Town of Los Altos Hills
Sanitary Sewer Construction Standards

GENERAL NOTES

1. All References to "Town" in these general notes shall mean Town of Los Altos Hills Public Works Department.
2. All sanitary sewer workmanship and materials shall conform to requirements of current Town Standard Details, Construction Standards, and the City Engineer.
3. The approval of these plans by the Town shall be interpreted to mean that the sanitary sewer design shown on these plans meets the Town's Standards. The Town's approval in no way guarantees any other aspect of this plan or its accuracy relative to actual field conditions.
4. The City Engineer is authorized to require modifications during construction.
5. The contractor shall contact the Town at 650-941-7222, two (2) working days in advance of beginning any sanitary sewer work. The contractor shall thereafter keep the Town Inspector informed of his schedule for sanitary sewer work.
6. Prior to commencement of excavation work, the contractor shall contact all utility companies by calling Underground Service Alert (USA) at 1-800-227-2600 at least forty-eight (48) hours prior to start of construction.
7. The contractor shall field verify the location of all utilities before beginning any excavation.
8. The contractor shall obtain any and all permits required by the Town before beginning any sanitary sewer work.
9. Contractor shall obtain encroachment permit prior to any work in the Town right-of-way. A pre-construction meeting is required with the Public Works Department.
10. Applicant shall provide sufficient deposit to the Town for inspection, testing, community outreach, staff time, arborist, traffic consultants, safety specialist and other services as determined by the City Engineer. Any outstanding deposit shall be paid in full prior to final sign off.
11. Sewer connection permits shall be issued by the Town for all proposed new connections.
12. Existing sanitary sewer service shall be maintained at all times. The contractor shall use whatever means necessary (e.g. pumps, bypass lines, etc.) to maintain this service during construction.
13. Prior to commencing any sanitary sewer work in easements, the contractor shall provide the Town with adequate evidence that all affected property owners (and tenants where applicable) were notified forty-eight (48) hours prior to the date of work and that they have updated that notice in a timely manner when those dates have changed.
14. All sanitary sewer work constructed without inspection by the Town shall be removed and reconstructed with inspection.
15. All sanitary sewer laterals shall be 4" PVC-SDR 26 or approved equal, one per lot and marked with the letter 'S' on a post per Town's standards.
16. Sewer mains shall be minimum of 8" PVC-SDR 26 or approved equal and have (a) 1% minimum slope or as approved by the City Engineer, and (b) minimum self-cleaning velocity of 2 feet per second.

17. Sewer laterals shall be a minimum of 4' below top of curb or finished ground at property line unless authorized by the City Engineer.
18. The contractor shall be responsible for verifying the elevation of all existing storm drains and sewers to be extended or connected prior to commencing work.
19. Traffic Control Plan shall be prepared by a licensed Traffic Engineer. Traffic Control Plan shall be in accordance with Town's construction standards and subject to review and approval of the City Engineer prior to permit issuance.
20. Two open traffic lanes are required during all non-working hours. One travel lane may be closed during work hours when flaggers are present.
21. Sewer trenches and permanent pavement within right-of-way and/or easements shall conform to Town's Standard Detail UT-1 and UT-2.
22. The contractor shall place temporary form fitting pieces of plywood or other suitable material over the bottoms of the manholes to prevent entry of foreign materials from the manhole to the pipe.
23. No open trenches in the street right-of-way will be allowed overnight. All trenches shall be backfill the same day the trench was excavated, except that portion of the trench or excavation to be used for connecting the extension of the installation. That said portion shall be adequately barricaded and protected to the satisfaction of the City Engineer or his representative. Excavations or trenches for poured in place concrete manhole may remain open for a period not to exceed seven days, providing said excavation or trenches are adequately barricaded, fenced, and plated with skid resistant steel plate of adequate thickness and flushed with pavement. The number of plates to be utilized each day shall be approved by the City Engineering or his representative.
24. All utility frames and covers, existing and proposed monuments, shall be brought to finish grade after finished paving.
25. 'Tracer Wire' shall be installed along the top of the pipe for all sections of the sewer line. The wire shall be solid copper AWG #10 with an insulated jacket.
26. Detectable warning tape shall be 3-inch wide GREEN color for with an overall minimum thickness of 6 mil and a solid aluminum foil core with minimum thickness of 3 mil. The solid foil shall be encased between two clear layers of 100% virgin polypropylene or polyethylene film. Warning Tape shall be permanently printed on both sides with a repeating warning "Caution: Sewer Pipe Below" at maximum interval of 2 feet. Warning Tape shall be placed 12 inch above the top of pipe.
27. All sanitary sewer mains shall be flushed, mandreled, air tested, and video inspected in accordance with Town's testing and retesting requirements.
28. Contractor shall submit video inspection CD/DVD to the Town for review and approval of the City Engineer prior to acceptance of the sewer main. The Contractor shall be responsible for repairing any defective sections observed in the video inspection to City engineer's satisfaction.
29. Trench, pipe bedding, and backfilling shall be in accordance with the Town Standard Details.

30. In areas where the existing road pavement is trenched for installation of the sewer main, contractor shall restore the pavement per Town of Los Altos Hills Standards. If the trench is more than 300 feet long, the street shall be slurry sealed. In the case where slurry seal is not suitable as determined by the Town, a fee may be required prior to permit issuance.
31. An as-built mylar plan, consists of locations of all sewer main and lateral wyes in the main trunk with reference to manholes, shall be submitted prior to acceptance of the improvements.
32. The Town is not responsible for cleaning private sewer laterals. The property owner is fully responsible for maintenance, repair, and replacement of the (a) lateral from the house to the main including wye connection at the main, (b) overflow, and (c) backflow devices.
33. All works to be done to the satisfaction of the City Engineer.
34. Include signature blocks, where applicable, for the following agencies:
    A. Town of Los Altos Hills Public Works Director:

Approved as to compliance with Town of Los Altos Hills requirements		
Nichol Bowersox, Public Works Director Town of Los Altos Hills	C.E. 80376 EXP. 03-31-2019	Date

    B. Purissima Hills Water District:

Approved by	
Purissima Hills Water District	Date

PIPES AND FITTINGS

Polyvinyl Chloride Pipe (PVC)

1. All pipe and fittings shall conform to ASTM Specifications D3034, SDR 26.
2. All joints shall be a bell and spigot assembly with elastomeric sealing gaskets sealing gaskets shall meet the requirements of ASTM Specification D1869, Solvent Cement joins are not permitted.
3. All pipes entering or leaving a concrete structure shall have a rubber waterstop gasket attached to it. The waterstop gasket shall conform to the pipe manufacturer's specifications. The waterstop gasket shall be sealed firmly around the pipe exterior and be cast into the concrete structure.
4. All pipe joints shall be made using manufactured PVC couplings. Band type compression couplings are not permitted, except repairs. Fernco or equivalent.

High Density Polyethylene (HDPE)

1. The CONTRACTOR shall provide polyethylene pipe as specified. The pipe shall be made to diameter and tolerances in accordance with ASTM D 3035. The minimum ratio of orthogonal diameters prior to installation shall be 0.95. All pipe shall be made from virgin grade material. The pipe shall be of the diameter as shown on the plans and furnished complete with all fittings, and other appurtenances as necessary for a complete and functional system.
2. All pipe and fittings shall be DR 17 (unless otherwise indicated on the plans), Extra High Molecular Weight, High Density Polyethylene PE 3408, Cell Class PE345434C, D or E per ASTM D 3350. Pipe shall be co-extruded using a melt homogenizing/plasticating extruder and appropriate die.
3. The pipe and fittings materials shall meet the requirements for Type III, Class B, Category 5, Grade P34 material as described in ASTM D 1248. Pipe and fittings shall be made in conformance with ASTM F 714 and ASTM D 3261 as modified for the specified material. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification from the same raw material pipe.

A. Pipe, fittings, and joints shall meet or exceed the following physical properties:

PROPERTY	ASTM TEST METHOD	NOMINAL VALUE
Density, gm/cc	D 1505	0.955
Melt Index, gm/10 min.	D 1238-E	0.10
High Load Melt Index, gm/10 min.	D 1238-F	12.0
Tensile Strength @ Break, psi	D 638	4,500
Tensile strength @ Yield, psi	D 638	<3,200
Elongation, %	D 638	>800
Flexural Modulus, psi	D 790	136,000
Environmental Stress Cracking Resistance, F20 Hours (100 degree C)	D 1693	>5,000
Brittleness Temperature, degree	D 746	< -180
Melting Point, degree F	D 789	261
Vicat Softening Temp, degree F	D 1525	255
Hardness, Shore D	D 2240	66
Volume Resistivity, ohm-cm	D 991	2.6 X 10 (16^{TH})
ASTM D 1248 Classification	D 1248	Type III Class C Category 5 Grade P34 345434C
Recommended Hydrostatic		800 psi @73.4° F
Design Stress		400 psi @140° F

B. Pipe Color:

1) The interior wall of all HDPE pipes to be used shall not be black or any dark. The inner wall shall be white, light green, or natural.

2) The outer wall shall be black, light green or natural. Orange, red, magenta or blue color are not acceptable.

C. Pipe Markings:

1) Pipe shall be marked at 3-foot intervals or less with the manufacturer's name (or trade mark), the designation ASTM D3350 and ASTM 714, including the year of issue, the letters "PE" followed by the cell classification number of the raw material compound used, the nominal pipe size in inches, the dimensional ratio, and the manufacturer's code identifying the resin manufacturer, lot number, and date of manufacture. Pipe shall be color identified by stripes, a color shell, or solid color.

The pipes shall be stored and handled in accordance with the manufacturer's recommendations and shall be less than two (2) years old at the time of installation.

2) The average outside diameter and wall thickness of pipe and fittings shall conform to the table below when measured in accordance with ASTM D 2122.

Nominal Size (inches)	Nominal OD (inches)	Minimum Wall Thickness DR17 (inches)
4	4.5	0.265
6	6.625	0.390
8	8.625	0.507
10	10.75	0.632
12	12.75	0.750
14	14.00	0.824
16	16.00	0.941
18	18.00	1.059

D. Pipe and Fittings shall be homogeneous throughout and free of:

1) Serious abrasion, cutting, or gouging of the outside surface extending to more than 10 percent of the wall thickness in depth
2) Cracks
3) Kinking (generally due to excessive or abrupt bending)
4) Flattening
5) Holes
6) Blisters
7) Other injurious defects

E. Polyethylene Fittings

1) All polyethylene fittings shall have butt end outlets. Molded and fabricated fittings shall have a pressure rating equal to the pipe
2) Minimum pipe wall thickness for fitting butt outlets shall be equal to the pipe wall thickness.
3) The fittings shall be as uniform as commercially practicable in color, opacity, density, and other physical properties. Any pipe and fittings not meeting these criteria shall be rejected.
4) Fittings shall be no older than 6 months from the date of manufacture to the date of shipment to the Town. All fittings shall be packaged in standard commercial cardboard boxes that provide protection from shipping injuries.

5) Fittings shall be molded except fittings larger than 12", which is allowed to be factory fabricated (unless molded fittings are available). Fabricated fittings shall be manufactured using Data Loggers recording heating iron face temperatures, fusion pressure and a graphic representation of the fusion cycle. The Data Logger printout shall be part of the required submittal for the fabricated fitting. Fabricated fittings shall be manufactured by ISCO or approved equal. All fabricated fittings must be approved by the Engineer prior to installation.

6) Fittings shall be marked with the following: ASTM D3261 (Butt type); manufacturer's name or trademark; material designation; date of manufacture or manufacturing code; size (including the sizing system used, such as IPS, CTS or OD). Where the fitting size does not allow complete marking, marking may be omitted in the following sequence: size, date of manufacture, material designation, manufacturer's name and trademark.

F. Joints:

1) Pipe lengths shall be assembled in the field with butt-fused joints in accordance with ASTM F2620 and the pipe manufacturer's written instructions shall apply. Butt-fused joints shall have internal bead projections of not more than 1/4 inch. Bead projections on the outside and inside of the pipe shall be removed. Joint strength shall be equal to or greater than the pipe and shall indicate a ductile rather than brittle fracture when tested.

2) Joint with Fusion Equipment: The fusion machine shall have hydraulic pressure control for fusing two pipe ends together and shall be equipped with gauges to monitor fusion pressures. The machine shall be equipped with an electric or gasoline engine powered facing unit to square and trim the pipe ends smooth and provide full surface contact with the heating plate. The heating plate on the fusion machine shall be electrically heated and thermostatically controlled with a temperature gauge and be capable of maintaining 500°F with a tolerance of 10°F. Fusion temperature shall be as recommended by the pipe manufacturer.

3) Where excavations for pipe installation are made between manholes, the pipe shall be joined by butt-fusion or per contractor's recommendations and as directed by the City Engineer.

G. Where applicable, private lateral connections to HDPE mains shall be made using electrofusion wye saddles made of polyethylene pipe compound that meets the requirements of ASTM D 1248, Class C and suitable for fusion welding to polyethylene pipe.

<u>Vitrified Clay Pipe (VCP)</u>

1. Pipe and fitting shall be extra strength, unglazed, bell and spigot, conforming to the latest version of ASTM Specification C700.

2. Joints shall be a bell and spigot assembly with factory installed flexible compression type gaskets made of plasticized polyvinyl or polyurethane conforming to the latest revision of ASTM specifications C425.

TESTING REQUIREMENTS

1. All references to the "Town" in these testing requirements shall mean the appropriate town of Los Altos Hills Public Works Department.
2. All required cleaning and testing of sanitary sewer mains and laterals shall be performed in the presence of a Town representative. Contractor shall notify the Town at least five (5) working days in advance of proposed testing dates.
3. All sanitary sewer mains being constructed shall be cleaned by means of a high speed jet rodder prior to testing.
4. Sanitary sewer systems shall be tested for tightness, alignment, cleanliness, and compliance with Town standards and requirements after completion of trench backfill and prior to paving and request for final inspection.
5. The Contractor shall take all necessary precautions to prevent any joint from drawing ground water while the pipeline and its appurtenances are being tested. Contractor shall, at own expense, correct any excess leakage and repair any damage to the pipe, structures, and appurtenances resulting from or caused by this test. Where the actual leakage exceeds the allowable leakage, the Contractor shall discover the cause and remedy it before the test is accepted. If the leakage is less than that allowed and leaks are observed, such leaks shall be repaired at the Town's direction.
6. Low-Pressure Air Test

   All sanitary sewer mains being constructed shall pass a low-pressure air test. Each section of main shall be tested between successive manholes. The low-pressure test shall be conducted in the following manner:

   A. A compressed air supply shall be attached to an air fitting on the main and the air pressure within the line increased to five (5) pounds per square inch (PSI). After the air supply is securely turned off or disconnected, there shall be a two (2) minute waiting period before the actual test period begins to allow stabilization of air within the main.
   B. The Town may test pressure gauges for accuracy.
   C. In no case shall the air pressure within the line be less than 4 PSI at the beginning of the test period. Refer to the chart which follows for the length of the test period. The minimum length of test is four (4) minutes. The allowable air pressure loss during the test period shall be 0.5 PSI. A written record of the test shall be submitted to the Public Works Department by the contractor.

Nominal Pipe Size (Inches)	Length of Line (feet)	Length of Test (minutes)
4	ALL	4
6	0 – 300	4
6	300 – 370	4 ½
6	370 and Greater	5
8	0 – 170	4
8	170 – 210	4 ½
8	210 – 250	5
8	250 – 290	5 ½
8	290 and Greater	5 ¾
10	0 – 110	4
10	110 – 165	5
10	165 – 215	6
10	215 and greater	6 ¾

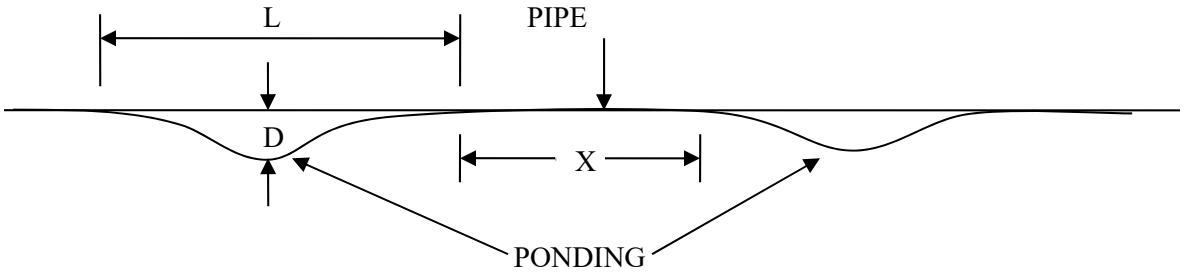
7. Deflection Testing
   A. Deflection testing of PVC sewer mains shall be performed after the placement of all trench backfill. Pipe deflection shall be tested by pulling by hand a go/no-go mandrel through the installed sections of sewer main.
   B. The Town shall observe mandrel testing. The Contractor shall give at least a five (5) working-day notice to the Engineer before commencing mandrel testing.
   C. The mandrel used shall have a minimum length equal to its diameter. The mandrel shall be constructed with a minimum of nine (9) ribs fabricated parallel to its longitudinal axis. Both the design of the mandrel and the fabricated mandrel itself shall be inspected by the Town well in advance of the deflection test.
   D. The mandrel diameter shall be 95% of the pipe's average inside diameter as defined by ASTM Specification D3034 for PVC.

Nominal Pipe Size (inches)	Average Inside Diameter (inches)	Minimum Mandrel Diameter (inches)
6	5.893	5.598
8	7.891	7.497
10	9.864	9.371

   Note: Average inside diameter = average outside diameter – 2(1.06)T, where T = minimum wall thickness as defined by ASTM Specification D3034.
   E. HDPE, mandrel size shall be 95% of average inside diameter of pipe installed.

F. Tolerance of sags in sanitary sewer pipe:

Pipe Diameter (Inches)	Maximum Allowable Depth (D) of Sag	Maximum Allowable Length (L) of Sag	Minimum Allowable Distance (X) Between Sags
4”	NONE	NONE	NONE
6”	NONE	NONE	NONE
8”	1/8”	4 FT	40 FT
10”	1/8”	6 FT	60 FT
12” and larger	1/8”	8 FT	80 FT



Any sags or ponding of water along the pipe will be repaired by excavation of the pipe, realigning and compacting the subgrade or relaying the non-conforming section of pipe if necessary.

1) The maximum allowable depth of ponding water in sewer pipes: 1/8”.
2) Ponding water in excess of the allowable tolerance will be cause for rejection.
3) Any defects in the pipe or construction method revealed shall be corrected and re-televised for Town’s review, approval, and acceptance.

8. Retesting

Each sanitary sewer pipe shall be retested at a date between eighteen (18) months and twenty-one (21) months from the date of acceptance of that pipe by the Contractor. The line shall be cleaned, mandrelled and televised in the manner specified herein for newly installed pipe. If the retesting reveals any defects due to faulty materials or workmanship, the Contractor shall repair or replace the defective structures to meet all requirements of Town standards including the testing criteria required for acceptance by the Town. Television inspection shall be provided by the Town and be reimbursed by Contractor’s remaining deposit. All costs associated with retesting and the correction of defects shall be the responsibility of the Contractor.

Additional testing requirements and/or procedures may be required by the City Engineer and/or his representative. All testing and retesting shall be done to the satisfaction of the City Engineer.

9. Cleaning and Video Inspection
   A. Equipment
      1) Cleaning:
         a. Hydraulically propelled equipment such as root saws or rotating chain flails shall be used for root removal.
         b. Hydraulically propelled equipment such as sewer balls or movable dam shall not be used.
         c. High-Velocity Hydraulic (Hydro-Cleaning) Equipment: High-velocity sewer cleaning equipment shall have a minimum working pressure of 1,000 psi at a 30 gpm rate. The nozzles shall be capable of producing a scouring action in the lines designated to be cleaned to remove debris and sand from the flow line. The equipment shall carry a nominal 800 gallon minimum water tank and have a minimum of 650 feet of high pressure hose.
         d. Vacuum truck/loader: vacuum loader shall be a 3 axle, 27" mercury (high-vacuum unit) with a positive displacement blower producing a minimum of 3,500 CFM air flow, 8" suction tubes, and 16 cubic yards capacity.
      2) The equipment shall have an operation length of at least 800 feet
      3) Video Inspection
         a. The color television camera to be used for the inspection shall be one specifically designed and constructed for operation in connection with sewer inspection. It shall be operative in 100 percent humidity conditions and have a 360-degree radial view rotating head.
         b. The camera head shall be capable of rotating to view up lateral connections and to evaluate defects.
         c. Lighting and camera quality shall be suitable to allow a clear in-focus picture of a minimum of six linear feet of the entire inside periphery of the sewer pipe. Lighting for the camera shall minimize reflective glare.
         d. To insure peak picture quality throughout all conditions encountered during the survey, a variable intensity control of the camera lights and remote control adjustments for focus and iris shall be located at the monitoring station.
         e. Focal distance shall be adjustable through a range of from six inches to infinity. Continuously displayed on the monitor shall be the date of the survey, number designation of the upstream and downstream manholes corresponding to the line section being surveyed, and a continuous forward and reverse readout of the camera distance from the manhole of reference.
         f. The remote reading footage counter shall be accurate to two-tenths of a foot. The color camera, television monitor and other components shall be capable of producing a minimum 500 line resolution color video picture. The equipment shall have a minimum operation length of at least 800 feet.

B. Procedure

1) Cleaning

a. The designated sewer sections shall be cleaned using hydraulically propelled, high-velocity jet equipment. Selection of the equipment used shall be based on the conditions of lines at the time the work commences.

b. The equipment shall be capable of removing dirt, grease, rocks, sand, roots and other materials and obstructions from the sewer lines and manholes.

c. If cleaning of the entire section cannot be successfully performed from one manhole, the equipment shall be set up at the destination manhole and cleaning attempted again.

d. A minimum of one operator and two laborers shall be at the job site at all time. One set of cleaning equipment, one vacuum loader, and a minimum of 300 linear feet of flexible hose for vacuuming, shall be at the job site at all time. (Contractor shall be responsible for all cost for obtaining water).

2) Material Removal

All sludge, dirt, sand, rocks, grease, roots, and other solid or semisolid material resulting from the cleaning operation shall be removed at the downstream manhole of the section being cleaned. Passing material from manhole to manhole will not permitted.

3) Disposal of Material

a. All solids or semisolids resulting from the cleaning operations shall be removed from the site and disposed outside of the Town limits. Contractor shall comply with all federal, state, and local regulations regarding disposal of debris outside Town limits. However, the Contractor may elect to provide and install a temporary solids transfer facility (including phase separator with cover, filter screens, and ramp).

b. The temporary facility may be staged within the Towns property adjacent to the intersection of Purissima Road and Elena Road.

c. Liquid in the phase separator shall be drained directly to the Town sanitary sewer manhole adjacent to the transfer facility.

d. The Contractor shall be responsible for cleaning and maintenance of the area and shall ensure any spilled materials are flushed into the sanitary sewer manhole.

e. A containment system, approved by the Town's Engineer, shall be installed to keep debris from entering the storm drain system. It is the responsibility of the Contractor to keep odors to a minimum by removing/disposing of the debris on a regular basis, covering the debris box during off hours, and cleaning the area around the facility on a daily basis. At a minimum, debris boxes shall be emptied and replaced once a week.

f. No separate payment will be made for disposal of debris and all costs therefore shall be included in the contract items of work.

4) Video Operation

a. The camera shall be moved through the line in either direction at a uniform rate, stopping when necessary to permit proper documentation of the sewer condition. In no case will the television camera be pulled at a speed great than 30 feet per minute. Manual winches, power winches, TV cable, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer condition shall be used to move the camera through the sewer line.

b. As the camera approaches a lateral connection or substantial defect, the camera progress shall be halted and the camera lens panned to further view the lateral pipe and connection (including looking up the lateral) or defect to thoroughly evaluate its condition.

c. When manually operated winches are used to pull the television camera through the line, walkie talkie radios or other suitable means of communication shall be set up between the two manholes of the section being inspected to ensure good communication between members of the crew.

d. The importance of accurate distance measurement is emphasized. The accuracy of the footage counter shall be checked by use of a walking meter, roll-a-tape, or other suitable device, and the accuracy shall be satisfactory to the Engineer.

e. In the event the section being televised has substantial flow entering the sewer between manholes, such that inspection of the sewer is impaired, the Contractor shall coordinate with the owner to have the flow temporarily stopped and/or reschedule television inspection of the particular section to a time when the flow is reduced to permit proceeding with the television inspection

5) Television Inspection Logs

Prepare a written record that documents the location of the inspection, date and time of the inspection, type and diameter of the pipe, direction of travel, and location and type of conditions observed including sanitary sewer laterals, roots, storm sewer connections, broken pipe, cracks, offset joints, sags, scale and corrosion, and other discernible features per NAASCO Standards.

6) Photographs

The Contractor shall capture digital still images of all observations made during every inspection

7) Digital Video Recordings

a. Prepare a digital visual and audio record of the inspection to document conditions observed. Recording playback shall be at the same speed in which it was recorded. Slow motion or stop-motion playback features may be supplied at the option of the Contractor.

b. The Contractor shall have all recordings and necessary playback equipment readily accessible for review by the Town during the project. Each segment of the submitted final recording shall begin and end at a manhole or cleanout, which shall be identified by the nomenclature used in the Drawings.

c. Digital recordings shall be labeled and individually numbered, beginning with the project name followed by Disc #01, #02 etc. Labels shall be typewritten

and include project title, dates(s) of recording, disc number, and segment (including MH#).

d. Recordings shall include the following:
    i. Data View Before the Inspection: Location, Date and time of video inspection, type and diameter of the pipe, direction of travel.
    ii. Data View During Inspection: Location, date and current distance along reach.
    iii. Audio shall include:
        - Date and time of video inspection
        - Verbal confirmation of upstream and downstream manhole numbers
        - Verbal description of pipe size, type and pipe joint length
        - Verbal description of location of each defect
        - Verbal description of location of each service connection point

8) Length of Report
    a. Prepare a written report identifying the length of each segment of pipeline measured from centerline of manhole to centerline of manhole, from cleanout to centerline of manhole, or cleanout to cleanout.
    b. If a difference of more than ten feet is found from the distance shown on the Drawings, notify the Town's Representative and re-measure the distance in his/her presence.