

SECTION TV1

TELEVISION INSPECTION OF SEWERS AND DRAINS

GENERAL

The work covered under this section consists of furnishing all equipment, labor, materials, and supervision as required to inspect the interior of all sewers and drains, provide video recordings with voice descriptions as well as full inspection reports, and all other appurtenant work, within the limits shown on the drawings, as directed by the Engineer, and as specified herein. Section TV2 describes the cleaning of pipes necessary for inspection. Pipes shall not be inspected until completely cleaned.

EQUIPMENT

Inspection shall be accomplished by the use of closed circuit, color television cameras. The camera used for the inspection shall be one specially designed and constructed for sewer line inspection and shall have its own lighting system capable of providing sufficient light levels to obtain a clear picture of the entire periphery of the pipe without creating significant steam vapor which might affect picture clarity. The camera shall be constructed so as to be operable in 100% humidity and without the lens fogging. Picture quality shall be such as to produce a continuous 600-line minimum resolution picture showing the entire periphery of the pipe.

The Contractor shall note that wide angle lens may be necessary for pipes with large diameters. Picture quality and definition shall be such that the interior of the pipe can be clearly seen in detail without static interference of any kind to the satisfaction of the Engineer.

Measurement for location of defects or other points of interest shall be by means of a metering device, approved by the Engineer, and accurate to within one (1.0) foot.

The closed-circuit television camera shall also have an inclinometer to display pipe grade/slope information during the duration of inspection recording. These readings should be displayed on the recording screen of the inspection along with the inspection footage.

METHOD OF WORK

Prior to the inspection of each pipe segment, the Contractor shall promptly notify the Engineer of apparent condition issues within the pipe, noting conditions, which may obstruct the transit of the camera through the line or obscure visibility. Accessibility issues with manholes, or any other field issues that may prevent the completion of cleaning and inspection shall also be made apparent to the Engineer as soon as possible. Full pipe collapses, where there is no apparent flow, should be reported to the Engineer immediately.

The Engineer may order the recleaning of all or a portion of a pipe when materials, not apparent prior to television inspection, are encountered during television inspection which obstruct the transit of the camera. Television inspection of any pipe may not commence prior to the approval of the Engineer.

The Contractor shall be responsible for keeping the pipes free from excess vapor and shall furnish and utilize equipment necessary for the reduction of vapor so that proper inspection of the pipes can be performed. The Contractor should also note that some of the pipes might have heavy flow that obstructs a complete view of the pipe. The Contractor will be required to inspect the pipe during periods of low flow or provide a bypass system for the flow during inspection.

Diversion of all or a portion of the flow:

- a. Should the Contractor elect to pump, under no circumstances shall an upstream pipe that has been restricted be allowed to become greater than 1/4 full.
- b. Under no circumstances will inspection of the sewer be permitted to the extent that damage or inconvenience is caused for people living or working in the area.
- c. If the Contractor is unable to bypass, video and/or photographic evidence must be provided of the attempted work or BWSC personnel must be present to observe. If the pipe is unable to be cleaned and televised, the Engineer will conduct a

follow up approval inspection with the Contractor on the pipe segment(s) in question.

For larger conduits the contractor may elect to employ the use of a professional diving contractor under the following conditions:

- a. All requirements for the inspection of the conditions of the conduits as specified herein shall (if full) apply.
- b. Additional divers insurance will be required, as well as indemnification to the Boston Water and Sewer Commission. No additional compensation will be due the Contractor if he chooses to use divers for inspection.

A unique file shall be created for each pipe segment. A pipe segment is defined as a unique section of pipe with its own feature ID. It is usually the length of pipe between two manholes but can also be a pipe between other features such as catch basins, wye connections, a change in grade or pipe size, or other nodes. The inspection shall be conducted so as to produce recordings with audio and video of each pipe segment, corresponding to the order that exists in the field. In the case of pipe segments that do not extend to the next manhole, the Contractor shall stop the inspection at the end of the pipe segment concluding that section. That point will then be the beginning of the next pipe segment. At the beginning and end of each pipe segment, the narrator shall state and display as an overlay, the date of inspection, size, type, location, condition and limits of each section inspected. The Operator is also required to do a 360-degree recorded scan of each manhole including the manhole cover to assess condition. Each video file shall include indexing, allowing for the individual defect observation to be tied into the video file.

The camera shall be moved through a pipe segment, at a uniform slow rate. The camera movement shall be halted only to observe and record defects in the pipe, service laterals and other pertinent features.

Inspection Software

The inspection software shall be capable of exporting digital inspection log data into an MS Access database in Pipeline Assessment and Certification Program (PACP) Standard Exchange

Format. The inspection software coding system shall be PACP certified (latest version) as per the National Association of Sewer Service Companies (NASSCO). The software shall be equipped with all modules necessary for PACP inspections and scoring.

Description of Recordings

A record of each pipe segment shall be supplied as described hereinafter and shall become the property of the Commission. The Contractor shall utilize video recording software capable of producing complete survey reports, records, inspection database, photographs, linked media files and pipe sections details submitted through the BWSC CCTV_Upload SharePoint system. Contractors' email domains must be submitted and authorized by BWSC Information Technology department prior to utilizing this system.

The Contractor shall produce and submit a project deliverable with all pipe data including all corresponding MS Access database(s), videos, photographs and pipe reports. The video files shall be cross - referenced in the software database for each pipe segment. Each video file shall be named with the BWSC manhole numbers, upstream and then downstream, as the start of the file name.

The Contractor shall provide a video of all pipe segment inspections and assign a unique filename per pipe segment inspection. Video shall be encoded in .MPG format. The filename shall include the corresponding Commission manhole Facility IDs (both upstream and downstream) and shall use the following naming convention;

UpstreamManhole-DownstreamManhole_StreetName_InspectionDate_RandomNumber

RandomNumber is to ensure no two videos are the same, the number can be the video ID if the software doesn't already have a random number generator.

Other inspection recording requirements are provided below:

Opening Screen: The following is an **example** of the required on-screen text display fields.

Date & Time: (YYYY/MM/DD), (military time hh:mm)
 Surveyor's Name/& Co.: John Doe (Contractor)
 Project Name: XYZ Project
 Location: Example (Main Street)
 Upstream MH No: ### (Facility_ID)
 Upstream MH depth: ##.# (nearest tenth of a foot)
 Downstream MH No: ### (Facility_ID)
 Downstream MH Depth: ##.# (nearest tenth of a foot)
 Pipe Segment Ref. ##### (Feature_ID)
 Starting Footage: ##.#(nearest tenth of foot)
 Inspection Direction: Downstream or Upstream
 Pipe Material: Example, (VCP)
 Pipe Diameter/Height/Width:Diameter/Height: ##" Width: ##"
 (as measured in the field)
 Weather: Example (Snow)
 Pre-Cleaning: Example (Jetting)
 Additional Info: Additional important
 information/Comments

The narration of the inspection video shall be subject to the approval of the Engineer. If, during the course of the project, the inspection is rejected due to the narration, the video record will be edited and an alternative narrator's voice shall be dubbed in.

The Contractor shall maintain records of all information necessary in order to allow prompt delivery of project work through BWSC CCTV_Upload system and report to the Engineer upon the completion of the inspection of each pipeline.

Photographs

Photographs shall be taken of each defect with a moderate or greater severity; of each lateral or connecting pipe connection where a moderate or more severe defect exists, looking into the lateral or connecting pipe; and of each lateral or connecting pipe anytime grease, roots or debris is observed coming from or up in the lateral or connecting pipe, looking into the lateral or connecting pipe. Digital photographs shall each have unique filename encoded in .JPEG format and a minimum 640 x 480 resolution. The filename shall include the corresponding Commission manhole Facility IDs (both upstream and downstream) and shall use the following naming convention;

UpstreamManhole-DownstreamManhole_InspectionDate_DefectCode_Footage_RandomNumber

RandomNumber is to ensure no two photos are the same, the number can be the photo ID if the software doesn't already have a random number generator.

The Contractor shall ensure that the structure Facility ID number, footage (linear location of defect) and defect code is shown in the photograph.

Any project worked submitted without photos is subject to rejection.

Records

The records report shall include a separate report for each pipe segment showing inspection data including locations of laterals, pipe defects, infiltration and other pertinent information. Also, each report shall include photographs and a map of each segment denoting stationed measurements along the pipe for laterals defects and other pertinent information.

The video record of the pipe inspections shall be provided through the Commission's CCTV_Upload SharePoint system along with copies of all reports. These records shall show all video information and narrations. The video files shall have indexing tied to the observation reports.

Database

A Standard PACP Exchange Database shall be provided that shall include all or as many of the inspections as possible. Creating a database for each inspection is not acceptable and will result in rejection of the project. The databases should conform to one of the two following options.

1. Databases will be named by date and project number, will include all inspections performed to date and will be accompanied with a description of the regions inspected to date.
2. If option 1. is not possible, then each transferred database will contain a distinct set of inspections. Inspections will not be included in more than one database. Databases will be named with the date of transfer and a general description of the inspected pipes (like basin name). An MS EXCEL file list of each database

transferred, date of transfer, and description of the data within will be updated during the transfer. Any updates to inspections will require that the database housing the inspection be re-created and transferred.

Provide a database of all collected data including:

1. Asset information.
2. Inspection information, where each inspection includes no more than one Facility ID to Facility ID segment.
3. Defect codes and scores.

MEASUREMENT AND PAYMENT

ITEM TV-1	Clean and Televisive 8" to < 18"	L.F.
ITEM TV-2	Clean and Televisive 18" to < 30"	L.F.
ITEM TV-3	Clean and Televisive 30" to < 48"	L.F.
ITEM TV-4	Clean and Televisive 48" to <60"	L.F.
ITEM TV-5	Clean and Televisive > 60"	L.F.

Payment for the inspection of sewers as shown on the plans, or directed by the Engineer, shall be measured along the centerline of pipe through manholes, from the inside face of structure to the inside face of structure, complete and accepted.

The quantity to be paid for under Items TV-1, TV-2, TV-3, TV-4 and TV-5 shall be the number of linear feet of conduit inspected by the Contractor, in accordance with the Drawings, as specified herein, or as ordered by the Engineer.

The contract unit bid prices shall include bypassing of flows, payment for labor, materials, equipment, completion and submission of project deliverables through the Commission's CCTV_Upload SharePoint system and inspection reports and appurtenant work necessary to satisfactorily inspect the conduits as specified and as directed under Items TV-1, TV-2, TV-3, TV-4 and TV-5.

The contract unit bid prices shall also include cleaning of the conduits to be inspected as described in Section TV2 of these specifications. Additional cleaning that does not qualify for

extensive cleaning such as limited and interspersed hand cleaning of accessible conduit inverts where required to determine their general condition, shall be considered incidental to inspection and the bid prices shall include such work where required and/or directed. Transport and disposal costs associated with any operations necessary to complete the inspection shall be incidental to the cost of inspection.

Where conduits are not circular the smaller dimension shall be considered the pipe diameter for payment purposes.

There may be instances where conduits will need to be inspected by handheld cameras or through the use of professional divers. There will be no additional payment for these inspections. It is the Contractor's responsibility to familiarize themselves with the situations necessary to inspect the conduits prior to submission of a bid and the bid prices shall reflect the Contractor's best assessment of actual conditions in the conduits to be inspected.

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