



**ACCUSONIC**  
TECHNOLOGIES

(A0007461)

**From:** Harvey Klaer  
**Accusonic Technologies**  
**Tel:** 770 945-5602  
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<b>To:</b> Gina Foley	<b>Date:</b> August 7, 2002
<b>At:</b> USACE - New Orleans District	<b>Tel #:</b> 504-862-2770
<b>Subj:</b> Accusonic Flowmeter System	<b>Fax #:</b> 504-862-1356
<b>Log #:</b> HK8702A	<b># Pgs:</b> 09

Gina Foley,

Per your request, please find the attached budgetary pricing for the London Avenue, Pump Station Number 3, 48-inch pipe flowmeter system as specified.

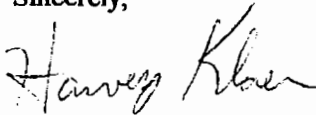
I have one recommended change to the specifications that you sent me. As you may be aware of the New Orleans Sewerage & Water Board has been pursuing installations of Accusonic flowmeters in an effort to standardize on a single technology which will result in improving overall measurement accuracies throughout Orleans Parish. As a result, the Deputy General Superintendent of New Orleans Sewerage & Water Board has requested that I ask for a modification to the specifications as follows:

Page 16002-2, 1.5.4 Experience and Qualifications second paragraph the end of the last sentence should remove the "or approved equal" clause. If the or approved equal can not be removed then the sentence should read ...or an approved equal as approved by The New Orleans Sewerage & Water Board.

Should you like to discuss this matter in more detail with the Deputy General Superintendent with the New Orleans Sewerage & Water Board, his name is Charles McKinney and his telephone number is (504) 865-0412. 585-2365

If you have any questions or need additional information, please call me at the numbers listed above.

Sincerely,



Harvey Klaer  
Accusonic Technologies

Cc: Joanne Carrara / Accusonic Sales  
Charles McKinney / New Orleans Water & Sewerage Board (cover only)

<p><b>Accusonic Technologies</b> 25 Bernard Saint Jean Drive, E. Falmouth, MA 02536 USA Tel: 508.495.6600, Fax: 508.495.6699 EMAIL: Sales@accusonic.com; http://www.accusonic.com <b>REGIONAL OFFICES:</b> Detroit - Seattle - Atlanta - Los Angeles - United Kingdom</p>
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**A DIVISION OF ADS CORP.**



**From:** Harvey Klaer  
**Accusonic Technologies**  
**Tel:** (770) 945-5602  
**Fax:** (770) 945-9024

<b>To:</b> Gina Foley	<b>Date:</b> August 7, 2002
<b>At:</b> USACE - New Orleans District	<b>Tel No:</b> 504-862-2770
<b>Subject:</b> Model 7510-B Flowmeter System	<b>Fax No:</b> 504-862-1356
Ref. Accusonic Quote No. Q-36771	<b>Log No:</b> HK8702A

Accusonic Technologies is pleased to provide this price quotation for 1 Model 7510-B Flowmeter System for measuring flow of Orleans Parish, London Avenue Pump Station Number 3, 48-inch pipeline.

Accusonic flowmeters can be used for monitoring flow in pressurized pipes, open-channels, or in pipes flowing partially full through surcharged (e.g., gravity flow lines). The Accusonic Model 7510-B Flowmeter System utilizes the latest in multiple-path ultrasonic transit-time technology for high-accuracy flow monitoring in large pipes and open channels.

The Model 7510-B flowmeter uses acoustic transit-time technology to measure average velocity at one or more elevations across a pipe or channel. The measured velocities are numerically integrated in the flowmeter to provide accurate flowrate measurement. The standard Model 7510-B has an eight-path capability. The acoustic paths may be distributed in up to four separate metering sections. The console accepts input signals from water level sensors that are used with the measured velocities to calculate flowrate in open channel applications.

The multiple-path velocity measurements allow the flowmeter to be used to directly determine flowrate without the need for extensive flow rating exercises. This technique can be applied to backwatering conditions, reversing flows, or disturbed flow profiles with excellent results. Cross-flow error due to off-axis velocities caused by upstream bends or other channel conditions can be mitigated by the use of symmetrically crossed acoustic paths.

Standard flowmeter outputs include analog 4-20 mA current loop or voltage outputs and RS-232 serial digital communications. Options for relay contact closures for high/low flow alerts or system status conditions are available. Lightning protection options are also available.

The Model 7510-B also includes our *AccuFlow Windows*<sup>®</sup>-based software for user-friendly interfacing to PC-type computers.

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Over the past 20 years, numerous Accusonic flowmeter systems have been installed in large diameter pipes, conduits, and channels with excellent results for hydroelectric flow monitoring, irrigation system flow monitoring, source water delivery, pump stations, and water/wastewater treatment plants. Particular advantages include:

- Superior accuracy over wide-ranging flow levels and hydraulic conditions
- Same basic flowmeter cost regardless of pipe or channel size
- No primary device required (e.g., flume weir, venturi, etc.)
- Multiple pipe/channel flow measurement capability
- Bi-directional flow measurement capability

Accusonic flowmeters are used in clean, turbid, or wastewater applications, providing superior performance in difficult operating environments. Accusonic flow measurements are based on the *multiple-path ultrasonic transit-time technique*, which is included in ASME, ANSI, ISO, and IEC codes as an accepted method for accurate flowrate determination in pipes and channels.

Note that Accusonic flowmeters are "dry calibrated" based on precise as-built measurements taken at the time of transducer installation. In addition, Accusonic multi-path flowmeters do not require initial flow profiling calibration exercises nor subsequent re-calibration over time.

**Please note that proper operation of acoustic transit-time flow measurement systems require that the flow stream in the measurement location(s) is free of visible or microscopic entrained air bubbles that interfere with effective transmission of the acoustic signals. Thus, transducer locations downstream of waterfalls, spillways, or vigorous hydraulic jumps must be avoided.**

For open-channel applications, water level (stage) is also measured and tracked as part of the flowrate calculation. The stage measurements typically are made via an *in-situ* pressure sensor or ultrasonic down-looking acoustic water level sensor that is mounted above the channel. The flowmeter console can be configured to accept up to 4 analog input signals from water level sensors. This can include redundant water level sensors for a measurement section or stage signals from multiple locations.

Please find the attached price quotation Q-36771 for (1) Model 7510-B, 8-path flow monitoring system to measure flow of one 48-inch pipe. The quoted configuration utilizes the Model 7601, 1MHz Stainless Steel Transducers with Model 7641 feedthrough assembly (single plane configuration)(Pipe wall thickness must be 3/8 inch - 1 inch). HDPE-jacketed RG-59 transducer signal

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cable has been quoted in 250 foot lengths. Actual cable lengths required will need to be determined prior to order placement.

For this full pipe, single plane, 4-path configuration, flowrate measurement accuracy will be better than  $\pm 1.0\%$  of actual flow with all four acoustic paths submerged.

Accusonic typically provides field technical services for working with site employees or contractors to supervise transducer installation, commission the flowmeter, and for training. An estimate for this service is included as a line item in the price quotation.

Please note that the estimate included for these services is predicated on the assumption that installation of the transducers and commissioning of the flowmeter system (which requires flowing water in the pipe) being accomplished in two separate trips. If both the transducer installation and commissioning can be accomplished in the same trip to the site, obviously the labor and expenses for these services will be much less than estimated herein.

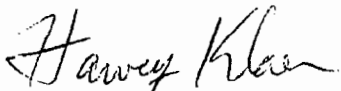
Accusonic does not supply the following items that are typically provided by local sources to the project agency or responsible contractor. Thus note that the quotation does not include:

- Labor for installation of the flowmeter systems;
- Supply and installation of protective cable conduit;
- Pulling of cables;
- Junction boxes or any special electrical fittings, if required
- Any scaffolding that may be required for installation;

Equipment is quoted FOB factory.

We stand ready to be of service.

Thank you & Regards,



Harvey Klaer  
Accusonic Technologies

Cc: Steve Nelson / Accusonic Director  
Joanne Carrara / Accusonic Sales

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USACE - Orleans Parish  
 London Ave., Pump Station No. 3  
 48-inch pipeline

**REFERENCE NO.** Q-36771  
**DATE** August 7, 2002  
**TERMS** Net 30 Days  
**SHIPMENT** FOB Falmouth  
**DELIVERY** 90 - 120 Days ARO  
**VALIDITY** September 7, 2002

ITEM	QTY	MODEL NUMBER/DESCRIPTION	UNIT PRICE	TOTAL
		<b>Flowmeter System for (1) 48-inch Plant Influent Pipe. (4-path, single plane configuration)</b>		
1.	1	Model 7510-B Flowmeter Console • Nema 4X Enclosure • 8-path capability • 2 channels isolated 4-20 mA outputs • 4 channels 4-20 mA inputs • 5 contact relays • Accuflow® PC Interface Software • Datalogging circuit board • Handheld Keypad/Display Terminal	\$ 13,425	\$ 13,425
2.	8	Model 7601 1MHz Stainless Steel Removable Transducer (2 transducers per path)	\$ 480	\$ 3,840
3.	8	Model 7641 Feedthrough Assembly.	\$ 610	\$ 4,880
4.	8	HDPE-Jacketed RG-59 Transducer Signal Cable with E-O Connector. (Estimated at 250 ft. each)	\$ 250	\$ 1,360
5.	1	Model 7642 Jacking Mechanism (for transducer insertion and removal)	\$ 1,100	\$ 1,100
		Equipment Total		\$ 24,605

Unless otherwise specified above, this quotation is subject to the attached Standard Terms and Conditions of Accusonic Technologies. Terms inconsistent with these that may appear on Purchaser's formal order will not be binding on the Seller unless agreed to in writing.

**Accusonic Technologies**  
 25 Bernard Saint Jean Drive  
 East Falmouth, MA 02536-4420



**PAGE**       2   **OF**   2    
**DATE**             August 7, 2002  
**QUOTE NO.**    Q-36771

ITEM	QTY	MODEL NUMBER/DESCRIPTION	UNIT PRICE	TOTAL
6.	---	<p>Accusonic Field Technical Services for installation supervision of (1) 48-inch pipe, system commissioning, and customer training provided at \$ 1,000 per day portal-to-portal Accusonic factory, including travel time. Travel/living expenses are invoiced at cost + 15%.                      Estimate based on:</p> <ul style="list-style-type: none"> <li>• 3 man-days for transducer installation supervision and system connection</li> <li>• 1 man-day for flowmeter commissioning &amp; customer training</li> <li>• 2 man-days of travel (Predicated on transducer installation and system commissioning &amp; training completed in one trip)</li> </ul> <p>Total estimated time is 6 days.</p>	Estimated	\$ 7,500
		<p><b>NOTES:</b></p> <ol style="list-style-type: none"> <li>1. The above prices do not include labor to support the installation of the flowmeter system. Access to the pipe and power must be provided by project sources.</li> <li>2. Above quotation does not include supply or installation of protective cable conduit, junction boxes, pulling of cables, provision of AC mains power to the flowmeter consoles, or mounting of the enclosures.</li> <li>3. The above prices do not include any special, modified, or custom documentation or manuals that may be required. Standard Accusonic manuals, appropriate to the flowmeter system delivered, are included with the equipment.</li> <li>4. Site personnel training requirements and adherence to procedures to meet applicable rules for Confined Space Entry shall be the responsibility of others. Proper safety precautions, including air monitoring and rescue standby personnel, if required, are to be provided by others.</li> <li>5. Freight charges will be billed to the purchaser at cost plus 10%.</li> <li>6. Accusonic IP65 (NEMA4X) enclosures are provided without provisions for cable or conduit penetrations. These will need to be made in the field for the required number, size and location of penetrations in the enclosure for the specific installation detail. If site specific enclosure penetrations are required, please contact Accusonic for pricing.</li> </ol>		

**ACCUSONIC TECHNOLOGIES  
STANDARD TERMS & CONDITIONS**

Orders placed for Accusonic Technologies, Inc. (Seller) products or services shall be subject to these terms and conditions of sale, whether or not specifically referred to. No other terms or conditions or any modifications, changes, or amendments shall be recognized unless specifically agreed to in writing by an authorized official designee of Seller. The lack of objection by Seller to any modifying provisions communicated by Buyer shall not be construed as an acceptance by Seller. The lack of enforcement, the invalidity, or the unenforceability of any provision shall not affect the remaining provisions of these terms.

In the event of an inconsistency between the terms, conditions, and provisions of this agreement and those of the Buyer's purchase order, then in accordance with the usage of trade, Buyer's assent to the terms and conditions of sale set forth below shall be conclusively presumed from Buyer's failure to reasonably object in writing and from Buyer's acceptance of all or any part of the material ordered.

All proposals, negotiations, and representations, if any, regarding this transaction and made prior to the date of this acknowledgement are merged herein.

1. **ORDER:** All orders placed with Seller must be in writing, signed, contain definitive prices, delivery dates, quantities and complete descriptions of products being purchased.
2. **SPECIFICATIONS:** Specifications applicable to items sold hereunder shall be those furnished by Seller, or those furnished by Buyer and agreed to in writing by Seller.
3. **PRICES:** Seller prices are those specified in the applicable Seller price list current at the time of placement of an order. Seller prices are subject to change without notice, and price quotations, unless otherwise stated, shall automatically expire thirty (30) calendar days from the date issued and may be cancelled or amended within said period upon written notice to Buyer.

Unless expressly indicated otherwise, prices are F.O.B. shipping point, and are exclusive of all transportation charges, insurance costs, export duties, license or fees, or any tax or duty of any nature whatsoever and Buyer shall either pay any items directly or reimburse Seller for any payments made by Seller. Any claim for exemption by Buyer shall, if applicable, be effective only after receipt of proper exemption forms by Seller, but in no event after delivery has been made.

4. **PAYMENT:** All products shall be invoiced upon delivery to carrier at point of shipment, and the amount thereon shall be due and payable within thirty (30) days from invoice date. Unpaid balances more than thirty (30) days from date of invoice may be subject to an interest charge of one and one-half percent (1.5%) per month computed from the due date of each invoice previously issued, or the maximum rate legally permitted, whichever is greater. Seller reserves the right to establish and/or change the credit and payment terms extended to Buyer when in Seller's sole opinion Buyer's financial condition or previous payment record warrants such action. Furthermore, on delinquent accounts, Seller may divert shipments or reschedule deliveries of products on unfilled orders. All invoices shall be payable in U.S. Funds, drawn on a U.S. Bank. For sales outside of the United States payment shall be at sight of shipping documents against an Irrevocable Letter of Credit which is satisfactory to Seller in its sole discretion.
5. **REMEDIES:** In the event (a) Buyer defaults in the payment of any monies due to Seller hereunder beyond the tenth (10<sup>th</sup>) day after the same is due or (b) Buyer defaults in the performance of any other of its obligations under these terms for a period of ten (10) days after receipt by Buyer of notice thereof from Seller or (c) Buyer files a petition of bankruptcy or insolvency or for reorganization or for the appointment of a receiver or trustee or makes an assignment for the benefit of creditors or enters into an arrangement with creditors or (d) suffers a petition in bankruptcy or insolvency or for reorganization or for the appointment of a receiver or trustee against it and Buyer fails to secure a discharge thereof within thirty (30) days, then in any such event Seller may at its option do any or all of the following: (i) collect from Buyer a service charge on all monies due; (ii) terminate the sale; (iii) whether or not this sale is terminated, take immediate possession of any or all of the equipment wherever situated and for such purpose enter upon any premises without liability for so doing; and (iv) sell, dispose of, hold, use or lease all or any of the equipment as Seller in its sole discretion may decide without any duty or account to Buyer. Buyer shall in any event remain fully liable for damages as provided by law and for all costs and expenses incurred by Seller on account of such default including all court costs and reasonable attorney's fees. The rights afforded Seller under this paragraph shall not be deemed to be exclusive but shall be in addition to the rights or remedies provided by law.
6. **TITLE:** Title to items sold hereunder shall pass to the Buyer upon payment to Seller of the full purchase price. Notwithstanding the foregoing, all risk of loss shall be borne by the Buyer from the time of delivery of the items by Seller to a public carrier or other agreed upon means of transportation.
7. **DELIVERY:** Delivery is F.O.B. shipping point. Unless otherwise instructed in writing, shipment method will be selected by Seller and shipment shall be prepaid by Seller and added as a separate line item on the invoice. In no event shall Seller be liable for any delay in delivery or assume any liability in connection with shipment, nor shall the carrier be deemed an agent of Seller. Insurance associated with goods during transit shall be Buyer's responsibility.
8. **FORCE MAJEURE:** Neither Buyer nor Seller shall hold the other responsible for delays in production or delivery caused by Force Majeure or other events beyond the control of the other party which could not reasonably have been anticipated or prevented. Force Majeure shall include, but not be limited to, unusually severe weather, floods, power outages, epidemics,

war, riot strikes, lockouts, exercise of police power, condemnation or eminent domain. The foregoing shall not give rise to any claims or damages or be considered a waiver by either party of the obligations of this Agreement.

9. **ACCEPTANCE TESTING:** Unless specifically authorized in writing by an official designate of Seller, the successful execution of the Seller standard test procedures for final test and checkout for Seller manufactured equipment shall constitute Buyer acceptance testing of the Products. Buyer may witness acceptance testing on a non-interference basis upon thirty (30) days advance written request to Seller.
10. **ENGINEERING CHANGES:** Seller reserves the right to make progress and design changes in standard product items ordered without prior approval or notification to Buyer.
11. **WARRANTY:** Accusonic warrants its products against defects in materials and workmanship for a period of up to one (1) year from the date of shipment. During this period, upon satisfactory written proof of such defects, any unit which becomes inoperative may be returned, prepaid by buyer, for repair or replacement at the sole option of Accusonic. This warranty applies only to the original purchaser and only if the equipment has been installed, operated, and maintained by such purchaser in accordance with the published Operations and Service Manual, or in a manner approved in writing by Accusonic. Warranty repairs and replacements will be performed only by Accusonic or its authorized representative. Any unauthorized repair or replacement, including but not limited to opening a monitor or monitoring device, will void this warranty relative to the product and all of its parts. Any repair or replacement will be covered by this new product warranty for ninety (90) days from the date that such repaired or replaced product is shipped from Accusonic. This warranty does not apply to damage caused by catastrophes of nature, fire, explosion, acts of God (including, but not limited to, lightning damage), war, riots, power outages, accidents, improper use or service, damage during transportation, or other similar causes beyond Accusonic's control. **THIS IS THE ONLY WARRANTY FOR ACCUSONIC PRODUCTS. NO OTHER WARRANTY IS EXPRESSED OR IMPLIED, INCLUDING FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY. PRODUCT REPAIR OR REPLACEMENT IS THE ONLY REMEDY. IN NO EVENT WILL ACCUSONIC BE RESPONSIBLE FOR ANY DIRECT, INDIRECT, CONSEQUENTIAL, OR SPECIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF DATA AS A RESULT OF A DEFECT.**
12. **OUT-OF-WARRANTY:** The cost of out-of-warranty repairs including return shipment, are subject to a charge as quoted by Seller. The cost of the repair will be invoiced and the return of the item will be made using the most economical shipment means available at Buyer's expense. Seller will utilize other means of express shipment at the request of the Buyer.
13. **RETURNS:** Authorization must be obtained from Seller prior to return of any items, including those for repair. Buyer's right to repair or replacement are governed by the items in Paragraph 12 (Warranty). Issuance of credit for returned items shall be made at Seller's discretion upon Buyer's request. All returns accepted by Seller are subject to a restocking fee.
14. **ALTERATION TO EQUIPMENT PURCHASED:** It is understood and agreed that any modification or alteration to purchased equipment by Buyer, other than that specifically authorized by this Agreement or by Seller, shall VOID AND NULLIFY, in its entirety, all warranty conditions as set forth in Paragraph 12 (Warranty), herein.
15. **PATENT AND COPYRIGHT INDEMNITY:**
  - A. Seller warrants that the Standard Products furnished under this Agreement shall be free and clear of infringement in the U.S. of any patent or copyright covering the structure or composition of such articles. In the event of a claim, suit or action against Buyer alleging such infringement, Seller shall save Buyer harmless from liability as finally determined by a court of competent jurisdiction, for such infringement, provided that Buyer gives Seller notice promptly of such claim, suit or action, and shall have given Seller full and exclusive control of the defense thereof, and that Seller shall have sole right to settle or compromise such claim, suit or action. Should Buyer be enjoined from any Seller Standard Product, the sole liability of Seller with respect to prohibited use shall be to accept the return of such Standard Products and give Buyer a credit prorated on the reasonable commercial life of same.
  - B. In the event of a claim, suit or action against Seller alleging infringement by the use of any such equipment or documentation, furnished under this Agreement, in combination with other articles or in carrying out any process covered by a patent owned or controlled by any other person, in which independent use of the equipment under this Agreement would not be an infringement, Buyer shall save Seller harmless from liability, as finally determined by a court of competent jurisdiction, for such infringement, provided that Seller shall have given Buyer full and exclusive control of the defense thereof, and that Buyer shall have the sole right to settle claim, suit or action.
  - C. Except as herein provided in this indemnity paragraph, neither Buyer nor Seller makes any warranty to the other with respect to any claim, suit, or action of any third party by way of infringement and neither party shall be responsible to the other for any loss, cost or damages consequential or otherwise, that may be suffered by the other as a result of any such claim, suit, or action.
16. **CANCELLATION:** Seller may at its option, cancel an order if:
  - A. Buyer's payments are in default or Buyer breaches any material provision hereto;
  - B. Substantial changes in raw materials occur;
  - C. Causes beyond Seller's reasonable control as specified in Paragraph 9 (Force Majeure); delivery makes it impossible to assure shipment.
  - D. Buyer becomes insolvent or a petition of bankruptcy is filed.
17. **TAXES:** Buyer shall be responsible for payment of all applicable sales, use or other taxes whether local, state, or federal, which are chargeable in connection with the sale of the items hereunder unless specifically provided for otherwise in writing.



18. **LAW:** The validity, construction, and performance of these Terms and Conditions of Sale shall be governed by the laws of the Commonwealth of Massachusetts, without regard to conflicts of laws rules or principles. Venue shall be in the Commonwealth of Massachusetts.
19. **GOVERNMENT INDEMNITY:** Purchase Orders placed hereunder containing a notation that the material is intended for use under a government contract shall be subject to the then current Government provisions referenced thereon in attachments thereto. However, prior to Buyer responding to a bid, said proposal to RFP will be submitted to Seller and all clauses and regulatory requirements required to "flow-down" to subcontractors from a U.S. Government prime contract shall be reviewed, noted as to acceptance or rejection of clauses and mutually agreed to in writing by Buyer and Seller on an individual basis.
20. **LIMITATION OF LIABILITY:** In no event shall either party be liable to any person, firm or entity, including but not limited to the other party, for indirect, punitive, exemplary, special, or consequential damages, including but not limited to lost profit, arising under this agreement, arising from the possession or use of any equipment or program, arising from the loss of data or use, arising from any infringement or alleged infringement of patents or copyrights, or arising otherwise, even though such party was notified of the possibility, likelihood, or certainty that such damages would be incurred, the other party hereby waiving such damages. In no event shall either party be liable to any person, firm or entity, including but not limited to the other party, for any loss, cost, damage or expense arising from the loss of data, integrity of data or use, the other party hereby waiving such losses, costs, damages and expenses. Under no circumstance will Seller's liability exceed the Agreement price for the goods upon which liability is claimed. Any action for breach of contract must be commenced within one (1) year after the cause of action has accrued.

## SECTION 16002 – MULTIPATH ACOUSTIC TRANSIT-TIME SYSTEM

### PART 1 GENERAL

#### 1.1 SCOPE

The contractor shall furnish and install an ultrasonic flowmeter in a forty-eight (48") inch diameter sewer force main, at the location shown on the drawings, complete and in accordance with these specifications. The flowmeter shall measure flow in the pipe and shall display an output flowrate. The method used for velocity measurement shall be the acoustic transit-time method which measures velocity by transmitting acoustic pulses between pairs of transducers mounted on the pipe walls. There shall be one plane of four parallel acoustic paths used for velocity measurement in the pipe. The velocity data from these paths shall be integrated according to the Gauss-Chebyshev integration method to determine flowrate through the pipe. Transducer placement shall be consistent with the requirements of the Gauss-Chebyshev integration method.

#### 1.2 MEASUREMENT AND PAYMENT

There will be no measurement for furnishing and installing a multipath acoustic transit-time system according to the plans and these specifications. Payment will be made at the contract lump sum price for "ULTRASONIC FLOWMETER". Price and payment shall constitute full compensation for all work required by this section and shall include the furnishing of all plant, equipment, labor and materials necessary to complete this item.

#### 1.3 RELATED WORK SPECIFIED ELSEWHERE

Section 15002 "INSTALLATION OF WELDED STEEL PIPE"

#### 1.4 SUBMITTALS

A minimum of 30 days prior to work the contractor shall submit for approval the material and equipment required to complete this item.

#### 1.5 GENERAL REQUIREMENTS

##### 1.5.1 Equipment to be furnished

Equipment to be furnished shall include the following:

- 1.5.1.1 One 8-path flowmeter console in NEMA 4X wall-mount enclosure
- 1.5.1.2 One hand-held keypad/display
- 1.5.1.3 Eight velocity transducer assemblies and cable. The approximate distance between the flowmeter console and the transducers is 250

+/- feet.

- 1.5.1.4 One transducer insertion/removal tool (suitable for removal with 36" clearance)

#### 1.5.2 Required Equipment Functions

The ultrasonic flowmeter will be required to perform the following:

- 1.5.2.1 Indicate and totalize flow through the pipe.
- 1.5.2.2 Provide analog 4-20mA output of flowrate for the pipe

#### 1.5.3 Operating Conditions

The ultrasonic flowmeter will be used for measuring the flow of sewage in one sewer force main as shown on the drawings. The system shall be capable of being powered by a 90 to 120 volts, 60 Hz source.

The flowmeter console shall be suitable for operation in an environment with temperature ranging from 0 degrees C to 50 degrees C and relative humidity ranging from 0% to 95% (non-condensing).

The sewage flowing in the pipe will be free of entrained air.

#### 1.5.4 Experience and Qualifications

The flowmeter manufacturer shall have a minimum of ten years experience manufacturing and installing flowmeters of the multiple-parallel-path type specified.

The flowmeter system shall be the Accusonic Series 7510 Electronics Model 7601/7641 Transducers as manufactured by Accusonic Technologies, Inc., 25 Bernard St. Jean Drive, East Falmouth, MA 02536-4420. Tel. (508) 495-6600. Fax (508) 495-6699, or an approved equal.

## PART 2 PRODUCTS

### 2.1 GENERAL

All of the equipment described below shall be furnished by one supplier. Component devices which perform similar functions in each system shall be purchased from the same manufacturer.

### 2.2 TRANSDUCER ASSEMBLIES

Each transducer assembly shall be watertight and shall consist of a wettable transducer which may be removed through a ball-type valve to allow removal/replacement of the transducer without dewatering the pipeline. The operating frequency of the transducers shall be 1 MHz. The transducer shaft and transducer feedthrough assembly shall be constructed of type 316 stainless steel with PVC face. The transducer feedthrough assemblies shall utilize O-ring and/or packing seals and shall not require welding to be installed on the pipe. No welding on the pipeline will be allowed.

### 2.3 FLOWMETER CONSOLE

The flowmeter console shall be a multi-path acoustic transit time type system. The flowmeter console shall measure discrete acoustic travel times to arrive at an average velocity for each of the acoustic paths. These velocity data points shall be integrated over the cross-sectional area of flow to determine the flowrate through the pipe. The method of measuring and computing water velocity shall be independent of the speed of sound in water. The flowmeter shall be capable of operating up to 8 acoustic paths. The system shall be capable of bi-directional flow measurement.

The console shall evaluate each acoustic signal received and shall reject those which are distorted by reflections or reverberations or whose amplitude is below a minimum value. Velocity and rate-of-change-of-velocity limits shall be user-selectable and adjustable on-site.

The flowmeter console shall be equipped with an Automatic Gain Control (AGC) feature to ensure that all received acoustic signals are continuously amplified to usable levels.

The flowmeter shall have a hand-held keypad/display for user interface with the flowmeter. The user shall be able to enter all site-specific and operational parameters via the keypad. The keypad/display module shall be removable to prevent unauthorized access to the flowmeter. The system shall also be capable of communication via a PC through a Windows 95® or higher-based user interface.

The console shall be installed in a NEMA 4X enclosure suitable for wall mounting at a location in the control room 5' (+/-) from the floor. The keypad/display shall be mounted inside the enclosure.

The system shall have the capability to display pipe flowrate and totalized flow. At the user's option the system shall display a message that indicates the type and path location of a signal interruption or transducer failure.

When configured as a full-pipe meter, the flowmeter shall be equipped with an automatic path substitution feature to allow the flowmeter to continue to calculate and output flow with one or more failed paths. The flowmeter will generate a substitute velocity for the failed path or paths from the velocities of the remaining good paths, weighted by the historic flow contribution ratios for all acoustic paths. The flowmeter

console shall be capable of automatically "learning" the relative ratios of velocities on each path so that substitution coefficients will be appropriate for specific site conditions.

Analog Outputs – 4-20 mA output of flowrate in the pipe shall be provided.

The flowmeter shall be designed to return to full operation following a short-term power interruption, with all stored values retained.

#### 2.4 Transducer Cable

The contractor shall follow the routing shown on the plans and furnish all cable between the transducers and the electronic console. The cable shall be of the type specified by the flowmeter manufacturer. Any connectors to the transducers that may be required shall also be supplied by the flowmeter manufacturer.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

The Contractor shall have the flowmeter manufacturer provide a qualified Field Engineer to supervise installation of the transducer assemblies, placement and connection of the flowmeter console, and commissioning of the system.

#### 3.2 WARRANTY

The Contractor shall repair or replace any part which fails due to defects in materials or workmanship for one (1) year following installation and acceptance. Failed parts shall be returned to the manufacturer's factory for repair or replacement at no expense to the government.