

SECTION 815
SEWER LINE, MANHOLE AND WET WELL INSPECTION

815-1 SCOPE OF WORK: The Contractor shall use a closed circuit color video system (CCTV) to remotely inspect and defect code the pipe, manhole, or pump station wet well in “real time” or other methods approved by the Engineer. The television camera used for the inspection and defect coding of the sewer features shall be one specifically designed and constructed for such inspection. The camera must be capable of tolerating a hazardous and corrosive environment.

- a. After the required cleaning is completed in accordance with Section 812, the Contractor will proceed with the television inspection of pipes and defect classification will be based on the latest revision of the Pipeline Assessment and Certification Program (PACP) Condition Grading System as developed by the National Association of Sewer Service Companies (NASSCO) as amended by the Owner.
- b. Direction of the CCTV inspection shall be from upstream to downstream, unless otherwise approved by the Engineer.
- c. The Owner makes no guarantee that the sewers proposed to be inspected after the cleaning, are clear for the passage of the camera set-up. The equipment, tools and method(s) used for securing the passage of the camera are to be at the discretion of the Contractor with the approval of the Engineer.
- d. The Contractor shall comply with all requirements of local, state, and federal confined space entry laws and regulations.
- e. CCTV inspection required for pre-installation assessments and acceptance of work does not require defect coding.

815-2 SUBMITTALS:

- a. A Traffic Control Plan will be submitted to DPW. The plan shall include an outline of the permit acquisition procedure for lane closure, methods for proper signing and barricades, which complies with local requirements and the MUTCD, and site Contractor telephone numbers for emergencies.
- b. Schedules of work shall be submitted to the Engineer on a weekly basis. Any deviation from the submitted plan not caused by weather or natural causes shall be preceded by a 24-hour notice.
- c. Copies of all the technical certifications for the Characterization Technicians that will work on the project must be submitted to the Engineer prior to commencing work.
- d. Contractor shall submit a signed affidavit stating that all required OSHA regulations are adhered to.

815-3 PREPARATION:

- a. Public notification and coordination with the homeowners shall be identified in the submittals and accomplished according to the following:
 1. At least 7 days prior to the inspection of any line segment or manhole and prior to beginning the inspection, the Contractor shall go door-to-door to distribute an Owner approved Homeowner Notification Door Knocker describing the work to be performed.

2. On the day of inspection, prior to commencing operations, Contractor shall knock on the doors of all structures potentially impacted by the testing to personally notify occupants.
 3. Contractor shall notify by fax or email to the Owner's designated office the location of the work to be performed daily prior to 7:00 a.m.
- b. Prior to CCTV inspections Contractor shall clean the pipelines, manholes and wet wells of debris in accordance with Section 812. Immediately after cleaning, the sewer line section, manhole or wet well shall be visually inspected by means of CCTV. Sewer line sections shall be characterized according to specifications from manhole to manhole.
 - c. With the agreement of the Engineer, a Traffic Control Director may be utilized onsite where equipment is in or near to a roadway to assist in alerting or directing traffic near the work area.

815-4 TELEVISION INSPECTION OF SEWER LINES:

- a. The system shall have the capability of recording on the digital video disk (DVD) written information identifying each pipe segment inspected and a metering device measuring distance to the nearest whole foot. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. Digital videos of poor and unacceptable quality will be rejected. Re-recording will be at no additional cost to the Owner.
- b. The television camera used for the inspection shall be one specifically designed and constructed for such inspection. 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 minimum 500-line resolution picture. The camera shall have an imager with minimum 0.7 lux sensitivity and utilize high intensity discharge lamps for illumination. Maintenance of video equipment is a must. Camera distortions, inadequate lighting, dirty lens or blurred/hazy picture will be cause for rejection. A backup camera, in good working conditions, shall be available on the project site. Camera shall be operative in a hazardous and corrosive environment.
- c. All internal pipe damage shall be still photographed in color by the Contractor utilizing picture capture equipment, and shall be clearly labeled with the date, upstream manhole (UM) number, footage to the UM, and type of defect generated in a _JPEG file format. These files will be recorded on a DVD and delivered to the Owner with the video. All videos, photos and data acquired are the property of the Owner.
- d. The entire circumference of the pipe (360 degrees) shall be viewable. The Contractor will be required to pause and pan all service lateral connections. The Contractor will also be required to dewater pipe as necessary to allow the required visibility. This dewatering will be considered incidental to the television inspection
- e. The camera shall be moved through the line at a uniform rate and at a maximum camera speed of 30 ft/minute, stopping when necessary to insure proper documentation of the pipe's condition. Digital video shall be captured at a minimum video bit rate of 5.0 M Bit/second. Manual winches, power winches, TV cable, and powered rewinds or crawler device or other devices that do not obstruct the camera view or interfere with proper documentation of the pipe conditions shall be used to move the camera through the line.

- f. If during the inspection operation the television camera will not pass through the entire section because of an obstruction such as a dropped joint, crushed pipe, etc., with the approval of the Engineer, the Contractor shall perform an additional setup of his equipment so that the inspection can be performed from the opposite end in order to obtain a "full" section (returning unimpeded to the original blockage). If, again the camera fails to obtain a "full" section because of a second obstruction preventing passage, the inspection shall be considered incomplete and marked survey abandoned at this time. If an additional setup is required, the Contractor will get paid for only one (1) additional setup per mainline segment.
- g. When remotely operated methods are used to move the television camera through the line, radios or other suitable means of communication shall be set up between the two ends of the section being inspected to insure good communications between members of the crew.
- h. Any obstructions causing a stuck camera are the responsibility of the Contractor. Likewise the retrieval of equipment or cameras is the Contractor's responsibility and will be performed at the Contractor's expense.
- i. Metering equipment will be accurate to two percent (2%) over the length of the sewer line section being inspected. Accuracy of the meters shall be checked daily by use of a walking meter, roll-a-tape, or other suitable device. Also a distance between all manholes will be recorded by a surface measure center to center in the provided database.
- j. The location of all pipe defects shall be noted in accordance with the PACP code as amended by the Owner. All CCTV operators must be PACP certified. The defects shall be recorded in "real time" or as approved by the Engineer in accordance with the latest revision of the PACP code as noted, and on the inspection sheet. The inspection sheet shall also show pipe type, size, depth, manhole locations, street addresses of all manholes, and location of all service lateral connections.
- k. The camera height shall be adjusted within the pipe to maintain a centered position for filming. The lighting should always be sufficient for high quality pictures. A reflector light system in front of the camera may be required to enhance the lighting of a dark colored pipe.
- l. Camera footage counter shall be set to measure and record length of each sewer line segment from centerline of its terminal manholes. If multiple sewer line segments are to be videoed from one setup, footage counter shall be reset for each line segment at its starting manhole.

815-5 TELEVISION INSPECTION OF LATERALS:

- a. Service laterals will be photographed and characterized in accordance with this specification.
- b. A self-leveling radial view camera (360 degree optical lens) will be used for lateral inspection. Cameras incorporating mirrors for viewing sides or cameras using exposed rotating heads are not acceptable. The camera must be an auto-iris type with remote controlled manual override. The camera light head includes a high-intensity side viewing lighting system to allow illumination of internal sections of lateral sewer connections.

- c. A main sewer television camera is used to position the lateral camera launcher. The lateral sewer camera is used to inspect each lateral from the mainline to the cleanout.
- d. The television inspection of the lateral must be attempted from the mainline to the cleanout. After an unsuccessful attempt, the inspection may be performed from the cleanout to the mainline by using a mini-push camera if necessary.
- e. Lateral inspection will be performed with the same minimum criteria for mainline inspections. Cleaning, conditions, classifications, and recording of datum will also apply.
- f. The Contractor may request permission from the Engineer not to perform lateral inspections in conjunction with mainline inspections. However if approved by the Engineer, the Contractor shall complete lateral inspections within one working day of the mainline inspection.
- g. If an additional set-up is approved for the mainline inspection for a mainline segment, another additional set-up will not be approved for the lateral inspection for the same mainline segment. Multiple additional setups on the same mainline segment will not be paid for due to the preferred method of inspection chosen by the Contractor.

815-6 SONAR INSPECTION OF SEWER LINES:

- a. **Description:** Contractor will be required to introduce equipment to create a volumetric section of the pipe in "difficult to see" and opaque submerged environments. This equipment, capable of withstanding harsh environments, will use sound to acoustically locate and document features and defects in the pipe to be investigated.
- b. **Data Acquisition:** The sonar system shall be designed to provide accurate dimensional data on silt level, grease accumulation, pipe deformation, offsets, etc, below the waterline. In full flowing lines or siphons, the system shall provide visual profile, profile comparison, and dimension data of significant items or defects. A sonar inspection of a fully or partially flowing line shall provide a two-dimensional profile of the interior pipe wall. In partially flowing lines, the sonar may be required to be combined with CCTV to provide a simultaneous composite image of the pipe both above and below the waterline.
- c. **General Sonar Specifications:**

Minimum Deployment Specifications

Above or Below Waterline:	Below
Wet or Dry Operating Environment	Wet
Minimum Pipe Diameter	36"
Maximum Pipe Diameter	144"
Manhole Minimum Diameter	24"
Maximum Inspection Length	600'

815-7 TELEVISION INSPECTION OF MANHOLES OR WET WELLS: This specification covers "non-entry" inspection of manholes and wet wells using internal video equipment for the purposes of assessing thoroughness of cleaning, observing and recording structural and service lateral defects and construction features and to verify new sewer construction prior to acceptance.

- a. **Operations:**

1. Each manhole or wet well inspection unit is to consist of a self-contained vehicle with separate areas for viewing and storage complete with the following equipment as a minimum:
 - i. Fans and blowers capable of removing fog that may be present in sewers at the time of the inspection.
 - ii. Video cameras, lighting, cables and power source.
 - iii. Video monitor, DVD recorder and digital video recorder.
 - iv. Computer system with video capture card or dedicated unit and other related equipment.

b. Video Inspection Equipment

1. Video equipment is to consist of a minimum of the following:
 - i. Video camera capable of panning 360° and tilting 270° with optimum picture quality provided by focus and iris adjustment. Focal range to be adjustable from 100 millimeters to infinity.
 - ii. Adjustable light source to allow an even distribution of light around the manhole perimeter without loss of contrast, flare out of picture, or shadowing. Ensure lighting illuminates the sewer or manhole ahead of the camera to be able to determine general condition, features and upcoming defects.
 - iii. Video overlay equipment capable of superimposing a minimum of 15 lines with up to 30 characters per line of alphanumeric information onto the video recording.

c. Manhole and Wet Well Camera Transport Equipment:

1. Video camera transport equipment to consist of the following:
 - i. A pole mounted device for manhole or wet well inspections that will securely orient the camera with the 12:00 video position facing north and capable of moving the camera through the entire vertical length of the manhole or wet well in a systematic manner.

d. Manhole Inspections:

1. Manhole inspections are used to determine the location and the physical condition and isolate current and possible infiltration and inflow sources. Each component of the manhole is inspected to establish a complete inventory, update existing records, and/or identify defects.
2. When performing manhole inspections, always follow all safety rules and regulations. All crew members are required to have the necessary safety training prior to performing any field work.
3. Do not spend more than ½ hour trying to find a manhole. If the manhole cannot be found in that time, list it as CNL in the designated location on the Manhole Inspection Form. If the manhole can be located outside of the roadway but is buried by less than or equal to one foot, then the manhole shall be exposed with hand tools, inspected, and restored to its original conditions.
4. Once the location has been secured for safety, always open the manhole cover and verify that;

- i. You are at the correct manhole.
- ii. That the manhole can be inspected (MH is not surcharged, broken lid, unsafe, gas etc.).

5. Gather the following information for MH inspection:

- i. General Data - Document the following items:
 - A. MH Number
 - B. Project Number
 - C. Date/Time
 - D. Inspector/Company Initials
 - E. Digital Photo Numbers & File Names
 - F. MH location
 - G. Surface Type
 - H. Precipitation
 - I. Traffic
 - J. Details of Incoming Pipes
 - K. MH Depth
 - L. MH Diameter
 - M. Flow Depth
- ii. Manhole Cover- Inspect the cover before and after it has been removed from the frame. Be sure to inspect both sides of the cover. The cover inspection should include:
 - A. Cover Diameter
 - B. Cover Type
 - C. MH Cover Condition
 - D. MH Cover to Rim fit
 - E. Distance above or below grade
- iii. Frame and Grade Adjuster- The frame is the "seat" for the manhole cover. The grade adjuster is used in construction to adjust for difference between the top of the cone and the surface. It is important to understand that not all manholes will have an adjuster. inspection includes:
 - A. Frame Condition
 - B. Frame to MH Seal
 - C. Insert
 - D. Riser Type
 - E. Riser Condition
 - F. Evidence of I/I from Riser
- iv. Inspect MH Cone - The cone is used to reduce the size of the manhole body to the size of the adjuster or the cover. The cone inspection includes:
 - A. MH Wall and Cone Type
 - B. Cone Condition
 - C. Evidence of I/I from Cone
- v. Document the Cone Shape:
 - A. Concentric
 - B. Eccentric
 - C. Flat Top

- vi. Document the MH Wall Construction:
 - A. Wall Condition
 - B. Evidence of I/I from Wall
 - C. No. of Steps
- vii. Bench - The bench is the floor or the base of the manhole. Clean the debris and/or redirect flow prior to inspection if necessary to reveal bench.
- viii. Inspect bench for Defects - Depending on the construction several different defects are possible. Most common defects are cracks, leaking construction joints and roots:
 - A. Bench and Invert Type
 - B. Bench and Invert Condition
 - C. Evidence of Infiltration at Bench and Invert
 - D. Bench Deposits
 - E. Work Order Issued

e. Operator Qualifications for Inspection and Condition Coding:

1. Provide a minimum one operator on site at all times with each inspection unit who holds a valid certificate in Manhole Assessment & Certification Program (MACP) or an acceptable alternate training program. Ensure each operator is fully trained in all aspects of manhole inspection and capable of making accurate observations and recording all conditions that may be encountered in manholes.
2. Perform inspection work only when MACP certified operators are operating on site.
3. Submit a valid copy of the MACP Operators Certificate for each operator to the Engineer as outlined in Submittals.

f. Manhole Condition Coding:

1. Perform manhole condition coding in accordance with the requirements of the latest revision of MACP as developed by the National Association of Sewer Service Companies (NASSCO) as amended by the Owner.
2. Record GPS coordinates (+/- 1 meter accuracy), manhole designation, place names and other data in accordance with this specification. If GPS coordinates cannot be obtained due to tree or cloud cover, Contractor shall note this on the inspection form. Conventional surveying is not required.

815-8 DELIVERABLES:

- a. A DVD recording shall be made by the Contractor of all pipe and manhole sections television inspected and photographed. Each line segment and manhole shall be recorded and saved in a continuous single digital video file labeled in accordance with the format shown below. The digital video will include a complete "color" video and audio record of the entire inspection. The digital video shall have the capability of permanently displaying information concerning the segment inspected, including the date, upstream and downstream manhole (MH) numbers, GPS manhole coordinates, the size of pipe, and the footage counter.

- b. All digital video files shall also be submitted on DVD-ROM with a file reference number, which have been scanned for viruses. The DVD index sheet shall be labeled with the DVD reference number, the project name, project number, date of inspection, and upstream and downstream manhole numbers listed by line segments as they appear on the DVD. The television inspection shall be recorded directly to digital format as specified herein. Recording to VHS or other media and converting to digital format are not acceptable.

File Naming: xxx-xxxxx_yyy-yyyyy.mpg where

x= upstream manhole and y= downstream manhole.

xxx, yyy - Numerical 3-digit Pump Station Area

xxxxx, yyyy - Numerical 5-digit Manhole Number

- c. The inspection sheets, electronic database, and DVD of all television inspections of sewer lines and manholes shall be kept by the Contractor and submitted to the Owner with monthly Payment Request. Contractor shall include an electronic spreadsheet listing all manholes inspected and included in the submittal. All inspection sheets shall be submitted on a standard inspection form which has been reviewed and approved by the Owner and shall be completed electronically. PDF electronic copies of the inspection sheets, CNL forms and Map Edit Forms shall be submitted on a DVD. The digital videos, images, files and disks shall become the property of the Owner.
- d. The Engineer shall provide an unpopulated electronic database. The Contractor shall populate the database with pipe defects/condition information as indicated in the PACP. The Contractor shall not make any design changes to the database prior to submittal. The Engineer will perform a quality assurance check of the defect database. Any inconsistencies, irregularities, errors, or incomplete data will be returned to the Contractor for resolution and correction at no additional cost to the Owner.
- e. Unless authorized by the Engineer, television inspection shall not be conducted in sewer lines with sewer flow. It shall be the Contractor's responsibility to dewater the lines as necessary in order to achieve the above criteria and shall be included in the cost of the television inspection. If plugging, blocking or bypassing is necessary sufficient precautions must be taken to protect the sewer lines from damage that might result from sewer surcharging. Further, precautions must be taken to insure that sewer flow control operations do not cause flooding or damage to public or private property being served by the sewers involved and as outlined more specifically in Specification 813 Sewer Flow Control.
- f. The Contractor shall complete and submit a Map Edit form provided by the Owner for any field condition that is not shown or is different from that shown on the original maps. These forms shall be submitted with the monthly inspection forms.
- g. GPS coordinates (+/- 1 meter accuracy) will be recorded for the upstream and downstream manholes based on the La. State Plane Coordinate System (south) whenever any physical inspection is performed.

815-9 MEASUREMENT:

- a. **Television Inspection:** Measurement for this Item shall be made on a linear foot basis, measured to the nearest whole foot, from center of upstream manhole to center of downstream manhole. One setup shall be included in each mainline segment.

- b. **Sonar Inspection:** Sonar may be substituted for television inspection with the permission of the Engineer. Measurement for Sonar Inspection shall be made on a linear foot basis, measured to the nearest whole foot, from the center of the upstream manhole to the center of the downstream manhole. One setup shall be included in each mainline segment.
- c. **Lateral Television Inspection:** Measurement for this item shall be made on a linear foot basis, measured to the nearest whole foot, from the mainline to the cleanout or from the cleanout to the mainline.
- d. **Additional Television Set-up:** Measurement for this Item shall be made per each for one additional equipment set-up after the initial set-up per mainline segment.
- e. **Manhole Inspection:** Measurement for this Item shall be made per each manhole inspected.
- f. **Pump Station Wet Well Inspection:** Measurement for this Item shall be made per each wet well inspected.

815-10 PAYMENT:

- a. **Television Inspection:** Payment of this Item will be full compensation for television inspection, one equipment set-up per mainline segment, dewatering, camera retrieval, defect coding, report, DVD production and other deliverables in accordance with the specifications. No mainline segment will be paid until lateral television inspection has been attempted and/or completed for that mainline segment.
- b. **Sonar Inspection:** Payment of this Item will be full compensation for sonar inspection, one equipment set-up per mainline segment, dewatering, equipment retrieval, defect coding, report, and DVD production in accordance with the specifications.
- c. **Lateral Television Inspection:** Payment of this item will be full compensation for television inspection of laterals to the main sewer line. This will be the total payment whether mainline or cleanout introduction of the camera is used. For lateral television inspection, setup shall be included in this pay item and no additional setups will be paid for this Work.
- d. **Additional Television Set-up:** Payment for this Item will be full compensation for the additional equipment set-up cost for full length mainline camera inspection after encountering blockage.
- e. **Manhole Inspection:** Payment of this item will be full compensation for television inspection of the full depth of the manhole, top and bottom conditions.
- f. **Pump Station Wet Well Inspection:** Payment of this item will be full compensation for television inspection of the full depth of the wet well, top and bottom conditions.

815-11 PAY ITEMS

<u>Item No.</u>	<u>Item</u>	<u>Unit</u>
8150015	Television Inspection of Sewer Line Less Than or Equal to 16"	Linear Feet
8150020	Television Inspection of Sewer Line Greater Than 16"	Linear Feet

8150101	Additional Television Setups	Each
8150102	Television Inspection Lateral of Sewer Line	Linear Feet
8150103	Sonar Inspection of Sewer Line	Linear Feet
8150104	Television Inspection of Manhole	Each
8150105	Television Inspection of Pump Station Wet Well	Each