

## MINIMUM SPECIFICATIONS

It is the intent of these specifications to guide Bidders in submitting competitive Bids on the following:

### Specification: Remote Confined Space and Video Pipeline Inspection Equipment Package

Yes No

*The purpose of these specifications is to secure for the purchaser the necessary equipment and accessories needed to effectively inspect and record defects found in sanitary/storm sewer pipelines, manholes, catch basins, bridges, vessels, tanks and any other confined or hard to reach spaces space areas.*

#### 1. General Requirements

- |   |                          |                          |
|---|--------------------------|--------------------------|
| a. The proposed system must be a self-contained camera system. Camera systems that require a generator or shore/house power will be deemed unacceptable.  | <input type="checkbox"/> | <input type="checkbox"/> |
| b. <i>Warranty:</i> The system furnished in accordance with these specifications shall be covered for a period of 3 (three) years.  | <input type="checkbox"/> | <input type="checkbox"/> |
| c. <i>Warranty:</i> The portable viewing device and the battery pack with charger shall be covered by a 1 (one) year warranty.  | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Optional zero cost maintenance plans or extended warranty shall be available.  | <input type="checkbox"/> | <input type="checkbox"/> |
| e. The proposed system must be able to be operated by one person thus requiring no entry into confined space areas. Systems that require confined space entries will be deemed unacceptable.  | <input type="checkbox"/> | <input type="checkbox"/> |
| f. System must have NRTL certification (listed and labeled) for the OSHA Federal Regulation for safe use of electrical equipment. NRTL certification number must be found on equipment or submitted via a copy of the listing report. | <input type="checkbox"/> | <input type="checkbox"/> |
| g. No tools required for the setting up or accessorizing the system. Only 3 cables required – power, camera and video.  | <input type="checkbox"/> | <input type="checkbox"/> |

#### 2. Camera Head: Module & Housing

- |  |                          |                          |
|--|--------------------------|--------------------------|
| a. The camera will produce a color video image and provide a minimum of 460 HTV Lines of video resolution.   | <input type="checkbox"/> | <input type="checkbox"/> |
| b. The image sensor shall be a Color Hyper-Had CCD with expanded sensitivity to view down a minimum diameter of 6" pipe lines and have a minimum viewing range of 75' to 150' with bright pipe sidewall detail.  | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Camera construction shall include all solid-state circuitry designed to withstand shocks and vibrations   | <input type="checkbox"/> | <input type="checkbox"/> |
| d. The camera shall have a zoom feature of 36:1 optical and a digital zoom of 12 times for a total of 432:1 magnification. Systems with more or less zoom will be deemed unacceptable.   | <input type="checkbox"/> | <input type="checkbox"/> |
| e. With standard package, camera shall have a minimum lux rating no greater than 0.7.  | <input type="checkbox"/> | <input type="checkbox"/> |
| f. The camera head shall have a function where the user can allow the shutter speed to go below 1/60 <sup>th</sup> of a second and react automatically to changing dark environments for viewing in large or far dark areas. Cameras without this feature will be deemed unacceptable. | <input type="checkbox"/> | <input type="checkbox"/> |

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g. Camera shall have ability for auto and manual focus. Maximum time for auto focus to resolve a subject is 1/2 second.	<input type="checkbox"/>	<input type="checkbox"/>
h. System illumination shall be provided by HID (High Intensity Discharge) lighting with a maximum reflector angle of 6 degree for far viewing and maximum of 13.5 degree for close viewing. (5450cp at 13 degree beam, 17300cp at 6 degree beam) Lamps operate at a minimum color temperature of 4,300 Kelvin and up to 5500 Kelvin to provide for bright and contrast lighting at far distances. Halogen or filament lamps will be deemed unacceptable.	<input type="checkbox"/>	<input type="checkbox"/>
i. Lamps shall have capability to add single or dual cool-touch polymer light diffuser which allows for the light pattern of narrow beam lamps to be greater than the field of view of the camera at its widest standard angle as well as when using the wide angle adapter. This assures an even light pattern without triggering the camera to close iris or reduce gain. No tools required.	<input type="checkbox"/>	<input type="checkbox"/>
j. Selectable single- or dual-lamp illumination.	<input type="checkbox"/>	<input type="checkbox"/>
k. For safety – lamps shall be able to be touched without burning even after operating at full power for an hour.	<input type="checkbox"/>	<input type="checkbox"/>
l. The complete camera housing shall be made of clear anodized aluminum designed for damp and underwater environments with an operating temperature range of 0° to 120° F.	<input type="checkbox"/>	<input type="checkbox"/>
m. Distance between center points of camera and lighting shall be no greater than 62 mm or 2 4/10" in order to guarantee acceptable video images in small pipes and at longer distances in larger pipes.	<input type="checkbox"/>	<input type="checkbox"/>
n. Distances between center points of dual narrow beam lamps shall be no greater than 40 mm or 1 6/10" in order to guarantee adequate performance in small diameter pipes or have concentrated illumination at farther distances.	<input type="checkbox"/>	<input type="checkbox"/>
o. Camera shall be rated at 4.5 bar / 150' of water to ensure durability.	<input type="checkbox"/>	<input type="checkbox"/>
p. Camera shall have Schrader air valve for purge and pressurization of electronic components to prevent fogging of lens when there is a change in temperature.	<input type="checkbox"/>	<input type="checkbox"/>
q. Camera shall have an opening other than the Schrader valve to allow for the introduction of dry air at the same time moist air is being purged out of the system. Purge release port is released via single machined allen head screw opening.	<input type="checkbox"/>	<input type="checkbox"/>
r. Rounded front and rear camera housings shall be able to be removed without tools for easy maintenance and camera module upgrade.	<input type="checkbox"/>	<input type="checkbox"/>
s. Front light housings shall be able to be removed without tools for easy lamp beam selection and field maintenance.	<input type="checkbox"/>	<input type="checkbox"/>
t. Camera shall have ability to easily tilt while pole is extended via a 3" aluminum tilt-bar secured to the rear camera housing cap.	<input type="checkbox"/>	<input type="checkbox"/>
u. All camera and lighting wires shall be housed within the camera housing. Cameras that have <b>ANY</b> wires other than the main cable that come out of the camera head or lights will be deemed unacceptable.	<input type="checkbox"/>	<input type="checkbox"/>

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v. System shall have quick-connect camera head feature where camera head attaches electrically to the cable via a single waterproof connector and mechanically to the pole via a single stainless spring loaded pin that engages the camera head collar from the pole hardware. No tools required.	<input type="checkbox"/>	<input type="checkbox"/>
w. Camera head shall have a single keyway for proper alignment within pole collar to insure proper camera placement and targeting results.	<input type="checkbox"/>	<input type="checkbox"/>
x. Camera shall be supported and be able to tilt via two side arms that have 1/3" diameter solid stainless steel journals.	<input type="checkbox"/>	<input type="checkbox"/>
y. Camera head with lighting shall have ability to fit into a 5.5" diameter opening, providing access in 6" risers and having viewing capability in 6" pipe lines.	<input type="checkbox"/>	<input type="checkbox"/>
z. Camera shall be able to straight tilt a maximum of 234 degrees in order to provide right side up video images in underground and overhead applications. Systems that do not provide this capability will be deemed unacceptable.	<input type="checkbox"/>	<input type="checkbox"/>
aa. Camera shall have tilt locking screw for times when camera tilt must be in a fixed position.	<input type="checkbox"/>	<input type="checkbox"/>
bb. Camera window shall be made of scratch resistant sapphire crystal.	<input type="checkbox"/>	<input type="checkbox"/>
3. Controller (Control Box, Menu System, Portable Vest and Battery)		
a. The size of the control box shall be no greater than 5 1/8" x 2" x 6".	<input type="checkbox"/>	<input type="checkbox"/>
b. Control box shall mount within a pocket that is on the right front side of the included safety, power and control vest.	<input type="checkbox"/>	<input type="checkbox"/>
c. The control unit shall contain controls on the top of the box for zoom, manual/auto focus, on/off switch for single or double lamps and onscreen menu-items. Main 12V power switch located at rear of box.	<input type="checkbox"/>	<input type="checkbox"/>
d. Control Box shall have input and output connectors on its bottom and side. BNC Video out, military spec locking connector with keyway for main control cable to be located at bottom for ergonomic cable management and 3-pin XLR secured connector for 12V DC power input to be at rear of box for close and direct access to battery or optional 12V power cable.	<input type="checkbox"/>	<input type="checkbox"/>
e. Control box switches/controls shall be backlit rocker style and joystick.	<input type="checkbox"/>	<input type="checkbox"/>
f. Control Box shall have splash proof switches and connectors.	<input type="checkbox"/>	<input type="checkbox"/>
g. System control box shall have a single joystick to control zoom, focus and auto focus. Backward and forward will control telephoto and macro zoom while left and right will control far and near manual focus. Depressing the joystick in the center will engage auto focus.	<input type="checkbox"/>	<input type="checkbox"/>
h. Control box shall have led indicator for manual vs. auto focus.	<input type="checkbox"/>	<input type="checkbox"/>
i. Joystick shall also be used to address on-screen menu items.	<input type="checkbox"/>	<input type="checkbox"/>
j. Toggle onscreen menu items shall be as follows:		
i. Distance measurement (included in base package)		
1. Distance reference measurement display on/off	<input type="checkbox"/>	<input type="checkbox"/>
2. Metric/English standard distance units toggle	<input type="checkbox"/>	<input type="checkbox"/>

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3. Shadow Brite feature toggle	<input type="checkbox"/>	<input type="checkbox"/>
4. Calibration setting	<input type="checkbox"/>	<input type="checkbox"/>
k. Control box shall have camera control software chip that can be upgraded in the field.	<input type="checkbox"/>	<input type="checkbox"/>
l. Safety operator vest shall fit all sizes via adjustable front snaps and be made of ANSI rated yellow for daytime safety and have reflective tape for night time visibility and safety.	<input type="checkbox"/>	<input type="checkbox"/>
m. Safety operator vest shall have zipper back pouch to enclose all available battery sizes. Pouch will be located lower center of the back for safe use.	<input type="checkbox"/>	<input type="checkbox"/>
n. Safety operator vest shall have two clips in front to properly adhere and position the viewing device sun shade pouch.	<input type="checkbox"/>	<input type="checkbox"/>
o. Safety operator vest shall have control box pouch located at waist level on the right hand side. Pouch will have necessary opening for all input, outputs and control access.	<input type="checkbox"/>	<input type="checkbox"/>
p. Safety vest shall have integral Velcro cable straps for neat and orderly management of excess camera cable.	<input type="checkbox"/>	<input type="checkbox"/>
q. An automatic battery charger shall be included.	<input type="checkbox"/>	<input type="checkbox"/>
r. The safety operator vest shall contain a minimum 95-watt hour rechargeable battery pack.	<input type="checkbox"/>	<input type="checkbox"/>
s. Battery shall have 10" pigtail with 3-pin XLR locking connector to attach to control unit.	<input type="checkbox"/>	<input type="checkbox"/>
t. Battery life shall be 3 hours with continuous use with maximum illumination. While intermittent use is greater than 5 hours.	<input type="checkbox"/>	<input type="checkbox"/>
u. Control box shall have colored (green, orange, red) LED indicator to let operator know condition of battery charge.	<input type="checkbox"/>	<input type="checkbox"/>
4. System Hardware		
a. A telescoping pole adjustable from 6' to 18' shall be included to permit placement of the camera into a variety of areas. Pole diameter must be large enough to internally house the camera connector and cable.	<input type="checkbox"/>	<input type="checkbox"/>
b. Pole end shall have standoff where cable exits in order to protect cable from continuous small diameter bending and banging of the end of the pole.	<input type="checkbox"/>	<input type="checkbox"/>
c. A 40' video/camera control cable shall be integrated inside the pole. Cable is externally armored with crush resistant steel to prevent damage or tangling of cable. Cables without this armor will be deemed unacceptable.	<input type="checkbox"/>	<input type="checkbox"/>
d. A sunscreen viewing device pouch shall be provided to house viewing device and instructions. This pouch must clip directly to the safety vest for hands free and SAFE operation of the pole and control box.	<input type="checkbox"/>	<input type="checkbox"/>
e. Maintenance tool bag shall be supplied with necessary maintenance tools and supplies.	<input type="checkbox"/>	<input type="checkbox"/>
f. System shall have ability to add optional 6' extension to standard pole	<input type="checkbox"/>	<input type="checkbox"/>

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g. System shall have ability to work with optional carbon fiber 16', 24' and 30' poles.	<input type="checkbox"/>	<input type="checkbox"/>
h. Due to the need to correctly position the camera for maximum results, carbon fiber poles shall be of the following specification to reduce operator fatigue and enhance ability to deliver the camera without bending or damaging the pole.		
i. 16FT extended - 12 lbs, 4 section, retracted height 60", maximum pole dia. 1 7/8"	<input type="checkbox"/>	<input type="checkbox"/>
ii. 24FT extended - 13 lbs, 4 section, retracted height 81", maximum pole dia. 1 7/8"	<input type="checkbox"/>	<input type="checkbox"/>
iii. 30FT extended - 15 lbs, 5 section, retracted height 85", maximum pole dia. 1 7/8"	<input type="checkbox"/>	<input type="checkbox"/>
i. Carbon fiber poles shall have solid aluminum clasps with multi position lever to quickly and securely lock pole into preferred length.	<input type="checkbox"/>	<input type="checkbox"/>
j. All carbon fiber poles shall have option of either 6' of 18' extension for deeper inspection capability	<input type="checkbox"/>	<input type="checkbox"/>
k. Camera head positioning shall be calibrated and have adjustable pole mounted targeting and stabilization fixture capability via a 3' aluminum rod to assist viewing dropped lines, centering camera in different diameter lines and to assist with stabilizing and dampening image from manhole or basin bottom.	<input type="checkbox"/>	<input type="checkbox"/>
l. Fixture shall be calibrated with markings that correspond to centering camera in 6-60" lines.	<input type="checkbox"/>	<input type="checkbox"/>
m. Fixture shall have spring loaded foot to allow for a minimum of 3" of travel to properly center the camera to maximize viewing results. Systems without targeting, centering and stabilization fixture will be deemed unacceptable.	<input type="checkbox"/>	<input type="checkbox"/>
n. Targeting system shall have ability to add different spring tensions that correspond with different camera and lighting configurations.	<input type="checkbox"/>	<input type="checkbox"/>
o. Targeting system shall have option to be fitted with 5' carbon fiber rod for use when inspection line drops in manholes	<input type="checkbox"/>	<input type="checkbox"/>
p. Shall be able to attach a sump stabilizer to stabilize rod according to calibrated centering lines for environments that are filled with soft sediment.	<input type="checkbox"/>	<input type="checkbox"/>
q. System shall have provisions for portable hard side shipping/transport and storage case with wheels and extending handle for ease of transport. This shall hold all components except for the pole in a single organized case.	<input type="checkbox"/>	<input type="checkbox"/>
r. Portable case shall not weigh more than 36 pounds when loaded with all equipment and viewing device.	<input type="checkbox"/>	<input type="checkbox"/>
s. Portable case shall have custom foam cutouts for safety operator vest, control box, camera head, battery charger, battery, tool kit, viewing device and accessories and have a removable cable tray to store the armored cable.	<input type="checkbox"/>	<input type="checkbox"/>

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t. System shall have option for wide angle camera lens adapter which can double the camera's field of view for wide angle applications. This adapter must maintain waterproof and pressurization integrity and be added without tools.	<input type="checkbox"/>	<input type="checkbox"/>
u. System shall have options for direct connection to 12V car power supply and an 110V AC to 12V DC adapter.	<input type="checkbox"/>	<input type="checkbox"/>
v. System shall have easy Quick Start operation and set-up card for quick and straight forward use.	<input type="checkbox"/>	<input type="checkbox"/>
w. System shall have option for heavy duty pole, camera head and stand-off shipping case that measures 8 inch dia. x 96 inch in Length. Weight 20lbs.	<input type="checkbox"/>	<input type="checkbox"/>
5. Measurement Upgrade		
a. Optional measurement shall be based on patented lens based focal plane measurement method.	<input type="checkbox"/>	<input type="checkbox"/>
b. Measurement methodology creates general range information to the area where the camera is focused.	<input type="checkbox"/>	<input type="checkbox"/>
c. System can take distance information and create screen size reference to conduct reference based measurement for objects found within the camera's field of view or the viewing screen or digital image.	<input type="checkbox"/>	<input type="checkbox"/>
d. System shall have the ability to be upgraded to measure and display depth of manhole to a distance of 30ft and the manhole width to a maximum of 3ft.	<input type="checkbox"/>	<input type="checkbox"/>
e. System shall have the ability to be upgraded to measure manhole inflow and outflow pipe diameters from 4" to 12" diameters.	<input type="checkbox"/>	<input type="checkbox"/>
f. Any system requiring extra hardware or accessories to provide measurements shall be deemed unacceptable	<input type="checkbox"/>	<input type="checkbox"/>
6. Video Image Viewing, Recording & Storing		
a. A Digital Video recorder (DV) device shall be provided for viewing live video and storing still images.	<input type="checkbox"/>	<input type="checkbox"/>
b. The DV recorder shall have a minimum 7" viewing area.	<input type="checkbox"/>	<input type="checkbox"/>
c. The DV recorder shall transfer digital images via memory stick, fire wire or USB.	<input type="checkbox"/>	<input type="checkbox"/>
d. The DV recorder shall the ability to capture still images on a memory stick with no less than 1 GB of storage.	<input type="checkbox"/>	<input type="checkbox"/>
e. The DV recorder shall be powered via a battery and receive video from the control box via a ruggedized BNC to RCA cable.	<input type="checkbox"/>	<input type="checkbox"/>
f. The DV recorder shall have the ability to take digital stills while live video is being recorded.	<input type="checkbox"/>	<input type="checkbox"/>
g. Still images must have a pixel count of 1.2 million.	<input type="checkbox"/>	<input type="checkbox"/>
h. Video storage system shall be integrated into a custom foam lined case that protects it and holds all accessories. Must be able to operate while in the case.	<input type="checkbox"/>	<input type="checkbox"/>
i. USB computer transfer import device for memory stick shall be included.	<input type="checkbox"/>	<input type="checkbox"/>

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	Yes	No
7. Wide-Angle Lens		
a. Camera window cap shall be easily removed without tools and replaced with a wide-angle lens cap which doubles the horizontal field of view to 90 degrees. (Lens shall afford full view of targets 22", 42", and 62" high at distances of 1', 2' and 3', respectively.) The waterproof integrity of the system shall not be compromised and the wide-angle lens shall remain protected within an aluminum front housing with sapphire crystal window.	<input type="checkbox"/>	<input type="checkbox"/>
8. Wireless video		
a. System shall have the option of wireless video transfer to stationary Vehicle or monitoring area	<input type="checkbox"/>	<input type="checkbox"/>
b. Use of extra battery source for signal transmittal shall be deemed Unacceptable	<input type="checkbox"/>	<input type="checkbox"/>
c. Operator shall be able to view images on viewing device while video is being transmitted.	<input type="checkbox"/>	<input type="checkbox"/>
d. Transmitting device shall be mounted on rear of operators vest and measure no more than 8" x 6" x 2"	<input type="checkbox"/>	<input type="checkbox"/>
e. Transmitting device shall require no more than 12V DC power	<input type="checkbox"/>	<input type="checkbox"/>
f. Ability to transmit at least 500ft in line of sight, with an 8 channel selection capability for use in high interference areas.	<input type="checkbox"/>	<input type="checkbox"/>
9. Slip ring attachment		
a. System shall have the ability to have an 'inline' slip ring fitted to aid inspection when camera head is rotated frequently.	<input type="checkbox"/>	<input type="checkbox"/>
b. Attachment can be fitted in the field by the operator with no tools required.	<input type="checkbox"/>	<input type="checkbox"/>
c. Slip ring attachment shall have the ability to be used with any style of extension pole.	<input type="checkbox"/>	<input type="checkbox"/>

Minor deviations from these specifications may be considered, provided the manufacturer or dealer submits, in writing, a description in detail of each variation with reference made to each item to which the variation will apply. These variations must be submitted with and made a part of this Bid. Without any statement of deviation, the City will assume that the specifications will be met as written and the Bidder must comply as such.

This equipment is described with a combination of integral or integrated design and construction in sufficient detail to secure Bids on comparable equipment. All parts not specifically mentioned which are necessary in order to provide a complete cart shall be included in the Bid. This equipment is to be purchased by the City of Sedro-Woolley.

The units shall be complete with all standard equipment as advertised and include all additional equipment and accessories included in City specifications. The unit Bid shall not be of a make or model, which has been or is foreseen in the near future to be a discontinued model of a company that regularly manufactures such equipment. If so desired, the City reserves the right to require any or all Bidders to verify, in writing, that the units Bid are not a manufacturer's discontinued or brand new models. New models and prototypes, experimental or one of a kind models, are not acceptable.

Products must have been in full production for a minimum of two (2) years.

The selling dealer shall be able to provide parts and service facilities to service the equipment and all its components and assure their performance. In order to provide on-location service at a reasonable fee in Sedro-Woolley, Washington, the Bidders are to be established dealers located in the State of Washington. Replacement parts must be delivered to the Fleet Division within 5 working days (Monday through Friday) of placement of order.

The City reserves the right to reject any Bid that does not meet the specifications as written, does not meet or exceed SAE standards, does not include the equipment called for in the specifications and/or the dealer does not have the parts and services.

Delivery shall be F.O.B., City of Sedro-Woolley.

The items to be provided at the time of delivery are as follows:

1. "Signed Price Invoice"
2. Pre-Delivery Inspection Report
3. Warranty Books
4. Parts, Service and Operator's Manuals (as per specifications)