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October 10, 2017

Ms. Bailey Taylor
Enforcement Analyst
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317

RECEIVED
OCT 10 2017
KJ 1137

RE: City of Walnut Ridge
LIS 17-040, AFIN 38-00040, Permit No. AR0046566
Sanitary Sewer Evaluation Study

Dear Ms. Taylor:

In accordance with the requirements of the Consent Administrative Order (CAO) LIS No. 17-040 with the Arkansas Department of Environmental Quality dated on May 25, 2017, we submit herewith the SSES Plan.

Should you have any questions regarding this correspondence plan please don't hesitate to contact me at 501.664.1552 or 501.993.2922.

Sincerely,
Crist Engineers, Inc.

Craig A. Johnson, P.E.
Associate

Enclosures: SSES

Cc: Jon Kopp, City Water Works



SANITARY SEWER EVALUATION STUDY

LIS 17-040, AFIN 38-00040, NPDES PERMIT No.: AR0046566

DATE: OCTOBER 10, 2017

PREPARED FOR:

Walnut Ridge City Water Works
216 S.W. 4th Street
Walnut Ridge, Arkansas 72476
www.cityofwalnutridge.com



PREPARED BY:



Crist Engineers, Inc.
205 Executive Court
Little Rock, Arkansas 72205

Crist Project No.: 1635





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SECTION 1

BACKGROUND

1.1 PURPOSE AND SCOPE

The City of Walnut Ridge entered into a Consent Administrative Order (CAO) LIS No. 17-040 with the Arkansas Department of Environmental Quality on May 25th, 2017. Per the Order and Agreement section a comprehensive Sanitary Sewer Evaluation Study with milestone schedule is required for submission on or before October 10, 2017.

SECTION 2

SSES STUDY

2.1 CURRENT STATUS

The City Water Works has employed a professional engineer to develop a system wide collection system map based upon available as-built information. The system map designates gravity mains, force mains, pump station locations, and sewer drainage sub-basins. The sewer system map is shown in **Figure 1-1 – Sewer System Map**. In addition, the location of sanitary sewer overflows (SSO) based upon the Department’s SSO Database where referenced. The SSO Database encompasses recorded SSO’s from December 2001 through current activity. Please note that there has not been a recorded SSO during 2016 or 2017. **Table 2-1 - SSO History** provides the frequency of SSO’s by year.

Year	SSO Occurrence
2001	2
2002	None Recorded
2003	None Recorded
2004	None Recorded
2005	None Recorded
2006	4
2007	1
2008	None Recorded
2009	3
2010	None Recorded
2011	7
2012	3
2013	5
2014	2
2015	4
2016	None Recorded
2017 to Current	None Recorded
Total 2001 to Current	31

Table 2-1: SSO History

A summary of the collection system is given in **Table 2-2: Sewer System Inventory**

MAP(S)/PLAN(S) SCANNED IN
SEPARATE FILE

Sub Basin	Manholes	Gravity						Force				
		Unknown	6"	8"	10"	12"	15"	4"	6"	8"	10"	12"
1	99	3,490	1,440	15,218	5,272	2,635	0	0	0	3,791	1,924	0
2	77	6,276	10,009	8,657	0	0	0	0	1,900	0	0	0
3	108	2,302	17,261	7,252	5,200	0	0	2,402	1,227	519	0	0
4	123	6,220	7,266	23,620	734	2,540	0	0	0	0	0	0
5	116	1,606	9,712	18,712	3,142	1,050	2,699	0	0	519	0	0
Not In Basin	8	272	0	1,808	0	79	0	2,030	0	0	2,129	1,360
Total	531	20,166	45,687	75,267	14,348	63,04	2,699	4,432	3,128	4,829	4,053	1,360
		Total Gravity = 164,472 feet; 31.1 miles						Total Force Main = 17,801; 3.4 miles				

Table 2-2: Sewer System Inventory

2.2 SEWER SYSTEM EVALUATION

The overall goal of the sewer system evaluation is to eliminate capacity and non-capacity related SSO's. The following components provided below will comprise the sanitary sewer evaluation study.

2.2.1 SMOKE TESTING

A dual-blower intensified smoke testing technique will be utilized to test sewer lines in the selected study areas. A non-toxic, non-hazardous smoke source shall be used. Each set up shall be between adjacent manholes. Segments less than 150 feet may be included with an adjacent line segment. Smoke testing will be performed only during dry periods. Flags shall be placed at observed smoke locations and digital images shall be captured. Smoke defect locations shall be recorded.

2.2.1 MANHOLE INSPECTION PROGRAM

Utilizing industry standard safety procedures and appropriate traffic control, all subsurface manhole components will be inspected. The manhole rim to invert dimension will be recorded for all connecting lines. Each manhole in the selected study areas will be visually inspected either by full descent entry or by use of a panoramic inspection camera. All subsurface manhole components including the manhole cover, frame seal, walls, manhole bench and trough will be inspected. Potential maintenance problems are also recorded and provisions to repair the problems are included in the recommendations.

All pipes entering or exiting the manhole structures will be inspected for defects and restrictions by either visual inspection or by use of a high-resolution GoPro Camera. Flow rates shall be estimated for major sources of I/I in each of the manholes inspected. Any major I/I sources or defects will be immediately reported to the City Water Works. A data management model will be used to process and analyze the inspection data. **Table 2-3 – Manhole Data Information** depicts the recorded data for each manhole.

Item No.	Data Description
1.	Location and identification number
2.	Potential for surface water ponding on manhole cover
3.	Cover type, fit, distance above or below grade, evidence of inflow
4.	Frame adjustment, type and condition of seal, evidence of inflow
5.	Corbel construction, condition, evidence of inflow
6.	Wall construction, condition, evidence in infiltration
7.	Bench/trough construction, condition, deposition, evidence of infiltration
8.	Pipe seal condition, evidence of infiltration
9.	Step and rung condition
10.	Inside diameter
11.	Surcharging or evidence of surcharging
12.	Indication of groundwater level at time of inspection
13.	Maintenance problems
14.	Line segment diameter and direction
15.	Line segment observations from the manhole

Table 2-3: Manhole Data Information

2.2.1 CLOSED CIRCUIT TELEVISION

Internal TV inspection and dyed water flooding recommendations will be based on the results of the manhole inspection and smoke testing activities. City Water Works will coordinate cleaning and internal TV inspection of selected sewer lines and record the findings. All data shall be provided in a digital format.

2.2.1 DYED WATER TESTING

Dyed water flooding shall be performed at suspected storm sewer cross-connections, streams, creeks, ditches, and other ponding areas that may be contributing to inflow. Estimated leakage rates shall be provided for each positive dye test.

2.2.1 DEFICIENCY PLAN

At the conclusion of the field investigation services, an engineering analysis of field survey data shall be performed to develop recommendations for prioritizing I/I source repairs. A description of field investigations, engineering analysis, and recommended action to reduce I/I will be included in the report. A comprehensive rehabilitation and improvement strategy as coordinated with City Water Works will be developed. The rehabilitation plan strategy is outlined in **Table 2-4 – Rehabilitation Strategy Plan** below.

Item No.	Data Description
1.	Develop estimated rehabilitation and improvement construction costs for various types of infiltration/inflow defect repairs and sewer improvements for line and manhole improvement.
2.	Perform priority analysis for infiltration rehabilitation plan based on applicable rehabilitation method, material, and costs.
3.	Perform analysis for inflow rehabilitation plan based on applicable rehabilitation method, material and costs.
4.	Develop recommendations for rehabilitation of both public and private I/I sources in priority order, cost estimates by individual rehabilitation type, and estimated I/I reduction as a result of the recommendations.
5.	Provide the method of manhole rehabilitation for all manholes identified with defects.
6.	Prepare a report which includes results of the I/I investigations, findings, cost estimates, recommended plan to reduce I/I and a preliminary schedule of implementation for sewer rehabilitation projects.
7.	Compile all findings, reports and field cataloging into a hard copy form and in digital format. All television inspection videos in DVD format. Compile all information pertaining to the investigation and final analysis of the SSES project.
8.	Develop plans and specifications to address deficiencies outlined in the SSES report.
9.	Advertise, bid, and award construction project(s) to address deficiencies identified.

Table 2-4: Rehabilitation Strategy Plan

2.2.1 PRIORITIZATION PLAN

As mentioned, the system is subdivided into five (5) basins, which is shown in **Figure 1-1 – Sewer System Map**. The prioritization of the survey will be based upon the frequency ranking of SSO's by basin and age of sewer basin. **Table 2-5: Basin Priority Ranking** provides the basin rankings.

Sub-Basin	SSO Occurrences	Chronic Occurrences	Priority Ranking
WR-01	1	0	5
WR-02	1	0	4
WR-03	5	0	3
WR-04	5	1	2
WR-05	5	0	1

Table 2-5: Basin Priority Ranking

A pump station project was completed in Basin WR-05 in 2015 that has assisted in the abatement of the chronic overflow noted in **Table 2-5: Basin Priority Ranking**. City Water Works staff has indicated needs in basin WR-05; as such, the basin is shown as priority ranking 1.

In light of the low SSO occurrence threshold City Water Works proposes to conduct the SSES within one calendar year with a specific rehabilitation plan to address deficiencies the following year that will be conducted by sub-basin. This phased approach would allow the City Water Works to address higher priorities areas first. As such, City Water Works proposes the following schedule outlined in **Table 2-6 – SSES and SSO Plan Schedule**.

Sub-Basin	Ranking	Study Plan Complete	Construction Plans and Specifications Complete	Construction Completion
WR-05	1.	April 10, 2018	March 10, 2019	July 10, 2020
WR-04	2.	April 10, 2019	March 10, 2020	July 10, 2021
WR-03	3.	April 10, 2020	March 10, 2021	July 10, 2022
WR-02	4.	April 10, 2021	March 10, 2022	July 10, 2023
WR-01	5.	April 10, 2022	March 10, 2023	July 10, 2024

Table 2-6: SSES and SSO Plan