

Document 00911

NOTICE OF
ADDENDUM NO. 1

Date of Addendum: 06-08-15

PROJECT NAME: FY2016 Storm Sewer Inspection and Cleaning Work Orders#1

PROJECT NO: M-430301-0010-4

BID DATE: June 11, 2015

(There is no change to the Bid Date.)

FROM: Rod Pinheiro, P.E., CFM
City of Houston, Public Works and Engineering Department
611 Walker Street, 20th Floor
Houston, Texas 77002
Attn: Pooja Bhatta, Project Manager

TO: Prospective Bidders

The referenced Addendum forms a part of the Bidding Documents and will be incorporated into the Contract documents, as applicable.

Written questions regarding this Addendum may be submitted to the Project Manager following the procedures specified in Document 00200 – Instructions to Bidders. Immediately notify the City Engineer through the named Project Manager upon finding discrepancies or omissions in the Bid Documents.

This Addendum includes:

ADDENDUM SYNOPSIS

Changes to Project Manual
Bidding Requirements



Rod Pinheiro, P.E., CFM
Assistant Director
Storm Water Maintenance Branch
Street and Drainage Division

DATED: 06-08-15

END OF DOCUMENT

00911-1
06-08-2015
ADDENDUM No. 1



Document 00910

ADDENDUM NO. 1

Date of Addendum: 06-08-15

PROJECT NAME: FY2016 Storm Sewer Inspection and Cleaning Work Orders#1

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This Addendum forms a part of the Bidding Documents and will be incorporated into the Contract documents, as applicable. Insofar as the original Project Manual and Drawings are inconsistent, this Addendum governs.

This Addendum uses the change page method: remove and replace or add pages, or Drawing sheets, as directed in the change instructions below. Change bars (|) are provided in the outside margins of pages from the Project Manual to indicate where changes have been made; no change bars are provided in added Sections. Reissued Drawing Sheets show the Addendum number below the title block and changes in the Drawing are noted by a revision mark and enclosed in a revision cloud.

CHANGES TO PROJECT MANUAL

SPECIFICATIONS

1. Document 02559 – Cleaning and Television Inspection of Storm Sewer. **Remove this document in its entirety and replace with the attached revised Document.**

CLARIFICATIONS

2. Regarding questions related to the Hire Houston First program, please refer to Document 00210 – Supplementary Instruction to Bidders. For additional information please also go to: <http://www.houstontx.gov/obo/hirehoustonfirst.html>.

3. Contractors will be mainly requested to clean lines that are in **Medium** or **Heavy** Operation and Maintenance (O&M) Condition, please refer to revised Document 02559 – Cleaning and Television Inspection of Storm Sewer.

END OF ADDENDUM NO. 1



Rod Pinheiro, P.E., CFM
Assistant Director
Storm Water Maintenance Branch
Street and Drainage Division

DATED: 06-08-15

END OF DOCUMENT



Section 02559

**CLEANING AND TELEVISION INSPECTION
OF STORM SEWERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cleaning of storm sewer lines to remove solids, light roots, soil, sand, pieces of broken pipe, bricks, grease, grit, and other debris from storm sewer lines and manholes, thus improving flow and facilitating television inspection for storm sewer evaluation. **Cleaning also includes initial manhole wall washing by high-pressure water jet.**
- B. Television inspecting the line to obtain quality Closed-Circuit Television (CCTV) video and Television Inspection Reports **in digital format** which will identify the location and extent of storm sewer line defects to allow the PROJECT MANAGER to determine rehabilitation needs, to document pre-rehabilitation line condition, and/or to document post-rehabilitation line condition.
- C. The provision of Sonar data collection provides an accurate determination of pipeline conditions below the fluid level. This information is to be captured for the duration of the inspection so that the entire pipeline is represented. The data must be displayed to the operator in real-time to ensure maximum quality and to help with platform maneuvers. The data must be logged in a digital format to enable extraction of any relevant information, such as sediment depth, pipe shape, etc.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices:

1. **Normal Cleaning** Equipment: Measurement for cleaning storm sewer mains all depths with normal cleaning equipment is on a **linear-foot basis**. The Contract unit price for cleaning with normal equipment is full payment for storm sewer line actually cleaned and accepted.

Cleaning using normal cleaning equipment includes:

- a. Charges for transient water meter setup and water usage.
- b. Collection, removal, transportation, and legal disposal of liquid wastes, soil, light roots, sand, and other debris.
- c. Locating, exposing, and opening manholes on storm sewers to be cleaned.
- d. **Initial manhole wall washing with high-pressure water.** Payment for additional cleaning and scrubbing of manhole walls which may be required for manhole rehabilitation is included in the unit price for manhole wall sealing as specified in Section 02555 - Manhole Rehabilitation.
- e. It is the CONTRACTOR's responsibility to reconstruct manholes dismantled for cleaning equipment access, and to repair damage caused by dismantling or cleaning equipment.

2. **Cleaning Using Heavy and/or Mechanical Cleaning Equipment:** Measurement for cleaning storm sewer mains at all depths with mechanical cleaning equipment is on a cubic yard basis for the quantity approved by the PROJECT MANAGER. The Contract unit price for cleaning storm sewer mains with remote and man entry cleaning equipment is paid in addition to the unit price for cleaning using normal cleaning equipment. Mechanical cleaning is limited to locations approved by the PROJECT MANAGER on a case-by-case basis after normal cleaning methods have failed to produce satisfactory results as determined by viewing videos, and where it has been determined that large deposits of debris or root growth exist within the storm sewer lines and that mechanical equipment will be used to facilitate the removal of such deposits. Compliance with this section requires substantial effort towards cleaning.

The CONTRACTOR shall also note the following:

- a. Mechanical cleaning prior to normal cleaning does not relieve the CONTRACTOR of the responsibility for fully cleaning the pipe with normal cleaning equipment.
 - b. Unit price for cleaning using heavy and mechanical equipment is compensation in full for all collection, removal, transportation, and legal disposal of liquid wastes, soil, sand, and debris to an approved disposal site.
 - c. Measurement shall be by properly **executed waste manifest for roll-off container**. The container shall be provided by the CONTRACTOR and available on site as needed. The container shall not be loaded with material other than debris from the storm sewer system, shall not contain excessive free water, and shall be filled to the appropriate capacity for transportation.
 - d. Under this BID item, the CONTRACTOR shall remove all obstructions in the sewer. All debris must be removed from the sewer, including any debris that may have been washed up into any service connections (does not include known pre-existing conditions in service connections), drop connections, or the bench wall of the manholes. This includes all grease, rocks, debris, sticks, etc. that will reduce the hydraulic capacity of the sewer and limit future maintenance access of remote equipment. This Work will include an unlimited number of passes by high velocity hydro-cleaning equipment. A mechanical/hydraulic Spinner Nozzle may be used where necessary at no additional cost to the CITY; however, the CONTRACTOR shall be responsible for any damage to the sewer or any service connections.
 - e. The CONTRACTOR shall maintain detailed documentation of cleaning efforts made to remove these items. Such documentation shall be made available to the PROJECT MANAGER at any time.
 - f. The CONTRACTOR shall immediately notify the PROJECT MANAGER if he believes that this level of cleaning will cause a sewer collapse due to the existing deterioration of the host pipe. The PROJECT MANAGERS's determination as to whether to continue or stop work is final.
3. **Television Inspection:** Measurement of digital survey television inspection for pipe segments at all depths selected by the PROJECT MANAGER is on a **linear-foot basis**. Payment for survey television inspection is **made for the actual lengths of television inspection footage**, as measured in the field at grade, as submitted for evaluation prior to final recommendations of storm sewer rehabilitation method.
 - a. The recorded video must show the entire cross section of the sewer. Any flow control to remove standing water and debris shall be incidental to the contract. It is not the intent of this specification to require bypass pumping to control heavy flow; however, the CONTRACTOR must, at a minimum, make reasonable effort to control the flow by using flushing equipment to temporarily retain flow or to remove standing water. The

CONTRACTOR must also consider weather conditions to obtain the best video image of the sewer. This may require the CONTRACTOR to delay any video work after major rain events until the system can return to lower dry weather flow. The CONTRACTOR shall submit all electronic data as a single Modified National Association of Sewer Service Companies (NASSCO) – Pipeline Assessment and Certification Program (PACP) Certified Access Database, in **Microsoft Access format** inclusive of all electronic video, reports, logs, etc. for the Owner’s review as required and set forth in this specification.

- b. No separate payment will be made for the following:
 - i. Poor or unacceptable-quality video. Camera distortion, inadequate lighting, dirty lens and blurred or hazy pictures will not qualify for payment. If quality is not sufficient, CONTRACTOR will re-record the storm sewer segment at no additional cost to the CITY.
 - ii. Re-recording of any segment without prior approval of the PROJECT MANAGER.
 - iii. Portions of storm sewer not recorded. No payment will be made for length of sewer through which the camera could not pass.
 - iv. Reverse setups required to bracket an obstruction.
 - v. Storm sewer flow control.
 - vi. In the event that a buried manhole or a FAIR or POOR defect is found during televising operations, the camera shall remain at the location of the buried manhole or pipe defect while the CONTRACTOR determines the location of the manhole or defect at the surface. The CONTRACTOR shall prepare a sketch on an 8-1/2” x 11” location drawing showing the location of the buried manhole and/or defect in relationship to the general topography and storm sewer system and dimensioned to two permanent landmarks.
- 4. **Pre-Installation Cleaning:** No separate payment will be made for pre-installation cleaning using normal cleaning equipment of pipes. CONTRACTOR shall include cost for pre-installation cleaning in cost of line work for which the rehabilitation effort is performed. If a line is inspected and, in the opinion of the PROJECT MANAGER, found to require no rehabilitation work, payment of cleaning will be made on the basis of survey normal cleaning.
- 5. **Pre-Installation Television Inspection:** No separate payment will be made for pre-installation television inspection, except for lines inspected but not rehabilitated. CONTRACTOR shall include cost for pre-installation television inspection in the cost of line work for which the rehabilitation effort is performed. If a line is inspected and, in the opinion of the PROJECT MANAGER, found to require no rehabilitation work, CONTRACTOR will be paid for pre-installation television inspection on the basis of survey television inspection.
- 6. **Post-Installation Television Inspection:** No separate payment will be made for post-installation television inspection. CONTRACTOR shall include cost for post-installation television inspection in the cost of line work for which the rehabilitation is performed. The post-installation television inspection policy allows payment for work based on field-measured lengths indicated on the inspector’s daily reports, but still requires the CONTRACTOR to submit a post-installation video within one calendar month after segment completion. If no video is received within that period, credit for the previously paid line segment will automatically be deducted from pay estimates in following months until the required video is submitted.
- 7. **Abandoned Inspections:** If the CONTRACTOR is unable to complete the TV inspection of a mainline section after performing a reverse setup (i.e., obstructions that prevent the passage of the camera are encountered from both the upstream and downstream manhole), the CONTRACTOR shall be paid for television inspection of the **actual footage of pipe successfully televised**, if the portions televised were

found to be properly cleaned (free of debris) and the TV inspection video and report is of acceptable quality.

8. **Survey Sonar Inspection:** Measurement of survey Sonar inspection for pipe segments selected by the Engineer is on a linear-foot basis from centerline to centerline of manholes. Payment for survey Sonar inspection is made for the actual lengths of Sonar inspection footage, as measured in the field at grade, as submitted for evaluation. No separate payment will be made for the following:
- a. Poor or unacceptable-quality imaging. Images with data spikes will not qualify for payment.
 - b. Re-recording of any segment without prior approval of the PROJECT MANAGER.
 - c. Portions of storm sewer not recorded. No payment will be made for length of sewer through which the Sonar equipment could not pass.
 - d. Reverse setups required to bracket an obstruction.

1.03 DEFINITIONS

- A. **Normal Cleaning Equipment:** Cleaning devices such as rods, metal pigs, porcupines, root saws, snakes, scooters, sewer balls, kites, and other approved equipment in conjunction with hand-winch devices and gas or electric rod-propelled devices. Variable-pressure water nozzles (3,000 psi) are considered normal cleaning equipment.
- B. **Heavy and/or Mechanical Cleaning Equipment:** Buckets, scrapers, scooters, augers, root cutters, porcupines, kites, heavy-duty brushes, and other debris-removing equipment and accessories used in conjunction with approved power winching machines. High- to very-high-pressure water nozzles (10,000 psi) are considered mechanical cleaning equipment.
- C. **Survey Cleaning and Television Inspection:** Video inspection of existing storm sewers to evaluate lines and determine whether conditions exist which would require line rehabilitation.
- D. **Pre-Installation Television Inspection:** Video inspection by CONTRACTOR of storm sewer lines designated for rehabilitation to confirm cleaning, location of service connections, and constructability of line rehabilitation according to Drawings and Specifications.
- E. **Post-Installation Television Inspection:** Video inspection to determine whether rehabilitation of a storm sewer has been completed according to Drawings and Specifications.
- F. **Television Inspection Report:** After completion of each segment of storm sewer inspected, the CONTRACTOR shall furnish to the CITY a computerized report. This report will be generated by an onboard PACP compliant computer software, and will provide commentary on photographs and fault areas.
- G. **Analysis Module:** Analyzes all data input into the project, including pictures and videos. Provides a list of data that fit selected criteria, which the viewer/user shall be able to select to print (available in 4, 9, and 16 images/page) and also query by. Has the ability to toggle between the listing and its linked pictures, once a report is generated.

1.04 PERFORMANCE REQUIREMENTS

- A. The CONTRACTOR shall furnish all labor, components, materials, tools, and appurtenances necessary for the performance and completion of the proposed Work.

- B. The CONTRACTOR shall clean designated storm sewers and manholes using mechanical, hydraulically-propelled, or high-velocity storm sewer cleaning equipment. Select cleaning processes which will remove grease, soil, sand, silt, solids, rags, and debris from each storm sewer segment and associated manholes.
- C. The PROJECT MANAGER may determine that no additional line rehabilitation work is required if the cleaning operation shows the sewer line to be free of damage or deterioration. The PROJECT MANAGER may delete from the project any or all storm sewer lines which do not show a need for rehabilitation.
- D. Patents, Trade Secrets, and Copyrights: The CONTRACTOR shall pay all license fees and royalties and assume all costs incidental to their use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights, trade secrets protection rights, or copyrights held by others.
- E. Modified (**City of Houston Storm Sewer Condition Rating System**) PACP Requirements:
 - 1. Current NASSCO PACP certification of all CCTV operators working on this project will be required for all CCTV work.
 - 2. Database shall be a Modified (**City of Houston Storm Sewer Condition Rating System**) NASSCO-PACP (Current Version) Certified Access Database in **Microsoft Access format**.
 - 3. CCTV Software shall be NASSCO-PACP (Current Version) certified.
 - 4. CCTV inspections (Video and Data Collected) will be conducted entirely in electronic format.

1.05 SUBMITTALS

- A. Upon Award of the contract, the successful Bidder will be required to submit within seven (7) days prior to the Preconstruction Meeting:
 - 1. Name of the project supervisor and resumes.
 - 2. Documentation of NASSCO PACP certification for all CCTV operators, database and software.
 - 3. Site Safety Plan. A complete generic site safety plan must be submitted one week prior to the preconstruction meeting. Work will not begin until an approved site safety plan is in place.
 - 4. Sample inspection CCTV data and video or data from other approved inspection method.
- B. Upon Award of the contract, the CONTRACTOR shall CCTV at least three (3) segments or 1,000 feet of pipe and submit the data to the PROJECT MANAGER to verify that the CCTV database is compatible with the PROJECT MANAGER's Modified (**City of Houston Storm Sewer Condition Rating System**) PACP Database, and the deliverables are acceptable to the PROJECT MANAGER. The PROJECT MANAGER shall verify acceptability of the deliverables within five (5) business days of receipt. After the PROJECT MANAGER verifies compatibility of the

database, the PROJECT MANAGER shall then issue to the CONTRACTOR a written “Notice to Proceed” including a date for commencement of work. The CONTRACTOR shall begin work on the date stated in the written “Notice To Proceed” (but no later than 10 calendar days after receipt) with an adequate force and sufficient resources to demonstrate due diligence in the performance of the contract.

- C. The CONTRACTOR shall submit equipment manufacturer’s operational manuals and guidelines to the PROJECT MANAGER for review. CONTRACTOR shall strictly follow such instructions unless otherwise directed by the PROJECT MANAGER.
- D. The CONTRACTOR shall submit a list of lawful disposal sites proposed for dumping debris from cleaning operations.
- E. The CONTRACTOR shall submit and maintain **Liquid Waste Manifests** conforming to **City of Houston Health and Human Services requirements**. The CONTRACTOR shall send the owner’s and regulator’s copies of the completed manifests to the PROJECT MANAGER within 24 hours after disposal of waste materials.
- F. The CONTRACTOR shall keep records of the types of debris removed from each segment of pipe and provide these records in the format requested by the City.
- G. The CONTRACTOR shall maintain the master originals of all Videos and Television Inspection Reports submitted for a period of 5 years after final acceptance of the Contract.
- H. **WEEKLY DEFICIENCY & PRODUCTION SUBMITTAL:**

To facilitate regular and timely review of inspection products to correct any inspection deficiencies, the CONTRACTOR shall provide the CITY or its designated representative information regarding when field inspections are occurring by close of business the Tuesday following the completion of Work. This submittal shall document all inspection efforts during the prior week of inspections. At a minimum, this weekly submittal must include:

1. All electronic data shall be submitted as a single Modified (**City of Houston Storm Sewer Condition Rating System**)National Association of Sewer Service Companies (NASSCO) – Pipeline Assessment and Certification Program (PACP) Certified Access Database, in **Microsoft Access format** inclusive of all inspections and observations (noting defects and observations encountered during inspection) integrated and/or referenced appropriately (digital MPEG-4/AVI video files, digital still photograph files, electronic reports, indexing files).
2. Video and Corresponding indexing files for MPEG-4/AVI files and digital defect image files. MPEG files shall open using Windows Media Player, regardless if the individual viewing the video has CONTRACTOR’s approved equal CCTV software.
3. Color “Inspection Reports” for each inspection. (This may be submitted as an Adobe Acrobat PDF file.).
4. An updated listing of incomplete CCTV segments and segments which were not able to be attempted along with an explanation why Work was not completed.

5. The CONTRACTOR shall provide a color Exhibit for which CCTV was conducted clearly identifying (by highlighting) the segments which were televised including designations of the UFIDs. Any intermediate and buried manholes shall be clearly labeled and noted on the plat sheet that it is “Buried and Located.”
6. The CONTRACTOR shall also provide with each submittal a map with the overall layout of the storm sewers. (If a current line, show UFID; if new construction, show ID used on construction plans.)
7. Location Sketch Sheet where POOR defect and/or buried/located manhole was identified.
8. Geographic Information System (GIS) correction and sketch sheet when new manhole was found between segments.
9. Submittal of the CCTV videos and the Television Inspection Reports for PROJECT MANAGER’s review can be sent through CONTRACTOR’s FTP site or cloud storage (e.g. Dropbox, Pogo plug, Amazon Cloud Drive, or equivalent) and be available for download but must follow the folder architecture of Contract # folder then the UFID subfolder containing corresponding video, photographs, and pdf reports.
10. After full review, the CITY or its designated representative shall either approve or reject each inspection effort and provide the CONTRACTOR reasons for any rejected inspections. The CITY or its designated representative shall indicate its acceptance of an inspection by initialing the corresponding inspection on the Weekly Inspection Inventory Report. Further, upon completion of its review, the CITY or its designated representative shall provide the CONTRACTOR a copy of this Weekly Inspection Inventory Reports with its approvals or rejections noted. This reviewed Weekly Inspection Inventory Report shall serve as the basis for the CONTRACTOR’s invoice(s). CONTRACTOR may provide additional information and/or documentation as necessary to gain approval from the CITY or its designated representative, but in any event, this additional documentation or information must be provided in subsequent Weekly Inspection Inventory Logs.
11. The CONTRACTOR shall provide videos of quality sufficient for the PROJECT MANAGER to evaluate the condition of the storm sewer, locate the storm sewer service connections, and verify cleaning. If quality is not sufficient, CONTRACTOR shall re-record the storm sewer segment and provide a new digital file (as file on portable cloud storage) and Television Inspection Report at no additional cost to the CITY. Camera distortion, inadequate lighting, dirty lens, and blurred or hazy pictures will be causes for rejection of video and the associated line segment.
12. Videos and Reports submitted become the property of the CITY.

1.06 QUALITY ASSURANCE

- A. **Qualifications:** CONTRACTOR shall use experienced personnel to operate cleaning equipment and devices.
- B. Acceptance of storm sewer cleaning work is subject to successful completion of the television inspection. If inspection shows solids, sand, grease, grit, or other debris remaining in the line, the cleaning is considered unsatisfactory. CONTRACTOR shall repeat cleaning and video inspection of the sewer line until cleaning is acceptable by the PROJECT MANAGER.

- C. **Unable to Penetrate:** If the CONTRACTOR is unable to penetrate a line during cleaning or TV inspection, the CONTRACTOR will call the PROJECT MANAGER within 24 hours of the event.
- D. **Analysis Module:** All data input into the project, including pictures and video clips, shall be able to be analyzed via this module. This module shall provide a list of printouts of data that fits selected criteria. The viewer/user shall be able to select criteria to print, and also query by these criteria. Once a report (listing) is generated, the ability to toggle between the listing and pictures that link to that listing shall be available. The picture printouts shall be available in 4, 9, and 16 images per page.

PART 2 PRODUCTS

2.01 CLEANING EQUIPMENT

- A. CONTRACTOR shall select cleaning equipment and methods based on the condition of the storm sewer mains at the time work begins. More than one method or type of equipment may be required on a single project or at a single location.
- B. When requested by the PROJECT MANAGER, the CONTRACTOR shall demonstrate the performance capabilities of cleaning equipment and methods proposed for use on the project. If results obtained by demonstration are not satisfactory, the CONTRACTOR shall provide other equipment that will clean the storm sewer line.
- C. For high-velocity cleaning, CONTRACTOR shall use a water jet capable of producing minimum volume 50 gpm with a pressure of 1500 psi at the pump. Install gauge to indicate working pressure on the discharge of high-pressure water pumps. In addition to conventional nozzles, CONTRACTOR shall use a nozzle which directs the cleaning force to the bottom of the pipe for sewers 18-inches and larger.
- D. When hydraulic or high-velocity cleaning equipment is used, **CONTRACTOR shall install a suitable sand trap, weir, dam or suction device in the downstream manhole so that solids and debris are trapped for removal.**
- E. When approved by the PROJECT MANAGER, both hydraulic cleaning and mechanical cleaning equipment (including pumps) may be employed to clean a storm sewer line segment.

2.02 CLEANING ACCESSORIES

- A. When an additional quantity of water from the public water supply is needed to meet the cleaning requirements of the equipment and the storm sewer, CONTRACTOR shall obtain transient water meters from the CITY for installation on trucks or at fire hydrants.
- B. CONTRACTOR shall obtain prior written approval when using a fire hydrant located in the Downtown Houston area as required by Houston Fire Department Regulations. However, prior written approval from the Department of Public Works or PROJECT MANAGER is not needed to use fire hydrants located elsewhere within the City of Houston.
- C. All cleaning equipment must be equipped with backflow preventers to prevent contamination to the public water supply.

2.03 VIDEO EQUIPMENT AND DIGITAL SUBMITTAL INFORMATION

- A. The CITY will provide storm sewer (gravity main) maps with each line segment and corresponding unique field identifier (UFIDs) for those areas (outfall drainage areas) where storm sewers will be cleaned and inspected by Closed-Circuit Television (CCTV). Maps will be provided as GIS shapefiles, pdfs. It should be noted that these storm sewer maps may not be completely accurate in terms of spatial location of noted sewers, structures, etc. and pipe connectivity. In addition maps will only contain storm sewers that are to be cleaned and inspected, but other gravity mains may be encountered in the field. CONTRACTOR shall coordinate with PROJECT MANAGER and provide GIS/Geographic Information Management System (GIMS) correction form, as necessary, to reconcile mapping inaccuracies identified through CCTV inspection activities. Due to inaccuracies introduced into the GIS system through the various steps of data collection, sewers can contain duplicate or missing UFIDs.
- B. Digital Submittal Structure & Data Development - The digital information to be submitted by CONTRACTOR shall contain files which store each line segment as a unique digital record. The unique field identifiers (UFIDs) provided by the CITY shall be used for each inspection, such as "6216881". This will allow for proper association between each inspection and the appropriate video, digital photograph, and inspection report.

The identified UFID ID must be spelled correctly. A correctly spelled UFID No. is required to spatially identify the pipe location and display the televised pipe segment in GIS or similar mapping software. This includes using the numbers "0" instead of the letters "o".

All electronic data shall be submitted in **Microsoft Access** format. Any variation from the requirements shall be subject to approval by the PROJECT MANAGER. If approved, the CONTRACTOR shall provide the CITY all required software and future updates, support and necessary license to use the software, in perpetuity at no cost to the CITY.

The CONTRACTOR shall follow the CITY's codes following the specifications set forth here. The CONTRACTOR shall provide the CITY with the line segment video, JPEG digital still photograph of FAIR and POOR defects (see sample table below for **Storm Sewer Condition Rating System** defects), hard copy and electronic copy of report for the inspections. Please note that CITY's latest **Storm Sewer Condition Rating System** codes will be provided at the time of the Contract notice to proceed.

A NEW inspection shall be started where a manhole is located. This includes new manholes identified in the field, but not previously identified in the CITY mapping. Therefore, no manholes shall be at a midpoint of an inspection report; only at the beginning and the end of each inspection. Inspection runs shall begin and end at manholes unless an obstruction is encountered. Not all line segments will have both an upstream and downstream manhole. Lateral connections from inlets, material changes, or breaks in grade are not approved locations to begin/end an inspection. Said features shall be logged on the recording. If CONTRACTOR, uses a lateral connection from inlets, material changes, or breaks in grade as a begin/end point for televising, the CITY will reject said segment.

If CONTRACTOR finds an UNKNOWN manhole between segment, CONTRACTOR shall fill out and submit to the CITY for corrections the GIMS correction form sketching on 8-1/2" x 11" the location of the new manhole dimensioned to two permanent landmarks. In this situation the upstream gravity line will be labeled with original UFID and consequent lines with UKN000X (with X = 1 for first, 2 for second, and so forth for consequent UNKNOWNs). The UNKNOWN naming convention should also be used for any unlabeled gravity lines.

Table 1: DRAFT - City of Houston Storm Sewer Condition Rating System

Condition	Defect Types	Estimated time to Failure
1.0 GOOD: Acceptable structural condition	1.1 - Cracks: Longitudinal/Circumferential/Multiple/Spiral	Unlikely in the foreseeable future
2.0 FAIR : Defects that will become grade 3 defects within the foreseeable future 1 = lowest 6 = highest	2.1 - Joint Displacement: Less than 1.0 pipe wall thickness 2.2 - Hole: where Soil is visible beyond defect 2.3 - Inflow/Infiltration: Running, Trickling 2.4 - Fractures: Longitudinal/Circumferential/Multiple/Spiral 2.5 - Deteriorated/Surface Damage: Exposed reinforcement of pipe wall thickness (rebar visible) 2.6 - Tap/ Service Connection: When connected to main line between flow line and ½ diameter with 25% - 50% diameter loss	1 - 5 years
3.0 POOR : Defects requiring immediate attention 1 = lowest 7 = highest	3.1 - Deteriorated/Surface Damage: Exposed reinforcement pipe wall thickness 3.2 - Joint Displacement: When greater than 1.0 pipe wall thickness 3.3 - Deformed/ Broken: Loss of visible structural integrity 3.4 - Inflow/Infiltration Structural: Gushing, Spurting, Constant Flow 3.5 - Tap /Service Connection: When connected to main line between flow line and ½ diameter with > 50% diameter loss 3.6 - Hole: where Major Void is visible beyond defect 3.7 - Collapsed Pipe	0-1 years Has failed or will likely fail

Table 2: DRAFT - City of Houston Storm Sewer Operation and Maintenance (O&M) and Miscellaneous Rating System

O & M			Miscellaneous
Debris Code 1. Light - < 25% diameter loss 2. Medium- 25% - 50% diameter loss 3. Heavy - > 50% diameter loss	Root Code 1. Light - < 25% diameter loss 2. Medium - 25% - 50% diameter loss 3. Heavy - > 50% diameter loss	Inflow/ Infiltration (I/I)	Water Level
Light¹	Light¹	N/A	N/A
Medium²	Medium²	Considerable Evidence - Running, Trickling	Medium: 50% - 75% Pipe Size
Heavy²	Heavy³	Great Evidence - Gushing, Spurting, Constant Flow	High: > 75% Pipe Size

Each inspection must have ONE video (MPEG-4/AVI file), which shall utilize the same naming convention as the UFID ID. There must be no video included without an associated inspection and no inspection without a video. This provides for a proper link of the video to the inspection when imported into GIS or similar mapping software. If there is a problem with the video before the segment is complete, a new video must be restarted at the beginning manhole. The only exception to this is when an obstruction is encountered. In this case, the video and inspection report shall be ended, and a new inspection shall be started from the downstream manhole or outfall and continued until the obstruction is encountered from the opposite direction.

The television inspection software used by the CONTRACTOR shall allow future linking with Microsoft Access any mapping system that is using DDE (Dynamic Data Exchange) communication. Upon request, the vendor shall provide information on the fields necessary to search from the mapping system. A metadatabase (metadb) structure shall be available for storing this information.

Prior to submitting a deliverable to the CITY, quality control shall be executed by the CONTRACTOR to ensure all submittals are compliant with this specification set forth. Any submitted data which is not compliant shall be returned and the CONTRACTOR shall correct all deficiencies before the line segment is accepted and payment approved.

The complete project shall be accessible off external hard drives and cloud storage using a read-only software that allows any user to view the project (standalone viewer). Unlimited copies of this read-only software shall be provided from the CONTRACTOR.

CONTRACTOR field crews and office staff will coordinate with PROJECT MANAGER regarding issues concerning data management prior to the start of any video inspection activities.

- C. **COMPLIANT DATABASE** - A single Microsoft Access format database with the following information integrated and/or referenced appropriately: digital MPEG-4/AVI video files, digital still photograph of all FAIR and POOR defects taken down the long axis of the pipe in JPEG format, Inspection Reports for each relevant inspection with an indexing file system.

In addition to the **Microsoft Access** format database compliance, the CONTRACTOR shall ensure each observation in the database is properly referenced to the CITY UFID and that elapsed times are correct, and video MPEG files and defect image files are appropriately referenced.

- D. **TELEVISION INSPECTION AND COMPUTERIZED EQUIPMENT** - All videos shall be submitted in accordance with the specifications set forth here.

Video Equipment: Select and use video equipment that will produce digital color videos.

Pipe Inspection Camera: The CONTRACTOR shall use a color pan tilt and zoom camera or a digital side scanning camera (panoramic) specifically designed and constructed for storm sewer inspection (pans \pm 275 degrees and rotates 360 degrees). The pan, tilt, zoom camera shall pause, pan, and visually inspect all service connections, pipe ends, and maintenance or structural defects. Camera must have an accurate footage counter, which displays on the monitor the exact distance of the camera from the centerline of the starting manhole. Use a camera with a camera height adjustment so that the camera lens is always centered at one-half the inside diameter, or higher in the pipe being inspected. Provide a lighting system that allows the features and condition of the pipe to be clearly seen. A reflector in front of the camera may be required to enhance lighting in dark or large diameter pipe. If a blockage cannot be removed and hampers the televising of the sewer in one direction, then the CONTRACTOR shall attempt to complete the segment by televising from the other manhole to complete the segment. This reversal must immediately follow the initial direction on the same report. The CONTRACTOR must immediately report the obstruction to the PROJECT MANAGER. CONTRACTOR shall perform all CCTV inspections in accordance with the Modified (**City of Houston Storm Sewer Condition Rating System**) NASSCO's Pipeline Assessment Certification Program (PACP). Images of both manholes of each segment shall also be provided on each CCTV report to document their condition from the casting to the invert. CCTV inspections will be conducted entirely in digital format. All panoramic side scanning inspection survey shall be recorded in an acceptable panoramic format and submitted with digital links to the survey. All cleaning and television inspection reports shall be within +/- two (2) feet of the measured linear footage between manholes along the existing sewer centerline from the start of pipe to end of pipe. Work not following these specifications may be rejected for payment and the CONTRACTOR may be required to re-do the Work.

The sewer video shall be MPEG4/AVI format. The purpose of video recording shall be to supply a visual and audio record of all line segments that are televised. The CONTRACTOR shall provide an intelligible audio description in English of each observation, including the location of the line segment at the same time that the inspection is performed. Video recording playback shall be at the same speed that it was recorded. Slow motion or stop-motion playback features may be supplied at the option of the CONTRACTOR. The CONTRACTOR shall have all video and necessary playback equipment readily accessible for review by the CITY during the project. Each video and associated inspection reports and field forms shall be submitted to the PROJECT MANAGER for review. The video including the audio portion shall be a deliverable and will be required for completion of the Work for each segment televised. Only Digital Videos and digital reports submitted on a Portable External Hard Drive or on Cloud Storage Service (CONTRACTOR must provide link, username, and login credentials) will be accepted by the PROJECT MANAGER.

The ELAPSED TIME column of an inspection shall be verified as accurate by the CONTRACTOR. If the elapsed time values are inaccurate, they shall be corrected by the CONTRACTOR before the submittal to the CITY.

Sites shall be televised in one continuous run. If a tractor camera is not usable, crews shall use a winch and pulley system, if feasible, to pull the camera through to complete the run. Incomplete runs (runs which the CITY's representative deems as televisable by alternate methodology such as winch and pulley) will not be paid for unless consent is obtained from the CITY's representative. Should a storm sewer be judged to be impassable by the CITY's representative, televising crews will be permitted to move on to an alternate site. Unusual conditions, roots, storm sewer connections, broken pipe, and other discernible features will be recorded and a copy of such records will be supplied to the CITY. The CONTRACTOR shall submit the photographs in JPEG format.

- E. **PHOTOS** - Digitized images of all FAIR and POOR defects identified shall be taken in JPEG format; their location shall be also noted on the Inspection Report.

The approximate location of POOR defects shall be identified on the ground surface with appropriate color paint. In addition, the CONTRACTOR shall prepare a sketch on 8-1/2" x 11" location drawings showing the location of the defects and/or buried manhole dimensioned to two permanent landmarks.

- F. **INSPECTION REPORTS** - After completion of each segment of storm sewer inspected, the CONTRACTOR shall furnish to the CITY a computerized Television Inspection Report. This report will be generated by an onboard PACP compliant computer software and will provide commentary on photographs and fault areas. The report will describe structural defects, misalignment, infiltration sources, and root intrusions. The report will also describe location of roots, defective joints, defective pipes, storm sewer line depressions, break-in lateral connections, and sediment accumulations.

The report shall be divided into two parts; Structural and Operational & Maintenance Inspection, and CCTV condition inspection utilizing the CITY's latest **Storm Sewer Condition Rating System** codes at the time of the Contract notice to proceed. All work on the contract shall follow the same codes.

Each image capture or video clip capture of a defect shall be indexed to identify its location. Each image shall be maximized to be viewable on the majority of the PC screen. A true-to-scale report for individual sections shall be printable and viewable on screen. Two written sets of reports shall be furnished to the CITY that include the following information:

Comprehensive data for each section header shall only include the following fields of information:

Segment Number: automatically defaults to sequential number
Cleaned Date: default input from computer
Comment Time: default input from computer

1. SURVEYED BY: Name of the Operator.
2. CERTIFICATE NUMBER: NASSCO PACP certification number of operator.
3. OWNER: Please populate with “ The City of Houston”.
4. DRAINAGE AREA: The watershed that the line segment is located in; an alpha-numeric field with 10 spaces available (e.g., IA010).
5. SHEET NUMBER: Page number if applicable.
6. UFID: Indicate UFID No. of each line segment as a unique digital record. The unique field identifiers (UFIDs) PROVIDED BY THE CITY shall be used for each inspection, such as “6216881”. The identified UFID ID must be spelled correctly. A correctly spelled UFID No. is required to spatially identify the pipe location and display the televised pipe segment in GIS or similar mapping software. This includes using the numbers “0” instead of the letters “o”.
7. DATE: The date that the video was recorded (same as the date shown on the display screen), a numeric field with 8 spaces available (e.g., 11/22/2015).
8. TIME: The time that the video was recorded.
9. ADDRESS: The physical location of the line segment (for the line segment, not the manholes). If the line segment covers more than one location, then state the location at the majority of line segment.
10. UPSTREAM MH UFID No.: Indicate UFID No. of each MH as a unique digital record. The unique field identifiers (UFIDs) PROVIDED BY THE CITY shall be used for each inspection, such as “6216881”. The identified UFID ID must be spelled correctly. A correctly spelled UFID No. is required to spatially identify the pipe location and display the televised pipe segment in GIS or similar mapping software. This includes using the numbers “0” instead of the letters “o”.
11. UPSTREAM RIM TO INVERT: The depth, measured from the top of the manhole frame of the upstream manhole to the invert of the upstream manhole, in feet and tenths of a foot; a numeric field with 3 spaces available, including one space for a decimal (e.g., 6.9 FT).
12. DOWNSTREAM MH UFID No.: Indicate UFID No. of each MH as a unique digital record. The unique field identifiers (UFIDs) PROVIDED BY THE CITY shall be used for each inspection, such as “6216881”. The identified UFID ID must be spelled correctly. A correctly spelled UFID No. is required to spatially identify the pipe location and display the televised pipe segment in GIS or similar mapping software. This includes using the numbers “0” instead of the letters “o”.
13. DOWNSTREAM RIM TO INVERT: The depth, measured from the top of the manhole frame of the downstream manhole to the invert of the downstream manhole, in feet and tenths of a foot; a numeric field with 3 spaces available, including one space for a decimal (e.g., 7.4FT).
14. DIRECTION: Direction of camera in relation to flow.
15. PIPE HEIGHT: The inside dimensions up and down of the pipe in inches
16. PIPE WIDTH: When not circular, the dimensions side to side of the pipe in inches
17. PIPE SHAPE: Circular, Elliptical, Box, Arch, Other)

18. PIPE MATERIAL: RCP, CMP, PVC, HDPE, Other
19. WEATHER: The existing weather conditions at the time that the inspection was made; an alpha-numeric field with 10 spaces available (e.g., Cloudy).
20. WORK ORDER No.: Since this number will be provided by the CITY, this field shall be left blank. This is an alpha-numeric field with 10 spaces available.
21. WBS No.: Since this number will be provided by the CITY, this field shall be left blank. This is an alpha-numeric field with 10 spaces available.
22. HIGHEST CONDITION RATING SCORE: Highest defect observation score from the latest version of the City of Houston Storm Sewer Condition Rating System.
23. ACTUAL LENGTH (FT.) OF TV INSPECTION: The actual lengths of television inspection footage.
24. ADDITIONAL INFORMATION: Use this field when applicable.

As a segment is completed with corresponding observations, captured pictures, and video clips; the segment shall be available for viewing in a graphic displayed on screen and able to be printed out true-to-scale. All data coordinating with each segment shall be easily comparable, with the viewer having access to scroll between segments, comparing only data.

Comprehensive data for **each defect/observation** in a section, including:

Location	Code for Defect
Defect Description w/ o'clock position	Severity Rating
Image Capture of defect (if appl.)	Videotape Number
Video clip Capture of Defect (if appl.)	Video clip Counter Number

- G. **REPORT GENERATION** - The software used by the CONTRACTOR shall allow for printing of a true-to-scale graphic depicting a line segment. This graphic shall show all section data as entered in the software. Printing of the graphic shall show all observation/defects input in a line segment. Each observation printed shall have the footage with a line pointing to the specific location on the graph where the observation occurs.

The following printouts shall be available from the software and all of these printouts shall be able to preview on screen:

Project Page: Prints out all information on client, PROJECT MANAGER, and CONTRACTOR.

Section: Prints out the true-to-scale graphic mentioned above.

Images: Pictures of each section shall be printed out as 4, 9, and 16 per page. These pictures shall be selected via the analysis module or particular section numbers. All printed pictures shall include a header that includes locations, street, date, and section number. Each picture shall show below the frame the footage location the image was captured at, the photo number, and overlay information shall appear in the captured picture.

Legend: The legend of damages shall be able to print out in coordination with the colors selected in the software.

Queried Reports: All for querying of any and all information input into a completed project.

2.04 SONAR UNIT

- A. The Sonar unit shall be digital and capable of operating in pipelines with diameters from 36" (0.9m) to 240" (6m). The Sonar shall have a remotely programmable frequency range of 600 kHz to 1.0 MHz and will log 2D profile information in a numeric format.
- B. The viewing application shall be available via online download and automatically check for updates.

The application shall provide a list of all pipeline segments included in the project identified by manhole number or segment ID. The user shall be able to query among all segments to highlight area(s) of interest or enumerate particular issues.

Selecting a segment should present detailed header information as well as a distance-based chart of the observations associated with that segment from all sensors. Within each selected segment, the user should be able to conduct activities such as Multi-View, Plot, Playback, and Export.

The following must all be available except in cases where the required data was not collected:

1. Multi-View. The following visualizations and plots are meant to describe the information types available. Each can be individually accessed. The application also offers multi-view capability within which any or all of the following can be viewed simultaneously to provide a comprehensive visualization of the pipe interior.
2. 3D LADAR visualization. The viewing application shall provide the user with the ability to select a location along a segment's distance-based chart and retrieve the nearest 3D LADAR visualization. This shall be a three dimensional visualization of the 3D LADAR's range measurements within which the user can rotate and zoom on any axis. The visualization shall be colored to reflect deviations from the as-built (if provided).
3. Pipe Diameter Cross-Section Plot. The viewing application shall provide the user with the ability to select a location along a segment's distance-based chart and retrieve the nearest diameter cross-section. The plot shall be overlaid on the as-built of the pipe for visualization of corrosion and provide a numeric indication of corrosion severity.
4. Ovality Cross-Section Plot. The viewing application shall provide the user with the ability to select a location along a segment's distance-based chart and retrieve the nearest ovality cross-section. The plot shall be overlaid on the as-built of the pipe for visualization and shall also include the ASTM ovality calculation.
5. Cross-Sectional Area Reduction Plot. The viewing application shall provide a plot of the cross-sectional area reduction due to sediment versus distance.
6. Sediment Volume Plot. The viewing application shall provide a plot of cumulative sediment volume versus distance.

7. Export Capabilities. The viewing application shall include the capability to export information in the form of a NASSCO PACP (Current Version) certified database or Microsoft Access for import into common 3rd party applications. In addition, it shall include the capability to generate segment summary reports in PDF.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin cleaning until both upstream and downstream manholes have been checked for flow monitors and other mechanical devices. Refer to Section 02555 - Manhole Rehabilitation.

3.02 PREPARATION

- A. Cleaning:

1. Take precautions to protect storm sewer mains and manholes from damage that might be inflicted by the improper selection of cleaning processes or improper use of equipment. When using hydraulically-propelled devices take precautions to ensure that the water pressure created does not cause damage to or flooding of public or private property. Do not surcharge any storm sewer to an elevation that could cause overflow into area waterways, homes, or buildings, or onto the surface.
2. If observed defects are believed to be such that further cleaning operations may compromise the structural integrity and/or cause the pipe to become unusable, the CONTRACTOR must provide written communication to the PROJECT MANAGER of the observed condition(s) and reason to believe that continued cleaning operations may cause substantial damage. The PROJECT MANAGER will then direct the CONTRACTOR as to what services, precautions, etc., the PROJECT MANAGER will require of the CONTRACTOR.
3. Do not use or obstruct fire hydrants when there is a fire in the area. Remove water meters, fittings and piping from fire hydrants at the end of each working day.
4. Exercise care to prevent contamination of the potable water system. Use an appropriately sized backflow preventer as required by the City of Houston Water Department when drawing water from a public hydrant.
5. Where possible, use the flow of storm water present in the storm sewer main to provide fluid for hydraulic cleaning devices.

- B. Document results of video inspections using the Television Inspection Report form following this Section.

3.03 CLEANING

- A. Conserve Water. Do not waste water from the public water supply through poor connections, hydrants left open, or any other cause.

- B. Collapsible Dams: Use collapsible dams for hydraulically-propelled devices which require a head of water to operate. Dam shall be easily collapsible to prevent damage to the sewer, public property, and private property.
- C. High Velocity Cleaning: Operate high-velocity cleaning equipment so that the pressurized nozzle moves continuously. Turn off or reduce the flow to the nozzle to prevent damage to the line any time the nozzle becomes stationary.
- D. Mechanical Cleaning: In addition to normal cleaning equipment, perform mechanical cleaning when required and approved using equipment and accessories as defined in this Section.
- E. **Debris Disposal:** Remove sludge, soil, sand, rocks, grease, roots, and other solid or semi-solid material resulting from the cleaning operation at the downstream manhole of the section being cleaned. Passing debris from any storm sewer section to any other storm sewer section is not allowed. Load debris from the manholes into an enclosed container permitted by the CITY's Health and Human Services Department for liquid waste hauling. **Remove solids and semi-solids resulting from cleaning operations from the site, and dispose of lawfully at the end of each work day.** Do not accumulate debris, liquid waste, or sludge on the site except in totally enclosed containers approved by the PROJECT MANAGER.
- F. Disposal Sites: Dispose of waste at a lawfully-permitted disposal site using a transporter holding a valid City Liquid Waste Transporter Permit.

3.04 TELEVISION INSPECTION

- A. Immediately after cleaning, video inspect the storm sewer line to document the condition of the line. Notify the PROJECT MANAGER 24 hours in advance of any television inspection so that the PROJECT MANAGER may observe inspection operations.
- B. Perform television inspection of storm sewers as follows:
 - 1. Perform a survey television inspection on storm sewers within the boundary of the project, as directed by the PROJECT MANAGER. After reviewing survey video, the PROJECT MANAGER will determine which storm sewers will be rehabilitated or need additional work.
 - 2. Perform pre-installation television inspection immediately after cleaning and before line rehabilitation work. Pre-installation video inspection is not required for sewer lines designated to be removed and replaced. Verify that the line is clean and ready to accept the line rehabilitation. Prepare Television Inspection Report forms. Maintain copies of all video reports for reference by the PROJECT MANAGER for the duration of the project.
 - 3. Digital videos shall pan all manholes showing benches, walls, annular spaces, and debris removal. Camera operator shall slowly pan each service connection, clamped joint and pipe material transition from one material to another. Complete and submit a Television Inspection Report for every sewer segment video submitted to the PROJECT MANAGER.

4. Perform post-installation television inspection to confirm completion of rehabilitation work, including removal and replacement. Verify that rehabilitation work conforms to the requirements of the Drawings and Specifications. Provide a video showing the completed work, including the condition of restored service connections. Prepare and submit Television Inspection Report forms providing the location of service connections along with the location of any discrepancies. Post-installation video of completed manholes may be substituted for photographic documentation, as described in Section 02555 – Manhole Rehabilitation. Manhole work, including benches, inverts and pipe penetrations into manhole, should be complete prior to post-installation video work.
5. CONTRACTOR shall make **actual measurement of pipe** inside dimensions and record measurement to nearest tenth of one inch as “pipe size” on “Television Inspection Report” and on “Video Header”.
 - C. Survey television inspection videos shall be continuous for pipe segments between manholes. Do not leave gaps in the video recording of a segment between manholes and do not show or submit a single segment more than **once**, unless specifically allowed by the PROJECT MANAGER.

3.05 FLOW CONTROL

- A. Perform survey television inspection on one manhole section at a time. Adequately control the flow in the section being inspected. Do not exceed the depth of storm water flow shown below:

<u>Pipe Diameter</u> <u>(Inches)</u>	<u>Depth of Flow</u> <u>(Percentage of Pipe Diameter)</u>
6 – 10	10
12 – 24	15
Over 24	20

If during survey television inspection of a manhole section, the storm water flow depth exceeds the maximum allowable, reduce the flow depth to an acceptable level by performing the survey television inspection during minimum flow hours, by diversion pumping, or by pulling a camera with swab, high-velocity jet nozzle or other acceptable dewatering device.

- B. Minimize flow in the line while performing pre-installation television inspection. Divert the normal flow as specified in Section 01540 - Diversion Pumping, and clean the line to be inspected.
- C. No flow is allowed in the line while performing post-installation video inspection.

3.06 PASSAGE OF VIDEO CAMERA

- A. Do not pull or propel the video camera through the line at a speed greater than 30 feet per minute.

- B. If during survey television inspection of a manhole section, the camera is unable to pass an obstruction even though flow is unobstructed, televise the manhole section from the other direction (reverse setup) in order to obtain a complete video of the line. Whenever such a condition arises, notify the PROJECT MANAGER to determine whether an obstruction removal or point repair is necessary. If a point repair is authorized, repair the pipe at the designated location and then re-televise the manhole section to verify completion of the point repair, unless waived by the PROJECT MANAGER.
1. When the camera is being pulled from the other direction in order to survey on either side of an obstruction and a second obstruction or repair location is encountered away from the first obstruction, notify the PROJECT MANAGER and request a review of the video. The PROJECT MANAGER may direct the CONTRACTOR to make one or both repairs. No downtime shall be allowed.
 2. Once point repairs are completed, re-inspect the manhole section.
 3. The CITY makes no guarantee that the storm sewer designated for survey television after cleaning is clear for the passage of the camera set-up. Select the appropriate equipment, tools, and methods for securing safe passage of the camera.
- C. During pre-installation television inspection, camera passage should show the line is ready for rehabilitation. Report to the PROJECT MANAGER any variations between previous reported (existing data) conditions and actual conditions encountered.
- D. For post-installation television inspection, exercise the full capabilities of the camera equipment to document the completion of the rehabilitation work and the conformance of the work to the Drawings and Specifications. Provide a full 360-degree view of pipe, joints, and service connections.

3.07. TELEVISION INSPECTION REPORT CODE INPUT SECTION

- A. TELEVISION INSPECTION CODES: Codes to be used in reports are specified and defined on the Television Inspection Codes sheet (attached following this Section and Sample Report form).
- B. FOOTAGE READING U/D: Show the up/down designation under the section titled "Footage Reading" in the boxes marked "U" and "D". This will make it clear what direction footage is measured from.
- C. CLOCK POSITION: Show the clock position, with 12 o'clock straight up, of each defect (e.g., 12:00, 3:00). Also, show the clock position of each service connection and state the condition of the connection. Include the distance the connection is protruding into the pipe, when appropriate, and the type of connection, such as "plumber service".
- D. CRACKS: List cracks in the pipe Television Inspection Codes. Report the size (length and width) of all cracks.
- E. JOINTS: List misaligned and broken joints using Television Inspection Codes.

- F. LATERALS: List all laterals using Television Inspection Codes.
 - G. ROOTS: List any root intrusions into the pipe using Television Inspection Codes.
 - H. DEBRIS: List any debris in the pipe using Television Inspection Codes.
 - I. INFLOW/INFILTRATION: Report any inflow and infiltration using Television Inspection Codes.
 - J. ALIGNMENT: Report the existence of any sags in the field using Television Inspection Codes. Report the beginning of sags for one-quarter pipe, one-half pipe, and underwater, as well as where the camera pulls out of the sag.
 - K. STRUCTURAL: Report structural condition of the pipe using Television Inspection Codes.
 - L. PICTURE NO.: Leave this field blank.
 - M. COMMENTS: Place comments in this field. Comments must be accompanied by a corresponding footage reading. Items to report in this field: collapses in pipe, stabilized material, mineral deposits, changes in pipe material, reverse setup, drop stack, large voids, multiple cracks, when unable to continue video, etc.
 - N. CLAMP/SPLICE LOCATION: The clamp/splice location shall be shown in the Comments field. Clamp/splice location must be accompanied by a footage reading.
 - O. START SURVEY AT M.H. XYZ: Note the depth of the line segment in the Comments field. (e.g., "Start Survey at M.H. 021 - Line Depth 10.2 FT"). Measure depth from the top of the manhole frame to the invert of the pipe being televised in feet and tenths of a foot. (This depth may be different from the manhole depth).
 - P. END OF SURVEY AT M.H. XYZ: Note the depth of the line segment in the Comments field (e.g., End Survey at M.H. 022 - Line Depth 10.8 FT). Measure depth from the top of the manhole to the invert of the pipe being inspected in feet and tenth of a foot. (This depth may be different from the manhole depth).
- 3.08 FIELD QUALITY CONTROL
- A. Do not under any circumstances, allow sewage or solids removed in the cleaning process to be released onto streets or into ditches, catch basins, cleanouts, storm drains, or sanitary or storm sewer manholes.
 - B. Acceptance of storm sewer cleaning work is subject to successful completion of the television inspection. If the television inspection shows solids, soil, sand, grease, grit, or other debris remaining in the line, cleaning will be considered unsatisfactory. Repeat cleaning and inspection of the line segment until cleaning is judged satisfactory by the PROJECT MANAGER.

3.09 MANHOLE REPAIR

- A. Repair manholes dismantled or damaged during the cleaning process, and replace manhole frames and covers damaged during the cleaning process.

Approved by:



Rod Pinheiro, P.E., CFM
Assistant Director
Street and Drainage Division
Storm Water Maintenance Branch

06-08-2015
Date

END OF SECTION

