in PDF format, and support files. The supplied data and information will become the property of the Owner.

- D. Final Submittal: At the completion of all inspections, the Contractor will supply the following to the Engineer on an external hard drive:
1. A single, consolidated NASSCO MACP Standard Exchange Database (version 6.0.1) in Microsoft Access file format (.mdb) containing all inspections for the Contract.
  2. NASSCO MACP validation report for the consolidated database (See Section 3.04.B.6.).
  3. All encoded inspection videos, observation photos, and inspection reports using required file naming formats.
  4. A single, consolidated proprietary database containing all inspections for the Contract, as generated by the Contractor's data collection software.
  5. Free-issue software to be used for the viewing of the proprietary inspections database and related media from within the database.
  6. Four (4) hours training in the use of any supplied free-issue software.

E. NASSCO MACP Compliance

The submitted database(s) should consist of, at a minimum, the NASSCO MACP standard data fields, formats, and conventions as set forth in this specification and Attachment A – Field Data Delivery Format Requirements.

END OF SECTION

## Attachment A

### PACP® "Inspections" Table - Required Fields, Formats, and Conventions

All field names, data types, and descriptions are from PACP v6.0.2 unless otherwise noted. PACP fields not required by City of Chattanooga have been omitted.

Field Name	Data Type	Description of Field
InspectionID	AutoNumber	This field is automatically populated when any inspection information is entered. The number generated must be entered in the InspectionID field of the Conditions table for all conditions recorded during the inspection
Surveyed_By	Text	Name of individual conducting survey
Certificate_Number	Text	NASSCO PACP # of Surveyor
Owner	Text	Owner of collection system surveyed
Customer	Text	Entity commissioning the survey
Drainage_Area	Text	Common name of drainage area - If field maps are provided and include drainage basins, populate this field with the drainage basin name/ID
PO_Number	Text	Customer's Purchase Order Number
Pipe_Segment_Reference	Text	Client provided segment number - If pipe segment number is not provided, use the convention "Upstream Manhole ID_DownstreamManhole ID"
Date	Date/Time	Inspection Date
Time	Date/Time	Time of inspection
Street	Text	Street Number and Name
City	Text	City name where sewer located
Location_Details	Text	Descriptive explanation of sewer location
Upstream_MH	Text	Client provided designation for upstream manhole
Up_Rim_to_Invert	Number	Distance (ft and tenths of ft) or (meters to 2 decimal places max) from rim to invert of upstream manhole
Up_Grade_to_Invert	Number	Distance (ft and tenths of ft) or (meters to 2 decimal places max) from average grade to invert of upstream manhole
Up_Rim_to_Grade	Number	Distance (ft and tenths of ft) or (meters to 2 decimal places max) from rim to average grade of upstream manhole
Downstream_MH	Text	Client provided designation for downstream manhole
Down_Rim_to_Invert	Number	Distance (ft and tenths of ft) or (meters to 2 decimal places max) from rim to invert of downstream manhole
Down_Grade_to_Invert	Number	Distance (ft and tenths of ft) or (meters to 2 decimal places max) from average grade to invert of downstream manhole

## Attachment A - Continued

**PACP® "Inspections" Table - Required Fields, Formats, and Conventions of Chattanooga have been omitted.**

Field Name	Data Type	Description of Field
Down_Rim_to_Grade	Number	Distance (ft and tenths of ft) or (meters to 2 decimal places max) from rim to average grade of downstream manhole
Sewer_Use	Text	Purpose of sewer
Direction	Text	Direction of survey, Upstream or Downstream
Flow_Control	Text	Type restriction of flow used
Height	Number	Diameter of sewer (or height if non-circular) to nearest inch(999) or nearest mm(99999)
Width	Number	Width of non-circular sewer to nearest inch(999) or nearest mm(99999)
Shape	Text	Sewer shape
Material	Text	Type of pipe material
Lining_Method	Text	Type of process used to line the host pipe
Pipe_Joint_Length	Number	Length of pipe joint sections measured to one decimal place whether in feet or meters
Total_Length	Number	Distance between the exit of the start manhole and the entrance of the finish measured to one decimal place whether it is feet or meters <b>-If field maps are provided for the project area and include a total length, then this value will be entered into the field "Total_Length".</b>
Length_Surveyed	Number	If the survey is abandoned, enter the actual length surveyed to one decimal place whether it is feet or meters
Year_Laid	Number	Year sewer surveyed was constructed
Year_Renewed	Number	Year sewer surveyed was renewed
Media_Label	Text	Unique identifier for tape/media
Purpose	Text	Reason for conducting survey
Sewer_Category	Text	Importance of sewer, to be provided by client
Pre-Cleaning	Text	Type of preparatory cleaning conducted prior to survey
Date_Cleaned	Date/Time	Date when sewer was cleaned prior to survey
Weather	Text	Weather conditions when survey conducted
Location_Code	Text	General description of ground cover of surveyed segment
Additional_Info	Text	Supplemental info regarding survey or segment
Reverse_Setup	Number	Specifies that a second survey has been done on the pipe segment--use inspection ID from matching survey
Sheet_Number	Number	Number used to identify individual surveys done within a group <b>-If field maps are provided, this field must be populated with the map number/ID</b>
IsImperial	Yes/No	Used to identify whether units are metric or imperial. Defaults to imperial.
PressureValue	Number	Grouting pressure value
WorkOrder	Text	Work order or Project reference for Asset Management
Project	Text	Project Title or reference for Asset Management



# **Appendix C**

## **Preventive Hydraulic Cleaning Support Information**

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Appendix C-1  
Specifications for Annual Blanket Contract for  
Sewer Line Cleaning Services

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**SPECIFICATIONS FOR  
ANNUAL BLANKET CONTRACT  
TO SUPPLY  
SEWER LINE CLEANING SERVICES FOR THE  
INTERCEPTOR SEWER SYSTEM  
AND RELATED FACILITIES**

**WASTE RESOURCES DIVISION  
CITY OF CHATTANOOGA, TENNESSEE**

**1.0 GENERAL**

**1.1 SCOPE OF SERVICES**

The Scope of Services included in these Specifications shall be for the provision of sanitary sewer, combined sewer, storm sewer, pump station, and tank cleaning labor services and related materials and equipment on an as-needed basis for the Moccasin Bend Wastewater Treatment Plant (MBWWTP) and related facilities of the Waste Resources Division, including Combined Sewer Overflow Treatment Facilities (CSOTF), Sanitary and Stormwater Pump Stations, and the City Landfills. The Moccasin Bend Wastewater Treatment Plant (MBWWTP) is located at 455 Moccasin Bend Road, Chattanooga, Tennessee 37405.

It is the responsibility of each bidder to visit the Moccasin Bend Wastewater Treatment Plant and the related Waste Resources Division facilities to determine the types of structures for which these services may be required, the associated work areas and conditions, the sizes and types of equipment and parts, the safety requirements, and any other circumstances associated with the provision of these services.

Any questions or comments related to the services described in these Specifications may be directed to Mr. Geoff Hipp, Buyer, Department of General Services, phone 423-757-4758.

**1.2 BASIS OF BIDDING**

The Vendor shall submit one (1) bid on the City's Standard Bid Form. The Bid shall include the labor cost per hour for the various personnel and equipment. **Please refer to Appendix A for a list of these items for which costs shall be provided.**

The cost per hour shall include any and all costs for wages, benefits, indirect costs, overhead and profit, insurance, and any other related direct or indirect cost. The cost per hour shall be for the services for a two-person crew and truck of the stated classification and any and all equipment necessary to perform the work described herein.

The Vendor shall also provide hourly rates for overtime for the various work described herein and as indicated in Appendix A. Emergency work as described in Section 2.2.1.D of these specifications shall be paid for at the stated overtime rate.

The bid shall be awarded on the basis of the unit cost per hour of the personnel as well as an evaluation of the Vendor's qualifications, experience, capabilities and other factors specified in the City Code.

***The City of Chattanooga reserves the right to reject any and/or all bids, to waive any information in Bids received, and to accept any Bid which in its opinion may be in the best interest of the city.***

### **1.3 SUBMITTALS**

#### **1.3.1 Bid Bond**

None.

#### **1.3.2 Performance Bond**

\$10,000.

#### **1.3.3 References and Experience**

The Vendor shall provide the following regarding qualifications:

- A. The Vendor shall provide description of capabilities and recent experience in providing sewer line cleaning services of the type contemplated under this request.
- B. The Vendor shall provide a list of municipal sewer line cleaning projects as follows:
  - 1. At least two (2) municipal project(s) for which the Vendor is providing, or has within the past five (5) years provided long term, high volume sewer line cleaning services (minimum 500,000 feet per year) of sewer line cleaning of lines greater than 6 inches in diameter.
  - 2. At least two (2) municipal projects for which the Vendor has provided within the past five (5) years, high volume cleaning services (minimum 5,000 feet per year) of sewer line cleaning of lines greater than 24 inches in diameter.
  - 3. At least one (1) municipal project for which the Vendor has provided within the past five (5) years, high volume cleaning services (minimum 5,000 feet per year) of sewer line cleaning of lines in easements.

This list of projects shall contain the following information for each project listed:

- a. Name, address, and phone number of the Municipality.
  - b. Name, fax number, and phone number of a representative of the Municipality who is knowledgeable about the project.
  - c. Brief description of the services provided, sewer line footage cleaned, the duration of the contract, and bid basis of contract (\$/ft, \$/hr, etc.)
  - d. A statement of the approximate value of the contract.
  - e. A statement of when the contract was completed.
- C. The Vendor shall provide resumes of the Vendor's Project Manager and key technical and operations personnel.
- D. Experience
1. The Vendor shall provide a description of its work force including number of skilled personnel and their length of service with the company.

#### **1.4 GENERAL CONDITIONS AND INSTRUCTIONS TO BIDDERS**

The Vendor shall comply with rules and conditions found in the City of Chattanooga Purchasing Department's "General Conditions and Instructions to Bidders" that are a part of the invitation to Bid for the equipment or services specified herein.

#### **1.5 LENGTH OF CONTRACT**

The Contract for services described herein shall be for a period of one (1) year beginning the effective date of the award of the Contract. The Vendor shall provide a firm hourly rate for the first year of the Contract.

The City shall have the option of extending the Contract for four (4) additional one (1) year periods.

Hourly rates shall be subject to adjustment by mutual agreement based on the Southern States CPI as published by the US Department of Labor.

#### **1.6 INSURANCE**

The Vendor shall, prior to the award of the Contract, furnish proof and maintain in

force the following types of insurance at the minimum limits specified below:

<u>COVERAGES</u>	<u>LIMITS OF LIABILITY</u>
Workmen's Compensation Employer's Liability	Statutory \$750,000
Bodily Injury Liability Except Automobile	\$750,000 each occurrence \$1,500,000 aggregate
Property Damage Liability Except Automobile	\$750,000 each occurrence \$750,000 aggregate
Automobile Bodily Injury Liability	\$750,000 each person \$1,500,000 each occurrence
Automobile Property Damage Excess Umbrella Liability	\$750,000 each occurrence \$3,000,000 each occurrence

Copies of the current insurance certificate(s) shall be provided to the City prior to any work being performed. Insurance shall be kept in force during the entire length of the contract.

## **2.0 SERVICES AND OTHER REQUIREMENTS**

### **2.1 GENERAL**

#### **2.1.1 *Subcontractors***

The Vendor shall not subcontract the services or assign the contract to others without the written consent of the City of Chattanooga.

#### **2.1.2 *Compliance with Applicable Regulations***

All of the services provided by the Vendor shall be completed in a good and workmanlike manner. All services provided shall be in compliance with all applicable statutes, rules, ordinances and regulations of, but not limited to, the USEPA, TDEC, TDOT, OSHA, and any similar federal, state, and local laws or regulations applicable to the Vendor or to the services described herein.

The Vendor's personnel shall comply with all City, Waste Resources Division, and Moccasin Bend WWTP work rules and regulations when on site.

#### **2.1.3 *Inspection***

The services furnished by the Vendor shall be subject to inspection and approval by the City's designated representative, but the manner and method of providing the services shall be the responsibility of the Vendor.

#### **2.1.4 Failure to Provide Services and Termination of Contract**

In the event the Vendor:

- a. Fails to initiate services on the date specified or otherwise agreed to;
- b. Fails to provide all of the required documentation for his personnel, insurance, and any other documentation required by these Specifications at the specified times;
- c. After having begun services, abandons them for any reason;
- d. Suspends or refuses to continue services; or
- e. Defaults in any manner in the performance under the terms of the Contract for a period of two (2) consecutive working days (unless the Vendor is prevented from continuing for reasons beyond its control);

The City of Chattanooga shall have the right to terminate the Contract immediately upon the written notification by the City for the reasons listed above and the City shall complete the Contract or have the services completed by another vendor in any reasonable manner at the Vendor's expense.

The City shall have the right to terminate the Contract after giving a thirty-day (30) written notice to the Vendor.

## **2.2 DESCRIPTION OF CONTRACTED SERVICES**

### **2.2.1 General**

- A. The Vendor shall provide equipment and labor services for the line cleaning and root removal for sanitary and combined sewer lines and structures throughout the City-owned and operated wastewater collection system, the Moccasin Bend Wastewater Treatment Plant, the City Landfill and related Waste Resources Division facilities. The Vendor shall provide all labor, benefits, tools, equipment, fuel, materials and other related expenses necessary to provide these services.
- B. The Vendor shall provide the services on an "as needed" basis as requested by the City. The City will attempt to schedule the work to optimize the use of the Vendor's personnel and equipment when it is needed.
- C. Vendor shall perform work on straight time, i.e., non-emergency, unless otherwise noted. Overtime, weekend, or holiday work shall only be performed at the City's direction.

- D. Vendor shall perform emergency work when requested by the City. Response to the need for emergency work shall be within four (4) hours of notification. Emergency work will be paid at the overtime rates. Vendor shall supply an after-hours contact name and phone number through which notification of the need for emergency work shall be made.

### **2.2.2 Vendor Services**

- A. The Vendor shall provide trained personnel to perform various tasks requested by the City in accordance with the agreed hourly rates (reference Appendix A). Hourly rate shall include all typical hand tools and equipment used by sanitary sewer line cleaning crews. Root cutters up to 15-inch diameter and general cleaning nozzles shall be considered incidental to the work and shall be supplied by the Vendor. Specialized equipment shall be as listed in Appendix A and shall have separate hourly rates (see Paragraph 2.2.2-C below).
- B. The Vendor shall provide the services of a superintendent or project manager as needed to review the various projects and assignments with City personnel, to determine labor, materials, and equipment needed, and to provide any other planning, sketches, drawings, product research, or other requirements of the work.
- C. The Vendor shall provide, as applicable to the various work assignments, available equipment owned by Vendor and listed in Appendix A. Hourly rates for use of Vendor's equipment shall be provided.
- D. The Vendor shall provide personnel time sheets for all work performed, indicating the personnel classification, hours of work, use of specialized equipment, and/or use of approved subcontractors. Upon completion of each project or assignment, vendor shall obtain the signature of the responsible City supervisor on the time sheets, and provide a copy of the signed time sheets to the City supervisor.
- E. The Vendor shall ensure that upon completion of work assignments, all materials and equipment are cleaned up and/or removed, all materials requiring disposal are removed, all equipment is properly stored, and the work area is completely cleaned. The City supervisor shall review and sign off on the completion of these tasks, giving final approval of the work.
- F. Vendor cleaning equipment shall meet the following minimum specifications:
  - 1. Jetter and Combination Jetter/Vacuum trucks shall be late model (no more than three model years old). Combination trucks shall be minimum 9 yard dump body with a vacuum system capable of 3600 CFM free air at



16" of Mercury vacuum, 80 GPM@2500 PSI delivered through 500' of 1" diameter hose. Combination Cleaning water capacity shall be at least 1000 gallons. Jetter trucks shall be capable of a minimum 50 GPM @2500 PSI delivered through 500' of 1" diameter hose. Cleaning water capacity shall be at least 750 gallons.

- G. The truck price per hour shall include one complete crew, consisting of, as a minimum, one truck operator and one laborer to operate the Vendor's equipment. The crew shall be trained in the operation of all of the above equipment, traffic control procedures and OSHA safety rules and regulations associated with sewer line cleaning services.
- H. The Vendor shall provide a resume or work history for all personnel being provided for this contract prior to beginning the work. If personnel change during the course of the work, work histories or resumes shall be provided prior to commencement of the work. The Vendor shall provide all labor, equipment, materials, fuel, utilities, insurance, and other related services required in connection with the contract for sewer line cleaning services for the removal and disposal of all dirt, silt, gravel, sand, wood, roots, leaves, grease, rags, sewage solids, various types of chemical scales, semi-solids, and any other debris that may be found in municipal sewer systems including interceptor sewers, sanitary and combined collection systems, related manholes, junction boxes, and other sewers and sewer structures as designated by the City.

Included, but not limited to, are the following specific items of work:

1. Clean and remove debris and roots from up to 200± miles of sewers annually. Clean up to an average of 2500 feet per day (±10 percent) of small sewer lines over the duration of the project. The quantity of large line cleaning and easement cleaning will be mutually agreed upon by the City and the Vendor as needed.
  2. Re-clean any sewer lines found to be deficient as a result of City's inspection at no charge to the City.
  3. Actual amount of work performed will be based on the amount of City funding available. Work in excess of the quantity listed above may be increased in future years, if additional City funding is available and both City and Vendor are in agreement.
- I. The Vendor shall obtain all necessary permits and approvals from all regulatory agencies and provide the City with proof of same.
  - J. The Vendor shall furnish labor, including as a minimum, the following:

1. Provide one (1) complete and independent Crew, consisting of, as a minimum, one (1) operator and one (1) laborer/flagman to operate the Vendor's equipment to wash, collect, remove and dispose of debris from sanitary system.
  2. Provide a Crew thoroughly trained in the operation all of the above equipment, traffic control procedures, and OSHA safety rules and regulations associated with sewer line cleaning services.
  3. Provide Crew Leader that is a properly licensed CDL operator. Provide copy of CDL license to City before beginning work. If Crew Leader is replaced or reassigned, a copy of his replacement's CDL license shall be provided before he can begin work.
  4. Provide to the City a resume or work history for all personnel being provided for this contract prior to beginning the work. If personnel changes during the course of performing the work, provide to the City a resume or work history for the new personnel being provided prior to beginning the work.
- K. The Vendor shall provide normal traffic control measures during execution of the work.
- L. The Vendor shall provide a communication device to the City in order to have reliable communications between the Vendor and the City. (i.e. two-way radio, cell phone, etc).
- M. The Vendor shall schedule work to be performed during City's normal work hours Monday through Friday, 7:30 am till 4:00 pm, unless otherwise mutually agreed upon by the City and the Vendor (no work shall be scheduled for holidays not worked by the City).
- The Vendor shall schedule work to begin when the City provides the work orders and project instructions to the Vendor and to end 0.5 hour after completing the final job of the day to allow the Vendor to return to the project base location.
- N. The Vendor shall coordinate the contract for specified sewer line cleaning services with the City's operating schedule.
- O. The Vendor shall conduct the contract for sewer line cleaning services in compliance with all applicable federal, state, and local laws, regulations, permits, and approvals.
- P. The Vendor shall provide adequate supervision and technical and managerial oversight of the Vendor's employees, subcontractors, and agents.
- Q. The Vendor shall provide a written Contingency Plan that addresses, as a minimum, the following circumstances:

1. Abnormal weather conditions that could interrupt the sewer line cleaning services.
  2. Changes in personnel that could disrupt the sewer line cleaning services.
  3. Malfunction of equipment items related to the sewer line cleaning services.
  4. Damage to private property during the performance of the sewer line cleaning services.
  5. Emergency cleaning services.
  6. Re-cleaning of sewer lines found to be deficient as a result of City's inspection.
- R. The Vendor shall conduct operations so as not to cause a nuisance to the public involving odors, dust, vectors, or noise.
- S. The Vendor shall obtain all necessary permits and approvals from all regulatory agencies, and furnish copies of all required permits and approvals to the City.
- T. The Vendor shall provide and submit reports and certifications as required by all applicable EPA and/or State regulations, and furnish copies of all required reports to the City in a timely manner.
- U. The Vendor shall complete the service work assigned in a good and workmanlike manner. The Vendor and Vendor's personnel shall comply with all applicable statutes, rules, ordinances and regulations of, but not limited to, the USEPA, TDOT, OSHA, and any similar federal, state, and local laws or regulations applicable to the Proposer or to the services described herein.
- V. The Vendor's personnel shall comply with all City, Waste Resources Division, and Moccasin Bend WWTP work rules and regulations when on site.
- W. The Vendor's services shall be subject to inspection and approval by the City's designated representative, but the manner and method of providing the services shall be the responsibility of the Vendor.

### **2.2.3 City Supplied Services**

- A. The City will designate a Project Coordinator and Inspector to oversee the Vendor's work.

- B. The City will designate line segments to be cleaned by means of work orders and project lists.
- C. The City will provide all water and disposal necessary for cleaning operations.
- D. The City will identify the locations for disposal of debris from cleaning operations.

### **3.0 EXECUTION**

#### **3.1 CONTRACT STARTING DATE**

The Contract for the full services shall begin immediately on the effective date of the award of the Contract.

#### **3.2 PAYMENT OF SERVICES**

The quantity of hours will be determined from the work order and inspection reports prepared by the City assigned inspector. Only hours worked on project shall be applicable.

Downtime for equipment, personnel, or other problems shall not be charged against the project. Representatives of the Vendor and the City will review the time sheets at the end of each workweek to determine the hours of work performed during that period.

Payment shall be made in accordance with City procedures. Payment requests should be submitted to the Moccasin Bend Wastewater Treatment Plant, 455 Moccasin Bend Road, Chattanooga, Tennessee 37405.

## APPENDIX A

### RATES

	<u>Unit</u>	<u>Rate</u>
Combination Jetter/Vacuum Truck	Hour	_____
Combination Jetter/Vacuum Truck (Emergency)	Hour	_____
Jetter Truck per section	Hour	_____
Jetter Truck per section (Emergency)	Hour	_____
Tracked easement machine	Hour	_____
Wheeled easement machine	Hour	_____



Appendix C-2  
Activity Worksheet

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City of Chattanooga

Public Works Department-Waste Resource Division

Activity Sheet:

Initiated By:	Time Arrived:	Lunch time start:
Time Left:	Lunch Time End:	
Work Type:	Date:	
Address:		
Crew Workers Names:		
311 O Other O Sewer Pipe Size: _____ Material: _____ Depth: _____		
<b>Call Response: Repairs Cleaning and TV :</b>		
Stoppage in City Line O Point Repair O Feet Cleaned _____		
Stoppage in Customer Line O	MH Repaired O Feet TVed: _____	
Water or Stormwater Problem O	MH Installed O	Tanks of Water _____
MH overflow from weather O	Tap O Meter Reading _____	
Locate MH/Line O	Located/Marked Lines or MH O Cut Out Roots O	
MH-Lid problem O	Feet of Line Replaced ____ Cleaned Wet Well O	
Odor Complaint O	Easement Clearing Footage _____	Equipment Downtime _____
Mileage Day Begin: _____	Cut Asphalt/Concrete O	Training or School time _____
Mileage End Day: _____	Temporary Patch O	Work order # _____
Final Patch O		

Equipment Used: \_\_\_\_\_

Material Used: \_\_\_\_\_

Work Comments: \_\_\_\_\_

Crew Supervisor Signature: \_\_\_\_\_

General Supervisor Signature: \_\_\_\_\_

I hereby certify that the information presented above has been reviewed by me and to the best of my knowledge to be true, accurate, and complete. I am aware there is a significant disciplinary action up to and including dismissal for submitting false information



Appendix C-3  
Contractor Cleaning Log

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XYZ Contractor  
 123 Main Street  
 Anytown, USA 12345  
 TEL (800) 123-4567  
 FAX (800) 123-4568  
[www.xyzcontractor.com](http://www.xyzcontractor.com)

Sewer Line Cleaning Services  
 CITY OF CHATTANOOGA, TN  
 Annual Blanket Contract  
 PROJECT SUMMARY - 2013-1

PLR	Date	Drainage Area	Operator	Pipe Size	Upstream MH	Downstream MH	Pipe	Asset Length	CCTV Length	Cleaning Length	Reverse	Root Cut	Tap Cut	By - Pass Pump
S128G0068	7/24/2013	SCC1	MDEMERY	84	S128G063	S128G066	RCP	433	0	433	N	N	N	N
S128G0069	7/24/2013	SCC1	MDEMERY	84	S128G066	S128G067	RCP	424.3	0	424.3	N	N	N	N
S128G0070	7/24/2013	SCC1	MDEMERY	84	S128G067	S128G068	RCP	417	0	417	N	N	N	N
S128G0071	7/25/2013	SCC1	MDEMERY	84	S128G068	S128G069	RCP	415.1	0	415.1	N	N	N	N
S128G0075	7/25/2013	SCC1	MDEMERY	84	S128G069	S128B001	RCP	550.9	0	550.9	N	N	N	N
S128B0001	7/25/2013	SCC1	MDEMERY	84	S128B001	S128B002	RCP	551.7	0	551.7	N	N	N	N
S128B0002	7/25/2013	SCC1	MDEMERY	84	S128B002	S128B003	RCP	342.3	0	342.3	N	N	N	N
S128A0001	7/26/2013	SCC1	MDEMERY	84	S128B003	S128A001	RCP	349.3	0	349.3	N	N	N	N
S128A0002	7/26/2013	SCC1	MDEMERY	84	S128A001	S128A002	RCP	478.3	0	478.3	N	N	N	N
S128A0003	7/26/2013	SCC1	MDEMERY	84	S128A002	S128A003	RCP	479.3	0	479.3	N	N	N	N
S128A0004	7/26/2013	SCC1	MDEMERY	84	S128A003	S128A004	RCP	506.9	0	506.9	N	N	N	N
S128A0011	7/29/2013	SCC1	MDEMERY	84	S128A010	S128A011	RCP	301.1	0	301.1	N	N	N	N
S128A0012	7/29/2013	SCC1	MDEMERY	84	S128A011	S128A012	RCP	290.6	0	290.6	N	N	N	N
S128A0013	7/29/2013	SCC1	MDEMERY	84	S128A012	S128A014	RCP	501	0	501	N	N	N	N
S127E0012	7/31/2013	SCC1	MDEMERY	48	S127E012	S127E029	XXX	387	0	387	N	N	N	N
S127E029_S127E015	7/31/2013	SCC1	MDEMERY	48	S127E029	S127E015	RCP	499.7	0	499.7	N	N	N	N
S127E0017	7/31/2013	SCC1	MDEMERY	48	S127E015	S127E030	RCP	367.3	0	367.3	N	N	N	N

CLEAN & CCTV INSPECTIONS	
S. Chickamauga Creek 1 SSES	
SUMMARY	
CCTV FOOTAGE :	0
CLEANING FOOTAGE:	7294.8
# OF REVERSES	0
# OF ROOT CUTS:	0
# OF TAP CUTS:	0
# OF BY-PASS PUMPS:	0