

**IT IS THE VENDOR'S RESPONSIBILITY TO CHECK
FOR ADDENDUMS PRIOR TO SUBMITTING PROPOSALS**

NOTICE TO BIDDERS SPECIFICATION NO. 07-168

The City of Lincoln, Nebraska intends to purchase and invites you to submit a sealed bid for:

Skid Mounted Chemical Pumps and Dosing System for Liquid Ferrous Chloride

Sealed bids will be received by the City of Lincoln, Nebraska on or before 12:00 noon Wednesday, May 30, 2007 in the office of the Purchasing Agent, Suite 200, K Street Complex, Southwest Wing, 440 South 8th Street, Lincoln, Nebraska 68508. Bids will be publicly opened and read at the K Street Complex.

Bids may be downloaded from the City's website at www.lincoln.ne.gov Keyword: Bid. Prospective submitters must monitor the bid listing for any addendums.

Bidders should take caution if U.S. mail or mail delivery services are used for the submission of bids. Mailing should be made in sufficient time for bids to arrive in the Purchasing Division, prior to the time and date specified above. Late bids will not be considered. **Fax or e-mail bids are not acceptable. Bid response must be in a sealed envelope.**

**PROPOSAL
SPECIFICATION NO. 07-168**

**BID OPENING TIME: 12:00 NOON
DATE: May 30, 2007**

The undersigned bidder, having full knowledge of the requirements of the City of Lincoln for the below listed items and the contract documents (which include Notice to Bidders, Instructions to Bidders, this Proposal, Specifications, Contract, and any and all addenda) and all other conditions of the Proposal, agrees to sell to the City the below listed items for the performance of this Specification, complete in every respect, in strict accordance with the contract documents at and for unit prices listed below.

**THE REQUIREMENTS FOR:
SKID MOUNTED CHEMICAL METERING PUMPS AND DOSING SYSTEM**

BIDDING SCHEDULE

<u>ITEM</u>	<u>ITEM DESCRIPTION</u>	<u>QTY</u>	<u>EACH</u>	<u>TOTAL</u>
1.	Skid Mounted Chemical Pumps & Dosing System	1	\$ _____	\$ _____

BID SECURITY REQUIRED: Yes___ No X

AFFIRMATIVE ACTION PROGRAM: Successful bidder will be required to comply with the provisions of the City's Affirmative Action Policy (Contract Compliance, Sec. 1.16). The Equal Opportunity Officer will determine compliance or non-compliance with the City's policy upon a complete and substantial review of successful bidder's equal opportunity policies, procedures and practices.

The undersigned signatory for the bidder represents and warrants that he has full and complete authority to submit this proposal to the City, and to enter into a contract if this proposal is accepted.

RETURN 2 COMPLETE COPIES OF BID AND SUPPORTING MATERIAL.
MARK OUTSIDE OF BID ENVELOPE:

SEALED BID FOR SPEC. 07-042

COMPANY NAME

BY (Signature)

STREET ADDRESS or P.O. BOX

(Print Name)

CITY, STATE ZIP CODE

(Title)

TELEPHONE No. FAX No.

(Date)

ESTIMATED DELIVERY DAYS

TERMS OF PAYMENT

E-MAIL ADDRESS

Bids may be inspected in the Purchasing Division offices during normal business hours, after tabulation by the purchasing agent. If you desire a copy of the bid tabulation to be mailed to you, you must enclose a self-addressed stamped envelope with your bidding documents. Bid tabulations can also be viewed on our website at: <http://www.ci.lincoln.ne.us/city/finance/purch/specindx.htm>

INSTRUCTIONS TO BIDDERS

CITY OF LINCOLN, NEBRASKA

1. BIDDING PROCEDURE

- 1.1 Bidder shall submit one (1) complete set of the bid documents and all supporting material, unless otherwise stipulated. All appropriate blanks shall be completed. Any interlineation, alteration or erasure on the specification document shall be initialed by the signer of the bid. Bidder shall not change the proposal form nor make additional stipulations on the specification document. Any amplified or qualifying information shall be on the bidder's letterhead and firmly attached to the specification document.
- 1.2 Bid prices shall be submitted on the Proposal Form included in the bid document.
- 1.3 Bidders may submit a bid on an "all or none" or "lump sum" basis, but should also submit a quotation on an item-by-item basis. Bidding documents shall be clearly marked indicating the kind of proposal being submitted.
- 1.4 Any person signing a bid for a firm, corporation, or other organization must show evidence of his authority so to bind such firm, corporation, or organization.
- 1.5 Bids received after the time and date established for receiving bids will be rejected.
- 1.6 If bidding on a Construction Contract, the City of Lincoln's Standard Specifications for Municipal Construction 2006 shall apply.
 - 1.6.1 Bidders may obtain this document from the City's Design Engineering Division of Public Works & Utilities for a small fee.
 - 1.6.2 Said document can be reviewed at Design Engineering or the Purchasing Division.
 - 1.6.3 The Standard Conditions are available on the web site.
<http://www.lincoln.ne.gov/city/pworks/engine/dconst/standard/stndspec/index.htm>

2. BIDDER'S SECURITY

- 2.1 Bid security, as a guarantee of good faith, in the form of a certified check, cashier's check, or bidder's bond, may be required to be submitted with this bid document, as indicated on the Proposal Form.
- 2.2 If alternates are submitted, only one bid security will be required, provided the bid security is based on the amount of the highest gross bid.
- 2.3 Such bid security will be returned to the unsuccessful bidders when the award of bid is made.
- 2.4 Bid security will be returned to the successful bidder(s) as follows:
 - 2.4.1 For single order bids with specified quantities: upon the delivery of all equipment or merchandise, and upon final acceptance by the City.
 - 2.4.2 For all other contracts: upon approval by the City of the executed contract and bonds.
- 2.5 City shall have the right to retain the bid security of bidders to whom an award is being considered until either:
 - 2.5.1 A contract has been executed and bonds have been furnished.
 - 2.5.2 The specified time has elapsed so that the bids may be withdrawn.
 - 2.5.3 All bids have been rejected.
- 2.6 Bid security will be forfeited to the City as full liquidated damages, but not as a penalty, for any of the following reasons, as pertains to this specification document:
 - 2.6.1 If the bidder fails to deliver the equipment or merchandise in full compliance with the accepted proposal and specifications.
 - 2.6.2 If the bidder fails or refuses to enter into a contract on forms provided by the City, and/or if the bidder fails to provide sufficient bonds or insurance within the time period as established in this specification document.

3. BIDDER'S REPRESENTATION

- 3.1 Each bidder by signing and submitting a bid, represents that the bidder has read and understands the specification documents, and the bid has been made in accordance therewith.
- 3.2 Each bidder for services further represents that the bidder has examined and is familiar with the local conditions under which the work is to be done and has correlated the observations with the requirements of the bid documents.

4. CLARIFICATION OF SPECIFICATION DOCUMENTS

- 4.1 Bidders shall promptly notify the Purchasing Agent of any ambiguity, inconsistency or error which they may discover upon examination of the specification documents.
- 4.2 Bidders desiring clarification or interpretation of the specification documents shall make a written request which must reach the Purchasing Agent at least five (5) calendar days prior to the date and time for receipt of bids.

- 4.3 Changes made to the specification documents will be made by written addenda to all known prospective bidders and posted on the City-County website at lincoln.ne.gov Keyword - Bid.
- 4.4 Oral interpretations or changes to the Specification Documents made in any other manner, will not be binding on the City; and bidders shall not rely upon such interpretations or changes.

5. ADDENDA

- 5.1 Addenda are written instruments issued by the City prior to the date for receipt of bids which modify or interpret the specification document by addition, deletion, clarification or correction.
- 5.2 Copies of addenda will be made available for inspection at the office of the Purchasing Agent and on the City-County website.
- 5.3 No addendum will be issued later than forty-eight (48) hours prior to the date and time for receipt of bids, except an addendum withdrawing the invitation to bid, or an addendum which includes postponement of the bid.
- 5.4 Bidders shall ascertain prior to submitting their bid that they have received all addenda issued, and they shall acknowledge receipt of addenda on the proposal form.

6. INDEPENDENT PRICE DETERMINATION

- 6.1 By signing and submitting this bid, the bidder certifies that the prices in this bid have been arrived at independently, without consultation, communication or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor; unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder prior to bid opening directly or indirectly to any other bidder or to any competitor; no attempt has been made, or will be made, by the bidder to induce any person or firm to submit, or not to submit, a bid for the purpose of restricting competition.

7. ANTI-LOBBYING PROVISION

- 7.1 During the period between the bid advertisement date and the contract award, bidders, including their agents and representatives, shall not lobby or promote their bid with any member of the City Council or City Staff except in the course of City-sponsored inquiries, briefings, interviews, or presentations, unless requested by the City.

8. BRAND NAMES

- 8.1 Wherever in the specifications or proposal form brand names, manufacturer, trade name, or catalog numbers are specified, it is for the purpose of establishing a grade or quality of material only; and the term "or equal" is deemed to follow.
- 8.2 It is the bidder's responsibility to identify any alternate items offered in the bid, and prove to the satisfaction of the City that said item is equal to, or better than, the product specified.
- 8.3 Bids for alternate items shall be stated in the appropriate brand on the proposal form, or if the proposal form does not contain blanks for alternates, bidder MUST attach to the specification documents on Company letterhead a statement identifying the manufacturer and brand name of each proposed alternate, plus a complete description of the alternate items including illustrations, performance test data and any other information necessary for an evaluation. The bidder must indicate any variances by item number from the specification document no matter how slight. Bidder must fully explain the variances from the specification document, since brochure information may not be sufficient.
- 8.4 If variations are not stated in the proposal, it will be assumed that the item being bid fully complies with the City's specifications.

9. DEMONSTRATIONS/SAMPLES

- 9.1 Bidders shall demonstrate the exact item(s) proposed within seven (7) calendar days from receipt of such request from the City.
- 9.2 Such demonstration can be at the City delivery location or a surrounding community.
- 9.3 If bidder does not have an item in the area, it will be at the bidder's expense to send appropriate City personnel to the nearest location to view and inspect proposed item(s).
- 9.4 If items are small and malleable, the bidder is proposing an alternate product, the bidder MUST supply a sample of the exact item. Samples will be returned at bidder's expense after receipt by the City of acceptable goods. Bidders must indicate how samples are to be returned.

10. DELIVERY (Non-Construction)

- 10.1 Each bidder shall state on his proposal form the date upon which he can make delivery of all equipment or merchandise.
- 10.2 The City reserves the right to cancel orders, or any part thereof, without obligation, if delivery is not made within the time(s) specified on the proposal form.

- 10.3 All bids shall be based upon **inside** delivery of the equipment/ merchandise F.O.B. the City at the location specified by the City, with all transportation charges paid.
- 10.4 At the time of delivery, a designated City of Lincoln employee will sign the invoice/packing slip. The signature will only indicate that the order has been received and the items actually delivered agree with the delivery invoice. This signature does not indicate all items met specifications, were received in good condition and/or that there is not possible hidden damage or shortages.

11. WARRANTIES, GUARANTEES AND MAINTENANCE

- 11.1 Copies of the following documents must accompany the bid proposal for all items being bid:
 - 11.1.1 Manufacturer's warranties and/or guarantees.
 - 11.1.2 Bidder's maintenance policies and associated costs.
- 11.2 As a minimum requirement of the City, the bidder will guarantee in writing that any defective components discovered within a one (1) year period after the date of acceptance shall be replaced at no expense to the City. Replacement parts of defective components shall be shipped at no cost to the City. Shipping costs for defective parts required to be returned to the bidder shall be paid by the bidder.

12. ACCEPTANCE OF MATERIAL

- 12.1 All components used in the manufacture or construction of materials, supplies and equipment, and all finished materials, shall be new, the latest make/model, of the best quality, and the highest grade workmanship.
- 12.2 Material delivered under this proposal shall remain the property of the bidder until:
 - 12.2.1 A physical inspection and actual usage of this material is made and found to be acceptable to the City; and
 - 12.2.2 Material is determined to be in full compliance with the specifications and accepted proposal.
- 12.3 In the event the delivered material is found to be defective or does not conform to the specification documents and accepted proposal, then the City reserves the right to cancel the order upon written notice to the bidder and return materials to the bidder at bidder's expense.
- 12.4 Successful bidder shall be required to furnish title to the material, free and clear of all liens and encumbrances, issued in the name of the City of Lincoln, Nebraska, as required by the specification documents or purchase orders.
- 12.5 Selling dealer's advertising decals, stickers or other signs shall not be affixed to equipment. Vehicle mud flaps shall be installed blank side out with no advertisements. Manufacturer's standard production forgings, stampings, nameplates and logos are acceptable.

13. BID EVALUATION AND AWARD

- 13.1 The signed bid proposal shall be considered an offer on the part of the bidder. Such offer shall be deemed accepted upon issuance by the City of purchase orders, contract award notifications, or other contract documents appropriate to the work.
- 13.2 No bid shall be modified or withdrawn for a period of ninety (90) calendar days after the time and date established for receiving bids, and each bidder so agrees in submitting the bid.
- 13.3 In case of a discrepancy between the unit prices and their extensions, the unit prices shall govern.
- 13.4 The bid will be awarded to the lowest responsible, responsive bidder whose proposal will be most advantageous to the City, and as the City deems will best serve it's requirements.
- 13.5 The City reserves the right to accept or reject any or all bids; to request rebids; to award bids item-by-item, with or without alternates, by groups, or "lump sum"; to waive minor irregularities in bids; such as shall best serve the requirements and interests of the City.
- 13.6 In order to determine if the Bidder has the experience, qualifications, resources and necessary attributes to provide the quality workmanship, materials and management required by the plans and specifications, the Bidder may be required to complete and submit additional information as deemed necessary by the City. Failure to provide the information requested to make this determination may be grounds for a declaration of non-responsive with respect to the Bidder.
- 13.7 The City reserves the right to reject irregular bids that contain unauthorized additions, conditions, alternate bids, or irregularities that make the Bid Proposal incomplete, indefinite or ambiguous.
- 13.8 Any governmental agency may piggy back on any contract entered into from this bid.

14. INDEMNIFICATION

- 14.1 The bidder shall indemnify and save harmless the City of Lincoln, Nebraska from and against all losses, claims, damages, and expenses, including, attorney's fees arising out of or resulting from the performance of the contract that results in bodily injury, sickness, disease, death, or to injury to or destruction of tangible property, including the loss of use resulting therefrom and is caused in whole or in part by the Bidder, any subcontractor, any directly or indirectly employed by any of them or anyone for whose acts any of them may be liable. This section will not require the Bidder to indemnify or hold harmless the City of Lincoln for any losses, claims damages, and expenses arising out of or resulting from the sole negligence of the City of Lincoln, Nebraska.
- 14.2 In any and all claims against the City or any of its members, officers or employees by an employee of the bidder, any subcontractor, anyone directly or indirectly employed by any of them or by anyone for whose acts made by any of them may be liable, the indemnification obligation under paragraph 13.1 shall not be limited in any way by any limitation of the amount or type of damages, compensation or benefits payable by or for the bidder or any subcontractor under worker's or workmen's compensation acts, disability benefit acts or other employee benefit acts.

15. TERMS OF PAYMENT

- 15.1 Unless stated otherwise, the City will begin processing payment within thirty (30) calendar days after all labor has been performed and all equipment or other merchandise has been delivered, and all such labor and equipment and other materials have met all contract specifications.

16. LAWS

- 16.1 The Laws of the State of Nebraska shall govern the rights, obligations, and remedies of the Parties under this proposal and any agreement reached as a result of this process.
- 16.2 Bidder agrees to abide by all applicable State and Federal laws and regulations concerning the handling and disclosure of private and confidential information concerning individuals and corporations as to inventions, copyrights, patents and patent rights.

17. AFFIRMATIVE ACTION

- 17.1 The City of Lincoln-Lancaster County Purchasing Division provides equal opportunity for all bidders and encourages minority businesses and women's business enterprises to participate in our bidding process.

18. LIVING WAGE

- 18.1 The bidders agree to pay all employees employed in the performance of this contract, a base wage of not less than the City Living Wage per section 2.81 of the Lincoln Municipal Code. This wage is subject to change every July.

19. EXECUTION OF AGREEMENT

- 19.1 Depending on the type of service provided, one of the following three (3) methods will be employed. The method applicable to this contract will be checked below:
 - a. This Contract shall consist of a **PURCHASE ORDER** and a copy of the suppliers signed bid (or referenced bid number) attached and that the same, in all particulars, becomes the agreement and contract between the parties hereto: that both parties thereby accept and agree to the terms and conditions of said bid documents, and that the parties are bound thereby and the compensation to be paid the Supplier is as set forth in the Supplier's Bid. Items not awarded, if any, have been deleted.
 - b. The contract shall consist of a **YEARLY AGREEMENT** and a copy of the suppliers signed bid attached and that the same, in all particulars, becomes the agreement and contract between the parties hereto. That both parties thereby accept and agree to the terms and conditions of said bid documents, and that the parties are bound thereby and the compensation to be paid the Supplier is as set forth in the Suppliers' Bid. Items not awarded, if any, have been deleted.
 - c. Three (3) copies of the **CONTRACT**, unless otherwise noted.
 - 1. City will furnish three (3) copies of the Contract to the successful Bidder who shall prepare attachments as required. Insurance as evidenced by a Certificate of Insurance, surety bonds properly executed, and Agreement signed with the date of signature shall be attached.
 - 2. The prepared documents shall be delivered to the City within 10 days (unless otherwise noted).
 - 3. The City will sign the Contract Agreement, insert the date of signature at the beginning of the Contract Agreement, prepare an Executive Order to go the Mayor for signature.
 - 4. Upon approval and signature from the Mayor, the City will return one copy to the Contractor.

SPECIFICATIONS 07-168

Skid Mounted Chemical Metering Pumps and Dosing System for Liquid Ferrous Chloride

1. GENERAL REQUIREMENTS

- 1.1 This specification describes skid mounted chemical feed equipment which includes but is not limited to: metering pumps, backpressure valves, pressure relief valves, isolation valves, anti-siphon valves and accessories as specified hereinafter.
- 1.2 All equipment, including pumps and skids, provided under this specification shall be new and of current design.
- 1.3 All equipment shall be obtained from a single supplier or manufacturer who, with the vendor, shall assume full responsibility for the completeness and proper operation of the chemical feed system.
- 1.4 To insure quality and unit responsibility, the pump skids must be assembled and tested by the chemical metering pump manufacturer at his facility and be a standard and regularly marketed product of that manufacturer.
- 1.5 Skids assembled by a second party fabricator, integrator or contractor shall not be acceptable.
- 1.6 The vendor shall furnish diaphragm chemical metering pump skids, with all controls, accessories, fittings, appurtenances, specialty items and all supports and anchors required for complete and operating pumping systems.
- 1.7 Acceptable manufacturer shall be ProMinent Sigma/2 Control or approved equal.
- 1.8 Bid prices shall include entire cost of the pump and dosing system and delivery.
 - 1.8.1 Bidder shall submit two (2) complete sets of bid documents and all supporting material, unless otherwise stipulated.
 - 1.8.2 All inquiries regarding these specifications shall be directed via e-mail or faxed written request to Bob Walla, Assistant Purchasing Agent (rwalla@lincoln.ne.gov)
Or Fax: (402)441-6513.
 - 1.8.2.1 These inquiries and/or responses shall be distributed to prospective bidders as an addenda.
 - 1.8.2.2 The City of Lincoln shall only reply to written inquiries received within five (5) calendar days of bid opening.
- 1.9 Bid prices shall include entire cost of the product and delivery to a specified location in Lincoln, NE.
 - 1.9.1 Delivery to:
Lincoln Wastewater Plant
2400 Teresa Street
Lincoln, NE 68521
- 1.10 Bidder shall submit two (2) complete sets of bid documents and all supporting material, unless otherwise stipulated.

2. DESIGN REQUIREMENTS

- 2.1 The Ferrous Chloride pump and dosage system components shall be designed to convey Ferrous Chloride with the following chemical properties:
 - 2.1.1 The Ferrous Chloride shall be approximately 10% concentration.
 - 2.1.2 The specific gravity shall be approximately 1.0.
 - 2.1.3 The temperature shall be between 32°F to 104°F.
- 2.2 All moving or otherwise dangerous parts capable of inflicting injury to any person in close proximity shall be fully enclosed or properly guarded.
- 2.3 Chemical feed equipment shall be of substantial construction with all parts designed for long life under working conditions, including corrosive atmospheres and intermittent or continuous operation.
 - 2.3.1 All wearing parts and items requiring adjustment shall be readily accessible.
 - 2.3.2 Each unit shall be completely enclosed and dust tight when in operation.
 - 2.3.3 All parts, which are exposed to corrosive conditions, shall be made from corrosion resistant materials or covered with suitable protective coatings.

- 2.3.4 The factory assembled chemical feed skid system shall fit through the existing building opening which is 3 ft. x 6 ft. without disassembly or modification.
- 2.4 Nameplates shall be provided and mounted on or adjacent of each chemical feeder to identify its function.
- 2.5 Selected System Options
 - 2.5.1 Dosing head material: PVDF
 - 2.5.2 Seal material: PTFE seals
 - 2.5.3 Displacement material: Diaphragm with PTFE coating
 - 2.5.4 Liquid end without valve springs
 - 2.5.5 Hydraulic connection: Standard
 - 2.5.6 Voltage supply: 115-230V, 1 ph, 60 Hz
 - 2.5.7 Cable and plug: N. American plug, 115V, 2m
 - 2.5.8 Relay: Option1 + 4-20 mA output
 - 2.5.9 Control variants: Manual + external with pulse control and analog
 - 2.5.10 Flow monitor: Input for metering monitor signal (pulse)
 - 2.5.11 Metering monitor: Type IV PVDF/EPDM

3. PERFORMANCE REQUIREMENTS

- 3.1 The Ferrous Chloride dosage pumps shall be designed to convey the Ferrous Chloride given the following pump performance requirements:
 - 3.1.1 The minimum flow shall be 25 gallons per hour.
 - 3.1.2 The maximum flow shall be 70 gallons per hour.
 - 3.1.3 The maximum discharge pressure shall be 145 psi.
- 3.2 The pump shall be capable of operating with variable speed.
- 3.3 The pumping units and skid components shall operate without or with little vibration or excessive noise over the operating speed range.
 - 3.3.1 Pumping system vibration shall not exceed the acceptable field vibration limits given in the standards of the Hydraulic Institute.
- 3.4 All wetted surfaces of the diaphragm chemical metering pumps and appurtenances shall be suitable for continuous exposure to the chemical being pumped as specified.
- 3.5 System and components shall be sized and rated for operation on 115-230 volt, 1 phase, 60 Hz service.

4. DETAILS OF CONSTRUCTION

- 4.1 The skid shall be constructed of fusion welded polypropylene sheets with adequate supports for all equipment and piping.
 - 4.1.1 Forklift truck cut outs and anchor bolt holes shall also be provided.
- 4.2 Skid shall be specially designed, constructed and installed for the service intended.
- 4.3 Each chemical feed system shall be completely assembled, mounted, calibrated, tested, and delivered to the site on a single skid.
- 4.4 The metering pump skid system shall contain the following items:
 - 4.4.1 Skid with drip lip
 - 4.4.2 Metering pumps with manual stroke length and speed adjustment
 - 4.4.3 Calibration column
 - 4.4.4 Pulsation dampener
 - 4.4.5 Pressure gauges with diaphragm seals
 - 4.4.6 Ball valves
 - 4.4.7 Pressure relief valves
 - 4.4.8 Backpressure valves
 - 4.4.9 All piping, valves, gaskets, supports, hardware, wiring, and accessories necessary for a fully functioning skid.
- 4.5 Calibration Chamber
 - 4.5.1 Provide one, clear plastic calibration chamber with vent for use in calibrating the metering pumps.
 - 4.5.2 The chamber shall be sized to give adequate capacity for a minimum 60-second draw down test.
 - 4.5.3 The scale shall give direct readings in GPH without the need for calculations.
 - 4.5.4 The calibration chamber shall be piped and valved so that each pump shall be able to utilize the calibration chamber without interfering with the operation of the other pumps.

- 4.5.5 The top of the chamber shall have a threaded fitting to allow for piping to a common vent.
- 4.6 Pulsation Dampeners
 - 4.6.1 Pulsation dampeners shall be of the single diaphragm design, capable of arresting water hammer in the pump discharge lines created by the metering pumps.
 - 4.6.2 Pulsation dampener shall dampen flow a minimum of 95 percent.
 - 4.6.3 Pulsation dampeners shall be provided with valves, gauges and fittings necessary for maintaining required air pressure in the air chamber.
 - 4.6.4 Materials of construction of diaphragm and body shall be corrosion resistant to the chemical fluid pumped.
 - 4.6.5 Provide one dampener on the discharge side of each metering pump.
 - 4.6.6 Each pulsation dampener shall include an integral pressure gauge.
- 4.7 Piping, Valves and Appurtenances
 - 4.7.1 Skid pipe and accessories shall be Schedule 80 PVC.
 - 4.7.2 True-union vented ball valves shall be utilized. Isolation valves shall be provided at all equipment connections.
 - 4.7.3 Seals shall be compatible with the chemical being pumped.
- 4.8 Back Pressure and Pressure Relief Valves
 - 4.8.1 Provide one type of each valve for each metering pump.
 - 4.8.2 Valves shall be spring-loaded, diaphragm-type, with materials of construction compatible with the specified chemical service.
- 4.9 The chemical feed system supplier shall be responsible for providing all equipment, valves and piping within the skid boundary.

5. CHEMICAL METERING PUMPS & CONTROLS

- 5.1 The chemical metering pump(s) shall be microprocessor-controlled, simplex, solenoid-driven, reciprocating, mechanically actuated diaphragm type.
- 5.2 All pumping functions shall be set by membrane-switch keypad and status shall be displayed on an illuminated LCD which is readable at an offset angle of 45 degrees.
 - 5.2.1 Keypad will allow for simple scrolling and display of programmed parameters.
 - 5.2.2 The housing shall be rated NEMA 4X.
- 5.3 The power supply shall be 120 VAC, 60 Hz, single phase.
 - 5.3.1 The microprocessor is to automatically compensate for supply voltage variations within 15% of the rated voltage such that the frequency of the pump remains constant.
- 5.4 The liquid end shall be physically separated from the drive unit by a backplate with weep hole creating an air gap.
 - 5.4.1 An elastomer shaft wiper seal shall prevent contamination of the solenoid if the primary diaphragm fails.
 - 5.4.2 The diaphragm shall be constructed of a steel core, vulcanized into nylon-reinforced EPDM, with PTFE-faced fluid contact surface.
- 5.5 The liquid end shall be Plexiglas (acrylic) with EPDM seals, with built-in coarse valve and needle valve for air bleed, manually adjusted for continuous degassing of process fluid and self-priming against pressure.
 - 5.5.1 The suction and discharge valves shall be PVC, with double ball check design.
- 5.6 Stroke length control shall be manually adjusted between 100% and 0% with a stroke adjustment knob on the pump face control.
 - 5.6.1 The LCD shall digitally display stroke length setting in 1% increments in the full range between 100% and 0%.
- 5.7 Programming shall allow pump to be calibrated so as to display pump output in gallons/hour or liters/hour.
 - 5.7.1 Calibration shall be maintained when stroke length is altered up to plus or minus 10% on the stroke length knob.
 - 5.7.2 If stroke length is altered by more than 10%, a yellow warning light will light and a flashing message "calib" will appear.
- 5.8 The pump shall be equipped with the programmable function of pressure levels to allow pump to operate at reduced pressures from the maximum rated pressure of the pump.
- 5.9 The pump shall be equipped with the programmable function of electronic interlocking of the keypad by access code to prevent unauthorized adjustments to the pump.

- 5.10 Keypad shall allow for scrolling and display on LCD such parameters as stroke frequency, stroke length, stroke counter, pump output in gals/hr or L/hr, dosing quantity, mA current input being received by pump, and indication of external mode.
- 5.11 Stroke frequency control shall be manually adjusted by touch keypads, with the set stroke rate displayed on the LCD.
 - 5.11.1 The metering pump shall be capable of receiving a pulse input via optional external control cable such that one pulse gives one pump stroke rate.
 - 5.11.2 The pump shall be capable of remote ON-OFF operation using the pause function via a voltage free contact relay through an optional control cable.
- 5.12 The pump shall accept an analog signal such that stroke frequency is proportional to 0/4-20mA or 20-4/0mA, the choice of which is programmable at the pump.
 - 5.12.1 The pump shall allow the setting of a maximum stroke rate, which corresponds to the maximum analog signal, with stroke rate proportional to signal strength below that rate.
 - 5.12.2 Programming for curve processing shall also be possible, in which any stroke frequency ratio in proportion to the electrical signal can be configured.
 - 5.12.3 Analog to digital converters external to the pump shall not be allowed.
- 5.13 PULSE MULTIPLIER/DIVIDER AND ANALOG – Both modes of frequency control, as described above, shall be configured into the metering pump.
- 5.14 Selected metering pump and control options
 - 5.14.1 Dual pump H/O/A SCADA interface panel which includes:
 - 5.14.1.1 NEMA 4X FRP enclosure
 - 5.14.1.2 Main 20A circuit breaker
 - 5.14.1.3 15A circuit breaker for each pump
 - 5.14.1.4 Two (2) H/O/A selector switches
 - 5.14.1.5 Two (2) P-16 digital process controllers
 - 5.14.1.6 Two (2) Alarm pilot lights
 - 5.14.1.7 Two (2) Analog input (4-20mA) speed command
 - 5.14.1.8 Two (2) Digital input (on/off) run command
 - 5.14.1.9 Two (2) Digital output (on/off) run status
 - 5.14.1.10 Two (2) Digital output (on/off) alarm status
 - 5.14.1.11 Two (2) Digital output (on/off) in-remote status
 - 5.14.1.12 Two (2) Analog (4-20mA) speed indication

6. SUBMITTALS

- 6.1 Shop Drawings and Data: Complete fabrication, assembly, foundation, and installation drawings, pump curves, and operation, maintenance and storage instructions, together with detailed specifications and data covering materials used, pump and motor assemblies, parts, devices and other accessories forming a part of the equipment furnished, shall be submitted for review.
- 6.2 Data and specifications for the equipment shall include, but shall not be limited to, the following:
 - 6.2.1 Manufacturer's literature, illustrations, specifications and engineering data including: dimensions, materials, size, weight, performance data showing, flow rate, discharge head, turndown, stroke rate, motor horsepower and speed.
 - 6.2.2 All calculations on pump selection, pulsation dampeners sizing, pipe sizing, etc.
 - 6.2.3 Data sheets on chemical compatibility of the wet end materials being furnished for each chemical.
 - 6.2.4 Shop drawings showing: fabrication, assembly, installation and wiring diagrams.
- 6.3 Operation and Maintenance Manuals:
 - 6.3.1 Submit three (3) sets of operation and maintenance manuals specific to the chemical feed system.
 - 6.3.2 O&M manuals shall accompany delivery of the equipment.
 - 6.3.3 O&M manual information shall consist of general operating instruction, recommended spare parts, recommended maintenance, trouble shooting guides, and exploded part assemblies.

7. QUALITY ASSURANCE

- 7.1 To insure quality and unit responsibility, the pump skids must be assembled and tested by the chemical metering pump manufacturer at his facility and be a standard and regularly marketed product of that manufacturer.
- 7.2 The manufacturer must have a physical plant, technical and design staff, and fabricating personnel to complete the work specified.
- 7.3 Skids assembled by a second party fabricator, integrator or contractor shall not be acceptable.

8. MANUFACTURER'S STARTUP SERVICE & TRAINING

- 8.1 Provide manufacturer's factory representative for the equipment specified to be present at the site for installation assistance, inspection and certification of the installation, equipment testing, startup assistance, and training of City personnel.
 - 8.1.1 Training shall be two (2) separate sessions on the same day for a period of at least two (2) hours each session.
 - 8.1.2 Testing shall include the following:
 - 8.1.2.1 Make adjustments necessary to place equipment in optimum operating condition.
 - 8.1.2.2 Furnish all testing equipment and devices required.
 - 8.1.2.3 Test the system for proper operation in the presence of the Owner.
 - 8.1.2.4 Demonstrate and document the accuracy of each pump using project supplied calibration chamber.
 - 8.1.2.5 If the system fails to meet any of the specified performance requirements, Manufacturer shall modify and/or replace defective equipment until it meets specified requirements.

9. TOOLS, SPARE PARTS AND MAINTENANCE MATERIALS

- 9.1 One set of the following spare parts shall be furnished:
 - 9.1.1 Special tools required for operation and maintenance.
 - 9.1.2 One spare parts kit per pump type supplied.
 - 9.1.2.1 Kit to include a minimum of one diaphragm, one complete suction valve, one complete discharge valve, two valve balls and one complete set of seals.
 - 9.1.3 Spare parts shall be sealed and be tagged with clear indelible identification marking and shall be stored in a dry, warm location until transferred to the Owner at the completion of the project.

10. NAMEPLATES

- 10.1 Each pump shall be furnished with a suitable nameplate securely mounted to the body of the equipment.
- 10.2 As a minimum, the nameplate for the pumps shall include the following:
 - 10.2.1 Complete equipment model number.
 - 10.2.2 Manufacturer's name and address.
 - 10.2.3 Serial number.
 - 10.2.4 Rated maximum flow capacity.
 - 10.2.5 Maximum discharge head.
 - 10.2.6 Field voltage.

11. WARRANTY

- 11.1 Manufacturer shall provide a written guarantee to the Owner to warrant the diaphragm chemical metering pump skids, controls and appurtenances for a period of one year on the skids, controls and accessories and two years on the chemical pumps from the date of Substantial Completion.
- 11.2 During the warranty period, the Manufacturer or Vendor shall provide the services of a trained technician to make all repairs and replace all defective equipment at no cost to the Owner.