Appendix D

SECTION 01110—Summary of Work

PART 1: GENERAL

1.1 Reference Standards

When these Specifications state that work or tests shall conform to specific provisions in a referenced standard, specification, code, recommendation or manual published by an association, organization, society or agency, the referenced provisions, as they apply to the work of the Contractor only, shall be considered a part of these Specifications as fully as if included in total. When these Specifications contain higher or more restrictive requirements than those contained in reference standards, these Specifications shall govern.

1.2 Specification Language and Style

Many parts of the Specifications are written in the active voice and are addressed to the Contractor.

When words or phrases requiring an action or performance of a task are used, it means that the Contractor shall provide the action or perform the task. For example: provide, perform, furnish, test, operate, adjust or similar words mean that the Contractor shall perform the action or task referred to.

When words or phrases requiring acceptance, approval, review or similar actions are referred to, it means that such actions are the Government's prerogative and that the Contractor must obtain such action before proceeding.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION (NOT USED)

SECTION 01355—Resources Protection

PART 1: GENERAL

National Park Service (NPS) areas contain areas of significant natural and cultural sensitivity that must be protected at all times. The contractor shall conform to the requirements set forth in this section to protect identified, suspected, or discovered natural and cultural resources within the project limits. Additional requirements may be described in other specification sections and shall be coordinated with the requirements of this section.

1.1 Description

The Contractor shall minimize environmental pollution and damage that may occur as the result of their work operations. The environmental resources, including natural, cultural and physical resources, within the project boundaries and those affected outside the limits of the work shall be protected during the entire duration of this contract. The Contractor shall comply with all applicable environmental Federal, State, and local laws and regulations. The Contractor shall be responsible for compliance with this section by its employees and its subcontractor employees. The Contractor shall be responsible for any delays resulting from failure to comply with environmental laws and regulations.

This section includes environmental procedures broadly identified as protection of natural, cultural and physical resources. The intention of this section is to ensure those involved with the project act positively to protect the environment, both on-site and off-site, during all construction operations. All activities and requirements of a general nature are applicable to all areas within the National Park Service areas boundaries.

1.2 Submittals

The following submittals shall be submitted prior to the start of work:

A. Sewage Spill Prevention and Response Plan (an electronic version of SPRP template is available from the NPS Project Manager)

B. MSDS for all materials proposed for use

C. Hazardous Materials Spill Prevention and Response Plan

1.3 Environmental Protection Measures

A. The Contractor shall comply with these waste management measures and shall comply with all applicable Federal, State and local regulations and addresses all aspects related to the management of all hazardous and non-hazardous liquid and solid wastes.

1. Sewage Spill Prevention and Response Plan (SPRP):

   a. The NPS requires that no sewage spills occur. The Contractor shall be required to

abide by this zero-tolerance requirement and shall prepare a Sewage Spill Prevention and Response Plan and take appropriate spill prevention measures during all phases of work.

b. The primary purpose of the SPRP is to prevent sewage spills from occurring by proper planning and protection of the project area, and then to respond to any sewage spills that may occur during the course of this project including appropriate notification of staff. The Plan will be general in nature and typical to all phases of the work with site specific plans required where indicated in the individual specifications sections. The sewer lines may be located in close proximity to waterways and stream channels. Any and all spills must be kept from entering any water course.

c. The SPRP is structured in two parts – first a Spill Prevention Plan and then a Spill Response Plan. The Spill Prevention Plan (SPP) includes evaluation of specific conditions, set-up of preventative containment where necessary for actual work as well as for bypass pumping. Sewer bypasses must be constructed to tie existing lines together while bypassing work areas. The Spill Response Plan (SRP) includes the initial response to stop and contain a spill, notification of staff, clean-up, and follow-up documentation. The SPP and the SRP together comprise the entire SPRP. A page outlining the components to be included in the plan follows at the end of this Section. A Microsoft Word® version of a generic SPRP is available from the NPS Project Manager.

d. All Contractor employees are required to be trained in the Sewage Spill Prevention measures in accordance with this SPRP.

2. Non-Hazardous Solid Waste:

a. Waste, trash, and debris shall be controlled at all times and disposed in authorized containers located throughout the NPS area.

b. All sanitary waste (garbage) must be disposed of in approved disposal containers.

c. Contractor generated debris (rubbish) may be stored in approved containers or in designated sites and removed on a regular basis.

d. The contractor shall police the work site daily for waste, wrappers, food packaging and the like. All waste shall be picked up and disposed of in approved containers.

e. Burying or burning of trash and debris on-site is not permitted. All un-used materials, trash, and debris shall be the property of the Contractor and shall be transported outside of the NPS boundary for disposal in accordance with law.

3. Hazardous Materials and Wastes:

a. Identify potentially hazardous substances to be used on the job site.

b. Identify handling procedures to ensure that hazardous substances are not released into the air, water, or ground.

c. Comply with Federal, State, and local laws and regulations for storage, handling, and disposal of these materials.

d. Storage of hazardous or flammable chemicals in the staging area or elsewhere on

the site is prohibited except as approved by the NPS Project Manager and/or Park POC.

e. Hazardous materials shall not be discarded into the jobsite debris or waste-disposal facilities, but shall be taken to designated hazardous waste disposal facilities outside the NPS area.

f. Empty containers shall be removed from the site and disposed of in a manner prescribed by law.

g. Used lubricants and used oil to be discarded shall be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations.

h. A copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be on site at any given time is to be maintained on site and submitted to the NPS Project Manager and/or Park POC on request.

i. Before new hazardous materials are brought on site or removed from the site, the MSDS file shall be updated and submitted to the NPS Project Manager and/or Park POC.

4. Contractor shall provide a Hazardous Materials Spill Prevention and Response Plan to address spill prevention and response measures for hazardous substances used on site, including fuels and lubricants. Prior to the start of work, the Contractor shall submit a plan that complies with NPS, Federal and State requirements and allows contractors to properly notify officials in the event of an emergency occurring during work activities. NPS requirements include at a minimum:

   a. During non-work operations, stationary equipment shall be parked in designated areas. Equipment that is visibly leaking fluids shall be parked over specially prepared containment pads designed to trap any leaking oil, fuel, or hydraulic fluids. It shall not be used until such time as the leaks have been repaired.

   b. Inspect work site daily for proper storage of hazardous materials, proper parking of equipment in designated areas, and for hydraulic and oil leaks of equipment, tighten hoses, and ensure they are in good condition.

   c. Routine oiling and lubrication shall be conducted in areas with secondary containment using Best Management Practices (BMP) at all times. Refueling of equipment in wetlands or stream channel areas is not allowed at any time.

   d. Contractor shall maintain secondary containment for all equipment operating with fluids (such as drilling) or when direct discharge of leakage, spills, or other source of construction or equipment fluids can flow directly to any streambed, whether flowing with water or dry. Containment shall be designed and installed so as to prevent accidental spills into streambeds in the event of mechanical failure or hose breakage.

   e. Contractor shall maintain spill response materials on the project site when using heavy vehicles and/or equipment to ensure rapid response to small spills. These materials shall include absorbent pads, booms, or other materials as appropriate to contain oil, hydraulic fluid, solvents, and hazardous material spills. A list of the spill response materials to be kept on site shall be submitted to the NPS Project

Manager and/or Park POC.

f. Contractor shall provide names and phone numbers of appropriate contractor's personnel to be contacted at any time (24 hours per day) regarding accidental release of hazardous substances to air, soil or water. This list shall be submitted to the NPS Project Manager and/or Park POC and a copy visibly displayed in work areas on site.

g. Contractor shall have the NPS Project Manager and Park POC and other appropriate Government emergency numbers posted and shall immediately notify the NPS Project Manager and/or Park POC or other Government representative on any accidental release of hazardous substances to air, soil or water.

B. The Contractor shall comply with these measures to protect natural resources. In addition, the Contractor must comply with any applicable Federal, State, and local regulations for the protection of these resources.

1. Natural Resource Protection:

a. Minimize ground disturbance to the greatest extent possible.

b. The Contractor shall not remove, cut, deface, injure, or destroy resources including trees, shrubs, vines, grasses, topsoil, and landforms without approval. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized.

i. Pruning or removal of vegetation shall be supervised by Park POC.

c. If required for access, removal of trees will be performed by the NPS in advance of Contractor's work. Should it be determined during the course of work that additional trees require removal, Contractor shall notify the Park POC who will coordinate an inspection and determination by the appropriate authorities whether to remove the tree or not.

d. Minimize disturbance to tree trunks and root zones to prevent damage to trees.

e. Do not drive trucks where they will disturb vegetation, including meadows and tree root zones. Do not drive over root zones unless work cannot otherwise be reasonably done. Driving over roots will compact the soil and can harm or destroy the tree. If unavoidable, use protective measures, like mats or plywood to prevent soil compaction. Use long hoses as required.

f. Do not cut wheels or make sharp turns with wheeled or tracked equipment in root zones.

g. Do not compact soil around roots to a greater degree than surrounding undisturbed soil.

h. Contractor shall setup operations within improved roadways, access roads or walkways whenever possible. Access to manholes within natural areas shall be approved by the Park POC prior to mobilization to the site. Access off road may require the use of plywood planking placed under all tires consisting of a minimum 2-foot by 8-foot sheets, 1-1/8" thick, placed one layer thick or two (2) each, minimum 2-foot by 8-foot sheets, 5/8" thick, placed two layers thick. Larger

sheets may be required if vehicle is unable to stay on top of plywood. Aluminum, portable aircraft landing mats may be used in lieu of plywood. Planking shall be fully removed following vehicle passage and shall in no case be left in place more than 48 hours. High flotation all-terrain vehicles with the camera setup may be used in lieu of planking if approved by the Park POC.

2. Plant Damage Appraisal:
   a. When authorized and supervised by the Park POC, the Contractor may be exempted from any penalties that might be assessed due to damage to vegetation.
   b. If the Contractor destroys or injures trees and vegetation designated for protection or outside the work limits, the Contractor may be assessed damages. NPS Law Enforcement Staff shall make the determination if Resource Protection laws have been violated.
   c. Replacement costs for damaged vegetation will be computed according to the method described in the International Society of Arborculture's 1992 Guide for Plant Appraisal. This method is based on the cost of the largest commonly available tree or shrub, with modifications based on species value, condition, and location. A trained arborist or professional plant appraiser from the state's region will be hired by the NPS to make the damage appraisal. The arborist's fees will be included in the damage assessment.
   d. This damage appraisal process will be triggered by any of the following types of damage to vegetation outside the work limits or unauthorized disturbance of vegetation within the work limits.
      i. Removal of any tree or shrub.
      ii. Pruning or removal of more than 30 percent of a tree or shrub canopy.
      iii. Removal or fracture of any limb or trunk that is one of the major structural entities of the damaged plant.
      iv. Removal or fracture of any limb greater than 12 inches in diameter.
      v. Bark damage or removal around more than 30 percent of the trunk circumference.
   e. If the damaged vegetation is protected under the Endangered Species Act or other special legislation, additional penalties may be assessed as per consultation with the U.S. Fish & Wildlife Service.
3. Protection from Exotic Species:
   a. Measures shall be taken to prevent the introduction of exotic species in the project area and/or other areas within the boundaries of the NPS site. All vehicles and equipment must enter the NPS area free of dirt, dust, mud, seeds, or other potential contaminants. Vehicles will be inspected at a mutually agreed site by the Park POC and Contractor prior to entering the Park. Vehicles and equipment exhibiting any dirt or other material attached to frame, tires, wheels, or other parts shall be thoroughly cleaned by the Contractor before entering the NPS area. All construction or service related vehicles and equipment that operate off road,

in a project area containing known high priority exotic plants will be pressure-washed on site prior to leaving the work site. Equipment found to have entered the NPS area with potential contaminants will be removed from the site at the direction of the Park POC at Contractor's sole expense. The Park POC will maintain a list of cleaned and approved vehicles and equipment for the duration of the project.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION (NOT USED)

Appendix A: Sewage Spill Prevention and Response Plan Outline

1.0 Project Overview

1.1 Project Description

1.2 Contractor Responsibilities

2.0 Spill Prevention Plan

2.1 Spill Prevention Analysis

2.2 Spill Containment System

2.3 Spill Prevention Procedures During Construction Operations

2.4 Bypass Plan

2.4.1 Spill Prevention Procedures During Bypass Operations

2.4.2 Materials

2.4.3 Initial installation steps for sewage bypass

2.4.4 Operation of the Bypass System

3.0 Spill Response Plan

3.1 Overview

3.2 Initial Actions in the Event of a Sewage Spill

3.3 Notification Procedure in the Event of a Sewage Spill

3.4 Spill Clean-up

3.5 Post-spill Debriefing and Documentation Procedures

3.5.1 Spill Reporting Procedure

4.0 Training of Contractor Security and Operations Personnel in Spill Prevention and Response

4.1 Scope of Training

4.2 Frequency of Training

4.3 Documentation of Training

5.0 Contractor Management Approval Statement

Appendix A: Spill Prevention Analysis Forms

Appendix B: Spill Containment and Bypass System Components

Appendix C: Training Summary Form

SECTION 01785—Deliverables

PART 1: GENERAL

1.1 Description

The work of this section consists of furnishing draft review copies and all final deliverables in electronic and hard copy formats. Electronic versions shall be in the same file format as the original document in which it was created and, where specified, in Adobe® Portable Document File (pdf) format.

1.2 Submittals

A. Submit a draft CCTV Inspection Report and a single DVD with a representative sample of the video inspection files to the NPS Project Manager (COTR). See Section 3.2.E below.

B. Submit final deliverables as per requirements contained in this section and/or other technical specifications sections that are a part of this contract.

C. Final submittals will be sent to various locations. The COTR will provide addresses for shipping.

1.3 Schedule

A. At start of project, begin accumulating final submittal data and initiate an index. Install and index all data in binders as work progresses. As custom written data and test results are produced, add them to the file. Compile a minimum of one hard copy file set within 20 calendar days after completion of field work and submit one draft review manual to NPS Project Manager for review while data entry process is in progress.

B. Keep data current. Make binders available to the Park POC for inspection at the time of monthly progress payment requests. If binders are not current the Park POC may request of the COTR to retain an appropriate amount of the progress payment.

C. Within 30 calendar days following receipt of review comments from NPS Project Manager, deliver two (2) completed hard copy sets and two (2) electronic versions on DVD and USB 2.0 (or higher) Portable Hard Drives. Flash or thumb drives are not acceptable unless specifically approved by the COTR.

PART 2: PRODUCTS

2.1 Binders

A. White, commercial quality, hard back, three-ring, 2-inch maximum ring size (3-inch on approval), lever-locking type with clear window pockets on front and side. Cardinal binder manufactured by Cardinal Brands, Inc., Georgetown, KY or equal.

2.2 Index System

A. Index sheet with mylar reinforced edges at binder holes and tabbed divider sheets with mylar reinforced edges and pre-printed numbered tabs aligned with numbers and title lines on index sheet. Cardinal One-Step, manufactured by Atapco Office Products Group, St. Louis, Missouri; Avery Ready Index, manufactured by Avery Dennison, Covina, California; or equal.

PART 3: EXECUTION

3.1 Electronic Database Records

A. Contractor shall prepare and maintain an electronic database of the inspection records and provide two (2) copies to the NPS upon completion of the work.

1. Two complete electronic copies of the CCTV inspections. One copy shall be on a single portable, external hard drive and the second on Digital Video Disks (DVD). Both shall be searchable and shall include an index to easily find the desired pipeline segment inspection. The Contractor shall provide one file for each manhole to manhole segment of the CCTV inspection. Each file shall be named and indexed to a data base of manhole/pipeline identifiers. Organization and naming of electronic files shall be approved by the Park POC and/or NPS Project Manager. Video shall be capable of running on any standard PC with MS Windows® operating systems and be compatible with Microsoft Office® software. Instructions for operating the CCTV inspection software and for accessing specific locations within the software are to be included. Any specific or proprietary software necessary to view and manage the data shall be provided at no additional cost to the Government.
2. A Table of Contents shall be provided listing the geographic or developed area name. If the pipe segment reports are arranged by segment number, there shall be a cross reference included that is arranged alpha/numerically by upstream manholes and another cross reference arranged alpha/numerically by downstream manhole number. These cross-referenced Tables of Contents shall be included in each copy of the manual(s).
3. Digital Video Disks are to have labels that clearly identify what is included on each disk. Include sub-contractor name and date of inspection. Number disks consecutively and name by geographic area.
4. USB 2.0 (or higher) powered Portable Hard Drives shall of a size suitable for the amount of data stored. Flash or thumb drives are not an acceptable device for delivery of the data unless specifically approved by the COTR.
5. Files shall be provided in the camera equipment original source file format, Microsoft Office® format and Adobe® Portable Document File (pdf) format.

3.2 Inspection Data Manuals

A. Provide two (2) complete sets of inspection and test data as 8.5” x 11” hard-copies, bound in three ring binders

1. Content

a. Inspection Data Sheets: For each pipe segment inspected, provide a Pipeline Inspection Report as generated by the camera inspection software. For each manhole inspected, provide a Manhole Inspection Report as generated by the same camera software.

i. CCTV Inspection Reports shall be compiled in alpha/numeric order, placed in high quality three ring binders, and submitted in duplicate to the NPS upon completion of the work. Only submit original, color reports, one segment per page. Inspection reports shall include the Pipeline Inspection Report Form and printed hard copy still image photographic records for each unusual condition and other pertinent defects. Photographic records shall be high contrast color computer generated original prints; four photos per sheet maximum, thumbnail sized photos are not acceptable. Proper labels shall easily identify the pictures. Photos shall be approximately 3”x3.5” each, maximum 4 per page.

ii. Manhole Inspection Reports shall be compiled in alpha/numeric order, placed in the Inspection Data Manuals following the pipeline inspection reports. Manhole Inspection Reports shall include the Manhole Inspection Report Form, printed hard copy of each manhole photographic record and printed hard copy of photographic records for each unusual condition and other pertinent defect. Photographic records shall be high contrast color computer generated original prints, one manhole per sheet and four photos per sheet maximum, thumbnail sized photos are not acceptable. Proper labels shall easily identify the pictures. Photos shall be approximately 3.5’x5” each, 4 per page.

b. Photographs: Provide photos of immediate hazards, unusual conditions and pertinent defects for pipelines. Provide manhole structure photos and immediate hazards, unusual conditions and pertinent defects. Include still photos taken during the inspection, maximum 4 photos per page. The 4 photos shall fill the page; photos shall be included with their respective pipe segment or manhole inspection report, bound in the 3 ring binder(s) and arranged logically according to the asset number and by system layout. Include maps of the systems in the report. Further arrangement shall have the pipe segments reports in one section and all manhole inspection reports section arranged numerically following the pipe segment section. Dividers shall mark individual geographic area reports and other logical divisions within the report.

c. Record Drawing: Provide related sheet for each geographic area inspected.

d. Test Results: Include the test results for tests conducted on force mains and air release valves.

e. Prime Contractor: List the Prime Contractor who worked on the project. Include address and telephone number and job number.

f. Subcontractor: List all subcontractors who worked on the project. Include address and telephone number and identify the work performed. Include their job number.

B. Submit one draft mockup of the inspection report to the COTR prior to finishing the report. Either an electronic version or a hard copy of the mockup is acceptable but must represent the exact layout of the final submittal and be representative of each paragraph, page and section required for this submittal. In essence, a "mini-final" report shall be submitted for approval. A complete copy of the proposed final submittal is not required for the draft version. The contractor shall incorporate any comments on the draft in the final version. The single DVD shall be a direct copy of the proposed final electronic video inspection files. The DVD files are to meet requirements of this and the other sections of this contract.

C. Final CCTV and Manhole Inspection Data Manuals shall be organized as follows:

1. A Table of Contents shall be provided listing the geographic or developed area name. If the pipe segment reports are arranged by segment number, there shall be a cross reference included that is arranged alpha/numerically by upstream manholes and another cross reference arranged alpha/numerically by downstream manhole number. These cross referenced Tables of Contents shall be included in each copy of the manual(s).
2. The report is to be grouped by geographic or developed area names (i.e. Loft Mountain Campground, El Portal Rancheria Housing, Fall River Pass)
3. An 11"x17" map sheet shall be included with each geographic or developed area section which shows line segments and manhole numbers. The map need only show the particular lines included in each section of the binder (i.e., lines "A", "B", "C" etc.). If the geographic area is too large to clearly show all labels for lines and manholes inspected on an 11"x17" sheet, the area shall be divided in a logical order and submitted with multiple map sheets depicting the areas.
4. Line segment reports shall be grouped within the geographic areas, and each line segment shall be arranged in alpha/numeric order (i.e. segment A1-A2, A2-A3, B1-B2, B2-B3, etc.)
5. Each line segment; Pre-cleaning CCTV Inspection Report, Cleaning Report and Final CCTV Inspection Report shall be placed together.
6. Photographic records of defects shall be placed immediately following the corresponding line segment report.
7. Manhole assessment reports shall be included within the geographic/developed area section of the manual. Manhole reports shall be tabbed and grouped by line (i.e. "A" line, "B" Line, etc.). Manhole reports shall be organized sequentially along their respective sewer line and shall be placed in the manuals following the line inspection and photographic reports section.
8. Manhole photographic records shall be placed immediately following the related manhole inspection report.
9. Results from force main and any air release valves testing shall be tabbed and included following the pipeline and manhole reports.
10. Prime Contractor's name, address, telephone number and any sub-contractor's names, addresses, telephone numbers shall be placed last in the manual.

D. Number multiple binder volumes consecutively.

E. Cover Sheet: Identify the project title, location, park, contract number and award date, prime contractor's name and address, sub-contractor's name and address, date of substantial completion, and binder volume number. Insert cover sheet into clear plastic

view pocket on front of binder. Insert sheet with NPS site name and relevant task name into side clear plastic view pocket.

F. Index System: Organize data into sections by common subjects and subsystems. Place a consecutively numbered tabbed divider sheet in front of each section. Place index sheet at the beginning of each binder, listing sections by subject name. If multiple binders are used, place a table of contents of all data provided behind the index sheet in each binder.

G. Data: Fill binders to no more than 75 percent of capacity. Punch holes shall not obscure any data. Normal sheet size shall be 8 ½ inches by 11 inches. Fold oversize sheets to 8½ inches by 11 inches.

H. Provide color originals for pipe segment reports. Black and white data may be originals or clean, good quality reproductions. Where originals are printed on both sides of the page, reproductions shall also be printed on both sides of the page. Copies produced by facsimile transmission and sheets with stamps, such as submittal approval stamps, will not be acceptable. Include only sheets that apply to work of this contract.

1. Record Drawings: Maximum 11-inch by 17-inch sheets with minimum character or lettering size of 1/8-inch folded to 8 ½ inches by 11 inches.
2. Custom Written Data: Typewritten text and data, supplemented by drawings and schematics as necessary to describe system(s) adequately.
3. Data that is poorly reproduced or in any way illegible will be rejected

I. Record Drawings depicting any field observations as to location, identification, numbering, or other useful information shall be submitted at the completion of the work. Record Drawings shall be the maps produced either by others under a separate contract or through this contract with observations clearly marked by hand in RED INK. Contractor shall submit one (1) copy of the Record Drawings.

SECTION 02501—Testing of Sewer Force, Mains, and Appurtenances

PART 1: GENERAL

1.1 Description

A. The work of this section consists of low pressure air testing of wastewater force mains, 2" diameter and larger and appurtenances for the sole purpose of documenting deficiencies in the NPS Facility Management Software System database. It is not intended to be used as a test for new pipe installation acceptance.

B. This procedure shall be used if the force main has not been or cannot be drained and/or access points are not available making a conventional internal camera inspection impossible. This guideline is to provide general procedures for testing of air release valves and low pressure air testing of wastewater force mains.

C. If it is determined by the Contractor and NPS that the force main cannot be shut down for enough time to perform the low-pressure air tests, the Contractor shall only perform the tests/checks on the air release valves and shall document any physical conditions present that may affect the performance of the force main system.

D. The Contractor shall furnish all equipment and personnel for conducting the tests under the observation of the NPS Project Manager, Park POC and/or the Utility System Operator (herein referred to as NPS). The procedures and equipment shall be subject to the approval of the NPS.

E. Testing Methods: Low pressure air testing and general observations. See Part 3.

1.2 Quality Assurance

A. This procedure shall be modified if any part of it presents a condition where a sewage spill could occur or damage to the lift station and/or force main could occur.

B. Air test gauges shall have minimum divisions of 0.10 psi and have an accuracy of 0.0625 psi (one ounce per square inch). Gauges shall be ANSI B40.1-80, Grade 3A (plus or minus 0.25 percent of full scale accuracy), with a 15 psi dial range.

C. All air used shall pass through a single control panel.

1.3 Submittals

A. Before testing, provide the following information:

1. Provide documentation of existing conditions. See Part 1.4C below.
2. All Tests: Describe precautions that will be taken to protect system equipment that might be damaged under test pressures.

1.4 Project Conditions

A. The Contractor and NPS Utility System Operator or other Park personnel in charge shall determine and agree that conditions are suitable for low pressure air testing prior to performing the test.

B. Document all existing conditions prior to the start of the testing. Documentation shall include, but not be limited to, positions of valves (open/closed), utility vaults that show water infiltration, status of pump controls, etc. At the completion of the testing, all valves, equipment and controls are to be returned to their original position unless specifically directed not to by the NPS. Document any changes to the original settings when returning the system to normal operation after the testing.

C. To accomplish any of the testing protocols, it must be possible for NPS to temporarily take the force main system out of service. The time required to complete the testing as outlined cannot be determined prior to testing and will vary considerably from system to system. Perform tests at low use time in coordination with NPS. A temporary suspension of the testing may be required due to high volume of inflow. The contractor shall insure the capability to place the system back into normal operating mode if inflow is too great to keep the system out of service for the complete testing duration.

D. At all steps of testing the NPS has the authority to approve or disapprove the exercising of a valve or other element on the system and the Contractor must explicitly receive the approval of the assigned on-site NPS contact before exercising any such elements. If disapproval of operating any of these elements precludes additional testing the contractor will cease testing operations and place the system back into service. Contractor shall document any decision to not move forward with the testing procedures.

1.5 Safety

A. Pneumatic Plugs

1. The pneumatic plugs must be firmly secured and care should be exercised in their removal. The total force on a 12" plug at 4.0 psi is over 450 pounds. Care must be exercised in not loading the sewer line with the full pressure of the compressor.

B. Confined Space:

1. Only trained and certified personnel shall be allowed to enter confined space locations. All confined space requirements are to be observed.

C. Traffic Control:

1. Personnel on-site shall have adequate traffic control measures in place. Hard hats and safety vests are required to be worn by all personnel in attendance.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION

3.1 General

A. Perform testing in the presence of the NPS. Notify the NPS Point of Contact at least 48 hours prior to testing.

B. Protect system equipment susceptible to damage by test pressures. Return services to full operation when required.

3.2 Air Release Valves (ARV)

A. Test air release valves first. Air release valves are typically located a long distance from the lift station pumps and/or discharge outlet of the force main. It is not possible to test their performance by pressurizing the pipeline from the discharge end as the air must travel to the high point to be vented by the ARV. Two tests can be performed to determine functionality of the valves.

B. All water and/or debris that have accumulated in ARV utility vaults shall be removed prior to the start of the testing.

C. Perform tests in coordination with the lift station wet well pump down process for the force main low pressure air test.

1. ARV Test 1: Verify the inlet valve between the force main and the ARV is open. Observe the ARV when the force main is pressurized under normal operating conditions. Perform this test in conjunction with pumping down the lift station wet well for the low-pressure air test if possible. If liquids are forced out of the ARV, it is assumed to be plugged and will require maintenance.
2. ARV Test 2: Perform this test when the force main is in a static condition. Close the inlet valve between the force main and the ARV. Open the blow-off valve (near bottom of ARV) and observe … if fluid drains out the valve body rapidly, flushing is not required and the valve is assumed to be operating properly. Should fluids not drain rapidly or at all, the valve must be flushed in accordance with the manufacturer's recommendations. The contractor is to document the need for the maintenance and is not to perform the task.

3.3 Low Pressure Air Test

A. Test force main with low pressure air. Safety requires a regulator or relief valve on pressurizing equipment, set at 8 psig. No one will be allowed in manholes while there is air pressure against test plugs.

1. In coordination with the NPS, pump down the lift station wet well to the lowest level possible. Plug all inflow lines to maintain a constant level in the wet well while the system is shut down. Measure the depth from point on rim to fluid level accurately.

    a. If the lift station and force main have been out of service for an extended period of time, water shall be introduced to completely fill the line prior to the air test.

b. All air/vacuum relief valves shall be closed prior to the start of the test.

2. Simultaneously, plug discharge end of force main pipe with a pneumatic plug equipped with a flow through air fitting capable of pressurizing the sewer line. The plug shall have remote air hose/gauge/rope combinations suitable for the testing purposes described herein. Make every effort to avoid entering the manhole to install the plug.
3. The pipe shall be tested with low pressure air. Air shall be slowly supplied to the plugged pipe installation until the internal air pressure reaches 4.0 pounds per square inch. DO NOT EXCEED 9 PSI
4. At least five minutes shall be allowed for temperature stabilization before proceeding further. After the five-minute temperature stabilization period, re-pressurize to the 4.0 pounds per square inch. Disconnect the air supply.
5. The line being tested shall be termed "Acceptable" if the time required in minutes for the pressure to decrease one (1) psig is not less than the time shown for the given diameters in the following table:

Pipe Diameter	Minutes*
2"	1.0
3"	1.5
4"	2.0
6"	3.0
8"	4.0
10"	5.0
12"	5.5
15"	7.5
18"	8.5
21"	10.0
24"	11.5

*Time in Minutes = 0.472 D

D = Diameter of pipe in inches

When a combination of more than one pipe size is under test, the calculated time for the larger pipe shall apply.

6. If the pipe fails to meet these requirements, the first location to investigate is the performance of the check valves. If bubbles are observed in the wet well and they originate below the pump(s) or the wet well level rises, the assumption is the check valves are leaking or the internal pipe is deteriorated. At this point the Contractor shall close the gate valve(s) immediately downstream of the check valves. Repeat the test. If the pipe meets acceptability requirements, the assumption is the check valves are leaking.
7. If the pipe continues to fail to meet the acceptable requirements, the Contractor shall begin to isolate the different sections of the pipe. Working from the lift station towards the force main discharge end, close the first isolation valve downstream of the gate valves at the lift station and repeat the test. If the test is acceptable, the leak is assumed to be between the lift station gate valves and the first downstream isolation gate valve. If the test is unacceptable, open the first isolation valve and close the second isolation valve downstream of the lift station. Repeat the test. Continue this procedure until the leak location is determined

8. Document each step in detail as progress is made towards a complete test.
9. Return the system to normal operating conditions at the completion of testing.

SECTION 02531—Sewer Line Cleaning

PART 1: GENERAL

1.1 Project Summary

A. Contractor shall perform a complete closed circuit television (CCTV) inspection of all sewer lines 4” and larger. The work includes a pre-cleaning CCTV inspection to document conditions that could be removed during cleaning; hydro-cleaning of the lines when necessary and follow up with a post-cleaning CCTV inspection. The CCTV documentation will be completed in accordance with the National Association of Sewer Service Companies (NASSCO) standards for pipeline and manhole condition assessments (PACP® and MACP®). Manholes will be inspected and their condition documented through completion of the database entries and still photos. Work also includes testing of force mains and appurtenances. Final documentation will include submittal of multiple copies of printed pipe segment inspection reports, the electronic database, written reports of force main test results and the digital video inspections.

B. Pre-cleaning CCTV: The pre-cleaning CCTV video inspection of all sewer lines 4” and larger includes all main lines, branch lines and laterals. The pre-cleaning video will document all defects that could be easily removed by high pressure hydro cleaning methods. If determined the line does not need cleaning, only one video will be performed that will document all defects, conditions and changes in materials. The pre-cleaning video will become part of the permanent record and defects found during that inspection will be included in the electronic database. The pre-cleaning CCTV digital files will be submitted to the NPS as part of the final deliverables.

C. Cleaning: If the sewer line requires cleaning, the line shall be cleaned by high pressure hydro- flushing and/or hydro-vacuuming following the pre-cleaning CCTV documentation. All debris shall be caught and removed from each downstream manhole and shall not be transported from manhole to manhole by the hydro-flushing method. Numerous passes with the cleaning equipment may be required to get an accurate view of the pipeline condition. See Sections 1.6.D and 1.6.E for requirements for cleaning of siphon lines.

D. Post-cleaning CCTV: Following cleaning, the line shall be video taped again to document all defects relating to the structure and condition of the line and changes in materials. Documentation shall include digital video with verbal descriptions of each defect or changes in conditions and/or materials on the video, still photos of defects, printed copy of the reports of all segments inspected and electronic data files.

E. Manhole Inspections: Manholes will be visually inspected and their construction specifications documented as per the MACP® standards. The manhole conditions will be documented in the electronic database. Digital still photos will be taken, added to the database and included with the final deliverables. Include a drawn graphic of the manhole

invert showing all the influent and effluent lines. Graphic shall be in the same orientation as the photo of the invert.

F. Force main testing / inspection: Force mains will be pressure tested using low pressure testing methods. Testing may involve multiple efforts to determine locations of defects. Results will be documented and included with final deliverables. See Section 02501.

1.2 Submittals

A. Submit for approval the following, prior to the start of the work:

1. Written procedure for cleaning and debris removal: Include descriptions of equipment to be used including types of heads, pressure ratings, flow volumes, and condition (new, slightly used, used). Describe vacuum/jetting equipment specifications.
2. The contractor shall submit a proposed sample of the weekly cleaning log in accordance with Section 1.14.B of this document. Approval of the NPS Project Manager is required prior to work starting.
3. Record Drawings: Contractor shall provide contract maps marked up according to conditions found during cleaning operations at the completion of the work. Record Drawings shall have critical observations clearly marked by hand in RED INK. See paragraph 1.14C below.

1.3 Closed Circuit Television (CCTV) Inspection Schedule

A. The Contractor shall complete CCTV inspection per Section 02534 immediately following cleaning to allow clear viewing of the sewer pipeline condition by the camera. A cleaned pipe reach shall be CCTV inspected within 24 hours elapsed time of being cleaned. The pipeline reach shall be re-cleaned if solids obstruct the camera view and re-cleaning shall be at no additional cost to the Government.

1.4 Manhole Closure

A. All existing manholes should be equipped with a solid well fitting cast iron cover with no drain or through-pick holes and may include a PVC infiltration lid beneath the cast iron cover. The Contractor shall reinstall any infiltration lids and cover following cleaning.

1.5 Bypass Conditions Assessment

A. Contractor shall assess each pipeline segment for bypass pumping needs. The assessment shall include: Identification of possible spill flow paths to a water course such as streams or rivers, developing a site specific Spill Prevention and Response Plan, and providing bypass equipment if needed, sand bags and other spill prevention and response equipment and materials prior to proceeding with the work. The site specific Spill Prevention and Response Plan shall be approved by the Park Point of Contact (POC) and NPS Project Manager prior to proceeding with the work. Reference Section 01355 for SPRP requirements

B. Equipment and materials shall be available as identified in the site specific Spill Prevention and Response Plan. In addition, equipment and material shall be standing by and ready within 30 minutes in the event of a spill.

1.6 Pressurized and Surcharged Gravity Line Cleaning

A. Contractor shall inspect all pressure cleanout locations and air release valves and develop a site specific spill prevention plan associated with opening the cleanout for cleaning. These cleanouts are generally on steep pipelines and are subject to pressures during blockages or surcharge conditions. Any compromised, damaged or unsound cleanout, cleanout pipe, cleanout lid and cover shall be reported immediately to the Government with a recommendation for repair.

B. Contractor shall coordinate the cleaning schedule of these pipelines and the work may involve working either prior to or after the peak visitation hours or possibly peak visitation seasons to reduce flows in the pipeline.

C. Situations may exist where it is neither safe, nor feasible to inspect a line. The contractor shall document the situation and proceed to the next area.

D. Siphon lines shall be cleaned provided access exists to either the inlet or outlet end of the line. Siphons less than 10” in diameter shall be cleaned without a pre-inspection report being generated. These lines shall require a minimum of 2 passes with cleaning equipment but may require more should debris still be encountered. The weekly cleaning log shall clearly show the number of passes made with the cleaning equipment and an estimation of the volume of sedimentation encountered if any. Details shall be very specific when documenting the cleaning of any surcharged lines.

E. Siphons 10” and larger shall be inspected prior to cleaning with sonar equipment to determine the amount of debris that may be present in the line. Following sonar assessment and documentation of the debris quantity, the line(s) shall be cleaned with the number of passes necessary to ensure a clean pipe. Cleaning shall be with a high pressure water jetting head only. No mechanical cleaning or root cutting is permitted. Extreme care shall be taken to prevent lodging of the cleaning nozzle in the pipe or in a dosing siphon trap. Reference Section 02534 for sonar assessment requirements

1.7 Pressurized Force Main Cleaning

A. See Specification Section 02501.

B. Not all force mains are suitable for cleaning. Many force mains only have access points at either end. Access points along the length of the force main may not exist. Coordination with the Park POC and utility system operators is required prior to any operation that involves force mains.

C. Contractor shall inspect all pressure cleanout locations and air release valves and develop site specific spill prevention plans associated with opening the cleanout for cleaning. These cleanouts are subject to pressures during routine operations as well as static conditions. Any compromised, damaged or unsound cleanout, cleanout lid and cover shall be reported immediately to the Park POC with a recommendation for repair.

D. Contractor shall coordinate the cleaning schedule of these pipelines and the work may involve working either prior to or after the peak visitation hours or possibly peak visitation seasons to reduce flows in the pipeline.

1.8 Minimum Equipment Onsite

A. Contractor shall maintain an adequate supply of backup equipment and parts at all times. Work locations are such that ready access to repair parts is very limited and may require several hours of travel time. Time lost due to equipment breakdown and/or lack of repair parts will not be chargeable to the Government.

1.9 Flow Control Without Bypass Pumping

A. Divert sewage flows and storm water around all sewer cleaning areas as needed. Depth of flow shall be limited to less than 1/3 of the diameter of the pipe. If flow is greater than 1/3 the diameter of the pipe, the video work shall be postponed for more favorable conditions or non-pumping flow control methods may be employed. Furnish, install, and manage plugs, conduits, and other equipment to lessen or divert the flow of sewage through or around the pipeline reach in which work is to be performed. Pneumatic plugs shall be designed so that all or any portion of the sewage can be released to the original line without requiring personnel to enter a manhole. The plug(s) shall be provided with an air line suitable for filling the plug from ground level and pressure gauge. The plugs shall also have a tag line. Flow through plugs may be employed to reduce flow into the pipe reach to be cleaned or inspected. These plugs must also be capable of having flow returned to the original pipe without personnel entering the manhole. Flow reduction operations must be completed during approved working hours for the location. Flow shall be restored to normal as soon as possible following flow reduction operations.

B. Competent personnel shall monitor the flow reduction methods continuously. The personnel shall be able to readily recognize situations indicating imminent failure or potential spill. They shall operate and manage the equipment employed during the operation.

C. A standby pump shall be provided and be on-site during non-pumping flow diversion operations. Pumping shall be done in such manner as will not damage property or create a nuisance or health menace. A standby pump is to be of suitable size to handle current pipe flows plus an additional 100%. Standby pumps shall have pipe fittings installed to provide an immediate installation to take over from non-pumping flow diversion methods should the situation require it.

D. Flow shall be restored to normal as soon as possible following flow reduction operations. Equipment shall be broken down in a manner to prevent any sewage from spilling

1.10 Flow Control with Bypass Pumping

A. Bypass pumping and pumped removal of water in the pipelines may be necessary for the cleaning of pipelines with sags or minimal slope. Bypass pumping or pumped removal of water shall be required when the water depth is greater than 1/3 the pipe diameter for more than 1/2 the length of the pipeline segment.

B. Bypass pumping may be required during cleaning to prevent surcharge and possible overflow of the sewer system. Bypass pumping may be required to allow immediate CCTV inspection prior to allowing waste to enter the pipeline. Contractor shall complete a prior assessment of the existing sewer flows and provide an appraisal to the Park POC of any required bypass pumping activities at a minimum of one week prior to the need.

C. The pumping system shall be of sufficient capacity to handle existing flow plus additional flow that may occur during a rainstorm. If pumping is required on a 24-hour basis and engine drives are required, engines shall be equipped in a manner to keep noise to a minimum.

D. Competent personnel shall monitor the bypass pumping operation continuously at all times the pumps are in place. If the operation extends beyond designated working hours, the competent person shall remain on-site at all times. The personnel shall be able to readily recognize situations indicating imminent failure or potential spill and be able capable of notifying authorities of the need for immediate action. They shall operate and manage the equipment employed during the operation. The designated competent person shall have no other duties than to manage the bypass pumping operation.

E. Engine driven bypass pumping in residential areas shall not be permitted on a 24-hour basis. Work must be coordinated to be completed during regular daytime operating hours.

F. Two (2) standby pumps, equal in size and capacity to the approved bypass pump shall be provided and be on-site during bypass pumping operations. Standby pumps shall have pipe fittings installed to provide an immediate conversion from the disabled pump to the standby pump.

G. Flow shall be restored to normal as soon as possible following bypass pumping. Equipment shall be broken down in a manner to prevent any sewage from spilling.

1.11 Cleaning

A. Set-up for cleaning operations shall be in accordance with the approved Spill Prevention and Response Plan as amended for the specific site to be cleaned.

B. The sewer cleaning setup shall be configured to allow the retention and removal of all rocks, gravel, pipe fragments, root cuttings, and heavy debris for disposal at an approved landfill.

C. Sewer line cleaning shall be by use of a high pressure jetting head in combination with a vacuum truck for removal of solids and debris. High pressure jetting only may be allowed with approved debris catching equipment installed in the manhole immediately downstream of the pipe segment being cleaned. Moving solids and debris from one manhole to another is not permitted. Multiple passes shall be used to thoroughly remove accumulated materials.

D. A root cutting head shall be used if at any time the cleaning head cannot pass through a pipe due to roots. The root cutter is not required if the jetting operation can pass the entire length of the pipeline. If a root cutter is necessary it shall be passed through the pipeline a minimum of twice. Root cutter shall be capable of cleaning a 4-inch pipeline and 6-inch and larger pipelines with offset joints. Multiple passes with high pressure water may be required for pipelines with offset joints.

E. Chain flail cutters are not to be used without prior approval of the Park POC.

F. The post cleaning condition of the pipe shall be free of settled solids in the invert, accumulated solids on the pipe walls and service taps, and be in a condition to allow CCTV inspection without encountering waste that obstructs the inspection. Failure to

sufficiently clean the pipeline prior to CCTV inspection will result in the re-cleaning and inspection of the affected pipeline at no additional cost to the Government.

1.12 Solids Removal

A. The Contractor shall collect and remove all solids produced during cleaning as follows:

1. Remove all rock, sand and gravel debris collected during cleaning. Report any rocks ¾- inch and larger in the weekly log of cleaning observations.
2. Report all pipe segments, pieces or other structural elements collected during cleaning in the weekly log of cleaning observations.
3. Clean and remove all material in the manholes including in the channel, on the bench, and on the walls.

1.13 Permanent Plugs

A. Existing permanent plugs may be found in the pipelines during cleaning. The plugs have been constructed over the years to abandon pipelines. Records of their true location are not up to date. Record the location of all found plugs during cleaning operations in the weekly log. Verify plug locations in CCTV work.

1.14 Weekly Log and Record Drawings

A. The information discovered during cleaning regarding obstructions, heavy roots, grease, and plugged and abandoned lines will be very useful to the Government. Weekly cleaning logs shall be maintained and reviewed with the Park POC. Record drawings and Weekly Logs shall be maintained and submitted to the NPS Project Manager and Park POC at the end of the work.

B. Weekly logs shall include the following information as a minimum.

1. Starting date, ending date, number of days worked
2. Number of feet cleaned per day
3. Type and size of debris in line
4. Number of feet requiring root cutting
5. Location of any obstructions
6. Location of any abandoned lines and confirmation of abandonment plug location
7. Special observations such as heavy rock debris, heavy grease, pipe pieces retrieved, etc. These special observations shall be highlighted in the weekly reports. Any obstructions remaining following cleaning shall be recorded as defects on the CCTV inspection forms per Section 02534.

C. Record Drawings: Marked up contract maps depicting any field observations made during cleaning operations as to location of immediate hazards such as heavy debris, broken pipe, rocks, or other useful information. Record Drawings shall have critical observations clearly marked by hand in RED INK. Record Drawings are to be maintained per pipe segment cleaned. Annotations shall be brief and consistent; for example;

1. Heavy roots cut during cleaning in segment A1-A2
2. Pipe pieces removed during cleaning in segment B23-B23A

3. Bypass pumping required during cleaning in segments A6-A7-A8-A9

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION (NOT USED)

SECTION 02533—Manhole Cleaning and Inspection

PART 1: GENERAL

1.1 Summary

A. Contractor shall perform a complete inspection and photo documentation of all manholes and related wastewater utility vaults in the assigned work area. The work includes a visual pre- cleaning inspection to document conditions that could be removed during cleaning of the manhole when necessary and follow up with a post-cleaning visual inspection. The documentation will be completed in accordance with the National Association of Sewer Service Companies (NASSCO) Level 2 standards for manhole condition assessments (MACP®). Manholes will be inspected and their condition documented through completion of the database entries and still photos.

1.2 Submittals

A. Submit items 1 and 2 prior to the start of work. Submit others as appropriate.

1. Sample Manhole Inspection Form; NPS may add or delete header fields as needed for the project
2. Manhole Inspection Health and Safety Plan (part of Company Safety Plan)
3. Weekly draft inspection reports
4. Printed hard copy and electronic copy of photographic image records (see Part 3)

B. Inspection reports shall be compiled in numerical order, placed in high quality three ring binders, and submitted in triplicate to the NPS Project Manager and Park POC upon completion of the Work. Inspection reports shall include the Manhole Inspection Form and hard copy of photographic records for each manhole. Photographic records shall be high color computer generated original prints, maximum 4 per sheet, 3.5”x5” approximate size. Thumbnail sized prints are not acceptable. See Section 01785 Deliverables.

C. Record Drawings depicting any field observations as to location, identification, numbering, or other useful information shall be submitted at the completion of the Work. Record Drawings shall be the Contract Drawings with observations clearly marked by hand in RED INK.

1.3 Manhole Numbering and Location Confirmation

A. The Government numbering system for manholes shall be the basis for recording and logging all information. Contractor shall notify the Park POC of any manholes not having an assigned number. In consultation with the Park POC, Contractor shall provide a preliminary number in accordance with the numbering scheme in place for the work location.

B. The Contractor shall locate the existing manholes and confirm access for inspection. The minimum effort required is as follows:

1. Open the adjacent manhole and determine the bearing of the pipeline leading to the manhole to be located and measure off the distance shown on the Drawings to establish the suspected existing manhole location.
2. Employ a pipe locator or metal detector with the capacity to audibly register a buried manhole lid at a depth of 3 feet. Contractor shall survey an area approximately 50 feet in diameter centered on the suspected existing manhole location.
3. When unable to locate a manhole, stake the suspected existing manhole location with wood lath with the top 4-inches painted surveyor's fluorescent green. Mark the lath with the manhole number using a wide tip black permanent ink pen.
4. Mark location of the manhole not found on the Drawings and notify the Park POC for assistance in locating.
5. The Contractor may, for his own convenience, stake manholes with the green top lath for future reference during CCTV work. Contractor shall retrieve all lath used and dispose of as construction debris once the pipeline has been inspected.

C. The NPS shall locate existing manholes not found by the Contractor following the efforts described above. The Contractor shall proceed with his inspections and failure by the NPS to locate an existing manhole shall not relieve the Contractor from completing the inspection of all located manholes.

D. Manholes located during the pipeline CCTV work shall be documented and their location staked with a green top wood lath with the new manhole number written on it and text indicating a "new" manhole. This stake shall not be removed until the NPS has the manhole location surveyed. (See Section 02534)

1.4 Manhole Lid Removal and Replacement

A. The ground around the manhole cover shall be cleared back a minimum of 6 inches all around the cover prior to opening. Material shall be raked neatly to the side and spread to avoid the appearance of an excavation.

B. The contractor shall notify the government when access into possible surcharged manhole(s) with bolt-down lid(s) is required. The contractor shall obtain written authorization from the Park POC before opening bolt-down manhole(s).

C. Before opening a bolt-down manhole the contractor shall have on hand, spill clean up equipment necessary for a minor spill. Any sewage issuing from the top of a bolt-down manhole should have the manhole lid reinstalled immediately and the spill cleaned up. The Park POC shall be notified immediately of this spill.

D. Once open, if present, the PVC infiltration insert lid shall be removed, cleaned and inspected for cracks and replaced at no cost to the NPS if damaged by the contractor. Document on the manhole inspection forms the presence of, the measured diameter and the condition of any infiltration insert lids. Reinstall any PVC infiltration insert lids at completion of the cleaning and/or inspection

E. Report any manhole with excessive debris accumulation in the manhole or residing on the PVC infiltration insert lid. This may constitute a hazard that should be addressed by the NPS immediately.

F. The frame, PVC infiltration insert lid and cover shall be cleaned prior to re-closure to provide a tight fitting installation.

G. Contractor shall paint a 1-inch diameter green circle on the edge of the manhole cover once the inspection is complete. Use typical utility marking paint for upside down application. Circle shall be neat with a solid green infill. Sloppy paint work shall be removed by the contractor and the cover repainted as directed by the Park POC.

1.5 Flow Control

A. It is anticipated that manhole inspections will not require flow control to observe the manhole bench, channel, and piping entering and leaving the manhole.

B. The Contractor shall make all accessible observations and measurements if the manhole is surcharged or passing sufficient flow as to restrict a complete inspection. The Contractor shall notify the Park POC of any manholes either surcharged or passing sufficient flows as to obstruct the inspection effort.

1.6 Manhole Cleaning

A. Manholes should not be cleaned prior to inspection. Soil streaks, water stains, etc are indicators of infiltration and are to be documented and photographed during the inspection.

B. If the manhole bench, walls or channels have too much debris to allow a thorough inspection, cleaning will be required as follows.

1. Using a wide spray nozzle, with a high velocity, truck mounted vacuum tube in the manhole, wash down the manhole interior walls. All debris should be removed to allow for clean visual inspection of the manhole interior. Do not allow debris from the manhole to flow down the pipeline.
2. Remove all debris that may be loaded on the bench or in the channel by vacuuming. Do not allow debris from the manhole to flow down the pipeline.

1.7 Manhole Inspection

A. The Contractor shall conduct a MACP® Level 2 structural inspection as follows:

1. Inspect manhole frame, cover, grade rings, and cone for materials of construction, alignment (offset), structural condition, roots, signs of infiltration, and depth from rim to top of cone (chimney depth). Gather detailed information to fully document all defects, determine condition of the manhole, and provide the specific information needed to recommend corrective action. Document all manhole conditions on the inspection report form.
2. Inspect the barrel (wall) for construction materials, diameter, offset, roots, inflow and infiltration and access rungs. Flag all manholes with less than 4 feet nominal diameter, on the inspection report form.
3. Built-in access ladder rungs are to be documented but are not to be given a

condition rating. Safe anchorage cannot be determined by visual inspection and therefore the data cannot be considered reliable. Flag all manholes with built-in access ladder rungs on the inspection report form and note the rungs have not been inspected.

4. Inspect bench and channel for materials of construction, condition, grease, debris, and corrosion. Flag on the inspection report form and report all manholes with channel and debris accumulation on the bench or obstructing flow. This may constitute an Immediate Hazard that should be addressed by the NPS immediately.
5. Measure and record depth to the nearest 1/8 inch or 0.05 feet from the frame rim to invert at the center of the manhole. Use straightedge across manhole to get accurate measurement at center. If the manhole has extreme fall across the diameter, record the invert of all pipes penetrating the manhole. Include apparent size and direction of flow.

   If any pipe penetrates a manhole at elevation above the manhole bottom then invert depths shall be measured for those pipe penetrations. Include invert measurements for both the upper and lower inlets of external drop connections at the point of entry to the manhole. Record drop connections and identify as internal drop or external drop inlets.

   An internal drop inlet shall be defined as any pipe entering the manhole at more that 12- inches above the bench. All internal drop inlets greater than 24-inches above the bench should be equipped with a drop pipe secured to the wall. Flag all internal drop inlets greater than 24 inches not equipped with a secure drop pipe on the inspection report form.

   An external drop inlet is identified by two same size wall penetrations aligned vertically, on top of the other. The upper penetration typically has a partial dam across the pipe to force low flows to travel through the drop pipe located outside the manhole. CCTV camera inspection may be necessary to identify an external drop.
6. All observations shall be recorded on a NASSCO approved manhole inspection form with an entry line for each component. The NPS reserves the right to review and modify as necessary the data entry form to provide the needed information. Entries shall be printed and legible. Inspection form shall include a drawn diagram plan view of the manhole for recording observations. Mark and number on the plan view all pipe penetrations. Record pipe sizes and materials, direction of flow (In / Out) of each pipe using small arrows (within the trough(s)) pointing the direction of flow, and observations using the assigned pipe numbering or lettering shown on the plan view diagram. Clearly mark the North direction on the plan view diagram. This plan view deviates from the NASSCO guidelines by documenting the layout as viewed facing north. Each pipe is to be numbered or lettered in a clockwise order with the outlet pipe being Pipe #1 or “A”. Pipes directly above one another shall be numbered or lettered consecutively with the upper pipe having the lower number or letter.

1.8 Manhole Digital Image Records

A. Each manhole shall have a minimum of three digital photographic image records made. One image will show the general proximity of the manhole. The second image shall show

the rim, chimney and upper portions of the manhole, taken at a point to see details of each. The third image shall show the interior of the manhole including the barrel, bench and trough(s). Interior image shall be taken sufficiently close to the rim to eliminate high contrast from the outside light and shall clearly show the inside of the manhole. Additional images shall be taken as necessary to show specific existing conditions not visible in the first three images. A reader board with the manhole number in large black, block letters/numbers shall be placed adjacent to the manhole opening in the proximity photo and shall be clearly visible and readable in the photo. The reader board shall be placed at the north side of the manhole. All photos are to be taken with north at the top of the photo.

B. Digital image shall have a minimum 1,024x768 pixel resolution and shall be saved in jpeg format.

C. The file name shall be “manhole id_date of photo_photo sequence number.jpg”. (A2_031708_002.jpg)

D. Two, color, high resolution quality photograph sets shall be provided by the Contractor with no more than one manhole per page showing up to four (4) images per 8-1/2 x 11 inch page. See Section 01785 Deliverables.

1.9 PERMANENT PLUGS

A. Existing permanent plugs may be found when inspecting the manholes. Record all found plugs. All existing plugs should be watertight and capable of withstanding all internal and external pressures without leakage. Record the location and condition of all plugs found. REPORT ANY UNSOUND PLUG IMMEDIATELY TO THE GOVERNMENT.

1.10 FINAL REPORT

A. Manhole inspection reports shall be compiled in alpha/numeric order, placed in high quality three ring binders, and submitted in duplicate to the NPS upon completion of the work. They are a component of the Inspection Data Manuals described in Section 01785 of this requirements package. Inspection reports shall include the Manhole Inspection Form, printed copy of manhole photographic records and printed copy of photographic records for each unusual condition and other pertinent defect. Photographic records shall be high contrast color, computer generated original prints, one manhole per sheet and four photos per sheet maximum. See Section 01785 Deliverables.

B. Record Drawings depicting any field observations as to location, identification, numbering, or other useful information shall be submitted at the completion of the work. Record Drawings shall be the final maps produced either by others under a separate contract and updated by this contract or produced entirely through this contract with observations clearly marked by hand in RED INK. Contractor shall submit one (1) copy of the marked up Record Drawings at the completion of the work.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION (NOT USED)

SECTION 02534— Closed Circuit Television (CCTV) and Sonar Inspection

PART 1: GENERAL

1.1 Summary

A. Included in the section are the requirements for completing the Closed-Circuit Television (CCTV) inspection of 4-inch and larger sanitary sewer pipelines. Four (4) inch and larger service laterals are included in this project. Sonar inspection of surcharged 10" diameter and larger pipes is also included. This work includes data entry into an electronic database with photographic image capture and submittal of detailed and summary reports listing the findings of the inspection. This work may include bypass pumping and off peak work hours as required to complete the CCTV inspection. This work also includes the implementation of a site-specific Spill Prevention and Response Plan (SPRP) completed as part of specifications section 01355 Resources Protection.

1.2 Submittals

A. Submit items 1 and 2 below for approval prior to the start of work. Submit others when appropriate.

1. Sample CCTV Inspection Form: NPS may add or delete header fields as needed for the project. The Inspection Form headers may be revised or adjusted as needed for different Park areas. The form headers will be approved prior to starting each Park but will not be modified while working at a Park unless a major discrepancy is noted.
2. Sample sonar inspection reports: Submit a variety showing the data compiled either graphically, numerically or in text format or a combination of any. Work with the Park POC and/or COTR to determine the best representation of the data.
3. Weekly summary inspection reports that must include segment reports and a summary totaling the work done each week
4. Weekly schedule and inspection plan.

1.3 Related Documents

A. Section 01355 Resources Protection

B. Section 01785 Deliverables

C. Section 02501 Testing of Sewer Force Mains and Appurtenances

D. Section 02533 Manhole Cleaning and Inspection

E. NASSCO Code Charts

1.4 General Information

A. Notification of Immediate Hazards: Contractor shall notify the Park POC of any immediate hazard. Notification shall be verbal and immediate when there is a risk of a potential spill and the Spill Prevention

   Plan measures shall continue until the NPS releases the Contractor of site control. Immediate hazards which shall be reported include severely fractured pipes, missing pipes segments, severe offset joints, and severe roots or grease. See paragraph 3.4 below.

B. Documentation for the Inspection Form header shall be verified with the Park POC prior to beginning of each inspection. Notably the address and specific Park location information shall be as per the POC.

C. Record Drawings shall be maintained in the field depicting the following field observations.

   1. Show pipe diameter and apparent material of construction.
   2. Show manhole numbering
   3. Show pipeline flow direction
   4. Show location of immediate hazards
   5. Other pipe intersections
   6. Location and size of laterals
   7. Location of pipeline plugs

1.5 Manhole Numbering and Pipe Segment Identification

A. The Government numbering system for manholes and/or cleanouts and termination points shall be the basis for recording and logging all information. Contractor shall notify the Park POC of any manholes not having an assigned number and shall provide a preliminary number in accordance with the numbering scheme in place for the specific work location.

B. The Contractor shall locate the existing manholes and confirm access for inspection. The minimum effort required may be as follows:

   1. Open the adjacent manhole and determine the bearing of the pipeline leading to the manhole to be located and measure off the distance shown on the Drawings to establish the suspected existing manhole location.
   2. Employ a pipe locator or metal detector with the capacity to audibly register a buried manhole lid at a depth of 3 feet. Contractor shall survey an area approximately 50 feet in diameter centered on the suspected existing manhole location.
   3. When unable to locate a manhole, stake the suspected existing manhole location with wood lath with the top 4-inches painted surveyor's fluorescent green. Mark the lath with the manhole number using a wide tip black permanent ink pen.
   4. Mark apparent locations of the manhole not found on the drawings, and notify the Park POC for assistance in locating.
   5. The Contractor may, for his own convenience, stake manholes with the green top lath for future reference during CCTV work. Contractor shall retrieve all lath used and dispose of as construction debris once the pipeline has been inspected.

C. The NPS shall locate existing manholes not found by the Contractor following the efforts described above. The Contractor shall proceed with his inspections and failure by the NPS to

locate an existing manhole shall not relieve the Contractor from completing the inspection of all located manholes.

D. Manholes located during the pipeline CCTV work shall be documented and their location staked with a green top wood lath with the new manhole number written on it and text indicating a "new" manhole. This stake shall not be removed until the Contractor has surveyed the manhole using sub-meter accurate GPS equipment or other approved surveying equipment.

1.6 Survey

A. Newly found manholes or other system features require surveying to determine their exact location. The Contractor shall survey the points using sub-meter accurate GPS equipment or conventional land survey instruments. Survey location is to be included on marked up Record Drawings.

B. Contractor may elect to use "office" location methods by accurately locating the new features and inserting them into accurately scaled, geo-referenced drawings.

C. All latitude and longitude survey data is to be recorded regardless of the method used to locate the newly found features.

1.7 Manhole Closure and Marking

A. All existing manholes should be equipped with a solid well-fitting cast iron cover with no drain holes and may include a PVC infiltration insert lid beneath the cast iron cover. The Contractor shall secure the manhole infiltration insert lid and replace place the cast iron cover upon completion of CCTV inspection.

B. Contractor shall mark the manhole cover with a 1-inch diameter white circle or spot painted on top of the cover denoting manhole was accessed during CCTV work and related pipeline data was completed. Painting shall be neat. Use typical utility marking paint for upside down application. Sloppy painting may require removal and re-painting at no additional cost to the Government.

1.8 Service Laterals

A. All service laterals, 4-inch diameter and larger, are to be included in the work. All data gathered shall be incorporated into the same database as the main line inspections. Access to clean outs shall be limited to external building locations only. The Contractor is not expected to access basements, crawl spaces or other interior building locations.

B. Cleanout plugs are notorious for breaking during opening. Arrange with the NPS prior to opening cleanouts, to have replacement plugs available. It shall be the responsibility of the NPS to provide replacement plugs as needed. Should a plug be impossible to open, document the condition.

1.9 Pressurized and Surcharged Gravity Main Inspection

A. Contractor shall inspect all pressure cleanout locations and air/vacuum release valves. A site specific spill prevention plan associated with opening the cleanout for inspection shall be completed prior to opening. These cleanouts are generally on steep pipelines and are subject to pressures during blockages or may be surcharged during normal operations. Any

compromised, damaged or unsound cleanout, cleanout pipe, cleanout lid and cover shall be reported immediately to the Government with a recommendation for repair.

B. Contractor shall coordinate the inspection schedule of these pipelines and the work may involve working either prior to or after the peak visitation hours or possibly peak visitation seasons to reduce flows in the pipeline.

1.10 Pressurized Force Main Inspections

A. See Section 02501 for Force Main Inspection requirements

B. Not all force mains are suitable for internal camera inspection. Many force mains only have access points at either end. Access points along the length of the force main may not exist. The force main may not be able to be drained or pumped out. Coordination with the Park POC and utility system operators is required prior to any operation that involves force mains.

C. Force mains not suitable for internal camera inspections shall be pressure tested. Coordination with the Park POC is required for this entire process.

D. Contractor shall be required to inspect all air/vacuum release valves.

E. Contractor shall coordinate the inspection schedule of these force mains with the Park POC. The work may involve working either prior to or after the peak visitation hours or possibly peak visitation seasons to reduce flows in the pipeline.

PART 2: PRODUCTS

2.1 Camera Equipment

A. Service Lateral Camera: Service lateral camera shall be a self-leveling push type or tractor mounted color camera with capability to negotiate a 4-inch 45-degee bend. Push camera shall be suitable for insertion through a 4” clean out and shall have a 200-foot range minimum.

B. Main-line Camera: Main-line camera shall be a pan and tilt type tractor mounted color camera with 360 degree scan of the circumference and tilt to allow viewing up to 115 degrees back from the axis of the camera. The camera shall meet the following performance criteria:

1. Camera shall be capable of being self-propelled through 4” diameter and larger pipes.
2. Camera shall have built-in text display capability with date, time, footage count, manhole location and comments as a minimum.
3. Camera shall be able to focus from ½ inch to infinity and be equipped with remote focus, iris, and color balance. Camera shall have a 2.5-lux rating or better.
4. Camera shall be waterproof and sealed. Any camera fogging from internal moisture shall be removed and replaced with a watertight, fog free camera.
5. The Contractor shall provide a completely fog free CCTV record.
6. Camera shall be equipped with sufficient cable to allow a minimum of 1000 linear feet of video inspection in a single run.

2.2 Camera Transport Drive

A. The camera transport drive assembly shall be specifically manufactured for the pipe material and diameters being inspected. Drive unit may be track or wheel driven and shall have the capability to pull over 600 feet of cable through a 4-inch PVC pipeline. Six inch (6") and larger diameter main-line cameras shall have a 1000-foot minimum range.

B. The drive unit shall have forward, reverse, and free wheel drive capability.

C. Drive unit shall provide a distance counter for measuring the traveled distance based on the revolutions of the drive or other accurate counter mechanism. Distance shall be measured in both forward and reverse and shall be to the nearest 0.1 feet.

2.3 Software Requirements

A. CCTV Software Requirements: Database records shall be submitted in Microsoft Access 2010 or later version. Camera software is to meet the latest NASSCO certified version requirements.

B. Sonar software shall be able to display live data from the sonar scanning head and display the information as an image using 256 colors to designate signal amplitude. Software shall be able to capture screen images and save the image as a JPG or Bitmap file. These images shall be readable in all major software programs used for word processing and report generation. An instant report shall be able to be produced and printed with user defined titling and showing the desired captured still image in full color. Included on this report shall be the distance count from the footage encoder on the cable drum and pitch and roll data from the underwater scanning unit. The software must have real time measurement capabilities. This shall include point-to-point measurement, diameter measurement using a circle overlay, and area calculations to acquire volume data of sediment and debris. Measurements must be able to be printed on reports and saved with the image. The first echo reflection data must be available to produce a line outline of the pipe wall. Software shall display both graphically and numerically the pitch and roll data from the underwater scanning unit. Software shall numerically display distance, in either English or Metric units from the encoder on the cable drum.

2.4 Digital Video Disk (DVD) Files

A. A complete set of all television records shall be submitted on Digital Video Disks (DVD) <u>and</u> on a USB 2.0 powered Portable Hard Drives. CCTV video files shall be provided in mpeg format. The Contractor shall provide one file for each manhole to manhole segment CCTV inspection. Each file shall be named and indexed to a data base of manhole/pipeline identifiers. Organization and naming of electronic files shall be approved by the Park POC and NPS Project Manager. See Section 01785 Deliverables.

2.5 Hard Copy Printed Reports

A. Printed pipeline segment reports shall be prepared and made available to the Park POC weekly. The contractor shall prepare two complete sets of pipeline segment reports as part of the final deliverables. See Section 01785 Deliverables.

PART 3: EXECUTION

3.1 CCTV Setup

A. CCTV and sonar setup shall be as described in the approved Spill Prevention and Response Plan (Specifications Section 01355) and shall include traffic control. Traffic Control shall include vehicular and pedestrian traffic.

B. CCTV and sonar setup shall be within improved roadways, access roads or walkways whenever possible. Access to manholes within natural areas shall be approved by the Park POC prior to mobilization to the site. Access off road may require the use of plywood planking placed under all tires consisting of a minimum 2-foot by 8-foot sheets, 1-1/8" thick, placed one layer thick or two (2) each , minimum 2-foot by 8-foot sheets, 5/8" thick, placed two layers thick. Larger sheets may be required if vehicle is unable to stay on top of plywood. Aluminum, portable aircraft landing mats may be used in lieu of plywood. Planking shall be fully removed following vehicle passage and shall in no case be left in place more than 48 hours. High flotation all-terrain vehicles with the camera setup may be used in lieu of planking if approved by the Park POC. See Section 01355.

C. Camera shall be inserted into the manhole or cleanout and the counter reset to the designated camera lens starting distance prior to beginning the inspection.

D. CCTV inspection may proceed if the pipeline is flowing 1/3 full or less. Flows in excess of 1/3 may be allowed if the visibility and picture quality are good. CCTV inspection over 1/3 full shall be at the approval of the Park POC and/or the NPS Project Manager. Sonar inspection is designed to be used in surcharged lines and as such the 1/3 full or less requirement does not apply.

E. The Contractor shall bypass pump and evacuate the pipeline if surcharged prior to inspecting. Contractor may reduce flows or divert flows as per below. Contractor shall adjust work hours to correspond with periods of low flow.

3.2 Sonar Setup

A. The sonar setup shall include all necessary equipment to acoustically inspect 10" to 24" inch sewer pipelines with a tether length of 1500 linear feet. This project is expected to include pipes of 10" and 15" diameters but may include 21" diameter pipe.

B. The pipeline shall be flushed with clear water to remove suspended solids as much as possible to provide the best possible unobstructed view of the pipe walls.

C. The sonar shall be inserted through the upstream manhole whenever possible. If a dosing siphon apparatus exists, the sonar equipment shall be inserted through the downstream manhole if accessible. Effort shall be made to ensure complete observation of the entire surcharged line(s).

3.3 Flow Control without Pumping

A. Divert sewage flows and storm water around all sewer cleaning areas as needed. Depth of flow shall be limited to 1/3 or less of the diameter of the pipe for inspection. If flow is greater than 1/3 the diameter of the pipe, the CCTV work shall be postponed for more favorable conditions or non-pumping flow control methods may be employed. Furnish,

install, and manage plugs, conduits, and other equipment to lessen or divert the flow of sewage through or around the pipeline reach in which work is to be performed. Pneumatic plugs shall be designed so that all or any portion of the sewage can be released to the original line without requiring personnel to enter a manhole. The plug(s) shall be provided with an air line suitable for filling the plug from ground level and include a pressure gauge. The plugs shall also have a tag line. Flow through plugs may be employed to reduce flow into the pipe reach to be cleaned or inspected. These plugs must also be capable of having flow returned to the original pipe without personnel entering the manhole. Flow reduction operations must be completed during approved working hours for the location. Flow shall be restored to normal as soon as possible following flow reduction operations.

B. Competent personnel shall monitor the flow control methods continuously. The personnel shall be able to readily recognize situations indicating imminent failure or potential spill. They shall operate and manage the equipment employed during the operation.

C. A standby pump shall be provided and be on-site during non-pumping flow diversion operations. Pumping shall be done in such manner as will not damage property or create a nuisance or health menace. A standby pump is to be of suitable size to handle current pipe flows plus an additional 100%. Standby pumps shall have pipe fittings installed to provide an immediate installation to take over from non- pumping flow diversion methods should the situation require it.

D. Flow shall be restored to normal as soon as possible following flow reduction operations. Equipment shall be broken down in a manner to prevent any sewage from spilling.

3.4 Flow Control with Bypass Pumping

A. Bypass pumping and/or pumped removal of water in the pipelines may be necessary for the inspection of pipelines with sags, minimal slope and/or high volume flow. Bypass pumping or pumped removal of water shall be required when the water depth is greater than 1/3 the pipe diameter for more than 1/2 the length of the pipeline segment.

B. Bypass pumping may be required during inspection to prevent surcharge and possible overflow of the sewer system. Bypass pumping may be required following cleaning to allow immediate CCTV inspection prior to allowing waste to enter the pipeline. Contractor shall complete a prior assessment of the existing sewer flows and provide an appraisal to the Park POC of any required bypass pumping activities at a minimum of one week prior to the need. Bypass pumping shall be the least favorable method of flow reduction for the CCTV inspection. Exhaust all alternatives before using bypass pumping.

C. The pumping system shall be of sufficient capacity to handle existing flow plus additional flow that may occur during a rainstorm. If pumping is required on a 24-hour basis and engine drives are required, engines shall be equipped in a manner to keep noise to a minimum.

D. Competent personnel shall monitor the bypass pumping operation continuously at all times the pumps are in place. If the operation extends beyond designated working hours, the competent person shall remain on-site at all times. The personnel shall be able to readily recognize situations indicating imminent failure or potential spill and be capable of notifying authorities of the need for immediate action. They shall operate and manage the

equipment employed during the operation. The designated competent person shall have no other duties than to manage the bypass pumping operation.

E. Engine driven bypass pumping in residential areas shall not be permitted on a 24-hour basis. Work must be coordinated to be completed during regular daytime operating hours.

F. Two (2) standby pumps, equal in size and capacity to the approved bypass pump(s) shall be provided and be on-site during bypass pumping operations. Standby pumps shall have pipe fittings installed to provide an immediate conversion from the disabled pump to the standby pump.

G. Flow shall be restored to normal as soon as possible following bypass pumping. Equipment shall be broken down in a manner to prevent any sewage from spilling

3.5 CCTV and Sonar Observations and Reporting Criteria

A. Contractor shall start each inspection with a verbal narrative of the manhole location, number and condition, as well as the date, time and any special circumstances associated with the specific location being inspected. Text with the same data shall be imprinted on the digital video file at the beginning of each run. The use of push cameras shall be limited to four (4) inch laterals and special conditions where a larger self-propelled camera cannot navigate the system. Obtain prior approval for special considerations for using a push camera. Failure to obtain prior approval of the Park POC or NPS Project Manager for use of a push type camera may result in rejection and re-inspection at no additional cost to the Government.

B. The Contractor shall proceed down the pipeline at a speed not to exceed 30 feet per minute or 6 inches per second. The footage counter shall be a combined count using both a cable length and the traction drive distance. The actual distance shall be a resolved distance between the two counters. The camera shall be extracted, reset and the inspection started again if the two methods of measuring the distance are more than 1 foot per 100 feet out of agreement. The NPS Project Manager or Park POC may waive this requirement if the Contractor can show accuracy with one counting system.

C. Observation shall include all conditions identified in the latest edition of the NASSCO Manual of Sewer Condition Classification, which include but are not limited to pipe condition, grease build up, pipe tap condition, root obstruction level and water depth. See attached NASSCO Code Chart.

D. The camera operator shall stop at all defects and changes in materials or conditions and pan and tilt as necessary to properly identify and document conditions. The operator shall follow all NASSCO PACP Code Chart abbreviations when documenting defects and changes in conditions. As a minimum, camera observations shall include close-ups of infiltration locations, taps of all types, longitudinal and circumferential cracks, roots, changes in materials, obstacles and deposits. Low points or sags shall be documented at the beginning of and the end of the sag.

E. Observations shall be made verbally on the video and shall be recorded on the printed hard copy inspection report form. Location and rating shall be clearly marked on the form. Inappropriate language recorded on the tape shall be grounds for rejection and re-inspection at no additional cost to the Government.

F. Camera shall be stopped and rotated to inspect all features listed above and to look up all service taps.

G. Still image capture shall be obtained for all immediate hazard or unusual conditions notification locations and other pertinent defects. Hard copy still image photographic prints of immediate hazards or unusual conditions shall be submitted within two working days of observation and included in the final deliverable manuals. Other pertinent defect photos shall be submitted as part of the final deliverables only. A minimum of one still image per pipe segment representative of the line conditions shall be provided.

H. Reverse set up and inspection shall be clearly documented showing the reason for using a reverse setup and identifying the location of the end of inspections from both upstream and downstream. Any reach inaccessible shall be identified and an estimate of the length included in the inspection narrative and reporting. All documentation shall clearly identify if and where a reverse setup has been used.

I. Report apparent flow volume at all laterals if such flow appears to be clear water as from infiltration.

J. The sonar shall be propelled through the pipeline using a floatable inspection vessel, a robotic tractor, or a skid assembly that will be winched through. As the sonar moves through the pipeline a spiral view shall be created with a complete 360° radial profile captured approximately once every 1.2 seconds. Once the profiles are stored in the computer the contractor shall compile the data to calculate sediment volumes, water volumes, and make note of observed defects.

K. Sonar assessment shall provide a detailed inspection of the pipeline below the flow level. The profiling shall show general pipeline condition including debris build-up, sediment depth, open breaks greater than or equal to 3mm in width, deflection, erosion, collapses, and voids. A determination of the amount of debris and sedimentation in the inspected pipes shall be derived from the sonar data documentation.

3.6 Immediate Hazards or Unusual Conditions Notification

A. The following conditions shall be reported as an immediate hazard or unusual condition on a daily basis to the Park POC. Hard copy still image photographic prints of immediate hazards or unusual conditions shall be submitted within two working days of observation.

1. Fracture, any descriptor
2. Broken, any descriptor
3. Collapsed, any descriptor
4. Grease level “Medium” or worse, where the level could impede or distort flow
5. Protruding tap blocking the passage of the camera or projecting 50% or more into the pipe
6. Offset joints of ¼ to ½ of the pipe wall thickness or more
7. Offset joints disrupting flow exceeding ¼ of the pipe diameter
8. Roots level “Medium” or worse
9. Increase in water level depth from less than 1/3 pipe diameter to ½ pipe diameter or greater

10. Sedimentation build-up of 1/4 the pipe diameter or greater

3.7 Permanent Plugs

A. Existing permanent plugs may be found when inspecting the pipeline. Record all found plugs. All existing plugs should be watertight and capable of withstanding all internal and external pressures without leakage. Record the location and condition of all plugs found. Report any unsound plug immediately to the government.

3.8 Electronic Database Records

A. Contractor shall prepare and maintain an electronic database of the inspection records and provide two (2) copies to the NPS upon completion of the work. See Section 01785 Deliverables.

B. Contractor shall maintain in their files a complete copy of the electronic database of the CCTV inspection for each NPS area for a minimum of 1 year. Contractor must be able to produce a complete set of hard copy reports from this electronic file.

3.9 Final Reports

A. CCTV Inspection Reports shall be compiled in alpha/numeric order, placed in high quality three ring binders, and submitted in duplicate to the NPS upon completion of the work. See Section 01785 for organization of final deliverables.

B. Record Drawings shall be marked up to depict any field observations as to location, identification, numbering, or other useful information and shall be submitted at the completion of the work. Record Drawings shall be the final maps produced either by others under a separate contract and updated by this contract or produced entirely through this contract with observations clearly marked by hand in RED INK. Contractor shall submit one (1) copy of the marked-up Record Drawings at the completion of the work.

Appendix A NASSCO'S PIPELINE ASSESSMENT & CERTIFICATION PROGRAM (PACP)©

A.1 Section 4- Continuous Defect Coding

"TRULY" 4-1

"Truly" continuous defects run along the sewer without any interruption for more than three feet (1 meter).
Examples:
- Longitudinal Fractures
- Longitudinal Cracks

"REPEATED" 4-1

"Repeated" continuous defects occur at regular intervals along the sewer. These occur at pipe joints and include:
-Encrustation
-Open Joints
-Circumferential Fractures

Code Changes in Version 6.0.1

Added:
Buckling Wall (KW), Buckling Dimpling (KD), and Buckling Inverse Curvature (KI)

A.2 Section 5- Structural Defect Coding (Module SA)

C CRACK 5-1
- CL Longitudinal 5-2
- CC Circumferential 5-2
- CM Multiple 5-2
- CS Spiral 5-2
- CH Hinge 5-2

F FRACTURE 5-7
- FL Longitudinal 5-7
- FC Circumferential 5-7
- FM Multiple 5-7
- FS Spiral 5-7
- FH Hinge 5-7

B BROKEN 5-15
- BSV -Soil Visible Beyond Defect 5-15
- BVV -Void Visible Beyond Defect 5-15

H HOLE 5-17
- HSV -Soil Visible Beyond Defect 5-17
- HVV -Void Visible Beyond Defect 5-17

D DEFORMED 5-19
- DV Deformed Vertically (brick) 5-19
- DH Deformed Horizontally (brick) 5-19

X COLLAPSE 5-23
- XP Pipe Collapse 5-23
- XB Brick Collapse 5-23

J JOINT 5-26
- JO Joint Offset (Displaced) 5-26
- JS Joint Separated (Open) 5-26
- JA Joint Angular 5-26

S SURFACE DAMAGE 5-31
- SRI Roughness Increased 5-31
  - SRI - M - Mechanical
  - SRI - C - Chemical
  - SRI - Z - Not Evident

S SURFACE DAMAGE 5-31
- SAV Aggregate Visible 5-31
  - SAV - M - Mechanical
  - SAV - C - Chemical
  - SAV - Z - Not Evident

S SURFACE DAMAGE 5-31
- SAP Aggregate Projecting 5-31
  - SAP - M - Mechanical
  - SAP - C - Chemical
  - SAP - Z - Not Evident

S SURFACE DAMAGE 5-31
- SAM Aggregate Missing 5-31
  - SAM - M - Mechanical
  - SAM - C - Chemical Attack
  - SAM - Z - Not Evident

S SURFACE DAMAGE 5-31
- SRV Reinforcement Visible 5-31
  - SRV - M - Mechanical
  - SRV - C - Chemical Attack
  - SRV - Z - Not Evident

S SURFACE DAMAGE 5-31
- SRP Reinforcement Projecting 5-31
  - SRP - M - Mechanical
  - SRP - C - Chemical Attack
  - SRP - Z - Not Evident

S SURFACE DAMAGE 5-31
- SRC Reinforcement Corroded 5-31
  - SRC - M - Mechanical
  - SRC - C - Chemical Attack
  - SRC - Z - Not Evident

S SURFACE DAMAGE 5-31
- SMW Missing Wall 5-32
  - SMW - M - Mechanical
  - SMW - C - Chemical Attack
  - SMW - Z - Not Evident

S SURFACE DAMAGE 5-31
- SSS Surface Spalling 5-32
  - SSS - M - Mechanical
  - SSS - C - Chemical Attack
  - SSS - Z - Not Evident

S SURFACE DAMAGE 5-31
- SZ Other 5-32
  - SZ - M - Mechanical
  - SZ - C - Chemical Attack
  - SZ - Z - Not Evident

S SURFACE DAMAGE 5-31
- SCP Corrosion (metal pipe) 5-32
  - *no modifiers used

K BUCKLING 5-45
- KW Wall 5-45
- KD Dimpling 5-45
- KI Inverse Curvature 5-45

LF LINING FAILURE 5-49
- LFD Detached Lining 5-49
- LFDE Defective End 5-49
- LFB Blistered Lining 5-49
- LFCS Service Cut Shifted 5-49
- LFAC Abandoned Connection 5-49

LF LINING FAILURE 5-49 (continued)
- LFOC Overcut Service 5-49
- LFUC Undercut Service 5-49
- LFBK Buckled Lining 5-49
- LFW Wrinkled Lining 5-49
- LFAS Annular Space 5-49

LF LINING FAILURE 5-50
- LFBU Bulges 5-50
- LFDC Discoloration 5-50
- LFDL Delamination 5-50
- LFRS Resin Slug 5-50
- LFPH Pinholes 5-50
- LFZ Other 5-50

WF WELD FAILURE 5-67
- WFL Longitudinal 5-67
- WFC Circumferential 5-67
- WFM Multiple 5-67
- WFS Spiral 5-67
- WFZ Unidentified 5-67

RP POINT REPAIR 5-71
- RPR Pipe Replaced 5-69
- RPR - D -Defective 5-69
- RPP Patch Repair 5-69
- RPP - D -Defective 5-69

RP POINT REPAIR 5-71
- RPL Localized Pipeliner 5-69
- RPL - D -Defective 5-69
- RPZ Other 5-69
- RPZ - D -Defective 5-69

BRICKWORK 5-77
- DB Displaced 5-75
- MB Missing 5-75
- DI Dropped Invert 5-75

BRICKWORK 5-77
- MM Missing Mortar 5-75
  - S -Small 5-75
  - M -Medium 5-75
  - L -Large 5-75

Updated November 2010

A.3 Section S-0perational and Maintenance (Module SB)

D	DEPOSITS	6-1
DA	Attached	6-1
DAE	-Encrustation	6-2
DAGS	-Grease	6-2
DAR	-Ragging	6-2
DAZ	-Other	6-2

D	DEPOSITS	6-1
DS	Settled	6-1
DSF	-Fine	6-2
DSGV	-Gravel	6-2
DSC	-Hard/Compacted	6-2
DSZ	-Other	6-2

D	DEPOSITS (continued)	6-1
DN	Ingress	6-1
DNF	-Fine (silt & sand)	6-3
DNGV	-Gravel	6-3
DNZ	-Other	6-3

R	ROOTS	6-7
RF	Fine	6-7
RFB	-Barrel	6-7
RFL	-Lateral	6-7
RFC	-Connection	6-8

R	ROOTS	6-7
RT	Tap	6-7
RTB	-Barrel	6-7
RTL	-Lateral	6-7
RTC	-Connection	6-8

R	ROOTS	6-7
RM	Medium	6-7
RMB	-Barrel	6-7
RML	-Lateral	6-7
RMC	-Connection	6-8

R	ROOTS	6-7
RB	Ball	6-7
RBB	-Barrel	6-7
RBL	-Lateral	6-7
RBC	-Connection	6-8

I	INFILTRATION	6-13
IS	Stain	6-13
IW	Weeper	6-13
ID	Dripper	6-13
IR	Runner	6-13
IG	Gusher	6-13

OB	OBSTACLES/ OBSTRUCTIONS	6-19
OBB	Brick or Masonry	6-19
OBM	Pipe Material in Invert	6-19
OBI	Object protruding through wall	6-19

OB	OBSTACLES/ OBSTRUCTIONS	6-19
OBJ	Object wedged in joint	6-19
OBC	Object through connection/junction	6-19
OBP	External Pipe Cable	6-19

OB	OBSTACLES/ OBSTRUCTIONS	6-19
OBS	Built into structure	6-20
OBN	Construction Debris	6-20
OBR	Rocks	6-20
OBZ	Other	6-20

V	VERMIN	6-31
VR	Rat	6-31
VC	Cockroach	6-31
VZ	Other	6-31

G	GROUT TEST & SEAL	6-33
GTP	Grout Test Passed	6-33
GTP - J - Joint		6-33
GTP - L - Lateral		6-33
GTF	Grout Test Failed	6-33

G	GROUT TEST & SEAL	6-33
GTU	Grout Test Unable	6-33
GTU - J - Joint		6-33
GTU - L - Lateral		6-33
GRT	Grout Test Location	6-33

A.4 Section 7-Construction Features Coding (Module SC)

T	TAP	7-1
TF	Factory Made	7-1
TFI	-Intruding	7-2
TFA	-Active	7-2
TFC	-Capped	7-2
TFB	-Abandoned	7-2
TFD	-Defective	7-2

T	TAP	7-1
TB	Break In/Hammer	7-2
TBI	-Intruding	7-2
TBA	-Active	7-2
TBC	-Capped	7-2
TBB	-Abandoned	7-2
TBD	-Defective	7-2

T	TAP	7-1
TS	Saddle	7-2
TSI	-Intruding	7-2
TSA	-Active	7-2
TSC	-Capped	7-2
TSB	-Abandoned	7-2
TSD	-Defective	7-2

T	TAP	7-1
TR	Rehabilitated	7-2
TRI	-Intruding	7-2
TRA	-Active	7-2
TRC	-Capped	7-2
TRB	-Abandoned	7-2
TRD	-Defective	7-2

IS	INTRUDING SEALING MATERIAL	7-9
ISSR	Sealing Ring	7-9
ISSRH	-Hanging	7-9
ISSRB	-Broken	7-9
ISSRL	-Loose	7-9

IS	INTRUDING SEALING MATERIAL	7-9
ISGT	Grout	7-9
ISZ	Other	7-9

L	LINE	7-11
LLU	Left Up	7-11
LLD	Left Down	7-11
LR	Right	7-11

L	LINE	7-11
LRU	Right Up	7-11
LRD	Right Down	7-11
LU	Up	7-11
LD	Down	7-11

A	ACCESS POINT	7-13
AMH	Manhole	7-13
AWA	Wastewater Access	7-13
ADP	Discharge Point	7-13
ATC	Tee Connection	7-13

A	ACCESS POINT	7-13
AOC	Other Special Chamber	7-13
AM	Meter	7-13
AWW	Wet Well	7-14
AJB	Junction Box	7-14

A	ACCESS POINT	7-13
ACB	Catch Basin	7-14
AEP	End of Pipe	7-14

A.5 Section 8-Miscellaneous Features Coding (Module SD)

M	MISCELLANEOUS FEATURES	8-1
MCU	Camera Underwater	8-1
MGO	General Observation	8-1
MGP	General Photograph	8-1
MSC	Shape/Size Change (Sewer Dimension/Vertical/ Horizontal)	8-1
MJL	Joint Length Change	8-1

M	MISCELLANEOUS FEATURES	8-1
MLC	Lining Change	8-2
MMC	Material Change	8-2
MSA	Survey Abandoned	8-2
MWL	Water Level	8-2
MWLS	-Sag	8-2

M	MISCELLANEOUS FEATURES	8-1
MWM	Water Mark	8-2
MY	Dye Test	8-2
MYV	-Dye Visible	8-3
MYN	-Not Visible	8-3

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