**SECTION 0000**

**CCTV INSPECTION**

**PART 1 GENERAL**

* 1. SUMMARY
1. The intent of this work is to document the condition of existing or newly constructed sanitary, storm, and/or combined sewer facilities as may be identified by the Engineer and/or Owner. This work will be accomplished by utilizing closed circuit television (CCTV) equipment.
	1. SCOPE OF WORK
2. CCTV Inspection – The pipe sections between manholes or other structures shall be inspected by means of CCTV equipment.
3. Schedule of Work Hours – The Contractor may work during the hours of 7:00 AM to 7:00 PM Monday through Friday. If there is a need for after-hours work or weekend work, prior consent shall be obtained from the Engineer.
4. Traffic Control – The Contractor shall be solely responsible for all signage, flagging, cones, personnel and any other item or personnel required for traffic control. All costs for traffic control shall be incidental to the project, unless otherwise specified in the contract documents.
	1. RELATED SECTIONS
	2. REFERENCES
5. National Association of Sewer Service Companies (NASSCO*)* prepared*, Pipe Line Assessment and Certification Program (PACP), TV inspection form and sewer condition codes.*
	1. SUBMITTALS
6. Safety Plan –The Contractor shall provide a safety plan and identify designated safety supervisory personnel to the Engineer. The plan shall include confined space entry provisions and training, listing of personal protective equipment, and a traffic control plan (if applicable).

B CCTV Technician NASSCO PACP Certification – The Contractor shall provide certification documentation for all technicians on the project.

 **PART 2 EQUIPMENT**
2.01 CCTV EQUIPMENT

1. Type of Equipment - The CCTV cameras used for inspection shall be specifically designed and constructed for such inspection. The cameras shall be operative in one hundred percent (100%) humidity conditions and capable of withstanding exposure to concentrations of pollutants typically found in municipal sewage.
2. Camera View - The view seen by the camera shall be transmitted to a monitor of greater than or equal to (≥) fifteen inches (15”) diagonal dimension.
3. Camera Movement - Camera systems shall be able to navigate minor objects, roots, and debris. The system used to move the camera through the pipe shall not obstruct the camera’s view or interfere with proper documentation of the sewer conditions. The camera shall be capable of traversing the sewer line for a distance of at least one thousand feet (1,000’). The camera shall have sufficient clearance to allow for the assembly to pass through sewer lines of nominal diameter six inches (6”) and larger.
4. Camera Accessories - The Contractor shall provide ancillary wheels, crawlers, tracks, or other adjustment plates, skids, arms, axles, etc. as may be necessary or dictated by flow conditions, pipe diameter, etc. These accessories shall be utilized to stabilize the camera in the pipeline, provide adequate propulsion in the pipeline for the camera, and/or to raise the camera above flow to provide a quality picture during CCTV inspection.
5. Camera Features – Cameras shall record all images in color. Cameras shall have pan and tilt capabilities, and shall have a minimum of three hundred sixty degree by one hundred eighty degree (360º x 180º) rotation capability. Illumination sensitivity shall be three (3) lux or less and provide a minimum of four hundred sixty (460) lines of resolution. The focal distance shall be adjustable through a range from one inch (1”) to infinity. There shall be no geometric distortion of the image.
6. Supplemental Lighting and Lighting Adjustments - Cameras shall also be provided with ancillary or supplemental lighting packs or units to provide sufficient light and illumination in larger diameter conduits or conduits where additional lighting may be necessary (e.g. HDPE pipe). Lighting intensity shall be adjustable to minimize glare. Lighting and picture quality shall be adjustable to provide a clear picture of the entire periphery of the pipeline for all conditions encountered.
7. Measurement of Distance - The distances traveled by the camera shall be measurable to one tenth of a foot (.1’) by an onboard measuring device and shall provide video display readout of said distances in units of one tenth of a foot (.1’). The cable footage counter shall be accurate to plus or minus (+/-) one foot (1’) per one hundred feet (100’).

**PART 3 EXECUTION**

3.01 CCTV INSPECTION

1. Standards – Video inspection shall be completed per the Pipeline Assessment Certification Program (PACP®) as promulgated by the National Association of Sewer Service Companies (NASSCO).
2. Certified Technicians – Video inspection shall be completed by technician(s) who have been certified by NASSCO as PACP compliant and trained.
3. Certified Software – All video inspection and subsequent reports shall be compiled using the latest version of a PACP compliant software package as certified by NASSCO.
4. Video of Line Segments – Each line segment shall be video inspected one at a time. Each segment will have its own video file (with distinct file name) and corresponding line segment report. This shall apply to lines videoed from the upstream manhole moving to the downstream end and to lines being accessed from the downstream manhole or structure during “reverse setups”.
5. Discovery of Undocumented Structures – When intermediate and undocumented manholes are found, the Contractor shall conclude the video inspection upon reaching the undocumented structure. A video file and printed line segment report shall be generated per usual procedures for this line segment. *It should be noted that the video text overlay that was created at the start of this survey will now be incorrect. This information and display cannot be changed within the video file once a line segment report has begun. The electronic file’s name shall be changed to reflect the proper and accurate line segment information.* The report will indicate the location of the intermediate structure (by its footage upstream/downstream from the point of origin of the survey), its type and corresponding PACP code. Anew line segment report will then begin at the intermediate and previously undocumented structure (now named, labeled, and documented) and proceed to the next structure indicated on the project maps, or to the next intermediate and undocumented structure, if any.
6. Locating and Exposing Manholes and Structures – The Engineer or the Owner shall locate and expose all manholes or other structures indicated on the project maps prior to the beginning of the project.
7. Corresponding Data – Each video clip or file and each digital photograph or file shall correspond to inspection data in the database, and each set of inspection data listed in the database shall be properly linked to the appropriate video file or photo(s).
8. Video Inspection Parameters – The following information shall constitute the desired parameters for video inspection for this project:
	1. Video Format – The Contractor shall make a continuous color digital recording in Motion Picture Experts Group (MPEG) 1 format.
	2. Minimum Resolution – Video files shall have a minimum resolution of six hundred forty by four hundred eighty (640 x 480) pixels and an interlaced frame rate at a minimum of twenty-nine point nine (29.9) frames per second.
	3. Video Text Overlay – Each pipe segment video shall begin with a video text overlay (displayed for a minimum of five (5) seconds) and completed in accordance with PACP’s CCTV inspection form headers and instructions as follows:
		1. Line 1: Surveyed By
		2. Line 2: City
		3. Line 3: Street
		4. Line 4: Weather
		5. Line 5: Direction of Survey
		6. Line 6:Use of sewer
		7. Line 7: Pipe Material
		8. Line 8: Pipe Diameter/Height
		9. Line 9: Start Manhole Number
		10. Line 10: End Manhole Number
		11. Line 11: Inspection Time/Date
	4. Text Shown During Video – During the CCTV inspection, the video text overlay shall show the following text at all times:
9. Start Manhole number
10. End manhole number
	1. Evaluation of Defects and Observations – During the CCTV inspection, the camera shall stop at all defects, observations, and connections to ensure a clear view of the pipe condition and shall rotate the camera head to evaluate the defect, observation, or connection.
	2. Text Overlay of Observation – All defects and observations shall include a video text overlay of the appropriate PACP code/description.
	3. Naming of Video Files – The naming of the video file shall consist of the following: “UPSTREAM MANHOLE - DOWNSTREAM MANHOLE” as shown in the following example (plus the appropriate file extension), **or as may be pre-assigned by the Engineer or Owner (if any)**. The naming of all video files shall be consistent throughout the project:

123-124.mpg

1. Additional Inspection Procedures – Other inspection procedures shall include:
	1. Pan of Manholes – All manholes shall be panned. This video footage shall occur at the beginning of each pipe segment survey inspection from the bottom of the manhole panning up to the manhole shaft. In the instance when the manhole is the terminating manhole of a survey, then the pan shall occur at the end of the pipe segment survey.
	2. Reverse Setups – Obstructions may be encountered during the course of the CCTV inspection that prevents the travel of the camera. In instances when obstructions are not passable, the Contractor shall withdraw the equipment and begin a CCTV inspection from the opposite end of the sewer line, i.e. a reverse setup. If the video inspection is performed from this reverse setup vantage point, then a new video file shall be created and the name and corresponding header shall contain the word “REVERSE” in the upstream manhole name/label. This video file will be in numerical and chronological order immediately following the original video file. If the line only has one adjoining manhole and a reverse setup is not possible, the televising of the line shall be considered complete, the video inspection shall be abandoned, and the Contractor shall be paid for the footage successfully videoed. If it is determined that a reverse setup is necessary, said setup will be paid for under the pay item “Reverse Setup”.
	3. Excessive Depth of Flow or Sags– If, in the course of the video line inspection, pipe flow is in excess of the acceptable PACP standards, the Contractor shall perform the video inspection during times of low flow conditions. If these conditions only exist outside the stated work periods of this project, the Contractor shall seek the Engineer’s approval before working during these times.
	4. QUALITY CONTROL
2. Review by the Contractor - The video recordings, photographs, and data shall be reviewed by the Contractor for focus, lighting, clarity of view, and technical quality.
3. Blocked or Distorted Video - Videos recorded while a camera has flipped over in the process of traveling or the viewing of laterals, obstructions, or defects that are blocked by cables, skids, or other equipment will not be accepted. Shape, focus, proper lighting, and clear, distortion-free viewing during the camera operations shall be maintained. Failure to maintain these conditions will result in the rejection of the video by the Engineer.

**PART FOUR DELIVERABLES AND PAYMENTS**

* 1. MEASUREMENT
1. Distance Measurement - Measurement of the actual number of feet televised shall be made from the center of the manhole to the center of the manhole.
2. Other Payment Units - Any ancillary items shall be paid at a unit price basis as specified by the contract’s payment schedule, including:

	1. Reverse Setups – will be paid per each setup; and
	2. ACCEPTANCE
3. Defective Work – Within sixty (60) days of the final delivery of written and video reports, the Engineer will notify the Contractor of any defective work. Defective work (if any) will be corrected by the Contractor within sixty (60) days of receipt of this written notification. These corrections will be made to the satisfaction of the Owner and Engineer.
	1. DELIVERABLES
4. Video Files - As part of the final submittal on this project, the Contractor shall submit all video recordings and database information (in approved PACP format), on DVDs or external hard drives (as dictated by the size and quantity of the files submitted). If a hard drive is submitted, the submittal shall include the power cord and USB connection cable. The external hard drive shall become the property of the Owner unless otherwise indicated or specified.
5. Written Reports – As part of the final submittal on this project, the Contractor shall provide two copies of a bound written report in the approved PACP format. This report shall include a cover page with the name of the project, scope of the project, and date of submission; an index page with listing of line segment reports; a complete set of line segment reports and a page or pages of holders containing the DVDs of this project’s data (if applicable).
6. Software – The Contractor shall provide the Owner a copy of the “read only” version of its inspection software (and appropriate license(s), if any).
7. Incidental Costs – All reports, DVDs, hard drives, printing, copying, software, and other costs associated with developing and rendering these deliverables to the Engineer or Owner shall be considered incidental to the project.
	1. PAYMENTS
8. Pay Estimates - Pay estimates will be submitted on a regularly scheduled basis to the Engineer by the Contractor.
9. Approval of Quantities - The Engineer shall review the quantities submitted by the Contractor, and shall immediately inform the Contractor of its certification or disallowing of any quantities submitted for payment. If the quantities of work in question by the Engineer can’t be immediately resolved to the satisfaction of both parties, the pay estimate shall move forward without those quantities included. Said denied quantities may be resolved and submitted on the next pay estimate.

**END OF SECTION**

**RECOMMENDED PAYMENT SCHEDULE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item Number** | **Description** | **Est. Qty.** | **Unit** | **Unit****Price $** | **Total Price $** |
|  |  |  |  |  |  |
|  | **GENERAL ITEMS** |  |  |  |  |
|  | Mobilization | 1 | Lump Sum |  |  |
|  | Traffic Control | 1 | Lump Sum |  |  |
|  | **CCTV INSPECTION** |  |  |  |  |
|  | CCTV inspection 6” diameter pipe | 000 | Linear Feet |  |  |
|  | CCTV inspection 8” diameter pipe | 000 | Linear Feet |  |  |
|  | CCTV inspection 10” diameter pipe | 000 | Linear Feet |  |  |
|  | CCTV inspection 12” diameter pipe | 000 | Linear Feet |  |  |
|  | CCTV inspection 15” diameter pipe | 000 | Linear Feet |  |  |
|  | CCTV inspection 18” diameter pipe | 000 | Linear Feet |  |  |
|  | CCTV inspection 21” diameter pipe | 000 | Linear Feet |  |  |
|  | CCTV inspection 24” diameter pipe | 000 | Linear Feet |  |  |
|  | **OTHER PAY ITEMS** |  |  |  |  |
|  | Reverse Setups | 000 | Per Each |  |  |
|  | **TOTAL BID** |  |  |  | **0,000,000.00** |