

## **Closed Circuit Television Video (CCTV) and Sonar Inspection of Sanitary Trunk Lines**

**Purpose:** The City of Littleton is requesting proposals from qualified, interested contracting firms to provide professional services for the Sanitary Sewer CCTV and Condition Assessment for approximately 39,258 linear feet or 7.4 miles of sanitary sewer pipes ranging in diameter from 15" to 24" and associated manholes (approximately 182) within the City limits.

**Term of Contract:** Work under this contract is due to be completed within 90 days after the date of the Notice to Proceed.

**Type of Contract:** This is a professional services contract.

**Response to Questions:** Brent Soderlin, Deputy Director of Public Works and Utilities, 303-795-3806, bsoderlin@littletongov.org

**Background:** The City of Littleton (City) has over 128 miles of sanitary sewer mains, trunklines and interceptor, ranging in size from 6" diameter to 66" diameter and over 3200 sanitary manholes. Video inspection of the entire system was completed in 2018. To effectively maintain this infrastructure and respond to emergency sewer issues, the City is requesting proposals from qualified contractors (Contractor) to provide sewer inspection of the trunklines that are 15" to 24" in diameter. This project will be to perform a multi-sensor inspection of the City's trunk lines via Closed Circuit Television (CCTV) and Sonar. We are also requesting that the Contractor evaluate the associated manholes on these lines.

## Scope of Services

### **Sanitary Sewer Trunk Lines CCTV, Condition Assessment and Recommendations:**

#### **CCTV Inspection**

Operation of the television inspection equipment shall be controlled from above ground, with a skilled technician at the control panel in the television inspection van controlling the movement of the television camera. The technician shall have the capability to: adjust the brilliance of the built-in lighting system; change the focus of the television camera by remote control; control the pan, tilt, and zoom features of the camera; control the forward and reverse motion of the camera; and determine the camera's position, at any time.

Contractor shall make a video recording of the television inspection and supply one copy to the City. The video recordings shall be in color and give clear video/pictures of conditions of pipelines with hydraulic and structural problems. The recording(s) deemed unacceptable by the City shall be reproduced at no cost to the City.

All data and video recording will become the sole property of the City without restrictions of future use, duplication, modification, and dissemination. Contractor shall have no vested rights to the completed work and may not sell or reuse it without the City's permission. The project data furnished to the Contractor for use in rendering project services shall remain the property of the City and shall be returned on termination of the agreement. Contractor may not distribute, sell or otherwise use data without permission of the City.

Contractor shall create pipeline inspection reports correlated to the videos, containing the measurement of faults and other features inside the pipeline. This includes measurements of pipe size, number and location of laterals, water levels and other features, as well as automatic analysis of pipe ovality and pipe available capacity up to 30 times per second.

The camera shall be moved through the line in either direction at a uniform rate stopping when necessary to ensure proper documentation of the sewer's condition but in no case shall the television camera speed be greater than 30 feet per minute (0.5 ft per second) for all inspections in compliance with NASSCO guidelines. Manual winches, power winches, TV cable, and power rewinds or other devices shall not obstruct the camera view or interfere with proper documentation of the sewer conditions to move the camera through the sewer line. The speed of scanning sonar will be limited to four (4) inches per second.

As the camera approaches a lateral connection or substantial structural defect, the camera progress shall be halted, and the camera lens panned to further view the lateral pipe and connection (including looking up the lateral) or defect to thoroughly evaluate its condition.

If during the inspection operation the television camera will not pass through the entire pipe section, Contractor shall reset their equipment in a manner so that the inspection can be performed from the opposite manhole. If again, the camera fails to pass through the entire section, Contractor shall notify the City's project manager immediately.

If during the television inspection Contractor encounters a condition where public safety is threatened (such as, but not limited to, a pipe hole, pipe collapse, stoppage, blockage and/or eminent sewer spill) City Utility Supervisor shall be notified immediately. Furthermore, Contractor shall provide a videotape copy of the section of line containing the condition within 24 hours to City's project manager.

If during the television Inspection, the camera is jammed inside the sewer and cannot be retrieved, the Contractor shall not excavate the pipe to retrieve it. Contractor shall inform the City immediately for assistance, but it is Contractor's responsibility to remove the camera and ensure that the sewer is not damaged.

Whenever non-remote powered and controlled winches are used to pull the television camera through the line, telephone, radios or other suitable means of communication shall be set up between the two manholes of the section being inspected to ensure that adequate communications exist between members of the crew.

### **Operators**

All closed-circuit television (CCTV) operators shall be certified by the National Association of Sewer Service Companies (NASSCO) by passing the Pipeline Assessment and Certification Program (PACP). The methodology of evaluation, data collection, and reporting criteria used for the NASSCO certification shall be practiced for all CCTV inspections. No work under this Contract shall be performed by non-NASSCO certified operators. Contractor shall include copies of its CCTV operators' NASSCO certifications in the proposal package.

## **Pre-Inspection Cleaning**

All sewer pipelines to be inspected shall be sufficiently cleaned by the Contractor within 72 hours prior to CCTV inspection to provide clear examination of the pipe's interior and to provide sufficient opening for the camera to pass through the pipe. The Contractor shall be careful not to damage any pipes, including existing plastic lining. Pre-Inspection Cleaning shall be defined as Light Sewer Cleaning per NAASCO standards. The Contractor shall clean the sewer and associated manholes, including drop connections and benches, to remove all settled deposits, so that the sewer is ready for televising. This will require an unlimited amount of passes of a hydraulic flusher to remove all loose debris and collect it for removal in the downstream manhole. All debris must be removed from the sewer, including any debris that may be washed up into any service connection (does not include known pre-existing conditions in service connections), drop connections or the bench wall of the manholes. This item does not include root cutting, deposit removal, or grinding of protruding service connections. Light cleaning shall remove settled deposits at the following percentage:

Pipe from 15 inches to 24 inches in diameter (15%).

The Contractor shall intercept and remove the flushed debris at the next downstream manhole using a weir or screening device. The Contractor will be responsible for providing their own water supply and dump site for the debris removed from the sanitary sewers. Contractor shall provide traffic control required to safely perform the work.

If after Light Sewer Cleaning, additional cleaning is required to perform CCTV/Sonar inspections, the Contractor shall notify the Project Manager and get permission to perform Heavy Sewer Cleaning as defined by NAASCO Standards. Heavy Sewer cleaning is defined as the removal of obstructions and settled deposits that exceed percentages established for light cleaning. This also includes Deposits Attached Grease (DAGS) if able to remove with rotating nozzle or other mechanical means; not to include saws or cutters. Compliance with this section requires substantial effort towards cleaning.

For heavy cleaning the Contractor shall remove all obstructions in the sewer. All debris must be removed from the sewer, including any debris that may have been washed up into any service connections (does not include known pre-existing conditions in service connections), drop connections or the bench wall of the manholes. This includes all grease, rocks, debris, sticks, etc. that will reduce the hydraulic capacity of the sewer and limit future maintenance access of remote equipment. This work will include an unlimited number of passes by high velocity hydro-cleaning equipment. A mechanical/hydraulic Spinner Nozzle may be used where necessary at no additional cost to the District; however, the Contractor shall be

responsible for any damage to the sewer or any service connections. This item does not include cutting/grinding protruding break-in connections.

The contractor shall maintain detailed documentation of cleaning efforts made to remove these items. Such documentation shall be made available to the Owner at any time.

The Contractor shall immediately notify the Project Manager if he believes that this level of cleaning will cause a sewer collapse due to the existing deterioration of the host pipe. The Owner's determination whether to continue or stop work is final.

Cleaning methods shall be employed to sufficiently clean the pipe so the camera can pass and fully ascertain and document the structural integrity and operational condition of the pipe. Any costs associated with CCTV/Sonar work that is necessitated by the Contractor's failure to sufficiently clean the main line shall be borne by the Contractor.

All sludge, dirt, sand, rocks, grease, roots, and other solid or semisolid material resulting from the cleaning operations shall be removed and hauled away from the downstream manhole of the section being cleaned. Passing material from sewer section to sewer section shall not be permitted. The Contractor shall be responsible for removing all solid and semisolid materials from the cleaning operation from the work site no less often than at the end of each workday. Materials, which accumulate during the workday, shall be placed in totally enclosed and watertight containers. Handling, transport, and disposal of materials shall be in full compliance with all applicable Federal, State, and local requirements, and is the sole responsibility of the Contractor.

The Contractor shall verify the manhole locations and information provided by the City's Project Manager in "Exhibit B, CCTV Maps" prior to the CCTV inspections. The Contractor shall notify Project Manager of any discrepancies within 24 hours of discovering discrepancies.

### **Equipment**

1. **CCTV EQUIPMENT:** The Contractor shall be capable of television inspection through a single port of access to the pipe line by means of a "tractor-camera", or "push-pull" type video cable. The television equipment utilized by the Contractor for inspection shall be specifically designed and constructed for such inspections. Lighting for the camera shall be suitable to allow a clear and properly contrasted picture of the entire periphery of the pipes to be inspected. The camera shall be operative in 100% humidity conditions. The camera, television monitor, and other components of the video system shall be capable of producing a clear, high quality unobstructed picture for the entire length of

the reach, from manhole to manhole including the connections on either end, to the satisfaction of the City Project Manager.

CCTV camera equipment must provide color, digital recording with high resolution video and still images with resolution of not less than 650 lines. The camera shall have pan and tilt capabilities and minimum 65-degree view angle with either automatic or remote focus and iris controls. The camera shall have a focal distance adjustable from 6 inches to infinity. The camera shall be mounted on an appropriate transport system, sized for each pipe diameter. The camera must be centered in the pipeline.

2. **SONAR EQUIPMENT:** The maximum beam width of the sonar energy pulse will be no greater than 2 degrees from the center of the transducer. The transducer will be of the continuous scanning type. The sonar image will be in full color at all times during the inspection.

### **Software Requirements**

The Contractor shall perform all CCTV inspections using the Granite Net version 7.0 software, by Cues, in the PACP module. It is intended that the Contractor shall make a continuous digital recording of the complete pipe inspection. The recording shall also be used as a permanent record of defects. Unless directed otherwise by the City, the recording shall be MPEG 4 (.mp4). The Contractor shall pause the digital recording at any time there is a delay in the inspection and restart the digital video recording in the same digital file. The pause shall in no way affect, freeze, or interrupt the reply of the video and shall not close the video file during the inspection. The Contractor shall store a single video file for each segment inspected. The recorded files shall have a resolution of 352 by 240 pixels and an interlaced frame rate of a minimum of 24 frames per second.

All pictures shall be recorded as a JPEG image. For each picture, indexing shall exist as a separate text file of the observation noted. The data shall be time coded using the elapsed time from the video file. This shall allow the user in Granite Net version 7.0 to use the indexing feature and go to that defect with a click instead of fast forwarding or rewinding. All pictures shall have the same file name as the pipeline video plus the footage where the picture is taken.

## Inspection Procedures

CCTV inspection of 15" to 24" sanitary sewer trunk lines owned by the City of Littleton. Inspections shall be in NASSCO PACP and MACP format. Pipe inspection files shall be stored in database format (.mdb), with separate inspections for each segment of pipe. The contract shall not be considered complete until the Asset Management and Utilities divisions of the Public Works department both approve the final data deliverables in a format that may be imported into the City's existing GraniteNet environment accurately and effectively. This may also include smaller sample deliverables throughout the duration of the project to ensure the data quality of the final deliverable. Please review the additional inspection process requirements below.

- Identify the location of all service lateral connections to sanitary trunk lines, sanitary sewer mains and manholes
  - Recorded view into each connection on video
  - Distance footage of connection from upstream manhole recorded
  - Note if connection appears to be active or dry, note the presence of roots, grease, offset joint or any other abnormality
- Record manhole condition both on inspection form and from video with panoramic and vertical views
- Identification of all potential combined sanitary/storm sewers
- Provide digital copies of inspection videos to the City of Littleton
- Provide digital logs of the following information upon completion of sanitary sewer inspections:
  - Date of inspection
  - Pipe material (VCP, CIPP, PVC, etc)
  - Sanitary sewer manhole numbers and use of manhole numbers to list line segments
  - Manholes that are listed on the map but not located during inspections
  - Manholes located during inspections but not on the map
  - Diameter of pipe per line segment
  - Length of line segment
  - Direction of inspection
  - The following items described with distance from upstream manhole
    - Live service laterals
    - Detached service taps
    - Protruding service taps into the main

- Cracked or broken main lines
  - Sags or low spots in mains
  - Missing gaskets or rings
  - Root intrusions from main joints
  - Root intrusions from service taps
  - Identified Inflow and Infiltration locations – taps, joints or cracks in main line
- Provide digital logs of the following information upon completion of manhole inspections:
    - Manhole identification number on provided map
    - Date of inspection
    - Ground cover (dirt, concrete, asphalt, grass, etc)
    - Cover dimension
    - Step material
    - Step condition
    - Wall material
    - Manhole condition
    - Grout condition
    - Survey manhole rim elevations and provide the size. In addition, survey the sanitary sewer invert elevation, and determine pipe size and flow directions. The horizontal and vertical control for the project is based on the High Accuracy Reference Network (HARN) and existing NGS benchmarks resulting in a 1983/1992 horizontal datum and a 1988 NAVD vertical datum.
    - Invert condition
    - GPS Coordinates

**Working Provisions:**

- Work for the trunk lines will be performed at low flow times on the trunk lines to avoid by bypass pumping, which is normally after midnight. These inspections will be scheduled with the Sewer Utility Supervisor so a representative of the City of Littleton can be with the contractor.
- Contractor will inform Deputy Director of Public Works or Utility Supervisor of weekly progress on the project
- Contractor will contact Utility Supervisor of trunk lines which need cleaning to accommodate accurate CCTV inspection



- Contractor will notify Utility Supervisor of issues which need to be addressed immediately (sewer backup, pipe collapse, etc.)

**City will provide:**

- Sanitary Sewer System Base Map
  - These maps can be provided in hard copy, PDF, AutoCAD, or GIS
- If any questions or concerns arise from the provided data (inconsistencies from map to field, new asset identification numbers, etc.), the Contractor shall meet with city staff to review and ensure data accuracy and understanding. Process and nomenclature for data integrity will be discussed and documented shortly before the Notice to Proceed.

**CITY PROJECT NUMBER 23-54**

**BIDDER'S PROPOSAL**

**EXHIBIT A**

**BID SCHEDULE**

<b>Item No.</b>	<b>Item</b>	<b>Unit</b>	<b>Estimated Quantity</b>	<b>Unit Cost</b>	<b>Extended Cost</b>
1	Scheduling, organizing, planning, etc	LS	1	\$_____	\$_____
2	Light Cleaning Trunk Line, 15" to 24"	LF	39,258	\$_____	\$_____
3	Heavy Cleaning Trunk Line, 15" to 24"	LF	4,000	\$_____	\$_____
4	CCTV/Sonar Inspection, 15" to 24'	LF	39,258	\$_____	\$_____
5	Manhole Video Inspection	EA	182	\$_____	\$_____
6	Temporary Traffic Control, Minor Streets	Day	30	\$_____	\$_____
7	Temporary Traffic Control, Collector & Arterials	Day	7	\$_____	\$_____
8	Temporary Traffic Control, State Highways	Day	7	\$_____	\$_____
9	Mobilization	LS	1	\$_____	\$_____
10	Survey Manhole Rims, and Pipe Inverts	LS	1	\$_____	\$_____

11	Force Account (Minor Contract Revisions)	LS	1	\$ 20,000.00	\$ 20,000.00
SCHEDULE 1 TOTAL:					
Bid Schedule A Total Bid (Written in Words)					

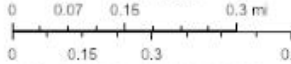
# Sanitary Sewer Trunk Lines West of Santa Fe near Bellevue



March 7, 2023

- All Sanitary Manholes
- All Sanitary Gravity...

1:14,924



Esri Community Maps Contributors, City of Littleton, County and City of Denver, County of Arapahoe, Esri, HERE, Garmin, SafeGraph



# Exhibit B

## Sanitary Sewer Trunk Lines in Slaughterhouse Gulch

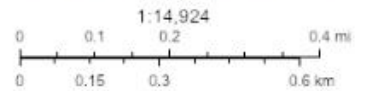


Interceptor Lines along South Platte and Santa Fe Not included in this project.

Slaughterhouse Gulch Trunk lines for CCTV/Sonar Inspections

March 7, 2023

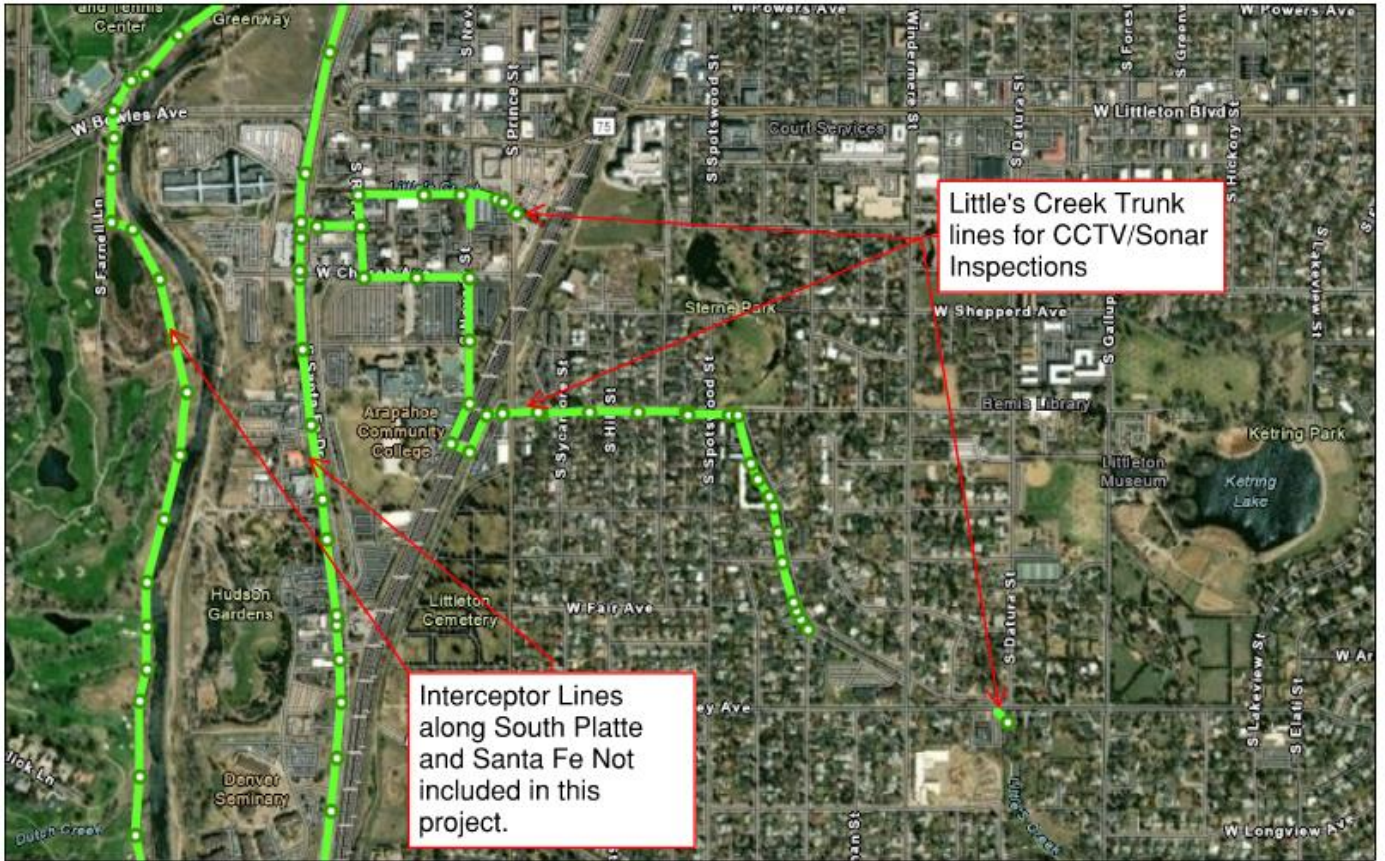
- All Sanitary Manholes
- All Sanitary Gravity...



East Community Maps Contributors: City of Littleton, County and City of Denver, County of Arapahoe, Esri, HERE, Garmin, SafeGraph

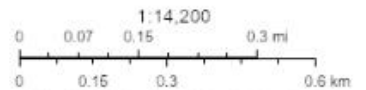


# Sanitary Sewer Trunk Lines on Little's Creek



March 7, 2023

- All Sanitary Manholes
- All Sanitary Gravity...



Esri Community Maps Contributors, City of Littleton, County of Arapahoe, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, MET/NASA, USGS.

## Sanitary Sewer Trunk Lines on Lee Gulch



March 7, 2023

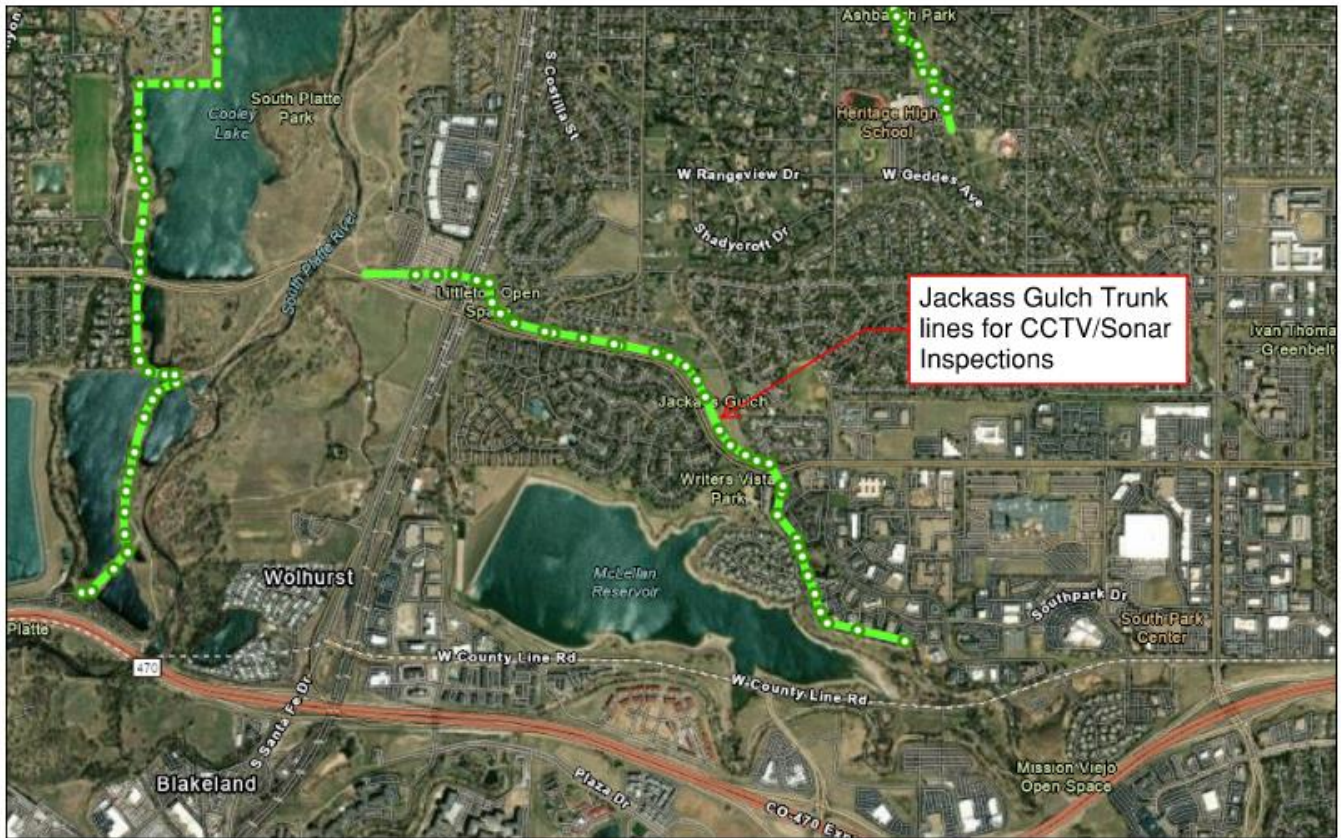
- All Sanitary Manholes
- All Sanitary Gravity...



City of Littleton, County of Arapahoe, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau



# Sanitary Trunk Lines on Jackass Gulch



March 7, 2023

- All Sanitary Manholes
- All Sanitary Gravity...

