***ADD THE FOLLOWING SECTION TO DIVISION II – CONSTRUCTION DETAILS***

***Note to Spec Writer – This section is to be used on all projects with new sewer and storm drain pipelines and structures, rehabilitated manholes, and rehabilitated sewer lines.***

SECTION 693 – INTERNAL INSPECTION OF SEWER AND STORM DRAIN FACILITIES

**DESCRIPTION**

**693.01.01 GENERAL**

1. This specification defines the requirements for internal internal video inspection of new storm drain pipelines and structures including manholes and drop inlets, new sewer pipelines including replacements per DSCWCS SD-18, sewer manholes, rehabilitated sewer manholes and existing sewer pipelines before and after rehabilitation.
2. Video inspection equipment and field operator(s) of inspection equipment must have current National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) Certification and/or Manhole Assessment and Certification Program (MACP) Certification.
3. The Contractor shall inspect the storm drain and/or sewer facility interiors, including manholes and drop inlets, using a color closed circuit television (CCTV) camera or scanner and document the inspection with location and date information, image title information, and hard copy inspection logs. The internal inspection shall be performed after the installation has been completed, including lateral connections, backfill compaction testing, deflection testing, manhole installation, and defects corrected, for new facility installation but prior to being placed into service.
4. All inspection documentation shall include the location referenced to the project survey control specifically the referenced facility stationing.
5. For sanitary sewer, complete documentation shall be submitted to the Engineer for review and approval prior to removing bypass and releasing flows into the system unless otherwise approved by the Engineer requires 2 working days per 1,000 linear feet of sewer televised, or a minimum of 5 working days, whichever is longer, for review.
6. For storm drain, complete documentation shall be submitted to the Engineer for review and approval prior to final completion. Engineer requires 2 working days per 1,000 linear feet of storm drain televised, or a minimum of 8 working days, whichever is longer, for review.
7. For sewer pipeline rehabilitation:
8. The first internal inspection shall be performed after cleaning the sewer and prior to lining the pipe.
9. The second internal inspection shall be performed in the same direction as the previous inspection after the lining of the sewer has been completed to ensure proper installation.
10. The third internal inspection of the sewer shall be performed in the same direction as the previous inspection, approximately 1-month prior to the end of the 2-year warranty period. This final internal inspection may be performed while the sewer is active.
11. The Contractor shall be responsible for properly inspecting the pipe or providing approval of the finished inspection image.

**693.01.02 SUBMITTALS**

A. The Contractor shall submit the following information for review at the Pre-Construction Conference following notification of award of the Contract:

1. An example of work consisting of one digital submittal of previous inspection work complete with inspection log(s) meeting the requirements of this specification.
	1. The digital submittal shall show operational and structural defects in facilities that are of the same size as the facilities in this Project.
	2. The submittal will be reviewed to determine if the quality of the internal image is acceptable and if defects were properly identified and documented.
	3. Samples shall be with the same camera and lighting equipment proposed for the work.
		1. One copy of the finished digital submittals, including standard inspection reports shall be submitted to the Engineer within 5 days of inspection. For rehabilitation of sewer pipelines, the inspection reports showing the existing sewer pipelines after cleaning and the sewer pipelines after liner installation, shall be submitted to the Engineer within 5 days of inspection.
2. The Engineer will review the inspection data, not for accuracy of content, but to make sure that the required information is provided and the recording is of acceptable quality.
3. If the Engineer determines that the inspection is defective or not of adequate quality, the Contractor shall inspect again at no additional cost to the Owner.

C. Quality Control Submittals at the pre-construction conference:

1. List of staff and equipment compliant with NASSCO PACP and/or MACP standards.
2. NASSCO PACP and/or MACP certifications for operators and supervisors who will be assigned to the work.

**MATERIALS**

**693.02.01 TELEVISION INSPECTION CAMERA**

1. For sewer facilities - camera shall be nationally-recognized testing laboratory (NRTL) certified for a normal sewer environment. Camera shall be explosion proof and certified for hazardous environments when gas meter readings of the manhole airspace indicate an LEL less than 10 percent.
2. Equipment shall be operative in 100 percent humidity conditions.
3. Resolution: 460 lines per inch, minimum, color image.
4. Camera shall be self-propelled; equipped with tag line suitable for pulling camera backwards.
5. For storm drain pipe, camera shall:
	1. Be operative in 100 percent humidity conditions.
	2. Have resolution of 460 lines per inch minimum, with a color image.
	3. Be self-propelled; equipped with tag line suitable for pulling camera backwards.
6. For structures including manholes and drop inlets, camera shall:
	1. Be operative in 100 percent humidity conditions.
	2. Have resolution of 460 lines per inch minimum, with a color image.
7. Lighting intensity shall be remote controlled and shall be adjusted to minimize reflective glare.
8. Lighting and camera quality shall provide a clear, in-focus picture of the entire inside periphery of the facility being inspected.

**693.02.02 DIGITAL STORAGE MEDIUM**

A. The inspection shall be recorded, stored and submitted on external hard drive in high quality MPG format formatted for use with Microsoft PC systems. Other software formats which require proprietary viewers, must have those viewers included with each submittal.

* + 1. **FOOTAGE COUNTER**
1. A footage counter device, which measures the distance traveled by the camera in the sewer or storm drain facility, shall be accurate to plus or minus 2 feet in 1,000 feet.
2. The footage counter shall be calibrated each day prior to start of work using walking meter, roll-a-tape, or other suitable device.

**693.02.04 CAMERA TILTING**

A. For conventional CCTV cameras, a pan and tilt unit, with adjustable supports specifically designed and constructed for operation in connection with pipe and/or structure inspection.

**693.02.05 FIELD DATA ACQUISITION SYSTEM**

A. User’s manual and office copy of the software for the field data acquisition system, used to provide electronic date files, shall be provided to the Engineer prior to start of the internal inspection work. System shall be certified for NASSCO PACP and/or MACP Coding System.

1. WinCan
2. Granite XP
3. PipeLogix
4. Or equal.

**CONSTRUCTION**

**693.03.01 FLOW IN SEWER AND STORM DRAIN FACILITIES**

1. Video inspections are to be performed only while no flow is in the pipe except when potable water is introduced to detect sags in new pipelines, unless otherwise approved by these specifications or the Engineer.
2. The bypassing requirements for sewer rehabilitation facilities are provided in Section 695 “Diversion of Sewage Flow”.
3. Flow may be present in pipes for video inspection of manholes and drop inlets.

**693.03.02 INSPECTION METHODS**

1. Verbal Commentary: None required
2. Access:
3. The Engineer shall have access to observe the monitor and all other operations at all times.
4. The system of cabling employed to transport the camera and transmit its signal shall not obstruct the camera’s view.
5. Inspection Rate for Pipe Facilities:
6. The camera shall be pulled through the rehabilitated sewer or new sewer in the downstream direction. If inspecting in the downstream direction is not possible, reverse inspection is permitted. All inspections at each location shall be in the same direction.
7. Storm drain facilities may be pulled through either direction, but all inspections at each location shall be in the same direction.
8. Line segments shall be televised complete from structure to structure in a continuous run. Image stream must clearly show the camera starting and ending at the upstream and downstream structures, unless a defect(s) does not allow it. Do not record partial televising of a segment and then record another partial run.
9. Maximum rate of travel for conventional CCTV cameras shall be 30 feet per minute when recording. The camera shall be stopped for a minimum of 5 seconds at each pipe defect.
10. Inspection Rate for Structures:
	1. Structures including manholes and drop inlets shall be performed from rim to invert in a continuous run.
	2. Maximum rate of travel for conventional CCTV cameras shall be 30 feet per minute along the line of sight of the camera and all interior surfaces shall be shown clearly in the image. The camera shall be stopped for a minimum of 5 seconds at each defect.
11. Image Perspective:
12. The camera image shall be down the center axis of the pipe/structure when the camera is in motion.
13. The Contractor is required to provide a 360-degree view of the pipe/structure interior.
14. The Contractor shall provide opening screen with correct information of the entire pipe/structure segment inspected.
15. Continuous Footage Readings:
	1. Visible on image at all times;
	2. Record defect locations to the nearest one-half foot (e.g. 2.5 feet); and
	3. Line segment recording will be rejected if continuous footage meter is inaccurate, not visible, or leave doubt as to the total length/depth of pipe/structure inspected.
16. Points of interest shall also be shown on the video and shall include, but not be limited to all joints for new facilities, defects, encrustations, mineral deposits, debris, sediment, any location determined not to be clean. For rehabilitated sewer proper liner installation and defects in any rehabilitated pipe including, but not limited to, bumps, folds, tears, dimples, etc.
17. Defect Coding: National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) and Manhole Assessment and Certification Program (MACP) coding system, latest version, shall be used to document all defects visible on the image recordings. Do not include defect codes on image at any time.
18. Quality Control:
19. The Engineer will review digital submittals and logs to ensure compliance with the requirements listed in this specification and contract documents. If, in the opinion of the Engineer, the inspection is not acceptable, re-inspection will be completed by the Contractor at no additional cost to the Owner.
20. For sewer rehabilitation, if the sewer line is determined not to be adequately cleaned, as required in Section 692 “Sewer Pipe and Structure Cleaning”, it shall be re-cleaned and video inspected by the Contractor at no additional cost to the Contracting Agency.
21. For sewer rehabilitation, if any portion of the liner is determined not acceptable, the liner shall be repaired or replaced, whichever the Engineer deems appropriate, and re-inspected by video at no additional cost to the Contracting Agency.
22. The Contractor shall be responsible for modifications to his equipment and/or inspection procedures to achieve inspection data of acceptable quality. No work shall commence prior to approval of the material by the Engineer. Once accepted, the inspection data shall serve as a standard for the remaining work.
23. Contractor shall maintain an electronic copy of all inspection documentation for the duration of the work and warranty period.

**METHOD OF MEASUREMENT**

**693.04.01 MEASUREMENT**

No unit of measurement will be made for Internal Inspection of Sewer and Storm Drain Facilities.

The quantity of [FILL IN ITEM DESCRIPTION] will be measured per [UNIT].

No direct measurement shall be made for [FILL IN ITEM DESCRIPTION].

**BASIS OF PAYMENT**

**693.05.01 PAYMENT**

Unless otherwise provided in the Special Provisions, no payment will be made for Internal Inspection of Sewer and Storm Drain Facilities as such. The cost thereof shall be considered as included in the price bid for CIPP liner, sewer pipelines, sewer manholes, storm drain pipelines and structures, or for which such Internal Inspection is required.

The accepted quantity of [FILL IN ITEM DESCRIPTION] will be paid for at the contract unit price of [UNIT] and shall include all materials, equipment and labor required including, but not limited to, [FILL IN] and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Unless otherwise provided in the Special Provisions, no payment will be made for [FILL IN ITEM DESCRIPTION] as such. The cost thereof shall be considered as included in the price bid for construction or installation of the items to which [FILL IN ITEM DESCRIPTION] is required.

**END OF SECTION 693**