865.328.3138
www.LJA.com
265 Brookview Centre Way, Suite 504, Knoxville, Tennessee 37919

February 2, 2024 **TASK ORDER_RV**

Mr. Chad Austin
City of Kingsport
1113 Konnarock Road
Kingsport, Tennessee 37664

RE: Engineering Services as Related to the
Sanitary Sewer Inspection & Rehabilitation Project
City of Kingsport, Tennessee
LJA Task Order 20240129

Dear Mr. Austin,

LJA Engineering, Inc. ("LJA") is pleased to provide this Task Order for engineering services associated with the Sanitary Sewer Inspection & Rehabilitation Project for the City of Kingsport ("Client"). This task order is made pursuant to the terms and conditions of the Professional Services Agreement ("PSA") entered into on November 28, 2022, by and between LJA Engineering, Inc. and the City of Kingsport .

Background

The Client is actively working through inflow/infiltration (I/I) correction measures within the sanitary sewer collection system. The Client previously retained LJA to assist with a temporary flow monitoring project within portions of the collection system to identify priority areas in which inspection and rehabilitation efforts should be focused.

The results of the study were presented to the Client and various approaches were discussed. LJA prepared several options to address I/I based on budget and timing. The results indicated that sanitary sewer evaluation survey (SSES) activities should be focused within specified areas of the system. The summary memo outlined the activities that should be completed during wet weather periods or where "wintertime" seasonal patterns are prevalent such that the observance of defects with extraneous flows could be identified. Following the identification of these defects, it was recommended that a rehabilitation project be formulated to address the required repairs. The Client requested the priority work be conducted within Basin 5438_12 which is approximately 100 manholes and 25,000 linear feet. (See Exhibit A)

Approach

It is expected that manhole inspections will begin immediately upon approval of this Task Order and be completed by the end of April 2024. The manhole wet weather inspections will be performed utilizing NASSCO defect criteria such that all defects can be relatively ranked and prioritized. The inspections will provide a condition assessment for each manhole and identify defects to be prioritized. It is critical that these inspections be performed during wetter periods to identify those contributing Rain-dependent inflow & infiltration (RDII) into the system since manhole/line connections are a typical inflow and infiltration (I/I) source. During the manhole inspection process, system connectivity and map verification is also performed which is critical for the next phases of work. Survey grade GPS coordinates will be taken at each manhole during the process of identifying system connectivity. It is imperative to have a corrected map prior to

beginning any rehabilitation projects in order to minimize change orders and provide the most efficient repairs.

Smoke testing efforts will be completed during the summer of 2024, approximately between the months of May through June when groundwater levels are at the lowest. This will identify inflow type defects which contribute to the significant peaks observed with intense rainfall events. These type defects also significantly contribute to SSO events due to the quick response during intense storms.

CCTV inspections are necessary to identify defects within mainlines and provide a means to formulate a rehabilitation design. Once completed, the CCTV inspection results are analyzed (coupled with the smoke testing and wet weather manhole inspection results) to finalize the priority ranking of work to be performed during rehabilitation.

Upon completion of all field work, LJA staff will compile the findings into a summary spreadsheet to provide a general indication of defects observed. LJA staff would integrate the associated reports from the SSES activities into the Client's current GIS and provide an updated GIS map layer. LJA would work with the Client's GIS staff to incorporate the updated layers into the Client's current GIS system.

The associated Scope of Services outline the tasks to be performed to meet the approach discussed in the above narrative.

Scope of Services

1.0 SSES Activities, Field Services Management, & GIS Integration

SSES field activities performed during this Task include the following with approximate quantities based on Client's current GIS:

- Manhole inspections (approximately 100) – Manhole inspections will be conducted during wet weather periods (~ February through April) to identify I/I sources. Data collected during manhole inspections will include the material of each manhole component (cover, frame, chimney, cone, wall, bench and invert) and will be based on NASSCO coding. The condition of each component will be assessed, defects identified, and pertinent photos will be taken. Additionally, connectivity will be verified with the GIS on each incoming and outgoing pipe segment such that map corrections can be made. A PDF report summarizing the information collected will be provided including photos. A sample is included in Exhibit B.
- GPS Surveying of Manholes (approximately 100) – A GPS survey of each manhole will be performed to obtain x, y, and z coordinates. Each point will be gathered with survey grade accuracy using a Trimble GPS data collector. Manhole GPS work will be performed during the wintertime period (between February through April) when the tree canopy is at a minimum. Any manholes where survey grade accuracy cannot be obtained will be collected with mapping grade accuracy (+/- 3 feet). At the time a model is formulated utilizing the GPS data, other survey means will be utilized as part of that effort to obtain survey grade data for any locations required. LJA staff will coordinate with the Client to integrate the GPS data and revised sanitary sewer layer into the Client's existing GIS mapping system.
- Smoke testing (approximately 25,000 LF) – Smoke testing will be conducted to identify cross connection defects and severe inflow sources. These activities will be conducted during drier periods of the year (~ May through June) when ground conditions are dry allowing the smoke to permeate through the soil and into the air. Strategic smoke testing points will be identified throughout the project area to accommodate approximately 600-800 foot stretches of sewer mainline. While

smoke is being pushed through the mainlines by a smoke blower, GPS points will be taken of each observed defect where smoke is exiting the ground. A photo will be taken of each defect and logged with the associated data collected. A summary report of each segment will be provided detailing the type of leak observed and an aerial map of the marked location. A sample is provided in Exhibit B.

In order to facilitate the field work listed above, LJA staff will perform the following:

- Provide oversight and direct management of subcontractors working on the project performing the above activities including scheduling, coordinating with the Client, coordinating during specific weather periods.
- Track progress throughout the project and provide updates to the Client as requested, including evaluating production logs and "cannot locate" lists for manholes. LJA staff will coordinate with subcontractor and the Client to get necessary access/manholes raised to facilitate work.
- A professional licensed surveyor (PLS) will validate any GPS shots taken to verify accuracy and ensure the points are imported into ESRI platform to be used in the Client's current GIS layer.
- Track progress during the smoke testing phase and provide updates to the Client as requested. Any significant findings will be submitted to the Client as they are identified.
- Perform various site visits during field activities.
- Conduct interim meetings/progress meetings with the Client during work to provide updates and discuss project progress and details.

Throughout the course of each field activity, LJA staff will receive preliminary data cuts of the database deliverable to ensure data is being collected properly, perform QA/QC checks, and verify accuracy. As each type of field work is completed, LJA staff will receive a final database submittal and perform a final review of the information collected. Upon receipt and final review of each dataset, LJA staff will integrate the data collected within the Client's currrent GIS layer. Using any GPS data collected, LJA staff will initially create the geometric network within the GIS to provide connectivity from manhole to manhole throughout the project area and enable the ability to perform tracing functions within ESRI. The manhole reports and individual data will be linked to each associated manhole within the manhole shape file. The smoke testing reports and individual data will be linked to each associated mainline segment within the sewer line shape file. LJA staff will compile the digital information and create point and linear defect events in personal geodatabases that will contain all the data to be served and queried within the GIS. Specific information about the defect such as type, location and severity score will be available in tabular format via the "Identify Tool" of ArcGIS. LJA staff will provide the Client with a final layer set to be imported into current GIS system. The final layer will contain links to each manhole and smoke testing report submitted.

Upon finalization of the GIS integration, LJA staff will compile the findings and create a list of priority mainline segments to be CCTV inspected. A map book will be created in PDF format, with index pages and map numbering, to be provided to the CCTV subcontractor to complete inspection work. An associated listing of each segment will also be exported from the GIS layer to create an Excel spreadsheet which will also be provided to the subcontractor to be used during the project to facilitate work.

2.0 CCTV Surveys, Field Services Management, & GIS Integration

It is anticipated that approximately 25,000 linear feet will be inspected. Preconditioning (cleaning) will only be conducted when needed. It is not expected that each pipe will need to be cleaned prior to inspections. A budgeted quantity of 60% of the inspected footage will be used for segments to be cleaned. However, this footage is a budgetary number and the segments that need to be cleaned in order to complete the work will be cleaned.

Of the pipe segments on the priority CCTV inspection list, only those mainlines requiring cleaning will be cleaned. It is expected that up to 60% (~15,000 LF) of the mainlines inspected may require preconditioning prior to inspection and 20% (~5,000 LF) of the mainlines may require heavy cleaning. However, should the pipes have a significant amount of debris, the totals could be higher. The projected footage to be cleaned and associated fees are only estimates. Should more cleaning be required than anticipated, fees will need to be increased appropriately or an associated reduction in scope for the inspection will be necessary. Although the service lateral connections within the mainline will be visible during the mainline inspections, the inspection of each individual service lateral via a lateral launch will not be included as part of the scope of this project. It will be required to inspect each lateral included in the rehabilitation project at the time of construction to verify final rehabilitation once that data becomes available.

CCTV mainline inspections will be performed utilizing NASSCO standards. The camera will stop and pan each defect and tap to record pertinent information. Pre-conditioning of the pipe will be performed as needed to obtain an unobstructed view of the pipe. Heavy cleaning may be required to remove roots, heavy debris/silt, or remove protruding taps. It is estimated/budgeted that approximately 20% of the pipelines will require heavy cleaning. This is only an estimate. Should the actual footage requiring heavy cleaning be higher than the estimated amount, additional monies would be required to complete the work or work would need to be eliminated accordingly. A log will be provided that indicates the footage inspected, the footage preconditioned, and the footage heavy cleaned. A PDF report will be created from the inspection summarizing each item observed along with pictures.

In order to facilitate the CCTV inspections listed above, LJA staff will perform the following:

- Provide oversight and direct management of subcontractors working on the project performing the above activities including scheduling, coordinating with Client, coordinating during specific weather periods
- Track progress throughout the project and provide updates to Client as requested, including evaluating production logs and manholes that have been located and marked for Client to raise.
- Perform various site visits during field activities.
- Conduct interim meetings/progress meetings with Client during work to provide updates and discuss project progress and details as needed.

Throughout the course work, LJA staff will receive preliminary data cuts of the database deliverable to ensure data is being collected properly, perform QA/QC checks, and verify accuracy. As field work is completed, LJA staff will receive a preliminary database submittal and perform a review of the information collected. Upon receipt and final review of each dataset, LJA staff will integrate the data collected within the GIS layer. LJA staff will compile the digital information and create point and linear defect events in personal geodatabases that will contain all the data to be served and queried within the GIS. Specific information about the defect such as type, location and severity score will be available in tabular format via the “Identify Tool” of ArcGIS. LJA staff will provide Client with a final layer set to be imported into Client’s current GIS system. The final layer will contain links to the associated inspection report.

3.0 Engineering Summary of Findings

Upon finalization of the GIS integration, LJA staff will perform a general prioritization for each sewer mainline segment, taking into account each SSES activity completed. This summary of information will be shown in ESRI ArcGIS via symbology based on severity of defects or I/I observed. LJA staff will provide a summary spreadsheet with defects prioritized based on the NASSCO scoring system. LJA staff will present the findings to Client staff and discuss the criteria used during the evaluation. LJA staff and Client staff will jointly review the results and findings and discuss steps to perform the next phase of work (rehabilitation).

LJA staff will provide a summary GIS dataset that can be incorporated into Client's existing GIS network. LJA will coordinate with Client's GIS department to facilitate the delivery.

Client's Responsibilities

Client shall be responsible for the following items:

- Provide assistance and coordinate with property owners as needed for property access.
- Assist LJA staff by locating manholes not easily identified both above and below grade.
- Provide access to buried manholes that are below grade (raising manholes to facilitate entry).
- Provide water at no charge during cleaning and CCTV inspections. Contractors will provide an accounting of water used for water loss purposes.
- Provide access at the WWTP to offload debris from the Vac-truck during cleaning and inspections.
- Allow CCTV inspections to be performed during Monday through Saturday if needed to ensure deadlines are met.

Compensation

We propose to provide the specific services described above to be billed as follows:

Task 1.0 SSES Activities, Field Services Management, & GIS Integration

Item No.	Description	Units	Unit Cost	Total
1a.	Manhole Inspections	100	$165	$16,500
1b.	Manhole GPS	100	$55	$5,500
1c.	Smoke Testing	25,000	$0.65	$16,250
1d.	Engineering/GIS integration Field/Management	LS	$15,250.00	$15,250
Sub-Total Task 1				**$53,500**

Task 2.0 CCTV Inspections, Field Services Management, & GIS Integration

Item No.	Description	Units	Unit Cost	Total
2a.	Mobilization	1	$4,200	$4,200
2b1.	CCTV Inspection 6-inch to 8-inch	19,100	$1.93	$36,901
2b2.	CCTV Inspection 12-inch	3,500	$2.03	$7,098
2b3.	CCTV Inspection 15-inch	2,400	$2.12	$5,098
2c1.	Preconditioning 6-inch to 8-inch	11,460	$2.07	$23,745
2c2.	Preconditioning 12-inch	2,100	$2.17	$4,563
2c3.	Preconditioning 15-inch	1,440	$2.27	$3,274
2d1.	Heavy Cleaning Adder to Preconditioning 6-inch to 8-inch	3,820	$1.40	$5,363
2d2.	Heavy Cleaning Adder to Preconditioning 12-inch	700	$1.54	$1,075
2d3.	Heavy Cleaning Adder to Preconditioning 15-inch	480	$1.75	$841
2e.	Reverse Setup	15	$210	$3,150
2f.	Locate, Sonde, Mark MH	10	$158	$1,580
2g.	CCTV Reports and Data Delivery	LS	$6,000	$6,000
2h.	Engineering/GIS CCTV & Management	LS	$18,750.00	$18,750
Sub-Total Task 2				**$121,638**

Task 3.0 Engineering Summary of Findings

Item No.	Description	Units	Unit Cost	Total
3	Engineering Reporting	LS	$ 15,500.00	$15,500

Total Not-to-Exceed Amount	**$190,638**

Any work not authorized within three (3) months of the date of this agreement will be subject to renegotiations based on current rates.

Schedule

LJA staff would tentatively schedule to begin manhole inspections and manhole GPS work immediately upon approval. It is anticipated the manhole inspections will take approximately 4-5 weeks to complete pending weather conditions. CCTV inspections will begin within 2-3 weeks of authorization. It is anticipated that CCTV inspections will take approximately 3-4 weeks to complete the field portion of the work. It is anticipated that smoke testing would begin in the when groundwater conditions are at the lowest. Timing to complete smoke testing would tentatively be between May 2024 and June 2024. It is anticipated that smoke testing would take approximately 2 weeks to complete pending weather conditions. Upon completion of all field work, LJA staff will present the findings and discuss the recommendations for the rehabilitation project and design parameters. LJA staff will then coordinate with the Client to determine the tentative schedule for advertisement and bidding of the project.

Reimbursables and additional services

Included in the above fees are reimbursable expenses incurred on the project's behalf, including: mileage, printing, plotting, photocopies, reproduction, express mail, and/or courier services. Any regulatory agency review fees associated with plan reviews shall be the responsibility of the Client. Reimbursable expenses will be billed at cost plus ten percent (10%). LJA will bill monthly for all work performed and expenses incurred on the project's behalf. Unpaid invoices after thirty (30) days will accrue service charges at 1-1/2% per month and include any costs of collections and reasonable attorney's fees.

Authorization

If this proposal meets with your approval, your signature below and on the attached Professional Services Agreement will be sufficient authorization for LJA to commence the stated work as indicated in the above Scope of Services.

We appreciate the opportunity to submit this proposal and look forward to working with you on this project. If you have any questions, please contact me at 931.273.8999.

Sincerely,

Travis E. Wilson, PE
Vice President

TEW

Attachments:
Exhibit A – Basin Maps
Exhibit B – Sample Field Reports

Accepted By:
City of Kingsport

By:_____

Name:_____

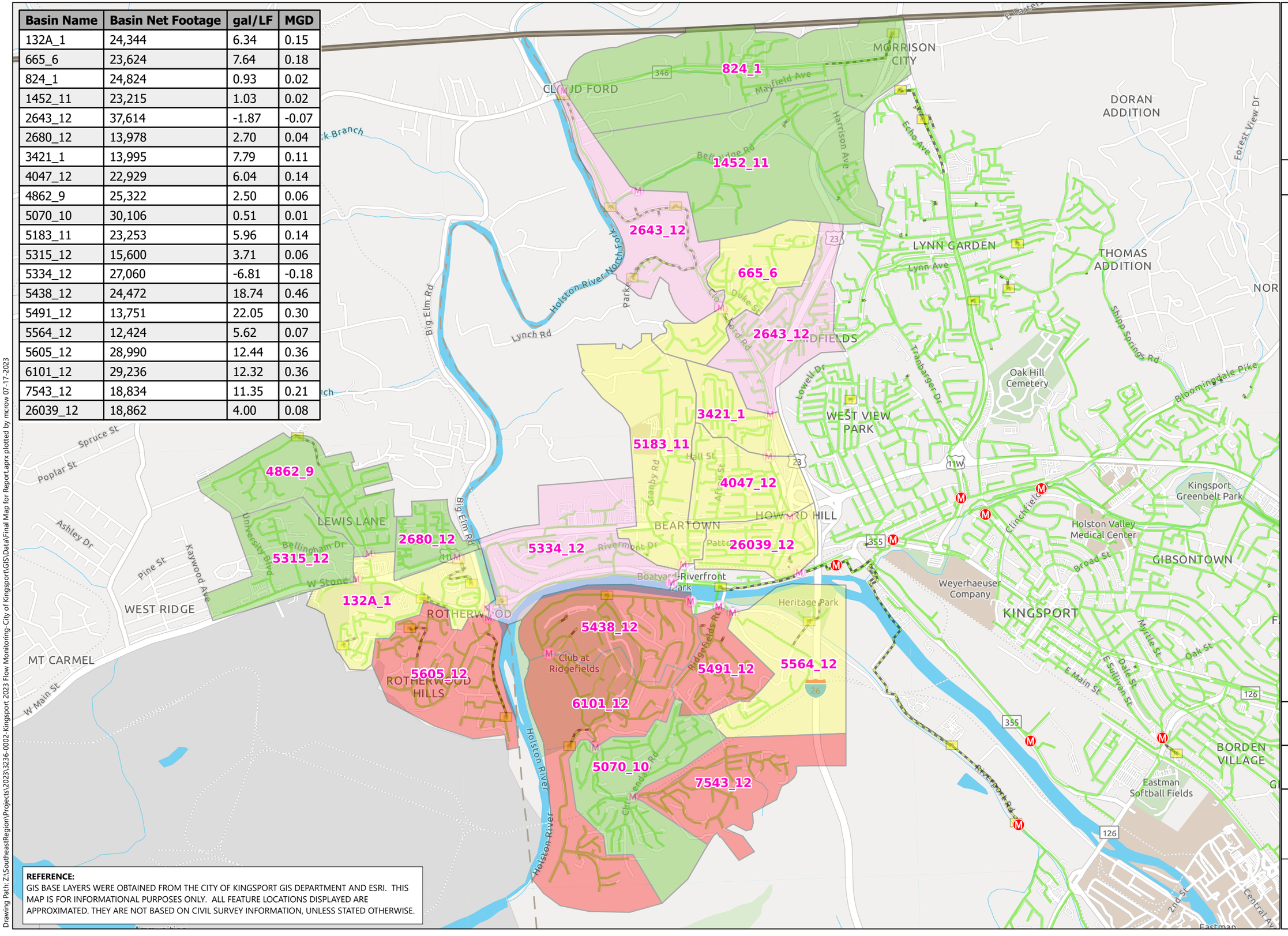
Title:_____

Date:_____

EXHIBITS

EXHIBIT A
Basin Maps

Basin Name	Basin Net Footage	gal/LF	MGD
132A_1	24,344	6.34	0.15
665_6	23,624	7.64	0.18
824_1	24,824	0.93	0.02
1452_11	23,215	1.03	0.02
2643_12	37,614	-1.87	-0.07
2680_12	13,978	2.70	0.04
3421_1	13,995	7.79	0.11
4047_12	22,929	6.04	0.14
4862_9	25,322	2.50	0.06
5070_10	30,106	0.51	0.01
5183_11	23,253	5.96	0.14
5315_12	15,600	3.71	0.06
5334_12	27,060	-6.81	-0.18
5438_12	24,472	18.74	0.46
5491_12	13,751	22.05	0.30
5564_12	12,424	5.62	0.07
5605_12	28,990	12.44	0.36
6101_12	29,236	12.32	0.36
7543_12	18,834	11.35	0.21
26039_12	18,862	4.00	0.08



REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE CITY OF KINGSPORT GIS DEPARTMENT AND ESRI. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

City of Kingsport

Flow Monitoring Location Map

Legend

- Pump and Lift Stations
- Sewer Force Mains
- Sewer Gravity Mains
- Existing Flow Meters
- Temporary Flow Meters
- Minimal RDII
- Significant RDII
- Severe RDII
- Inconclusive due to Balancing

1 inch = 2,500 feet

0 1,250 2,500 Feet

DATE:
7/17/2023

LJA PROJECT NO.
3236-0002

KINGSPORT TENNESSEE

LJA ENGINEERING
LJA Engineering | 265 Brookview Centre Way
Suite 504 Knoxville, TN 37919 | www.lja.com

EXHIBIT B
Sample Field Reports

Manhole Inspection Report

Date: 01/26/2022

Manhole ID: 906
Crew: UT
Street Address: TN-72
General Location: Center 75 PS Easement

Inspection Type:	Internal	**Cover Type:**	Bolt Down	**Ponding Type:**	None
Structure Type:	Standard	**Cover Fit:**	Bolts Missing	**Ponding Depth:**	0
Location:	Grass	**# Holes in Cover:**	4	**Grade +/-:**	2.4 ft
Surface Type:	Dirt/Grass	**Riser Present?:**	0	**Inflow Dish?:**	No
Weather:	Dry	**Riser Height:**	0	**Frame Offset:**	0 in

Chimney Material:	None	**Wall Material:**	Pre-Cast	**Bench Type:**	Poured
Chimney Height:	0	**Wall Lining Type:**	None	**Trough Type:**	Poured
Cone Material:	Pre-Cast	**Wall Length:**	0	**Step Type:**	Plastic
Cone Shape:	Eccentric	**Wall Width/Dia:**	48 in		

Manhole Depth: 9.2 ft **Evidence of Surcharge?:** No **Surcharge Depth:** 0

Comments: Lower wall joint weeping at time of inspection. Known to gush after rain event.

Area Photo

Internal Photo

Manhole Defect Information

Components with Defects: Wall

	I/I Code Type	Broken	Lining Failure	Deposits	Roots	Fracture	Crack	Hole	Surface Damage	Brickwork	Joint
Cover:											
Frame:											
Frame Seal:											
Chimney:											
Cone:											
Wall:	Weeper										
Bench:											
Trough:											

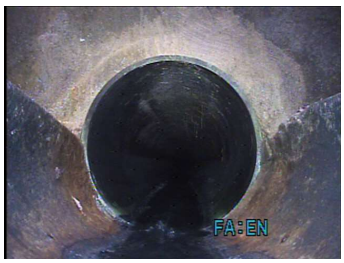
Manhole Defect Photos:

LJA ENGINEERING

Manhole Inspection Report - Pipes

Pipe #: 1
Upstream MH: 906
Downstream MH: 905
Clock Position: 6
Shape of Pipe: Round
Diameter/Height: 15 in

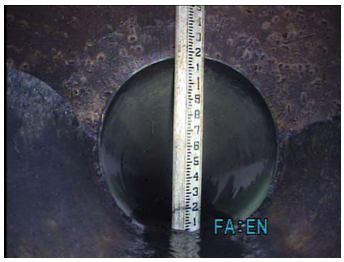
Material: PVC
Rim to Invert: 9.2 ft
Flow Depth: 2 in

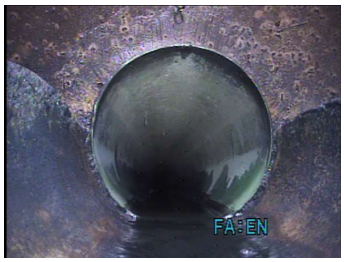


Comments: None

Pipe #: 2
Upstream MH: 907
Downstream MH: 906
Clock Position: 11
Shape of Pipe: Round
Diameter/Height: 15 in

Material: PVC
Rim to Invert: 9.1 ft
Flow Depth: 2 in





Comments: None

Smoke Test Inspection Report

Observation :	27-5
Collected By:	Utility Technologies
Date Inspected:	12/2/2021
Address:	1150 Carding Machine Rd
Location:	Front Yard
Upstream Manhole:	154
Downstream Manhole:	148
Area:	Private
Smoke Source:	SVC CO Needs Cap/Collar
Smoke Intensity:	Heavy
I & I Rating:	Mild
Notes:	Smoke from open cleanout

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