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Section 33 01 30.16 (02959) TV Inspection of Sewer Pipelines

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CONSTRUCTION STANDARD SPECIFICATION

SECTION 33 01 30.16 (02959)

TV INSPECTION OF SEWER PIPELINES

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SPECIFICATION SECTION 33 01 30.16 (02959)

TV INSPECTION OF SEWER PIPELINES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Rehabilitation Project Contract apply to this section for rehabilitation projects.

B. Maps, structure lists, and general provisions of the Non-Rehabilitation Project Contract apply to this section for video inspection of sanitary sewers or storm drains not specifically related to rehabilitation projects such as condition assessments.

C. Related Sections: Refer to the following sections for related work:

1. Section 02955, *Sewer Flow Control*
2. Section 02956, *Sewer Cleaning*

1.2 SUMMARY

A. Section includes video inspection of sanitary sewers and storm drains.

1. Inspect interior of sanitary sewer pipes or lines, storm drain pipes or lines, and/or storm drain box culverts using color video camera(s).
2. Document inspection by placing video files, inspection logs, and any still images on DVD.
3. Line cleaning may be required as part of the video inspection effort and is to be done according to Specification 02956, *Sewer Cleaning*. The requirement for line cleaning is shown on the related documents detailed in section 1.1, *Related Documents* and in section 3.1 of this document.

1.3 DEFINITIONS

A. Video Inspection: Synonym for TV Inspection

B. SNL/NM: Sandia National Laboratories/New Mexico Site

C. SDR: Sandia Delegated Representative

1.4 SUBMITTALS

A. Sample DVD Prior to Video Inspection Work: Submit one example DVD showing video samples of at least three video inspections of storm drain lines and at least three video inspections of sanitary sewer lines that meet the requirements of this

specification. If the work to be done is only sanitary sewer, then only samples for sanitary sewer may be submitted. Submit similarly if the work to be done is only storm drain. Include a completed inspection log for each of the video samples. Prior to submittal, finalize the DVD to prevent re-recording.

1. DVD, video, and inspection logs will be reviewed by SNL/NM personnel to determine if quality of video is acceptable, and if defects were properly identified and documented according to SNL/NM requirements.
2. If needed, modify equipment and/or inspection procedures to achieve acceptable quality and inspection requirements per these specifications.
3. Do not commence work prior to approval of the Sample DVD by the SDR. Upon acceptance, Sample DVD is to serve as the minimum standard for remaining work.

B. DVD(s) Containing Completed Video Inspection Digital Files: The DVD is to contain video digital files for inspected lines, the corresponding inspection logs, and any corresponding still images. For rehabilitation projects such as relining, the DVD is to contain video inspection files, logs, and still images for rehabilitated lines both before rehabilitation and after rehabilitation (pre-lining video inspection and post-lining video inspection). The before and after video inspection files, logs, and still images are to be submitted at the completion of the rehabilitation work unless otherwise indicated. For non-rehabilitation efforts such as condition assessments, the DVD is to contain video inspection files, logs, and any still images of the lines shown on the provided lists and maps.

1. Inspection Logs: Unless otherwise indicated, submit inspection logs in PDF format. Place the inspection logs in PDF format on the same DVD as the video file for the same inspection. Inspection logs must include the following as a minimum:
   a. Project title
   b. Name: state as Sandia National Laboratories
   c. Time of day
   d. Structure to structure pipe or line section (manhole to manhole, drop inlet to manhole, etc.)
   e. Pipe segment length
   f. Pipe material
   g. Line size
   h. Flow direction
   i. Camera direction (start structure and end structure, arrow, etc.)
   j. Operator name

k. Camera counter reading at beginning and end of each structure to structure pipe segment (manhole to manhole, etc.).

l. Camera counter location and circumferential location of laterals.

m. Camera counter location, circumferential location, type, and severity of noteworthy operational or structural damage and defects.

2. DVDs: Prior to submittal, finalize the DVD to prevent re-recording. DVDs and associated video files must be in a readable format with standard viewing software such as Windows Media Player. If a specific program is needed, please submit for preapproval. Video file is to include:

a. Audio location and date information.

b. Read out in the video of location, time, and date.

c. Read out in the video of the continuous camera counter.

d. Read out in the video of direction of view.

e. Read out in the video of segment terminal man hole or structure numbers.

f. Read out in the video of pipe diameter and material.

g. Audio description of laterals and noteworthy operational or structural damage and defects.

h. Each segment of pipe or line inspected is to have its own video file and be titled with the beginning and end point of the pipe segment.

C. Maintain a copy of all inspection documentation (video files of video inspections and inspection logs) for duration of work and warranty period if it applies but no less than three months regardless.

PART 2 – PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Video Inspection Camera(s): All cameras used are to provide color images and be specifically designed for video inspection of sanitary sewer and storm drain pipes or lines.

1. Inspection camera for 6-inch diameter pipes and larger to be of the remotely operated pan and tilt type.

a. Minimum Camera Resolution: 400 vertical lines and 460 horizontal lines

b. Camera Lens: The rotating camera and lighthead configuration is to provide a minimum of 240 degrees of pan and tilt angle measuring centerline to centerline, a minimum of 70 degree lens viewing angle, and a minimum of a 90-degree rotation from horizontal.

c. Focus: Camera to be equipped with necessary circuitry to allow for remote adjustment of the optical focus from the power control unit at the

viewing station. Focus to adjustable through range of a minimum of 6 inches (152 mm) to infinity.

d. Camera(s) shall be intrinsically safe and operable in 100 percent humidity conditions.

e. Lighting Intensity and Iris: Camera to be equipped with necessary circuitry to allow for remote adjustment of the iris and/or lighting intensity from the power control unit at the viewing station in order to minimize reflective glare and to provide clearly visible images of the pipe inspected.

f. Lighting and Camera Quality: Lighting and picture quality are to be adjusted to provide a clear, in-focus picture of the entire periphery of the sanitary sewer or storm drain line. All video is to have good contrast, adequate color and tint, and without distortion or outside interference.

2. Inspection camera for pipes smaller than 6-inch diameter may be push camera. A push camera may be used for lines 6 inches and larger if, and only if, the only reasonable access to the line is through a cleanout that will not accommodate the pan and tilt type camera.

a. Minimum Camera Resolution: 400 vertical lines and 460 horizontal lines

b. Leveling: Self leveling type

c. Camera(s) shall be intrinsically safe and operable in 100 percent humidity conditions.

d. Lighting Intensity and Iris: Camera to be equipped with necessary circuitry to allow for remote adjustment of the iris and/or lighting intensity from the power control unit at the viewing station in order to minimize reflective glare and to provide clearly visible images of the pipe inspected.

e. Lighting and Camera Quality: Lighting and picture quality are to be adjusted to provide a clear, in-focus picture of the entire periphery of the sanitary sewer or storm drain line. All video is to have good contrast, adequate color and tint, and without distortion or outside interference.

C. DVD: 120 minute minimum, high-quality, type DVD-R, DVD-RW, or DVD+R

1. Audio portion of video files shall be sufficiently free from electrical interference and background noise to provide complete understanding of oral report.

2. Store in an appropriate CD or DVD case to prevent scratches and within the manufacturer’s stated operating temperature range.

3. Label each disk showing SNL’s name, contractor’s name, and manhole-to-manhole (structure-to-structure) segment of sanitary sewer or storm drain line represented on the DVD disk. If more than one segment is on the disk, label the disk with a unique disk number and provide an index or table of contents.

D. Footage Counter: Measures distance traveled by camera in sewer or storm drain, accurate to plus or minus 2 feet (0.6 m) in 1,000 feet (305 m).

PART 3 – EXECUTION

3.1 SEWER FLOW REQUIREMENTS

A. Rehabilitation Projects

1. Different rehabilitation methods might have different flow requirements for video inspections. Those requirements might also be different for pre-rehabilitation assessments compared to post-rehabilitation assessments. Therefore, follow the sanitary sewer or storm drain flow requirements for video inspection provided by the specific rehabilitation project.

2. If no flow requirements are provided by a specific rehabilitation project, do not exceed depth of flow shown in Table 1 for respective pipe or line sizes as measured in the manhole when performing video inspection.

3. When depth of flow at upstream manhole of sanitary sewer or storm drain line section being worked is above maximum allowable for video inspection as defined in points 1 and 2 above, evaluate the viability of returning to video inspect during a low-flow time period. If viable, submit a proposal for low-flow time period video inspection to the SDR for approval. The SDR must approve any plan to return at a low-flow time because low-flow times are often outside of regular work hours. If returning at a low-flow time is not viable, reduce flow to the level defined above by plugging or blocking of flow, or by pumping and bypassing of flow as needed. Comply with requirements of Section 02955, *Sewer Flow Control* to reduce flow.

4. If sanitary sewer or storm drain flow control is required from points 1, 2, or 3 above, provide all labor, equipment, and materials necessary to control the flow of sewage or storm drain water in and/or around line segment(s) being video inspected unless otherwise noted.

TABLE 1
Maximum Depth of Flow for TV Inspection

Nominal Pipe Diameter	Maximum Depth of Flow
6” – 10”	20 percent of pipe diameter
12” – 24”	25 percent of pipe diameter

B. Non-rehabilitation Projects such as Condition Assessments:

1. Follow the sanitary sewer or storm drain flow requirements for video inspection provided by the specific project or assessment.

2. If no specific sanitary sewer or storm drain flow requirements are provided as part of the project or assessment, follow the general sewer flow guidelines below:

    a. For a specific location structural investigation, do not exceed depth of flow shown in Table 1 for respective pipe or line sizes as measured in the manhole when performing video inspection unless otherwise noted. This is to adequately show structural defect. If the depths of flow exceed those shown in Table 1, evaluate the viability of returning to video inspect during a low-flow time period. If viable, submit proposal for low-flow time period video inspection to the SDR for approval. The SDR must approve any plan to return at a low-flow time because low-flow times are often outside of regular work hours. If returning at a low-flow time is not viable, provide a fee and method proposal to the SDR for providing all labor, equipment, and materials necessary to control the flow of sewage or storm drain flow in and/or around sewer or storm drain segment(s) being video inspected unless otherwise noted. The SDR must approve the proposal prior to any flow control efforts. Please see point 3 below for flow control options.

    b. For a specific blockage problem investigation, there is no minimum depth of flow so the flows in the line can help indicate a problem location. After the initial video inspection in this type of investigation using no flow control, the SDR may request an additional video inspection with flows that meet the requirements of Table 1 if the flows did not meet those requirements in the initial inspection. The additional video inspection would be considered a separate inspection. If an additional video inspection is requested, evaluate the viability of returning to video inspect during a low-flow time period. If viable, submit a proposal for low-flow time period video inspection to the SDR for approval. The SDR must approve any plan to return at a low-flow time because low-flow times are often outside of regular work hours. If returning at a low-flow time is not viable, provide a fee and a method proposal to the SDR for providing all labor, equipment, and materials necessary to control the flow of sewage or storm drain flow in and/or around sewer or storm drain segment(s) being video inspected unless otherwise noted. The SDR must approve the proposal prior to any flow control efforts. Please see point 3 below for flow control options.

    c. For regular condition assessments, there is no minimum depth of flow so the flows in the line can help indicate problems in the line such as sags or flow obstructions.

3. When depth of flow in a sewer line section needs to be reduced per the instructions in points a, b, and c above, evaluate the viability of returning to video inspect during a low-flow time period first. If viable, submit a proposal for low-flow time period video inspection to the SDR for approval. The SDR must approve any plan to return at a low-flow time because low-flow times are often outside of regular work hours. If returning at a low-flow time is not viable,

flow will need to be reduced by plugging or blocking of flow, or by pumping and bypassing of flow as specified. Comply with requirements of Section 02955, *Sewer Flow Control* to reduce flow.

3.2 SEQUENCE OF WORK

Perform work in the following sequence:

A. Clean sanitary sewer lines in accordance with requirements of Section 02956, *Sewer Cleaning* prior to video inspection unless otherwise noted. There might be times where a sanitary sewer line would not be cleaned due to a known defect that would be exacerbated with cleaning.

B. Do not clean storm drain lines prior to video inspection unless otherwise noted.

C. Perform video inspection according to the requirements of this specification.

D. For rehabilitation projects, rehabilitate pipe or line according to rehabilitation project requirements.

E. For rehabilitation projects, repeat video inspection in same direction as pre-rehabilitation inspection, after rehabilitation is complete.

3.3 INSPECTION REQUIREMENTS

A. Access: Provide access to SDR to observe and monitor operations at all times.

B. Record information in the video file according to Part 1.4.B.2.

C. Provide camera image that is down the center axis of pipe when camera is in motion.

1. Provide a 360-degree sweep of pipe interior at points of interest, to more fully document existing condition of sewer.

2. Points of interest may include, but are not limited to the following: defects, cracks, voids, connections, encrustations, mineral deposits, debris, sediment, noticeable sags, joint problems, any location determined not to be clean, and defects in a liner. Defects in a liner include, but are not limited to, significant bumps, folds, tears, and dimples. A liner defect is significant if it can alter the flow characteristics enough to create blockage concern or contribute to a structural failure of the pipe.

3. Provide a view of the pipe or line that is not obstructed by the cabling system attached to the camera.

D. Camera may be pulled or driven through the line in either direction.

E. If, during the inspection operations, the inspection camera will not pass through the entire length of line to be inspected, reset camera equipment so the inspection can begin at the opposite structure or man hole. If again, the camera fails to pass through the entire manhole section, the inspection is considered complete and no additional inspection work will be required for that segment of line.

F. If camera equipment becomes lodged in any line being video inspected, it is to be removed at the contractor's expense. This is to include, if necessary, excavation and repair of the line, underground utility repairs, backfilling and surface restoration. Re-video inspect any line segment in which the equipment became lodged after removal and any needed repairs to demonstrate to the SDR that no damage exists as a result of the lodged equipment.

G. Maximum rate of travel shall be 30 feet (9 m) per minute when recording.

3.4 FIELD QUALITY CONTROL

A. The SDR will review video inspection files and logs to ensure compliance with requirements listed in this specification section and Section 02956, *Sewer Cleaning.*

B. If line, in sole opinion of SDR, is not adequately clean, re-clean it and video inspect it again at no additional cost.

END OF SECTION