



3605 Jefferson Ave. • Texarkana, AR 71854 • Phone: (870) 774-3204 • Fax: (870) 774-8615  
 May 29, 2019

RE: Corrective Action Plan for City of Hope, AR  
 Bois D'Arc WWTP, NPDES Permit No. AR0038466, AFIN 29-00034  
 Pate Creek WWTP, NPDES Permit No. AR0038458, AFIN 29-00512

Ms. Leslie Allen-Daniel  
 Enforcement Analyst  
 Water Division, Enforcement Branch  
 Arkansas Department of Environmental Quality  
 5301 Northshore Drive  
 North Little Rock, AR 72118-5317

Dear Ms. Allen-Daniel,

We are submitting to you on behalf of the City of Hope regarding your Corrective Action Plan (CAP) Request letter dated March 29, 2019 for the City of Hope's NPDES permits referenced above. We have been working with the City of Hope to determine causes for the Sanitary Sewer Overflows (SSOs) permit violations and to correct deficiencies within the wastewater system since 2012. The City has been proactive in making repairs through bond issues passed by the City Board in 2013, 2016, and 2017. The following improvements have been made to the collection system and treatment facilities:

<u>Project</u>	<u>Contractor</u>	<u>Description</u>	<u>Completion Date</u>	<u>Final Total Project</u>
Manhole Inspections & Pump Station Evaluation	Spears Engineering Company	Condition evaluation for 1,526 manholes & calculate pump stations' capacity	12/4/2012	\$ 95,472.50
I & I Study	Pipeline Analysis	Smoke tested all sewer mains (115 miles); Clean & CCTV critical sewer mains (16.8 miles); Final Report attached	6/29/2015	\$ 745,300.57
Flow Monitoring	Hach Company	Installed and monitored flow data for the 6 major drainage basins of the collection system to determine areas for I&I rehab	12/18/2016	\$ 185,130.00
UV Repair at West Plant	Instrument & Supply	Replaced control panel and UV bulbs at West WWTP	4/1/2016	\$ 53,751.17
Hwy 278 Interceptor	Online Construction, Inc.	Install 3,464' of new 15" sewer main to abandon the City's largest pump station (Hwy 278)	4/28/2016	\$ 626,393.37
East & West WWTP Pump Station Imp & Blower	Heritage Constructors	Replaced all pumps, motors, check valves, and gate valves in influent pump stations at the East WWTP and the West WWTP; replaced one blower, check valves, and wafer valves at West WWTP	3/1/2016	\$ 361,646.55

Eastside MH Rehab	ICM Technologies, Inc.	Rehab 185 manholes; grout & realign 27 MH covers; chimney seal 3 manholes	6/28/2016	\$ 201,150.33
Eastside Sewer Main Rehab	RBIS, LLC	Replaced 10,305' of sewer main & 17 manholes; installed 12 point repairs	8/31/2017	\$ 1,372,307.00
Westside MH Rehab	Mayer Specialty Services	Rehab 213 manholes; grout & realign 27 MH covers; chimney seal 1 manhole	9/9/2016	\$ 223,669.06
Westside Sewer Main Rehab	RBIS, LLC	Replaced 4,043' of sewer main & 2 manholes; installed 42 point repairs	8/31/2017	\$ 663,959.05
West WWTP & East WWTP Improvements	J.S. Haren Company	The following repairs at both the East WWTP & West WWTP: <ul style="list-style-type: none"> <li>• Replace mechanical bar screen</li> <li>• Replace grit removal equipment</li> <li>• Repair influent structure</li> <li>• Repair Treatment Units</li> <li>• Replace sand filters with tertiary effluent filters</li> <li>• Repair sludge gates</li> </ul>	12/6/2018	\$ 2,251,900.51
CIPP Sanitary Sewer Rehabilitation	PM Construction & Rehab, LLC	Rehab 7,944' of sewer main with CIPP; installed 12 point repairs	9/15/2017	\$ 469,688.79
Sanitary Sewer Collection System Rehab – Phase 2	PM Construction & Rehab, LLC	Replaced 3,689' of sewer main and 10 manholes; Rehab 4,916' of sewer main by pipe bursting; installed 22 point repairs	6/24/2019	\$ 818,933.00
			<b>TOTAL</b>	<b>\$ 8,069,301.90</b>

The City of Hope purchased cleanout caps and replaced the ones identified as missing in the I&I Study. The City also sent notices to property owners that had service lateral defects and required the owners to repair/replace the defective pipes. In continuing the effort to eliminate SSOs, the City of Hope plans to perform the following:

Collection System:

1. Since 2016 the City has reported 39 overflows in the collection system. Causes for the overflows are broken down as follows:
  - 25 due to grease
  - 5 due to equipment failure
  - 6 due to roots/debris/broken line
  - 2 occurred during construction projects
  - 1 due to Inflow & Infiltration

2. Per the data above, over 60% of the SSOs in the collection system is due to grease. The City of Hope currently has ordinances for disposal of grease. The City has previously sent educational brochures on proper disposal of grease to all wastewater users in the City of Hope. The City will review the current regulations and education program to better control grease in the wastewater collection system. The City is also using a degreasing chemical to assist in reducing grease issues in the collection system.
3. Purchase CCTV camera system and dedicate personnel to begin inspecting existing collection system for possible I&I sources.
4. Refine flow monitoring to smaller areas within the individual drainage basins to pinpoint areas of greatest I&I.
5. Continue manhole and sewer main rehabilitations as discovered from the previous I&I Study (attached) and the new studies mentioned above.

#### WWTPs:

1. Perform study of dry weather and wet weather inflows and verify treatment capacity.
2. Check the sludge depth in the holding ponds to verify there is no reduction in storage capacity.
3. The City has begun taking samples from the holding pond overflows to test for DO, CBOD5, TSS, Ammonia Nitrogen, fecal coliform, and pH.
4. Investigate options to install a parallel treatment chain to treat overflows from the holding pond and combine the flows from both treatment trains prior to the disinfection process and discharge. The parallel treatment facility will be designed based on effluent testing mentioned above.

The City of Hope will use City Maintenance Personnel to reduce grease in the collection system, educate the public on grease disposal, and enforce grease ordinances. City personnel will also be responsible for CCTV data collection on existing sewer mains. The City will get proposals to provide flow monitoring in the collection basins. Funding will need to be secured (loan, grant, city reserve funds) to continue the sanitary sewer collection system rehabilitation and to make future treatment plant improvements. We recommend the City pursue funding from the various agencies once final recommendations and estimated costs have been developed. The milestone schedule is as follows:

Complete grease program and Purchase CCTV system	October 1, 2019
Measure sludge depth in Holding Ponds	October 31, 2019
Complete Flow & Capacity Study at WWTPs	February 28, 2020
Complete flow monitoring of collection system	June 30, 2020
Evaluate WWTP Options & Prepare Cost Estimates	June 30, 2020

The City should complete the above mentioned maintenance and begin the process to make upgrades to the wastewater treatment plant. All maintenance and operational work should be complete by January 30, 2020. The City of Hope will achieve final compliance by December 31, 2020. Future improvements will likely be required for long term compliance due to the age of the existing wastewater collection system and capacity of the current WWTPs to treat additional flows due to Inflow & Infiltration. The timeline for completion of the future improvements will be dependent upon many factors including funding, design, approvals, permits, bidding process, and construction.

We appreciate you working with the City of Hope to meet compliance. If you have any questions or need additional information regarding the above corrective action plan, please contact me.

Sincerely,

*Chas Spears, Jr.*

C. Glen Spears, P.E. #8823  
Spears Engineering Company



Cc: Ms. Catherine Cook, City Manager, Hope, AR

# Sanitary Sewer Evaluation Survey Final Report



**City of Hope, Arkansas**

**Spears Engineering Company**

I certify that this report was prepared under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Arkansas.

STATE OF  
ARKANSAS  
\*\*\*  
LICENSED  
PROFESSIONAL  
ENGINEER  
\*\*\*

*Mattie A. Engel*  
Mattie A. Engel, P.E. No. 15223  
Registration No. 15223 A. ENGR. 24-15

**June 2015**



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## I. Executive Summary

Pipeline Analysis, LLC was contracted by the Spears Engineering Company to smoke test and inspect portions of the Hope, Arkansas wastewater collection system. The goal of the City and ADEQ is to develop long-term solutions to infiltration/inflow (I/I) and sanitary sewer overflows (SSO's). The first step in achieving this goal is to establish the magnitude and location of the problem. City-wide temporary flow monitoring was completed in March 2009. (Figure I-1) This flow analysis established dry and wet weather flows at key locations across the city. In addition, flow meters isolated the areas of the collection system that contribute to excessive rainfall dependent infiltration/inflow (RDII) that enters through poor fitting manhole castings, vented manhole covers in ponding areas, holes in pipes, open or defective cleanouts, yard drains, storm sewer cross connections, etc. The results of the flow monitoring provided a ranking of basins by priority. This project builds on the previous flow monitoring and master plan efforts and is the next step to locate defects and establish least cost repair cost estimates. This report presents the findings of system inspection and testing for the study area.

Wastewater collection systems are composed of manholes, pipelines, and pump stations that will, over a period of time, deteriorate and require rehabilitation or replacement. The Hope collection system consists of approximately 102 miles of mainline gravity sewer. These assets have a replacement value of approximately \$80 million. Stretched end to end, the collection system would connect Hope with Little Rock. With a design life of 75 to 100 years, some of the Hope system has reached its design life. Infiltration/inflow is a symptom of aging collection systems. The City of Hope (like all municipalities) cannot afford to wait for system failure and replace the collection system. The least cost strategy is to locate system defects early while trenchless repair methods can be used.

The most recognized result of system deterioration is high infiltration/inflow during wet weather. Infiltration/inflow is composed of groundwater and rainfall runoff that enters the collection system through broken pipelines, open pipe joints, vented manhole covers, defective manholes, unauthorized storm drain connections, roof drains, etc. The extraneous infiltration/inflow (commonly referred to as I/I) reduces the pipeline capacity to serve customers and may result in sanitary sewer overflows which are in violation of State and Federal regulations. To locate, identify the best means of repair, and estimate the cost of the most feasible alternative requires evaluation and testing of the wastewater collection system.

By implementing a systematic sewer system evaluation consisting of inspecting, testing and repairing system defects, the City staff will minimize repair costs and extend the life of collection system assets. Identifying defects early will allow less expensive repairs and minimize wet weather infiltration/inflow. An on-going program of collection system renewal will ensure asset life will be extended at the least cost. The recommendations from this portion of the field testing effort area are summarized in Table I-1.



Figure I-1 – Flow Meter Basins

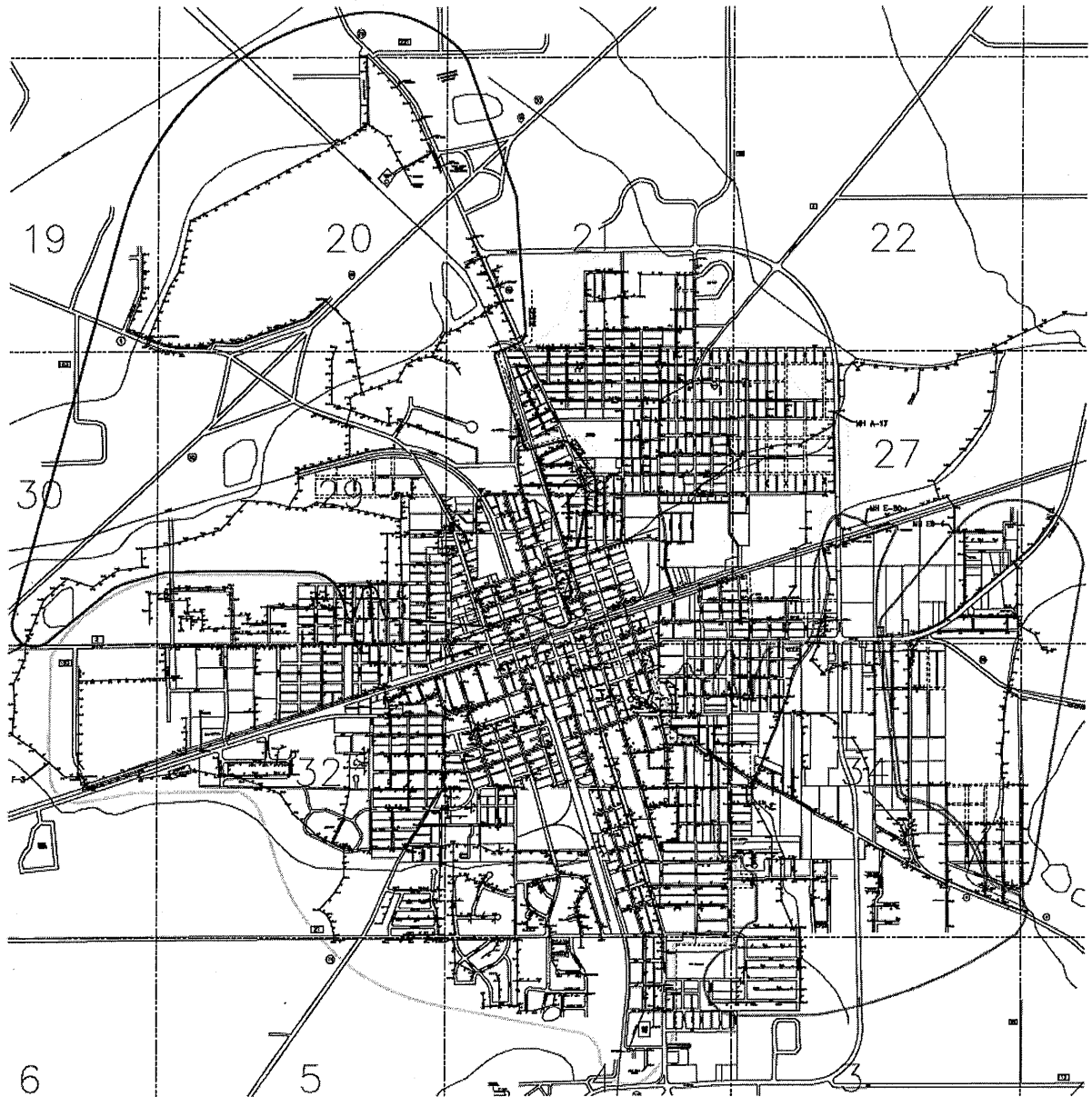






Table I-1 – Estimated Rehabilitation Cost Summary

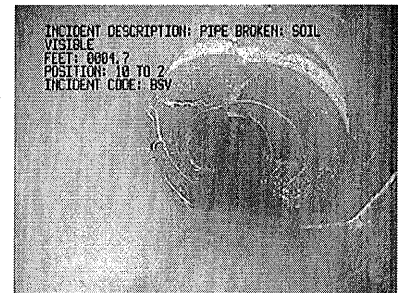
<b>A. Manhole Recommendations (Appendix A)</b>	
Rehabilitate Manhole Frame/Casting	\$143,600
Inspect Manhole	\$4,500
<b>Total Estimated Cost</b>	<b>\$148,100</b>
<b>B. Lateral Rehabilitation (Appendix B)</b>	
Private Lateral Rehabilitation	\$114,900
Municipal Lateral Rehabilitation	\$1,500
<b>Total Estimated Cost</b>	<b>\$116,400</b>
<b>C. Mainline Rehabilitation (Appendix C)</b>	
Mainline Rehabilitation Estimated Cost	\$4,090,316
<b>TOTAL ESTIMATED PROJECT COST</b>	<b>\$4,354,816</b>



## II. Background Information

The Hope collection system consists of approximately 102 miles of mainline gravity sewer. These assets have a replacement value of approximately \$80 million. Stretched end to end, the collection system would connect Hope with Little Rock. Wastewater pipes have a design life of 75-100 years, and portions of the Hope system are reaching their design life. Rehabilitation or renewal of existing infrastructure is the least cost alternative to replacement. Identifying deterioration and making timely repairs will minimize system renewal costs and extend the life of these valuable underground assets for another 75 to 100 years.

The Hope collection system has a significant percentage of vitrified clay sewer pipe (VCP). Many of these lines have reached or are nearing their useful life of 75 years, however, through various rehabilitation methods these assets can be renewed to extend the useful life. Such renewal is several magnitudes less expensive than replacement. The VCP pipe will prove problematic for the City for decades to come. Clay pipe is brittle and cracks easily due to installation, soil movement or over burden soil loadings. Root intrusion through poor pipe joints, cracks and plumbers taps will cause pipe deterioration. Once weakened, the pipe is susceptible to breaks or collapse. High pressure cleaning equipment and/or mechanical root removing equipment can cause significant damage to the pipe. Cured-In-Place (CIPP) pipe is an effective method to renew VCP pipe, using trenchless techniques, if rehabilitation is performed early in the deterioration process. Once the pipe is severely broken and no longer round, then pipe bursting or open cut replacement may be necessary.



Vitrified Clay Pipe (VCP)



### III. Sewer System Evaluation and Renewal Program

The approach to the Hope sewer evaluation was organized around the objectives for this project:

- Attainment of long-term Infiltration/Inflow Solutions
- Regulatory compliance
- Customer satisfaction
- Cost control

Collection system renewal is a continual process of “finding” system defects, prioritizing them, and “fixing” them. The goal for the collection system manager may be to inspect the collection system on a 10-year cycle. Critical sewers or those assets in flood prone areas may be on an annual cycle of inspection. A ten year cycle will require inspecting/testing 10% of the collection system (approximately 54,000 linear feet) annually. The results of the inspection/testing will generate repairs to manholes and mainline sewers. Private sector defects will also be identified requiring enforcement of local codes and ordinances. Budgeting funds to find and fix defects is the least cost solution to extend the life of the collection system. Waiting for pipeline or manhole failure will result in replacement of the assets which is the most expensive alternative.

Collections system tools used to “find” defects include flow monitoring (to prioritize areas), manhole/pipe inspections, smoke testing, and CCTV inspection. These testing tools were used in the evaluation of the Hope collection system.

Rehabilitation methods available to extend the life of collection system assets (renewal of assets) include trenchless technologies that minimize the impact to customers. Manhole rehabilitation may include lining, sealing, installing water tight ring and covers, raising buried manholes to grade, replacing vented covers, etc. Mainline sewer rehabilitation may include cured-in-place pipe (CIPP), slip lining and upsizing or pipe replacement by pipe bursting. These “fix-it” technologies are expanding to include service laterals which must be addressed by collection system managers.

The capacity analysis performed in a sewer system master plan will impact sewer system renewal. Knowing when a particular pipeline will require upsizing will impact the decision to rehabilitate the pipe. It may be more cost effective to defer rehabilitation (yet maintain the pipe) and replace the pipe as part of the capital improvement plan (CIP). Also, the least cost renewal plan may require deferring some rehabilitation until sufficient quantities are identified to reduce unit repair costs. Utilization of annual term contracts for collection system renewal is gaining favor as it speeds up the process of rehabilitation, thus keeping projects within annual budgets.

The most recognized result of system deterioration is high infiltration/inflow during wet weather. Infiltration/inflow is composed of groundwater and rainfall runoff that enters the collection system through broken pipelines, open pipe joints, vented manhole covers, defective manholes, unauthorized storm drain connections, roof drains, etc. The extraneous infiltration/inflow



(commonly referred to as I/I) reduces the pipeline capacity to serve facilities and may result in sanitary sewer overflows which are in violation of State and Federal regulations. To locate, identify the best means of repair, and estimate the cost of the most feasible alternative requires evaluation and testing of the wastewater collection system.

By locating the defects within the collection system, a repair plan can be implemented to restore manhole and pipeline integrity, reduce excessive I/I, and develop a prioritized Capital Improvement Program (CIP) to address current and future needs.

### A. Smoke Testing Results

Smoke testing was performed on the entire study area. In order to identify defects in the lines, a non-toxic smoke was forced into the sewer pipes. Breaks in the sewer will allow the smoke to escape. Normally one line segment upstream and downstream of the manhole is tested at one time.

Field documentation of the defects is extremely important and includes sketches of each system defect along with pertinent information for prioritizing the defects. Defects identified during smoke testing will reference the "Smoke Sketch Page" for information in re-locating the specific defect. GPS coordinates are also provided. Color digital photographs were taken to document each defect during smoke testing.



Defective Manhole  
Eastside Basin, Manhole D6

Pipeline repair recommendations are separated according to those on private property and municipal right of way. Appendix B presents the summary of recommended repairs on private and municipal laterals. Referenced smoke sketches and photographs are included in the electronic files that accompany this report. Abandoned service lines were identified at various locations and these service lines should be disconnected at the property line and a cleanout installed. In general, defects on private property are normally the responsibility of the property owner to repair and current city codes and ordinances should be used to ensure compliance. Table III-1 presents a summary of recommended repair costs associated with laterals.

Smoke Testing also identifies defects on manholes that may be a potential source of I/I. Often the smoke exits through a poor casting or frame. The smoke may also exit from the manhole structure itself. Manholes exhibiting defects from the manhole structure are recommended for further manhole inspection to determine if the source of the smoke, i.e. defective pipe seals, manhole wall, defective joints, etc. Appendix A presents a summary of recommended repairs and those manholes recommended for inspection. A summary of the estimated repair cost is presented in Table III-2.



Table III-1  
Lateral Rehabilitation Summary

Recommended Service Lateral Rehabilitation	Occurrences	Estimated Cost
Notify Resident of Faulty Plumbing	82	\$ 0
Replace Missing Cleanout Cap	256	\$ 12,800
Repair Broken Cleanout	73	\$ 18,550
Realign and Grout Manhole Casting/Frame	1	\$ 650
Disconnect Abandoned Service Line	34	\$ 15,300
Disconnect Area Drain	3	\$ 1,950
CCTV Service Lateral to Determine Condition	211	\$ 52,750
Point Repair on Service Lateral	30	\$ 14,400
Total Estimated Cost		\$ 116,400

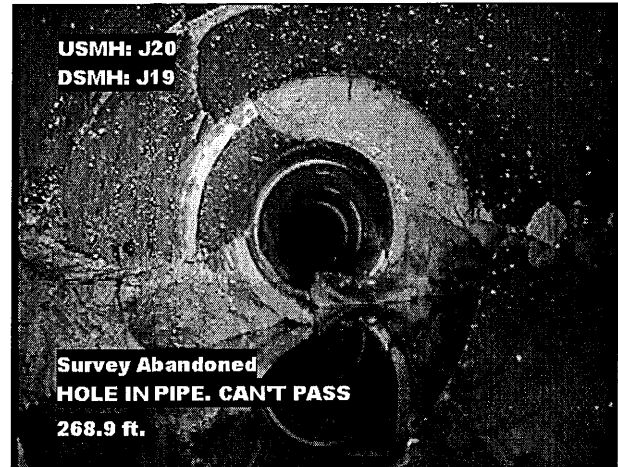
Table III-2  
Manhole Rehabilitation Summary

Recommended Manhole Rehabilitation	Occurrences	Estimated Cost
Inspect Manhole to Determine Condition/Source of Smoke	36	\$ 4,500
Realign and Grout Manhole Casting/Frame	214	\$ 143,600
Total Estimated Cost		\$ 148,100



## B. CCTV Inspection Results

A listing of recommended mainline sewer repairs is presented in Appendix C. Internal color television inspection was undertaken on specific lines to visually establish the pipeline condition. Any structural problems or defects were digitally recorded along with a detailed log. The electronic logs and video accompany this report. Internal inspection of specific sewer lines determined the best repair options, which in turn, will reduce overall project costs. Appendix C summarizes the mainline sewer recommendations. Supporting CCTV logs for those lines internally cleaned and inspected are included on the hard drive.



Portion of pipe missing  
Segment J20-J19

Total cost for repairs to municipal pipelines is summarized in Table III-3. Priority 1 recommendations are repairs that should be performed as soon as practical. Priority 2 recommendations are repairs that need to be addressed, but may be scheduled as budget allows.

Table III-3  
Mainline Rehabilitation Summary

Priority 1 – Mainline Rehabilitation	\$ 2,060,856
Priority 2 – Mainline Rehabilitation	\$ 2,029,460
Total	\$ 4,090,316

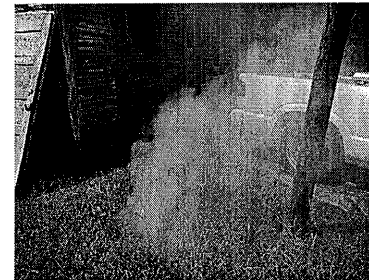


### C. Digital Photographs

Digital photographs were taken during the project. Figure III-1 presents the nomenclature used when naming the digital files. Information that can be gathered from the photographs includes right of way condition, surface cover, manhole grade, etc.

Figure III-1  
Photograph Nomenclature

Smoke Photo = Manhole ID, S, Photo No.  
Example: B11AS0012.jpg  
Manhole: B11A  
S=Smoke Photo  
Photo No. 0012



### D. Rehabilitation Plan

The project staff have evaluated and provided preliminary recommendations concerning defects identified during field inspection and testing. A recommended repair plan for the identified deficiencies has been developed based on a priority ranking. The rehabilitation plan considered conventional rehabilitation methods including, but not limited to, the following:

#### 1. Service Line Rehabilitation

These defects are generally the responsibility of the property owner to repair. To facilitate these repairs the field location sketches and digital photographs are provided electronically. The street address and GPS coordinates for the defects are included in the summary tables. Note that the address listed may be an adjacent house if no house number could be determined in the field. Refer to the scanned defect sketches, GPS coordinates and digital photographs to relocate defects.

#### 2. Point Repairs

Point repairs will be used to correct defects on the mainline or private service lines. When associated with pipe lining, a major defect must be repaired in order to install the liner. The cost basis for the point repair is a price per each and will vary depending on pipe size, depth and cover. Some mainline point repairs can utilize sectional liners if open cut is not practical. The final rehabilitation plans and specifications should review possible utility conflicts associated with open cuts.



3. Manhole Rehabilitation

Manhole rehabilitation recommendations include minor repairs or inspection of the manhole to determine condition. Minor repairs include realigning or replacing the casting and installation of inflow inserts. Manholes that exhibited smoke coming from the manhole structure itself should be inspected to determine if the source of the smoke, i.e. defective pipe seals, manhole wall, defective joints, etc.

4. Municipal Mainline Rehabilitation

Mainline rehabilitation may involve the use of multiple repair methods on a single line segment. The recommendations in this report are preliminary and may change in the final design due to utility conflicts, quantities of work to be performed and current construction costs. Supporting information for implementing repairs include CCTV logs, smoke sketches, digital photographs and digital video. Final plans and specifications should take into consideration adjacent line segments or contiguous sections of mainline sewer rehabilitation and current maintenance issues based on City records.

E. Recommendations

Based on the testing and evaluation of portions of the Hope wastewater collection system the following summarizes the findings and recommendations:

1. Perform manhole rehabilitation and inspection as presented at an estimated cost of \$148,100.
2. Private sector defects contribute to excessive infiltration/inflow. The City should implement a lateral repair program to address those defects. The estimated cost associated with lateral sewer is \$116,400.
3. Mainline repairs identified during this project are estimated to cost \$4,090,316. A review of future capacity needs is recommended prior to initiating mainline repairs. The City may wish to defer specific mainline repairs on those pipelines scheduled for replacement or upsizing based on hydraulic modeling results or master planning efforts. Development of rehabilitation plans and specifications should also consider current chronic maintenance history and incorporate any additional CCTV inspections performed by City crews.
4. It is recommended that the City of Hope continue its program of system renewal and proceed with recommendations as outlined in this report. The total estimated cost for the recommendations presented is \$4,354,816. Table I-1 presents a summary of recommended rehabilitation.