



Prepared By:



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ACRONYMS

ADEQ- Arkansas Department of Environmental Quality
CAO- Consent Administrative Order
CAP – Corrective Action Plan
CEU- Continuing Education Units
CMOM – Capacity, Management, Operations and Maintenance
COOP- Continuity of Operations Program
CSR- Customer Service Representatives
EPA – Environmental Protection Agency
FOG- Fats, Oils & Grease
GIS – Geographical Information System
GPS- Global Positioning System
I/I – Infiltration and Inflow
MGD – Million Gallons per Day
NPDES- National Pollutant Discharge Elimination System
O&M – Operations and Maintenance
ORP – Overflow Response Plan
PCW -Pollution Control Works (Treatment Plant)
PDH- Professional Development Hours
PM – Preventive Maintenance
PPE – Personal Protective Equipment
SCADA – Supervisory Control and Data Acquisition
SECAP – System Evaluation and Capacity Assurance Plan
SOP – Standard Operating Procedure
SSES- Sanitary Sewer Evaluation Study
SSO – Sanitary Sewer Overflow or Sanitary Sewer Outfall
SSORP- Sanitary Sewer Overflow Response Plan
TMDL- Total Maximum Daily Load
TSS – Total Suspended Solids
WWTP – Wastewater Treatment Plant

CHAPTER 1-PROGRAM INTRODUCTION

1.1 What is CMOM?

CMOM stands for “Capacity, Management, Operations, and Maintenance”. It is a flexible, dynamic framework for municipalities to identify and incorporate widely accepted wastewater industry practices to:

- Better manage, operate, and maintain collection systems
- Identify and investigate capacity constrained areas of the collection system
- Respond to sanitary sewer overflow (SSO) events

In CMOM planning, the utility selects performance goal targets, and designs CMOM activities to meet the goals. Information collection and management practices are used to track how well each CMOM activity is meeting the performance goals, and whether overall system efficiency is improving.

1.2 Purpose and Overview

In an ideal world, sanitary sewer systems would be sized and maintained in a manner resulting in no unpermitted discharges and a high quality effluent released into the receiving stream. Unfortunately, sanitary sewer collection systems have limited hydraulic capacity to carry wastewater based on the size of the system components. The size of the components is based upon an analysis of the contributory flows into the system plus a factor for growth. The analysis considers residential, commercial and industrial sources of flow plus a designed leakage rate for the system components. With time, the design basis for the system may change resulting in flows in excess of the designed flow. Changes can include population increases beyond the anticipated growth factor, deterioration of the system components, inappropriate storm water connections, etc. These factors can eventually lead to overflows of the system as the increased flows exceed the ability of the collection system or lift stations to convey the wastewater.

Additionally, poor collection system maintenance can result in overflows irrespective of any flow increases. Materials such as grease, rags, roots and other foreign objects can create blockages within the system. Regular maintenance and cleaning can severely limit or even eliminate these occurrences, particularly grease and root development.

Overflows, regardless of the cause, release untreated sewage to surface waters, at times leading to substantial negative impacts on the receiving body. The majority of impaired waters in the United States are impaired due to nutrients, sediment, pathogens, metals and organic enrichment. Sewage overflows contribute to these impairments and can have acute impacts such as fish kills and beach closures. The CMOM provides the resources and information necessary to properly plan, manage, operate, and maintain the sanitary sewer system to minimize this environmental impact.

The CMOM shall enable the Permittee to:

- Properly manage, operate, and maintain, at all times, all parts of the collection system the Permittee owns or over which it retains operational control.

- Provide adequate capacity to convey base flows and peak flows for all parts of the collection system the Permittee owns or over which it retains operational control and take all feasible steps to stop and mitigate the impact of non-wet weather-related sanitary sewer overflows in portions of the collection system owned by the Permittee or over which the Permittee retains operational control.
- Provide notification to parties with a reasonable potential for exposure to pollutants associated with an overflow event.

1.3 Goals

City Corporation operates and maintains approximately two hundred and eleven (211) miles of sanitary sewer and nineteen (19) wastewater lift stations. Continuing growth, urbanization, changing hydrologic conditions, and age of system contribute to the strain on the infrastructure. In addition, new regulations will impose additional constraints. The purpose of this document is to detail a formal Capacity, Management, Operations and Maintenance (CMOM) Program. The Program's approach is environmentally conscientious and cost-effective. The Program elements outline and provide specific activities and reporting procedures to document the progress of the Program. Current and anticipated federal and state requirements will be evaluated and implemented throughout the program.

The Program's goals are:

- *Prevent*- Prevent sanitary sewer overflows. Take all steps feasible to eliminate current overflow locations and prevent new overflow locations.
- *Protect* - Protect the Environment. Take all feasible steps to eliminate and mitigate the impact of sanitary sewer overflows for all parts of the collection system and to develop and enforce appropriate ordinances that will enhance the performance of the collection system.
- *Prolong*- Prolong the life of City Corporations sanitary sewer system, through effective rehab methods and effective management of Inflow and Infiltration.
- *Provide*-
 - Provide effective resource management for the assets of City Corporation.
 - Provide adequate system capacity through the use of analytical and engineering methods through the development of a system to assess and prioritize maintenance, rehabilitation and replacement activities
 - Provide excellent service to our customers through effective communication, programs, and education.

1.4 Components

This CMOM contains chapters that address specific requirements of the CMOM Program. The chapters contain language addressing how City Corporation is applying CMOM principles to its conveyance and treatment facilities. The Program, including objectives, strategies, tactics and other activities will be subject to change and refinement as City Corporation continues implementing the CMOM Program. The CMOM will be updated annually for the first five years of the program.

1.5 Consent Administrative Order

City Corporation entered into Consent Administrative Order LIS No. 09-146 AFIN 58-00105 with the Arkansas Department of Environmental Quality (ADEQ). The CMOM document satisfies Section 8 of the Order and Agreement portion of the Consent Administrative Order (CAO). The CAO was executed November 6, 2009 and became effective December 25, 2009. The Executed CAO document is attached as Appendix A.

The CAO was amended on June 2nd 2014. An executed copy of the amended CAO can be found in Appendix A-1.

1.6 Corrective Action Plan

Corrective Action Plans were implemented as required by the CAO to guide City Corporation to implement improvements to the sanitary sewer collection system.

1.6.1 TSS & TRC

A Corrective Action Plan (CAP) was prepared by Garver LLC on behalf of City Corporation, Russellville, AR, to address the possible solutions for the City Corporation Pollution Control Works (PCW) Total Suspended Solids (TSS) and Total Residual Chlorine (TRC) violations. This CAP is required per the Consent Administrative Order (CAO) No. 09-146 AFIN 58-00105. The CAP outlines proposed improvements to address TSS and TRC violations and proposes an implementation schedule for the said improvements. This document can be viewed in Appendix B.

1.6.2 Comprehensive

A Comprehensive Corrective Action Plan (CAP) was formulated to address paragraph Two (2.) of the Order and Agreement section of the Consent Administrative Order LIS No. 09-146. The entire Comprehensive Corrective Action Plan can be viewed in Appendix B.

CHAPTER 2-PERSONNEL

2.1 City Corporation Organization

2.1.1 History

WWTP/Storm Water Basin-The original Wastewater Treatment Plant was constructed in 1923 on the banks of Prairie Creek near Arkansas Tech University. The Pollution Control Works (PCW) is located at 404 Jimmy Lile Road and construction was completed in 1965. In 1973 and 1978 two (2) major expansions greatly increased the pretreatment capacity and enabled the plant to comply with more stringent treatment limits. Between 1990 and 2010, seven (7) smaller upgrades and expansions were completed. The recent improvements, including a new 21-million-gallon equalization basin, have significantly increased the capacity of the plant. Extensive rehabilitation and replacement of the sewer collection system has also greatly reduced the number of overflows and volume at the plant. In 2014, as required to comply with a Consent Administrative Order (CAO) issued in 2009, a third major upgrade and expansion was completed. City Corporation has continued to implement improvements at the PCW and throughout the collection system.

The City of Russellville has been served by a community sanitary sewer system since approximately 1912. The sewers originally discharged to nearby creeks, but as the City grew the individual sewer lines were connected to form a collection system. The sewers were maintained by the street department or other maintenance functions of the general City government until 1985. The City Corporation commission established by the City to operate the municipal water system, assumed responsibility for the sewer collection system, lift stations and treatment plant in 1985.

2.1.2 System Profile

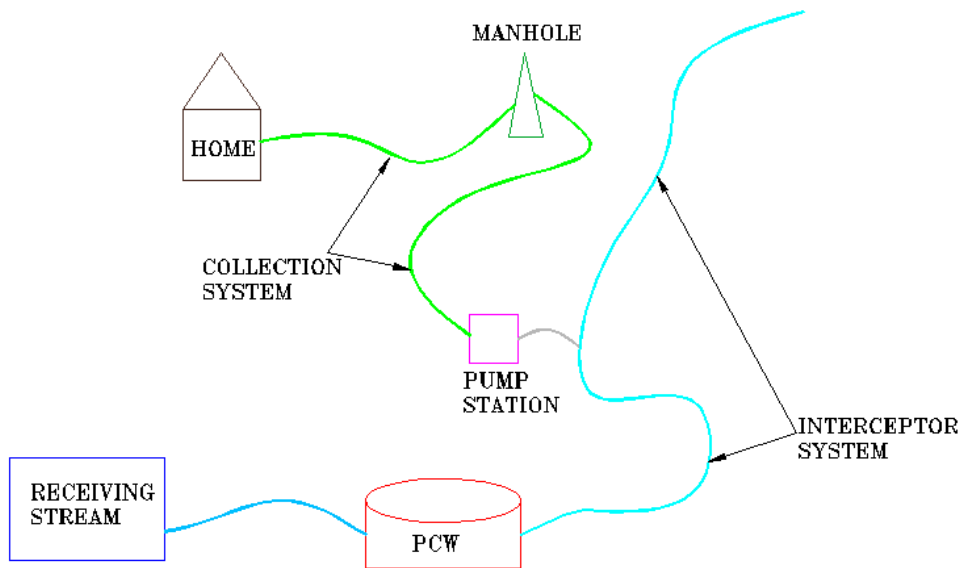
On average the PCW treats 5.34 MGD and has the capacity to treat 7.3 MGD. During significant rain events the plant can treat up to 13 MGD for a short period of time. The collection system comprises of 19 sewer lift stations, 4,154 sewer manholes, roughly 190 miles of gravity mains, and 21 miles of force mains serving the community of Russellville and a portion of the city of Dover. Maps of the system are maintained by the City Corporation at the Administration office located at 205 West 3rd Place in Russellville, AR. The system profile is as follows:

Table 2-1: Sewer System Profile

Population of Russellville	29,193 (2019)
Contributory Area	6,500 acres
Population of Dover	2,045 (2019)
Total Customers	12,994-water 11,376-sewer
Treatment Plant Name(s)	City Corporation Pollution Control Works
Plant Design Capacity	7.3 MGD
Average Daily Flow 2021	5.34 MGD
Miles of Public Gravity Sewers	190
Miles of Force Mains	21
Number of Pump Stations	19
Number of Public Manholes	4,154
Number of Employees	64

As shown in the graphic below, in City Corporation’s service area, wastewater leaving a house or business typically flows through a gravity pipeline toward the street, where it enters the city’s collection system and continues to a pump station. At this point, the wastewater is pumped into a large interceptor pipeline, which is then transported to the Wastewater Treatment Plant. After being treated, the effluent water is then released into Whig Creek, and ultimately flows into the Arkansas River.

Figure 2-1: System Profile



As a result of the terrain in Russellville, the system consists of 21 miles of force mains, and 19 lift stations to transport wastewater to the treatment plants. These pipes are operated under pressure and typically have minimal inflow and infiltration (I/I) problems.

Chart 2-1: Pipe Type Breakdown for Gravity Sewer

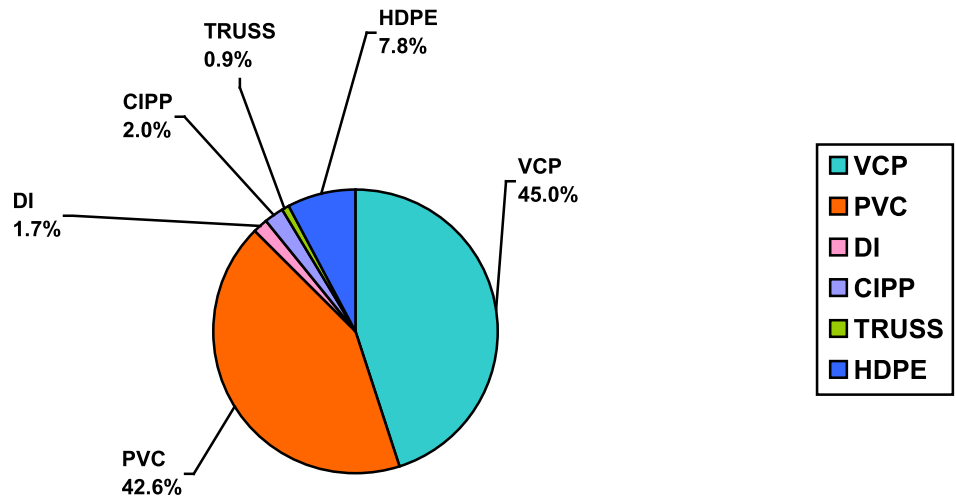


Chart 2-2: Pipe Type Breakdown for Force Mains

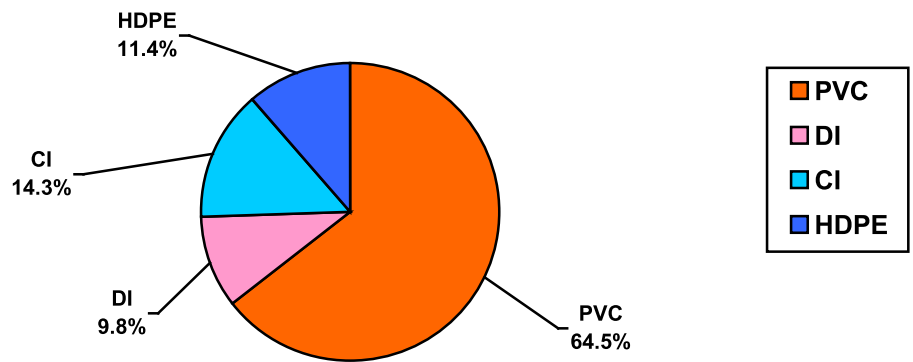


Chart 2-3: Pipe Diameter Breakdown for Gravity Sewer

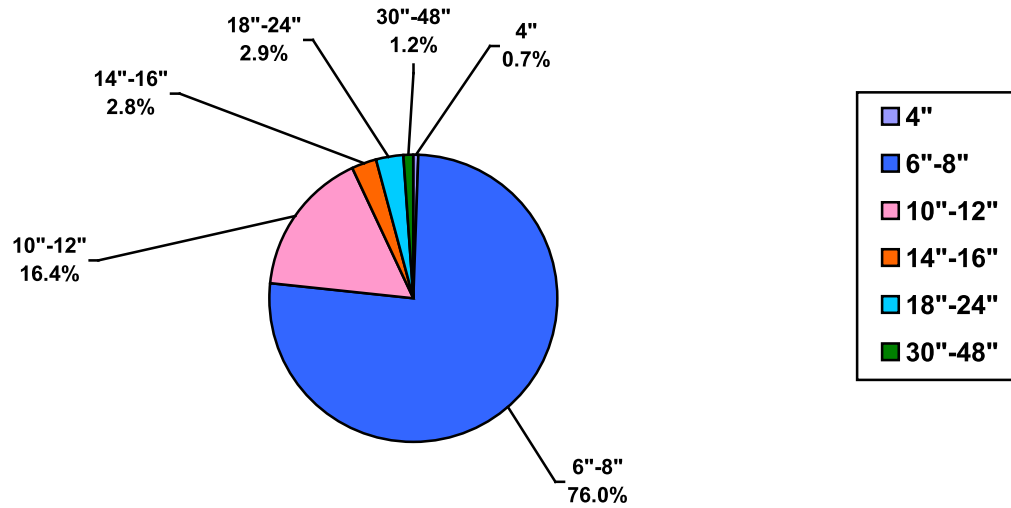
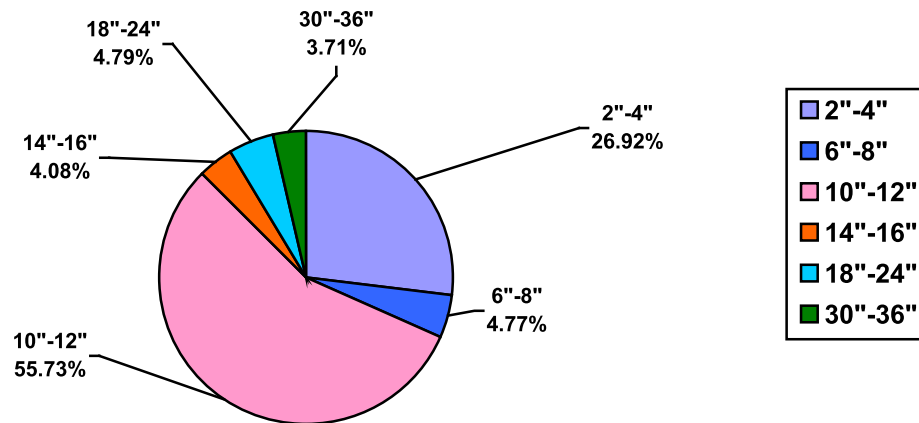


Chart 2-4: Pipe Diameter Breakdown for Force Mains



2.1.3 Organizational Structure

The sewer system is governed by City Corporation, a board established by the City of Russellville to operate the municipal water system both potable and sewerage. City Corporation assumed responsibility of the sewer system and treatment plant in 1985. The board is made up of five board members. City Corporation employs the service of a Chief Executive Officer (CEO), who oversees the entire utility and reports directly to the board. The following positions report to the Chief Executive Officer (CEO): Chief Operations Officer, Chief Financial Officer, and the Chief Engineering Officer. The Chief Operations Officer oversees the WW Operations Manager and the Water Operations Manager located at Pollution Control Works. The Chief Financial Officer oversees the Customer Service Manager and the IT Manager. The Chief Engineering Officer oversees the Engineering Department and Construction Department. Please refer to Appendix 14 for the Organization Chart for City Corporation.

2.2 Job Descriptions

Job descriptions lay out the foundation for the requirements and responsibilities of each person within the organizational structure. Descriptions are reviewed every two years and updated as necessary to reflect new or changing requirements. Employees are expected to comply with the elements of the job descriptions including any requirements for professional licenses and continuing education. Failure to meet the basic elements of an employee's assigned job description may be reason for termination, demotion or other disciplinary action deemed appropriate. City Corporation has 64 current positions available. The individuals who fill them perform a variety of duties essential to their mission. The Human Resources Division maintains current job descriptions for all positions. The job descriptions define the nature of the work to be performed, minimum requirements for the position, necessary qualifications or certifications, common examples of the type of work and licenses required. Job descriptions are included as Appendix C.

2.3 Public Relations

City Corporation has a customer service department responsible for correspondence and complaints received through email, calls, or letters. The CSR's (Customer Service Representatives) take all the calls from customers and make work orders that are sent directly to the field technicians to confirm and address. The lobby hours for the CSR's are Monday through Friday; 8:00 a.m. to 4:30 p.m. However, the CSR's can be reached by telephone Monday through Friday; 8:00 a.m. to 5:30 p.m. Employees trained in customer service provide prompt and courteous responses to telephone inquiries regarding billing issues or other concerns. Drive up services are provided until 5:30 p.m. at the main office for City Corporation. During evenings, weekends and holidays, an emergency after hour's number is listed on the answering machine that directs them to a representative located at the water treatment plant. A copy of the customer complaint form is located in Appendix 10. City Corporation has completed a PR campaign in the newspaper, this helps to inform the public and talk about the CAO's and other issues City Corporation faces.

2.4 Training

Each licensed employee is required to obtain a minimum of 12 hours of professional/trades development training per year upon approval by an immediate supervisor. Training may be in the form of formal off-site or on-site training, on-the-job training, college/vocational course work or other approved education. The training must be directly relevant to the employee's duties as described in his/her job description. If an employee is

required to obtain continuing education units (CEUs) or professional development hours (PDHs) for his/her license, the employee is required to determine if the license granting agency/board will accept the hours before the employee begins the course.

Within the first three months of employment, each employee is required to attend a course in Safety. The Manager or his/her designee will approve the course prior to attendance.

Other potential course topical areas include:

- Routine line maintenance including rodding, cabling, chemical and jet cleaning
- Traffic control
- Environmental/safety regulations
- Pump theory, operation, and maintenance
- Laboratory procedures, equipment calibration, sample collection and handling
- Electrical and instrumentation
- Public relations
- Sewer overflow response and reporting
- Collection system evaluation including smoke testing and closed circuit TV
- Pipe repair
- Collection system rehabilitation including pipe bursting, cured in place, slip lining, and trenching/shoring
- Heavy equipment operation
- Wastewater System Operations and Maintenance

City Corporation will include in the operating budget sufficient funds to provide a combination of on and off site training such that each employee can obtain a minimum of 12 hours of professional/trades development training per year inclusive of continuing education needed for license requirements. The funding will be inclusive of course cost, travel, lodging, meals, and incidental expenses consistent with typical costs for the location. College and vocational tuition cost reimbursements will be consistent with the City Corporation's policy for such reimbursements.

CHAPTER 3-LEGAL AUTHORITY

3.1 Ordinances

City Corporation is provided legal authority through the ordinances enacted by the City of Russellville, Arkansas. The ordinances providing authority are summarized below and are included in their entirety in Appendix D.

- Ordinance 1075- Sewer Use Ordinance - Outlines the requirements for sewer design, installation, testing, and inspection of new sewer facilities. It also details illegal connections and materials which are illegal to discharge into the sewer. It gives the employees of City Corporation the right to access all system properties.
- Agreement with the City of Dover – This agreement provides the specific details of the arrangement between the City of Dover and City Corporation in regards to sanitary sewer treatment. The City of Dover is a satellite system of City Corporation. City Corporation is responsible for treating the sanitary sewer, but the collection system is maintained by the City of Dover. This agreement gives City Corporation the specific right to review plans and specifications for system improvements, to inspect the Dover system, and to require maintenance or repair work as may be necessary to prevent the infiltration of surface water or storm drainage.
- Ordinance 2105 – Pretreatment Ordinance – Current Ordinance outlines the details of the City Corporation pretreatment program.
- Ordinance 976-Service Line Responsibility- Amended Ordinance that outlines the requirements for sewer service line installation and responsibility for repairs.
- Ordinance 2060-Service Line Responsibility- Current Ordinance that outlines the requirements for sewer service line installation and responsibility for repairs.
- Ordinance 2043-Current Sewer User Rate Ordinance -This Ordinance establishes the current sewer rates for City Corporation.
- Ordinance 2194-Current Water User Rate Ordinance- This Ordinance establishes the current water rates for City Corporation.
- Ordinance 949-Original Sewer User Rate Ordinance
- Ordinance 1022-Amended Sewer User Rate Ordinance
- Ordinance 1294-Amended Sewer User Rate Ordinance
- Ordinance 1372-Amended Sewer User Rate Ordinance
- Ordinance 1388 – Amended Pretreatment Ordinance
- Ordinance 2234-Amended Ordinance 1980.
- Ordinance 2044 -Amended Sewer User Rate Ordinance
- Ordinance 2252-Right of Way Requirements

3.2 ADEQ Permits

3.2.1 NPDES Permit

City Corporation is authorized to discharge through NPDES permit No. AR0021768. Discharge shall be in accordance with effluent limitations, monitoring requirements, and other conditions set forth in this permit. The current permit became effective September 1, 2016. The expiration of this permit is August 31, 2021. The entire permit can be viewed in Appendix 8.

3.2.2 No Exposure Storm Water Permit

No exposure means all industrial materials and activities are protected by a storm-resistant shelter to prevent exposure to rain, snow, snow melt and/or runoff. No Exposure Exclusions may be obtained for discharges composed entirely of storm water associated with industrial activity in lieu of this general permit as long as all of the required conditions for applicability can be certified. A Notice of Intent form can be obtained from the General Permits Section of the Water Division. The No Exposure Exclusion Certification must be renewed 120 days after the effective date of the renewal permit. A renewal form is located in Appendix F.

3.3 Industrial Stormwater Control

City Corporation experiences significant sources of Inflow and Infiltration from industries throughout the city. The system wide evaluation from RJN identified the industrial basins as some of the highest inflow problems in the entire collection system. Industries can have illegal taps and direct storm water connections that significantly add to the wastewater flows in the sewer system. It is recommended that City Corporation continue their effort to prevent industrial stormwater from entering the sewer system through active monitoring, enforcement of existing ordinances, and enactment of additional ordinances or regulations for stormwater.

CHAPTER 4-MANAGEMENT

4.1 Maintenance Facilities and Equipment

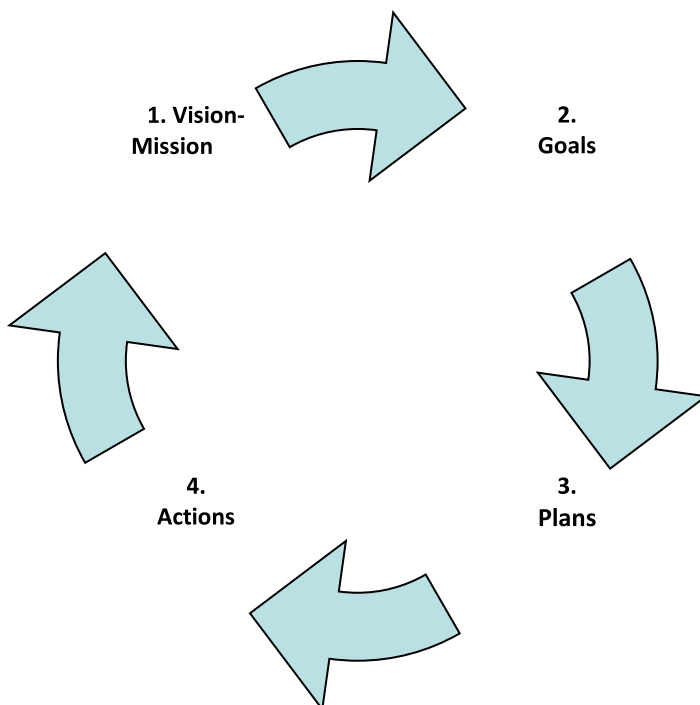
City Corporation maintains several facilities to support the collection system program. Administrative activities are conducted at the Administrative Office, which houses the Human Resources, Administration, Customer Service, and Engineering Department. The Pollution Control Works Facility houses all Pollution Control workers, Pretreatment Operations, and Laboratory Operations. The majority of facility and construction equipment is stored at the construction office or on site at the treatment plant facility. Adjacent to the Pollution Control Work-Treatment Plant is a Construction Office, which houses all Construction crews.

The Construction & Maintenance Operations uses a wide and extensive variety of equipment including backhoes, tractors, dump trucks, utility crew trucks with trailers, pickup trucks, utility vehicles, hydraulic jet cleaners, trailers, hydraulic pumps, video inspection trailers, portable video equipment, gas detectors, and safety equipment. A complete list of all Maintenance Vehicles and Major Equipment is located in Appendix G.

4.1.1 Scheduling & Strategic Planning

To schedule and maintain facilities and equipment City Corporation prints “Maintenance Tickets”. Maintenance can be scheduled every day, once a week, twice a month, once a month, quarterly, six months, and yearly. They are kept on file and can be reviewed upon request.

Strategic Planning will be done under the guidance of City Corporation’s Mission-Vision Policy. The following graphic shows how the Strategic Planning Process works.



Strategic Planning defines the five-year business oriented goals and establishes a Strategic Plan to accomplish these goals. The Strategic Plan expresses the Vision of City Corporation and attempts to guide our efforts in that direction. Individual action items and action plans are developed to direct the work to be accomplished. The Strategic Planning Process is broken down in more detail in Appendix 22.

4.1.2 SCADA

The Maintenance Operations of City Corporation maintains 19 wastewater lift stations throughout the city. There are four employees assigned to monitor and repair lift stations. These lift stations are constantly monitored by the Supervisory Control and Data Acquisition (SCADA) system.

SCADA is a computer system for gathering and analyzing real time data. SCADA systems are used to monitor and control a plant or equipment in industries such as telecommunications, water and waste control, energy, oil and gas refining and transportation. A SCADA system gathers information, such as where a leak on a pipeline has occurred, transfers the information back to a central site, alerting the home station that the leak has occurred, carrying out necessary analysis and control, such as determining if the leak is critical, and displaying the information in a logical and organized fashion. SCADA systems can be relatively simple, such as one that monitors environmental conditions of a small office building, or incredibly complex, such as a system that monitors all the activity in a nuclear power plant or the activity of a municipal water system. All SCADA information is stored in Historian (a historical database) on City Corporation's computer.

4.1.3 Replacement Parts

City Corporation maintains a construction shop with a supply yard that houses all necessary materials and equipment required to make emergency repairs. Appendix H is an inventory of all maintained spare parts. The program "AS/400" is used to keep inventory of all these spare parts. For those parts not kept in inventory, City Corp uses vendors, to supply the necessary materials to make the repairs.

4.2 Engineering

4.2.1 Collection System Maps-GIS

Geographic Information System (GIS) technology has made the mapping and map updating process considerably more efficient. GIS is a computerized mapping program capable of combining mapping with detailed information about the physical structures within the collection system. City Corporation maintains a CAD-based map of the entire sewer system. The map is updated as additional information is received. To facilitate information storage and retrieval, the sewer system has been segmented into 27 individual basins. A map of the basins is shown in Appendix 15.

City Corporation has successfully converted from a manually drawn, paper mapping system, to a Geographic Information System (GIS) based on aerial photography. All graphic information from the old system has been entered into the computerized mapping system, and the assignment of identifying labels to all manholes is complete.

Recognizing that significant error will likely be associated with the transfer of available graphic data (e.g. hand-drawn maps) into the GIS, City Corporation has also undertaken a program to obtain accurate positions for manholes within the system through the use of Global Positioning System (GPS) technology.

4.2.2 Construction

City Corporation's Construction Operation has crews that complete new services, maintenance, and repairs on the water and sewer system. Also, crews perform Inflow & Infiltration work and repairs in the sewer system. The Inflow & Infiltration crew gets assistance from the other crews to keep up with the repairs to the sewer system. The Inflow & Infiltration crew is responsible for sewer stoppages during regular hours. City Corporation maintains 2 persons on call after hours for sewer stoppages and water leaks.

4.2.3 Developer Funded

City Corporation is involved with several Developer Funded Projects. The designs are reviewed by City Corporation staff for approval. Once approved, the construction site is supervised by qualified personnel to ascertain that the construction is in accordance with the plans and specifications. All new lines are televised, and all new manholes are vacuum tested.

4.2.4 Record Keeping and Asset Management

City Corporation has started the use of a new asset management software (Trimble Unity). It offers specialty water & wastewater line of wireless monitoring solutions. To support the hardware, they have developed an asset management software that is fully GIS integrated. It is web browser based and essentially a suite of application and tools specific to the water industry. City Corps existing rain gages can be connected to a cellular transmitter and report to the software which will allow them to monitor rain events in real time. This should be extremely useful to identify two-year rain event which we get a reprieve for overflows from ADEQ. Currently they must visit the site (monthly) they are installed, connect a cable to a laptop, download the data, process it, and then review it. The unity software will allow them to set up an alert and it will notify them when the event has occurred.

The Unity Software's Capabilities and Workflows:

1. Build Customer Workflows and Forms
2. Capture Accurate 3D Positions
3. Efficiently Manage, Dispatch, and Track Work Progress
4. Smart, Configurable Data Collection Forms and Tools
5. Driving Directions and Optimized Routes
6. Support for Proactive Asset Performance Monitoring, Alarming, and Regulatory Reporting.
7. Non-Revenue Water and Leakage Management
8. Deliver Reports and Performance Analytics.
9. Ready for Enterprise Integration.
10. Multi-Platform Support. Powerful When Online, Still Works When Offline."

4.3 Safety Program

The Safety Division is administered by the Safety Coordinator. The Safety Division is responsible for:

- Safety training
- Safety inspections
- Accident investigations
- Development of emergency response procedures
- Documentation of training, sampling, inspections, and medical information conducted by the Safety Division
- Safety Notices
- Communication of relevant safety information to all employees

4.3.1 Safety Procedures

Safety rules are written rules describing required practices and procedures to follow for performing routine and non-routine activities in a safe manner. City Corporation personnel are responsible for familiarizing themselves with all safety rules and are mandated to follow all safety rules in the performance of their daily activities while at City Corporation's facilities or when representing City Corporation off site. Supervisors are responsible for: informing, explaining, and publicizing all safety rules to their personnel; enforcing observance of all safety rules by personnel; and ensuring each employee receives a copy of the safety rules. To view the Safety & Health Manual in full see Appendix J.

4.3.2 Vehicle Safety

City Corporation maintains an accurate log of all reportable accidents, both in the HR department for workers comp, and in the Safety Manual binder completed by the safety coordinator. All injuries have an accident investigation sheet completed and filed with the accident report. A chart of injuries with name, department, date, and type of injury listed is on file with the safety coordinator. The following are related to the safety program:

Appendix K- Vehicle Accident SOP (Standard Operating Procedures)

Appendix L- Parked Traffic Cone Procedure

Appendix M- Cone Positioning

4.3.3 Pharmaceutical Take-Back Program

City Corp assisted in the development of a new Pharmaceutical Take-Back Program. City Corp purchased the Drug Terminator incinerator and donated to the River Valley Operation Medicine Cabinet. It is our understanding that it is the second full-time program in the state. The Drug Terminator poster can be viewed in Appendix N. The Proper Drug Prescription Disposal Guidelines can be viewed in Appendix O. The latest Drug Take Back event was held on Saturday October 22, 2016.

4.4 Emergency Disaster Response Plan

Disasters/Emergencies that are likely to occur in the service area that are addressed are: earthquake, major fire emergencies, water outages do to loss of power, localized flooding, water contaminations and acts of sabotage. City Corporation has developed a COOP (Continuity of Operations Program). A team is currently working on a comprehensive emergency management plan that is in the approval process. The Plan Maintenance Schedule can be view in Appendix O-1. In Appendix P-1 you will find the Training, Testing and Maintenance Chart.

4.5 City Corporation Master Plan 2003

There were several locations in the last master plan (2003) effort that reflected similar results and inadequate deficient areas as the 1997 Wastewater Collection System Master Plan. Flow data may have limited the accuracy of these collection system models. The master Plan recommended that City Corporation perform and I/I evaluation of its collection system and start a Clay Pipe replacement program. Improvements to Prairie Creek Pump Station, Pump Stations "A", "B" and 23rd St Pump Station were also included in the report. Because of the age and limitations of the existing 2003 Master Plan, City Corporation is considering the current SSES efforts and resulting data as the new comprehensive Master Plan for the sewer system. City Corporation is currently involved in design and construction of a collection system rehab.

CHAPTER 5-OPERATIONS AND MAINTENANCE

Collection system operation and maintenance (O&M) consists of inspection, evaluation, preventative maintenance, and cleaning to maintain flow and mitigate inflow and infiltration. O&M varies by the equipment type, condition, age, and operating history. Chapter 4.1 describes City Corporation's maintenance equipment. Table 5-1 is a baseline O&M schedule. However, periodic factors may necessitate a more frequent O&M schedule for individual components. Appropriate corrective actions or temporary mitigation measures are initiated based upon the findings of the routine O&M activities.

Table 5-1: Collection System Routine Maintenance Schedule

Description	Known Problems/Issues	Every Other Week	Monthly	Semi-Annually	Annually	Every 5 years
Restaurant/Apartment Areas	Routine FOG issues	Monitor Line	Clean			Assess condition
Lines near Streams or Creeks	No known problems, but could be a larger source of I/I			Walk lines and visually inspect manholes for evidence of surcharging	Clean and Televisе lines	Assess condition
Lines in remote areas	No known problems but could present large I/I sources if undetected			Walk lines and visually inspect manholes for evidence of surcharging	Clean and Televisе lines	Assess condition
All other lines in system	No known problems					Clean and Televisе lines, assess condition

5.1 Critical Components



Grease-Grease and grease like products can be significant causes of sewer overflows. Restaurants and industrial facilities can discharge grease as part of their normal sanitary flows that can lead, in time, to blockages, backups, and overflows. The discharge of fats, oils, and grease (FOG) are regulated through the City Corporation FOG program, however, backups can sometimes occur. Typically, areas in which there is heavy industrial activity or large numbers of restaurants will be regularly monitored for accumulations of fats, oils, and grease (FOG).



Stream Crossings-Gravity sewers follow the natural topography of the land which often leads to streams. Several miles of City Corporation's collection system were constructed along streams making them critical components requiring greater monitoring. Also, several areas within the system are isolated from population centers and as such an overflow could go undetected for an extended period of time. These areas will be monitored by the Inflow & Infiltration crew to prevent an undetected overflow.



Deteriorating Sewer System- A significant amount of City Corporations sanitary sewer pipes are beyond their design life. Deteriorating pipes are a major component in the operation and maintenance of the system. Planning and funding for long-term sewer rehabilitation and replacement projects will help address this critical component.



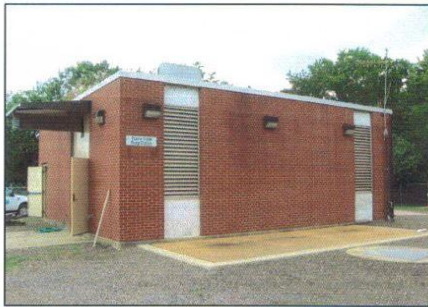
Infiltration and Inflow (I/I)- Rainfall and occasional snowmelt can infiltrate through the ground into leaky sanitary sewers. Roof drains connected to sewers, broken pipes, or poorly connected sewer service lines are also large contributors of I/I. Smoke Testing and Dye Testing will help to identify these areas of concern.



Undersized System-Undersized Force Mains or Outfall lines can cause a major problem in a Sanitary Sewer System. Through the use of Hydraulic Modeling and engineering tools, the system shall be designed to convey the flows without an overflow.



Pipe Failures-Pipe failures can result from cracked pipes, broken pipes, or blocked pipes. Identifying these failures before they occur through smoke testing and/or CCTV will help to prevent overflows and stoppages.



Prairie Creek Lift Station

Pump Station Failures-Pump failures, power failures or inadequate wet well capacity can cause an overflow. Power backup generators and scheduled O&M on the Pump Stations will help to prevent these overflows.

5.2 Collection System

The Russellville wastewater collection system consists of approximately 190 miles of publicly maintained gravity sewer ranging in size from 6" to 36" in diameter, approximately 4,154 manholes, 19 lift stations of various pumping capacities and 21 miles of force main ranging in size from 2" through 48" in diameter.

5.3 Infiltration/Inflow Control

City Corporation has a more detailed and systematic program to address the infiltration/inflow issue through the completion of a city-wide wastewater flow-monitoring program. This effort resulted in an estimate of sanitary flow, infiltration, and inflow for each of the 27 basins within the City. This study also identified the basins in which I/I reduction was deemed to be most cost-effective. This work serves as the basis for direction of the City Corporations infiltration and inflow reduction efforts.

An Inflow & Infiltration (I &I) crew was re-established at City Corporation in 2010. Currently staffed by 3 employees, their goal is to identify and mitigate sources of infiltration and inflow into the system. City Corporation has adjusted its approach to infiltration/inflow reduction by the following:

- Re-Establishing an I/I Program
- Developing a qualified crew
- Equipping the Crew
- Supporting the I/I team

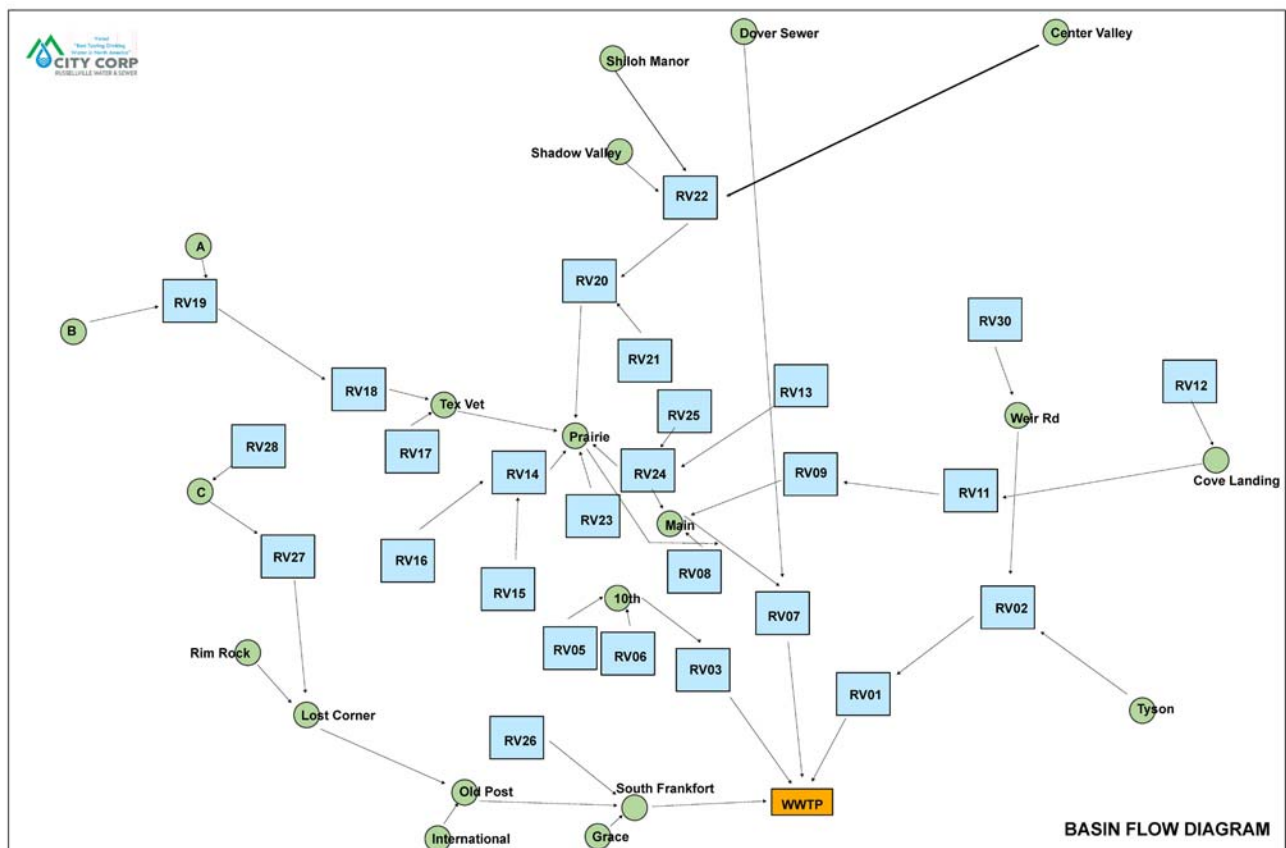
It is anticipated that an expansion of I/I reduction efforts, as outlined above, will be effective in reducing peak flow rates.

5.4 Lift Stations

5.4.1 Operation & Monitoring

The collection system includes 19 lift stations to move sewage from low elevation areas to higher elevation areas. Two (2) of the pump stations have auxiliary power with the remaining seventeen (17) capable of accepting a portable generator. All 19 lift stations have Genset quick connections installed. All lift stations have full Supervisory Control and Data Acquisition (SCADA) systems in place. SCADA system generates and stores critical operational information, such as pump run times, wet well status, power status, and other operational data. Utilizing advanced radio technology with extensive functionality, the system provides remote operational control of the facilities, a benefit during emergency or other abnormal conditions. Periodic loss of power may occur due to storms and electrical grid equipment failures. Please refer to Table 5-2 for the Pump Station Routine Maintenance Schedule. A basin flow diagram indicating direction of flow from one basin to another including pump stations is shown on Figure 5-1.

Figure 5-1: Basin Flow Diagram



5.4.2 Preventive & Routine Maintenance

Responsibility for lift station maintenance is divided among four employees. The removal of grease from each pump station is done at least twice a year. All equipment is to be maintained in accordance with the manufacturer's specifications. In addition, the following maintenance activities will be conducted:

Table 5-2: Pump Station Routine Maintenance Schedule

Description	Alarming /Known Issues	Daily	Weekly	Monthly	Annually	Every 5 years
Main St. Prairie Creek	Backup power available, full SCADA, no known issues – Large Flow Stations	Monitor SCADA Information	Check station for problems including security, Record pump pressure and pump run times	Check and record motor amperage, check mechanical and electrical, operate backup generator, check and top off all fluids	Exercise all valves	Disassemble and clean internal pump components, check impeller, disassemble and clean check valves, assess condition
Cove Landing International Paper South Frankfort Tex Vet Old Post	No known problems, has back up power and SCADA	Monitor SCADA information	Check station for problems including security, record pump pressure and run time	Check and record motor amperage, check mechanical and electrical connections, operate backup generator, check and top off all fluids	Exercise all valves	Disassemble and clean internal pump components, check impeller, disassemble and clean check valves, assess condition
Center Valley Rimrock Shadow Valley Tyson Grace Shiloh Manor Lost Corner Station A Station B Station C 10 th St.	SCADA, no standby power but have the capability of backup power by a portable generator	Monitor SCADA information	Check station for problems including security, record pump pressure and run time	Check and record motor amperage, check mechanical and electrical connections	Exercise all valves	Disassemble and clean internal pump components, check impeller, disassemble and clean check valves, assess condition

5.4.3 Lift station details

Table 5-3 lists the lift station name, pump manufacturer, pump model, number of pumps, pump horsepower, force main diameter, and wet well dimensions.

Table 5-3: Lift Station Details

Name	Pump Manufacturer	Pump Model	# Pumps	Horsepower per Pump	Force Main Diameter	Wet Well Dimensions Diameter (ft)	Wet Well Dimensions Depth (ft)
10 th Street	Hydromatic	S6A300M4-4	2	30	10	13	22.5
Lift Station A	Hydromatic	UNK	2	25	8	6	21
Lift Station B	Hydromatic	S4Q3000M4-4	2	30	8	6	21
Lift Station C	Hydromatic	S4T1000M4-4	2	100	6	6	16
Center Valley	Goulds	1GA87J4BD	2	5	4	4	10.6
Cove Landing	Hydromatic	S4B200M4-4	2	20	8	6	21.5
South Frankfort	Hydromatic	S6A4000M4-4	2	40	12	12	24
Grace	Pumpex	UNK	2	30	8	8	17.25
International Paper	Myers	4VC 150M4-43	2	15	6	6	11.1
Lost Corner	Myers	6VC 150M6-23	2	15	12	6	10
Main Street	Allis-Chalmers	1-69945	3	1-25HP / 2-50HP	30	11X9.4	22
Old Post	Myers	6VC 150M6-23	2	15	12	6	17.5
Prairie Creek	Flyght	3306.735	3	245	24	30X11	29.4
Rim Rock	Myers	4WHV50M4-21	2	5	6	5	11
Shadow Valley	Hydromatic	S4M750M3-4	2	7.5	4	6	15.1
Shiloh Manor	Myers	4VHA	2	10	4	6	12
Tex-Vet	Hydromatic	S8L1500M4-6	2	50	15	12	23.2
Tyson	Hydromatic	S4P1500M3/4-4	2	15	6	6	15.8
Weir Rd	Hydromatic	S4T/S4TX	2	60	12	12	33.5

Table 5-4: Lift Station Pumping Capacity

Name	Total Dynamic Head	Pump 1 Flow Rate (gpm)	Pump 2 Flow Rate (gpm)	Pump 3 Flow Rate (gpm)	Pump 1 & 2 Flow Rate (gpm)	Pump 2 & 3 Flow Rate (gpm)
10 th Street	86	1,103	1,158	n/a	1,262	n/a
Lift Station A	102	261	310	n/a	395	n/a
Lift Station B	125	390	360	n/a	Low flow	n/a
Lift Station C	197	153	Not operating during visit	n/a	Not operating during visit	n/a
Center Valley	93	46	35	n/a	49	n/a
Cove Landing	105	202	219	n/a	234	n/a
South Frankfort (Darling)	76	835	763	n/a	1,108	n/a
Grace	134	211	242	n/a	267	n/a
International Paper	96.4	462	392	n/a	Not configured for dual pump	n/a
Lost Corner	75	696	564	n/a	942	n/a
Main Street	36	Not operating during visit	808	924	n/a	1,872
Old Post	45.2	852	948	n/a	1,140	n/a
Prairie Creek	98	2,123	2,293	Not operating during visit	3,976	n/a
Rim Rock	45	116	151	n/a	Not configured for dual pump	n/a
Shadow Valley	40	102	91	n/a	81	n/a
Shiloh Manor	96	127	124	n/a	137	n/a
Tex-Vet	50	1,520	1,595	n/a	2,256	n/a
Tyson	82	228	191	n/a	249	n/a
Weir Rd	121.1	1100	1100	n/a	n/a	n/a

5.5 Force Mains

5.5.1 Air Release Valves

City Corporation maintenance crews operate air release valves every six months or more often as needed to release air that may accumulate in the system. Any accumulation is removed during the operation of the air release valves. Elimination of air entrainment in interceptor force mains is absolutely essential to reduce corrosion and failure of force mains due to sulfuric acid attack. Air entrainment in interceptor force mains is the result of improper design and/or operation of pump stations since air can only enter a force main via a pump station. Air entrainment in interceptor force mains must be eliminated by proper design and/or operation of pump stations and force mains as follows:

5.5.2 Operating Practices

- Minimize wet well turbulence and splash.
- Eliminate free discharge or falling jets from incoming sewers and force mains by:
 - Raising minimum wet well levels to minimize or eliminate drops.
 - Directing incoming flows below the minimum wet well level using chutes.
 - Directing incoming flow away from pump suction lines.
 - Relocating air relief discharges, sump pump discharges, and bubbler control discharges away from pump suction lines.
- Eliminate vortex formation at pump suction lines by raising minimum wet well level to submerge pump suction lines.
- Operate all installed force main air vents periodically with a frequency depending upon experience and air accumulation at each air vent.
- Install and operate additional air vents where needed and not originally installed.
- Pump Station preventative maintenance tickets are developed through MVP Plant software, and assigned to appropriate employee.

5.5.3 Design Practices

- Minimize wet well turbulence and splash.
- Establish wet well levels as high as possible with respect to the incoming sewers and force mains.
- Avoid free discharge or falling jets from incoming sewers and force mains onto the wet well liquid surface.
- Locate air relief discharges and sump pump discharges as far away as possible from pump suction inlets.
- Select force main profile to minimize the number of high points.
- Provide air vents at profile changes from an upward slope to a relatively flat or downward slope
- Provide air reliefs at one half-mile intervals on long ascents, descents or horizontal sections between defined high points.

5.6 System Rehab

Routine maintenance will identify repair needs within system components. The appropriate repair for any given problem is dependent upon the nature of the problem and cannot be prescribed in this plan. However, a priority hierarchy has been established to structure when and how repairs are to be accomplished. The hierarchy is based upon identifying and repairing critical components first. Critical components are parts of the collection system which if failure occurs will result in system failure and sewer overflow. Such items may include failure of a pump, failure of a backup generator to start, or obstruction in the sewer line. Other problems identified by maintenance activities will be less acute and can be repaired on a lower priority basis. This may include loose or missing manhole bricks, broken manhole covers, lift station lighting, etc. When normal maintenance activities identify the need for component repairs or when problems are brought to the attention of the system by customers or others, the problem and corresponding repair will be assigned a priority ranking based on the following hierarchy. The response time and repair time goals are stated in the hierarchy. The goals shall be monitored and evaluated annually with the plan review.

5.6.1 Main Lines

City Corporation identifies and prioritizes all structural deficiencies to provide short-term and long-term rehabilitation actions to address each deficiency. Overall, the utility must provide a structured approach for gathering, storing, and analyzing costs related to the planning, engineering, design, construction, start-up, operations, maintenance, energy use, rehabilitation, refurbishment and disposal of its assets. The structured approach is necessary to have the information available when making asset management decisions.

5.6.2 Manholes

Manholes are underground chambers to provide man-entry access to maintain utility pipelines. They usually are subjected to underground corrosive environments and traffic loads which accelerates the degradation process of these structures. As they are underground and out of general sight, degradation of these structures is not usually monitored unless a collapse or problem occurs.

With the advancement of pipeline rehabilitation techniques and technologies, defects and problems in manholes are now receiving increased attention. Engineers and municipalities have realized the benefits of rehabilitation repairs to manholes. As leaks which are prevented from repaired pipes are only re-directed to the next weakest part of the system which are usually the manholes. As manhole rehabilitation is an integral part of the whole pipeline rehabilitation process, neglecting it and only concentrating on the pipe, just shifts the problem and defeats the rehabilitation process. A benefit to manhole rehabilitation is that it is usually the easiest and the least costly repair process. The restoration of these manholes is done in less time that it would take to replace them and for a fraction of the cost. It can be carried out within two to three hours without much disruption to above ground activities and environment. By rehabilitation of these manholes, cities are able to prolong the lifespan of the structures. Appendix 2 contains an example of a Manhole Inspection form. It is recommended that Standard Specifications and Details for Manhole Rehabilitation should be included in the updated Standard Specifications and Details to be completed on a future date.

5.6.3 Scheduling

Table 5-5: Collection System Response and Repair Priority Hierarchy

Problem	Priority	Response Time	Action	Repair Time Goal
Active Sewer Overflow	1	Within 1 hour of receiving report	Stop overflow, return system to normal operation	Within 4 hours of arriving on site
Failure of Critical Component, Overflow/Bypass Will Occur if Not Repaired	1	Within 1 hour of receiving report or discovering problem	Repair or replace component, return system to normal operation	Within 4 hours of arriving on site
Unsafe Condition Poses Risk to Public or Employees	1	Within 1 hour of receiving report or discovering problem	Mitigate and repair to eliminate unsafe condition	Mitigate risk within 2 hours of arriving on site, repair within 8 hours if public risk, 7 days if employee risk
Evidence of System Surcharging and Intermittent Overflow	2	Within 1 day of receiving report or discovering problem	Clean sewer line and/or check for proper downstream pump station operation and repair as needed. Re-evaluate problem following cleaning/repair.	Within 8 hours of arriving on site for cleaning and station repairs. Initiate I&I evaluation within 30 days
Failure of Backup Power System	2	Within 3 days of receiving report or discovering problem	Repair or replace equipment as needed	Within 10 days of response
Evidence of Surcharging, No Overflow Evidence	3	Within 1 week of receiving report or discovering problem	Clean sewer line and/or check for proper downstream pump station operation and repair as needed. Re-evaluate problem following cleaning/repair.	Within 8 hours of arriving on site for cleaning and station repairs. I&I evaluation within 90 days
Failure of Monitoring or Measuring Equipment	3	Within 3 days of receiving report or discovering problem	Make repairs or replace as needed	Repairs within 7 days of response. Replacement within 30 days.
Evidence of I&I Non-surcharging	4	Complete evaluation of cause within 90 days of discovering problem.	Make corrective actions based on I&I evaluation findings	Within 360 days
Component failures non-critical and general non-routine maintenance	5	Evaluate repair/maintenance need within 180 days of discovering problem	Make repairs	Within 360 days

Chart 5-1: Mainlines Rehabbed

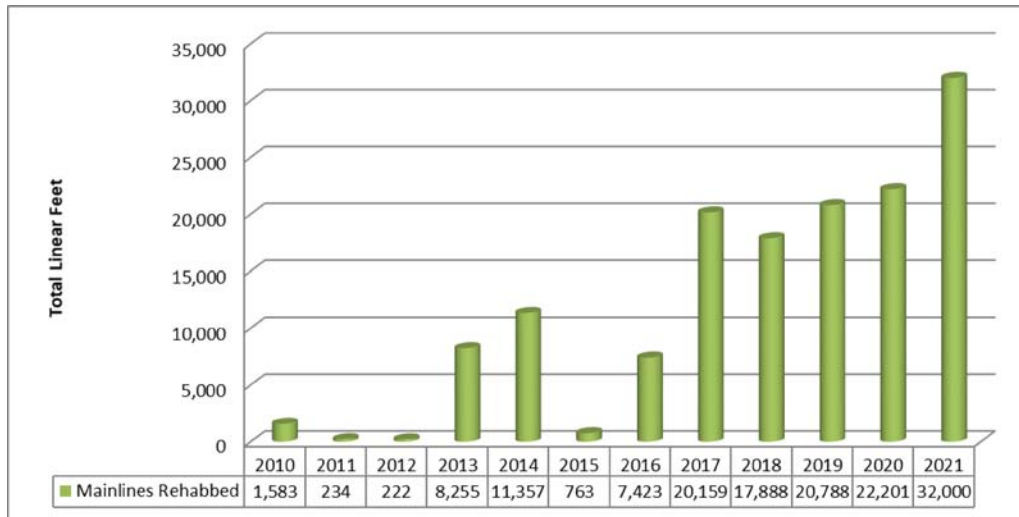
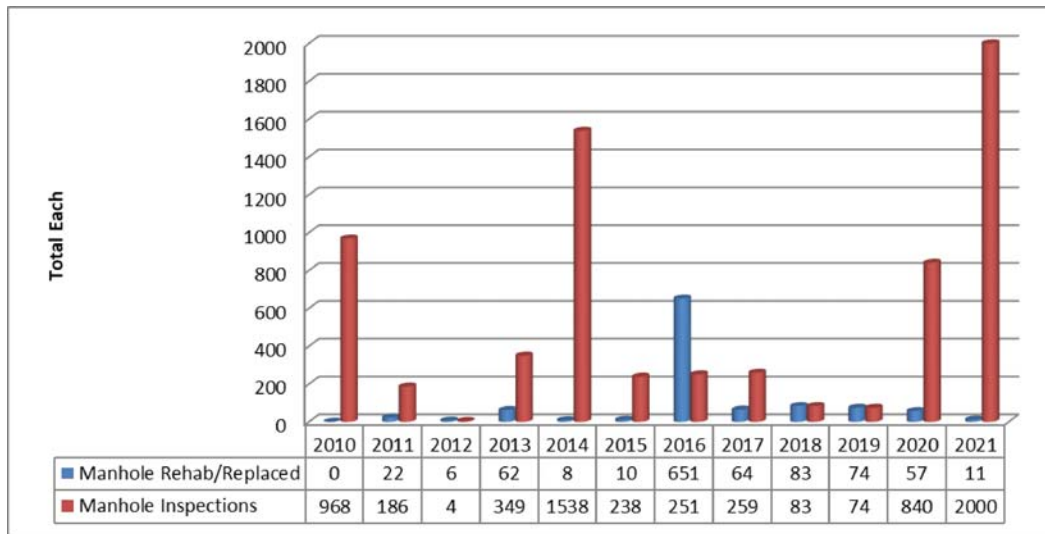


Chart 5-2: Manholes Rehabbed/Inspected



5.6.4 Service Lateral Repairs

City Corporation owns, maintains, and repairs all of the underground water and sewer lines up to the customers' property line. The customer owns and is responsible for the installation; maintenance, and repair of everything from the property line in the case of sewer service into the house. If a stoppage occurs on the customer's portion of the line, the customer must have the leak repaired. Service Line Ordinance 2060 addresses the ownership of the service lateral, and can be found in Appendix D. An inspection is done on all service lines new or repaired. The inspector will inspect the sewer service connection between the house and the property line, and it must be installed according to Arkansas State Plumbing Code standards. The Arkansas State Plumbing Code standards states that the pipe used must be Schedule 40 piping and at least 4" in diameter with a fall of 1% or 1/2" every 10'. There also has to be a 2-way clean out installed within 3' of the building and the line has to be tested for leaks with water or air to pass inspection.

5.7 Cleaning/Television Inspection

Pipeline hydraulic cleaning and television inspection are performed as a part of routine maintenance in areas where deposition issues are chronic or in response to immediate flow problems. The hydraulic cleaning is effective in reducing material that becomes deposited in lines with minimal slopes and in areas of high commercial activity. Television inspection is an aide in identifying lines with obstructions, with corrosion problems, and with potential failure possibilities. Both cleaning and television inspection are performed by crews from the Construction Department.

City Corporation will clean the sanitary sewer per the baseline maintenance schedule with the equipment listed below.

- (2) Jetters
- (1) Jetter/Camera Trailer
- (1) Tiger Vac
- (1) Easement Machine

Additional cleaning equipment and manpower are available via contract operations with several area vendors. City Corporation does not anticipate using contract services unless the following conditions exist:

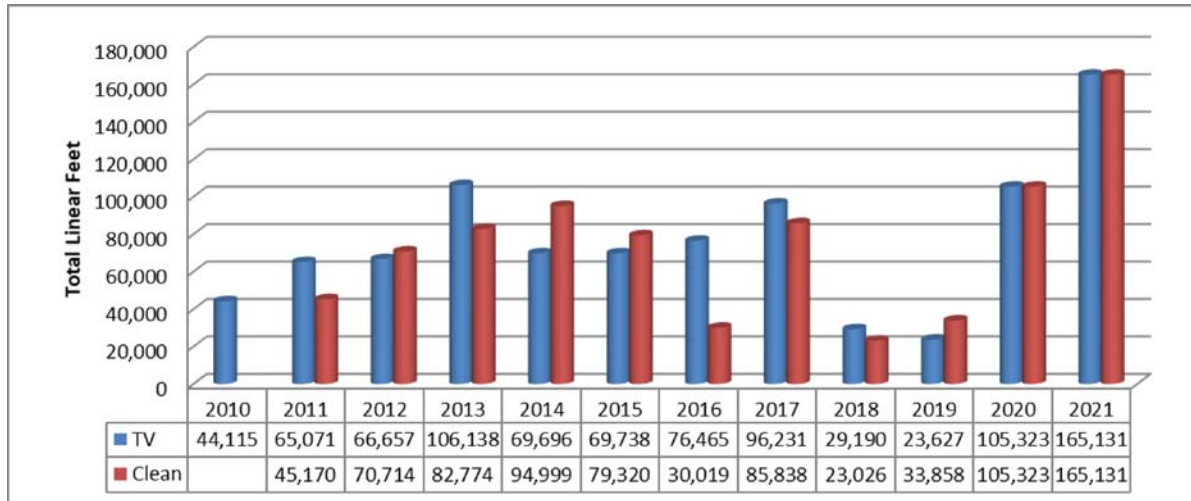
- system equipment inoperable for extended period
- manpower shortage
- unusually high cleaning demand due to unforeseen circumstances
- large flows or difficult conditions requiring specialized expertise or equipment

RJN has begun to assess the condition of all City Corporations facilities and recommend upgrades, as necessary. As part of enhancing the integrity of City Corporations network of gravity mains, RJN uses a CCTV van to inspect parts of the gravity pipelines. CCTV inspection is a non-destructive, proactive approach to evaluate the pipeline infrastructure and is required to assess the condition of the pipeline interior. A CCTV inspection may be utilized to:

- Inspect conditions and determine the location of problem areas such as pipe or joint separations, drops, ruptures, leaks, obstructions, deterioration, pipe misalignment, and root intrusions.
- Locate infiltration and inflow sources.
- Look for damage to sewers caused by excavation and construction.

- Search for unrecorded connections, such as illegal taps.
- Evaluate effectiveness of pipeline repairs, replacement, and/or rehabilitation within the sewer system.
- Assess pipeline condition of new installation before the warranty period ends.

Chart 5-3: Cleaning/Television Inspection Completed



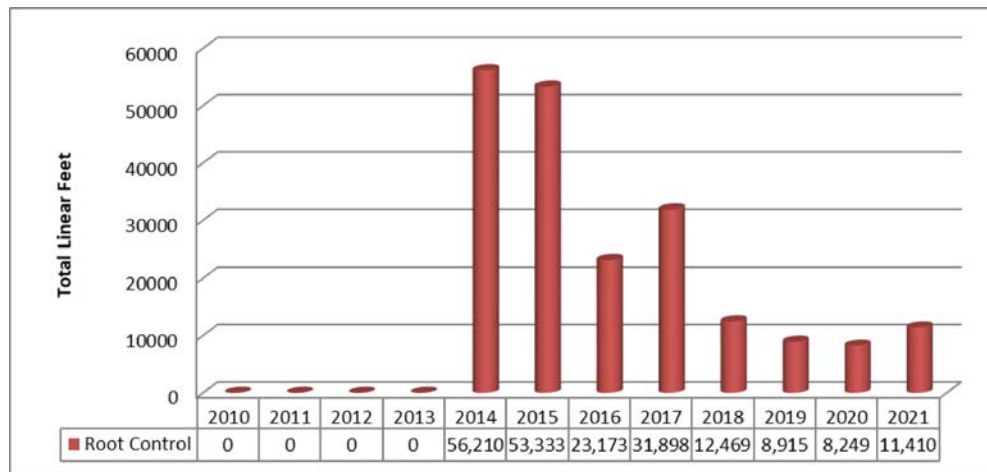
5.8 Root Control

The intrusion of roots into sewer lines, particularly collector sewers, is always going to be an ongoing concern for City Corporation. Extensive root intrusion, if allowed to continue without attention, can result in reduced system capacity and, ultimately, blockage of the pipe. Problems associated with root intrusion are sometimes exacerbated by the presence of grease in the flow stream, which tends to attach to any roots present and cause more rapid impact on flow conditions.

City Corporation has obtained the service of Duke's Root Control, Inc. to apply a root control product to the collection system. Duke's will apply a product called "Razerooter II", which contains the active ingredient diquat dibromide ("diquat"). "Razerooter II" is the only diquat-based, sewer root control product that is registered with the US Environmental Protection Agency (EPA Registration No 64898-8) and the Arkansas State Plant Board. The following is a breakdown of treated pipes in their sanitary sewer system:

Year	6"	8"	10"	12"	15"
2014	26,586	24,828	4,796		
2015	26,912	17,363	5,127	1,895	1,895
2016	19,191	3,730	1,008	224	
2017	24,826	4,609	2,219	244	
2018	9,263	3,206			
2019	7,850	556	162	347	
2020	7,804	445			
2021	8,858	2,111	426	15	

Chart 5-4: Root Control Completed



5.9 Grease Control

Ordinance 1075 was created in 1983. Sec. 6 of the ordinance addresses grease. It states “Grease, oil, and sand interceptors shall be provided when, in the opinion of the Superintendent, they are necessary for the proper handling of liquid wastes containing grease in excessive amounts, or any flammable wastes, sand, or other harmful ingredients; except that such interceptors shall not be required for private living quarters or dwelling units. All interceptors shall be of a type and capacity approved by the Superintendent and shall be located as to be readily and easily accessible for cleaning and inspection.” The entire ordinance is located in Appendix D. City Corporation is in the process of amending the current grease ordinance to improve the FOG program.

5.9.1 FOG Commercial

City Corporation currently has 171 grease traps. All of the following information is located on City Corporation web site so that it is available to all of their customers. Grease traps or Grease Interceptors are used at any FSE (food service establishment) that has the potential of discharging FOG into the sewer system. When no grease trap is present or if traps become overly full FOG is discharged into the sewer where overflows can occur in the business or in the streets as a result of stoppages. Proper use and maintenance of grease traps are the key to preventing this from happening. The traps need to be pumped at least every 90 days or less based on the amount of FOG that is discharged from the facility. This schedule is located in Appendix R. Manifest or receipts should be sent to the control authority as soon as the trap is cleaned. Training employees to follow BMPs can help to reduce pumping frequency for the facility and save the facility money. FSEs must keep cleaning manifests on file for a minimum of 5 years. A current grease trap detail drawing is located in Appendix U.

BMPs or best management practices are ways that a business or a company can help to reduce the amount of FOG that a business discharges. BMPs will include items such as employee training to help stop the amount of FOG that gets put down the drain and in turn introduced to the sewer system. Also, another BMP includes verifying that drain screens are properly installed to prevent food and other debris from entering the sewer

system and insuring that employees know to never remove these screen for the purpose of sweeping debris down the drains. The drains screens should only be removed to empty any debris that has become caught in the screen into the appropriate receptacles. A full list of BMPs is located in Appendix 4.

5.9.2 FOG Residential

FOG stands for fats, oil, and grease. FOG is a byproduct from cooking. It comes from a variety of foods such as

- Sauces and Condiments
- Food scraps
- Baking goods
- Dairy products
- Shortening
- Butter and margarine
- Meat fats
- Lard

FOG enters the system from various sources such as homes, apartments, restaurants, and other public facilities.

After FOG enters the sewer system it starts to accumulate on the walls of the pipes as it cools. After a while the buildup can become bad enough that it will start to restrict the flow of the sewer system which can lead to backups in the home or sewer overflow in the streets. With any sewer backup that becomes an overflow, it can become a health hazard to the public and the environment because of the sanitary issue. You can help reduce the amount of FOG going into the system by doing the following:

- Scrape as much residue, grease, and food scraps off of the pans, plates, and cooking utensils into the garbage. Install screens in the sink drain to help catch any debris that may go down the drain and the dispose of the debris in the garbage.
- Use a paper towel to wipe out remaining grease before washing.
- FOG can be poured into containers such as old coffee cans. When solidified, it can be thrown in the trash.

A diagram of how FOG clogs pipes is located in Appendix 3. And a diagram of how to throw FOG into the trash is located in Appendix 5.

5.10 Aerial Stream Crossing Inspection

City Corporation operates and maintains approximately 190 miles of gravity sanitary sewer with approximately 73 aerial sewer stream crossings of six-inch size and above. Parts of the system are over fifty years old.

City Corporation has developed a stream crossing log sheet that they use when inspecting aerial stream crossing. The log sheet and current findings are located in Appendix 9. City Corporation had developed an aerial sewer stream crossing inspection and operation & maintenance program. This program includes an inspection schedule with forms to identify required preventive and routine maintenance for City Corporation's aerial sewer stream crossings.

The goal of the inspection program is to inspect, remove debris, and repair as required, all major sewer trunk crossings six inches or more in diameter within the major drainage basins, and then perform a scheduled, regular, preventive maintenance inspection. A copy of a sample inspection sheet is included in Appendix 6. City Corporation will use their Record System to store all inventory and inspection data, all digital photographs,

and to generate preventive maintenance work orders for periodic inspection of all sewer aerial crossings. From an initial inspection, each crossing will be graded to determine the frequency of future inspections. Larger line crossings suspended over major streams will be inspected more frequently than smaller line crossings that may only be partially exposed in smaller streams. The digital photographs from the initial inspection will be compared to subsequent inspections and photographs to adjust the inspection frequency in addition to the inspection grade. The work order system will automatically generate work orders to conduct repeat inspections.

5.11 Pipe Patch

City Corporation has bought a Pipe Patch “No dig” pipe repair system. A copy of the Brochure is located in Appendix 23. This allows City Corporation to make internal point repairs to pipes sized 6”-10” in diameter. The following is a breakdown of the Pipe Patch Repairs:

Year	2015	2016	2017	2018	2019	2021
Patch Size	Total	Total	Total	Total	Total	Total
6”x24”	2	4	3	1	3	2
6”x48”		2			1	
8”x24”	1	3	7			
8”x48”	2	8				
10”x48”		1	1			

5.12 Treatment Facility

Pollution Control Works used to be located on the NW part of Russellville, around the Arkansas Tech area. However, around 1963, the Corp of Engineers developed the McClellan Kerr Navigation System which involved the building of a dike to keep Lake Dardanelle from flooding Russellville. This caused the water and wastewater utility to relocate their facilities to the southeast side of town. The Pollution Control Works (PCW) design capacity is 7.3 MGD with an additional 21 MG equalization basin for wet weather flows. The breakdown of the daily flows for the year 2020 are located in Appendix 11. Appendix 16 shows the layout of the treatment plant:



POLLUTION CONTROL WORKS

404 Jimmy Lile Rd.
Russellville, AR 72802

Receiving Stream: Whig Creek then into Arkansas River

Operation Startup: 1964

Capacity (Design Flow): 7.3 MGD

Average Daily Flow (2021): 5.34 MGD

Level of Treatment: three biological treatment processes

Solids Management: Aerobic Digester with Land Application

Disinfection Method: Chlorine Contact Chamber

Effluent Discharge Limitations: (reported monthly to the Arkansas Department of Environmental Quality):

Effluent Characteristics	Discharge Limitations Concentration Monthly Average	Discharge Limitations Concentration Daily Maximum
BOD (May-Oct) (Nov-Apr)	10 mg/L 15 mg/L	15 mg/L 22.5 mg/L
TSS (May-Oct) (Nov-Apr)	15 mg/L 20 mg/L	22.5 mg/L 30.0 mg/L
pH	6.0 S.U. Min to 9.0 S.U. Max	
Fecal Coliform	1000/100 mL	

Interim Limits: (established by CAO):

Effluent Characteristics	Discharge Limitations Mass (lbs/day) Monthly Average	Discharge Limitations Concentration (mg/L) Monthly Average	Discharge Limitations Concentration (mg/L) 7-day Average
Nitrates (NO ₃ -N)	542.0	10.0	15.0
Total Residual Chlorine (TRC)	N/A	<0.1 (Inst. Max)	

5.13 Private Defect Program SOP

In 2008, City Corporation started the "I&I Cleanout Cap Program". The goal of the program was to work through each pump station basin by smoke testing to identify broken or missing cleanout caps, and private service line defects throughout the entire collection system. The two-man I&I crew carried a supply of cleanout caps and replaced missing caps as they were discovered. A record was kept so that they could confirm each cap that was installed. The first cap for a particular residence would be installed for free; any subsequent caps installed during follow-up investigative smoke testing leads to a \$50 direct bill to the customer. The routine of the smoke testing operation was to first send out door hangers that gave the customers notification of the upcoming smoke testing to be performed. In 2010, City Corporation changed from door hanger notifications to newspaper ad notifications in hopes to add more production days for smoke testing and finding defects. The defects were marked in green paint, and added to a log for future repairs.

City Corp has developed a new program to help locate and rehab their private defects. The following is the procedure followed:

First, A letter is sent and any attachments detailing defect with a 30 day repair request- If the owner notifies City Corp, we will work with them toward the goal of repair. This may include further investigation or testing at the expense of the customer/owner.

Second, A notice is sent only if no contact and/or attempt has been made to repair defect within the 30 days. The second notice says they must contact us within 5 business days with a plan of action or we will disconnect services and impose a penalty. City Ordinances and Policies and Procedures are included and is sent registered mail so a signature is required.

If there remains to be no attempt of contact, then we notify the code enforcement for the city and ask them to make a courtesy contact with the customer.

Last resort is to disconnect services until repairs are made.

Fees associated with helping the customer:

Camera- \$25

Smoke- \$25

Crew- \$25

Verification of repair w/o request- \$25 (forced check after first 30 days and no contact is maintained)

Verification of repair with request- no charge (if repair completed)

Verification of repair with request- \$25 (if repair is not completed)

Please understand there are circumstances that may require deviation from this process. They have to be evaluated on a case-by-case basis.

In all cases with the exception of circumstances that would require a B report, the customer has a minimum of 35 days before disconnection. We are only required to give a written notice of 5 business days before disconnection.

Chart 5-5: Private Defects Rehabbed

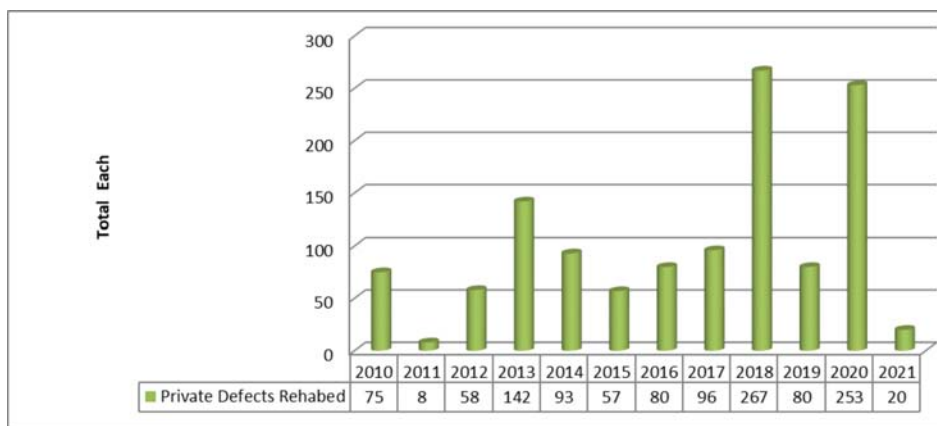
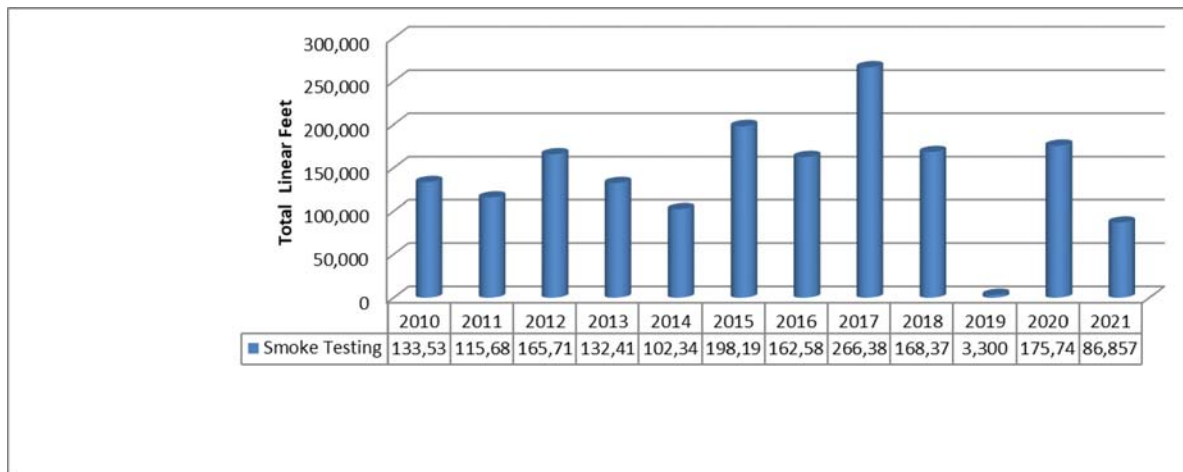


Chart 5-6: Smoke Testing Completed



5.14 Water Quality Monitoring

The Arkansas Department of Environmental Quality (ADEQ) has issued a report on the condition of the state's waters. The 2010 list of Impaired Water bodies is the assessment used to determine the water quality standards throughout the state. City Corporation discharges into Whig Creek. Whig Creek is listed as an impaired water body (stream) with completed TMDLs. The ultimate receiving stream is the Arkansas River and it is listed as a water quality limited water bodies (streams).

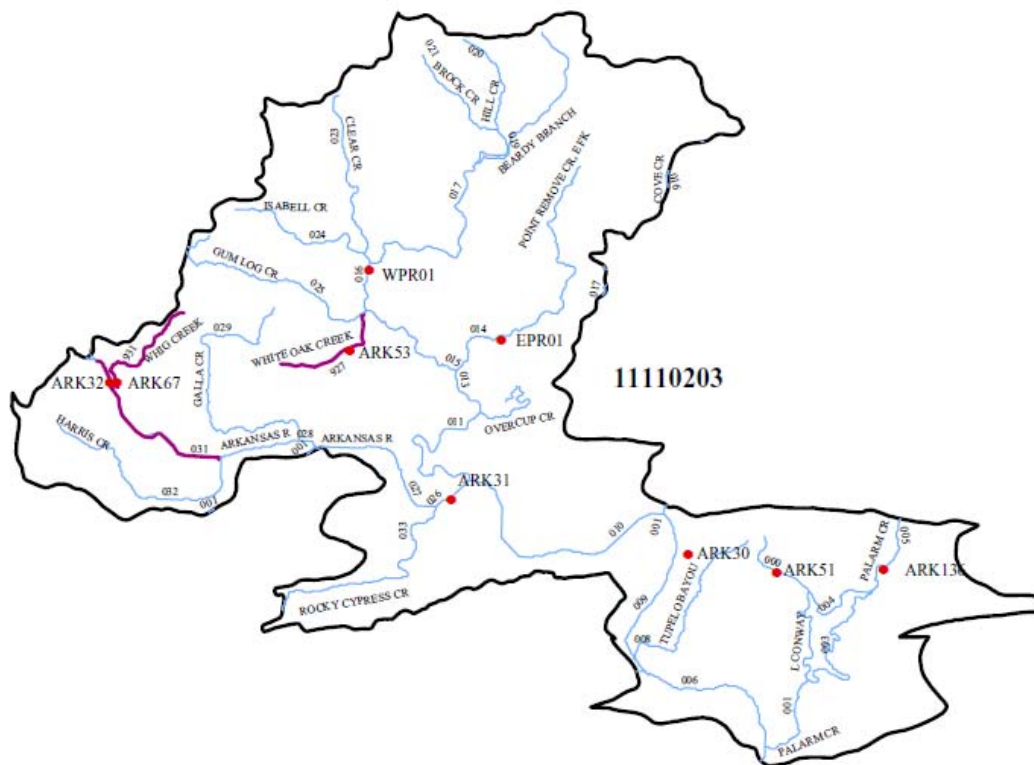
The 2004 Integrated Water Quality Report by ADEQ states that "Region Whig Creek continues to be impaired by point source discharges. Both municipal and industrial discharges exist in Whig Creek. A TMDL has been completed for this water body." The following table shows the report and the location of the sampling site.

ARK0067 Whig Creek Downstream of Russellville, AR

Parameter	Valid Data Points	Mean	Minimum	Maximum	Standard Deviation
Dissolved Oxygen (mg/L)	57	7.81	4.00	12.60	1.93
BOD5 (mg/L)	55	1.37	0.29	5.60	1.03
pH (standard units)	57	7.06	6.35	7.68	0.30
Total Organic Carbon (mg/L)	58	6.33	4.059	10.40	1.07
Ammonia as N (mg/L)	59	0.16	<0.005	1.69	0.27
NO ₂ +NO ₃ as N (mg/L)	59	8.51	0.168	23.90	4.37

Parameter	Valid Data Points	Mean	Minimum	Maximum	Standard Deviation
Orthophosphate as P (mg/L)	59	3.48	<0.005	8.54	2.27
Total phosphorus as P (mg/L)	58	3.63	0.37	8.23	2.13
Total Hardness (mg/L)	29	56.17	17	124.00	19.09
Chloride (mg/L)	60	43.25	2.98	96.40	23.64
Sulfate (mg/L)	60	38.16	11.8	70.90	11.28
Total dissolved solids (mg/L)	47	262.99	35.5	424.50	103.15
Total Suspended Solids (mg/L)	48	48.9	<1.0	1348.00	206.77
Turbidity (NTU)	58	33.51	2.7	630.00	106.48

ARK0067 Sampling Site



5.15 Rain Gauges

Six temporary rain Gauges were installed to determine the amount of rainfall that occurred during the system wide flow monitoring study conducted by RJN Group in 2010. The temporary rain gauge locations, which have been removed, are shown in Appendix 17. See Appendix V for Permanent Rain Gauge Specifications. In 2013, City Corporation ordered and installed seven permanent rain gauges around the city to monitor rainfall events. The permanent gauges are allowing City Corporation to track rainfall throughout the city. Furthermore, it will provide rainfall data for smaller portions of the system. City Corp will be able to isolate overflows and localized rainfall amounts at the time of the overflow. The permanent rain gauge locations are shown in Appendix 18. The rain gauge specifications are located in Appendix V.

Table 5-6: Temporary Rain Gauge Locations

Name	Location
RG01	2221 Skyline Dr (Western Hill Pump Station)
RG02	500 N. Glenwood Ave. (Prairie Creek Pump Station)
RG03	915 Arkansas (Steve Standridge Insurance)
RG04	404 Jimmy Lile Rd (Pollution Control Works)
RG05	2606 E Main St (Furniture Factory Outlet)
RG06	1920 N Arkansas (Station Fire Department)

Table 5-7: Permanent Rain Gauge Locations

Location
Shiloh Manor Pump Station
Prairie Creek Pump Station
10 th Street Pump Station
Western Hills Tank
Cove Landing Pump Station
Hob Knob-Weir Rd PS
Pollution Control Works

5.16 Inspection Procedures and Specifications

All Plans for proposed extensions of the sewage collection system shall be prepared by and bear the stamp of a Professional Engineer currently registered by the Arkansas State Board of Registration for Professional Engineers and Land Surveyors and shall conform to the latest edition of the "City Corporation Standard Specifications and Details and Policies and Procedures." Standard Specifications and Details are included in Appendix U. Policies and Procedures are included in Appendix W.

City Corporation's approval of a plan for a particular sewer main extension is contingent on several standard conditions:

- The engineer of record must also submit the same plan to the Arkansas Department of Health and to any other agencies or local entities for approval. City Corporation does not submit proposed plans to regulatory agencies or local entities for approval.
- No construction is permitted on the proposed sewer main extension until City Corporation, the regulatory agencies and all local entities have approved the proposed plans in writing. In addition, approval of the Russellville City Council is required for any proposed service outside of the City limits.
- Approval of proposed plans for sewer main extensions by City Corporation is subject to the condition that all materials, construction procedures and tests are to be as specified in the latest edition of the City Corporation Standard Specifications. The only deviations from published City Corporations Standards, which are permitted, are those which are specifically approved in writing by City Corporation for particular sewer main extensions proposed.
- City Corporation inspectors do not have the authority to waive or modify City Corporations standard in the field.
- When City Corporation approves plans for sewer main extensions, the approval process does not stop with the plan approval. The City Corporation approval is with the express understanding that the engineer of record will remain responsible for the construction as shown on the approved plans, until all work is complete, and the project has been " Accepted for Service" by the City Corporation.
- The engineer of record for an approved sewer main extension is responsible for advising City Corporations when construction is to begin on the proposed sewer main extensions. Please provide a minimum of 24 hours' notice of commencement of construction. If construction is to be performed on a weekend, holiday or after normal working hours (8:00 a.m. to 4:30 p.m.), make arrangements in advance for a City Corporation inspector to be present.
- No permits for sewer taps will be issued for main extensions, which have not been "Accepted for Service" by City Corporation. "Accepted for Service" is defined as follows:
 1. All construction and cleanup is complete and all tests have been passed with the documentation in City Corporation files.
 2. Plans have been received by City Corporation and have been field checked and found acceptable.
 3. All appropriate agreements have been executed and filed with City Corporation. All applicable pro-rata rebates have been collected.
 4. Easements and/or street dedications have been filed for record in the Courthouse and copies furnished to City Corporation.
 5. City Corporation has by letter accepted the main extension for service and maintenance, subject only to the one-year's maintenance period.

CHAPTER 6- SYSTEM EVALUATION AND CAPACITY ASSURANCE PLAN

The concept of capacity for a wastewater system has two basic elements: the capacity of the wastewater plant and the capacity of the collection system. Inflow/infiltration and growth can result in wastewater flows exceeding the design capacity of either the plant or collection system or both. RJN Group has been contracted by City Corporation to complete a thorough evaluation of the capacity of the system. The Sanitary Sewer Evaluation Survey (SSES) will entail several key components to assist City Corporation with future repair efforts and hydraulic upgrades to the system. The components of this study are detailed below.

6.1 System Wide Flow Monitoring/Capacity Analysis- Phase I

Phase I of the Sanitary Sewer Evaluation Survey (SSES) includes a System Wide Inflow/Infiltration (I/I) Analysis. RJN divided the system into 27 distinct basins. Each basin was monitored through the installation of flow meters. Appendix 19 shows the locations of the flow meters. The meters were monitored and analyzed for a period of 53 days. Rain gauges were also installed throughout the system to correlate rainfall information with the resulting flow data. Areas that exhibited high amounts of I/I were listed as priority basins. These basins will be studied in more detail as described in 6.2 below.

Concurrent with the flow monitoring, RJN updated the system maps for all lines 10-inch in diameter and larger. All manholes on these lines were GPS surveyed to ensure accuracy and each manhole was inspected for signs of I/I and structural soundness. As a result of the survey information, a hydraulic model network was developed for all 10-inch in diameter and larger lines, selected 8-inch diameter lines, and all major pump stations. The model will be used along with the flow monitoring data to identify collection system capacity issues. Also included in Phase I of the SSES was a review of all 19 lift stations, one of which has since been abandoned and removed, as discussed in 6.1.3 below.

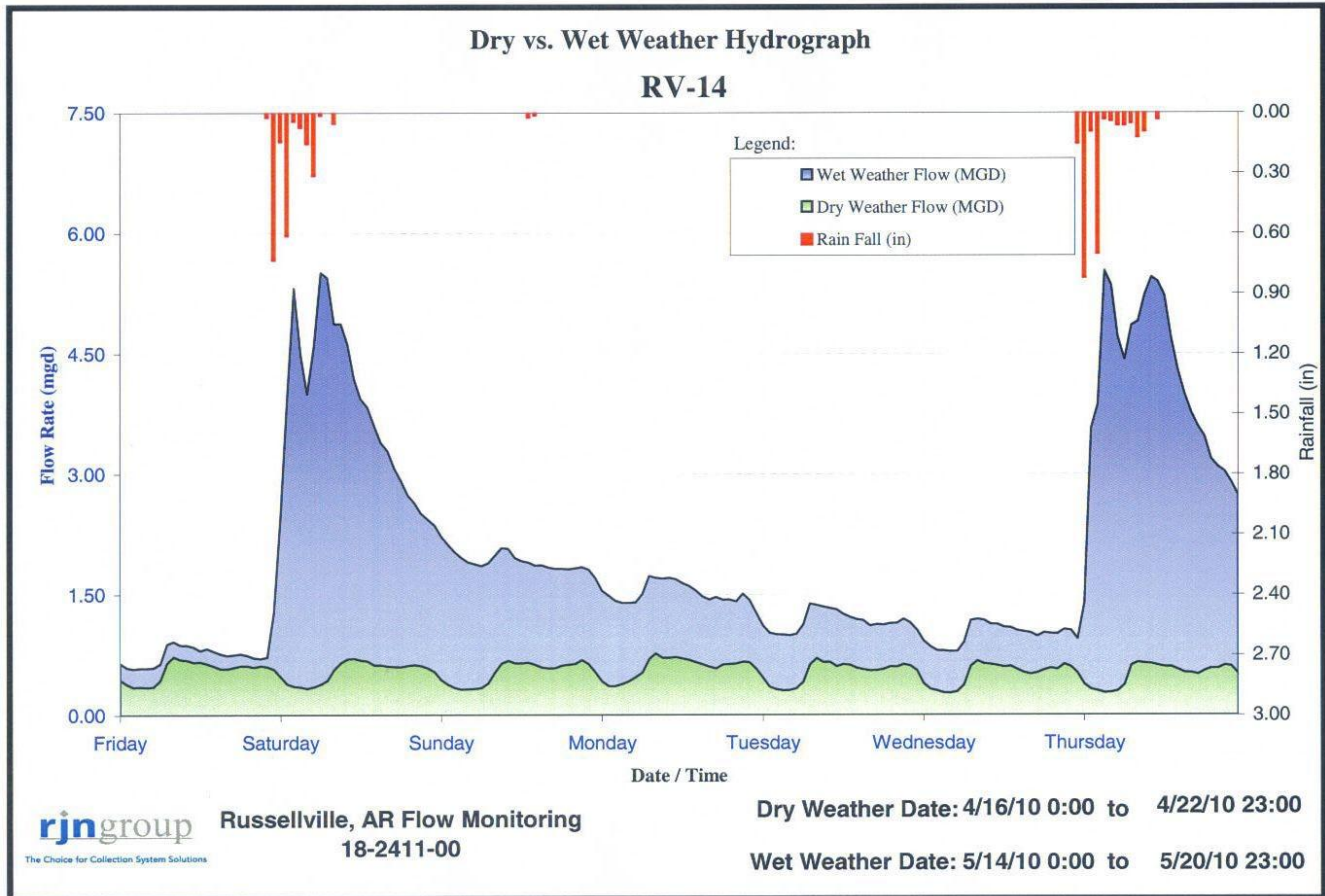
RJN has developed a detailed report for all Phase I activities. The report provides the results of the flow monitoring and capacity analysis including recommendations for further investigation. The recommendations are based on the amount of inflow and infiltration contribution from each basin. The I/I ranking was to be used to develop a prioritization for each basin, along with a milestone schedule for studying the high priority basins. Wet and Dry Peaking factor results of the study can be found in Appendix X.

6.1.1 Flow Monitoring

Concurrent with establishment of the I/I program, a comprehensive evaluation of I/I within the City was undertaken through a Consultant. RJN Group, Inc. performed a city-wide flow monitoring program during the spring of 2010. A total of 31 ADS flow meters were used to monitor wastewater flow from March 15, 2010 to May 24, 2010 for a period of 53 days. Six rain gauges were also installed to determine the amount of rainfall that occurred during this period. While the initial city-wide monitoring effort included basins comprising on the order of 939,871 linear feet of sewer, the follow-up monitoring effort included only about 30,000 linear feet per monitor. Each of these smaller basins was evaluated with respect to infiltration and to inflow, and a recommendation was made for each of the parameters. In general, if an area was considered cost-effective for inflow removal, manhole inspection, smoke testing, dye testing, and repair were recommended. If an area was considered cost-

effective for infiltration removal, manhole inspection, sewer cleaning, television inspection, and repair were recommended. For areas where both infiltration and inflow appeared excessive, all of these activities were recommended. Figure 6-1 is an example of Peak flow during a rain event.

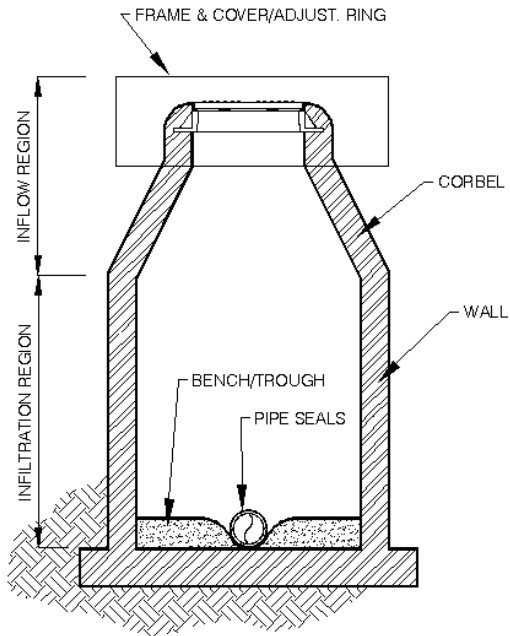
Figure 6-1: Hydrograph



6.1.2 Manhole Inspection

Manhole inspections were performed on selected manholes to verify system mapping, collect coordinates, and invert elevations for construction the hydraulic model. All manholes were physically descended and visually inspected unless deemed unsafe or unable to descend. All manholes were inspected for defects and restrictions. Figure 6-2 shows the main parts of a standard manhole.

Figure 6-2: Parts of a Standard Manhole



The following data was recorded for each manhole:

- Location and identification number
- Potential for ponding on manhole cover
- Cover type, fit, distance above or below grade, evidence of inflow
- Frame adjustment, type and condition of seal, evidence of inflow
- Corbel construction, condition, evidence of inflow
- Wall construction, condition, evidence of infiltration
- Bench/trough construction, condition, deposition, evidence of infiltration
- Pipe seal condition, evidence of infiltration
- Step and rung conditions
- Manhole inside diameter
- Surcharging or evidence of surcharging
- Indication of groundwater level at time of inspection
- Maintenance problems
- Line segment diameter and direction
- Line segment observations from manhole

Approximately 700 manholes serve as access structures for 10 inch and larger diameter pipes and selected 8-inch diameter pipes and were selected for inspection. RJN completed 659 of the 698 manhole inspections attempted and identified 11 inaccessible, 2 buried, and 26 not found manholes. Table 6-1 shows the findings in more detail.

Table 6-1: RJN Manhole Findings Phase I

Basin	Total	Inspected	Not Found	Buried	Inaccess- sible
RV01	16	14	2	0	0
RV02	42	39	3	0	0
RV03	32	29	3	0	0
RV05	21	20	0	1	0
RV07	96	93	1	0	2
RV08	2	2	0	0	0
RV09	51	47	3	0	1
RV11	65	62	2	0	1
RV13	4	4	0	0	0
RV14	65	57	5	0	0
RV15	21	20	1	0	0
RV16	17	17	0	0	0
RV17	5	5	0	0	0
RV18	34	32	1	0	1
RV19	10	10	0	0	0
RV20	34	34	0	0	0
RV21	27	26	0	0	1
RV22	31	31	0	0	0
RV23	11	10	0	0	1
RV24	60	56	3	0	1
RV26	19	17	0	0	2
RV27	22	18	2	1	1
RVUM	16	16	0	0	0
TOTAL	698	659	26	2	11

A total of 311 manholes were found to have evidence of surcharging during the manhole inspections activities. Table 6-2 shows the findings.

Table 6-2: RJN Manhole Defects Phase I

Type of Defect	Number of Defects
Pick Holes	304
Cover Missing Bolts	10
Broken Cover	24
Defective Frame Seal	96
Broken Frame	32
Manhole Rim Leaks	15
Defective Manhole Corbel	53
Defective Wall	122
Cracked Pipe Seal	86
Cracked Bench/Trough	32
Total	774

6.1.3 Lift Station Evaluation

RJN Group, Inc. evaluated all 19 lift stations from July 19, 2010 through July 23, 2010. The purpose of the evaluation was to assess the performance of each pump station and determine the firm pumping capacity of each station for use in the preparation of the hydraulic model. Appendix 20 shows the locations of lift stations.

Field information collected during site investigations at each of the lift stations uncovered an array of lift station types, including pump and wet well variations. Lift station configuration ranges from duplex, alternating pump to triplex, dual pump operation. The recommendations from the evaluation are in Table 6-3. City Corporation has completed the recommended rehab by RJN.

Table 6-3: RJN Recommendations for Lift Station Improvements

Lift Station	Improvements Needed	Improvements Completed
10 th Street	None	
23 rd Street	Redesign and Re-evaluate drainage system for the dry well	Removed & gravity to South Frankfort (Darling)
Lift Station "A"	Alleviating the drainage issues within the vault and correcting rust concerns	Repairs were completed
Lift Station "B"	Alleviating the drainage issues within the vault and correcting rust concerns	Repairs were completed
Lift Station "C"	None	
Center Valley	None	
Cove Landing	None	
South Frankfort (Darling)	None	
Grace	None	
International Paper	Repair any corroded or rusted components	Pump Station was Rebuilt
Lost Corner	None	Repairs completed
Main Street	Replace Pump 1 and provide reliable emergency option, evaluate condition of wet well and ventilation system	Removed Comminutor and Cleaned Pump Station-completely rebuilt
Old Post	Rehab wet well	Pump Station was Rebuilt
Prairie Creek	Repair wall leak, Evaluate condition of wet well and ventilation system	Installed new 215HP Flygt pump on 12/30/2016
Rimrock	Schedule more frequent removal of Grease	
Shadow Valley	Investigate why pumps are not running at full power	
Shiloh Manor	Schedule more frequent removal of Grease	
Tex Vet	Alleviating the drainage issues within the vault and correcting rust concerns	Repairs were completed
Tyson	Schedule more frequent removal of Grease	

6.1.4 Capacity Improvements

RJN recommended improvements on the overall sanitary sewer system to reduce the I/I 30% and included proposed growth to the city of Russellville. Shown below on table 6-4 are the recommendations RJN has made and the future or current project the lines will be associated with and their proposed design time.

Table 6-4: RJN Recommendations for Overall Capacity Improvements

Project Name	Improvements Recommended	Status
10 th Street FM	Upsize 5,664 LF 10" Force Main to 12"	Complete
Prairie Creek FM	Upsize 8,616 LF Force Main to 24"	Design 2022
Hydraulic Capacity Improvements	Upsize 2,055 LF 8"-10" Upsize 1,676 LF 10"-12"	Partially Complete
East 2nd Street Wastewater Improvements	Upsize 597 LF 10" 14" Upsize 8,520 LF 10"-18"	Complete
City Mall Wastewater Improvements	Upsize 5,462 LF 8"-12" Upsize 2,729 LF 18"-24"	Complete
ATU North/South	Upsize 14,650 LF	Complete

6.2 System Wide Flow Monitoring/Capacity Analysis- Phase II

The high priority basins resulting from the flow monitoring studies will be further examined in Phase II. The studies of the priority basins will involve extensive field investigation in an effort to quantify the results of the I/I Analysis. The following field activities will be part of the Phase II investigations:

- Manhole Inspections
- Additional Flow Monitoring
- Smoke Testing
- Dyed Water Flooding
- Cleaning
- Television Inspection

A detailed report for each basin studied will be developed by the engineer at the conclusion of the Phase II activities. The report will include a capital improvement plan which includes a rehabilitation plan, capacity improvements, a staged priority schedule, and budget costs for the recommended improvements. The report

will also include a narrative description of the hydraulic analysis and field investigations. A detailed map of the basins is located in Appendix 13. The goals for all Phase II study areas are:

- Improve overall sewer system
- Reduce I/I
- Eliminate Overflows
- Reduce Maintenance Calls
- Reroute main sewer line from under business and home

6.2.1 Basins 7,14,23 SSES Findings, Design, and Construction

The three basins included a total of 146,868 linear feet of sanitary sewer lines. RJN Group, Inc. has finished an extensive study of the collection system in basins 7,14,23. The following is a summary of the work performed and the defects found in the SSES report:

Work Performed	Quantity	Units
Manhole Inspections	338	EA
Smoke Testing	133,531	LF
Dyed Water Testing	32	Areas
TV Inspection	29,231	LF

Defects Found	Quantity	Units
Root Growth	60	Locations
Longitudinal Cracks	10	Locations
Circular Cracks	52	Locations
Collapsed Pipe	6	Locations
Offset Pipe	31	Locations
Broken Pipe	39	Locations
Manhole Defects	114	Locations
Building Lateral Defects	159	Locations
Defective Cleanout	142	Each

This project area was broken down into just Basins 7 & 14. Basin 23 is located in Downtown Russellville and will be constructed at a separate time. The projects bid price was \$2,768,130.35 and the projects final construction cost was \$2,180,965.75. The following is a brief description of the work completed:

Description	Quantity	Units
CIPP Existing 8"	2123	LF
CIPP Existing 10"	1269	LF
CIPP Existing 12"	1191	LF
CIPP Existing 15"	1082	LF
CIPP Existing 18"	402	LF
CIPP Services	45	EA
Pipe Burst 6"-8"	6205	LF
Pipe Burst 10"-10"	1954	LF
Relay/Install 8"	4513	LF
Reinstate Services	122	EA
Construct Manholes	69	EA

Basin 23 is located in Downtown Russellville and was in its own project. The projects bid price was \$1,720,509.25 the project is complete. The final construction cost was \$1,565,089.50. The following is a brief description of the work completed:

Description	Quantity	Units
Pipe Burst 6"/8"-8"	10,479	LF
Pipe Burst 8"-10"	663	LF
Reinstate Services	114	EA
Construct Manholes	33	EA

6.2.2 Basins 1,2,8,11 SSES Findings, Design, and Construction

The four basins included a total of 126,967 linear feet of sanitary sewer lines. RJN Group, Inc. has finished an extensive study of the collection system in basins 1,2,8,11. The following is a summary of the work performed and the defects found during the Phase II study:

Work Performed	Quantities	Units
Manhole Inspections	376	EA
Smoke Testing	113,818	LF
Dyed Water Testing	53	Areas
TV Inspection	22,514	LF

Defects Found	Quantities	Units
Root Growth	21	Locations
Longitudinal Cracks	2	Locations
Circular Cracks	21	Locations
Collapsed Pipe	5	Locations
Offset Pipe	23	Locations
Broken Pipe	6	Locations
Manhole Defects	115	Locations
Building Lateral Defects	72	Locations
Defective Cleanout	89	Each

The projects bid price was \$1,141,322 and the projects final construction cost was \$1,106,569. The following is a brief description of the work completed:

Description	Quantity	Units
CIPP Existing 8"	1353	LF
CIPP Existing 24"	2842	LF
CIPP Services	16	EA
Pipe Burst 6"-8"	4410	LF
Pipe Burst 8"-10"	783	LF
Pipe Burst 8"-8"	375	LF
Relay/Install 6"-6"	112	LF
Relay/Install 6"-8"	1286	LF
Reinstate Services	99	EA
Construct Manholes	4	EA

6.2.3 Manhole Rehab Phase I Construction

Three SSES Phase II areas (1,2,8,11/3,5,6/7,14,23) were combined into a Manhole Rehab project. The project bid was \$721,695. The project is complete, the final construction cost was \$768,826.30. The following is a summary of the work completed.

Work Performed	Quantities	Unit
Replace Manhole Ring and Lid	547	EA
Grout Lower 18"	107	EA
Grade Adjustment	18	VF
Chimney Seal	260	EA
Cementitious Coating	1238	VF
Epoxy Coating	214	VF

6.2.4 Basins 3,5,6,21 SSES Findings, Design, and Construction

The four Basins included a total of 115,919 linear feet of sanitary sewer lines. RJN Group, Inc. has finished an extensive study of the collection system in basins 3,5,6,21. The following is a summary of the work performed and the defects found during this Phase II study:

Work Performed	Quantities	Unit
Manhole Inspections	361	EA
Smoke Testing	115,919	LF
Dyed Water Testing	22	Areas
TV Inspection	27,241	LF

Defects Found	Quantities	Units
Root Growth	53	Locations
Longitudinal Cracks	1	Locations
Circular Cracks	33	Locations
Collapsed Pipe	2	Locations
Offset Pipe	34	Locations
Broken Pipe	11	Locations
Manhole Defects	144	Locations
Building Lateral Defects	37	Locations
Defective Cleanout	76	Each

Basin 21 was removed from this project and placed with basin 17,18,20 because of the proximity to the basins. The Basins 3,5,6 project bid amount was \$1,998,714.50 and the projects final construction cost was \$1,680,690.78. The following is a summary of the work completed.

Description	Quantity	Units
Pipe Burst 6"-8"	7232	LF
Pipe Burst 8"-8"	1357	LF
Relay/Install 8"-12"	4465	LF
Relay/Install 24"	43	LF
Relay/Install 14" Force Main	1466	LF
Reinstate Services	160	EA
Construct Manholes	36	EA

6.2.5 Basins 17,18,20 SSES Findings, Design, and Construction

The three basins included a total of 121,689 linear feet of sanitary sewer lines. RJN Group, Inc. has finished an extensive study of the collection system in basins 17,18,20. The following is a summary of the work performed and the defects found:

Work Performed	Quantities	Units
Manhole Inspections	483	EA
Smoke Testing	117,372	LF
Dyed Water Testing	11	Areas
TV Inspection	26,566	LF

Defects Found	Quantities	Units
Root Growth	51	Locations
Longitudinal Cracks	3	Locations
Circular Cracks	44	Locations
Collapsed Pipe	3	Locations
Offset Pipe	43	Locations
Broken Pipe	8	Locations
Manhole Defects	103	Locations
Building Lateral Defects	32	Locations
Defective Cleanout	51	Each

Basin 21 was added to this project because of proximity. The projects bid price was \$2,260,647.25 and the projects final construction cost was \$1,949,040. The following is a brief description of the work completed:

Description	Quantity	Units
Pipe Burst 6"-8"	10,041	LF
Pipe Burst 8"-8"	1,528	LF
Pipe Burst 8"-10"	1,879	LF
Relay/Install 8"-15"	3,435	LF
Reinstate Services	190	EA
Construct Manholes	77	EA

6.2.6 Basins 9,15,25 SSES Findings, Design Plan, and Construction

The three basins included a total of 128,987 linear feet of sanitary sewer lines. RJN Group, Inc. has finished an extensive study of the collection system in basins 9,15,25. The following is a summary of the work performed and the defects found:

Work Performed	Quantities	Unit
Manhole Inspections	459	EA
Smoke Testing	128,987	LF
Dyed Water Testing	8	Areas
TV Inspection	6,388	LF

Defects Found	Quantities	Unit
Root Growth	53	Locations
Longitudinal Cracks	1	Locations
Circular Cracks	44	Locations
Collapsed Pipe	2	Locations
Offset Pipe	0	Locations
Broken Pipe	2	Locations
Manhole Defects	223	Locations
Building Lateral Defects	7	Locations
Defective Cleanout	74	Each

The projects bid price was \$2,350,000 and the projects final construction cost was \$2,142,697.75. The following is a brief description of the work designed for rehab in this area:

Description	Quantity	Units
CIPP 8" Pipe	761	LF
CIPP 10" Pipe	1,894	LF
CIPP 15" Pipe	791	LF
CIPP 18" Pipe	184	LF
Pipe Burst 6"-8"	10,798	LF
Pipe Burst 8"-8"	1,693	LF
Pipe Burst 8"-10"	929	LF
Relay/Install 8"-10"	3,659	LF
Reinstate Services	218	EA
Construct Manholes	61	EA

6.2.7 Basins 13,16,26 SSES Findings & Design Plan

The three basins included a total of 117,810 linear feet of sanitary sewer lines. RJN Group, Inc. has finished an extensive study of the collection system in basins 13,16,26. The following is a summary of the work performed and the defects found:

Work Performed	Quantities	Unit
Manhole Inspections	494	EA
Smoke Testing	114,975	LF
Dyed Water Testing	6	Areas
TV Inspection	11,795	LF

Defects Found	Quantities	Unit
Root Growth	119	Locations
Cracked Pipe	90	Locations
Collapsed Pipe	6	Locations
Broken Pipe	1	Locations
Sag	3	Locations
Offset	3	Locations
Manhole Defects	627	Locations
Building Lateral Defects	21	Locations
Defective Cleanout	57	Each

The projects bid price was \$2,149,244.24. The projects final construction cost was \$1,889,887.59 The following is a summary of the work completed in this area.

Description	Quantity	Units
CIPP 8" Pipe	4,219	LF
CIPP 10" Pipe	1,998	LF
Pipe Burst 6"-8"	4,323	LF
Pipe Burst 8"-8"	2,219	LF
Pipe Burst 8/10"-12"	2,120	LF
Relay/Install 8"-12"	2,671	LF
Reinstate Services	137	EA
Construct Manholes	41	EA

6.2.8 Basins 12,19,24 SSES Findings & Design Plan

The three basins included a total of 122,329 linear feet of sanitary sewer lines. RJN Group, Inc. has finished an extensive study of the collection system in basins 12,19,24. The following is a summary of the work performed and the defects found:

Work Performed	Quantities	Unit
Manhole Inspections	444	EA
Smoke Testing	116,946	LF
Dyed Water Testing	13	Areas
TV Inspection	15,895	LF

Defects Found	Quantities	Unit
Root Growth	37	Locations
Cracked Pipe	28	Locations
Collapsed Pipe	5	Locations
Broken Pipe	4	Locations
Sag	7	Locations
Offset	28	Locations
Manhole Defects	576	Locations
Building Lateral Defects	28	Locations
Defective Cleanout	68	Each

The projects bid price was \$3,249,156.69 and is in construction. The following is a summary of rehab work planned for this area.

Description	Quantity	Units
CIPP 15" Pipe	749	LF
Pipe Burst 6"-8"	7,339	LF
Pipe Burst 10"-12"	2,340	LF
Relay/Install 8"-12"	6,671	LF
Reinstate Services	270	EA
Construct Manholes	77	EA

6.2.9 Right Of Way Clearing Phase I and Phase II and Phase III

City Corporation generally holds a 15' minimum permanent easement along its sewer lines. While some other individual or entity normally owns the underlying property, City Corporation has the right to access and maintain the line. This is not an issue in areas where sewers cross undeveloped property; however, issues have arisen from homeowners when easement clearing is needed in developed areas. City Corporation has started a program to fund the Right of way Clearing throughout the City. The following is a breakdown of the areas cleared:

Basins	Quantities	Year	Bid Amount	Status
1,2,8,11-Phase I	7.55 acres	2018	\$65,000	Complete
All remaining sewer & water lines-Phase II	10.76 acres	2019	\$54,543	Complete
Sewer & Water lines-Phase III	15.31 acres	2020	\$74,574	Complete

6.2.10 Post Flow Monitoring

CWB Engineers has put together a post flow monitoring report for Basins 1,2,8,11,3,5,6,7, & 14. The report shows hydrographs and I/I reduction in the basin areas listed above. These basins have undergone significant rehab work on the line segments and manholes. The following is a summary of the report.

A system wide flow study was conducted by RJN in 2010. The flows were measured during dry and wet weather events. A comprehensive I/I rehab program has been ongoing since 2010, with an overall goal of 30% reduction in the collection system. In 2017, nine basins were monitored for 90 days. Line rehab and manhole rehab was completed in each of the nine basins. The flow results were compared to the 2010 system wide flow study. Six of the basins achieved average wet weather flow reduction ranging from 26% -67%. The remaining three basins experienced changes in industrial flows, rerouted basin flows, or increased private line flows, resulting in an increase in flows. Peak flows were reduced in 5 of the 9 basins, resulting in 10%-48% reductions. The remaining basins experienced increase peak flows because of issues mentioned above. The table below details the results of the flow metering:

Site	Dry Weather Flow	Wet Weather Flow	Wet Weather Peak Flow
RV01 - 6178	95% Reduction	72% Reduction	77% Reduction
RV02 - 6294	64% Increase	27% Reduction	10% Reduction
RV03 – 6130	49% Reduction	43% Reduction	24% Reduction
RV05 – 5155	22% Reduction	37% Reduction	40% Reduction
RV06 – 5038	400% Increase	0%	14% Increase
RV07 – 6152	11% Reduction	35% Reduction	24% Reduction
RV08 – 4113	162% Increase	5% Increase	33% Increase
RV11 – 4093	133% Increase	4% Reduction	72% Increase
RV14 – 1008	46% Reduction	52% Reduction	48% Reduction

6.2.11 Manhole Rehab Phase II and III Construction

Four SSES Phase II areas (9,15,25/12,19,24/13,16,26/17,18,20,21) were combined into a Manhole Rehab project. The project bid was \$1,407,777.00. The project started construction in the month of February 2022. The following is a summary of the work to be completed.

Work Performed	Quantities	Unit
Replace Manhole Ring and Lid	502	EA
Grout Lower 18"	238	EA
Grade Adjustment	1471	VF
Chimney Seal	93	EA
Cementitious Coating	1938	VF
Epoxy Coating	212	VF

CHAPTER 7-OVERFLOW EMERGENCY RESPONSE PLAN

7.1 Awareness

In order to respond effectively to a sewer overflow, a plan must be in place prior to the overflow and all personnel need to understand their role in the response and follow up. The following SSO Response Plan Summary describes the actions that will be taken in the event of an overflow of the collection system. The full Overflow Response Plan is located in Appendix Y.



7.2 Response

The Sanitary Sewer Overflow Response Plan (SSORP) is designed to ensure that every report of a confirmed sewage overflow is immediately dispatched to the appropriate crew so that the effects of the overflow can be minimized with respect to impacts to public health, beneficial use, quality of surface waters, and customer service. The SSORP further includes provisions to ensure safety pursuant to the directions provided by the ADEQ and that notification and reporting is made to the appropriate local, state, and federal authorities. For purposes of this SSORP, “confirmed sewage spill” is also sometimes referred to as “sewer overflow,” “overflow,” or sanitary sewer overflow “SSO”. The 24 Hour SSO Report and the SSO Monthly Report are located in Appendix Z.

7.3 Official Notification

Official Notification of SSO during working hours

Customer Service Representative (CSR) receives notification of a possible SSO from the public. The CSR will collect relevant information, as outlined in Section IV-A. The appropriate Response Crew will be dispatched to the site to verify if an SSO has occurred.

Response Crew determines if SSO has occurred and attempts to resolve problem. Response Crew uses their tablets to complete the application electronically. They then take photographs before clean-up is started, and places warning sign(s) at the site, as required. Construction Supervisor verifies Overflow Report, problem resolution, and signage have been appropriately addressed.

On all public overflows, Response Crew begins cleanup and disinfection of the affected area. The Construction Supervisor will verify cleanup is completed, take photographs, and remove warning signs.

All private overflow calls are directed directly to the field crews. The customer is then directed to contact their individual insurance carrier for coverage and is encouraged to work with insurance company to complete cleanup. Because of the nature of a private overflow, City Corporation recommends the use of a professional restoration service to complete the cleanup. City Corporation employees are not allowed to work inside private/commercial addresses.

Official Notification of SSO after working hours

After Hours Emergency Crew receives direct notification of possible SSO from public at which time they collect all relevant information as outlined in Section IV-A and proceed to location. (After Hours Emergency Crew emergency phone after business hours)

Emergency crew determines if SSO has occurred and attempts to resolve problem then takes photographs before cleanup and places warning signs at site, as required. Emergency Crew uses tablet application, and a report is generated electronically to the administrative staff.

On all public overflows, Emergency Crew then begins clean-up and disinfection of the affected area. When cleanup is completed, crew is to take photographs and remove warning signs. Site visit is to be performed the first workday after the overflow occurrence.

All private overflow calls are directed to the field crews. The customer is then directed to contact personal insurance for coverage and restorations service for cleanup. City Corporation employees are not allowed to work inside private/commercial addresses.

Internal Notification of possible SSO

All City Corporation personnel are directed to immediately report any potential overflow and provide all relevant information as outlined in Section IV-A. After the overflow has been reported, all procedures will be the same as with a public notification of possible SSO above.

Rain events that are one inch or greater will trigger our Response Crews to investigate possible recurring SSO sites to verify if an overflow has occurred. These crews will be furnished a list of possible SSO sites (see appendix E), which has been determined as being locations that have potential to overflow. After crews have completed a check of the entire list, they will begin clean-up at each site. Appendix 21 is a map showing the recorded overflow locations.

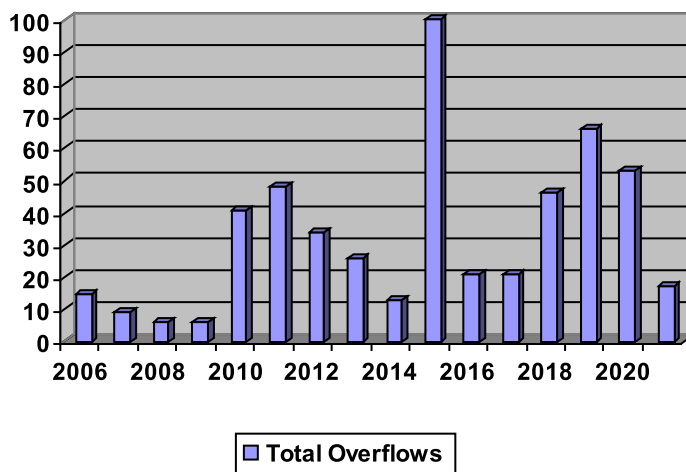
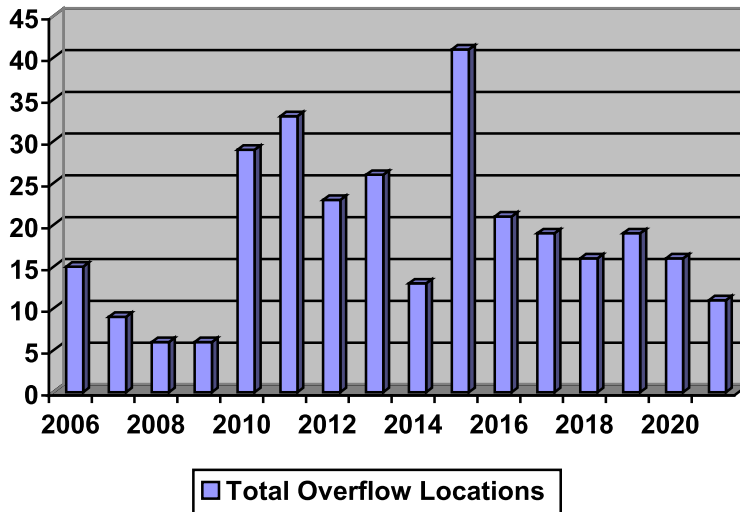
Chart 7-1: Total Overflows

Chart 7-2: Total Overflow Locations



CHAPTER 8- FINANCIAL

8.1 User Rate/User Charge

Sewer service charge

Monthly residential sewer service charge is computed on the average water used in the month of January, February, and March of each year. In general, these are the months when residential customers use the least amount of water and when water issued is going into sanitary sewer for treatment.

Charges for *new* domestic users will be based on the water consumption of a typical user of the same or similar class until a water use history is established and the average computed. Charges for all other classes of customers (commercial, industrial, etc.) are based on the same rate but are computed each month according to the amount of water used.

See Appendix 7 for the Sewer & Water Rate Flyer.

8.2 Budget Process and Schedule

Budget preparation begins approximately 6 months prior to new fiscal year. Authorized employees are capable of keying in their Operations & Maintenance Expenses into the Budget program screen. Capital budget items are submitted to the Administrative Manager with these items then being compiled into a report. This capital

budget is then reviewed by management at a meeting scheduled after completion of the operations and maintenance budget. This allows management to have the dollars available for capital work after operations and maintenance expenses are addressed.

Authorization is given to the individual employees involved in preparation for account numbers of a designated department. The employee can print out work sheets for these accounts and compile the budgeted numbers with assistance of their manager. They are then able to key these budget figures into the mainframe budget program. At the deadline given for budget entry, this authorization is revoked to protect any numbers from being changed without approval of the General Manager. Meetings are scheduled (see attached schedule example) with General Manager, Department Manager, Department Lead, Accountant and Administrative Manager to review the projected budget numbers. Any changes made at that time are keyed into the program by Accountant and budget is reprinted and reviewed with auditor and Board member. Final version is then printed and presented for review at the next scheduled Board meeting with Board approval given in the June Board meeting each year.

8.3 Rate Study

City Corporation completed a rate study in 2014. The study is located in Appendix P. Economist.com was hired to analyze the existing water and sewer rates, and to make recommendation for implementing City Corp's Capital Improvement Plan for the next ten years. City Corp has developed a ten-year Capital Improvement Plan with the help of staff and consulting engineers. The plan has identified \$41 Million in improvements to water infrastructure and \$54 million in wastewater infrastructure improvements. Economist.com has recommend funding the needed improvements through a combination of rate increases and bonds. City Corporation is currently working with the City Council and civic organizations to garner support for the needed improvements. The council approved the necessary rates and the initial bonds for the first three years of the plan have been issued. The capital improvement plan and rate study presentation is included the Appendix T.

CHAPTER 9-PROGRAM AUDITS

9.1 Summary

The foregoing Capacity, Management, Operation and Maintenance Program for the sanitary sewer system owned by City Corporation reflects the commitment to the protection of the environment and continued provision of exemplary customer service. As indicated throughout this document, City Corporation has committed and is prepared to further commit the resources necessary to provide vigilance over the wastewater system. Necessary funds and staffing are available through operating and capital budgets and required contractual arrangements are either already in place or can be readily accomplished. This document will be updated annually through revisions to reflect the City Corporations commitment to its mission and to satisfy federal and state regulatory requirements. This CMOM document, appendices, and supporting documents are presented on the CMOM link on the City Corporation web site. The CMOM Program is viewed as a working document with the most current data available that reflects the latest collection system conditions.

9.2 Program Updates

This plan lays out metrics for employee training, routine maintenance, repairs, and system monitoring. The plan is essentially the business plan for the sewer system of City Corporation. The program is developed as a guidance manual for the entire staff and customers of City Corporation. City Corporation, along with their consulting engineer, will evaluate adherence to these metrics and the goals of this program on an annual basis. The plan will be modified to incorporate new information from current studies, new technology, and any additional changes, at City Corp's discretion, based on the annual evaluation. The General Manager is expected to require all employees to adhere to this plan in the performance of their individual duties.

CHAPTER 10-SUMMARY OF RECOMMENDATIONS

10.1 Schedule of Recommended Improvements

Figure 10-1 is a schedule that has been created to give City Corporation and ADEQ a milestone to the activities of the recommended improvements throughout the city, as required by the Consent Administrative Order. The schedule reflects a 10 year comprehensive program including a study phase, a design phase, and a construction phase. The program and corresponding dates may be revised as the program is implemented.

10.2 Continuing of Sewer System Evaluation

City Corporation just purchased a new camera and software. CWB Engineers recommends that they use this for evaluating and investigating the sanitary sewer lines that were not addressed in the Phase II study. City Corporation plans to continue to evaluate and address the collection system. City Corporation plans to budget \$500,000 for collection system repairs annually.

10.3 Post Monitoring for Remaining Basins

CWB recommends post flow monitoring the basins 23, 9-15-25, 13-16-26, and 12-19-24 after the completion of the final manhole rehab project.