



CITY of NOVI CITY COUNCIL

Agenda Item 1
April 9, 2012

SUBJECT: Approval to award the purchase of an Aries TR3300 Pathfinder pipeline television inspection system to Fredrickson Supply, LLC in the amount of \$59,650.

SUBMITTING DEPARTMENT: Department of Public Services / Water & Sewer Division

CITY MANAGER APPROVAL: 

EXPENDITURE REQUIRED	\$59,650
ADDITIONAL AMOUNT REQUIRED	N/A
LINE ITEM NUMBER	592-000.00-140.000

BACKGROUND INFORMATION:

The Water and Sewer Fund's capital expenditures recommended for 2011-2012 include \$60,000 for sanitary sewer televising equipment. The televising equipment is a vital tool for performing operations and maintenance work in DPS's Water and Sewer Division, as underground sanitary infrastructure frequently requires televising for maintenance and repairs. The sanitary sewer televising equipment will enhance DPS's ability to efficiently repair and maintain Novi's underground infrastructure.

The new Aries TR3300 Pathfinder unit will enhance service to the community by providing sanitary pipeline assessments from televised reports. The new unit has the ability to be mounted in the new Ford Transit Connects, John Deere Gators, full-size trucks, or in the enclosed trailer included in this bid. The versatility of the different mounting methods allows field staff to operate the televising equipment in various locations in Novi that often require off-road travel.

On March 22, 2012, eight sanitary sewer televising equipment bids were received following a public bid solicitation period. Fredrickson Supply, LLC was the lowest qualified bidder by meeting all the required specifications and providing a responsive bid for an Aries TR3300 Pathfinder System. Another vendor provided pricing on an identical unit, but was approximately \$6,695 higher than the Fredrickson Supply, LLC bid. Fredrickson Supply, LLC was able to offer an \$8,433 discount because its unit has been displayed at a trade show but is still in new condition.

The procurement of the sanitary sewer televising equipment resulted in a savings of \$350 from the amount estimated. Delivery is expected to take place in 14-21 days.

RECOMMENDED ACTION: Approval to award the purchase of an Aries TR3300 Pathfinder pipeline television inspection system to Fredrickson Supply, LLC in the amount of \$59,650.

	1	2	Y	N
Mayor Gatt				
Mayor Pro Tem Staudt				
Council Member Casey				
Council Member Fischer				

	1	2	Y	N
Council Member Margolis				
Council Member Mutch				
Council Member Wrobel				



Closed Circuit Television System for Sewer Inspection
Promotion II

This sewer television system is delivered complete and ready for operation and includes a Pathfinder Zoom camera, a Non-Zoom Pathfinder Camera, as well as Pathfinder Transporter for 6" relined to 24" lines.



Optional reel stand, equipment wash down system, and rear monitor pictured above.



CITY OF NOVI
PIPELINE TELEVISION INSPECTION SYSTEM BID TABULATION "AS READ"
THURSDAY, MARCH 22, 2012 3:00 P.M.

This tabulation reflects submittal data by the following companies. However, they have not been evaluated for accuracy of information. Final decision for award will be determined once the evaluation has been completed.

	Dreier & Maller	C & S Solutions	Telespector	Fredrickson Supply	Fredrickson Supply (Alternate Bid)	M Tech	Jack Doheny	Jack Doheny (Alternate Bid)
BASE BID								
Pipeline Television Inspection System	\$80,949	\$90,575	\$129,979	\$64,500	\$59,650	\$69,800	\$69,500	\$62,425
Brand	R.S. Technical Services	Pearpoint P350	Telespector	Aries Pathfinder	Aries Pathfinder (display unit)	Cues	IBAK	Aries Pathfinder
OPTIONS								
1. Enhancer Operation Station	\$502	\$465	included	\$605	included	\$1,750	\$600	\$600
2. Tool Chest	\$250	\$1,200	included	\$619	included	\$1,150	\$680	\$680
3. Reel Stand	\$800	\$620	included	\$454	included	\$450	\$450	\$450
4. Wash Down System	\$1,506	included/standard	\$600	\$930	included	\$850	\$890	\$890
5. 15" LCD Monitor	\$808	\$355	included (19" monitor)	\$976	included	\$750	\$1,300	\$1,300
Days Delivery (ARO)	blank	45	90-120	60-90	14-21	60-75	30	immediate
Extend to MITN	yes	no	yes	yes	no	yes	yes	
BID TOTALS:	\$84,815	\$93,260	\$130,579	\$68,084	\$59,650	\$74,750	\$73,450	\$66,345



1. Trailer

- 1.1. A new 6'x10' trailer shall be provided. The trailer shall conform to all of the following specifications:
 - 1.1.1. 3,500lb gross vehicle weight rating
 - 1.1.2. Single 3,500lb rated axle, with ITS and radial tires
 - 1.1.3. Interior width of 72" minimum
 - 1.1.4. Interior length of 120" minimum
 - 1.1.5. Interior height of 78" minimum
 - 1.1.6. Interior walls and ceiling insulated and finished in seamless white vinyl
 - 1.1.7. Floor plywood construction
 - 1.1.8. Electric braking system with breakaway safety switch
 - 1.1.9. Extended triple tube tongue with 2-5/16 ball hitch
 - 1.1.10. Drop-down tongue jack, manually operated
 - 1.1.11. Dual safety chains for hitch
 - 1.1.12. Drop-down corner stabilizing posts, rear corners, 1000lb rating each
 - 1.1.13. Exterior aluminum panels painted in the City's standard color (White)
 - 1.1.14. Curb side lockable swing opening 32" wide door forward of axle
 - 1.1.15. Full opening rear swing doors with tie-down latches
- 1.2. The trailer shall contain all standard equipment and meet all current Federal DOT and State highway motor vehicle standards.
- 1.3. The vehicle shall be additionally equipped with the following aftermarket products:
 - 1.3.1. (2) Roof mounted amber strobe lights, with controls in rear of vehicle
 - 1.3.2. (2) 12V rear facing floodlights



2. Trailer Outfitting

- 2.1. The trailer shall be outfitted with the following features for storage and operation of the sewer inspection equipment.
- 2.2. The walls shall be insulated and finished with white non-porous laminate.
- 2.3. The ceiling shall be insulated and finished with a non-porous laminate.
- 2.4. The floor shall be covered with Lonseal Lonplate flooring, with caulked protection at wall joints.
- 2.5. The room shall be lit by fluorescent lighting, with switch.
- 2.6. A desktop shall be included with the following features:
 - 2.6.1. Minimum ¾" 7-ply Luan plywood construction with non-porous durable laminated finish
 - 2.6.2. Adequate space for specified system controls, possibly including: camera controller, transporter controller, reel controller, SCU case, steerable transporter controller, keyboard, and mouse

COMPLY ✓
YES / NO

CITY OF NOVI
PIPELINE TELEVISION INSPECTION SYSTEM SPECIFICATIONS

- 2.6.3. (3) shelves shall be installed under the desktop
- 2.6.4. An overhead shelf shall be installed across the entire desktop
- 2.7. An adjustable height, fabric covered, foam padded chair with 5-leg base and casters (minimum locking) shall be supplied. A securing cord shall also be supplied for in-transit storage.
- 2.8. There shall be a minimum of (2) duplex outlet boxes supplied in the room.
- 2.9. There shall be a fire extinguisher securely mounted to a wall of the room in clear view of the operator. The fire extinguisher shall be a dry chemical type, NFPA-Classified 3A-40BC.
- 2.10. The TV cable reel system shall be mounted at the rear of the room on the street side.
- 2.11. A set of vertical storage brackets and hooks shall be included on the curbside of the vehicle at the rear of the room.
- 2.12. Down hole pole storage shall be included at the rear door of the vehicle.



3. Honda On-Board AC Power System, 3kW

- 3.1. The system shall include an on-board electrical power source rated for 3kW of alternating current output.
- 3.2. All electrical fixtures shall be appropriate for the complete electrical requirements of the system and are installed to NEC codes and local requirements.
- 3.3. All wiring shall be run in protective conduits.
- 3.4. A connection feature shall be provided for the on-board power supply. This will allow for the system to be powered by the commercial 120V AC house power supply through a connection in the vehicle. There shall also be a house power cord with weatherproof plug and socket for attaching to house power or the generator.
- 3.5. The generator shall have the following features:
 - 3.5.1. Gas powered, 6.4hp, 196cc, single cylinder, overhead valve engine
 - 3.5.2. Spark arrest muffler
 - 3.5.3. Low oil pressure indicator
 - 3.5.4. Inverter technology for clean sine wave output, "contractor" model generators without inverter technology shall be deemed unacceptable
- 3.6. The generator mounting system shall include the following:
 - 3.6.1. Bonding wire to chassis
 - 3.6.2. Protective hinged lockable metal enclosure mounted on the tongue of the trailer



4. System Control Unit (SCU)

- 4.1. A system control unit (SCU) shall be provided to control and distribute power to the TV system equipment specified. The SCU shall include the following features at a minimum:
 - 4.1.1. Non-glare 9" color TV monitor, with 3" internal speaker and controls
 - 4.1.2. Hardigg-style ATA-rated polypropylene case with side handles
 - 4.1.3. Storage compartment in cover of case
 - 4.1.4. Modular component design to simplify repair and troubleshooting
 - 4.1.5. Approval through test spec UL1012 for power units
 - 4.1.6. Isolation transformer for clean downhole power signal source
 - 4.1.7. AC power cord with IEC connection and input breaker
 - 4.1.8. Mil-spec reel connector, weatherproof
 - 4.1.9. Connections for video recording device
 - 4.1.10. Parallel port for PC devices such as a printer or laptop computer
 - 4.1.11. 120VAC duplex GFI-protected outlet for auxiliary electrical devices
 - 4.1.12. Front face of unit shall include the following controls:
 - 4.1.13. Camera power switch
 - 4.1.14. Camera power breaker reset button
 - 4.1.15. Camera voltage adjustment dial, 0 to 150V DC
 - 4.1.16. Camera current adjustment dial
 - 4.1.17. Pan and tilt controller connection
 - 4.1.18. Auxiliary lighthouse switch
 - 4.1.19. Lighthouse power switch
 - 4.1.20. Lighthouse power breaker reset button
 - 4.1.21. Lighthouse lamp power selector
 - 4.1.22. Lighthouse intensity dial
 - 4.1.23. Lighthouse overcurrent warning light
 - 4.1.24. Auxiliary lighthouse controller connector
 - 4.1.25. Auxiliary tractor controller connector
 - 4.1.26. Diagnostic meters on front face of unit shall include:
 - 4.1.27. Camera module voltage
 - 4.1.28. Camera module current draw
 - 4.1.29. Lighthouse voltage
 - 4.1.30. Lighthouse current draw



5. Data Display System

- 5.1. The Data Display System is a specialized minicomputer designed for utilizing in pipe video inspection and rehabilitation applications.
- 5.2. Major functions shall include:
 - 5.2.1. Collecting, processing and displaying information from a variety of meters during a video inspection
 - 5.2.2. Inserting necessary text information into a camera video signal to create video report (e.g. on DVD)
 - 5.2.3. Providing a convenient Human-Machine Interface with access to a Keyboard, Video Monitor and Printer during video inspection in Standalone configuration

COMPLY ✓
YES / NO

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- 5.2.4. Creating, editing, and printing a Report about pipe defects found in process of video inspection in Standalone configuration
- 5.2.5. Serving as an adaptor-interface between all meters and a Personal Computer in PC-based report preparation systems (PC-Controlled configuration)
- 5.3. Key features shall include:
 - 5.3.1. Standalone and PC-Controlled configurations
 - 5.3.2. User-friendly Menu Interface
 - 5.3.3. Software-configurable System parameters
 - 5.3.4. Configurable Status Line data display
 - 5.3.5. Primary Distance Meter LED display
 - 5.3.6. 16 selectable font styles
 - 5.3.7. USB keyboard and printer compatible
 - 5.3.8. USB or RS232 link to a Personal Computer
 - 5.3.9. Dual Distance Meters
 - 5.3.10. Real Time Clock
 - 5.3.11. Configurable link to a Single/Dual Axis Inclinometer
 - 5.3.12. Configurable link to a Digital Panel Meter
 - 5.3.13. Report Processing tools
 - 5.3.14. Set of 103 permanent Fault Codes/Messages (WRC Standard)
 - 5.3.15. Up to 14 user-customized Fault Codes/Messages
 - 5.3.16. Up to 88 Free Comments in a report
 - 5.3.17. Saves Last Report (up to 128 records)
 - 5.3.18. Saves Last Primary Distance Meter reading
 - 5.3.19. Dual buffered Video outputs
 - 5.3.20. Video signal bypass circuitry



6. Ink Jet Printer, Color

- 6.1. One (1) color ink jet printer with 4800x1200dpi color resolution and 15ppm (color) output shall be supplied.



7. DVD Recorder

- 7.1. A DVD recorder system shall be included for recording of inspection video. The video recorder shall include the following features at a minimum:
 - 7.1.1. AC power input of 120V
 - 7.1.2. Mounted in soft sided protective carrying case
 - 7.1.3. Commercial or professional grade
 - 7.1.4. Remote control with record, fast forward, pause, slow, stop, and rewind functions
 - 7.1.5. Minimum of (4) recording modes, for up to 10 hours of video inspection storage

DVD devices that are consumer grade will be deemed unacceptable due to their limited duty cycle and lower overall picture quality.

COMPLY ✓
YES / NO

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8. Pan and Tilt Zoom Camera

- 8.1. A color pan and tilt view camera shall be supplied. The camera shall use directional long-life-rated LED light sources to provide adequate pipe wall illumination in sizes up to 36".
- 8.2. The camera shall have the following operational features:
 - 8.2.1. Usable in 6" relined pipes and larger
 - 8.2.2. Transmits a color video signal through at least 1000' of multi-conductor cable
 - 8.2.3. Designed with solid-state circuitry to withstand shock and vibration
 - 8.2.4. Operates in climatic conditions from at least 0°C to 50°C with 100% RH
- 8.3. The camera module shall have the following electronic features:
 - 8.3.1. Color Super HAD CCD, 1/3"
 - 8.3.2. Collection matrix of 768h x 494v pixels, total of 379,392
 - 8.3.3. 480h TV lines of resolution
 - 8.3.4. NTSC color image scanning - 525 lines a 60Hz, 2:1 interlaced
 - 8.3.5. Minimum illumination sensitivity of 0.14lux, with (4) user-selectable preset shutter settings
 - 8.3.6. Automatic light-compensating iris, with manual override
 - 8.3.7. White balance optimization with minimum (4) user-selectable presets
 - 8.3.8. Regulated DC power input range of 18-36V
 - 8.3.9. Software resident on upgradeable EEPROM
 - 8.3.10. 4.2 ~ 42mm, f1.8 zoom lens, 10x optical, 4x digital, 40:1 total zoom
 - 8.3.11. Proportionally slowed camera movements when zooming
 - 8.3.12. 1/2" to ∞ automatic focus, with manual override

The City of Novi has evaluated different cameras and has determined that the following characteristics must be present in the camera electronics to be acceptable:

- Minimum light sensitivity of 0.1lux or better
- Camera software upgrades

- 8.4. The camera chassis shall have the following electromechanical features:
 - 8.4.1. Overall length of 8" or less
 - 8.4.2. Head diameter of 3 1/4" or less
 - 8.4.3. Stainless steel and anodized aluminum construction
 - 8.4.4. Infinite camera head axial rotation
 - 8.4.5. Pan and tilt angle to view backward a minimum of 45°
 - 8.4.6. Military-rated gold slip ring contacts
 - 8.4.7. Scratchproof sapphire camera window
 - 8.4.8. Sealed keyed military connector with gold plated contacts
 - 8.4.9. DC motors with planetary gears, ball bearings, power all camera motions, with clutches to protect from overloads and impacts
 - 8.4.10. Redundant dirt and pressure seals at all moving joints
 - 8.4.11. Automatic home feature to upright forward viewing, with forks at side of camera head
 - 8.4.12. Qty.6 minimum user-selectable location presets

COMPLY ✓
YES / NO

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- 8.4.13. Qty.2 minimum user-selectable scanning presets
- 8.4.14. Fast-check LED indicator for low camera head pressure

The City of Novi has evaluated different cameras and has determined that the following characteristics must be present in the camera mechanisms to be acceptable:

- Infinite camera head axial rotation
- Forks at side of camera head at home position

- 8.5. The camera lighting system shall have the following features:
 - 8.5.1. Light emitting diode (LED) light sources, lifetime rated for 10,000 hours of use
 - 8.5.2. A maintenance-free directional true color warm white LED module for operation up to 36" pipelines
 - 8.5.3. Maintenance-free forward facing true color warm white LED modules, positioned in the arms of the camera
 - 8.5.4. Field-replaceable polycarbonate LED windows

The City of Novi has evaluated different cameras and has determined that a 10,000-hour life rated LED light source is the only acceptable light source. Cameras that offer lighting through any style incandescent bulb with substantially shorter life ratings will be deemed unacceptable.

- 8.6. The camera shall be equipped with the following diagnostic and safety features:
 - 8.6.1. Internally pressurized with dry nitrogen to a minimum of 15psi
 - 8.6.2. An EIA color bar test chart display
 - 8.6.3. A set of diagnostic telemetry, including:
 - 8.6.4. Camera module regulated Voltage
 - 8.6.5. Light head current
 - 8.6.6. Camera model, serial number, and software revision level
 - 8.6.7. Internal camera head pressure
 - 8.6.8. Operating hours

The City of Novi has evaluated different cameras and has determined that only cameras with the aforementioned safety devices are acceptable.

- 8.7. The camera shall include a field pressurization kit including:
 - 8.7.1. Dry nitrogen pressurized container
 - 8.7.2. Pressure delivery regulator
 - 8.7.3. Pressure meter for system
 - 8.7.4. Pressure delivery trigger
 - 8.7.5. Enclosed valve port design

The City of Novi has evaluated different cameras and has determined that only cameras with an enclosed pressurization valve port will be considered acceptable. Cameras that employ a design that allows a standard automotive-type air chuck to be attached shall be deemed unacceptable due to the possibility of over-pressurizing the system without proper equipment.

COMPLY ✓
YES / NO

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- 8.8. The camera controller shall have the following features:
- 8.8.1. Joystick controller for camera head pan/tilt and rotational movements
 - 8.8.2. Switch for manual focus override (in/out)
 - 8.8.3. Switch for manual iris override (open/close)
 - 8.8.4. Switch for diagnostic telemetry display (on/off)
 - 8.8.5. Switch for camera home position
 - 8.8.6. Desktop model, with cable connection to rear of control unit



9. Wheel Drive Steerable Transporter

- 9.1. A remotely controlled steerable wheeled transporter shall be supplied. The transporter system shall be able to propel an inspection camera through relined 6" to 24" pipes to a distance of up to 1000' from point of entry.
- 9.2. The transporter shall have the following operational features:
- 9.2.1. Usable in 6" relined pipes and larger
 - 9.2.2. At least 1" of ground clearance in 6" relined pipes
 - 9.2.3. Capable of lifting the camera head a minimum of 4"
 - 9.2.4. Capable of free-wheeling, allowing retrieval by cable and reel combination
 - 9.2.5. Capable of driving around debris or other obstacles in a pipeline
 - 9.2.6. Capable of transporting a standard pan and tilt or mini-mainline camera
- 9.3. The transporter shall have the following electronic features:
- 9.3.1. Continuous duty rated brushless drive motors, (1) motor per side
 - 9.3.2. Transporter shall accept controls from system power control unit transmitted through a maximum of 1000' of cable
 - 9.3.3. Complete solid-state design
 - 9.3.4. Articulated rear cable connector for added cable strain relief
 - 9.3.5. Rearward viewing color camera with LED lighting, useable in relined 6" configuration for viewing behind tractor during inspection
 - 9.3.6. Integral 512 Hz transmitting beacon
 - 9.3.7. Universal, quick connect port for lighthoods, locating beacons, etc.
 - 9.3.8. Quick connect auxiliary LED lighthouse has no exposed wires and requires no clamp for mounting
 - 9.3.9. Solenoid operated clutches release upon power loss, allowing tractor to be retrieved in freewheel mode. Tractors without clutches or with mechanical clutches that do not release upon power loss are not acceptable.
 - 9.3.10. Integral, LED lights below camera
 - 9.3.11. No exposed interconnect cables for camera or tractor control
- 9.4. The transporter shall have the following mechanical features:
- 9.4.1. Forward attachment for mounting miniature pan and tilt camera
 - 9.4.2. Replaceable O-ring seals at all field-serviceable joint locations
 - 9.4.3. Internal nitrogen recharge valve, not automotive style Schrader valve
 - 9.4.4. Manually-operated camera lifting mechanism, 4" minimum rise
 - 9.4.5. Removal of camera lift not necessary for use in relined 6" and 8" pipes

COMPLY ✓
YES / NO

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- 9.4.6. Camera lift must collapse if resistance is encountered during retrieval. Lifts that are mechanically fixed in a raised position are not acceptable due the risk of becoming stuck in the pipe.
- 9.4.7. A transmission that includes:
- 9.4.8. Gears in oil bath for maximum cooling and lubrication
- 9.4.9. Neutral position to freewheel during retrieval
- 9.4.10. Heavy duty worm drive gear to absorb drive line shock
- 9.4.11. An enclosed drive train that includes:
 - 9.4.11.1. 6 3/8" rubber wheels for relined 6" lines
 - 9.4.11.2. 4 4/8" rubber wheels for 8"-15" sewer lines
 - 9.4.11.3. 4 4" extended hub rubber wheels for 8"-18" sewer lines
 - 9.4.11.4. 4 5" extended hub rubber wheels for 12"-24" sewer lines
- 9.4.12. All wheels must be interchangeable with a single fastener
- 9.4.13. No more than 7" between front and rear axles
- 9.4.14. No wider than 4.75" in relined 6" configuration
- 9.4.15. Tractor with zoom camera shall not exceed 26 lbs in 8" pipe configuration
- 9.4.16. Tractor with zoom camera shall not exceed 18.5" in length in 8" pipe configuration
- 9.4.17. Mainline cable to mate directly to tractor via 1/8 turn locking collar

The City of Novi has evaluated different transporters and has determined that the following characteristics must be present in the transporter mechanisms to be acceptable:

- Articulated rear cable connector
- Overall length less than 16"
- Rear viewing camera to prevent cable entanglements
- Freewheeling capability during retrieval

- 9.5. The transporter shall include a field pressurization kit including:
 - 9.5.1. Dry nitrogen pressurized container
 - 9.5.2. Pressure delivery regulator
 - 9.5.3. Pressure meter for system
 - 9.5.4. Pressure delivery trigger
 - 9.5.5. Enclosed valve port design

The City of Novi has evaluated different cameras and has determined that only cameras with an enclosed pressurization valve port will be considered acceptable. Cameras that employ a design that allows a standard automotive-type air chuck to be attached shall be deemed unacceptable due to the possibility of over-pressurizing the system without proper equipment.

- 9.6. The transporter controller shall have the following features:
 - 9.6.1. Power distribution device for portable systems
 - 9.6.2. Handheld joystick controller for directional control
- 9.7. A spare parts kit shall be included with the unit that includes all parts that are expected to be replaced in the field. The kit shall also include any tools that are regularly needed in the servicing of the transporter.

COMPLY ✓
YES / NO

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- 9.8. The camera and transporter shall be shipped with a damage-resistant case. The case shall include a foam cradle, with solid exterior construction.



10. Transmission Cable and Reel System

- 10.1. A reel with multi-conductor cable shall be supplied. The cable shall be used for closed circuit video transmission as well as retrieval of the downhole equipment. The reel shall be capable of providing adequate force to the cable for equipment retrieval.

- 10.2. The reel shall have the following features:

- 10.2.1. High strength epoxy coated paint steel frame with lightweight anodized aluminum drum
- 10.2.2. Cable storage drum and frame handles
- 10.2.3. Overall dimensions 16" x 22" x 21" maximum in any direction
- 10.2.4. Weight with 1,000 ft of cable not to exceed 115 lbs
- 10.2.5. 120V AC motor
- 10.2.6. Maximum motorized retrieval speed of at least 180 fpm with tractor attached
- 10.2.7. Clutch system with freewheeling capability and manual override
- 10.2.8. Mechanical drive chain between clutch and drum
- 10.2.9. Low friction greased bearings to minimize drag
- 10.2.10. Cable level wind that automatically lays cable evenly across drum with manual override
- 10.2.11. Local digital footage display
- 10.2.12. Footage encoder to send electronic footage data to display system, ±2% accuracy minimum
- 10.2.13. Sealed continuous gold contact slip ring assembly with the following features:
 - 10.2.14. Voltage range from 1µV to 460V
 - 10.2.15. Current range from 1nA to 25A
 - 10.2.16. Pulse DC frequencies to 100MHz
 - 10.2.17. Corrosion proof and maintenance free
 - 10.2.18. 12 circuits minimum
 - 10.2.19. Control panel with motor speed control, clutch engage/disengage switch, and local/remote control switch
- 10.2.20. Telescopic cable guide with 30" maximum extension; able to withstand minimum 450 lbs downward force while fully extended.
- 10.2.21. Mounting kit for securing reel in a vehicle application

- 10.3. The cable shall have the following features:

- 10.3.1. Continuous length of 1000' minimum
- 10.3.2. Diameter of 0.28" minimum
- 10.3.3. Rated breaking strength of 1200 pounds minimum
- 10.3.4. Outer jacket of low-friction abrasion-resistant material
- 10.3.5. Continuous length terminated at resin-free 12-pin connector
- 10.3.6. Construction of (10) separate conductors of adequate gauge for delivering power and control signals to downhole equipment

COMPLY ✓
YES / NO

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- 10.3.7. Termination to field-replaceable resin-free sealed tapered connector. Cables that cannot be reterminated in the field are not acceptable.
- 10.3.8. Cable shall mate directly to camera via quick connect fitting to facilitate manhole inspections. No external strain relief shall be required to support this application.

10.4. The cable shall also include a repair kit for repairing the termination.



11. Downhole Guide System

- 11.1. A downhole guide system shall be supplied for guiding and protecting the cable between the inspection system and the pipe. The system shall include the following devices at a minimum:
 - 11.1.1. Topside roller with aluminum roller and steel frame
 - 11.1.2. Durable plastic "tiger tail" ribbed downhole cable protector with tie rope
 - 11.1.3. Downhole roller with aluminum rollers and steel frame, quick-lock detachable
 - 11.1.4. (Qty. 30') of fiberglass poles for attaching to downhole roller, quick-lock detachable sections
 - 11.1.5. Hook for attaching to poles allowing for roller to be hung from manhole ring
 - 11.1.6. Extraction pole assembly for lifting equipment from manhole or culvert, including:
 - 11.1.6.1. Tractor lifting eye with attachment hardware
 - 11.1.6.2. (Qty. 3) quick-lock detachable reinforced fiberglass poles



12. Training

- 12.1. Within 30 days of delivery, a qualified factory representative shall fully instruct appointed personnel in the operation and maintenance of the sewer inspection equipment specified. At a minimum, this instructional course shall be one (1) day in duration. Topics covered shall include operational procedures, maintenance procedures, and safety procedures. Data handling procedures shall also be discussed, tailored to the data system specified.

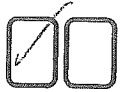


13. Instructional Materials

- 13.1. The following instructional materials must be provided in electronic format, and delivered with the system:
 - 13.1.1. DVD; operation, maintenance, troubleshooting of equipment
 - 13.1.2. Master set of equipment manuals, matched to specified system equipment, including any aftermarket equipment installed
 - 13.1.3. Copy set of equipment manuals, TV system only, matched to specified system equipment
 - 13.1.4. Manufacturer's parts catalog

COMPLY ✓
YES / NO

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14. Maintenance Kit

- 14.1. A maintenance kit shall be included with delivery of the system. This kit shall include all the necessary common tools needed in the normal course of maintenance of the TV system equipment specified. Tools should include at a minimum:
- 14.1.1. Adjustable wrench
 - 14.1.2. Combination wrench set
 - 14.1.3. Allen wrench set
 - 14.1.4. Side cutter pliers
 - 14.1.5. Long nose pliers
 - 14.1.6. Channel lock pliers
 - 14.1.7. Vise-Grip pliers
 - 14.1.8. Screwdriver set including flat blade and Phillips
 - 14.1.9. 5/16 nutdriver
 - 14.1.10. Soldering iron
 - 14.1.11. Roll of 60/40 resin core solder
 - 14.1.12. Multimeter with AC and DC voltage, resistance, and continuity signal
 - 14.1.13. Wire cutter with terminal crimper
 - 14.1.14. Utility knife
 - 14.1.15. Electrical tape



15. Warranty

- 15.1. The TV inspection system shall be warranted against manufacturing defects for a period of (12) months from the date of delivery at a minimum. Any installed equipment warranties that extend beyond this period (e.g. a vehicle 36 month / 36000 mile warranty) shall be passed on to the City of Novi by the TV system manufacturer.



16. Delivery

- 16.1. The system shall be delivered to the City of Novi in first-class operating condition. Acceptance of the system shall be subject to inspection and approval by City personnel.

OPTIONAL EQUIPMENT:

The following components are to be offered to the City of Novi for purchase at the City's choice. Please include pricing for each section (**bold font**) as noted on the price sheet.



17. Option 1 – Enhanced Operator Station

- 17.1. An enhanced operator's station shall include the following:
- 17.1.1. Additional operator's chair, for a total of two (2)
 - 17.1.2. Rear workbench extension
 - 17.1.3. Bookshelf



18. Option 2 – Tool Chest

18.1. One 7-drawer tool chest with diamond plate posi-close hinge shall be offered for purchase as an option.



19. Option 3 – Reel Stand

19.1. One welded aluminum reel stand with drain shall be offered for purchase as an option.



20. Option 4 – Wash Down System

20.1. A pressurized water system shall be supplied in order to rinse down hole equipment after an inspection. The wash down system shall conform to the following specifications:

20.1.1. The pump shall operate from 12VDC with circuit breaker protection. The pump shall supply a minimum of 1.4gpm at 60psi.

20.1.2. The system shall include a reservoir with the following features:

20.1.2.1. 12-gallon capacity

20.1.2.2. Fill port

20.1.2.3. Drain port

20.1.2.4. Mounted along driver's side wall

20.1.3. The system shall include a spray nozzle.

20.1.4. The system shall include a 25' length of 90psi-rated hose on a retractable reel.



21. Option 5 – 15" LCD Monitor

21.1. One 15" LCD monitor shall be supplied in the equipment room, facing rearward, for viewing the inspection at the rear of the vehicle.

21.2. The monitor(s) shall meet these minimum specifications:

21.2.1. Size = 15" diagonal

21.2.2. Dimensions = 12.75"h x 14.1"w x 6.7"d

21.2.3. Resolution = 1024x768

21.2.4. Brightness = 250 cd/m²

21.2.5. Viewing angle = 130° horizontal, 100° vertical

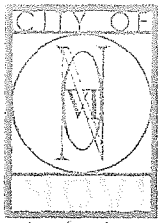
21.2.6. Contrast ratio = 600:1

21.2.7. Power signal = 100 to 240V AC at 50 to 60Hz

21.2.8. Video input from PC and component sources

21.2.9. Internal speakers, qty.2

21.2.10. Adjustments for H-position, V-position, contrast, tint, brightness, and color



cityofnovi.org

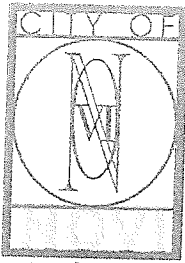
**CITY OF NOVI
INSURANCE REQUIREMENTS
ATTACHMENT A**

1. The Contractor shall maintain at its expense during the term of this Contract, the following insurance:
 - a. **Worker's Compensation** insurance with the Michigan statutory limits and Employer's Liability insurance with minimum limits of **\$100,000** (One Hundred Thousand Dollars) each accident.
 - b. **Commercial General Liability Insurance** – The Contractor shall procure and maintain during the life of this contract, Commercial General Liability Insurance, Personal Injury, Bodily Injury and Property Damage on an "Occurrence Basis" with limits of liability not less than **\$1,000,000** (One Million Dollars) per occurrence combined single limit.
 - c. **Automobile Liability** insurance covering all owned, hired and non-owned vehicles with Personal Protection insurance to comply with the provisions of the Michigan No Fault Insurance Law including Residual Liability insurance with minimum bodily injury limits of **\$1,000,000** (One Million Dollars) each person and **\$1,000,000** (One Million Dollars) each occurrence and minimum property damage limits of **\$1,000,000** (One Million Dollars) each occurrence.
2. All policies shall name the Contractor as the insured and shall be accompanied by a commitment from the insurer that such policies shall not be canceled or reduced without at least thirty (30) days prior notice date to the City; alternately, contractor may agree to provide notice of such cancellation or reduction.
3. The City of Novi shall be named as Additional Insured for General Liability and Auto Liability. Certificates of Insurance evidencing such coverage shall be submitted to City of Novi, Purchasing Department, 45175 West Ten Mile Road, Novi, Michigan 48375-3024 prior to commencement of performance under this Contract and at least fifteen (15) days prior to the expiration dates of expiring policies. A current certificate of insurance must be on file with the City for the duration of the contract.
4. The Contractor shall be responsible for payment of all deductibles contained in any insurance required hereunder.
5. If, during the term of this Contract, changed conditions or other pertinent factors should in the reasonable judgment of the City render inadequate insurance limits, the Contractor will furnish on demand such additional coverage as may reasonably be required under the circumstances. All such insurance shall be effected at the Contractor's expense, under valid and enforceable policies, issued by the insurers of recognized responsibility which are well-rated by national rating organizations and are acceptable to the City.

6. If any work is sublet in connection with this Contract, the Contractor shall require each subcontractor to effect and maintain at least the same types and limits of insurance as fixed for the Contractor.
7. The provisions requiring the Contractor to carry said insurance shall not be construed in any manner as waiving or restricting the liability of the Contractor under this contract.
8. The City has the authority to vary from the specified limits as deemed necessary.

ADDITIONAL REQUIREMENTS
Indemnity/Hold Harmless

1. The Contractor agrees to save harmless and defend the City against and from any or all liability, loss or damages (including without limitations, fees and expenses of attorneys, expert witnesses and other consultants) which the City may suffer as a result of claims, demands, costs, or judgments against it arising from, out of or in consequence of the performance of this Agreement, excepting only such liability, loss or damage as shall have been occasioned by the sole negligence of the City of Novi, its officers, agents or employees.
2. The Contractor agrees that it is its responsibility and not the responsibility of the City of safeguard the property and materials used in performing this Contract. Further the Contractor agrees to hold the City harmless for any loss of such property and materials used in pursuant to the Contractor's performance under this Contract.
3. The Contractor shall not discriminate against any employee, or applicant for employment because of race, color, sex, age, or handicap, religion, ancestry, marital status, national origin, place of birth, or sexual preference. The Contractor further covenants that it will comply with the Civil Rights Act of 1973, as amended; and the Michigan Civil Rights Act of 1976 (78. Stat. 252 and 1976 PA 453) and will require a similar covenant on the part of any consultant or subcontractor employed in the performance of this contract.



cityofnovi.org

CITY OF NOVI
BID FORM

PIPELINE TELEVISION INSPECTION SYSTEM

We the undersigned as bidder, propose to furnish to the City of Novi, according to the conditions and instructions attached hereto and made a part thereof according to the attached terms and conditions.

BASE BID:

Pipeline Television Inspection System per specs \$ 59,650.00 Lump Sum

OPTIONS:

- 1. Enhancer Operation Station \$ Included
- 2. Tool Chest \$ Included
- 3. Reel Stand \$ Included
- 4. Wash Down System \$ Included
- 5. 15" LCD Monitor \$ Included

Delivery of system within 14-21 days after receipt of Purchase Order.

Bid Submission

Each bidder is required to submit the following information with their bid. Please initial each item to confirm compliance.

A. Complete the bid specification package, checking "YES" to show compliance, or "NO" indicating a variance.

Initial TF

B. Submit the following technical information with the bid proposal:

a. Detailed component listing with quantities Initial TF

b. Detailed system specifications Initial TF

c. Explanation of deviations, if necessary Initial TF

d. Complete supplier information sheet(s)

Initial TF

e. User list

Initial TF

COMMENTS: This unit was delivered to Fredrickson Supply on
March 7th, 2012 - New unit from factory. System
has been used very little. Includes Full Warranty.

We acknowledge receipt of the following Addenda: N/A
(please indicate numbers)

THIS BID SUBMITTED BY:

Company (Legal Registration) FREDRICKSON SUPPLY, LLC

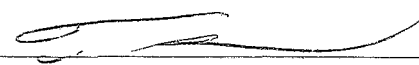
Address 3705 LINDEN AVENUE S.E.

City WYOMING State MI Zip 49548

Telephone 616.949.2385 Fax 616.949.2290

Representative's Name (please print) TODD FREDRICKSON

Representative's Title PRESIDENT

Representative's Signature 

E-mail todd@fredricksonsupply.com

Date MARCH 19, 2012

**CITY OF NOVI
PIPELINE TELEVISION INSPECTION SYSTEM**

Please return this page with your bid form

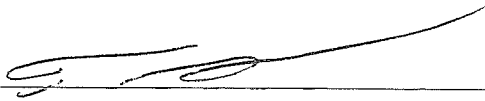
If your company is awarded the item(s) referenced in the bid proposal, other governmental entities may wish to use this contract and will issue a purchase order or contract for the item(s) awarded in the bid proposal following minimum order/contract requirements set forth in the bid documents. Each entity will provide their own purchase order and delivery location(s) and must be invoiced separately to the address indicated on their purchase order.

**1. EXTENSION OF AWARD TO THE MITN (MICHIGAN INTER-GOVERNMENTAL TRADE NETWORK)
PURCHASING COOPERATIVE: OPTIONAL**

Numerous Counties, Cities, Townships, and Authorities of the State of Michigan are members of the MITN (Michigan Inter-governmental Trade Network) Purchasing Cooperative. Other associate entities are also members of the Cooperative in the Tri-County area. Please visit www.mitn.info website to view the entire list of participating agencies.

() If an award is made to _____, it is agreed that the contract will be extended to other MITN Purchasing Cooperative members and associate entities under the same prices, terms, and conditions.

(**X**) Our company is **NOT** interested in extending the contract to those MITN members listed on the website.

Contractor Signature:  _____

Company Name: FREDRICKSON SUPPLY, LLC

Date: MARCH 19, 2012



Aries Users List

1. Advance Plumbing & Mechanical	Zach Johnson	309-337-8280
2. City of Waverly	Kevin Russel	319-352-6247
3. Elite Pipeline	Carl Beitner	616-719-8804
4. City of Fall City	Doug Wheeler	402-245-3195
5. Holland Board of Public Works	Daniel Sorek	616-335-3195
6. M & K Jetting	Mark Konapacki	517-206-8289
7. City of Jackson, MI	Greg Lucas	517-206-8142
8. City of Grand Rapids	Dan Simila	616-456-3247
9. City of Willow Spring, MO	Danny Cooper	417-252-0127
10. City of Festus, MO	Scott Ruble	314-565-4670



Pipeline Television Inspection System

This sewer television system is delivered complete, ready for operation. The system includes a pan & tilt camera and transporter with light head capacity from relined 6" to 24" lines. Components can be used with the base unit including a small diameter color camera for pull, push or tractor applications.

COMPONENT LIST

- 1 **Single Axle Trailer, 6'x10' body, 3500 GVWR. See detailed specs for full vehicle specifications, to which Aries will include:**
 - 2 Roof mounted amber strobe
 - 2 Flood lights, rear work area illumination

- 1 **Trailer outfitting package, including:**
 - 1 Aluminum tread plate flooring
 - 1 White laminated surface wall and ceiling covering
 - 2 Duplex electrical outlets, 120V AC grounded
 - 2 Fluorescent light fixtures with switch
 - 1 Ergonomically contoured and finished control desk
 - 1 Overhead shelf
 - 3 Under desktop shelves
 - 1 Operator chair, swivel with casters
 - 1 Set equipment storage brackets and hooks
 - 1 Down hole pole mounting bracket
 - 1 Tie-down brackets along floor
 - 1 Fire extinguisher, 10 BC rating

- 1 **3kW electric generator set, sound attenuated, gas-powered, features including:**
 - 1 Fuel tank, 3.4 gallons
 - 1 Electronic ignition system
 - 1 196cc gas engine
 - 1 Sine wave inverter, computer-friendlyReceptacles included:
 - 2 20A 125V (5-20P)
 - 1 30A 125V locking (L5-30P)
 - 1 Tongue-mounted lockable enclosure
 - 1 House power exterior connection with cover
 - 1 25' house power cord with plug and socket
 - 1 Auxiliary battery, 12V DC and case
 - 1 DC converter, 45A
 - 1 System engineering panel to include:
 - 1 Generator volt meter
 - 1 Generator frequency meter



- 1 **System Control Unit ("SCU") assembly mounted in a Hardigg-style, ATA airline-rated shipping case. Major built-in components are:**
 - 1 Non-glare 9" color TV monitor, with 3" internal speaker and controls
 - 1 Monitor sun shield
 - 1 Video recorder bypass switch
 - 1 Set of video recorder audio and video jacks
 - 1 Microphone jack
 - 1 Audio recording microphone
 - 1 Camera power selector switch, micro/mainline
 - 1 Light power selector switch, micro/mainline
 - 1 5-position lighthouse selector switch
 - 1 Lighthouse protection system with an auto reset circuit breaker and trip indicator light
 - 1 Lighthouse intensity control knob
 - 1 AC power switch with indicator light
 - 1 Set of individual circuit breakers for AC power input/lighthouse power output/camera power output
 - 1 120V AC power input GFI protected plug with cord
 - 1 120V AC duplex GFI protected outlet
 - 1 Military connector for SCU to reel interconnect cable (prewired for push reel, pull reel, tractor and on-screen footage features)
 - 1 Multi-function system diagnostic test meter with concurrent volt and amp LED readout
 - 1 Storage compartment mounted in shipping case protective cover
 - 1 Expansion slot and keyboard tray position for VL5000 data display module and keyboard

- 1 **Aries VL5000 Video Data Display and Report Writer System with:**
 - 1 Data display control module, panel mounted
 - 1 Alphanumeric full "QWERTY" keyboard for video titling and report data input (must be built in control unit for storage safety)
 - 1 Ink jet printer, parallel port

- 1 **DVD video recording system including:**
 - 1 Soft-sided protective carrying case
 - 1 Remote control functions include: record, fast forward, pause, frame advance, slow motion, search, stop and rewind
 - 1 Set power and video cabling
 - 5 DVD-recordable media discs

- 1 **Aries PE3500 Pathfinder series zoom pan and tilt camera w/ high intensity LED light ring, including:**
 - 1 Pathfinder zoom pan and tilt camera w/ 360° continuous rotation
 - 1 40X zoom (10X optical & 4X digital)
 - 1 Maintenance-free forward facing true color warm white directional LED lighting modules, positioned in the arms of the camera
 - 1 Maintenance-free true color warm white directional LED directional lighting system with for inspecting up to 36" pipelines
 - 1 White balance optimization with (4) selectable settings
 - 1 "Starlite" light enhancement feature with (4) user selectable enhancement steps
 - 1 "One Touch Scanning" feature with (2) user selectable continuous joint scan presets
 - 1 "Quick Look" preset view positions (6) (Up, Down, Right, Left, Lat R, Lat L)
 - 1 Fast-check pressure monitoring system



- 1 On-screen camera diagnostics functions including:
 - Camera model, serial number, software revision
 - Camera operating hours, regulated voltage value, head temperature
 - Camera internal pressure, control error recognition, LED current value
 - 1 Camera/tractor storage and transport case
 - 1 Spare parts / camera recharge kit
 - 1 Test cable, Pathfinder system
 - 1 Desktop dual mode camera controller including: joystick for axial rotation and pan and tilt angle; remote focus; zoom in/out; home, diagnostics, white balance, Starlite, and preset switches
- 1 Aries TR3300 Pathfinder steerable self-propelled transporter for relined 6" to 24" lines, including:**
- 1 Tractor assembly with continuous duty drive motors
 - 6 3 $\frac{3}{8}$ " rubber wheels for relined 6" lines
 - 4 4 $\frac{3}{8}$ " rubber wheels for 8"-15" sewer lines
 - 4 5" rubber tires for 10"-18" sewer lines
 - 4 5" extended hub rubber tires for 12"-24" sewer lines
 - 1 Fast-check pressure monitoring system
 - 1 Manual camera lifting mechanism
 - 1 Rear viewing camera with LED lighting
 - 1 Auxiliary high power detachable light head
 - 1 Storage and transport case
 - 1 Set maintenance parts
 - 1 Hand-held Pathfinder series tractor controller
 - 1 Tractor power supply and control interface box to SCU
 - 1 512 Hz detachable locating beacon
 - 1 Integrated inclinometer system
- 1 Pathfinder cable and reel assembly, including:**
- 1 Heavy-duty frame, drum and motor assembly with clutch and cable level wind assembly
 - 1 Footage meter with local LCD footage display and encoder for footage signal to remote video data display system
 - 1 Hand held reel controller with 20' cable
 - 1 Emergency hand crank arm
 - 1 1000' of lightweight low friction multi-conductor cable
 - 1 Sealed continuous contact collector assembly, 12 slip rings minimum
 - 1 Telescoping swivel cable guide roller assembly
 - 1 Drip pan with drain
 - 1 Interconnect cable to TV system electronics
- 1 Cable manhole guide system including:**
- 1 Manhole top roller assembly
 - 1 Manhole bottom roller assembly and adapter hook
 - 5 Quick lock extension poles
 - 1 Insertion and extractor pole assembly and tractor adapter



- 2 Manuals – operation and maintenance, DVD format
- 2 Spare parts catalogs, DVD format
- 1 Maintenance tool kit
- 1 Delivery of system
- 1 Day of training
- 1 One year warranty, TV system

OPTIONAL EQUIPMENT

Option #1 – add to outfitting

- 1 **Enhanced operator station, including:**
 - 1 20” desktop extention
 - 1 Long shelf installed in hutch
 - 2 Short shelves installed in hutch, adjustable
 - 1 Operator chair, swivel with casters

Option #2 – add to outfitting

- 1 **7-drawer tool chest**

Option #3 – add to outfitting

- 1 **Mounting bridge with tractor storage underneath**

Option #4 – add to outfitting

- 1 **Water wash down system for equipment clean-up including:**
 - 1 Water storage tank, 12-gallon
 - 1 Set of fill, vent and drain connections
 - 1 Water tank demand pump
 - 1 25’ retractable wash down hose with spring-loaded hand nozzle

Option #5 – add to electronics

- 1 **15” LCD flat panel multimedia monitor, mounted rear facing**



DETAILED SPECIFICATIONS

Trailer, 6'x10' Single Axle, 3500 GVWR

Standard Construction

Interior dimensions: 69" wide x 77" high x 125" long
Gross Vehicle Weight: 3500 lbs.
32" side door with bar lock
Galvanized underbelly
Dust proof sidewall design
Dexter independent torsion suspension axles
Trailer rated radial tires
Modular-styled wheels w/E-coat prime & powder coat finish
All wheel electric brakes w/12V breakaway switch, battery included
Welded in place dual safety chains
ABS front cap
Aerodynamic front end
Long life coating on all fasteners
Automotive style weather stripping
Formed steel rear header with recessed clearance lights
3" tube frame
.030 exterior metal with 16" on-center wall posts
Aluminum fenders
.080 hardened aluminum top wrap with drip edge
ABS molded license plate holder with light
3-year warranty

Additional Construction

Extended triple tube tongue with ball hitch
ATP Stoneguard on front of trailer
Reinforced roof for air conditioning unit
Stabilizer jacks at rear corners
32" curbside door
Double swing full opening rear doors with semi-style cam locks
Interior finished in white vinyl

Trailer Interior

All freestanding cabinets and doors are constructed of 7-ply cabinet grade plywood and mounted to minimize any potential water damage from capillary absorption of freestanding water during wash down. All cabinet doors are installed with metal Sure-Lock flush-mounted latches, eliminating the unwanted opening of doors during transit.

The floor is constructed of a 1/2" AC-rated plywood substrate with built-in water relief channels to prevent moisture gathering under the floor, minimizing potential long-term water damage. The plywood substrate is covered with aluminum tread plate non-skid industrial flooring. The walls and ceiling are covered with a white laminate surface.

A control console is specially designed to bring all controls within a comfortable reach of the operator. The exact controllers furnished are indicated on the component list. The chair for the control room is a foam-padded, woven fabric covered chair. The control console has a counter top



covered with scratch-resistant plastic laminate. A shelf is also built above the control console for accessories such as a printer.

The walls and ceiling are insulated for sound attenuation and thermal control. The side walls are constructed of 3/8" plywood and covered with white vinyl laminate. Storage space is provided for all down hole equipment. 120VAC socket outlets and working light switches are provided near the rear door for easy access. Two (2) 120VAC fluorescent light fixtures light the room.

Gasoline Generator, 3kW

- Engine: 6.5 HP, Single Cylinder, Overhead valve
- Air-cooled
- AC output 120V, 3000 Watts max (25A), 2800 Watts rated (23.3A)
- DC output: 12V, 144W (12.0A)
- Displacement: 196cc
- Fuel tank capacity: 3.4 gallons
- Fuel Consumption: Approx 7.1 hrs @ rated load
- Oil Alert®
- Eco-Throttle
- Receptacles: 20A, 125V Duplex/30A, 125V Locking plug
- Starting System: Electric key start & recoil - 12V battery included
- Noise level: 58 dB
- Dry Weight 134lbs
- Dimensions (LxWxH): 25.8"x 18.9" x 22.4"

Generator Housing

The generator is bolted in operating position. Generator housing will be built on the tongue of the trailer. The lockable generator enclosure is constructed of aluminum diamond plate. Electrical, ventilation and exhaust connections are flexible.

Electrical System

The 120V electrical system for powering all Aries-supplied equipment is independent from the vehicle's 12V electrical system. Aries provides an auxiliary 12V DC battery to power work lights and warning lights independent from the vehicle battery. This prevents draw down of the vehicle's battery, which could result in failure to start vehicle. A 10A charger is provided for recharging auxiliary battery off the generator system. A 120V AC house or shore power connection is provided along with a switchover device enabling the TV system to operate from either the onboard generator or a house/shore power source.

House Power Cord

So that equipment can be checked out without operating onboard power supply, a 35' power cord is supplied with one end terminated for plugging into standard 3-wire 110V electrical outlet, and the other end terminating at weather-proof receptacle mounted in the vehicle.

Engineering Panel, Generator System

This system will be supplied for control and monitoring of functions not special to TV/tape recording system. The panel will be assembled on a rack mount frame and installed in the modular control center.

The panel will have the following items:

- AC Volt Meter and Frequency Meter (56-64 Hertz)



System Control Unit ("SCU")/Monitor Assembly

A combination SCU/monitor for the system is provided in a fitted, damage-resistant Hardigg-style ATA-rated shipping case with six flush-mounted quick connect strap latches and carrying handles. The case has interior compartments which support the equipment in shipment. The case is constructed of a polypropylene material to prevent damage when transporting. Transportation case does not exceed 23"W x 21"H x 20"D. Total weight does not exceed 77 lbs.

The combination SCU will operate on a 120V AC, 60 Hz power source. The camera power supply is a solid state power source. The power supply will operate all Aries multi-conductor cameras on cable lengths up to 1000 feet or push cameras up to 400'. The lighting for the camera is supplied through an isolated power supply, which has separate controls. The SCU will power all Aries light styles for inspecting lines 3" thru 60" diameter. A light intensity control knob is located on the front panel of the unit.

The System Control Unit (SCU) has the following built-in features:

- Non-glare 9" color TV monitor, with 3" internal speaker and controls
- Video recorder Use/By-pass Switch
- Microphone jack
- Set of video recorder audio and video jacks
- Camera power selector switch, micro/mainline
- Light power selector switch, micro/mainline
- 5-Position lighthouse selector switch
- Lighthouse bulb protection system with an auto reset circuit breaker and trip indicator
- Lighthouse intensity control knob
- AC On/Off power switch with indicator light
- Set of individual circuit breakers for AC power input/lighthouse power output/camera power output
- Multi-function system diagnostic test meter with concurrent volt and amp LED readout
- Connection for Pan & Tilt handheld controller (when provided)
- Storage compartment mounted in the protective cover
- Monitor sun shield
- 120V AC power input plug with cord, GFI protected
- 120V AC duplex GFI-protected outlet
- Military connector for SCU to reel interconnect cable
- Connection for auxiliary lightbox (when provided)
- Expansion slot and keyboard tray position for factory-installed data display options

Color Monitor

The color monitor is housed in the Camera Control Unit. The monitor has a minimum 9" diagonal picture tube and operates on standard NTSC color. The monitor operates off the 110V AC provided by the camera control system.

The unit has a built-in microphone and 3" round speaker that can be used for verbal recording and play-back of survey information as part of video recording. The monitor and speaker will be able to be used to either view camera in operation or review play-back of pre-recorded tapes.

ARIES VL5000 sewer line video data display input, logging, and report system



The VL5000 data display module and report writer system provides pipeline condition recording and report writing functions.

The system places defect condition information along with distance of the camera in the pipe on the monitor screen, permanently on the video tape and into an on-board computer memory for report writing at the end of each run. The camera location in the line is continuously electronically fed to the VL5000 system from the cable footage input encoder mounted on the TV cable footage and level wind head assembly.

VL5000 data display system is all solid state micro processor electronics with current state-of-the-art computer memory with data processing capability. The unit is built into the system control unit. The faceplate has an industrial finish and permanent labels designating control functions and switches.

A full size complete "QWERTY" keyboard for data input is provided.

The report writer output function thru an inkjet printer is also supplied.

Features

- Menu-driven system, providing on-screen operator instructions
- 52 pipeline, service connection, and defect/observation codes are available
- Codes can be changed by user as needed
- Footage display is an LED read-out as well as on the TV monitor
- Footage display has non-volatile memory back-up (no battery required)
- Internal clock and calendar that can be displayed with the footage information
- Ability to store, edit and (optionally) print out operational report of inspection data
- Footage is automatically captured when observation data is added to the report list
- Video character brightness can be changed and accented with background
- VL5000 footage function (encoder signal counter and display) will continue to function even with loss of main power or video signal
- Footage display can be positioned anywhere on TV monitor screen
- Defect cursor arrow is provided
- Access to a blank screen for user-definable alphanumeric information is provided
- Encoder calibration factor can be changed to correct footage variance to actual (due to pulley wear) or to show footage in metric units
- Select footage count direction; to or away from unit
- Footage preset in units and tenths allows the operator to input footage from manhole center to starting point of video picture for accurate image position measurement
- Simple push button or joystick operation and control of all functions
- 120V AC operation
- Information that can be displayed with footage:
 - Time and date
 - Pull direction
 - Three lines of user-entered text
- Low power consumption
- VL5000 can be used without keyboard and printer. These can be supplied as upgrades to the basic VL5000 unit
- Video signal is by-passed when VL5000 is not powered.



- Power requirements: 200 watts maximum, 120V (+/- 20%), 50/60 Hz

Components

- VL5000 data display module for installation in standard SCU electronic console
- Interconnect cable to interface with any standard 10ppr (pulse per revolution) magnetic footage encoder
- Data input QWERTY keyboard
- Inkjet printer, for output reports

DVD Video Recorder

A DVD recorder that makes recordings to blank DVD±R and DVD±RW discs is supplied with the system. The recorder has the capabilities found on most VCRs including advanced recording and playback options. Depending on the selected quality level of the recording, 60 minutes to 480 minutes can be recorded onto a single disc.

Technical Specifications

Dimensions: 16.54" wide x 2.32" high x 9.72" deep
Weight: 5.28 lbs

Pathfinder Zoom Camera

The pan and tilt camera is specifically designed to provide an optimum view of sewer pipe walls and lateral entrances through the use of a low light sensitive camera, movable camera head and directional solid state lighting. The unit produces a color video signal and is designed for operation through over 1,000' of multi-conductor cable in sanitary and storm sewers. Chassis construction is 100% solid state circuitry designed to withstand shocks and vibration normally sustained while being pulled through a pipe. The image pick-up device is a low light sensitive 0.14 Lux solid state camera incorporating the latest high-resolution closed circuit television technology. Operating climatic ranges of the camera are 0°C to 50°C, and up to 100% relative humidity.

The camera provides 360° of continuous axial rotation viewing with camera module rotation to view all sewer wall surfaces and lateral connections. The rotating camera and light head configuration provides 270° of pan and tilt angle measuring centerline to centerline. With the 75° lens viewing angle, this yields a total pan and tilt viewing area in excess of 345°. This configuration provides a reverse angle viewing capability for incoming lateral inspection when camera is moving downstream away from lateral connections. The camera design provides over 90% spherical viewing of the pipe or chamber being inspected.

The camera provides greater than 480 TV lines of horizontal resolution. The image pick-up device contains in excess of 379,000 pixels (768h x 494v). The camera develops a true color and transmits a sharp image picture on video bandwidths only. Full color video bandwidths are provided with no sacrifice of low frequency response. There is no visible streaking of the low frequency test bars when viewing a standard EIA Test Chart. The camera is equipped with an electronic controlled automatic iris for an acceptable picture between 0.1 and 10,000 Lux.

The camera contains Fast-Check pressure sensor circuitry to monitor the internal pressure of the camera and an external red LED to alert the operator in the event of pressure loss at all times. Positive internal pressure is the most effective way to prevent water entry to a camera and the resultant damage that occurs.



The camera can be connected and operate directly from the TV Cable to operate as a skid camera or for system troubleshooting.

Mechanical Features

360° camera continuous head rotation
345° pan and tilt viewing angle
Camera pressurized with dry nitrogen
360° slip rings, military-rated gold contacts
Camera body extends to camera front to withstand severe shock
Scratchproof sapphire color camera window
Brush DC drive motors with mechanical clutches on all motor motions
Redundant pressure seals at each external moving joint for long seal life
Military glass to metal hermetic seals (secondary) at all LED / Laser windows
Ball bearings used on all moving external parts
Length = 8.0"
Head Diameter = 3.25"

Electronic Features

DC/DC converter power supply input (20-60VDC), input polarity protected
Internal light head regulator
Dielectric tested to insure operator safety
Home view feature to return camera to upright and forward viewing automatically, with forks at the side of the camera head. Both home motions operate simultaneously.
Long life, shock resistant, warm white LED internal light ring, moves with color camera
Camera operating software contained in EEPROM, which allows future performance improvements to be programmed into camera without any hardware changes
Gold military-rated camera connector
Internal pressure sensor and external LED indicator (Fast-Check)
On-screen status indicators: white balance, zoom, focus, Starlite
"No Blur" variable rotate and pan motion speed based on zoom ratio
Simultaneous motion operations for quick location

Color Camera Module - Technical Specifications

1/3" CCD
768h x 494v Picture Elements (379,392 total)
480h TV lines resolution
Image scanning 525 lines at 60 Hz (NTSC), 2:1 interlaced
Low light 0.14 Lux color chip camera
Precise image geometry, no image burn-in
Excellent color rendition
Image pick up device (CCD) has a lower random noise feature than other devices
1/2" to ∞ remote controlled focus

The design of the camera head allows it to view 360° around the entire barrel of the pipe. The pan and tilt feature permits up to 70° of rear viewing, thus permitting examination of a lateral while moving the camera either up or down stream.

The camera is pressurized with dry nitrogen to prevent external moisture from entering. An external LED indicator advises when pressure is at the proper level or if it is low.



The camera contains a time clock that measures and records the total operating time of the camera for maintenance purposes. Camera serial number, software revision, etc., can be determined.

Camera Controller

The pan and tilt angle and rotational motion are remotely controlled from the desktop controller. The controller is equipped with a joystick to pan, tilt and rotate the view providing complete, undistorted pipe barrel and lateral connection viewing. The controller is equipped with remote focus, remote iris, and zoom in/out controls. The controller is designed for quick hook-up to the power control unit when the pan and tilt camera is being used. It is compact and easily stored while not in use.

Pan & Tilt Zoom Lens

The camera is equipped with a 4.2~42mm optical zoom lens for a 10x optical zoom and a 4x digital zoom.

High Intensity Directional LED Lighting System

A high intensity lighting system is furnished to provide the proper illumination to inspect down the pipe, along the pipe crown, invert, sidewalls and laterals while using the camera. The lighting system uses a 10,000 hour life Warm White LED lighting system. The lighting system is designed for inspecting connections, pipe walls and joints in pipe sizes from 5"-36" in diameter.

Solid State Camera Control Circuitry

The color camera is equipped with the necessary circuitry to allow for the remote adjustment of the optical focus from the controller unit at the viewing station. The camera is calibrated with both color bench test and picture analysis equipment at the factory.

Camera Storage and Transportation Case

A damage resistant case is provided for the camera and light head while it is in storage or during transport, including shipping on commercial carriers. The interior of the case contains a foam saddle and a lid installed yoke to firmly hold the camera and protect it from damage. The case is equipped with metal closing latches.

Pathfinder Tractor

The Aries Pathfinder self-propelled wheeled steerable camera transporter assembly including specified camera facilitates the remote inspection of lines ranging from relined 6" to 24" including offsets and protrusions.

The transporter incorporates a 6-wheel drive system designed to match the contour of the pipe regardless of pipe size. The drive motors are specifically designed to meet the power and torque requirements of the system, regardless of size of pipe being inspected.

The transporter is capable of operating in power forward, power reverse, steer-left, steer-right, and free wheel. The transporter may be retrieved in the free wheel mode by the video cable reel. This will reduce the normal wear on the drive motor and drive by fifty percent (50%).

Dimensions

Overall length with camera attached = 16" (with rear connector)

Overall width with 3 $\frac{3}{8}$ " tires = 4.5"

Overall height = 3 $\frac{3}{8}$ "



Overall weight = 24.5 lbs. with camera and swivel connector

Mechanical Features

The Aries Pathfinder tractor is operable in 6" lines that have been relined, producing an internal diameter of less than 5.5". The tractor includes (2) internal brushless motors, each with electronic clutch, that allow forward and reverse drive, as well as left/right and freewheel functions. In the event of a rollover in the pipe, the tractor remains operable. The rear connector is designed to pivot up and down to aid in unit removal from a culvert. The wheels are changeable with a single nut, providing a quicker changeover.

The tractor has a manual lift to raise the camera to the center of the pipe and out of the pipe flow. The lift is capable of raising the camera 4.3" from its down position. The lift still allows inspection of true 6" pipelines when installed.

The tractor has a standard integrated rear viewing color camera with LED Lighting to eliminate operating blindly when in reverse or when pulling the tractor back with the reel.

The tractor contains Fast-Check pressure sensor circuitry to monitor the internal pressure of the tractor and an external red LED to alert the operator in the event of pressure loss at all times. Positive internal pressure is the most effective way to prevent water entry to a tractor and the resultant damage that occurs.

Tractor Controller

The controller is equipped with a joystick to control forward, reverse, right and left pivot motions remotely from the operator's station. The controller also has pushbuttons to control the clutch (On/Off), aux lighting (On/Off), reverse view camera (On/Off) and beacon transmitter (On/Off).

The tractor contains an internal 512Hz beacon transmitter with operator On/Off Control.

Inclinometer System

The Aries Pathfinder tractor also includes an inclinometer system which allows pipeline inspection operators to confirm the slope of new and existing pipelines. Slope verification assures proper pipeline grade installation and eliminates associated problems.

Inclinometer calibration is simple and provides the most accurate measurement for tractor or skid tilt zeroing with a camera installed. This eliminates the need for camera adjustments to obtain a true level zero.

Pathfinder Reel and Cable

Dimensions

Reel = 14" W x 21" D x 21" H

Cable = .285" in diameter

Features

Footage counter – front panel mounted with feed for external footage counter overlays

Electronic free-wheel clutch – push button operated with manual override

Hand crank – manual operation using a hand crank in the event of power failure

True Pulse Width Modulation (PWM) motor controller – controlled power for camera and tractor retrieval



Remote hand controller – provides all operations by remote control
Telescoping swivel cable guide

Reel

Reel drive – chain/sprocket through an electronic clutch
Reel frame – high strength aluminum tubing
Weight – 110 pounds with 1000’ of cable
Level wind – aluminum screw-type for even placement during cable retrieval with manual override
Footage head – low friction with electronic encoder for high level of measurement accuracy
Cable strength – 1200 pound break strength due to Kevlar-braided internal member
Connector – resin-free and tapered

Cable manhole guide system

Manhole Top Roller

A top roller assembly to guide the cable or hose over the lip of and into the manhole is provided. This assembly is made to operate in a 18” to 30” manhole opening.

Manhole Bottom Roller

A bottom roller assembly to protect the cable or hose when entering and leaving the manhole is provided. The assembly has corrosive resistant rollers, a minimum bend radius of 6”, and is made for easy attachment to extension poles.

Extension Poles

A number of 6’ long fiberglass extension poles are provided for connection to manhole bottom roller. A locking mechanism allows for rapid set up and sturdy locking in place of poles. One adapter hook is supplied with each bottom roller to secure extension poles to manhole ring.

Insertion / Extraction Pole Assembly

An extendable pole assembly with a hook and adapter for the tractor for inserting or removing the camera and tractor are provided.

Training, Customer’s Facility

One day of operations and maintenance training is included. Aries will fully instruct and test the customer’s employees in the operation of the equipment furnished after delivery. The instruction and testing is conducted by a field service technician and includes component familiarization, theory of operation, field procedures, techniques of use, troubleshooting, maintenance recording, and logging of sewer conditions and safety procedures.

Maintenance Tool Kit

16” plastic toolbox

Mechanical

- (5) combination wrenches, 3/8, 7/16, 1/2, 9/16, 5/8
- (7) hex wrenches, 1/16, 5/64, 3/32, 7/64, 1/8, 9/64, 5/32, and 3/16, with pouch
- 10” adjustable wrench
- 7” diagonal pliers
- 7” needle nose pliers
- 12” groove joint pliers
- 10” locking pliers (vise-grip)
- 5/16 nutdriver



Offset screwdriver

(3) slotted screwdrivers, 8mm x 5", 6mm x 4", 3mm x 3"

(3) Phillips screwdrivers, #1 x 3", #2 x 4", #3 x 5"

Electrical

Soldering iron

Solder, 60/40 resin core

Multi-meter with AC/DC voltage, resistance, and continuity

8" wire cutter / stripper / crimper

Utility knife

Consumables

10yd roll UL electrical tape

Connector lubricant, 1oz

(20) tie wraps, 4.5"

(10) tie wraps, 8"

(6) tie wraps, 14"



OPTIONAL EQUIPMENT

Option #1 – add to outfitting

Please see component list for spec.

Option #2 – add to outfitting

Please see component list for spec.

Option #3 – add to outfitting

Please see component list for spec.

Option #4 – add to outfitting

Vehicle Wash Down System

A vehicle 12V-wash down system will be provided which is designed to supply clean water pressure to the rear of the vehicle. A pump that supplies 2.2gpm at 70psi is supplied to power the water system. A 12-gallon water tank is supplied for mounting in or under the vehicle. The system also has a 25-foot hose on auto retractable reel with a spray nozzle to facilitate washing of all contaminated equipment after operating in a field environment.

Option #5 – add to electronics

15" Multimedia Monitor

15" monitor(s) will be supplied at the locations shown in the component list section. The monitors have LCD displays with audio speakers. The screen has a native 1024x768 resolution for PC viewing, and produces a clear picture from the video camera. Adjustment functions are via remote control and include: H-position, V-position, clock, phase, contrast, brightness, tint, sharpness, and color. A set of internal audio speakers are also included. Technical specifications of the product are as follows:

Video Input

Format: NTSC

Signal: Digital PC (RGB), component, and S-video

Dimensions with Stand

Depth: 6.7"

Height: 12.8"

Width: 14.1"

Display

Diagonal size: 15"

Max resolution: 1024x768

Brightness: 250 cd/m²

Viewing angle: 130° horizontal, 100° vertical

Contrast ratio: 600:1

Power Supply

Power Consumption: 55W

Power Signal: 100V to 240V AC at 50Hz to 60Hz