

Clean Water 2020 Program

**INFORMATION MANAGEMENT
SYSTEM PROGRAM**

December 2015



We Are Columbia



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Section 1 Program Summary and Intent

1.1 Introduction

The City of Columbia (City) has developed the Information Management System Program (IMS) in accordance with the requirements of Paragraph 12 of the Consent Decree (CD) entered by order dated May 21, 2014 in *The United States of America and State of South Carolina by and through the Department of Health and Environmental Control (SCDHEC) vs. The City of Columbia*, Civil Action No. 3:13-2429-TLW, DOJ Case Number 90-5-1-1-00954. The IMS addresses specific requirements of the CD as outlined in **Table 1** and was developed based on the specific needs of the City’s WCTS.

Table 1 – CD Requirements for the Information Management System Program

CD Section	CD Requirements	IMS Section
12.d	“ <u>Information Management System Program</u> . Within eighteen (18) months after the Date of Entry of this Consent Decree, Columbia shall submit to EPA and DHEC for review, comment, and approval an Information Management System (IMS) Program. The IMS Program shall include, but not limited to the following: a description of what information is entered into the system, how it is entered and by what means its is recorded; types of work reports prepared and submitted, including examples; a description of the management reports generated from input data (i.e. work reports), including examples; standard forms used by field personnel and management for the program, where applicable; a detailed description of the software used with cited reference for software training and procedures for utilizing the software; and a procedure for periodic quality assurance/quality control checks for the sytem. The program shall include the following sub-programs:”	Section 2. Management IMS
12.d.(i)	“ <u>Management IMS</u> . The IMS Program shall include a Management IMS to provide WCTS managers guidance and instruction to adequately evaluate operations, maintenance, customer service, and system rehabilitation activities so that overall system performance can be determined and WCTS planning can be conducted.”	Section 2. Management IMS
12.d.(ii)	“ <u>Operations IMS</u> . The IMS Program shall include an Operations IMS to provide managers and field supervisors the guidance to adequately track scheduled operational activities and to enhance operational performance. The system shall utilize operating reports and standard operation forms used by field personnel and provide for field supervisor review. While the Operations IMS need not be computer based, it shall be capable of feeding information into the Management IMS.”	Section 3. Operations and Maintenance IMS
12.d.(iii)	“ <u>Maintenance IMS</u> . The IMS Program shall include a Maintenance IMS to provide managers and field supervisors the guidance to adequately track scheduled maintenance activities and to enhance maintenance performance. The system shall utilize maintenance reports and standard maintenance forms used by field personnel and for field supervisor review. While the Maintenance IMS need not be computer based, it shall be capable of feeding information into the Management IMS.”	

CD Section	CD Requirements	IMS Section
12.d.(iv)	“ <u>Complaint Tracking IMS</u> . The IMS Program shall include a Complaint Tracking IMS to provide managers the guidance to adequately assess and manage complaint information. The system shall utilize standard complaint forms used by personnel and provide for supervisor review. While the Complaint Tracking IMS need not be computer based, it shall be capable of feeding information into the Management Programs IMS.”	Section 4. Complaint Tracking IMS
12.d.(vi)	“An implementation schedule specifying dates and actions.”	Section 6. Implementation Schedule

1.2 Acronyms & Abbreviations

Banner – Banner CIS (CIS) from Hansen Technologies

CAP – Capacity Assurance Program

CCTV – Closed-Circuit Television

CD – Consent Decree

CIP – Capital Improvements Program

CIS – Customer Information System

City – City of Columbia

Cityworks® – Cityworks® (CMMS) from Azteca Systems, Inc.

CMMS – Computerized Maintenance Management System

CMOM – Capacity, Management, Operations, and Maintenance

CW2020 – City’s program to manage the Consent Decree compliance

FSE – Food Service Establishment

FOG – Fats, Oils and Grease

GIS – Geographic Information System

IFAS – Integrated Financial Administrative Solution (Financial Management) from SunGard Bi-Tech

IMS – Information Management System

O&M – Operations and Maintenance

P6 – Primavera P6 from Oracle

QA/QC – Quality Assurance/Quality Control

SCDHEC – South Carolina Department of Health and Environmental Control

SMP – Sewer Mapping Program

SOP – Standard Operating Procedure

SR – Service Request

SSES – Sewer System Evaluation Survey

SSO – Sanitary Sewer Overflow

WCTS – Wastewater Collection and Transmission System

WMD – Wastewater Maintenance Division

WO – Work Order

WWTP – Wastewater Treatment Plant (also Metro WWTP)

Section 2 Management IMS

The Management IMS is driven by the following sections of the CD:

- Subparagraph 12.d – Information Management System Program. Within eighteen (18) months after the Date of Entry of this Consent Decree, Columbia shall submit to EPA and DHEC for review, comment, and approval an Information Management System (IMS) Program. The IMS Program shall include, but not limited to the following: a description of what information is entered into the system, how it is entered and by what means its is recorded; types of work reports prepared and submitted, including examples; a description of the management reports generated from input data (i.e. work reports), including examples; standard forms used by field personnel and management for the program, where applicable; a detailed description of the software used with cited reference for software training and procedures for utiizing the software; and a procedure for periodic quality assurance/quality control checks for the sytem.
- Subparagraph 12.d.(i) – Management IMS. The IMS Program shall include a Management IMS to provide WCTS managers guidance and instruction to adequately evaluate operations, maintenance, customer service, and system rehabilitation activities so that overall system performance can be determined and WCTS planning can be conducted.

2.1 Management IMS Components

The Management IMS provides guidance and instruction to adequately evaluate operations, maintenance, customer service, and system rehabilitation activities allowing data to be collected and analyzed within the WCTS. The IMS provides WCTS managers convenient and timely access to information, giving them the ability to determine system and staff performance and track rehabilitation of the WCTS on an ongoing basis.

2.1.1 Operations and Maintenance

The City uses Cityworks® by Azteca Systems, Inc. as its computerized maintenance management system (CMMS) to track operations and maintenance activities. The Wastewater Maintenance Division (WMD) has been using Cityworks® within the Department of Utilities and Engineering since 2011.

Cityworks® is used to record all operations and maintenance activities performed in-house, including both proactive and reactive work. Cityworks® is a GIS-centric Asset Maintenance Management System, designed for the management of assets, to track operations and maintenance, and customer information in a database.

Information available and entered the CMMS includes the following:

- WCTS Customer Account Information (Name, Address, Telephone Number, etc.)
- Incident Information
 - Additional Location Information
 - Start Date and Time
 - Completion Date and Time

- Asset Information (Asset Number)
- Work Activity (Wastewater Mainline Blockage, Customer Blockage)

Personnel located at Customer Care, the City's Customer Service Center, enter initial customer calls. If a call is not routed through customer care and is directed to the WMD, personnel at the WMD will enter the information. Information is entered into the computer and recorded electronically in the Cityworks® database.

Work reports that are currently generated include daily, weekly and monthly reports that provide information on outstanding and completed work. Work reports provide information on the work being completed, including linear footage of cleaning and inspection of WCTS assets. The following reports are generated from data that are entered into Cityworks® and provided to management for review (available for electronic review):

- Monthly Performance Report (narrative)
 - Summary of SSOs and comparison to previous year
 - Number of WMD work orders opened and closed
 - Number of Outstanding work orders open
 - Metrics (linear footage of work completed)
- Monthly Sanitary Sewer Overflow (SSO) Report
 - Calendar Year SSO Report by type and volume of flow
 - Fiscal Year SSO Report by type and volume of flow
 - SSO Maps (visual representation of all SSOs)

Personnel use different forms to manually record assigned and completed work. WMD staff will record information on these forms and turn in the information at the end of the day where the WMD administrative staff will input work information into Cityworks®.

Records are electronically maintained in the Cityworks® database. Cityworks® is a GIS-based system and thus consumes spatial and non spatial data. The existing GIS geodatabase serves as the asset inventory for Cityworks®.

Training and procedures for utilizing the software are available and used by staff. Training is conducted by the City Information Technology (IT) staff on an ongoing basis. IT provides support and is responsible for quality assurance/quality control check of the system.

2.1.2 Customer Service

The City's Customer Care also uses Cityworks® by Azteca Systems, Inc. to track customer complaints/calls. Customer Care has been using Cityworks® within the Department of Utilities and Engineering since 2011.

Cityworks® is used to record all customer service calls for the WCTS and these calls are routed to the WMD's operations and maintenance to track the customer's complaint/call. Customer Care has the ability to visually view customer location information, i.e., streets, houses, gravity sewer lines. Gravity sewer lines are mapped in the GIS.

Information is entered into Cityworks® by Customer Care service representatives. Once a work order has been issued, a Customer Care representative will see an icon that indicates a work order is in progress. Information on the customer account is recorded electronically in the Cityworks® database. Customer Care has the ability to develop reports to provide information on the number of calls it receives, by type of call and the amount of time it took to complete the work.

Records are electronically maintained in the Cityworks® database and training and procedures for utilizing the software are available and used by staff. Training is conducted by the City Information Technology (IT) staff on an ongoing basis. IT provides support and is responsible for quality assurance/quality control check of the system.

2.1.3 System Rehabilitation

The Utilities and Engineering Department has dedicated full-time staff including engineers, support staff and outside consultants charged with planning, budgeting and managing the CIP project lifecycle.

Staff and project managers use a series of Microsoft Excel spreadsheets to track CIPs throughout the project lifecycle, from concept through completion. A published project manager guide describes related processes, such as requesting CIP numbers and developing business cases used to plan and prioritize CIPs.

Annual rehabilitation contracts are currently managed by the WMD. These are considered small construction projects and locations are inspected by WMD CCTV staff prior to bid documents and construction plans being developed by Engineering. Inspection data is entered into Cityworks® and the City's GIS to capture the amount of linear footage and asset types inspected. This information is used to determine future annual rehabilitation locations for bid documents.

The following process is how data is managed and used for the small construction/annual contracts:

- Project information for small construction rehabilitation projects identified by WMD crews using CCTV technology and review of Cityworks® customer data.
- Inspection loaded in City's GIS, and area maps are developed to determine gravity line rehabilitation projects.
- Engineering Department develops bid specification documents and finalizes costs based on work quantities.
- Rehabilitation documents are advertised and contract is awarded to contractor based on low bid submittal.
- Contractor CCTV locations and data are reviewed by staff and rehabilitation projects are identified and completed.
- Inspection data and rehabilitation data are loaded into the City's GIS.

2.1.4 Sanitary Sewer Evaluation Survey (SSES)

The City is currently conducting condition assessments of assets within its gravity sewer system for the purpose of locating conditions that present a risk of failure. Procedures are described in the City's Continuing Sewer Assessment Program (CSAP) and have been submitted to USEPA for approval.

Section 3 Operations and Maintenance IMS

The Operations and Maintenance IMS is driven by the following sections of the CD:

- Subparagraph 12.d.(ii) – Operations IMS. The IMS Program shall include an Operations IMS to provide managers and field supervisors the guidance to adequately track scheduled operational activities and to enhance operational performance. The system shall utilize operating reports and standard operation forms used by field personnel and provide for field supervisor review. While the Operations IMS need not be computer based, it shall be capable of feeding information into the Management IMS.
- Subparagraph 12.d.(iii) – Maintenance IMS. The IMS Program shall include a Maintenance IMS to provide managers and field supervisors the guidance to adequately track scheduled maintenance activities and to enhance maintenance performance. The system shall utilize maintenance reports and standard maintenance forms used by field personnel and for field supervisor review. While the Maintenance IMS need not be computer based, it shall be capable of feeding information into the Management IMS.

3.1 Operations and Maintenance IMS Components

The Operations IMS leverages the City’s existing computer infrastructure to support the reporting of operations and maintenance activities within the system and track work performed over time. The CMMS and GIS computerized software systems are the applications that support the input, storage, analysis and display/reporting of the O&M activities performed by City staff and as such are the primary components of this part of the IMS.

Descriptions of the use of these applications to support the CD requirements referenced above is provided in the text below.

3.1.1 Computerized Maintenance Management System (CMMS)

Work Order and Service Request Process

The WCTS staff use standard forms and reports to adequately track scheduled operational activities using a CMMS software package called Cityworks® by Azteca Systems. The WCTS has implemented Cityworks® to provide centralized access to information about the location, condition, maintenance and performance history, and attributes of all of the Division’s WCTS assets, which are comprised primarily of the gravity and forcemain sewer pipe network and pump stations.

Work Orders (WOs) are used to track maintenance activities that WCTS field staff performs (often in response to a service request). The WO captures the type of work that is performed, the asset on which it is performed, and some additional details depending upon the type of work that is performed. Cityworks® is used to record all maintenance activities performed in-house, including both proactive and reactive work.

Service requests (SR) are generated by the customer information system as well as by internal WMD staff. The Administrative Assistants at WMD convert the SR to a WO within Cityworks® and then print the WO for the WMD Supervisor to dispatch or schedule the work.

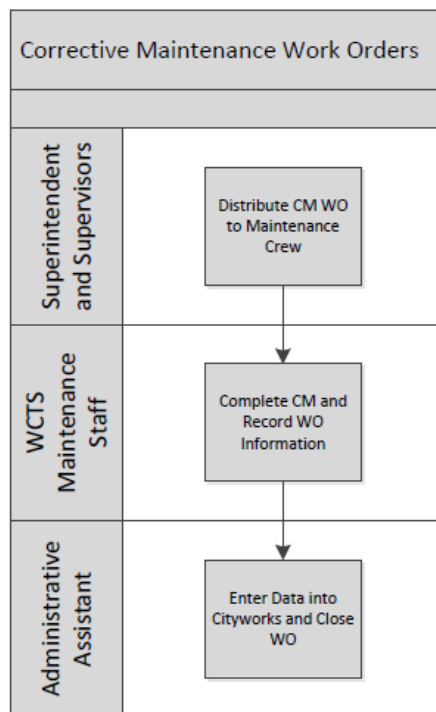
The crews carry out and document the work performed and record the assets involved on a hardcopy WO which is then returned to their Supervisor for review and approval. If unplanned work is required (e.g. emergency or priority work) the crew will complete a “green sheet” to record the activity and associated work. The information written on the “green sheet” is later entered into the Cityworks® WO record after the work is completed. The Administrative Assistants then enter the information from the WO forms and “green sheets” into Cityworks® and close the WOs as appropriate.

The Administrative Assistants use Cityworks® software, which is integrated with the electronic WCTS GIS database to attach the WOs to the related asset(s) so that the work history over time is recorded and managers can identify trends in work or asset condition over time.

The following types of information are stored within the CMMS:

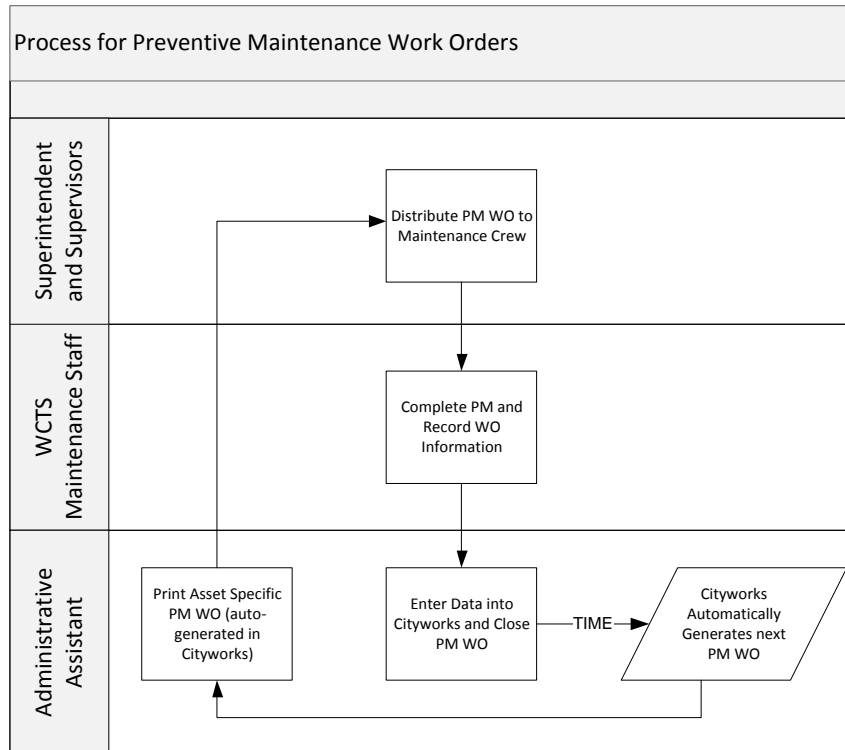
Corrective Maintenance – The WOs that are being logged in Cityworks® for the WMD staff reflect corrective maintenance and are reactionary maintenance in response to a repair event, failure, or request. Based upon the current configuration of Cityworks®, the Administrative Assistants must select the type of GIS asset (entity type) before they can select the type of WO that is needed. The Corrective Maintenance work order process is outlined below in **Figure 1**.

Figure 1 – Corrective Maintenance Work Order Process



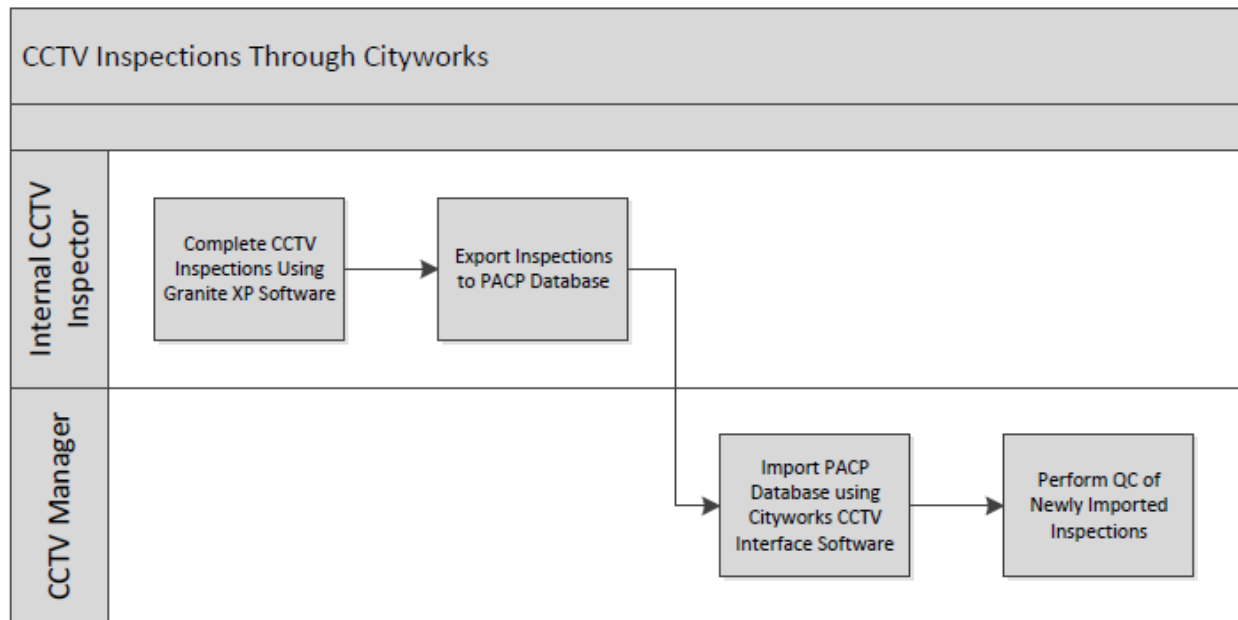
Preventative Maintenance – Preventative Maintenance (PM) is being conducted by WMD crews, and it is identified and documented. The PM activities related to the collection and transmission system are scheduled within Cityworks® by supervisors based on standard best practices or O&M maintenance guidelines for the assets in question. The WOs generated by Cityworks® are provided to the field staff in paper format and the work is performed as described in **Figure 2** below.

Figure 2 – Preventative Maintenance Work Order Process



Inspections – The WMD conducts CCTV internal pipeline inspections as well as dye and smoke testing. The inspection results are being tracked through Cityworks®, as outlined in **Figure 3**, and follow-up WOs are issued when CCTV staff members identify an issue through the inspection process. WMD uses Granite XP software, by CUES, to collect and store the digital CCTV inspection information that is then linked to the City’s GIS database.

Figure 3 – CCTV Inspection Process through Cityworks®

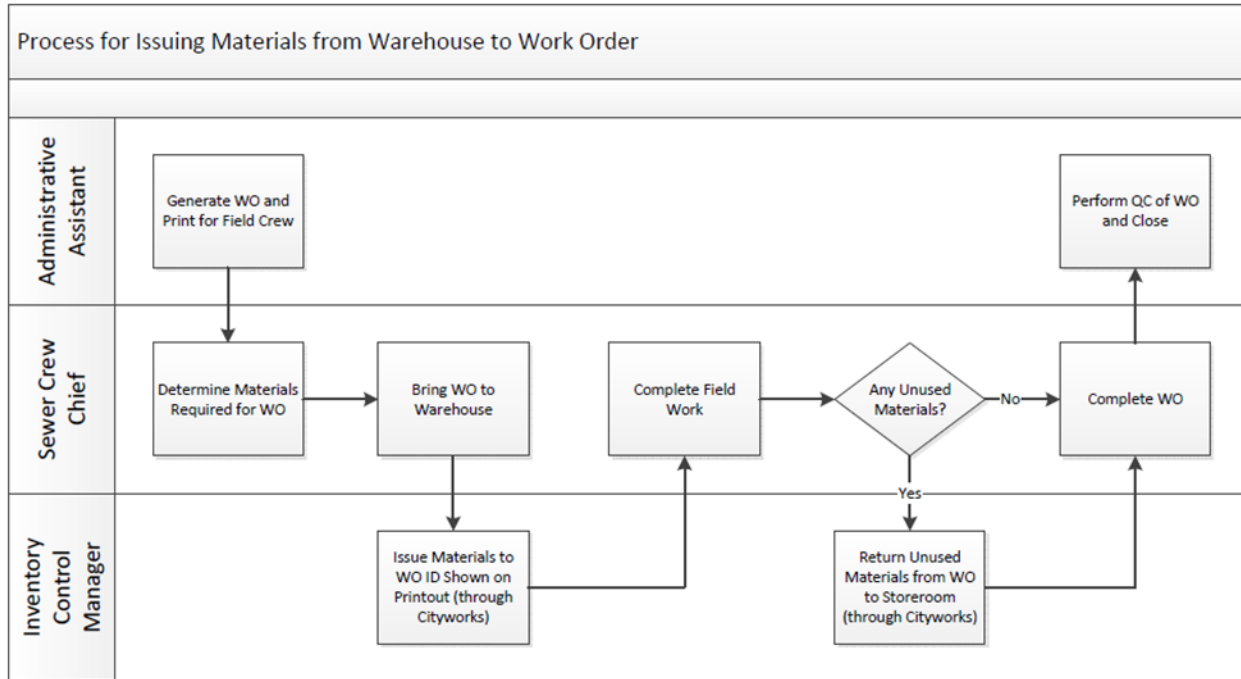


SSO Response – Currently, upon receipt of a handwritten SSO report form from field personnel, an SSO WO is created in Cityworks® and linked to an asset. In addition to inputting information in Cityworks®, the Administrative Assistant types the same information from the WO into a notification form (Microsoft Word template) from the SCDHEC, creating a digital version of the SSO Report. This report is then passed onto the Compliance Manager for review, correction, approval and final submission to SCDHEC.

Inventory – The WMD warehouse uses the Storeroom module as part of the Cityworks® software. The process for tracking and issuing stock is a manual one and is not done directly from the warehouse to the WO at the time of the event. However, the process does result in the capture and tracking of issued stock for each WO. The current process involves the following steps and is also outlined in **Figure 4**:

- Warehouse hands out necessary parts/materials to the crews and documents on a sheet what is distributed to each crew.
- Warehouse takes the sheet and performs a "transfer" in Cityworks® Storeroom to move each part from the main WMD storeroom to the applicable "crew" storeroom.
- When closing out the WO the Administrative Assistants add the part from the "crew" storeroom to the Cityworks® WO in order to capture the use of materials/stock on the WO.

Figure 4 – Process for Issuing Materials from Warehouse to Work Order



Section 4 Complaint Tracking IMS

The Complaint Tracking IMS is driven by the following section of the CD:

- Subparagraph 12.d.(iv) – Complaint Tracking IMS. The IMS Program shall include a Complaint Tracking IMS to provide managers the guidance to adequately assess and manage complaint information. The system shall utilize standard complaint forms used by personnel and provide for supervisor review. While the system need not be computer based, it shall be capable of feeding information into the Management IMS.

4.1 Complaint Tracking IMS Components

As with the O&M IMS, the Cityworks® CMMS software is the primary application supporting the tracking and reporting of customer complaints surrounding issues regarding the WCTS.

4.1.1 Computerized Maintenance Management System (CMMS) Component

The City uses Cityworks® by Azteca Systems, Inc. as its CMMS. The Wastewater Maintenance Division has been using Cityworks® within the Department of Utilities and Engineering since 2011.

The City's Customer Care Center has been recording customer complaints in Cityworks® since 2011. All wastewater-related complaints are routed to the appropriate WMD staff and follow-up work orders are created in Cityworks®, as needed, for field staff to review and determine the cause and corrective action for the complaint.

Work orders regarding complaints received by citizens through the Customer Care Center are then documented and closed out appropriately within the Cityworks® application using the same corrective/preventative maintenance work order process described in **Section 3**.

Managers at WMD can then generate reports utilizing Cityworks® reporting functions to determine the number, cause and resolution of customer complaint driven work orders.

Section 5 Metrics and Reporting

WCTS managers and supervisors obtain metrics and reports directly from Cityworks® regarding the amount, type and frequency of work performed in the WCTS. The reports are in both digital and paper format and utilize both standard and customized reports within the Cityworks® software. In addition, the WO events can also be viewed on screen directly within the GIS using the Cityworks® interface to view the work performed on a map. This allows O&M managers and supervisors to identify and analyze trends in work frequency and/or location. The following are the reports currently utilized by managers to track and analyze the work performed in the system:

Service

- Service calls received monthly, quarterly, annually with response times included

Inspection

- Linear feet of lines cleaned
- Linear feet of CCTV
- Manholes Inspected
- Linear feet of lines smoke tested

Repairs/Installations

- Mainlines repaired
- Service lines/taps renewed
- New taps installed
- Linear feet of new lines installed

Rehabilitation

- Linear feet of CIPP installed
- Manholes rehabilitated
- Linear feet of root control applied
- Linear feet of lines replaced

SSOs

- Number of SSOs per mile of gravity sewer
- Number of SSOs pump station related
- Number of SSOs capacity related
- Number of SSOs force main related
- Number of SSOs grease related
- Number of SSOs root related
- Number of SSOs tracked by volume released

Maintenance Activities by Type

- Corrective

- Preventative
- Emergency

Section 6 Implementation Schedule

The implementation schedule below satisfies the following section of the CD:

- Subparagraph 12.d.(v) – An implementation schedule specifying dates and actions.

The City is already using the information management system programs described herein with the exception of the follow:

Table 2 – IMS Implementation Schedule

Program	Description
Storeroom component of Cityworks®	The Storeroom will not be completed until June 30, 2018. The data entry/reporting which is dependent on this feature will not be implemented until June 30, 2018.
Sewer Mapping Program	Sewerbasin electronic mapping will be implemented in accordance with the submitted and EPA approved Sewer Mapping Plan (July 2014).