

**Specifications for:**

**City of Mountlake Terrace**

Equipment to be Supplied:

**DRW VAN with Multi-Conductor  
TV Inspection Equipment**

Each camera, camera transporter, and external lighthouse to be supplied on this specification must be labeled and listed as a minimum by a Nationally Recognized Testing Laboratory (NRTL) to the applicable Standard for Safety for Closed Circuit Television Equipment, UL 2044, 2nd edition, 11/9/01. A listing report must be supplied that certifies the aforementioned equipment is acceptable as defined by 29 CFR 1910.399 and required by 29 CFR 1910.303(a). Self-certification or certification by a laboratory that is not an NRTL will be deemed unacceptable. NRTL labeled and listed equipment shall be supplied as required by the FEDOSHA memorandum, dated September 25, 2005, page 3, Section on Compliance, prepared by John L Henshaw, Assistant Secretary of Occupational Safety and Health.

**General Provisions: Please check Yes or No for the following requirements**

1. Cable Reel must hold 1000 ft. multi conductor cable with 2000 lbs break strength and cable weight must be no greater than 65 lbs per 1000 ft. and .375" diameter nominal: Comply: Yes\_\_\_\_ No\_\_\_\_
2. Cable Reel must have automatic payout / synchronization of the video cable to be coordinated with the speed of the transporter: Comply: Yes\_\_\_\_ No\_\_\_\_
3. The wheeled transporter must be supplied with a built in connector. The optical zoom camera will slide directly into this connector with no external cables required. Comply: Yes\_\_\_\_ No\_\_\_\_
4. The optical zoom pan and tilt camera must have built in diagnostics to include humidity, camera temperature, camera and light voltage, serial number, and hour meter: Comply: Yes\_\_\_\_No\_\_\_\_
5. The optical zoom pan and tilt camera must be constructed with a built-in water proof bulkhead connector the slides directly into the transporter assembly thus eliminating the need for interface cable. Comply: Yes\_\_\_\_No\_\_\_\_
6. The length of the compact wheeled transporter with the optical zoom pan and tilt camera assembled cannot exceed 25". Comply: Yes\_\_\_\_ No\_\_\_\_
7. The transporter must have the ability to quickly be converted from wheels to tracks to accommodate various pipe conditions: Comply: Yes\_\_\_\_ No\_\_\_\_
8. The City of Mountlake Terrace requires that the software must be approved in accordance with the latest version of PACP: Comply: Yes\_\_\_\_ No\_\_\_\_.

**Specifications for:**

**City of Mountlake Terrace**

Equipment to be Supplied: **DRW Van with Multi-Conductor  
TV Inspection Equipment**

Each camera, camera transporter, and external lighthouse to be supplied on this specification must be labeled and listed as a minimum by a Nationally Recognized Testing Laboratory (NRTL) to the applicable Standard for Safety for Closed Circuit Television Equipment, UL 2044, 2nd edition, 11/9/01. A listing report must be supplied that certifies the aforementioned equipment is acceptable as defined by 29 CFR 1910.399 and required by 29 CFR 1910.303(a). Self-certification or certification by a laboratory that is not an NRTL will be deemed unacceptable. NRTL labeled and listed equipment shall be supplied as required by the FEDOSHA memorandum, dated September 25, 2005, page 3, Section on Compliance, prepared by John L Henshaw, Assistant Secretary of Occupational Safety and Health.

**Component List:**

**TV DRW HI-CUBE 12' GAS**

**1 TV DRW Hi-Cube Van Gas (12,000 GVWR) with Automatic Transmission and 12' Loadspace**

- 1 Aerocap with Full Height Pass Thru To Control Room

*Compliance:* YES \_\_\_\_\_ NO \_\_\_\_\_

**1 DRW TV Hi-Cube Van Equipment to include:**

- 2 Amber Electronic Strobe Warning Beacons - Roof Mount with on/off switch in Cab
- 2 Adjustable Floodlights Rear of Vehicle Area Illumination - Mounted Inside of Rear Doors
- 1 Standard Drivers Seat with Seatbelt and Sunvisor
- 1 Standard Passenger Seat with Seatbelt and Sunvisor
- 1 12 Volt Light, Cab Area
- 1 Back-Up Alarm
- 1 Cab Air Conditioner
- 1 AM/FM Radio

*Compliance:* YES \_\_\_\_\_ NO \_\_\_\_\_

**1 TV DRW Hi-Cube Van Power Package to include:**

- 1 6000 Watt, 120 Volt, 60 Hz Commercial Grade Generator, Gasoline Powered with Electric Start
- 1 Generator Remote Start/Stop Cable Assembly
- 1 Generator Storage Compartment with a Lockable External Access Door
- 1 Commercial Power Supply Receptacle, 25' Cord and Plug
- 1 Electric Supply Center with Circuit Breaker Box, Commercial Power and Generator Power Connectors
- 1 Automatic Power Transfer Switch

*Compliance:* YES \_\_\_\_\_ NO \_\_\_\_\_

**1 System Engineering Panel, Power Distribution System Rack Mount to include:**

- 1 Voltage Readout, Power Supply
- 1 Hertz Readout, Power Supply for 60Hz
- 1 Generator Hour Readout
- 1 Remote Generator Start/Stop Control Switch

*Compliance:* YES \_\_\_\_\_ NO \_\_\_\_\_

**1 DRW TV Hi-Cube Van Control Room Interior to Include:**

- 1 13,500 Air Conditioner Roof Mount with 5600 BTU Heat Strip
- 1 Lonseal Lonplate Flooring
- 1 Kemlite Surface Wall Covering
- 1 Kemlite Ceiling Covering
- 1 Bulkhead Wall with Passage Door From Control Room To Equipment Room with "Safety Plus Visual" Viewing Window

**Specifications for:**

**City of Mountlake Terrace**

- 1 Ergonomic (angled) Placement of Main Controllers in Desktop with Recessed Housing
- 1 EVO II above Desk Mounted Control Console for Electronic Equipment
- 1 Desktop/work area
- 1 Storage under desk
- 1 12V Courtesy Light with 15 Minute Timer located at rear door area
- 1 110 Volt Fluorescent Light Fixture
- 1 Electrical Outlet with Dual Receptacles
- 1 Fire Extinguisher with Bracket, 10 BC Rating
- 1 Operators Chair With Castors
- 1 Padded Bench Seat with Storage

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

**1 DRW TV Hi-Cube Van Equipment Room Interior to Include:**

- 1 Aluminum Treadplate Flooring
- 1 Kemlite Covered Walls and Ceiling
- 1 Insulated Tapered Roof
- 1 Climate controlled Breaker Box/Electronics Storage Area with Locking Positive Latches
- 1 Workbench with Lonseal Lonplate covered worktop, Sink, Upper Storage Cabinet and 20 Gallon Wash Down
- 1 Retractable Hose Reel with 25' Water Hose
- 1 Electrical Outlet with Dual Receptacles
- 1 110 Volt Fluorescent Light Fixture
- 1 Downhole Pole Mounting Bracket Assembly on rear doors
- 1 12V Courtesy Light with 15 Minute Timer located at rear door area

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

**1 Rear Video Monitor 17" LCD Flatscreen to include:**

- 1 Video Monitor 17" LCD Flatscreen, NTSC/PAL Color Standards
- 1 Cable Assembly - Video Monitor to Monitor in control room
- 1 Monitor mount bracket

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

**1 OZ III Pan, Tilt, and Zoom Camera System to include:**

- 1 Solid State Color Sewer TV Camera with a Pan & Rotate Camera Head, 40:1 Zoom Ratio, 10x Optical Zoom, 4x Digital Zoom, NTSC Color Standard, 4x Light Integration
- 1 Camera Lighting System, built in for 6" Relined through 30" Pipe
- 1 Camera Transportation and Storage Case

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

**1 Color TV Power Control Unit-Multi Conductor Rack Mount, NTSC Color Standard to include:**

- 1 TV Camera Remote Optical Focus Control
- 1 TV Camera Automatic Iris Remote Control
- 1 TV Camera Lighthouse Intensity Control w/Meter
- 1 Camera Test Cable Assembly

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

**1 17" LCD Flat Screen Color Industrial TV Monitor, NTSC/PAL Color Standards, Built-in Speakers**

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

**Specifications for:**

**City of Mountlake Terrace**

**1 DVD Recorder System to include:**

- 1 Rack Mount for DVD
- 1 Sony RDR GX7 DVD recorder or Equal
- 1 Cable Assembly - DVD to Power Control Unit

Compliance: YES \_\_\_\_\_NO \_\_\_\_\_

**1 Pipeline Data Collection & Real Time Video Capture System, Rack Mount, to include:**

- 1 Motherboard w/775 Socket and 945P Chipset
- 1 Genuine Intel Dual Core E4400 ALLENDALE 2GHZ
- 1 3 GB of DDR2 (Double Data Rate) RAM
- 1 PCI Video Capture Board for MPEG1/2/4 Video Capture with Hardware Compression
- 1 Video Graphics Card, Supporting up to 256MB, 16x PCI-Express
- 1 LAN, On Board Network Connection, Intel 82547E1 10 / 100 / 1000
- 8 USB 2.0 Ports (6 on Rear, 2 on Front)
- 1 Soundblaster Compatible, On Board Sound
- 1 DVD +/- RW DVD Burner 16x / CD-RW 40x Internal
- 2 500 GB (7,200 RPM) SATA Hard Drives
- 1 450 Watt ATX Power Supply
- 1 19" Rack Mountable Video Character Generator & Titler
- 1 Industrial Hardened Case with Air Filtering, Vibration Dampening Hard Drive Mounts, Peripheral, Cards Support Bar, 19" Rack
- 1 101 Key Enhanced Heavy Duty Keyboard
- 1 Optical PS2/USB Mouse
- 1 SVGA Multimedia Monitor w/ Speakers 17"
- 1 Desk top Color Ink Jet Printer, 600x300 dpi, 512K
- 1 Windows XP Professional Operating System
- 1 GRANITE XP Inspection Edition Version 2.x Software
- 1 User Guide, Hard-copy
- 1 User Guide, CD
- 1 One Year Enhanced Support

Compliance: YES \_\_\_\_\_NO \_\_\_\_\_

**1 Combination TV Transmission & Tow Cable Assembly to include:**

- 1 **1000' Multi Conductor Platinum Kevlar Fiber Armored Cable, .437 " Diameter**
- 1 Kevlar Armored Cable Terminal Connector
- 1 **Stainless Steel bullet connection – field repairable – no scotchcast**
- 1 Cable Strain Relief

Compliance: YES \_\_\_\_\_NO \_\_\_\_\_

**1 Electric Motor Drive Television Cable Reel to include:**

- 1 Power Level Wind
- 1 Footage Meter with Local Counter and Remote Counter
- 1 Transmission Control at Viewing Station
- 1 Local Reel Mount Electrical & Mechanical Control
- 1 Sealed Continuous Contact Collector Assembly
- 1 Controller Cable Reel/Power Winch Motor

Compliance: YES \_\_\_\_\_NO \_\_\_\_\_

**1 Self-propelled Wheeled Camera Transporter, Wheel Driven, to Include:**

- 1 Set of Rubber Wheels to inspect 6" Pipe
- 1 Set of Rubber Wheels to inspect 8" Pipe
- 1 Set of Rubber Wheels to inspect 10" – 15" Pipe
- 1 Set of Weighted Adapters for 18"-24" Pipe

**Specifications for:**

**City of Mountlake Terrace**

- 1 The Unit Shall Have Forward, Free Wheel, and Powered Reverse Capabilities
- 1 All Six (6) Wheel Drive Transporter Assembly to Include Motor and Enclosed Drive Train
- 1 Transporter Controller w/Automatic Safety Off
- 1 Transporter Control Unit
- 1 Set of Steel Wheels to inspect 8" Pipe

Compliance: YES \_\_\_\_ NO \_\_\_\_

**1 Cable Manhole Guide System to include:**

- 1 TV Invert Pulley Assemblies
- 6 Quick Coupling Extension Poles
- 1 Manhole Adapter Hooks
- 1 Manhole Top Roller Assembly
- 1 Equipment retrieval tool

Compliance: YES \_\_\_\_ NO \_\_\_\_

**1 TV Inspection Accessories Package to include:**

- 1 TV Maintenance Tool Kit
- 1 Set Manual Operation, Instruction and Maintenance TV
- 1 Manual Spare Parts, TV
- 1 Video Training Tape, TV Systems Operating Procedures
- 1 Video Training Tape, System Trouble Shooting Procedures
- 1 Video Training Tape, TV Cable Repair Procedures

Compliance: YES \_\_\_\_ NO \_\_\_\_

**3 Days of Training**

Compliance: YES \_\_\_\_ NO \_\_\_\_

**1 Delivery**

Compliance: YES \_\_\_\_ NO \_\_\_\_

**End Component List**

**OPTIONAL Equipment**

**Item 1:**

- 1 Auto Payout for TV Reel

Compliance: YES \_\_\_\_ NO \_\_\_\_

**Item 2: Work Bench:**

- 1 Workbench with Lonseal Lonplate covered worktop, Sink, Upper Storage Cabinet and 20 Gallon Wash Down Retractable Hose Reel with 25' Water Hose

Compliance: YES \_\_\_\_ NO \_\_\_\_

**Specifications for:  
DETAILED SPECIFICATIONS:**

**City of Mountlake Terrace**

**CHEVY EXPRESS CUTAWAY GAS DRW**

Engine	Vortec 6.0 Liter 364 CID V-8 Gas Minimum 300 Net Horsepower @ 4400 RPM 360 lb.-ft @ 4000 RPM
Exhaust System	Stainless Steel Content
Emission Control Systems	Meets Government Standards
Cooling System	Heavy Duty
Wheelbase	139" Minimum
GVWR	12300 lb. Minimum
Suspension	Heavy Duty Springs 4300 lb. front minimum 8600 lb. rear minimum
Brakes	Heavy Duty Shock Absorbers Power Disc - Front Power Disc - Rear 4 Wheel ABS
Electrical	Parking, Drive Line Mounted, Foot Operated
Alternator	12 Volt System
Battery Type	145 AMP
Fuel Tank Capacity	600 CCA
Steering	33 Gallons
Transmission	Power Steering
Tires and Wheels	Automatic, 4 Speed, HD Electronic w/ Overdrive 6 each Dual Rear Wheel
Miscellaneous	LT 245/75R16E all season SBR BSW Dual Intermittent Windshield Wipers Windshield Washers Dual Rear-View Mirrors, Externally mounted Directional Turn Signals Emergency Four-Way Flashers Back-Up Alarm Paint - White Cab Air Conditioning AM/FM Radio

Compliance: YES\_\_\_\_NO\_\_\_\_

**CHEVY EXPRESS BODY**

Construction	Aluminum
Rear Doors	Full Opening
Rear Bumper	Full Width Steel
Lighting	Standard Lights including Stop/Turn, License Plate, Back Up and ICC Running Lights

Compliance: YES\_\_\_\_NO\_\_\_\_

**Specifications for:  
CHEVY EXPRESS BODY DIMENSIONS AND EQUIPMENT**

**City of Mountlake Terrace**

Interior Height	75 Inches Minimum
Interior Width	90 Inches Minimum
Interior Loadspace	12 Foot Minimum

Compliance: YES \_\_\_ NO \_\_\_

**EXTERIOR**

The vehicle body shall include front and rear amber warning beacons mounted on the roof. Dual adjustable 12V halogen floodlights (work lights) shall be mounted inside of the vehicle box, at the rear header. The floodlight placement on the inside of the box allows the operator to safely adjust them while standing on the inside of the truck box facing rearward. **Floodlights that are mounted on the outside of the vehicle shall be deemed unacceptable due to the awkwardness of adjustments.**

Compliance: YES \_\_\_ NO \_\_\_

**INTERIOR**

The van interior shall be divided into two areas - an Operators Control Room and an Equipment/ Storage Room. A full width laminate covered bulkhead wall constructed with cabinet grade plywood with an operator pass through door will divide the two areas. The bulkhead wall will have a 3" aluminum kick plate (minimum 1/8" thick) attached at the base for protection from possible damage caused by impact.

Access to the truck cab from the viewing room shall be provided through a passway.

Compliance: YES \_\_\_ NO \_\_\_

**VAN CONTROL ROOM**

The Control Room shall be located at the front of the van body. A roof mounted 13,500 BTU air conditioner with a built in 5,600 BTU heat strip shall be supplied. All cabinets and hinged cabinet doors shall be constructed of 7ply cabinet grade plywood for durability. All cabinets will be mounted above the floor surface on 1/4" nylon spacers to minimize any potential water damage from absorption of water during the wash down process. Edges of cabinet doors, bulkhead doors, door cutouts, and cabinets shall have 1/8" thick aluminum trim installed on them to provide maximum protection in areas that are susceptible to potential impact. A 3" aluminum kick plate (minimum 1/8" thick) will be installed at the base of all cabinets and walls to provide maximum protection against potential damage caused by impact or moisture. **Cabinets not constructed with 7ply cabinet grade plywood shall be deemed unacceptable.** All hinged cabinet doors will have a metal flush (recessed) mounted positive latch, eliminating the unwanted opening of doors during transit. **Plastic door latches or surface mounted "barrel bolt" type latches shall be deemed unacceptable on any cabinet doors.**

**Cabinets installed directly on the floor surface without nylon spacers and cabinets constructed with particle/MDF board shall be deemed unacceptable due to the possibility of water damage. Cabinets installed with no protective aluminum trim for exposed surfaces and no 3 inch aluminum kick plate at the base shall be deemed unacceptable due to lack of protection from potential long term impact damage.**

The Control Room floor shall be constructed of a 3/4" cabinet grade plywood substrate with 1/4" tall water relief channels attached to the bottom of the floor to prevent moisture from gathering under the floor, thus minimizing potential long term water damage. The plywood substrate shall be covered with Lonseal Lonplate Flooring. The Control Room walls and ceiling will be covered with a seamless Kemlite laminate. The Kemlite laminate on the walls and ceiling shall be void of any seams or exposed screws for easy cleaning. **Laminate wall and ceiling covering that is not void of seams and screws will be deemed unacceptable due to the difficulty of cleaning.**

*A plywood control console shall be used for mounting all electronic components. The control console shall be designed to bring all controls within comfortable reach of the operator. The control console shall be positioned so the operator can see the Equipment Room area through a 30" X 30" (minimum) smoked Plexiglas window in the bulkhead wall. The control console shall be equipped with a 19" industrial rack mount for the electronic components mounted above the desktop. An ergonomic, recessed angled housing will be provided to house the Pan and Tilt Camera Controller, TV Reel Motor / Power Winch Controller, and the Self Propelled Camera*

**Specifications for:**

**City of Mountlake Terrace**

*Transporter Controller. The exact controllers furnished will be indicated on the component list. A 1” thick counter top constructed with 7ply cabinet grade plywood shall be provided. The counter top shall be covered (including the edge) with an industrial grade “standard” laminate (.062” thick) for durability.*

A bench seat with a seamless vinyl cushion shall be supplied. **Fabric covered cushions or vinyl covered cushions with seams shall be deemed unacceptable due to the inability to clean them thoroughly.**

One 48” 110 VAC indirect fluorescent light shall be supplied for optimum lighting in the Control Room. **Track lighting shall be deemed unacceptable due to the heat produced from the bulbs.**

(1) Duplex interior electrical outlet shall be supplied in the Control Room.

Compliance: YES\_\_\_\_NO\_\_\_\_

**EQUIPMENT/ STORAGE ROOM**

The Equipment/Storage Room will be located in the rear of the van. The floor shall be constructed of 2 X 6 pine planks and covered with a plywood sub-floor and Aluminum Treadplate flooring. The side walls, rear doors, and ceiling shall be constructed of 3/8" plywood and covered with a protective washable Kemlite laminate. The Kemlite laminate on the walls and ceiling of the Equipment Room shall be void of any seams or exposed screws for easy cleaning. **Laminate wall and ceiling covering that is not void of seams and screws will be deemed unacceptable due to the difficulty of cleaning.**

There shall be a workbench with a plywood worktop covered with Lonseal Lonplate flooring material located on the passenger side (curbside) of the Equipment Room. A wall mounted upper storage cabinet will be mounted above the curbside wall workbench.

**A 20-Gallon (minimum) Washdown System with a 12 VDC water pump shall be installed to maintain water pressure for wash down of all cameras, transporters and other related equipment. The washdown system will include a stainless steel sink with a gooseneck faucet located on top of the plywood worktop.**

The electrical system shall be designed to fully meet the environmental, safety, and electrical requirements of the vehicle as specified. All electronics will be housed in a climate-controlled cabinet.

Two 48” 110 VAC indirect fluorescent lights shall be supplied for optimum lighting in the Equipment Room. A 12 VDC cargo bay light will also be installed on the Equipment Room. All Equipment Room electrical boxes, outlets, and wiring conduit will be UL approved for exterior use in a wet environment. One (1) duplex interior electrical outlet will be supplied in the Equipment Room area. No exposed wiring will be acceptable. All electrical wiring shall be in accordance with applicable electrical codes including NEC. An automatic transfer switch for Shore / Generator Power shall be installed and will be activated upon receipt of power with a minimum 40 second delay to protect all electronic components and assemblies.

Brackets shall be mounted on the passenger side rear door to hold all downhole poles, invert rollers and manhole adapter hooks when required.

Compliance: YES\_\_\_\_NO\_\_\_\_

**GASOLINE GENERATOR w/ELECTRIC START - 6000 WATT**

The power source for the system will be a 6000-watt commercial grade alternating current gasoline powered generator consisting of the following (minimum):

**Generator**

- Shall be mounted in an enclosed cabinet with a fire retardant liner, locking vented door with a recessed stainless steel lock, and spark free exhaust system.
- Shall be the product of a firm regularly engaged in the manufacture of gasoline powered generators.
- Shall be designed for commercial mobile applications capable of handling the load of intermittent heavy-duty use for sewerline television inspection units.

**Specifications for:**

**City of Mountlake Terrace**

- Shall be capable of continuously producing 6000 watts of power (50.0 amps) at 120 volts AC while rotating at 3600 RPM without undue heating, wear or vibration.
- Shall be furnished with vibration isolators and a heavy-duty industrial muffler to ensure quiet operation.
- Dry weight: 216 lbs.
- Dimensions (LxWxH): 25.59” L x 19.09”W x 14.17” H

**Engine**

- Shall be a 359cc twin-cylinder, liquid-cooled, electronic ignition, OHC four-stroke unit developing at least 12.2 hp.
- Shall be designed to operate the generator at 60 cycles + or - 2 cps and shall be governor controlled to maintain these cycles under varying load conditions.
- Shall be equipped with an electrical starting device for local and remote start/stop, electrical fuel pump and low oil pressure shutdown.
- Shall be equipped with an oil and temperature alert system to automatically shut off the engine to prevent damage when the oil level drops below the recommendation level.
- Ignition system: transistorized magneto

**Other**

- A 30-amp external shore power receptacle shall be provided.
- Shore power to generator switchover shall be accomplish through a UL approved automatic changeover switch with suitable time delay to avoid damaging power surges.
- A 25 foot, 30 A shore power extension cable shall be supplied.

*Compliance:* YES\_\_\_\_NO\_\_\_\_

**SYSTEM ENGINEERING PANEL**

The engineering panel shall provide monitoring of the power supply to the system. The panel circuitry shall be assembled in a rack mounted chassis for installation in a built in control console. The face plate shall be heavy gauge aluminum finished with an industrial grade surface and shall have permanent labels designating the function of the various switches and controls.

Provisions shall be made on the panel for the following items:

- AC Volt Readout
- AC Frequency Readout (58-62 Hertz)
- Generator Remote Start/Stop
- Generator Run Time Readout
- Beacon on/off Glow Switch

*Compliance:* YES\_\_\_\_NO\_\_\_\_

**17” COLOR FLATSCREEN LCD MONITOR NTSC, PAL – Speco Technologies VM-TV17LCD or Equivalent**

**17” Widescreen Monitor**

- Shall be a high quality, ultra-thin, industrial grade color unit providing a minimum of 1280 x 1024 pixels of resolution.
- Shall be securely mounted above the cable reel for viewing at the rear of the vehicle. The mounting position shall provide maximum protection from direct sunlight for enhanced viewing.
- Shall include a user-friendly, on-screen menu for easy parameter adjustments.
- Shall be compatible with both NTSC and PAL signals; shall include an auto-detect function that has the ability to identify the signal that’s being input and automatically switch from NTSC or PAL.
- Shall have the ability to automatically monitor / adjust the video input and optimize the display settings without manual adjustments.
- Shall include an On-screen Menu for adjusting monitor parameters. The menu shall include a user-friendly graphical interface to guide users through the customization of features and individual preferences.
- Shall operate from 120V AC or 230V AC power sources.

**Specifications for:**

**City of Mountlake Terrace**

- Shall be black in color with a metallic finish.

Dimensions

- 16.25”(H) x 16.30”(V) x 7.68”(D)

Compliance: YES\_\_\_\_NO\_\_\_\_

**CAMERA POWER CONTROL UNIT - MULTI CONDUCTOR**

The power control unit shall provide all the necessary power and controls to operate and monitor the television inspection system. All circuits shall be of solid state design, assembled in a rack mounted chassis for installation in a built in control console. The faceplate shall be heavy gauge aluminum finished with an industrial grade finish and shall have permanent labels designating the function or purpose of the various switches, readouts and controls. The PCU shall have a back plate for all cable connectors each separately indexed and locking, and labeled as to purpose. Each camera system shall be equipped with a test cable to allow for the direct by-pass of slip rings, TV cable and any applicable connectors for testing purposes.

Compliance: YES\_\_\_\_NO\_\_\_\_

**POWER CONTROL UNIT MINIMUM TECHNICAL REQUIREMENTS**

The power control unit shall operate off of 120 volts AC current. The PCU shall contain a solid state lighthouse power source whose input shall be through an isolation, variable voltage transformer and whose output shall be from 0 volts to 120 volts DC. A light intensity adjustment control and DC volt readout shall be provided on the front panel. Input and output of both the camera and lighthouse power shall be protected by circuit breakers with indicators to identify open circuits. Circuits shall be isolated to provide operator protection from electrical shock hazards.

Compliance: YES\_\_\_\_NO\_\_\_\_

The power control unit will be equipped with the following remote camera adjustments:

**Focus Control**

A two pole switch spring loaded to off, permits the operator to adjust the camera focus for changes in pipe diameter or different views of defect conditions. In the neutral position, the camera focus will be electronically locked.

Compliance: YES\_\_\_\_NO\_\_\_\_

**Automatic Iris Control**

This control allows the operator to override the camera's automatic light compensating circuitry operating range in the event an excess of light or lack of light produces a poor picture response. With the proper adjustment, the operator can change the iris opening to compensate for the light level available thereby improving the picture response. **Systems requiring manual external camera settings or the removal of the camera from the sealed housing in the field to make these adjustments, shall be deemed not acceptable.**

Compliance: YES\_\_\_\_NO\_\_\_\_

**DVD RECORDER – SONY RDR-GX7**

A DVD recorder shall be provided to permanently record on DVD any transmission from the closed circuit television camera. The recorder shall have one disc. It shall record using two(2) types of disc, DVD-RW and DVD+RW as well as write-once DVD-R discs. Both video and audio signals may be recorded at the same time.

The DVD recorder shall be rack mounted in the Control Console. Desk mounted recorders that are subject to damage during travel will not be acceptable.

- Number of Disc (1)
- DVD Recording Media DVD-R, DVD-RW, DVD+RW
- Recordable DVD Playback DVD-r, DVD-RW, DVD+r, DVD+RW
- DTS-Capable
- CD-R Capable
- S-Video Inputs - 2 Rear/1 Front

**Specifications for:**

**City of Mountlake Terrace**

Compliance: YES \_\_\_\_\_NO \_\_\_\_\_

**PAN, TILT, and OPTICAL ZOOM CAMERA**

The unit shall be labeled and listed as a minimum by a Nationally Recognized Testing Laboratory (NRTL) to the applicable Standard for Safety for Closed Circuit Television Equipment, UL 2044, 2nd edition, 11/9/01. A listing report must be supplied that certifies the aforementioned equipment is acceptable as defined by 29 CFR 1910.399 and required by 29 CFR 1910.303(a). Self-certification or certification by a laboratory that is not an NRTL will be deemed unacceptable. NRTL labeled and listed equipment shall be supplied as required by the FEDOSHA memorandum, dated September 25, 2002, page 3, Section on Compliance, prepared by John L Henshaw, Assistant Secretary of Occupational Safety and Health.

The Pan, Tilt, and Zoom Camera shall be designed for use in 6” diameter relined pipe and larger. The unit will be designed to provide close-up views of pipe walls during inspection including minute defects and voids. The unit will be color, shall operate optimally through a maximum of 1200’ multi conductor and shall consist of the following (minimum):

Compliance: YES \_\_\_\_\_NO \_\_\_\_\_

**Camera**

- Chassis construction shall include 100% solid state circuitry designed to withstand shocks and vibration normally sustained while being pulled through a pipe.
- The camera module shall be an industrial model only. *Repackaged consumer grade cameras (i.e. Camcorders) will be deemed unacceptable for use in a pipeline television inspection system.*
- Operating temperature ranges of the camera shall be 0 degrees C to 50 degrees C. *Cameras incorporating built in lighting systems that generate heat exceeding the operating temperature parameters listed by the base stock camera manufacturer will not be acceptable.*
- The camera shall develop a true color and transmit a sharp image picture on the video bandwidths only. *Picture transmission systems that require the use of R.F. suppressors and are subject to local transmitter interference shall not qualify as being equal.*
- Full color video bandwidths shall be provided with no sacrifice of low frequency response. *There shall be no visible streaking of the low frequency test bars when viewing a standard EIA Test Chart.*
- Shall not exceed an overall length of 14.5”, a head length of 5.9”, and a camera barrel diameter of 2.5”.

Compliance: YES \_\_\_\_\_NO \_\_\_\_\_

**Camera Optical & Digital Zoom**

- Optical & digital zoom and zoom & focus speeds shall be selectable from the maintenance terminal. Remote control of pan, tilt, pan and tilt homing, optical zoom, manual focus, automatic focus, shutter speed, frame integration, manual iris, diagnostics and internal lights shall be provided.
- Optical Zoom Range: 10x
- Digital Zoom Range: 4x (40x with optical zoom)
- Total effective zoom ratio: 40:1
- The lens shall be an automatic iris type with a manual override (controlled from the control console) to control the illumination range for an acceptable picture between 3 and 10,000 lux.

Compliance: YES \_\_\_\_\_NO \_\_\_\_\_

**Pan and Rotate Speeds**

- Full Pan (no load): 56 deg/sec, full pan in 7-8 seconds
- Full Rotation (no load): 31 deg/sec, full rotation in 10-11 seconds

Compliance: YES \_\_\_\_\_NO \_\_\_\_\_

**Camera Housing**

- The camera mechanics and electronics shall be housed in a high strength, damage resistant, aluminum housing with a stainless steel tube.

**Specifications for:**

**City of Mountlake Terrace**

- The rear portion of the camera shall not exceed 2.5 inches in diameter to allow for operation in skids and self-propelled units that are designed for 2.5-inch diameter cameras.
- The front of the camera head housing shall have a view port of optical grade sapphire.
- The camera connector shall integrate directly to the transporter, securing with a cam-locking action for positive sealing and retention.

Compliance: YES\_\_\_\_NO\_\_\_\_

**Mounting Fork**

- The forward portion of the camera shall not exceed 4 inches in diameter and will include the mounting fork, camera head and lighting.
- The camera forks must be rounded or chamfered and be the same diameter as the forward portion of the camera to eliminate any sharp corners that can become caught on obstructions. **Camera forks that exceed the diameter of the camera housing that are subject to damage inside the pipe are not acceptable.**
- The mounting fork will rotate 360 degrees with an optical viewing angle of 400 degrees and shall allow the camera head to pan mechanically 285 degrees with a pan viewing angle of 331 degrees.

Compliance: YES\_\_\_\_NO\_\_\_\_

**Camera Lighting**

- Shall be remotely controlled from the control console.
- Shall be integrated into the camera and include four xenon lamps.
- Shall provide adequate lighting in pipe sizes from 6”–30” in diameter. **Cameras that require external mounted non-directional lighting for 12” through 30” pipe are not acceptable.**

Compliance: YES\_\_\_\_NO\_\_\_\_

**Camera Controller**

- The mounting surface for the joystick, switches, and LED shall be angled for ease of operator use.
- RS-232 maintenance port shall be provided.
- The pushbuttons mounted on the controller’s panel shall provide the following switch positions: Focus: Near and Far, Zoom: In and Out, Iris: Open and Close, Autofocus and Lamps, Shutter: Fast and Slow, Pan, Tilt, Focus and Zoom Home, and Diagnostics.
- Shall include a joystick mounted in the middle of the controller’s front panel.
- The joystick shall have the ability to move the camera head in four directions: up, down, left, and right.

Compliance: YES\_\_\_\_NO\_\_\_\_

**ELECTRICAL SPECIFICATIONS and CAMERA REQUIREMENTS**

**Video Output**

- Multi-Conductor Version: 1 V, S/N 46dB or greater

**Integrated Lights**

- 4 xenon lamps
- Field Replaceable
- Color temp: 3000° K
- Optional long-life LED’s containing (2) each 5 watt cluster LED’s

**Image Pick-up Device**

- Interline transfer 1/4 inch CCD color

**Picture Elements ( pixels)**

- Solid state 1/4” diagonal pixels: 768 (H) x 494 (V) = 379,392 elements (NTSC)

**Lens**

- 10x Zoom f=4.2mm to 42mm (F1.8 to F2.9)

**Digital Zoom**

- 4x (40x with optical zoom)

**Field of View**

- 56° diagonal, 46° (H) wide, 4.6° (H) tele end

**Resolution Lines**

- 470 TV lines horizontal

**Electronic Shutter**

- 1/4 s to 1/10,000 s, 20 steps

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### Specifications for:

#### Minimum Illumination

- 1.5 lux @ F/1.8

#### Input Camera Voltage

- Multi-Conductor Version: 20-72V from controller

#### Head Rotation

- Axial Rotation: 360°
- Rotation Optical Viewing Angle: 400°
- Lateral Pan: 285°
- Pan Viewing Angle Range: 331°
- Operate in a 6" Relined Pipe
- Rotational Diameter: 4"

#### Internal Diagnostics

- Humidity sensor, CCD temperature, camera voltage, light head voltage, serial number identification, and operating hour meter. *Cameras without the aforementioned diagnostics will be deemed unacceptable.*

#### Working Pressure

- 50 PSI (minimum)

#### Operating Temperature

- 0° to 50° C

#### Compatible PCU's

- Multi-conductor Version: 1208 Mainline PCU and Inspector General portable PCU

#### Compatible Cables

- Multi-Conductor Version: Up to 1200'

#### Dimensions

- Overall length: 14.5", Head length: 5.9", Body tube diameter: 2.5", Head rotational diameter, 4"

#### Weight

- 10 lbs.

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

### 17" COLOR FLATSCREEN LCD MONITOR NTSC, PAL – Samsung SMT-171 or Equivalent

#### 17" Widescreen Monitor

- Shall be a high quality, ultra-thin, industrial grade color unit providing a minimum of 1280 x 1024 pixels of resolution.
- Shall be a desk-mounted 17" LCD computer display in the Viewing Room of the vehicle.
- Shall include a user-friendly, on-screen menu for easy parameter adjustments.
- Shall be compatible with both NTSC and PAL signals; shall include an auto-detect function that has the ability to identify the signal that's being input and automatically switch from NTSC or PAL.
- Shall have the ability to automatically monitor / adjust the video input and optimize the display settings without manual adjustments.
- Shall include an On-screen Menu for adjusting monitor parameters. The menu shall include a user-friendly graphical interface to guide users through the customization of features and individual preferences.
- Shall operate from 120V AC or 230V AC power sources.
- Shall be black in color with a metallic finish.

#### Dimensions

- 15.1" w x 15.4" h x 7.9" d

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

### Generic CCTV software Specifications for Granite XP Asset Management & Decision Support Software from CUES

#### Functional Requirements of the Software

- a. The inspection software shall fully support CMOM activities as defined by the US EPA.
- b. The inspection software shall support GASB 34 regulations.
- c. The software shall be NASSCO PACP 4.2 certified and conform to its pipeline assessment procedures.
- d. The software shall offer the ability to quickly click on an asset and see all of the history performed against that asset.

Specifications for:

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- e. The software's data entry interface shall be intuitive, easy to use, and able to provide on-line help files within the software to assist remote users with questions they may have.
- f. It shall use familiar Microsoft™ layouts or 'panes' that are customizable screens for each user's preferences and job responsibility.
- g. It shall offer tool bars, drop-down menus, 'auto-complete' features to speed data entry, and display data with easy Microsoft tree structures.
- h. Users shall be able to "single click" to burn CD/DVD's or generate reports.
- i. The core software or 'standard' inspection edition used in the field shall maintain a complete database of infrastructure assets (pipelines, manholes, lateral service connections, lift stations, etc.).
- j. The software shall enable users to immediately point to a defect within the video stream.

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

The panes shall be synchronized, whereby interaction with the main navigation window will determine the display of data in other associated panes. Changes made to an observation, inspection, asset, project, or resulting from a specific filtering criteria shall display the newly selected properties in all corresponding open panes.

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

- a. To allow the user to select his/her default preferences as to which panes to view on a regular basis, each of the panes selected shall be able to be "docked" and/or "floating". The user shall have the ability to "dock" the panes side-by-side, place one pane over another, and access each pane through a tab. "Floating" panes shall be able to be positioned anywhere in the application window. The software provider shall provide a common "out-of-the-box" layout scheme for use while performing a field inspection as well as for use in the office to review the collected data.
- b. The user shall be able to change the field labels. The module to change labels shall be part of the system and shall not require third party software.
- c. A pipe graph shall be interactive and the pane viewable during the inspection. The pipe graph shall show service connections with a graphic indicating the location of the connection. The user shall have the ability to control the graphical representation of the observations made during the inspection by selecting any combination of the following features: Connections, Defects, Continuous, Laterals, Informational, and/or Status Bar.
- d. A zoom feature shall be available for the pipe graph that allows the user to select a portion of the pipe with a mouse and zoom to that specific portion. A grid system shall be provided to display the location of a 'zoomed' observation within 10 feet.
- e. To start an inspection, the user shall be able to select structure, nodes or manhole information already within the database. If the data is not available, the operator shall be able to enter the correct information and the information shall be retained in separate tables for future selection. A graph shall be provided for structures that allow for the direction of entry and exit and flow direction of each main and lateral.
- f. The user shall be able to display live video, playback video, and captured pictures on the screen simultaneously.
  - a. All drop down look up values shall be customizable by the end user without the use of third party programs.
  - b. The application shall allow for the addition of custom fields available in the user interface without the need of third party applications.
  - c. City Administrators shall be able to set visual mandatory entry fields for both pipe information and defect entry fields and import them into this basic module.

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

The software shall offer the following optional modules to provide the relevant functions as noted by their descriptions below:

- a. The inspection software shall include an optional ESRI GIS module to enable bi-directional integration with ESRI's GIS software.
- b. The inspection software shall include an optional GPS module to enable wireless real-time collection of sub-meter accurate GPS coordinates.
- c. The inspection software shall include an optional Manhole, Structure & Nodes module to capture inspection and observation details that shall be linked to the manhole, structure or node.
- d. The inspection software shall include an optional Lateral Assets module to capture inspection data, observation details, video, and pictures which are all linked to the lateral structure.
- e. The inspection software shall include an optional Inclination module to support an inclinometer.
- f. The inspection software shall include an optional Seal & Grout module to record and graph pressure changes and test results that show the repair integrity and quantity of grout used.

**Specifications for:**

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- g. The inspection software shall include an optional WRc Compatibility and Export Module.
- h. The inspection software shall include an optional WinCan v.7 export module.
- i. The inspection software shall include an optional Flexidata PACP v2.x export module.

*Compliance:* YES \_\_\_\_\_ NO \_\_\_\_\_

**Specifications for:  
Technical Requirements of the Software**

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The software shall be coupled with a firmware controller to receive multiple, simultaneous inputs from connected devices to, for example, allow mainline footage, lateral footage and inclination data to be received into the software without the need for manual input from multiple keyboards.

Compliance: YES \_\_\_\_NO \_\_\_\_

**Database Structure & Requirements**

- a. The inspection database shall include an *asset-based* architecture which allows multiple inspections to be performed and retained as a historical record for the same physical location (asset). The “project- based” database architecture shall store and immediately show all inspection history for each asset.
- b. The software shall be able to import an entire asset database.
- c. The software shall have the ability to import and retain the entire list of assets despite not ever having generated an inspection.
- d. The inspection database shall have the ability to support and synchronize with multiple data sources, such as Microsoft Access, Oracle 8, 9i & 10 g, or SQL Server. All or part of the data shall be capable of being duplicated between video and inspection databases and exported into multiple formats, such as Granite XP, Access, PACP, Azteca, Hansen, Maximo, GBA, RJN, Maintstar and ASCII. All or part of the inspection and asset information shall be able to be synchronized between the field and office with built-in automatic validation and error checking.
  - a. The software must be based on Microsoft Windows and be a 32 bit Windows application, compatible with Microsoft Windows XP and 2000.
  - b. The software must be capable of connection to external systems via an ODBC or OLE DB connection.
  - c. The collected CCTV survey data shall be stored in either a Microsoft Access, SQL or Oracle tables, and be available for use by the system owner.
  - d. Databases shall be able to be created in the default directory or on any writable drive available.
- e. The Database structure shall have the ability to use Microsoft Jet Engine 4.0 files, Microsoft Access, or an OLE DB database, such as Oracle or Microsoft SQL Server.
- f. The database shall support simultaneously the following code systems: WRc, PACP, CUES standard and individual custom codes. The “Customer” shall provide the “Contractor” the code requirement prior to inspection creation. The code editor shall provide the ability to add, modify, and/or delete the code systems per the inspection requirements or user’s preferences. Each project shall be able to utilize a different code system and units of measurement based on the “Customer” inspection requirements. The “Customer” shall have full and independent access to the code editor for customization needs without the use of third party applications.
- g. The database structure shall retain information on the various structures found within a Sewer, Storm or combined system. It is important that the structures, nodes, manholes and pipe identifiers and related attribute information be retained as separate tables from the inspection allowing import of existing data from multiple sources. The data structure allows different projects to reside within a single database. Information gathered in projects shall be available to view by project or by system. Data gathered during project inspection shall be available to view by the selected structure. Therefore, all inspections can be viewed on a structure even if gathered in different projects.

Compliance: YES \_\_\_\_NO \_\_\_\_

**Digital Video Format Capabilities and Requirements**

- a. Digital video files (Inspection Videos) shall be captured and/or recorded in the MPEG 1, 2 or 4 formats or as specified by the City or County. The Video capture files shall be in MPEG format with linking to the database file(s) (Inspection Observations). The “Link” of the video capture file to the database observation file is required and each Observation shall record the name of the video file and the frame number referencing the time in the video when the inspection was made. The inspection observation(s) shall link to the video record in real-time.
- b. A Main, Lateral, or Node Inspection may have one or many linked video files. Video recording can be paused and then restarted without generating a new file.
- c. On playback, single click selection of a Main, Lateral or Node Observation shall start the video from the moment the observation was made, and subsequent selections of observations will “jump” the video playback to the corresponding spot. If no additional observation selection is made, the software will play sequentially all linked videos in the inspection.
- d. Video linking to pipe inspection observations is a patented and protected technique, and only software that holds the appropriate licenses is deemed acceptable.

Compliance: YES \_\_\_\_NO \_\_\_\_

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**Image (Photos) Capture Format Capabilities and Requirements**

- a. The Inspection image files (pictures) shall have the ability to be exported to Industry Standard Formats to include JPEG, BMP, TIFF formats and be transferable by disk, DVD and/or External Hard drive to an external personal computer utilizing standard viewers and printers.
- b. **The video image capture module shall be capable of collecting multiple color video frames of the defects found during inspection and then linked to the inspection reports. There shall not be a limitation to the number of pictures allowed per observation.**
- c. **Images or video clips shall be easily launched for viewing during inspection report review.**
- d. **Images can be captured and linked to an observation directly from “live” video during the TV inspection, or from the video playback at the office.**
- e. Footage count shall be attached to the corresponding video image and shall appear on the reports indicating the correct footage when the image was captured during the pipeline inspection.
- f. Shall be able to print any captured image on the ink jet color printer in the inspection truck. Picture files shall be stored and exported with inspection data.
- g. A “thumbnail” preview of all pictures at an observation shall be available. The pictures shall be able to be expanded from thumbnail to window to full screen by utilizing the mouse.

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

**Export of the Database, Videos, Pictures - Capabilities and Requirements**

- a. **The database, videos, pictures shall have the ability to be “Exported”. Export is the process of selecting all or portions of the original data, video, and pictures, and creating a complete and independent copy of this information, which can be run independently or synchronized by a City’s or County’s office program.**
- b. **The office program shall have the ability to select the Assets and Projects to transfer to a particular database.**
- c. **All or part of a database can be exported from the TV Inspection database with or without videos and pictures. This new file can be burned to a CD/DVD, or transferred to a USB Hard drive and brought into the office from the truck, or vice versa.**

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

**Synchronization Capabilities and Requirements**

- a. The application shall have the ability to synchronize with assets and inspections from exported databases.
- b. The synchronization process shall have built-in error checking for duplicates, conflicts, updates and any modifications to the data being synchronized using a unique hash revision control mechanism for every data object.
- c. The software shall have an optional Scheduler module that allows for a daily, weekly, or monthly scheduled transfer of information and media between two databases (i.e. central office to truck, truck to Enterprise, etc.). Inspections for an asset shall be able to be sent to the truck from the office.
- d. Synchronization and Exporting activities can be independently scheduled.
- e. Log files must be created for review purposes.
- f. During the synchronization process, validation dialogs shall be used to allow the user to select which data takes precedence when a conflict is challenged.
- g. All filtering capabilities previously described must be available for all exporting and synchronization tasks.
- h. The application will allow for multiple sources of data to be effectively consolidated into a single unitary database for analysis and evaluation.

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

**Televising Survey Collection/Reporting Capabilities and Requirements**

- a. The software’s basic module shall be capable of providing complete survey reports.
- b. The software shall be capable of customization with the ability to modify/add to the pipeline condition descriptions/codes and to group them for ease of use.
- c. The software shall allow footage reading from the existing mainline and lateral camera equipment to be automatically entered into the current survey record and directly correspond to the noted defect location throughout either the main or lateral pipe graph and tabular reports generated.
- d. A context-sensitive, complete on-screen help file should be available.

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- e. Drop-down boxes shall be available to quickly reference common information such as defects, pipe materials, survey purpose, locations, pipe usage, etc.
- f. Multiple windows shall be allowed so as to display live video compared to recorded video and/or recorded snapshots.
- g. The software's basic module database shall have the means to sort in ascending and descending order according to date, pipe id, street name, structure id, observed footage, pipe materials, pipe diameters, work order numbers, etc.
- h. Summary reports compiling data from multiple inspections shall be available. Reporting order shall be user defined.
- i. Individual inspection summary reports shall also be available, and tabulate pipe survey results.
- j. Quarter section (or map or project areas) summary reports are to be made available so that all surveys within a quarter section are listed showing purpose of inspection, dates, work order numbers, structure ids, street names and total lengths.
- k. A report showing defects by inspection shall be available and programmable to list specific defects observed with corresponding footage, starting and ending manhole numbers, structural pipe defects (i.e. cracks, offsets, defective laterals, collapsed pipe, etc) and service oriented defects (i.e. roots, grease, obstructions, infiltration, etc).
- l. A report showing grading scores shall be available and summarize the structure ID's, pipe material and diameter, and the grade scores for each survey with totals.
- m. Reports showing service and structural aspect scoring shall also be available and shall list the pipe ID, total observed length, number of defects and total score with reference to the condition of the total pipe, average of the pipe, total defects and average of defects.
- n. The software shall allow users to create additional reports as needed.
- o. The data structure shall allow different projects to reside within a single database. Information gathered in projects shall be available to view by project or by a unique system ID number or asset ID. Data gathered during the project inspection shall be available to view by the selected structure. Therefore, all inspections can be viewed on a structure even if gathered in different projects.
- p. The data structure shall allow for the entire asset data inventory to be created or imported even if no inspections have been performed on the assets.

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

## Televising Viewer Capabilities and Requirements

### **A Viewer Module shall be available for viewing all collected data and shall allow users to:**

- a. View or print all available pictures.
- b. View all available video files.
- c. Review or print individually all available reports.
- d. View all data in the same format as the main software application.
- e. Use GIS map within the viewer to select assets, review inspections, and run reports.
- f. Use predefined and custom filters to search and sort the information and reports.

Compliance: YES \_\_\_\_\_ NO \_\_\_\_\_

## GIS and GPS Requirements

- a. The inspection software will integrate with GIS, GPS, and selected CMMS systems.
- b. **The Database and Software program shall be able to import and export asset data, Inspection Observations, and pipeline inspection scores from an ArcGIS 9.2 geo-database or ArcSDE files utilizing the network features to associate Sewer, Storm or combined Mains with corresponding Node and Lateral assets.**
- c. **Both an "import" and "export" profile shall be provided in the software to strictly control the attributes exchanged between the systems.**
- d. The "import" and "export" profiles shall allow for data type conversions when the source and destination field types are not the same. (i.e. allow for data type conversion of a float to an integer)
- e. Imported asset data from GIS, as well as exported asset data to GIS shall be filterable to bring in all asset data (full asset inventory) or selected assets/pipelines.
- f. The inspection software shall allow linear references to be created in GIS with corresponding hyperlinks to spawn video, still images and other data from the inspection software or an ESRI GIS application.
- g. **An interactive and integrated GIS map shall be viewable from within the application and allow for the initiation of inspection, creation of multiple inspections in a project format, viewing, exporting, burning, and reporting of inspections for selected assets, map layer management, and customizable filtering capabilities for selection of map features.**
- h. The software shall collect real-time submeter accurate GPS coordinates wirelessly from the field for located structures.
- i. The software shall allow collection/storage of GPS coordinates imported from an existing GIS database.
- j. The inspection software shall provide a 'zoom to GPS location' capability when a GPS device is connected to show the location of the inspection vehicle or a particular known structure's location.

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- k. The software shall enable structures, observations, entry points, etc. to be estimated with GPS coordinates as a linear reference.
- l. The software shall provide the ability to use the GIS map within the viewer to select assets, review inspections, and run reports.

Compliance: YES \_\_\_\_ NO \_\_\_\_

**Televising Data Analysis/Reporting Capabilities and Requirements**

- a. Users shall have the ability to check for invalid data. To avoid corruption, data gathered from the field inspection shall be error checked. Inconsistent or erroneous data shall automatically be displayed and allow the user or supervisor to add or change data before being input into the database.
- b. Users shall have the ability to perform data entry and automatically control the video text overlay simultaneously to eliminate the need for dual entry.
- c. Users shall be able to directly access Oracle 8i, Oracle 9i, and Microsoft SQL Server 2000 databases.
- d. Users shall have the ability to transfer data between the Data Acquisition System and the Software Interface without the need for any user supplied programming, special scripts, or macros.
- e. The user shall be able to build a code system from active codes.
- f. The administrator shall be able to select asset and inspection fields that can be updated without user verification, therefore allowing quick transfer.
- g. The application shall have the ability to filter all data using any data field in the application. Filter state should be savable for future use. Multiple filters can be saved. Filters can be defined graphically or by SQL query language.
- h. Users shall be able to filter the list of mainline inspections or assets to be exported. Users shall be able to select the mainline inspections by:
  - a. Data Acquisition System projects, filtering by: Project name
  - b. Inspections, filtering by date (from/to), operator name, or work order number
  - c. In addition, the user shall be able to filter the mainline inspections by Sewer Main Assets:
    - a. The user shall be able to select a list of Main Assets and the inspections associated with these assets will be displayed.
    - b. The user shall be allowed to select/deselect individual inspections.
- i. A scoring system incorporated in the software shall assist the user/management personnel in making proper pipe condition assessments. Scoring is to be based upon grades assigned to observation codes and calculated using either standard or customer specific algorithms. Grades can be programmed to be dependant to secondary properties like pipe size, type, weather, etc. Only Administrators shall be allowed/able to make changes to grade and scoring algorithm values.
- j. Upload/download features shall be available to move surveys, assets, or projects between databases, to allow information and media stored on a truck system to be incorporated into a master database on the City's network or a supervisor's computer. The software program shall be able to combine databases from multiple sources into a master database and link media to a central location. A revision control system shall automatically monitor changes and resolve conflicts between databases.

Compliance: YES \_\_\_\_ NO \_\_\_\_

**Vendor Requirements**

- a. Vendor shall design, develop and support the software in the US. The software shall not be designed and supported offshore.
- b. Vendor shall offer comprehensive Annual Support Plans which include Web-based troubleshooting tools, online assistance, user forums, and access to downloadable upgrades and documentation via an established Support web site.
- c. Vendor shall provide referencable clients similar in size and scope.

Compliance: YES \_\_\_\_ NO \_\_\_\_

Specifications for:

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**Definitions**

- 3     **Application Options:** Special operating parameters in the software that affect its behavior. These parameters are known within the application as Options and can be modified.
- 4     **ASCII:** The American Standard Code for Information Interchange is a standard seven-bit code. In the software rendering a Report to ASCII means to save it in ASCII format (also known as plain text format).
- 5     **Asset:** A general term representing sewer physical structure (see Lateral Asset, Main Asset and Node Asset). All Inspections in the application can be grouped into Assets because all Inspections (and their respective Observations) are performed on Assets. Multiple inspections can be linked to an asset to provide a historical perspective.
- 6     **Code System:** A set of Codes that comprise the menu of possible choices when assigning values to fields. For example, when recording an Observation the Code System includes all of the types of defect Observations can have (e.g. crack, sag, blockage, etc.).
- 7     **Codes:** A value assigned to fields in the software. Codes control the type of information that can be entered for a particular field.
- 8     **CSV file format:** Comma-separated values contain table values as a series of ASCII text lines organized so that each column value is separated by a comma from the next column's value and each row starts a new line. This is useful for importing data into spreadsheets, such as Microsoft Excel.
- 9     **Engineering Edition:** This is a special version of the Software. An Engineer is a user that is able to access and view data contained in the database to check the validity of the data and perform minor corrections.
- 10    **Template:** A field template is used for assigning certain fields in the software specific values. Field templates are used for Asset Addresses, Node Asset IDs, and Site IDs.
- 11    **Footage:** The distance from a Node Asset (or other starting point) from which an Inspection began. Footage is used to describe the location of observed defects in pipes. Footage also is used to describe the current camera position during an Inspection. Footage also refers to the distance in a service line inspection from either the mainline asset or the cleanout/property line.
- 12    **HTML:** The Hyper Text Mark-up Language is the language that web pages are written in to format the presentation of content. Reports exported in HTML format retain formatting and are viewable in many email applications and word processing applications.
- 13    **Inclination Survey:** The process of recording the slope of the pipe at every tenth of a foot in order to calculate the changes in inclination and depth from node to node.
- 14    **Inspection:** General term to refer to the procedure of investigating the quality and conditions of pipes. An Inspection means a TV inspection in which a camera presents live video and/or records video and still pictures for later playback to determine the status of a pipe.
- 15    **Jet DB:** Microsoft Jet Database, a database engine that provides a workstation-based storage system and enables data exchange in a replicated database over an Internet connection and other (traditional) transfer means.
- 16    **Labels:** The names of fields in the software dialogs.
- 17    **Lateral Asset:** An adjoining pipe to the main pipe of a Main Asset. A Lateral Asset intersects and opens into the main.
- 18    **Lateral Inspection:** An investigation of a Lateral Asset usually undertaken in the context of a TV Inspection, but may also be an independently generated inspection.
- 19    **Lateral Observation:** A defect found during a Lateral Inspection of a Lateral Asset.
- 20    **Main Asset:** A physical structure defined by two Node Assets and the interconnecting pipe.
- 21    **Node Asset:** The physical manhole or entry point into the sewer system. It can also be any type of an end point (catch basin, pumping station, ditch, etc.)
- 22    **Node Asset Inspection:** An investigation of the type and condition of a Node Asset. This procedure also enters Node Asset data into the software.
- 23    **MDB file format:** Microsoft Database, the file format used to read, view, and store Microsoft Access databases.
- 24    **Observation:** General term to describe a peculiarity during an Inspection. In the software, Observations are perceived defects, informational items, or general comments noted during a TV Inspection.
- 25    **ODBC Data Source:** Open Database Connectivity standard, an integration tool to access information from a range of databases including Access, dBase, DB2, Excel, SQL Server, Oracle, and Text. Reports may be generated to ODBC data sources.
- 26    **Enterprise Edition:** A special version of the software. An Enterprise edition user can manage inspection information, generate customized reports, configure and manage Oracle and SQL Server databases, customize and manage scoring algorithms, and export the database containing all the inspections performed to clients. Enterprise databases (Oracle, SQL Server) allow for multiple users running Engineering, Inspection, and Viewer Editions to access and work with the centralized data and media.
- 27    **PACP:** NASSCO's Pipeline Assessment and Certification Program. It is a coding standard used to evaluate and classify sewer pipe conditions.

**Specifications for:**

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- 28 **Pane:** A window containing different views of data and processes in the software. These panes are synchronized, wherein operating in one of the panes will effect changes in another pane. Panes can be laid out in any custom arrangement.
- 29 **PDF:** Portable Display Format document. PDF files are viewable independent of the application that created them using PDF Viewers such as Adobe Acrobat Reader. The software shall allow generating of Reports into this format.
- 30 **Plug-ins:** Additional components of an application that can be added to the basic system configuration to extend the application's functionality. The software shall use plug-ins to allow for an expandable application to meet the needs of different users.
- 31 **Project:** A grouping of Inspections completed or assigned and the Assets upon which these Inspections have been or will be performed by the contract, customer, or other manner. In the software, all Inspections in the system are grouped into projects since Inspections are completed for specific reasons (customers, contracts, etc.).
- 32 **Report Filter:** This is a means of selecting only relevant information to be presented in a report. In the software, reports can be filtering by applying a Report Template to include user-defined information for the Report.
- 33 **Report Preset:** A Report Preset is a setting to generate reports rapidly. It is useful to specify persistent filters for daily or weekly reports and for selecting and generating several reports at a time. Using Report Preset can substantially reduce report processing time.
- 34 **Report Template:** Defines the content and look of a report. Reports packaged with the software will be represented as templates (in conjunction with report presets to set up filtering criteria) and when run request values for variable parameters to be entered, such as dates, operators, etc.
- 35 **Report:** A paper or electronic file based presentation of data contained in the application. Customized Reports can be generated that meaningfully present the data contained in the software.
- 36 **Seal & Grout Inspection:** A grouping of all the sealings and air pressure tests completed during an Inspection of an Asset.
- 37 **Sealing:** A sealing of a single Joint or Crack during a Seal and Grout Inspection.
- 38 **Synchronization:** The Database Synchronization is a process of forcing two data subsets of two databases to have the same content. This is useful for data transfer between the Inspection and the Enterprise/Engineering databases, when the Inspection edition user brings the updated database to the office and synchronizes completed inspections (for example) with the Enterprise/Engineering database. Also in the software, the Panes representing different modules of the application must be integrated and synchronized so a change in one pane effects a change in another.
- 39 **Toolbar:** Graphic tool that contains buttons with small images (the same images you see next to corresponding menu items), menus, or a combination of both. The software should include many built-in toolbars that you can show, hide, and position as needed.
- 40 **Tool-tip:** Notes that appear when you position the mouse over a control element (button, field etc.) that describes the element usage.
- 41 **Inspection Edition:** A special version of the software. An Inspection edition user conducts the Inspections on Assets and may synchronize the results with a central database. The Inspection edition provides all of the functionality for conducting Inspections, recording Observations, and synchronizing the results.
- 42 **TV Inspection:** The main method of inspected pipes and nodes. The procedure includes viewing television output of a camera traversing the pipe between two Node Assets.
- 43 **Viewer Edition:** A special version of the software. A Viewer is any user interested in simply viewing the results of the Inspections. Viewers cannot change data stored in the software, but have full access to review all of the stored data using the appropriate Panes. Viewers can print reports and review the video
- 44 **WRc:** Water Research Center (UK) is a technology-based consultancy providing services to the water, wastewater and environmental industries. It is a coding standard used to evaluate and classify sewer pipe conditions.

*Compliance:* YES\_\_\_\_NO\_\_\_\_

**TV CABLE REEL ASSEMBLY**

A TV cable reel assembly will be supplied with a minimum storage capacity for 1000' of 1/2" or 5/8" maximum diameter video transmission cable. The reel shall be chain driven and properly reinforced to withstand 200% of the maximum motor torque to insure trouble-free operation. The reel shall be powered by a variable speed electric motor and driven through a multi-gear ratio transmission. The transmission will have multiple speeds to limit the motor load during varying towing conditions. The reel shall be equipped with an automatic level wind assembly to evenly pay out or rewind the cable to prevent pile-ups, entanglements and burying. The reel shall be built into a rugged frame designed for fixed mounting into a unit. The reel drum and level wind shall be open to view to allow for inspection during operation. TV REEL SYSTEMS THAT ARE NOT CONTROLLED REMOTELY OR DO NOT HAVE A MULTI RATIO TRANSMISSION WILL NOT BE ACCEPTABLE.

Specifications for:

**City of Mountlake Terrace**

*Compliance:* YES\_\_\_\_NO\_\_\_\_

**Specifications for:**

**City of Mountlake Terrace**

**TV CABLE REEL SLIP RING ASSEMBLY**

The reel shall be equipped with a continuous contact rotary slip ring assembly. The assembly will be equipped with a minimum of twelve (12) slip rings to conduct the necessary current and signals through the reel. Slip ring assemblies with fewer than twelve (12) rings will not be acceptable. The slip ring assembly shall be fully enclosed in a dust and weatherproof high strength aluminum housing. Systems equipped with the high maintenance copper slip ring assemblies shall not be considered acceptable. Mercury Slip Rings shall not be considered acceptable.

Compliance: YES\_\_\_\_NO\_\_\_\_

**CABLE FOOTAGE METER, LOCAL / REMOTE ELECTRONIC READOUT**

The unit shall be equipped with a distance counting meter designed to accurately measure cable travel in feet and tenths of feet. The metering head shall be constructed of machined cast aluminum parts and shall include the necessary sheaves, wheels and guides. The meter shall be equipped with an LCD for use at the rear of the unit and an electronic counter which is connected to the Data Display System at the operator's station.

Compliance: YES\_\_\_\_NO\_\_\_\_

**CONTROLLER TV CABLE REEL MOTOR/POWER WINCH MOTOR**

A single combined controller will be furnished to operate either the TV Cable Reel Motor or Power Winch Motor if supplied. It will be designed for mounting at the control console in an angular panel. The controller shall be equipped with an ON/OFF switch, an ON indicator light, clutch control (forward/reverse switch) and speed control with built in automatic off positioning for safety when the operator releases the speed control.

Compliance: YES\_\_\_\_NO\_\_\_\_

**TV CABLE REEL CONTROL REMOTE AND LOCAL**

A gear shift selector and linkage shall be provided at the control console to operate the reel mounted transmission. The combination of the reel motor controller and transmission gear shift selector will maximize the efficiency of the television inspection operation and minimize the load on the reel and motor. A speed controller, gear shift selector and on/off switch shall be provided at the reel for local control during set up.

Compliance: YES\_\_\_\_NO\_\_\_\_

**COMBINATION VIDEO TRANSMISSION/TOW CABLE, KEVLAR FIBER ARMORED, - MULTI-CONDUCTOR**

A combined video and towing cable shall be furnished in a continuous length of 1000 feet (minimum) and shall consist of the following (minimum):

Compliance: YES\_\_\_\_NO\_\_\_\_

Cable

- The cable shall consist of a coaxial core wrapped with a braided wire shield ground return.
- An additional braided wire shield shall encircle both the coax and ground return and shall act as a Faraday shield. ***Cables with only a single braided wire shield acting as a ground return shall be deemed unacceptable.***
- A total of 10 separately insulated and color-coded 18/20 gage standard copper conductors shall be bundled and twisted in groups of 3 with one conductor remaining single.
- To prevent cable breakage when placed under load, all wire bundles, wires, and the coax shall twist in a serpentine pattern for the entire length of the cable so that all wires, including the coax, are the same total lengths. ***Cables that have a 'center' coax, making it the shortest and therefore the most easily broken conductor, shall be deemed unacceptable.***
- The cable diameter shall be no greater than .375 inches and shall be able to withstand external pressures of up to 400 psi.
- ***The cable weight shall not exceed 65 lbs. per 1000 feet.***

Compliance: YES\_\_\_\_NO\_\_\_\_

Cable Jacket

- The exterior of the cable shall consist of a minimum 1/16" thick abrasion resistant high-density nylon composite outer jacket embedded with Kevlar fibers to provide the cable with the required towing tensile strength.
- Shall provide a lower coefficient of friction to reduce drag and therefore increase its resistance to wear.

**Specifications for:**

**City of Mountlake Terrace**

Cable Connection

- The end of the multi-conductor cable shall be equipped with a waterproof scotchcast splice to allow for the direct wiring of the female connectors.
- An adjustable strain relief shall be provided to transfer the cable towing strength from the cable to the camera skids or transporter.
- The termination shall consist of the necessary connectors and dummy plugs.

Compliance: YES\_\_\_\_NO\_\_\_\_

**SELF-PROPELLED Wheeled Compact CAMERA TRANSPORTER**

The unit shall be labeled and listed as a minimum by a Nationally Recognized Testing Laboratory (NRTL) to the applicable Standard for Safety for Closed Circuit Television Equipment, UL 2044, 2nd edition, 11/9/01. A listing report must be supplied that certifies the aforementioned equipment is acceptable as defined by 29 CFR 1910.399 and required by 29 CFR 1910.303(a). Self-certification or certification by a laboratory that is not an NRTL will be deemed unacceptable. NRTL labeled and listed equipment shall be supplied as required by the FEDOSHA memorandum, dated September 25, 2002, page 3, Section on Compliance, prepared by John L Henshaw, Assistant Secretary of Occupational Safety and Health.

A self-propelled camera transporter shall be provided for inspecting relined pipe and storm drains/wastewater pipelines measuring 6” and up in diameter. The transporter assembly shall be designed to operate optimally with 1200’ multi-conductor cable and shall consist of the following (minimum):

**Transporter**

- Shall include the following (minimum) equipment: (6) Driven Wheels, available in various sizes.
- Shall operate through a minimum of (1200) feet of multi conductor video cable in suitable pipe conditions.
- The corresponding pan and tilt or pan and tilt zoom camera shall plug directly into the transporter with no external exposed cables.
- Shall have sufficient power and traction to inspect a minimum of (1200) feet from the manhole entry point in suitable pipe conditions.
- Shall include a heavy-duty drive motor specifically designed to meet the power requirements of the system, regardless of size of pipe being inspected. The motors shall incorporate over-current protection circuitry.
- Shall be equipped with self-propelled power forward, power reverse, and free wheel capabilities.
- Shall be constructed of brass, stainless steel, and aluminum alloy.
- Shall have speed and direction controlled from the control console.
- Shall be retrievable in the free wheel mode by the video cable reel to reduce the normal wear on the drive motor by 50%.
- Shall have full, variable speed in power forward or power reverse modes with a maximum speed of 55-60 ft. per minute.
- The transporter connector shall integrate directly to the camera, securing with a cam-locking action for positive sealing and retention.
- The transporter shall have a forward-locking feature to secure the camera, increasing the strength of the camera-to-transporter interface.
- The self- propelled camera carrier shall weigh a minimum of 27 lbs.

Compliance: YES\_\_\_\_NO\_\_\_\_

**Camera Compatibility**

- Shall be designed to be compatible with the CUES pan and tilt III / optical zoom pan and tilt III cameras.
- The transporter, when used with an optical zoom pan and tilt camera, shall fit into an 6” diameter relined pipe and will have the ability to operate in an 8” diameter pipe with offsets. **All transporter / optical zoom camera combinations that are unable to operate in 6” diameter pipe will be deemed unacceptable.**
- **All transporter / pan & tilt combinations that are unable to operate in 6” relined pipe shall be deemed unacceptable.**
- The combined length of the transporter / pan & tilt camera assembly shall not exceed 24” with the camera in the home position. This will allow the inspection and traversal of 6” diameter pipe with off sets or meandering conditions and facilitate entry into short inverts. **Camera / transporter assemblies exceeding 24.” in length will be deemed unacceptable.**

Compliance: YES\_\_\_\_NO\_\_\_\_

**Transporter Controller**

- Transporter shall be controlled via a rack-mounted controller.
- The speed control shall allow for an infinite control of the speed of the transporter from stop to maximum speed.

• **Speed**  
0 to 65 fpm

• **Direction**

**Specifications for:**

**City of Mountlake Terrace**

Forward/ Reverse/Freewheel

Tires

- The Transporter shall include (6) wheels, available in various sizes, designed to maximize traction in each pipe size.
- 3.5” diameter tires for 6” pipe and 6” relined pipe
- 4.375” diameter tires for 8” pipe
- 5” diameter tires for 10”-15” pipe
- 7.9” diameter tires for 18” –30” pipe
- 8” Steel Wheels will be provided for High Traction
- The transporter shall be capable of inspecting pipes up to 30" diameter with the addition of larger diameter wheels.
- The (2) smaller diameter wheels, designed to help negotiate offsets in larger pipe configurations, shall remain affixed to the middle axle, regardless of pipe size to be inspected.
- **Kits contain complete sets of wheels.**

Compliance: YES\_\_\_\_NO\_\_\_\_

**CABLE GUIDE EQUIPMENT, TV only**

Manhole cable guide rollers shall be provided to protect the TV cable, and/or winch cable from damage during the inspection. They shall be constructed of aluminum to minimize weight and be equipped with corrosion resistant pulleys. The minimum pulley bend radius shall be 6”.

Six (6) 4.8 foot (57.5”) quick coupling spring loaded extension poles will be supplied to connect to the down hole cable guides. To minimize weight, the quick coupling extension poles shall be constructed of .125” thick fiberglass tubing with an outside diameter of 1.25". The fiberglass tubing shall consist of 1 ounce continuous strand matt encapsulated with vinylester resin. **The weight per each pole shall not exceed 2.8 lbs.** The extension poles shall be corrosion resistant and orange in color to ensure visibility for added safety.

Manhole adapter hooks will be supplied to secure the guide system to the manhole ring. A manhole top roller assembly shall be supplied to provide topside cable protection. The top roller shall consist of a welded steel angle iron frame with the necessary pulleys. Rear door mounted pole and guide holding brackets with appropriate safety warnings shall be provided. **Downhole equipment requiring manhole entry to install shall not be deemed acceptable.**

Compliance: YES\_\_\_\_NO\_\_\_\_

**RETRIEVAL TOOL FOR CAMERA, SKIDS AND TRANSPORTER**

A Retrieval Tool will be supplied for skids and/or transporter. This device will allow placement or retrieval of camera, skids and/or transporter without the need to enter the manhole. Tool will feature 6' to 10' extending fiberglass safety handle with extension locks.

Compliance: YES\_\_\_\_NO\_\_\_\_

**TV MAINTENANCE TOOL KIT**

A kit containing sets of tools as listed herein shall be furnished. The kit shall contain the necessary items to field test, adjust and repair a number of components on the television systems. This kit must include: volt OHM test meter (0-600 milliamps), Allen wrench set, and soldering kit.

Compliance: YES\_\_\_\_NO\_\_\_\_

**OPERATING MANUALS**

Operating manuals shall be furnished that contain the recommended operating instructions and maintenance procedures for all systems and components being furnished. The instructions shall provide step-by-step use methods and include adequate illustrations, diagrams and other aids. Special attention shall be given to safety considerations for personnel and the equipment.

Compliance: YES\_\_\_\_NO\_\_\_\_

**Specifications for:  
SYSTEMS PARTS BOOK**

**City of Mountlake Terrace**

A parts book supporting field repair and replacement of the various components of the delivered systems shall be furnished. This book shall include exploded or cutaway drawings of numerous components and assemblies with each drawing referencing a manufacturer's part number and description.

*Compliance:* YES \_\_\_\_ NO \_\_\_\_

**INSTRUCTIONAL VIDEO TAPES**

The vendor shall provide VHS format training videos covering the following minimum requirements:

**Video 1**

TV System instructional video covering the recommended operation, step by step set up procedures and safety precautions for personnel and equipment. Minimum run time, 12 minutes.

*Compliance:* YES \_\_\_\_ NO \_\_\_\_

**Video 2**

Trouble Shooting instructional video covering step by step procedures on continuity, cable testing, trouble shooting steps and safety precautions for personnel and equipment. Minimum run time, 14 minutes.

*Compliance:* YES \_\_\_\_ NO \_\_\_\_

**Video 3**

TV Cable End Replacement instructional video covering step by step procedures on replacing the TV cable end, soldering techniques, connection location and safety precautions for personnel and equipment. Minimum run time, 34 minutes.

All videos provided must be produced from BataCam SP studio cameras and edited on "1" master dubs allowing for the maximum reproduction quality of the VHS videos provided. Video tapes produced for the purpose of sales or marketing shall be deemed not acceptable. Video training tapes produced from consumer grade camcorders shall be deemed not acceptable.

*Compliance:* YES \_\_\_\_ NO \_\_\_\_

**INSTRUCTION AND TESTING**

The supplier shall fully instruct and test buyers in the operation of the equipment furnished after delivery. The instruction period shall be of sufficient duration (number of days shown on the component list) to fully familiarize the buyers operating personnel. The instruction and testing shall be conducted by the supplier's field service technician and shall include component familiarization, theory of operation, equipment operation, field procedures, techniques of use, troubleshooting, maintenance recording and logging of sewer conditions and safety procedures. Training provided by sales or office personnel will not be acceptable.

*Compliance:* YES \_\_\_\_ NO \_\_\_\_