

CITY OF OGALLALA, NEBRASKA

NOTICE TO BIDDERS

OGALLALA WWTP 2016-1

Sealed bids will be received by the City of Ogallala, Nebraska for the construction of Ogallala WWTP 2016-1 located at City of Ogallala, Nebraska.

Description of Work: This project shall consist of the following major items or process units:

Contract No. 1: Effluent Pumps and controls including onsite training.
1 LS

Bids for the Ogallala WWTP 2016-1, will be received until 2:00 P.M. local times, on November 1, 2016 at the City Administration Building, 411 East 2 Street, at which time they will be publicly opened and read aloud. Bids received after this time will not be accepted.

The work shall be started within 30 days of the date of the Notice to Proceed and completed by March 1, 2017 unless extended due to weather.

Each bidder shall submit, with their Bid, a certified check or Bid Bond in a separate sealed envelope, in an amount not less than five percent (5%) of the total amount of the base bid. No bidder may withdraw his proposal for at least thirty (30) days after the scheduled closing time for the receipt of bids.

Contract documents may be obtained from the ENGINEER, T.C. ENGINEERING INC.; One South Sycamore; North Platte, Nebraska 69101; (Phone: 308-534-9245) upon payment of a non-refundable deposit of Twenty-Five Dollars (\$25).

The Owner may require any bidder to submit to the Engineer, prior to the date of the Bid opening, a properly executed Contractor's Qualification Statement, AIA Document A305, and/or that his Bid be accompanied with a signed certificate from a surety company licensed in the State of Nebraska that the surety company shall provide the Bidder, if awarded the Contract, with a Performance Bond and Labor & Material Bond in the amount of one hundred percent (100%) of the Contract Sum.

The Owner reserves the right to reject any or all Bids and to waive informalities in Bids received. The Owner reserves the right to accept that bid, with or without alternates, which the Owner deems most beneficial to the City of Ogallala, Nebraska.

Dated this 27th day of September 2016.


Jane Skinner, City Clerk

Publish: October 3, 2016
 October 10, 2016
 October 17, 2016

SPECIFICATIONS FOR
Ogallala WWTP 2016-1
FOR
OGALLALA, NEBRASKA



T.C. ENGINEERING INC.
CONSULTING ENGINEERS



ONE SOUTH SYCAMORE
NORTH PLATTE, NE 69101
(308) 534 - 9245
(308) 534-3735 Fax
tcw@tcengineeringinc.com
brb@tcengineeringinc.com

**SPECIFICATIONS
Ogallala WWTP 2016-1
FOR
OGALLALA, NEBRASKA**

9/19/16

T.C. Engineering Inc.
North Platte, Nebraska

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INSTRUCTIONS TO BIDDERS

To be considered, Bids must be made in accord with these Instruction to Bidders.

IB-01. DOCUMENTS: General Contractors may obtain copies of the Contract Documents from the Engineer, between the hours of 8:00 AM and 12:00 PM and 1:00 PM and 5:00 PM, Central time, North Platte, Nebraska, Monday through Friday upon the receipt of \$100 per set. Major sub-contractors, such as mechanical and electrical, may obtain one set. Bidding Documents will not be issued to other sub-bidders. They may obtain partial sets of the Contract Documents on payment of \$5.00 per print of the required drawings and \$0.50 per copy of other required Bidding Documents. These payments are not refundable.

IB-02. EXAMINATION: Bidders shall carefully examine the Contract Documents and construction site to obtain firsthand knowledge of existing conditions. Contractors will not be given extra payments for conditions which can be determined by examining the site and Contract Documents.

IB-03. QUESTIONS: Submit all questions about Contract Documents to the Engineer. Replies will be issued to all Prime Bidders of record as Addenda to the Drawings and Project Manual, and will become part of the Contract. The Engineer and the Owner will not be responsible for oral clarification. **No technical questions received less than forty-eight (48) hours immediately preceding the Bid opening will be answered.**

IB-04. SUBSTITUTIONS: To obtain approval to use unspecified products, Bidders shall submit written requests at least ten (10) days before the Bid date and hour. Requests received after this time will not considered. Requests shall clearly describe the product for which approval is asked, including all data necessary to demonstrate acceptability. If the Product is acceptable, the Engineer will approve it in an Addendum issued to all Prime Bidders of record.

IB-05. ADDENDA AND INTERPRETATIONS: No interpretation of the meaning of the Contract Documents will be made to any Bidder orally.

Every request for such interpretation shall be in writing addressed to the Engineer, and , to be given consideration, must be received at least ten (10) days prior to the date fixed for receiving Bids. Any and all such interpretations and any supplemental instructions will be in the form of written Addenda to the Contract Documents which, if issued, will be mailed by certified mail with return receipt requested to all Bidders of record (at the respective address furnished for such purposes), not later than three (3) days prior to the date fixed for the receipt of Bids. Failure of any bidder to receive any such Addendum or interpretation shall not relieve such bidder from any obligation under his Bid as submitted. All Addenda so issued shall become part of the Contract Documents.

IB-06. BASIS OF BIDS: The bidder must include all unit cost items shown on the Bid Form; failure to comply may be cause for rejection. No segregated Bids or assignments will be considered.

IB-07. BID SECURITY: A certified check or Bid Bond in an amount not less than percent five (5%) total amount of the Base Bid, payable to the City of Ogallala, Ogallala, Nebraska, shall accompany each Bid in a separate sealed opaque envelope, bearing on the outside the bidder's name and address, and marked "**Bid Security for Ogallala WWTP 2016-1, City of Ogallala, Ogallala, Nebraska**", and marked with the division of Work or Contract it represents.

If a Bid Bond is submitted, it shall be issued by a surety company authorized the State of Nebraska to issue such bonds, shall be acceptable to the Owner, and shall be submitted on AIA Document A310, latest edition.

Bid Security will be returned to the Bidders as soon as the successful bidder has executed and delivered the Contract, and has furnished satisfactory Bonds.

IB-08. LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT: Upon his failure or refusal to execute and deliver the Contract and bonds required within ten (10) days after receiving notice of the acceptance of his Bid, the successful Bidder shall forfeit to the Owner the security deposited with his Bid as Liquidated Damages for Such failure or refusal.

IB-09. PERFORMANCE, LABOR AND MATERIAL BOND in the amount equal to one hundred percent (100%) of the Contract Price, shall be furnished by the successful Bidder in accord with the General and Supplementary Conditions and General Requirements.

IB-10. POWER OF ATTORNEY: Attorneys-in-fact who sign Bid Bonds and Contract Bonds must file with each Bond a certified and dated copy of their power of Attorney.

IB-11. SALES AND USE TAX: FINAL DETERMINATION OF TAXABLE STATUS OF PROJECT MATERIAL SHALL BE DETERMINED BY THE DEPT. OF REVENUE. IT SHALL BE THE BIDDERS RESPONSIBILITY TO DETERMINE THE TAXABLE STATUS OF MATERIAL AND LABOR FOR THIS PROJECT PRIOR TO THE BID.

IB-12. EQUIPMENT LIST: Bids shall be accompanied with an accurate list of major items of equipment to be used in assembling the installation including all items of equipment specified herein.

IB-13. PREPARATION OF BIDS: Bids shall be made on unaltered Bid Forms furnished by the Engineer. In ink or typewritten words and figures, fill in all blank spaces for Bid Prices and submit on (1) copy. Bids shall be signed by the person or persons legally authorized to bind the bidder to a Contract, with the name or names typed below the signature or signatures. Bids submitted by an agent shall have a current Power of Attorney attached certifying the authority of the agent to bind the Bidder.

IB-14. SUBMITTALS: Bids shall be submitted in opaque, sealed envelopes bearing on the outside the name and address of the Bidder, and marked "bid for Ogallala WWTP 2016-1". If Bids are sent by mail, they shall be received until November 1, 2016 by the City of Ogallala, ,Ogallala, Nebraska,69153. If Bids are faxed they shall be received by .

IB-15. MODIFICATION AND WITHDRAWAL: No Bid may be withdrawn or modified after the Bid opening, except where the award of the Contract has been delayed for thirty (30) days.

IB-16. DISQUALIFICATION: The Owner reserved the right to disqualify Bids before or after opening, upon evidence of collusion with the intent to defraud or other illegal practices upon the part of the Bidder.

IB-17. OPENING: Bids will be received until the appointed hour at which time they will be publicly opened and read aloud. Bids received after this time will not be accepted.

IB-18. BID AWARD: The Contract will be awarded to the responsive, responsible Bidder submitting the lowest Base Bid with or without alternates provided his Bid is reasonable and it is in the Owner's interest to accept it. The Owner reserves the right to reject any and all Bids received. The Owner shall have the right to reject any or all Bids and to reject bids not accompanied by required Bid Security.

IB-18.1 The Owner reserves the right to retain the security of the next 3 lowest bidders until the selected bidder enters into contract, or until Thirty (30) days subsequent to the receipt of bids, whichever is shorter. Bid security will be returned after contract with successful bidder has been executed or 60 days after receipt of bids; whichever

period is shorter.

IB-18.2 All other Bid Security will be retired as soon as practicable. If any bidder refuses to enter into an agreement, within 10 days from notice of the award of contract, the Owner will retain his Bid Security as liquidated damages, but Not add a penalty. The Bid Security is to be submitted with the Bid Form.

IB-19. FAIR LABOR STANDARDS: Each Bid shall be accompanied with a statement from the bidder that he is complying with, and will continue to comply with, Fair Labor Standards according to law, in the pursuit of his business and in the execution of the Contract on which he is bidding.

IB-20. BID AWARD: The Contract will be awarded to the responsive, responsible Bidder submitting the lowest Base Bid and/or applicable alternates provided his Bid is reasonable and it is in the Owner's interest to accept it. The Owner reserves the right to reject any and all Bids received. The Owner shall have the right to reject any or all Bids and to reject bids not accompanied by required Bid Security.

IB-21. QUALIFICATIONS OF CONTRACTORS STATEMENT: The Owner will not award to any bidder who cannot furnish satisfactory evidence that he has adequate equipment and personnel to complete the work properly within the time stated in the proposal, and that he has suitable financial status to promptly meet all obligations incidental to performing the work.

BID FOR OGALLALA WWTP 2016-1

Wastewater Plant in OGALLALA, NEBRASKA

Bid of _____,

a corporation organized and existing under the laws of the

State of _____;

a partnership consisting of _____

_____ partners; or,

a sole proprietor;

hereinafter called the Bidder.

To: City of Ogallala
411 E 2nd St
Ogallala NE 69153

The undersigned acknowledges that he has received, and has familiarized himself with the following:

Project Manual for City of Ogallala, Nebraska, WWTP 2016-1

Addenda: _____ through _____

The undersigned further acknowledges that he has visited the site, and has familiarized himself with local conditions affecting the cost of the Work at the place where the Work is to be done.

In submitting this Bid, the Undersigned agrees:

1. To furnish all material, labor, survey stakes, tools expendable equipment, bailing, shoring removal, overhead, profit, insurance, etc., and all utility and transportation services necessary to perform and complete, in a workmanlike manner, any individual Project contract or Contracts for which Bids are submitted, in accord with the Bidding Documents prepared by T.C. Engineering Inc., for the consideration hereinafter set forth.
2. To hold his Bid open for Thirty (30) days after the receipt of Bids and to accept the provisions of the Instructions to Bidders regarding disposition of Bid Security.
3. To enter into and execute a Contract, if awarded on the basis of this Bid, to furnish a Performance Bond and a Labor and Material Bond in accord with the General Conditions and General Requirements of this Contract, and to deliver executed Contract and Bonds to the Engineer within ten (10) days after Notice of Award. The Bid Security shall become the property of the Owner in the event the Contract and Bonds are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

4. To deliver materials to Owner by March 1st, 2017.
5. Acknowledges that he has reviewed and read the Drawings, Project Manual (Specifications), General Conditions, and Special Conditions, and that there are no errors in, or omissions from, the Drawings and Project Manual. In the event there are errors in or omissions from, the Drawings and Project Manual, he never-the-less accepts same as is.

BID SCHEDULE: The quantities are estimated. Unit Prices are for the complete installation of each item and related work thereto. (Amounts shall be shown in both Unit Prices and Total Amounts. In case of discrepancy, Unit Prices shall govern).

PROJECT CONTRACT NO. 1 (Material and Shipping)

The undersigned agrees to perform all of the Work required to complete Project Contract No. 1 for the following Unit Prices based upon Measurements in accord with Section 01200 Progress and Payment:

<u>NO.</u>	<u>ITEM</u>	<u>AMOUNT</u>	<u>UNIT</u>	<u>UNIT PRICE</u>	<u>TOTAL PRICE</u>
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SCHEDULE 1 Effluent Pumps:

1.	Submersible Pump with 15HP Submersible electric motor, 1050 GPM @ 29 TDH connected for operation on 460 Volt, 3 Phase, 60 hertz, 4 wire service, with 50 feet of submersible cable; including elbow inlet and stands; MiniCas per pump; new triplex pump station control panel suitable for floor mounting; panel to be NEMA 12 painted and lockable; spare air breakers to be included. (Supplier will confirm electrical requirements prior to ordering)			\$ _____	\$ _____
	1 LS				

TOTAL SCHEDULE 1				\$ _____	\$ _____
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TOTAL SCHEDULE 1 written in words \$ _____

TOTAL ADDITIVE ALTERNATE 1 written in words \$ _____

Equipment:

Pumps: _____ Control Panel: _____

EXPERIENCE DATA: Each bidder shall supply the following data on their experience on attached form or below:

Name of Bidder: _____

<u>Owner Contact Name and Phone No.</u>	<u>Project Location</u>	<u>Project Description (type and cost)</u>	<u>Completion Date</u>
---	-------------------------	--	------------------------

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Additional Data: _____

Respectfully Submitted:

Signature

Title

Address

Address

Address

Telephone

Date: _____

Corporate Seal:

License # : _____

FAX # _____

Email Address

GENERAL CONDITIONS

- | | |
|--|---|
| 1. Definitions | 16. Correction of Work |
| 2. Additional Instructions and Detail Drawings | 17. Subsurface Conditions |
| 3. Schedules, Reports, and Records | 18. Suspension of Work, Termination and Delay |
| 4. Drawings and Specifications | 19. Payments to Contractor |
| 5. Shop Drawings | 20. Acceptance of Final Payment as Release |
| 6. Materials, Services and Facilities | 21. Insurance |
| 7. Inspection and Testing | 22. Contract Security |
| 8. Substitutions | 23. Assignments |
| 9. Patents | 24. Indemnification |
| 10. Surveys, Permits, Regulations | 25. Separate Contracts |
| 11. Protection of Work, Property, Persons | 26. Subcontracting |
| 12. Supervision by Contractor | 27. Engineer's Authority |
| 13. Changes in the Work | 28. Land and Rights-of-Way |
| 14. Changes in Contract Price | 29. Guaranty |
| 15. Time for Completion and Liquidated Damages | 30. Arbitration |
| | 31. Taxes |

1. DEFINITIONS

1.1 Wherever used in the CONTRACT DOCUMENTS, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:

1.2 ADDENDA- Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the CONTRACT DOCUMENTS, DRAWINGS, and SPECIFICATIONS, by additions, deletions, clarifications or corrections.

1.3 BID- The offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed.

1.4 BIDDER- Any person, firm or corporation submitting a BID for the WORK.

1.5 BONDS- BID, Performance, and Payment Bonds and other instruments of security, furnished by the CONTRACTOR and his surety in accordance with the CONTRACT DOCUMENTS.

1.6 CHANGE ORDER- A written order to the CONTRACTOR authorizing an addition, deletion or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE or CONTRACT TIME.

1.7 CONTRACT DOCUMENTS- The contract, including Advertisement For Bids, Information For Bidders, BID, Bid Bond, Agreement, Payment Bond, Performance Bond, NOTICE OF AWARD, NOTICE TO PROCEED, CHANGE ORDER, DRAWINGS, SPECIFICATIONS, AND ADDENDA.

1.8 CONTRACT PRICE- The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.

1.9 CONTRACT TIME- The number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.

1.10 CONTRACTOR- The person, firm or corporation with whom the OWNER has executed the Agreement.

1.11 DRAWINGS- The part of the CONTRACT DOCUMENTS which show the characteristics and scope of the WORK to be performed and which have been prepared or approved by the ENGINEER.

1.12 ENGINEER- The person, firm or corporation named as such in the CONTRACT DOCUMENTS.

1.13 FIELD ORDER- A written order effecting a change in the WORK not involving an adjustment in the CONTRACT PRICE, or an extension of the CONTRACT TIME, issued by the ENGINEER to the CONTRACTOR during construction.

1.14 NOTICE OF AWARD- The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.

1.15 NOTICE TO PROCEED- Written communication issued by the OWNER to the CONTRACTOR authorizing him to proceed with the WORK and establishing the date of commencement of the WORK.

1.16 OWNER- A public or quasi-public, body or authority, corporation, association, partnership, or individual for whom the WORK is to be performed.

1.17 PROJECT- The undertaking to be performed as provided in the CONTRACT DOCUMENTS.

1.18 RESIDENT PROJECT REPRESENTATIVE- The authorized representative of the OWNER who is assigned to the PROJECT site or any part thereof.

1.19 SHOP DRAWINGS- All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the CONTRACTOR, a SUBCONTRACTOR, manufacturer, SUPPLIER or distributor, which illustrate how specific portions of the WORK shall be fabricated or installed.

1.20 SPECIFICATIONS- A part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

1.21 SUBCONTRACTOR- An individual, firm or corporation having a direct contract with the CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK at the site.

1.22 SUBSTANTIAL COMPLETION- That date as certified by the ENGINEER when the construction of the PROJECT or a specified part thereof is sufficiently completed, in accordance with the CONTRACT DOCUMENTS, so that the PROJECT or specified part can be utilized for the purposes for which it is intended.

1.23 SUPPLEMENTAL GENERAL CONDITIONS Modifications to General Conditions required by a Federal agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS or such requirements that may be imposed by applicable state laws.

1.24 SUPPLIER- Any person or organization who supplies materials or equipment for the WORK, including that fabricated to a special design, but who does not perform labor at the site.

1.25 WORK- All labor necessary to produce the construction required by the CONTRACT DOCUMENTS, and all materials and equipment incorporated or to be incorporated in the PROJECT.

1.26 WRITTEN NOTICE- Any notice to any party or the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the WORK.

2. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

2.1 The CONTRACTOR may be furnished additional instructions and detail drawings, by the ENGINEER, as necessary to carry out the WORK required by the CONTRACT DOCUMENTS.

2.2 The additional drawings and instruction thus supplied will become a part of the CONTRACT DOCUMENTS. The CONTRACTOR shall carry out the WORK in accordance with the additional detail drawings and instructions.

3. SCHEDULES, REPORTS AND RECORDS

3.1 The CONTRACTOR shall submit to the OWNER such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data where applicable as are required by the CONTRACT DOCUMENTS for the WORK to be performed.

3.2 Prior to the first partial payment estimate the CONTRACTOR shall submit construction progress schedules showing the order in which he proposes to carry on the WORK, including dates at which he will start the various parts of the WORK, estimated date of completion of each part and, as applicable:

3.2.1 The dates at which special detail drawings will be required; and

3.2.2 Respective dates for submission of SHOP DRAWINGS, the beginning of manufacture, the testing and the installation of materials, supplies, and equipment.

4. DRAWINGS AND SPECIFICATIONS

4.1 The intent of the DRAWINGS and SPECIFICATIONS is that the CONTRACTOR shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the WORK in accordance with the CONTRACT DOCUMENTS and all incidental work necessary to complete the PROJECT in an acceptable manner, ready for use, occupancy or operation by the OWNER.

4.2 In case of conflict between the DRAWINGS and SPECIFICATIONS, the SPECIFICATIONS shall govern. Figure dimensions on DRAWINGS shall govern over scale dimensions, detailed DRAWINGS shall govern over general DRAWINGS.

4.3 Any discrepancies found between the DRAWINGS and SPECIFICATIONS and site conditions or any inconsistencies or ambiguities in the DRAWINGS or SPECIFICATIONS shall be immediately reported to the ENGINEER, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. WORK done by the CONTRACTOR after his discovery of such discrepancies, inconsistencies, or ambiguities shall be done at the CONTRACTOR'S risk.

5. SHOP DRAWINGS

5.1 The CONTRACTOR shall provide SHOP DRAWINGS as may be necessary for the prosecutions of the WORK as required by the CONTRACT DOCUMENTS. The engineer shall promptly review all SHOP DRAWINGS. The ENGINEER'S approval of any SHOP DRAWINGS shall not release the CONTRACTOR from responsibility for deviations from the CONTRACT DOCUMENTS. The approval of any SHOP DRAWING which substantially deviates from the requirement of the CONTRACT DOCUMENTS shall be evidenced by a CHANGE ORDER.

5.2 When submitted for the ENGINEER'S review, SHOP DRAWINGS shall bear the CONTRACTORS certification that he has reviewed, checked, and approved the SHOP DRAWINGS and that they are in conformance with the requirements of the CONTRACT DOCUMENTS.

5.3 Portions of the WORK requiring a SHOP DRAWING or sample submission shall not begin until the SHOP DRAWING or submission has been approved by the ENGINEER. A copy of each approved SHOP DRAWING and each approved sample shall be kept in good order by the CONTRACTOR at the site and shall be available to the ENGINEER.

6. MATERIALS, SERVICES, AND FACILITIES

6.1 It is understood that, except as otherwise specifically stated in the CONTRACT DOCUMENTS, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature whatsoever necessary to execute, complete, and deliver the WORK within the specified time.

6.2 Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the WORK. Stored materials and equipment to be incorporated in the WORK shall be located so as to facilitate prompt inspection.

6.3 Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

6.4 Materials, supplies and equipment shall be in accordance with samples submitted by the CONTRACTOR and approved by the ENGINEER.

6.5 Materials, supplies, or equipment to be incorporated into the WORK shall not be purchased by the CONTRACTOR or the SUBCONTRACTOR subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

7. INSPECTION AND TESTING

7.1 All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the CONTRACT DOCUMENTS.

7.2 The OWNER shall provide all inspection and testing services not required by the CONTRACT DOCUMENTS.

7.3 The CONTRACTOR shall provide at his expense the testing and inspection services required by the CONTRACT DOCUMENTS.

7.4 If the CONTRACT DOCUMENTS, laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction required any WORK to specifically be inspected, tested, or approved by someone other than the CONTRACTOR, the CONTRACTOR will give the ENGINEER timely notice of readiness. The CONTRACTOR will then furnish the ENGINEER the required certificates of inspection, testing or approval.

7.5 Inspections, tests or approvals by the engineer or others shall not relieve the CONTRACTOR from his obligations to perform the WORK in accordance with the requirements of the CONTRACT DOCUMENTS.

7.6 The ENGINEER and his representatives will at all times have access to the WORK. In addition, authorized representatives and agents of any participating Federal or state agency shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records. The CONTRACTOR will provide proper facilities for such access and observation of the WORK and also for any inspection, or testing thereof.

7.7 If any WORK is covered contrary to the written instructions of the ENGINEER it must, if requested by the ENGINEER, be uncovered for his observation and replaced at the CONTRACTOR'S expense.

7.8 If the ENGINEER considers it necessary or advisable that covered WORK be inspected or tested by others, the CONTRACTOR, at the ENGINEER'S request, will uncover, expose or otherwise make available for observation, inspection or testing as the ENGINEER may require, that portion of the WORK in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such WORK is defective, the CONTRACTOR will bear all the expenses of such uncovering, exposure, observation, inspection, and testing and of satisfactory reconstruction. If, however, such WORK is not found to be defective, the CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction, and an appropriate CHANGE ORDER shall be issued.

8 SUBSTITUTIONS

8.1 Whenever a material, article, or piece of equipment is identified on the DRAWINGS or SPECIFICATIONS by reference to brand name or catalogue number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality, and function shall be considered. The CONTRACTOR may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the CONTRACT DOCUMENTS by reference to brand name or catalogue number, and if, in the opinion of the ENGINEER, such material, article, or piece of equipment is of equal substance and function to that specified, by the ENGINEER may approve its substitution and use by the CONTRACTOR. Any cost differential shall be deductible from the CONTRACT PRICE and the CONTRACT DOCUMENTS shall be appropriately modified by CHANGE ORDER. The CONTRACTOR warrants that if substitutes are approved, no major changes in the function or general design of the PROJECT will result. Incidental changes or extra component parts required to accommodate the substitute will be made by the CONTRACTOR without a change in the CONTRACT PRICE or CONTRACT TIME.

9. PATENTS

9.1 The CONTRACTOR shall pay all applicable royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and save the OWNER harmless from loss on account thereof, except that the OWNER shall be responsible for any such loss when a particular process, design, or the product of a particular manufacturer or manufacturers is specified, however if the CONTRACTOR has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the ENGINEER.

10. SURVEYS, PERMITS, REGULATIONS

10.1 The OWNER shall furnish all boundary surveys and establish all base lines for locating the principal component parts of the WORK together with a suitable number of bench marks adjacent to the WORK as shown in the CONTRACT DOCUMENTS. From the information provided by the OWNER, unless otherwise specified in the CONTRACT DOCUMENTS, the CONTRACTOR shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, stakes for pile locations and other working points, lines elevations and cut sheets.

10.2 The CONTRACTOR shall carefully preserve bench marks, reference points and stakes and, in case of willful or careless destruction, he shall be charged with the resulting expense and shall be responsible for any mistakes that any be caused by their unnecessary loss or disturbance.

10.3 Permits and licenses of a temporary nature necessary for the prosecution of the WORK shall be secured and paid for by the CONTRACTOR unless otherwise stated in the SUPPLEMENTAL GENERAL CONDITIONS. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for

by the OWNER, unless otherwise specified. The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the WORK as drawn and specified. If the CONTRACTOR observes that the CONTRACT DOCUMENTS are at variance therewith, he shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in Section 13, CHANGES IN THE WORK.

11. PROTECTION OF WORK, PROPERTY AND PERSONS

11.1 The CONTRACTOR will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the WORK. He will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the WORK and other persons who may be affected thereby, all the WORK and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

11.2 The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He will erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. HE will notify owners of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the CONTRACTOR, any SUBCONTRACTOR or anyone directly or indirectly employed by any of them or anyone for whose acts any of them be liable, except damage or loss attributable to the fault of the CONTRACT DOCUMENTS or to the acts or omissions of the OWNER or the ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the CONTRACTOR.

11.3 In emergencies affecting the safety of persons or the WORK or property at the site or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the ENGINEER or OWNER, shall act to prevent threatened damage, injury or loss. HE will give the ENGINEER prompt WRITTEN NOTICE of any significant changes in the WORK or deviations from the CONTRACT DOCUMENTS caused thereby, and a CHANGE ORDER shall thereupon be issued covering the changes and deviations involved.

12. SUPERVISION BY CONTRACTOR

12.1 The CONTRACTOR will supervise and direct the WORK. He will be solely responsible for the means, methods, techniques, sequences, and procedures of construction. The CONTRACTOR will employ and maintain on the WORK a qualified supervisor or superintendent who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR'S representative at the site. The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. The supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the WORK.

13 CHANGES IN THE WORK

13.1 The OWNER may at any time, as the need arises, order changes within the scope of the WORK without invalidating the Agreement. IF such changes increase or decrease the amount due under the CONTRACT DOCUMENTS, or in the time required for performance of the WORK, an equitable adjustment shall be authorized by CHANGE ORDER.

13.2 The ENGINEER, also, may at any time, by issuing a FIELD ORDER, make changes in the details of the WORK. The CONTRACTOR shall proceed with the performance of any changes in the WORK so ordered by the ENGINEER unless the CONTRACTOR believes that such FIELD ORDER entitles him to a change in CONTRACT PRICE or TIME, or both, in which event he shall give the ENGINEER WRITTEN NOTICE thereof within seven (7) days after the receipt of the ordered change. Thereafter the CONTRACT shall document the basis for the change in CONTRACT PRICE or TIME, within thirty (30) days. The CONTRACTOR shall not execute such changes pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER.

14. CHANGES IN CONTRACT PRICE

14.1 The CONTRACT PRICE may be changed only by a CHANGE ORDER. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one or more of the following methods in the order of precedence listed below:

- (a) Unit prices previously approved.
- (b) An agreed lump sum.
- (c) The Maximum percent which shall be allowed for CONTRACTOR'S combined overhead

and profit shall be as follows:

- a. For the subcontractor; 10% of the net extra cost of the work he performs.
- b. For the Contractor, 5% of the net extra cost of the work performed by the subcontractors.
- c. For the Contractor, 10% of the net extra cost of the work he performs with his own forces. The cost shall include all direct and necessary production costs of the work itself, i.e., labor and items incidental to labor (such as public liability and workmen's compensation insurance, old-age and unemployment insurance, social security), pro-rata charges for foremen, material, and the use of power tools and equipment.

Among the items to be considered as overhead and not as cost are insurance other than as mentioned, premium or bond(s) required by the Contract, supervision, superintendents, timekeepers, clerks, watchmen, small tools, incidental job burdens, and general office expense.

For each Change Order issued, the Contractor shall furnish an itemized, bona fide, written proposal in multiple-copy form and with such supporting papers as the Engineer may require.

The general contractor will be allowed an additional 5% for all change orders less than \$500.

15. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

15.1 The date of beginning and the time for completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the NOTICE TO PROCEED.

15.2 The CONTRACTOR will proceed with the WORK at such rate of progress to insure full completion within the CONTRACT TIME. IT is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the CONTRACT TIME for the completion of the WORK described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.

15.3 IF the CONTRACTOR shall fail to complete the WORK within the CONTRACT TIME, or extension of time granted by the OWNER, then the CONTRACTOR will pay to the OWNER the amount for liquidated damages as specified in the BID for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the CONTRACT DOCUMENTS.

15.4 The CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the WORK is due to the following and the CONTRACTOR has promptly given WRITTEN NOTICE of such delay to the OWNER or ENGINEER.

15.4.1 To any preference, priority or allocation order duly issued by the OWNER.

15.4.2 To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including but not restricted to, acts of God, or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a contract with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and

15.4.3 To any delays of SUBCONTRACTORS occasioned by any of the causes specified in paragraphs 15.4.1 and 15.4.2 of this article.

16. CORRECTION OF WORK

16.1 The CONTRACTOR shall promptly remove from the premises all WORK rejected by the ENGINEER for failure to comply with the CONTRACT DOCUMENTS, whether incorporated in the construction or not, and the CONTRACTOR shall promptly replace and re-execute the WORK in accordance with the CONTRACT DOCUMENTS and without expense to the OWNER and shall bear the expense of making good all WORK of other CONTRACTORS

destroyed or damaged by such removal or replacement.

16.2 All removal and replacement WORK shall be done at the CONTRACTOR'S expense. IF the CONTRACTOR does not take action to remove such rejected WORK within ten (10) days after receipt of WRITTEN NOTICE, the OWNER may remove such WORK and store the materials at the expense of the CONTRACTOR.

17. SUBSURFACE CONDITIONS

17.1 The CONTRACTOR shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the OWNER by WRITTEN NOTICE of:

17.1.1 Subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENTS; or

17.1.2 Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in WORK of the character provided for in the CONTRACT DOCUMENTS.

17.2 The OWNER shall promptly investigate the conditions, and if he finds that such conditions do materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the WORK, an equitable adjustment shall be made and the CONTRACT DOCUMENTS shall be modified by a CHANGE ORDER. Any claim of the CONTRACTOR for adjustment hereunder shall not be allowed unless he has given the required WRITTEN NOTICE; provided that the OWNER may, if he determines the facts so justify, consider and adjust any such claims asserted before the date of final payment.

18. SUSPENSION OF WORK, TERMINATION AND DELAY

18.1 The OWNER may suspend the WORK or any portion thereof for a period of not more than ninety days or such further time as agreed upon by the CONTRACTOR, by WRITTEN NOTICE to the CONTRACTOR and the ENGINEER which notice shall fix the date on which WORK shall be resumed. The CONTRACTOR will resume that WORK on the date so fixed. The CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to any suspension.

18.2 If the CONTRACTOR is adjudged a bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of his property, or if he files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he repeatedly fails to make prompt payments to SUBCONTRACTORS or for labor, materials or equipment or if he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the WORK or if he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the WORK or if he disregards the authority of the ENGINEER, or if he otherwise violates any provision of the CONTRACT DOCUMENTS, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and his surety a minimum of ten (10) days from delivery of a WRITTEN NOTICE, terminate the services of the CONTRACTOR, and finish the WORK by whatever method he may deem expedient. In such case the CONTRACTOR shall not be entitled to receive any further payment until the WORK is finished. If the unpaid balance of the CONTRACT PRICE exceeds the direct and indirect costs of completing the PROJECT, including compensation for additional professional services, such excess SHALL BE PAID TO THE CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.

18.3 Where the CONTRACTOR'S services have been so terminated by the OWNER, said termination shall not affect any right of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of monies by the OWNER due the CONTRACTOR will not release the CONTRACTOR from compliance with the CONTRACT DOCUMENTS.

18.4 After ten (10) days from delivery of a WRITTEN NOTICE to the CONTRACTOR and the ENGINEER, the OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the PROJECT and terminate the Contract. In such case, the CONTRACTOR shall be paid for all WORK executed and any expense sustained plus reasonable profit.

18.5 If, through no act or fault of the CONTRACTOR, the WORK is suspended for a period of more than ninety (90) days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any request for payment within thirty (30) days after it is submitted, or the OWNER fails to pay the CONTRACTOR substantially the sum approved by the Engineer or awarded by arbitrators within thirty (30) days of its approval and presentation, then the CONTRACTOR may, after ten (10) days from delivery of a WRITTEN NOTICE to the OWNER and the

ENGINEER, terminate the CONTRACT and recover from the OWNER payment for all WORK executed and all expenses sustained. In addition and in lieu of terminating the CONTRACT, if the ENGINEER has failed to act on a request for payment or if the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon ten (10) days written notice to the OWNER and the ENGINEER stop the WORK until he has been paid all amounts then due, in which event and upon resumption of the WORK, CHANGE ORDERS shall be issued for adjusting the CONTRACT PRICE or extending the CONTRACT TIME or both to compensate for the costs and delays attributable to the stoppage of the WORK.

18.6 If the performance of all or any portion of the WORK is suspended, delayed, or interrupted as a result of a failure of the OWNER or ENGINEER to act within the time specified in the CONTRACT DOCUMENTS, or if no time is specified, within a reasonable time, an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, shall be made by CHANGE ORDER to compensate the CONTRACTOR for the costs and delays necessarily caused by the failure of the OWNER or ENGINEER.

19. PAYMENTS TO CONTRACTOR

19.1 At least ten (10) days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as the ENGINEER may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the WORK but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER's title to the material and equipment and protect his interest therein, including applicable insurance. The ENGINEER will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing his reasons for refusing to approve payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the partial payment estimate. The OWNER will, within ten (10) days of presentation to him of an approved partial payment estimate, pay the CONTRACTOR a progress payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate. The OWNER shall retain ten (10) percent of the amount of each payment until final completion and acceptance of all work covered by the CONTRACT DOCUMENTS. The OWNER at any time, however, after fifty (50) percent of the WORK has been completed, if he finds that satisfactory progress is being made, shall reduce retainage to five (5%) percent on the current and remaining estimates. When the WORK is substantially complete (operational or beneficial occupancy), the retained amount may be further reduced below five (5%) percent to only that amount necessary to assure completion. On completion and acceptance of a part of the WORK on which the price is stated separately in the CONTRACT DOCUMENTS, payment may be made in full, including retained percentages, less authorized deductions.

19.2 The request for payment may also include an allowance for the cost of such major materials and equipment which are suitably stored either at or near the site.

19.3 Prior to SUBSTANTIAL COMPLETION, the OWNER, with the approval of the ENGINEER and with the concurrence of the CONTRACTOR, may use any completed or substantially completed portions of the WORK. Such use shall not constitute an acceptance of such portions of the WORK.

19.4 The OWNER shall have the right to enter the premises for the purpose of doing work not covered by the CONTRACT DOCUMENTS. This provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the WORK, or the restoration of any damaged WORK except such as may be caused by agents or employees of the OWNER.

19.5 Upon completion and acceptance of the WORK, the ENGINEER shall issue a certificate attached to the final payment request that the WORK has been accepted by him under the conditions of the CONTRACT DOCUMENTS. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within thirty (30) days of completion and acceptance of the WORK.

19.6 The CONTRACTOR will indemnify and save the OWNER or the OWNER'S agents harmless from all claims growing out of the lawful demands of SUBCONTRACTORS, laborers, workmen, mechanics, material, men, and furnishes of machinery, and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the WORK. The CONTRACTOR shall, at the OWNER'S request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the CONTRACTOR fails to do so the OWNER may, after having notified the CONTRACTOR, either pay unpaid bills or withhold from the CONTRACTOR'S unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful

claims until satisfactory evidence is furnished that all liabilities have been full discharged where- upon payment to the CONTRACTOR shall be resumed, in accordance with the terms of the CONTRACT DOCUMENTS, but in no event shall the provisions of this sentence be construed to impose any obligations upon the OWNER to either the CONTRACTOR, his Surety, or any third party. In paying any unpaid bills of the CONTRACTOR, any payment so made by the OWNER shall be considered as a payment made under the CONTRACT DOCUMENTS by the OWNER to the CONTRACTOR and the OWNER shall not be liable to the CONTRACTOR for any such payments made in good faith.

19.7 If the OWNER fails to make payment thirty (30) days after approval by the ENGINEER, in addition to other remedies available to the CONTRACTOR, there shall be added to each such payment interest at the maximum legal rate commencing on the first day after said payment is due and continuing until the payment is received by the CONTRACTOR.

20. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

20.1 The acceptance by the CONTRACTOR of final payment shall be and shall operate as a release to the owner of all claims and all liability to the CONTRACTOR other than claims in stated amounts as may be specifically excepted by the CONTRACTOR for all things done or furnished in connection with this WORK and for every act and neglect of the OWNER and others relating to or arising out of this WORK. Any payment, however, final or otherwise, shall not release the CONTRACTOR or his sureties from any obligations under the CONTRACT DOCUMENTS or the Performance BOND and Payment BONDS.

21 INSURANCE

21.1 The CONTRACTOR shall purchase and maintain such insurance as will protect him from claims set forth below which may arise out of or result from the CONTRACTOR'S execution of the WORK, whether such execution be by himself or by any SUBCONTRACTOR or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

21.1.1 Claims under workmen's compensation disability benefit and other similar employee benefits;

21.1.2 Claims for damages because of bodily injury, occupations sickness or disease, or death of his employees;

21.1.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees;

21.1.4 Claims for damages because of injury to or destruction of tangible property, including loss of use resulting there from.

21.2 Certificates of Insurance acceptable to the OWNER shall be filed with the OWNER prior to commencement of the WORK. These Certificates shall contain a provision that coverage afforded under the policies will not be cancelled unless at least fifteen (15) days prior WRITTEN NOTICE has been given to the OWNER.

21.3 The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, liability insurance as hereinafter specified;

21.3.1 CONTRACTOR'S General Public Liability and Property Damage Insurance including vehicle coverage issued to the CONTRACTOR and protecting him from all claims for personal injury, including death, and all claims for destruction of or damage to property, arising out of or in connection with any operations under the CONTRACT DOCUMENTS, whether such operations be by himself or by any SUBCONTRACTOR under him, or anyone directly or indirectly employed by the CONTRACTOR or by a SUBCONTRACTOR under him. Insurance shall be written with a limit of liability of not less the \$500,000 for all damages arising out of bodily injury, including death, at any time resulting there from, sustained by any one person in any one accident; and a limit of liability of not less than \$200,000 for all property damage sustained by any one person in any one accident; and a limit of liability of not less than \$200,000 aggregate for any such damage sustained by two or more persons in any one accident.

21.3.2 The CONTRACTOR shall acquire and maintain, if applicable. Fire and Expended Coverage insurance upon the PROJECT to the full insurable value thereof for the benefit of the OWNER, the CONTRACTOR, and SUB-CONTRACTORS as their interest may appear. This provision shall in no way release the CONTRACTOR or CONTRACTOR'S surety from obligations under the CONTRACT DOCUMENTS to fully complete the PROJECT.

21.4 The CONTRACTOR shall procure and maintain at his own expense, during the CONTRACT TIME, in

accordance with the provisions of the laws of the state in which the work is performed. Workmen's Compensation Insurance, including occupational disease provisions, for all of his employees at the site of the PROJECT and in case any work is sublet, the CONTRACTOR shall required such SUBCONTRACTOR similarly to provide Workmen's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. In case any class of employees engaged in hazardous work under this contract at the site of the PROJECT is not protected under Workmen's Compensation statute, the CONTRACTOR shall provide, adequate and suitable insurance for the protection of his employees not otherwise protected.

21.5 The CONTRACTOR shall secure, if applicable "All Risk" type Builder's Risk Insurance for WORK to be performed. Unless specifically authorized by the OWNER, the amount of such insurance shall not be less than the CONTRACT PRICE totaled in the BID. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind, collapse, riot, aircraft, and smoke during the CONTRACT TIME, and until the WORK is accepted by the OWNER. The policy shall name as the insured the CONTRACTOR, the ENGINEER, and the OWNER.

22. CONTRACT SECURITY

22.1 The CONTRACTOR shall within ten (10) days after the receipt of the NOTICE OF AWARD furnish the OWNER with a Performance Bond and a Payment Bond in penal sums equal to the amount of the CONTRACT PRICE, conditioned upon the performance by the CONTRACTOR of all undertakings, covenants, terms, conditions and agreements of the CONTRACT DOCUMENTS, and upon the prompt payment by the CONTRACTOR to all persons supplying labor and materials in the prosecution of the WORK provided by the CONTRACT DOCUMENTS. Such BONDS shall be executed by the CONTRACTOR and a corporate bonding company licensed to transact such business in the state in which the WORK is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these BONDS shall be borne by the CONTRACTOR. If at any time a surety on any such BOND is declared a bankrupt or loses its right to do business in the state in which the WORK is to be performed or is removed from the list of Surety Companies accepted on Federal BONDS, CONTRACTOR shall within ten (10) days after notice from the OWNER to do so, substitute an acceptable BOND (or BONDS) in such form and sum and signed by such other surety or sureties as may be satisfactory to the OWNER. The premiums on such BOND shall be paid by the CONTRACTOR.

No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.

23. ASSIGNMENTS

23.1 Neither the CONTRACTOR nor the OWNER shall sell, transfer, assign or otherwise dispose of the Contract or any portion thereof, or of his right, title or interest therein, or his obligations thereunder, without written consent of the other party.

24 INDEMNIFICATION

24.1 The CONTRACTOR will indemnify and hold harmless the OWNER and the ENGINEER and their agents and employees from and against all claims, damages losses and expenses including attorney's fees arising out of or resulting from the performance of the WORK, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting there from; and is caused in whole or in part by any negligent or willful act or omission of the CONTRACTOR or SUBCONTRACTOR, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

24.2 In any and all claims against the OWNER or the ENGINEER, or any of their agents or employees, by any employee of the CONTRACTOR, any SUBCONTRACTOR, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the CONTRACTOR or any SUBCONTRACTOR under workmen's compensation acts, disability benefit acts or other employee benefits acts.

24.3 The obligation of the CONTRACTOR under this paragraph shall not extend to the liability of the ENGINEER, his agents or employees arising out of the preparation or approval of maps, DRAWINGS, opinions, reports, surveys, CHANGE ORDERS, designs or SPECIFICATIONS.

25. SEPARATE CONTRACTS

25.1 The OWNER reserves the right to let other contracts in connection with this PROJECT. The CONTRACTOR shall afford other CONTRACTORS reasonable opportunity for the introduction and storage of their materials and the execution of their WORK, and shall properly connect and coordinate his WORK with theirs. If the proper execution or results of any part of the CONTRACTOR'S WORK depends upon the WORK of any other CONTRACTOR, the CONTRACTOR shall inspect and promptly report to the ENGINEER any defects in such WORK that render it unsuitable for such proper execution and results.

25.2 The OWNER may perform additional WORK related to the PROJECT by himself, or he may let other contracts containing provisions similar to these. The CONTRACTOR will afford the other CONTRACTORS who are parties to such Contracts (or the OWNER, if he is performing the additional WORK himself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of WORK, and shall properly connect and coordinate his WORK with theirs.

25.3 IF the performance of additional WORK by other CONTRACTORS or the OWNER is not noted in the CONTRACT DOCUMENTS prior to the execution of the CONTRACT, written notice thereof shall be given to the CONTRACTOR prior to the starting any such additional WORK. If the CONTRACTOR believes that the performance of such additional WORK by the OWNER or other involves him in additional expense or entitles him to an extension of the CONTRACT TIME, he may make a claim therefore as provided in Sections 14 and 15.

26. SUBCONTRACTING

26.1 The CONTRACTOR may utilize the services of specialty SUBCONTRACTORS on those parts of the WORK which, under normal contracting practices, are performed by specialty SUBCONTRACTORS.

26.2 The CONTRACTOR shall not award WORK to SUBCONTRACTOR(s), in excess of fifty (50%) percent of the CONTRACT PRICE, without prior written approval of the OWNER.

26.3 The CONTRACTOR shall be sully responsible to the OWNER for the acts and omissions of his SUBCONTRACTORS, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

26.4 The CONTRACTOR shall cause appropriate provisions to be inserted in all subcontracts relative to the WORK to bind SUBCONTRACTORS to the CONTRACTOR by the terms of the CONTRACT DOCUMENTS insofar as applicable to the WORK of SUBCONTRACTORS and to give the CONTRACTOR the same power as regards terminating any subcontract that the OWNER may exercise over the CONTRACTOR under any provision of the CONTRACTOR DOCUMENTS.

26.4 Nothing contained in this CONTRACT shall create any contractual relation between any SUBCONTRACTOR and the OWNER.

27. ENGINEER'S AUTHORITY

27.1 The ENGINEER shall act as the OWNER'S representative during the construction period. He shall decide questions which may arise as to the quality and acceptability of materials furnished and WORK performed. He shall interpret the intent of the CONTRACT DOCUMENTS in a fair and unbiased manner. The ENGINEER will make visits to the site and determine if the WORK is proceeding in accordance with the CONTRACT DOCUMENTS.

27.2 The CONTRACTOR will be held strictly to the intent of the CONTRACT DOCUMENTS in regard to the quality of materials, workmanship and execution of the WORK. Inspections may be made at the factory or fabrication plant of the source of material supply.

27.3 The ENGINEER will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

27.4 The ENGINEER shall promptly make decisions relative to interpretation of the CONTRACT DOCUMENTS.

28. LAND AND RIGHTS-OF-WAY

28.1 Prior to issuance of NOTICE TO PROCEED, the OWNER shall obtain all land and rights-of-way necessary for carrying out and for the completion of the WORK to be performed pursuant to the CONTRACT DOCUMENTS, unless otherwise mutually agreed.

28.2 The OWNER shall provide to the CONTRACTOR information which delineates and describes the lands owned

and rights-of-way acquired.

28.3 The CONTRACTOR shall provide at his own expense and without liability to the OWNER any additional land and access thereto that the CONTRACTOR may desire for temporary construction facilities, or for storage of materials.

29. GUARANTY

29.1 The CONTRACTOR shall guarantee all materials and equipment furnished and WORK performed for a period of one (1) year from the date of SUBSTANTIAL COMPLETION. The CONTRACTOR warrants and guarantees for a period of one (1) year from the date of SUBSTANTIAL COMPLETION of the system that the completed system is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such correction as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects. The OWNER will give notice of observed defects with reasonable promptness. IN the event that the CONTRACTOR should fail to make such repairs, adjustments, or other WORK that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance BOND shall remain in full force and effect through the guarantee period.

30. ARBITRATION

30.1 All claims, disputes and other matters in question arising out of, or relating to, the CONTRACT DOCUMENTS or the breach thereof, except for claims which have been waived by the making and acceptance of final payment as provided by Section 20, shall be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association. This agreement to arbitrate shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in any court having jurisdiction thereof.

30.2 Notice of the demand for arbitration shall be filed in writing with the other party to the CONTRACT DOCUMENTS and with the American Arbitration Association, and a copy shall be filed with the ENGINEER. Demand for arbitration shall in no event be made on any claim, dispute or other matter in question which would be barred by the applicable statute of limitations.

30.3 The CONTRACTOR will carry on the WORK and maintain the progress schedule during any arbitration proceedings, unless otherwise mutually agreed in writing

31. TAXES

31.1 The CONTRACTOR will pay all sales, consumer, use and other similar taxes required by the law of the place where the WORK is performed.

ADDITIONAL CONDITIONS

1.0 ENGINEER

1.1 Whenever reference is made to the Engineer, it shall mean T.C. Engineering Inc., One South Sycamore, North Platte, NE 69101.

1.2 The Contract Documents shall not be construed to create any contractual relationship of any kind between the Engineer and the Contractor, but the Engineer shall be entitled to performance of obligations intended for his benefit, and to enforcement thereof. Nothing contained in the Contract Documents shall create any contractual relationship between the Owner or the Engineer and any Subcontractor or Sub-subcontractor.

1.3 The Engineer will visit the site at intervals appropriate to the stage of construction to familiarize himself generally with the progress and quality of the Work and to determine in general if the Work is proceeding in accordance with the Contract documents. However, the Engineer will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. ON the basis of his on-site observations as an Engineer, he will keep the Owner informed of the progress of the Work, and will endeavor to guard the Owner against defects and deficiencies in the Work of the Contractor.

1.4 The Engineer will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, and he will not be responsible for the contractor's failure to carry out the Work in accordance with the Contract Documents.

1.5 Based on the Engineer's observations and an evaluation of the contractor's partial payment estimate, the Engineer will determine the amounts owing to the Contractor and will approve partial payment in such amounts, as provided in the General Conditions.

1.6 Claims, disputes and other matters in question between the Contractor and the Owner relating to the execution or progress of the Work or the interpretation of the Contract Documents shall be referred initially to the Engineer for decision which he will render in writing within a reasonable time.

2.0 CONTRACTOR

2.1 The Contractor warrants to the Owner and the Engineer that all materials and equipment furnished under this Contract will be new unless otherwise specified, and that all Work will be of good quality, free from faults and defects, and in conformance with the Contract Documents. All Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by the Engineer, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

2.2 The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with any materials or equipment.

2.3 Cutting and Patching of Work

2.3.1 The Contractor shall be responsible for all cutting, fitting or patching that may be required to complete the Work or to make its several parts fit together properly.

2.3.2 The Contractor shall not damage or endanger any portion of the Work or the work of the Owner or any separate contractors by cutting, patching or otherwise altering any work, or by excavation. The Contractor shall not cut or otherwise alter the work of the Owner or any separate contractor without his prior written consent to cutting or otherwise altering the Work.

2.4 Cleaning Up

2.4.1 The Contractor at all times shall keep the premises free from accumulation of waste materials caused by his operations. At the completion of the Work, he shall remove all his waste materials caused by his operations. **Contractor shall leave site in a "HAND-RAKED" finish.**

2.4.2 If the Contractor fails to clean up at the completion of the Work, the Owner may do so and the cost thereof shall be charged to the Contractor.

2.5 The Contractor shall forward all communications to the Owner through the Engineer.

2.6 The Contractor shall maintain at the site for the Owner one record copy of all Drawings, Specifications, Addenda, Change Orders and other modifications, in good order and marked currently to record all changes made during construction, and approved Shop Drawings, Product Data and Samples. These shall be available to the Engineer, and shall be delivered to him for the Owner upon completion of the Work.

3.0 WORK BY OWNER OR SEPARATE CONTRACTOR

3.1 Mutual Responsibility

3.1.1. The Contractor shall afford the Owner and separate contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work, and shall connect and coordinate his Work with theirs as required by the Contract Documents.

3.1.2 If any part of the Contractor's Work depends for proper execution of results upon the work of the Owner or any separate contractor, the Contractor shall, prior to proceeding with the Work, promptly report to the Engineer any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results. Failure of the Contractor to report shall constitute an acceptance of the Owner's or separate contractors' work as fit and proper to receive his Work, except as to defects which may subsequently become apparent in such work by others.

3.1.3 Any costs caused by defective or ill-timed work shall be borne by the party responsible therefore.

3.1.4 Should the Contractor wrongfully cause damage to the work or property of the Owner, or to other work on the site, the Contractor shall promptly remedy such damage as provided in the General Conditions.

3.1.5 Should the Contractor wrongfully cause damage to the work or property of any separate contractor, the Contractor shall upon due notice promptly attempt to settle with such other contractor by agreement, or otherwise to resolve the dispute. If such separate contractor sues or initiates an arbitration proceeding against the Owner on account of any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor who shall defend such proceedings at the Owner's expense, and if any judgment or award against the Owner arises there

from, the Contractor shall pay or satisfy it and shall reimburse the Owner for all attorneys' fees and court or arbitration costs which the Owner has incurred.

3.2 Owner's Right to Clean Up

3.2.1 If a dispute arises between the Contractor and separate contractors as to their responsibility for cleaning up as required by Paragraph 2.4, the Owner may clean up and charge the cost thereof to the contractors responsible therefore as the Engineer shall determine to be just.

4.0 MISCELLANEOUS PROVISIONS

4.1 Should either party to the Contract suffer injury or damage to person or property because of any act or omission of the other party or of any of his employees, agents, or others for whose acts he is legally liable, claim shall be made in writing to such other party within a reasonable time after the first observance of such injury or damage.

4.3 Rights and remedies

4.3.1 The duties and obligations imposed by the Contract Documents and the rights and remedies available there under shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

4.3.2 No action or failure to act by the Owner, Engineer or Contractor shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach there under, except as may be specifically agreed in writing.

5.0 PAYMENTS AND COMPLETION

5.1 Before the first partial payment estimate, the Contractor shall submit to the Engineer a schedule of values allocated to the various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Engineer may require. This schedule, unless objected to by the Engineer, shall be used only as a basis for the Contractor's partial payment estimates.

5.2 The Contractor warrants that title to all Work, materials and equipment covered by a partial payment estimate will pass to the Owner either by incorporation in the construction or upon the receipt of payment by the Contractor, whichever occurs first, free and clear of all liens, claims, security interests or encumbrances; and that no Work, materials or equipment covered by an Application for Payment will have been acquired by the Contractor, or by any other person performing Work at the site or furnishing materials and equipment for the Project, subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or such other person.

5.3 The approval of a partial payment estimate will constitute a representation by the Engineer to the Owner, based on his observations at the site as provided herein and the data comprising the request for payment, that the Work has progressed to the point indicated; that, to the best of his knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to the results of any subsequent tasks required by or performed under the Contract Documents, to minor deviations from the Contract documents correctable prior to completion, and to any specific qualifications stated in writing; and that the Contractor is entitled to payment in the amount approved. However, by approving a partial payment estimate, the Engineer shall not thereby be deemed to represent that he has made exhaustive or continuous on-site inspections to check the quality or quantity of the Work or that he has reviewed the construction means, methods, techniques, sequences or procedures, or that he has made any examination to ascertain how or for what purpose the Contractor

has used the moneys previously paid on account of the Contract Price.

5.4 No approval of a partial payment estimate, nor any payment, nor any partial or entire use or occupancy of the Project by the Owner, shall constitute an acceptance or any Work not in accordance with the Contract Documents.

6.0 ACCEPTANCE OR DEFECTIVE OR NON-CONFORMING WORK

6.1 IF the Owner prefers to accept defective or non-conforming Work, he may do so instead or requiring its removal and correction, in which case a Change Order will be issued to reflect a reduction in the Contracted Price where appropriate and equitable.

7.0 DRAWINGS AND SPECIFICATIONS AT THE SITE

7.1 The Contractor shall maintain at the site for the Engineer one copy of all Drawings, Specifications, Addenda, approved Shop Drawings, Change Orders, and other Modifications, in good order, and marked to record all changes made during construction. These shall be available to the Engineer. The Drawings, marked to record all changes made during construction, shall be delivered to him upon completion of the work.

8.0 ENUMERATION OF THE DRAWINGS, PROJECT MANUAL AND ADDENDA

8.1 Following are the Drawings, Project Manual, and Addenda which form a part of this Contract as set forth the accompanying General Conditions of the Contract for Construction:

Drawings: Sheets: N/A.

Project Manual

Addenda: As Issued

9.0 FINAL QUANTITIES

9.1 The Owner reserves the right to increase or decrease, within reasonable limits, any of the quantities shown. The term "reasonable limits" shall mean a twenty-five percent (25%) increase or decrease in the quantities on any one Contract or Bid item. In the event that the actual quantities differ more than the reasonable limits, an equitable revision of the Unit Price shall be made when requested by wither the Owner or Contractor, in writing.

DIVISION 1

<u>GENERAL REQUIREMENTS</u>	<u>Pages</u>
Section 01010 Summary of the Work	01010-1
Section 01150 Project Meetings	01150-1
Section 01200 Progress and Payment	01200-1; 2
Section 01300 Submittals	01300-1;
Section 01400 Testing Laboratory Services	01400-1
Section 01500 Temporary Facilities	01500-1; 3
Section 01600 Material and Equipment	01600-1
Section 01700 Project Closeout	01700-1

SECTION 01010

SUMMARY OF THE WORK

1.0 THIS CONTRACT includes all material, labor, tools, expendable equipment, utility and transportation services, and all incidental items necessary to perform and complete, in a workmanlike manner, the Work required for the construction of the **Ogallala WWTP 2016-1, Ogallala, Nebraska, Nebraska.**

Supplier shall provide pumps and controls including on-site training. City will acquire installation services for pump and panel. Supplier to coordinate start up with installation.

2.0 WORK ON WEEKENDS AND HOLIDAYS. Except for strictly emergency work or for protection of property or work required by these Specifications, no work shall be performed by the Contractor on Weekends or holidays without permission from the Owner. The intent of this requirement is that the public or any individuals shall not be unduly disturbed by the construction operations on the said days.

SECTION 01150

PROJECT MEETINGS

1.0 PRECONSTRUCTION CONFERENCE. The Contractor shall attend a preconstruction conference to discuss and clarify contract administration procedures, requirements under which the construction operation is to proceed. The Owner and the Engineer may also attend. The Engineer will notify the Contractor of the date, time, and location of the conference.

SECTION 01200

PROGRESS AND PAYMENT

1.0 APPLICATION FOR PAYMENT shall be submitted to the Engineer on the one week before the 4th Tuesday of the month for City of Ogallala payment. Work completed and material stored up to five days prior to the day on which the Application for Payment is submitted. Applications for Payment shall be submitted in triplicate on forms provided by the Engineer.

2.0 PAYMENT Upon certification by the Engineer, the Owner shall, at the next regularly scheduled meeting, pay to the Contractor, on account of the contract, 90 percent of the value of labor and materials incorporated in the Work and 90 percent of materials suitably stored in accord with the General Conditions.

3.0 REDUCTION IN RETAINAGE AFTER WORK IS FIFTY PERCENT COMPLETE. After 50 percent of the Work is complete, and upon receipt of Applications for Payment accompanied by Consent of Surety to Reduction in or Partial Release of Retainage, executed in duplicate on AIA Documents G707A, June 1971 Edition, the Engineer, if he finds satisfactory progress is being made, will certify reduction in retainage to five percent, and 50 percent of the funds previously retained will be released to the Contractor. A cash bond or irrevocable letter of credit may be accepted in lieu of all or part of the retainage when it reaches five percent or less.

4.0 REDUCTION IN RETAINAGE AFTER SUBSTANTIAL COMPLETION. After substantial Completion, and upon receipt of Applications for Payment accompanied by Consent of Surety to Reduction in or Partial Release of Retainage executed in duplicate on AIA Document G707A, June, 1971 Edition, the Engineer will certify reduction in retainage to the amount necessary to assure completion.

5.0 FINAL PAYMENT. After final Completion of any Project Contract, and upon receipt of Applications for Payment accompanied by Consent of Surety Company to Final Payment and Contractor's Affidavit of Payment of Debts and Claims executed in duplicate on AIA Documents G707 and G706, April, 1970, Editions respectively, and upon certification of the Engineer, the Owner shall pay the Contractor the entire balance of the Contract Sum applicable to the Project Contract.

6.0 MEASUREMENT

6.1 ASPHALT shall be measured by the ton of mixed aggregate and asphalt as specified in-place, and shall be paid for at the unit price bid per ton which price shall constitute full payment for cleaning base or underlying course, for producing, furnishing, transporting, stock piling, heating, drying, and screening for aggregate materials; for furnishing, handling, measuring, mixing, manipulating and placing of materials; for hauling placing, shaping, compacting, and finishing of the paving mix; for tacking and tack oil; for improving unsatisfactory areas; for reconditioning underlying courses; for furnishing samples; for furnishing those tests specified; for maintenance of the completed Work until final acceptance; for all materials necessary to complete the Work as described in the Project Manual or Specification and Drawings or Plans.

6.2 PIPE AND CASING shall be measured on the surface of the ground from center to center of junctions in the pipelines, or from center of junction to end of pipe line for dead-end lines or service lines. No deductions for length of line will be made for fittings, manholes and valves installed in the line. Payment will be made on this basis at the price per foot of line of the various sizes installed. Connections shall be made to existing pipe lines at no additional compensation, but the cost thereof shall be included in the unit price bid for main. No additional payment shall be made for couplers, followers, glands, lugs, nuts, rivets, washers, and the like. No additional payment shall be made for jacking or boring service lines beneath pavement or sidewalks.

6.3 FITTINGS shall be measured by the piece and shall be paid at the Unit Price bid per piece. Measurement shall be for the fitting only, and bolts, flanges, glands, followers and other appurtenances shall not be included in the measurement.

6.4 PAVEMENT removed and replaced, or installed during the construction shall be paid as per the unit price bid for asphalt or concrete repair. Pavement cuts exceeding the following shall be repaired but not included in the quantity for payment:

10" Pipe	60" Trench Width
8" Pipe	60" Trench Width
4" or 6" Pipe	48" Trench Width
2" Pipe	18" Trench Width
less than 2" Pipe	10" Trench Width
Valves	10 SF/ea
Fittings	5 SF/ea
Fire Hydrants	20 SF/ea

THE ENGINEER SHALL MAKE THE FINAL DETERMINATION AS TO THE RESPONSIBILITY OF CUTS.

6.5 EXCAVATION shall be determined by the "average end area" method for all materials measured in its original position at the actual start of construction. The average end area method shall be computed using a minimum of three elevations, one/side and one/center line, at a maximum of 100-ft. intervals. Payment shall be made per cubic yard of material removed as specified. No additional payment shall be made for material scarified and re-compacted in-place, including compacted subgrade beneath pavement and curb and gutter. Unacceptable subgrade material shall be removed at the same unit price per cubic yard as for the excavation bid price.

6.6 CRUSHED CONCRETE OR AGGREGATE FILL shall be measured by the ton of aggregate and as specified compacted in-place, and shall be paid for at the unit price bid per ton which price shall constitute full payment for cleaning subgrade; for producing, furnishing, transporting, stock piling and screening for aggregate materials; for furnishing, handling, measuring, manipulating and placing of materials; for hauling placing, shaping, compacting, of the fill; for improving unsatisfactory areas; for furnishing samples; for furnishing those tests specified; for all materials necessary to complete the Work as described in the Project Manual or Specification and Drawings or Plans.

6.7 INDIVIDUAL ITEMS including valves, fire hydrants and the like shall be paid at the unit price bid for the various kinds and sizes installed.

7.0 MISCELLANEOUS ITEMS called for on the drawings or included in the specifications or project manual, and not specifically named in the Bid Form shall be considered Incidental Expenses and included in the unit price bid for the associated bid item. No additional payment shall be made for Incidental Expenses. Examples include testing, signs or poles removed and replaced, off-site fill material, connections, traffic control, miscellaneous tunneling, storm sewer repair or reconstruction.

8.0 TREES required to be removed for construction shall be removed as an Incidental Expense by the Contractor, and at no additional cost to the Owner. No additional payment shall be made for trimming trees.

9.0 PIT-RUN, SAND, AND GRAVEL shall be included in the unit price bid per cubic yard. The weight of sand, gravel and cobble shall be determined by using 2,700 pounds per cubic yard. Weight tickets shall be furnished to the Engineer for the sand and gravel.

10.0 FINAL QUANTITIES. The Owner reserves the right to increase or decrease, within reasonable limits, any of the quantities shown. The term "reasonable limits" shall mean a twenty-five percent (25%) increase or decrease in the quantities on any one Contract or Bid item. In the event that the actual quantities differ more than the reasonable limits, an equitable revision of the Unit Price shall be made when requested by either the Owner or Contractor, in writing.

SECTION 01300

SUBMITTALS

1.0 SUBMITTALS SPECIFIED IN OTHER SECTIONS are as follows:

Section 01400 Testing Reports

2.0 AIA DOCUMENTS which are required for submittals in this or other Sections of these Specifications may be obtained from:

Association Services
1910 South 44th Street
Omaha, Nebraska 68105
402/556-8506

3.0 CERTIFICATE OF INSURANCE, shall be submitted to the Owner's insurance representative by the Contractor prior to the commencement of the Work.

4.0 DELETE

5.0 SHOP DRAWINGS AND PRODUCT DATA, shall be submitted to the Engineer, prior to 50 percent completion of the contract. Failure to submit shop drawings by 50 percent completion shall result in the withholding of contract payment until such time shop drawings are submitted.

5.01 TRANSMITTAL FORMS. Each transmittal shall be accompanied by two (2) Shop Drawing Transmittal Forms furnished by the Engineer and completed and consecutively numbered by the Contractor.

5.02 SHOP DRAWINGS. Submit one sepia print, not exceeding 30 inches x 42 inches in size, for each sheet of shop drawings.

5.03 PRODUCT DATA. Submit in seven (5) copies. Shop drawings and product data shall be submitted for the following:

<u>Section No.</u>	<u>Description</u>
011938	Pumps
011938	Control Panel

SECTION 01600

MATERIAL AND EQUIPMENT

1.0 MATERIAL AND EQUIPMENT shall be for the manufacture, model, and type specified. Substitute material and equipment approved prior to bidding, in accord with the Instructions to Bidders, are incorporated into these Specifications as Addenda.

2.0 MATERIAL AND EQUIPMENT OF ACCEPTABLE MANUFACTURE. An item of material or equipment may be used in place of an item which is specified by manufacturer and model number or type, provided that all of the following provisions are met:

- .1 The item is manufactured by one of the acceptable manufacturers listed in the Specifications.
- .2 The item of material or equipment meets or exceeds the minimum qualities established by the specified item.
- .3 The item is used throughout the project so that all items of material or equipment used in place of specified items are of the same make and type.
- .4 The entire cost of all modifications which result from the use of items in place of specified items shall be borne by the Contractor who uses such items, at no additional cost to other Contractors or to the Owner.

3.0 REPEATED FEATURES OR MATERIAL must be constructed alike, although detailed or indicated only once. Detail and ornament must continue throughout all moldings, bands, etc. Where items, devices, or equipment are specified singular in number, the Specification shall apply to as many items, devices, or pieces of equipment as are shown on the Drawings or required to complete the installation. Repeated items of material or equipment shall be of the same manufacture, model number, and type.

4.0 WHEN BULKY MATERIAL AND EQUIPMENT ARE FURNISHED BY OTHERS, the Contractor shall, upon receipt of notice in ample time, leave proper openings to permit the installation and properly close such openings afterward.

SECTION 11938

WASTEWATER PUMPING EQUIPMENT

1.0 GENERAL

1.01 CONSTRUCTION

1.01.2 CONSTRUCTION AND MATERIALS SHALL CONFORM WITH THE STANDARDS OF THE NEBRASKA DEPT. OF ENVIRONMENTAL QUALITY, THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, AND APPLICABLE STANDARDS OF THE WATER ENVIRONMENT FEDERATION AND TEN STATES STANDARDS.

2.0 DRY PIT SUBMERSIBLE PUMPS AND CONTROL SYSTEM

2.01 GENERAL

2.02 DESCRIPTION

The Contractor shall furnish all labor, materials, equipment and incidentals required to provide complete wastewater pumping station as shown on the drawings and specified herein.

2.03 SHOP DRAWINGS

SUBMIT SHOP DRAWINGS AND MANUFACTURER'S LITERATURE to the Engineer. Submittals include, but are not limited to, the following:

Pump (pump, characteristic curves)	Electrical
Electric Motors	Control Panel

All other information necessary to enable the Engineer to determine whether the proposed equipment meets the specified requirements.

2.04 WORKMANSHIP & GUARANTEES

The completed stations and all appurtenances shall carry a two year guarantee covering defects in design, material and workmanship, that when properly installed, operated and maintained, shall serve its specified purpose. Warranty shall be for 24 months after start up, 30 months maximum from delivery at client, whichever comes first.

In the event a component fails to properly perform its function or is proven defective during the guarantee period, the manufacturer shall provide replacement parts without cost. The labor required to repair or replace major items including the structure, pumps and/or motors, valves or fittings shall also be furnished without charge during this period. Items that are normally consumed during service such as light bulbs, grease, packing and seals are exempt from this guarantee, unless it is due to manufacturer defect.

2.05 PRODUCTS

Dry-Pit Submersible Pumps
Stand Elbows

2.06 DESIGN REQUIREMENTS

The Contractor shall furnish and install dry-pit submersible pumps and all accessories in accordance with these specifications and the manufacturers' recommendations.

Power at the pump station shall be 460 volt, 3 phase, 60 hertz maintained within industry standards. Supplier shall verify voltage with City of Ogallala and Utility (as needed) before ordering pumps.

2.07 SUBMITTALS

Product Information and Data

Submittals shall include, at a minimum, the following data:

Major component characteristics

Materials of construction

Major dimensions

Motor data

Pump curves showing duty point, capacity, heat, net positive suction head (NPSH), and hydraulic brake horsepower (BHP)

Full description of components for pump protection

Operation and Maintenance Manuals – Furnish five (5) copies of O & M Manuals.

A technical representative, authorized by the manufacturer, shall provide guidance to the contractor as to proper handling and installation of the equipment. That same representative shall also inspect the completed installation and correct any defects, deficiencies, or malfunctions, for not less than 4 hours on-site continuously.

A technical representative, authorized by the manufacturer, shall instruct operating personnel in the proper operation and maintenance of the equipment as described in subsequent sections of this specification

2.08 WARRANTY

The pump manufacturer shall provide a five (5) year, non-prorated warranty on the motor and pump to the Owner against defects in workmanship and materials.

Components that fail to perform as specified by the Engineer, or as represented by the Manufacturer, or as proven defective in service during the warranty period, shall be replaced, repaired, or satisfactorily modified without cost to the Owner. This shall include wear items, including seals.

3.0 EXECUTION

Furnish and install (3) submersible non-clog wastewater pump(s). Each pump shall be equipped with a 15 HP submersible electric motor connected for operation on 460 volts, 3 phase, 60 hertz, 4 wire service with 50 feet of submersible cable (SUBCAB) suitable for submersible pump applications. The power cable shall be sized according to NEC and ICEA standards and have P-MSHA Approval.

The pump shall be supplied with a mating cast iron discharge connection and be capable of delivering 1050 GPM at 29 TDH. The pump(s) (Dry pit installation) Pump shall be capable of operating in a continuous non submerged condition in vertical (NT) position in a dry pit installation and permanently connected to inlet and outlet pipes. Pump shall be of submersible construction and will continue to operate satisfactorily should the dry pit be subjected to flooding.

Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. The lifting handle shall be of stainless steel. All exposed nuts or bolts shall be AISI type 316 stainless steel construction. All metal surfaces coming into contact with the pumpage, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile rubber O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit.

Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.

Each unit shall be provided with an integral motor cooling system. A stainless steel motor cooling jacket shall encircle the stator housing, providing for dissipation of motor heat regardless of the type of pump installation. An impeller, integral to the cooling system and driven by the pump shaft, shall provide the necessary circulation of the cooling liquid through the jacket. The cooling liquid shall pass about the stator housing in the closed loop system in turbulent flow providing for superior heat transfer. The cooling system shall have one fill port and one drain port integral to the cooling jacket. The cooling system shall provide for continuous pump operation in liquid or ambient temperatures of up to 104°F (40°C). Operational restrictions at temperatures below 104°F are not acceptable. Fans, blowers or auxiliary cooling systems that are mounted external to the pump motor are not acceptable.

The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall consist of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the body containing a strain relief function, separate from the function of sealing the cable. The assembly shall provide ease of changing the cable when necessary using the same entry seal. The cable entry junction chamber and motor shall be separated by a stator lead sealing gland or terminal board, which shall isolate the interior from foreign material gaining access through the pump top. Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable.

The pump motor shall be a NEMA B design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%. The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31. The stator shall be heat-shrink fitted into the cast iron stator housing. The use of multiple step dip and bake-type stator insulation process is not acceptable. The use of bolts, pins or other fastening devices requiring penetration of the stator housing is not acceptable. The motor shall be designed for continuous duty handling pumped media of 40°C (104°F) and capable of no less than 15 evenly spaced starts per hour. The rotor bars and short circuit rings shall be made of cast aluminum. Thermal switches set to open at 125°C (260°F) shall be embedded in the stator end coils to monitor the temperature of each phase winding. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the control panel. The junction chamber containing the terminal board, shall be hermetically sealed from the motor by an elastomer compression seal. Connection between the cable conductors and stator leads shall be made with threaded compression type binding posts permanently affixed to a terminal board. The motor and the pump shall be produced by the same manufacturer.

The combined service factor (combined effect of voltage, frequency and specific gravity) shall be a minimum of 1.15. The motor shall have a voltage tolerance of plus or minus 10%. The motor shall be designed for operation up to 40°C

(104°F) ambient and with a temperature rise not to exceed 80°C. A performance chart shall be provided upon request showing curves for torque, current, power factor, input/output kW and efficiency. This chart shall also include data on starting and no-load characteristics.

The power cable shall be sized according to the NEC and ICEA standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket of the cable shall be oil resistant chlorinated polyethylene rubber. The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 50 feet or greater.

The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.

The pump shaft shall rotate on two bearings. Motor bearings shall be permanently grease lubricated. The upper bearing shall be a single deep groove ball bearing. The lower bearing shall be a two row angular contact bearing to compensate for axial thrust and radial forces. Single row lower bearings are not acceptable.

Each pump shall be provided with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating, corrosion resistant tungsten-carbide ring. The upper, secondary seal unit, located between the lubricant chamber and the motor housing, shall contain one stationary and one positively driven rotating, corrosion resistant tungsten-carbide seal ring. Each seal interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment nor depend on direction of rotation for sealing. The position of both mechanical seals shall depend on the shaft. Mounting of the lower mechanical seal on the impeller hub will not be acceptable.

The following seal types shall not be considered acceptable or equal to the dual independent seal specified: shaft seals without positively driven rotating members, or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces. No system requiring a pressure differential to offset pressure and to affect sealing shall be used.

Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal shall be easily accessible from the outside. The seal system shall not rely upon the pumped media for lubrication. The motor shall be able to operate dry without damage while pumping under load.

Seal lubricant shall be FDA Approved, nontoxic.

Pump and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft. Couplings shall not be acceptable. The shaft shall be stainless steel – ASTM A479 S43100-T.

The impeller shall be of (ASTM A-48, Class 35B gray iron or ASTM A-532 (Alloy III A) 25% chrome cast iron) dynamically balanced, semi-open, multi-vane, back swept, screw-shaped, non-clog design. The impeller leading edges shall be mechanically self-cleaned automatically upon each rotation as they pass across a spiral groove located on the volute suction. The screw-shaped leading edges of the gray iron impeller shall be hardened to Rc 45 and shall be capable of handling solids, fibrous materials, heavy sludge and other matter normally found in wastewater. The screw shape of the impeller inlet shall provide an inducing effect for the handling of up to 5% sludge and rag-laden wastewater. The impeller to volute clearance shall be readily adjustable by the means of a single trim screw. The impellers shall be locked to the shaft, held by an impeller bolt and shall be coated with alkyd resin primer.

The pump volute shall be a single piece gray cast iron, ASTM A-48, Class 35B, non-concentric design with smooth passages of sufficient size to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as specified. The volute shall have a replaceable suction cover insert ring in which are cast spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide trash release pathways and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed. The insert ring shall be cast of (ASTM A-48, Class 35B gray iron) and provide effective sealing between the multi-vane semi-open impeller and the volute housing. Impeller and volute shall be capable of passing a 3-inch sphere.

All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. The thermal switches shall open at 125°C (260°F), stop the motor and activate an alarm.

A leakage sensor shall be provided to detect water in the stator chamber. The Float Leakage Sensor (FLS) is a small float switch used to detect the presence of water in the stator chamber. When activated, the FLS will stop the motor and send an alarm both local and/or remote. **USE OF VOLTAGE SENSITIVE SOLID STATE SENSORS AND TRIP TEMPERATURE ABOVE 125°C (260°F) SHALL NOT BE ALLOWED.** The thermal switches and FLS shall be connected to a Control and Status) monitoring unit.

Junction Box

Furnish and install a weatherproof junction box on the exterior. The junction box shall be a NEMA Type 3R enclosure and accept cords from all electrical equipment. All equipment cords shall be spliced in the junction box to allow easy removal of any piece of electrical equipment if required for service.

Valves

The pump supplier/contractor shall furnish & install the following valves:

Gate Valves: Resilient Wedge Valve as manufactured by Waterous Company, Clow Valve Company, or approved equivalent.

Valves shall be in full compliance with AWWA Standard -515, and be rated for 250 psig cold water working pressure.

Valves shall open counterclockwise.

Valves shall be furnished with a handle.

Valves shall be lifted in accordance with manufacturer's recommendations.

All valves shall be flanged end.

Check Valves: Swing Check Valve as manufactured by Waterous Company, Clow Valve Company, or approved equivalent.

Valves shall be in full compliance with AWWA Standard C-508, and be rated for 250 psig cold water working pressure.

Valves shall be furnished with outside spring and lever with adjusting weight.

All valves shall be flanged end.

4.0 PUMP CONTROLS

Provide labor, materials, equipment and supervision to furnish and install a pump control system. Work covered by this section shall comprise complete assembly and installation for proper operation. The principal items of this equipment shall include, but not be limited to, the following:

All required cables and electrical work.

One (1) Triplex control panel equipped for operation of three (3) each – 15 HP pumps.

Level Controls which will match form and function of influent pump station control panel E1434220 provided with in 2014.

Liquid level controls shall be furnished and installed in the wet well. The primary level control shall consist of one (1) submersible transducer and two (2) mercury free type switches, each sealed in a waterproof and shockproof polyurethane float.

The pump control panel shall be furnished by the Electric Pump/Pump Supplier. The control panel shall be designed to provide proper pump down operation based on level controls, pump controller communication and pump protections for the specific pumps being utilized. All electrical controls shall be contained in a common enclosure.

The enclosure shall be a NEMA type 4X/3R Stainless Steel and be of suitable size to house all components. A locking hasp shall be provided in addition to latches. Tamper Proof – Vandal Proof Enclosure and required 18 inch tall mounting feet and ventilated skirts shall be fabricated from 14 gauge type 304 stainless steel. The top of the enclosure shall serve as a drip shield. Inner panel shall be made of 12 gauge steel and shall be painted white. Louvered vents and filters shall be provided on cabinets containing variable frequency drives or other components that require operating temperatures to be maintained below those that can be maintained without ventilation. Venting shall be equipped with covers that can be manually installed at times when high ambient temperatures do not exist.

4.01 INNER DOOR

The control enclosure shall be equipped with a hinged inner door with latching device. Pilot lights, switches and other operator interface required to control pump(s) shall be mounted on the inner door. Material shall be corrosion resistant .090 aluminum.

4.02 LINE TERMINAL BLOCK

A 3 pole line terminal block rated for 600 volt use shall be provided. Block shall be constructed of nylon and have insulating walls on all sides of the lug. Blocks must be UL recognized.

4.03 CABINET HEATER

A cabinet heater and thermostat shall be provided to prevent condensation from accumulating in the control enclosure. The heater shall be rated at 100 watts (minimum) and shall operate on 120 VAC. An adjustable thermostat shall be provided to turn heater on and off. The circuit shall be protected by a separate 15 amp circuit breaker.

4.04 LIGHTNING PROTECTION

A lightning protection unit shall be installed at the point of connection for incoming power to the control panel. All units shall be rated at a minimum of 100,000 amps (maximum current)/ 3000 joules per pole. The unit shall be capable of withstanding an unlimited number of surges. There shall be no leak current at double the rated voltage. Housing shall be made of PVC and shall attach through the wall of the control panel enclosure by means of a water-tight connection. Three phase units shall be rated at 600VAC, three phase, 4 wire. Single phase 200-240 VAC units shall be rated at 250VAC, single phase, 3 wire.

4.05 MOTOR CIRCUIT BREAKER

A 3 pole circuit breaker shall be supplied for each pump motor, and be of adequate size to allow starting of the motor without nuisance tripping, but provide short circuit and branch circuit protection. Breaker shall have a minimum interrupt rating of 18,000 RMS symmetrical AMPS at 460 volts. Breaker shall have line and load lugs and be attached to sub-panel.

4.06 INVERTER

VFD shall be manufactured by ABB, Model ACQ550 - U1-031 or approved equal

Adjustable Speed Drives (ASD)

The Drive shall be solid state, with a Pulse Width Modulated (PWM) output. The Drive shall be a Sensorless Vector AC to AC converter utilizing the latest insulated gate bipolar transistor (IGBT) technology. The Drive shall employ a Sensorless Vector inner loop torque control strategy that mathematically determines motor torque and flux. The Drive must also provide an optional operational mode for V/Hz Operation.

Ratings

The Drive shall be rated to operate from 3-phase power at 460VAC to 600VAC, +10%/-15%, 48Hz to 63Hz. The Drive shall employ a full wave rectifier to prevent input line notching and operate at a fundamental (displacement) input power factor of 0.98 at all speeds and nominal load. The Drive efficiency shall be 98% or better at full speed and load. An internally mounted AC line reactor or DC choke shall be provided to reduce input current harmonic content, provide protection from power line transients such as utility power factor correction capacitor switching transients and reduce RFI emissions. When a DC choke is utilized it shall be of swinging choke design to mitigate harmonics substantially more than conventional choke designs and shall provide equivalent to 5% impedance.

The overvoltage trip level shall be a minimum of 30% over nominal, and the undervoltage trip level shall be a minimum 35% under the nominal voltage.

Output voltage and current ratings shall match the adjustable frequency operating requirements of standard 200-575VAC, 3ph, 60Hz, NEMA Design B motors. The short term normal duty overload current capacity shall be 110% of rated current for one (1) minute out of ten (10) minutes. The short term heavy duty overload current capacity shall be 150% of rated current for one (1) minute out of ten (10) minutes and peak overload capacity shall be 180% for two (2) seconds out of each minute with an instantaneous overcurrent trip at 350% or higher. Output frequency shall be adjustable between 0Hz and 500Hz. Operation above motor nameplate shall require programming changes to prevent inadvertent high-speed operation. The Drive shall be furnished in a UL Type 1 (NEMA 1) listed enclosure rated for operation at ambient temperatures between -15 and 40 degrees C at an altitude not exceeding 3300 feet, with relative humidity less than 95% and no condensation allowed. The Drive shall be protected from atmospheric contamination by Chemical gasses and Solid particles per IEC 60721-3-3; Chemical gasses Class 3C2 and Solid particles Class 3S2. The Drive shall be protected from vibration per IEC 60721-3-3, Class 3M4 (sinusoidal displacement 3.0 mm (0.12 in.), 2Hz to 9Hz; acceleration 10 m/s² (33 ft/s²), 9Hz to 200Hz).

4.07 Control Functions and Adjustments

A start-up assistant provided by the pump supplier will query the user to provide Start-up data specific to operation of a submersible pump, centrifugal pump/fan and positive displacement pump or compressor. Additional entries shall include motor nameplate power, speed, voltage, frequency and current.

A motor parameter ID function shall automatically define the motor equivalent circuit used by the sensorless vector torque controller.

Two independent PID speed/torque loop regulators shall be provided with an autotune function as well as manual adjustments.

A dynamic braking chopper shall be provided on all models rated up to 15 horsepower 600V and up to 10 horsepower 240V.

A selection of seven (7) preprogrammed application macro parameter sets shall be provided to minimize the number of different parameters to be set during start-up. Macros included as standard are as follows: ABB Standard, 3-Wire, Alternate, Motor Potentiometer, Hand/Auto, PID Control, and Pump & Fan Control (PFC).. A selection of two (2) User Defined Parameter Sets shall also be available.

Carrier frequency shall be adjustable between 1 and 12 kHz up to 200 HP 480V or 150 HP 600V and between 1 and 4 kHz from 250 through 550 HP 480V. The ASD shall automatically adjust the carrier frequency dependent upon Drive temperature and load. Increased temperatures result in automatically decreased switching frequency to ensure continuous operation of the Drive.

Start/Stop control functions shall include two (2) or three-(3) wire start/stop, coast/ramp stop selections, optional dynamic braking and flux braking.

The ASD shall be capable of starting into a rotating load (forward or reverse) and accelerate or decelerate to reference without safety tripping or component damage (flying start). The ASD shall also be capable of flux braking at start to stop a reverse spinning motor prior to ramp.

The ASD shall have the ability to automatically restart after an overcurrent, overvoltage, undervoltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between reset attempts shall be programmable.

Accel/Decel control functions shall include two (2) sets of ramp time adjustments with linear and two (2) s-curve ramp selections.

Speed/Torque control functions shall include:

- a. Adjustable min./max. speed and/or torque limits
- b. Selection of up to seven (7) preset speed settings or external speed control
- c. Two (2) independent built-in PID controllers to control a process variable such as pressure, flow or fluid level.

Two (2) analog inputs shall be programmable to form a reference by addition, subtraction, multiplication, minimum selection or maximum selection.

Output control functions shall include:

Current and torque limit adjustments to limit the maximum Drive output current and the maximum torque produced by the motor. These limits shall govern the inner loop torque regulator to provide tight conformance with the limits with minimum overshoot.

A torque regulated operating mode with adjustable torque ramp up/down and speed/torque limits.

The ASD shall be capable of sensing a loss of load (broken belt / broken coupling) and signal the loss of load condition. The Drive shall have user adjustable load curves (motor torque as a function of frequency) defined by five (5) points to signal this condition via a keypad warning, relay output and/or over the serial communications bus. Relay output shall include programmable time delays that will allow for Drive acceleration from zero speed without signaling a false underload condition.

The Drive shall have programmable "Sleep" and "Wake up" functions to allow the Drive to be started and stopped from the level of a process feedback signal.

Three (3) programmable critical frequency lockout ranges to prevent the ASD from operating the load continuously at an unstable speed.

Static and Dynamic Performance

Open loop static speed regulation shall be 0.5 % to 1% of rated motor speed. Dynamic speed accuracy shall be less than 1%-sec with 100% torque step open loop and 0.5%-sec closed loop with 100% torque step.

4.08 Operator Control Panel (Keypad)

Each ASD shall be equipped with a front mounted operator control panel (keypad) consisting of a backlit, alphanumeric, graphic display and a keypad with keys for Hand, Off and Auto, Up/Down and Help. Two (2) Softkeys will be provided which change functionality depending upon the position within the parameter hierarchy or state of panel.

All parameter names, fault messages, warnings and other information shall be displayed in complete English words or Standard English abbreviations to allow the user to understand what is being displayed without the use of a manual or cross-reference table.

The Display shall have contrast adjustment provisions to optimize viewing at any angle.

The control panel shall provide a real time clock for time stamping events and fault conditions.

The control panel shall include a feature for uploading parameter settings to control panel memory and downloading from the control panel to the same Drive or to another Drive.

All Drives throughout the entire power range shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating.

The keypad is to be used for Hand control, for setting all parameters, and for stepping through the displays and menus.

The keypad shall be removable and insertable under Drive power, capable of remote mounting, and shall have its own non-volatile memory.

The standard operator panel shall provide a start-up, maintenance and diagnostic assistants that guide a new user through initial start-up and commissioning of the Drive as well as provide indications for maintenance and help to diagnose a fault. In addition, a PID assistant, Real-time Clock assistant, Serial Communications assistant, and Drive Optimizer assistant shall be included. A Drive Optimizer assistant permits the user to choose Drive set-up for low nose,

drive & motor efficiency or motor control accuracy.

User input of Pump Power and Energy Price will provide means of real time display of saved KWH, Saved Amount (energy savings resulting from VFD) and Saved CO2.

A Load Analyzer function will provide profiling users load and process with three different variables within 10% bands showing time within bands from 0 to 100%.

During normal operation, one (1) line of the control panel shall display the speed reference, and run/stop forward/reverse status. The remaining three (3) lines of the display shall be programmable to display the values of any three (3) operating parameters. At least twenty-six (26) selections shall be available including the following:

- a. Speed/torque in percent (%), RPM or user-scaled units
- b. Output frequency, voltage, current and torque
- c. Output voltage, power and kilowatt hours
- d. Heatsink temperature and DC bus voltage
- e. Status of discrete inputs and outputs
- f. Values of analog input and output signals
- g. Values of PID controller reference, feedback and error signals.
- h. Control interface inputs and outputs shall include:
 - f I/O Capabilities

Six (6) digital inputs 12 to 24VDC PNP and NPN, all independently programmable with at least twenty-five (25) input function selections. Inputs shall be designed for "dry contact" inputs used with either an internal or external 24 VDC source.

Three (3) form C relay contact digital outputs, all independently programmable with at least thirty (30) output function selections. Relay contacts shall be rated to switch a maximum two (2) Amps rms continuous current at a maximum switching voltage of 30VDC or 250VAC. Function selections shall include indications that the Drive is ready, running, reversed and at set speed/torque. General and specific warning and fault indications shall be available. Adjustable supervision limit indications shall be available to indicate programmed values of operating speed, speed reference, current, torque and PID feedback. An optional relay expansion card shall be available to provide three (3) additional relay outputs. This option card shall be integrally mounted.

Two (2) analog inputs, each selectable for 0VAC - 10VAC or 4mA - 20mA, and independently programmable with at least ten (10) input function selections. Analog input signal processing functions shall include scaling adjustments, adjustable filtering and signal inversion. If the input reference (4-20mA or 0-10V) is lost, the ASD shall give the user the option of the following: (1) stopping and displaying a fault, (2) running at a programmable preset speed, (3) hold the ASD speed based on the last good reference received, or (4) cause a warning to be issued, as selected by the user. The Drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus.

Two (2) analog outputs providing 0 (4) to 20mA signals. Outputs shall be independently programmable to provide signals proportional to at least twelve (12) output function selections including output speed, frequency, voltage, current and power.

G. Serial communications

The ASD shall have an RS-485 port as standard. The standard embedded protocol shall be Modbus RTU.

Serial communication capabilities shall include, but not be limited to, run-stop control; speed set adjustment, proportional/integral/derivative PID control adjustments, current limit, and accel/decel time adjustments. The Drive shall have the capability of monitoring feedback such as process variable feedback, output speed/frequency, current (in amps), % torque, power (kW), kilowatt hours (resettable), operating hours (resettable), relay outputs, and diagnostic warning and fault information. Additionally, remote Local Area Network (LAN) ASD fault reset shall be possible. A minimum of fifteen (15) field parameters shall be capable of being monitored. The DDC system shall be able to monitor if the motor is running in the ASD mode or bypass mode (if bypass is specified) over serial communications.

The ASD shall allow the DDC to control the Drive's digital and analog outputs via the serial interface. The serial communications interface shall allow for Digital Output DO (relay) control and Analog Output (AO) control. This control shall be independent of any ASD function. Examples of possible DO usage are as follows: Opening check valves, opening discharge valves, starting auxiliary equipment, etc. In addition, status of DO's is available over the communications link. Examples of possible AO usage are as follows: Controlling a bypass valve position, throttling valve position, etc. In addition, status of AO's is available over the communications link.

The operator panel port shall be connectable to a personal computer interface. Microsoft© Windows based software shall be provided for Drive setup, diagnostic analysis, maintenance, monitoring and control. The software shall follow trends and provide real time graphical displays of Drive performance.

5.0 Protective Functions

For each programmed warning and fault protection function, the Drive shall display a message in complete English words or Standard English abbreviations. The three (3) most recent fault messages along with time, current, speed, voltage, frequency and DI Status shall be stored in the Drive's fault history. The last ten (10) fault names shall be stored in Drive memory.

The Drive shall include internal MOV's for phase to phase and phase to ground line voltage transient protection.

Output short circuit withstand rating and ground fault protection rated for 100,000 AIC shall be provided per UL508C without relying on line fuses. Motor phase loss protection shall be provided.

The Drive shall provide electronic motor overload protection qualified per UL508C.

Protection shall be provided for AC line or DC bus overvoltage at 130% of max. rated or undervoltage at 65% of min. rated and input phase loss.

A power loss ride through feature will allow the Drive to remain fully operational after losing power as long as kinetic energy can be recovered from the rotating mass of the motor and load.

Stall protection shall be programmable to provide a warning or stop the Drive after the motor has operated above a programmed torque level for a programmed time limit.

Underload protection shall be programmable to provide a warning or stop the Drive after the motor has operated below a selected underload curve for a programmed time limit.

Over-temperature protection shall provide a warning if the power module temperature is less than 5°C below the over-temperature trip level.

Input terminals shall be provided for connecting a motor thermister (PTC type) to the Drive's protective monitoring circuitry. An input shall also be programmable to monitor an external relay or switch contact (klixon).

Certified factory start-up shall be provided for each Drive by a factory authorized service center on-site for 4 continuous hours. A certified start-up form shall be filled out for each Drive with a copy provided to the owner, and a copy kept on file at the manufacturer.

The factory will extend the normal warranty for the Drive.

6.0 Warranty

Standard Warranty shall be 12 months from the date of start-up, not to exceed 18 months from the date of receipt from Owner in Ogallala, Nebraska. The warranty shall include all parts.

Provide an extended warranty shall be 24 months from the date of start-up, not to exceed 30 months from the date of receipt from Owner in Ogallala, Nebraska. The warranty shall include all parts, labor, travel time, and expenses. This additional warranty term is only valid after the certified startup has been registered with ABB Technical Support in New Berlin, WI. and the registration must be submitted within 60 days of completion of the certified start-up. The provisions of extended warranty include repair or replacement at the discretion of ABB Inc. and require that the defective unit is returned to ABB freight prepaid by the sender.

6.0 TRANSFORMER PRIMARY CIRCUIT BREAKER

A properly sized two-pole circuit breaker with a minimum interrupt rating of 10,000 RMS symmetrical AMPS shall be supplied.

6.1 AUXILIARY POWER CIRCUIT BREAKER

20 amp, one pole circuit breaker with a minimum interrupt rating of 10,000 RMS symmetrical AMPS at 120 volts shall be supplied for the convenience receptacle. Breaker shall have line and load lugs and be attached to sub-panel.

2 Required

6.2 CONTROL FUSING

Control, alarm, and cabinet heater circuits, wiring shall be protected by use of properly sized fuses mounted on the secondary side of the transformer. Fuses shall be applied and sized in accordance with latest

6.3 STATION CONTROLLER

An inner door mounted pump controller shall be furnished. The controller shall be designed specifically for alternating duplex pump down sewage wet well applications. The pump controller shall have an integral color touch screen HMI and logic processor, both in communication with I/O terminals mounted on the subpanel of the control panel. The color touch screen shall be a minimum of 5.7 inches measured diagonally, a resolution of 320 x 240 pixels, and capable of 65,536 color with white LED back lighting. The operational temperature shall be 0 degrees to 50 degrees C (32 degrees to 122 degrees F) and the storage temperature shall be -20 degrees to 60 degrees C (-4 degrees to 140 degrees F) with allowable humidity ratings of 5% to 95% non-condensing. Input voltage, nominal 24 VDC. Permissible range: shall be 20.4 to 28.8 VDC with less than 10% ripple. Maximum current consumption shall be 320 ma'at 24 VDC with typical power consumption of 6.5 watts. A back-up battery shall be furnished for real time clock and variable date. The battery shall be rated for 7 years typical at 25 degrees C. Back-up battery shall be replaceable without opening the controller. A bit shall be provided to give warning to the operator of an imminent need to replace the battery.

Under normal operating conditions the operator shall be able to monitor the following from the Main screen:

A digital display of level in feet and tenths of feet.

A bar graph that shows the level relative to the actual depth

Existing level set points for low alarm, lead off, lag off, lead on, lag on, and high alarm

Pump status for each pump showing running, stopped, not in auto, and trouble.

Pump last run time in seconds

Pump alarm status showing none, high temp, seal fail, and pump failure (timed out).

Station status including normal, high level, low level, loss of signal, float backup, maintenance alerts, loss of transmitter signal, and others that may be appropriate.

Current time and date.

A "Help" touch point shall be on the screens, such as the Main screen, when additional explanatory information might be required by the operator. A "Menu" touch point shall display the controller menu or the first level of the menu if there are multiple levels. By pressing and holding down on the screen that is not a active point, a password protected Information Mode screen will appear. This display will allow the monitoring and forcing of inputs, outputs, bits (or coils), registers (integers), timers, and counters. This function shall also allow monitoring of serial, Ethernet, and CANBus ports, and to change the time and date of the real time clock.

The controller shall have the following menus accessible from the Menu screen:

Current Alarms. By referring to this screen the operator shall be able to determine all of the active alarms monitored by the pump controller.

Daily Totals. This display shall show the hours per day of operation for each pump, its total number of cycles, and the calculated kilo gallons (thousands of gallons) of flow. A full week's operation shall be shown with the current day highlighted. Old totals shall be overwritten as new totals are recorded.

Alarm Histories. In order for operators to be alerted to potential problems, an alarm histories display shall show the number of pump and station alarms along with the time and date of the last alarm in each category. Operators shall be able to reset the number of alarms.

Contacts. In order to provide ready access in an emergency, the menu shall contain screen on which is the control panel suppliers contact information is shown along with similar information on the company and/or individuals contracted for maintenance. A submenu shall be accessed from this screen which shall provide factory information on job number, job name, purchase order number and other information to facilitate identification if it is necessary to contact the factory. Maintenance contact information may be changed, but other information is read only.

Level Set points. A screen shall be provided to enter, using a virtual key, the following levels: low alarm, lead pump off, lag pump off, lead pump on, lag pump on and high alarm. This screen may be password protected at the owner's option.

Lead Pump Select. This menu selection shall allow the operator to select either pump as the lead pump or to alternate pumps based on time. This screen is used in coordination with the Alternation Select screen and may be password protected at the owner's option.

Transmitter Setup. In order to allow utilization of various ranges, a screen shall be provided to enter the range of the level or pressure transmitter, ultrasonic sensor, or other 4-20 milliamp sensing device in order to scale the output of the sensor to the actual level. This screen may be password protected at the owner's option.

Seal Fail Option. A screen shall be provided to either (a) shut down a pump that has experienced a seal failure, or (b) provide a warning on the display of the existing condition. This screen may be password protected at the owner's option.

Alternation Select. A screen shall be provided to select either cycle alternation, i.e. lead pump to alternate each time both pumps are off, or timed alternation where the time is hours between lead pump changes can be set in hours. This

screen may be password protected at the owner's option.

Wet Well Setup. This screen shall provide a method using a virtual keypad to enter wet well depth and diameter information for use in scaling the Main screen bar graph and to facilitate meterless flow calculations. This screen may be password protected at the owner's option.

Other Setup Options. The controller shall provide a menu option for miscellaneous setup parameters such as (a) single pump operation only, (b) time out delays, (c) pump maintenance dates, (d) any back up battery renewals, and other functions as the controller supplier shall deem necessary.

Control Logic shall be as follows:

All functions described herein shall be with the HOA selector(s) in the Auto position. In Hand, as well as when operating in Float Backup mode, pump operation is completely independent of controller functions. Operational levels and transmitter constants shall be field adjustable from the touch screen. Upon the rise of the empty wet well above the low level alarm set point, the alarm shall be automatically reset to allow pump operation. Upon reaching the lead pump on level, the lead pump shall be called to run. If that pump is out-of-service or is not in the Auto mode, the controller shall automatically switch to the standby pump and display an alarm. Assuming the initial lead pump does start, the controller shall monitor the level until it reaches the lead pump off level, at which time the pump shall be switched off. If the level continues to rise above lead pump on and reaches lag pump on set point, the standby pump shall be switched on in parallel with the lead pump. If the level continues to rise with both pumps operating, the high alarm set point may be reached. An alarm output will occur and be registered with the alarm histories, but pumping operation will not be interrupted. As the decreasing level reaches the lag pump off set point, the lag pump shall be de-energized. With further reduction in level, the lead off set point is reach stopping further pump operation. In the event pumping continues, when reaching the low alarm level both lead and lag pumps shall be disabled.

Level Control Operation:

The primary and backup level control shall be capable of the following operation:

Level 1 (Backup float switch) – Redundant Off / Low Wetwell Level Alarm / Backup Pump(s) Stop

Level 2 (Submersible transducer) - Low Level Alarm

Level 3 (Submersible transducer) - Lead Pump Off

Level 4 (Submersible transducer) - Lead Pump On

Level 5 (Submersible transducer) - Lag Pump Off

Level 6 (Submersible transducer) - Lag Pump On

Level 7 (Submersible transducer) - High Wetwell Level Alarm

Level 8 (Backup float switch) - Redundant High Wetwell Level Alarm / Backup Pump(s) Start

Displayed alarms shall be in two categories: Pump operation alarms and station related alarms. Pump operation alarms shall consist of the following:

High temperature alarm. This alarm, caused by opening of thermostats in pump motor windings, shall always shut down the affected pump as continued operation will likely cause a pump failure in a matter of minutes or hours. High temp alarms must be manually reset (in Auto mode operation) by switching the HOA out of Auto.

Seal failure alarm. As most submersible pumps give an indication when liquid has breached their outer seal, this condition shall give an alarm. Seal failure alarms shall not be latched in by the controller, but shall automatically reset if no longer valid.

Pump Failure (Timed Out) Alarms. The controller shall monitor a feedback contact from a starter or VFD to determine if the device is operating. A 3-second timer shall compare the called pump output indication to the feedback from the auxiliary contact. If the timer times out, an alarm shall be declared and the pump shall be taken out-of-service with the

standby pump automatically called. Timed Out pumps must be manually reset (in Auto mode operation) by switching the HOA out of Auto.

Station operation alarms shall consist of the following:

High Level. The high level alarm level(s) shall be monitored by both the high level set point and an input from a high level float (if used). In either case the Station Status on the Main screen shall indicate the high level condition. This alarm shall be automatically reset, and the counter indexed along with updates of the last time and date of the alarm.

Low Level. A low level alarm shall occur when either the level has dropped below the low alarm set point, or if the low level float has been uncovered. This alarm shall be automatically reset, and the counter indexed along with updates of the last time and date of the alarm. The alarm condition shall disable all pump operation except when provision is made to pump below this level for maintenance purposes.

Loss of Analog Signal. In the event the analog level signal has been disrupted, the station alarm shall display this condition. The station will automatically go into float backup with normal analog operation disabled.

Maintenance Alerts. The controller shall monitor the time for such parameters as scheduled pump maintenance, back up batteries, and other functions requiring a real-time based indicator for optimizing maintenance as determined by the controller provider.

The controller shall provide calculated daily totals and most recent flow rates for each pump. These calculations shall be performed in the following manner:

At the instant of a lead pump off indication, a timer shall be started and shall record the time required for the wet well to reach the lead pump on level. Based on a previous volumetric calculation of the cylinder of water that has entered the wet well during the filling period and the time required, an influent rate shall be calculated.

A second timer shall be started at the instant that the lead pump output is energized and stopped at the moment the level reaches the lead pump off set point. The volume pumped during this cycle shall be calculated by the volume of liquid in the cylinder, plus the influent rate previously calculated times the pump down time.

The controller shall log daily run time, pump cycles, and flow per pump on a daily basis as described in "Menus" above.

Other optional logging to an SD card shall include the following:

Time and dates of levels on a schedule (e.g., each minute) determined by owner.

Time and dates of daily flows.

Time and dates of pump run times.

Time and dates of reset and other operator performed activities.

SD cards shall be provided. Data shall be read from an CSV compatible with Microsoft Excel.

Communications

The controller shall have the following ports and be capable of the communications protocols:

The controller shall have two isolated RS232 convertible to RS495 ports. (DIP switch settable.) An optional third port

shall be either a third RS232/RS485 port or an Ethernet via TCP/IP port.

The controller shall be able to communicate using bridges or gateways to other protocols using bridges or gateways.

The baud rates for both RS232 and RS485 communications are 300 to 115200 bps.

The pump controller shall be a VisiCon 1210

7.0 SUBMERSIBLE PRESSURE TRANSDUCER

The level sensor is used to measure a liquid level and to give a signal to a control system. The sensor is specially developed to withstand a harsh environment and for media typical for pumps: sewage, slurry and viscous liquids. The output is a standard 4–20 mA direct current, proportional to the measured level. The sensor is therefore well adapted to the prevalent control systems. The sensor is a ceramic sensor (Capacitive Ceramic Sensor). The sensor element unites high performance with robustness, properties usually hard to combine.

The sensor is characterised by:

High accuracy, repeatability and long term stability

Wide temperature range: –20°C to 80°C

Durability to foam, dirt and sediment

Durability to overpressure (5 times the meas. range)

High tear and chemical resistance

Power supply: 10–30 V DC, two-wire system

Output signal: 4–20 mA

Max load resistance: $R = 50x$ (supply voltage –10V) Ω

Media temperature: –20°C – 80°C (max +90°C for non Ex-applications)

Inaccuracy: $\pm 0,1\%$ of total range incl. non-linearity, hysteresis and repeatability

Long term drift: $\pm 0,1\%$ of total range over 6 months

Temperature drift: $\pm 0,015\%$ of total range per °C

Mounting: Freely suspended in the cable

Material, wet side parts:

Sensor: Ceramic/stainless steel

Sensor housing: 316 stainless steel or poly

‘O’ring: Viton

Cable: Polyurethane vented, minimum bend radius 80 mm

Length of sensor: 50’

Diameter of sensor: 1.5”

Intrinsic safety approval:

7.1 INTRINSICALLY SAFE RELAYS

The control panel shall be equipped with an intrinsically safe level control circuit. Panel mounted, UL 913 listed, intrinsically safe isolation relays shall be provided to reduce float switch signal levels which extend into the wetwell to be suitable for use in Class I, Div. I, Groups A,B,C,D, hazardous atmospheres. The isolation relays as well as all other components in the control panel shall be factory installed in accordance with UL 698A.

7.2 BACKUP REDUNDANT OFF / LOW LEVEL AND HIGH LEVEL ALARM CIRCUITS

The control panel shall be equipped with an intrinsically safe backup high level alarm circuit. A panel mounted, UL 913 listed, intrinsically safe isolation relay shall be provided to reduce float switch signal levels which extend into the wetwell to be suitable for use in Class I, Div. I, Groups A,B,C,D, hazardous atmospheres. The isolation relays as well as all other components in the control panel shall be factory installed in accordance with UL 698A.

7.3 BATTERY BACK UP

In the event of a utility power failure, battery power shall be supplied to the controller for a minimum of two (2) hours, during which time the display will indicate the power fail fault condition plus any other faults co-existing at the time. Output relays to dialers or other alarm devices shall maintain their alarm conditions during this period.

7.4 CONTROL TERMINAL BLOCK

Control terminals shall be provided for connecting level control switch leads. Terminal blocks shall be rated for 600 volt use and accept a wire range of #22-8. Block shall be constructed of nylon and have insulating walls on all sides of the lug. Blocks must be UL recognized.

7.5 ELAPSED TIME METER

An elapsed time meter for each pump shall be mounted on the dead front door. The meter shall operate on 120 vac, shall indicate in hours [6 digits] and tenths and shall be non-resettable.

7.6 HAND-OFF-AUTO SWITCHES

Switch shall be 22mm oil-tight design, rated NEMA 4X. When in the auto position the level controls shall control the operation of the pump. When in the hand position all safeties shall be by passed except overload protection.

7.7 SPEED POT

Switch shall be 22mm oil-tight design, rated NEMA 4X. When in the HAND position the control the speed operation of the pump

7.8 MINI CAS SEAL FAILURE / OVER-TEMP PROTECTORS

A MiniCAS solid state device that provides a signal to the pump mounted moisture and thermal sensors shall measure the moisture and thermal characteristics of the motor and provide an indication of an out of tolerance condition. Upon an over-temperature condition the unit mounted LED and inner door mounted pilot light will illuminate and the motor shall shut down. When the temperature reaches an acceptable level the pump shall automatically re-start. Upon seal failure condition the pump will continue to run and the unit mounted LED and inner door mounted pilot light will illuminate.

7.9 CONTROL RELAYS

Required control relays shall be 2PDT, plug-in type. Relay shall be equipped with silver cadmium oxide contacts, rated at 5 amps and a dust cover. An indicating LED shall illuminate when the relay coil is energized. A test lever shall be integral to the relay. Relay must be UL recognized.

7.1 CONTROL TERMINAL BLOCK

Control terminals shall be provided for connecting level control switch leads. Terminal blocks shall be rated for 600 volt use and accept a wire range of #22-8. Block shall be constructed of nylon and have insulating walls on all sides of the lug. Blocks must be UL recognized.

7.11 PUMP RUN LIGHTS

Pilot lights shall be 22mm oil-tight design, rated NEMA 4X. Lamp shall be high brightness 120 VAC. Green lenses shall be provided.

7.12 HIGH LEVEL ALARM LIGHT

Pilot lights shall be 22mm oil-tight design, rated NEMA 4X. Lamp shall be high brightness 120 VAC. Green lenses shall be provided.

7.13 GROUND LUG

An equipment ground lug shall be provided for grounding the enclosure. The ground lug shall be suitable for the service provided to the enclosure sized per table 250-95 of the N.E.C. In all cases the enclosure must be adequately grounded per article 250 of N.E.C.

7.14 CONSTRUCTION STANDARDS

Sub-panel shall be drilled and tapped to accept machine thread bolts (self tapping screws are not acceptable). All control wiring shall be 16 AWG machine tool wire, Carol type 76512 or equal. All control wire shall be numbered in accordance with JIC standards. Power (motor) wiring shall be in accordance with the National Electrical Code. Major groups of wires shall be contained in plastic wiring trough equal to Panduit type E. All component parts in the control panel shall be permanently marked and identified using engraved name plates as they are indicated on the drawing. Marking shall be on the back plate adjacent to the component. All control conductors shall be identified with wire markers at each end as close as practical to the end of conductor termination.

7.15 UL LISTING

The control panel unit shall be the product of a manufacturer that is authorized by Underwriters Laboratories, Inc. to build products in compliance with UL Standard 508A (Enclosed Industrial Control Panel) and 698A (Enclosed Industrial Control Panel With Extensions Into Hazardous Area). A UL 698A label shall be affixed to the completed control panel and all UL required documentation shall be shipped with the completed unit.

7.16 CONSTRUCTION STANDARDS

Sub-panel shall be drilled and tapped to accept machine thread bolts. All control wiring shall be 16 AWG machine tool wire, Carol type 76512 or equal. All control wire shall be numbered in accordance with JIC standards. Power (motor) wiring shall be in accordance with the National Electrical Code. Major groups of wires shall be contained in plastic wiring trough equal to Panduit type E.

All internal wiring shall be provided by manufacturer as specified herein.

All wiring shall be alphanumerically labeled in reference to manufacturer's standard wiring schematics with minimum 10pt font.

Labels shall be high performance matte white polyester type. Labels shall be thermal transfer type and shall be UL recognized, CSA approved, and AGA approved.

Terminal blocks shall be identified by reference number, which clearly indicates the purpose each terminal block. Reference number used for identification shall reference rung number and component type as indicated by manufacturer's project specific drawings.

Conductor color coding and marking shall conform to the following UL508A standards:

Line voltage, ungrounded: Black (Appropriately phase marked)

Line voltage, grounded: White

AC controls, ungrounded: Red

AC controls, grounded: White

DC controls, ungrounded: Blue

DC controls, grounded: White with Blue Stripe

Interconnect, ungrounded: Yellow

Interconnect, grounded: White with Yellow Stripe

Ground Green

7.17 GUARANTEE

The manufacturer of the control panel shall furnish a limited warranty for thirty six (36) months from the date of customer receipt, that all equipment shall be free from defects in design, materials and workmanship. The manufacturer shall furnish replacement parts for any component proven defective, whether of his or other manufacturer during the warranty period, excepting only those items which are normally consumed in service, such as (but not limited to), light bulbs, oil, grease, packing, etc. A written copy of the Limited Warranty shall be furnished with engineering submittal data.

8.0 WORKMANSHIP AND EXPERIENCE

The control panel shall be the product of a supplier who has been actively engaged in research, development and has supplied proven field installations of complete sewage pumping systems for not less than five (5) years. A list of ten (10) separate sewage pumping systems shall be provided on request.

8.1 BASIS OF MEASUREMENT AND PAYMENT

Payment for the lift station and appurtenances shall be at the lump sum price bid for the lift station and shall constitute full and complete compensation for the work and material completion including start-up on the site by representatives of the manufacturer and instruction to the Utility Superintendent on the operation and maintenance of the lift station

8.2 FIELD SUPERVISION

The services of a factory trained, qualified representative shall be provided to inspect the completed installation, make all adjustments necessary to place the system in trouble-free operation and instruct the operating personnel in the proper care and operation of the equipment.

8.3 INSTRUCTIONS

Provide a minimum of 8 hours onsite startup and instruction for the pumping station.

Provide three (3) copies of Operation and Maintenance Instructions from the pump manufacturer in hard cover binders.

8.4 PACKAGING AND MARKING

Installation instructions shall be furnished with the station.

8.5 CALIBRATION, ADJUSTMENT AND TESTING

Devices requiring field calibration shall be calibrated in presence of Owner's representative and documented.

8.6 INSTALLATION AND START UP

Supplier shall provide skilled programmer/instrumentation engineer or technician who shall complete troubleshooting and start up to place entire system into satisfactory operation; engineer or technician shall make necessary inspection of completed installation, make necessary final field adjustments and make program revisions as required for startup.

Demonstrate proper operation of all system features and functions to Owner and Engineer.

Coordinate installation and start up scheduling with Owner and Engineer.

9.0 EXECUTION

9.1 EXAMINATION

Supplier shall off-load equipment at installation site using equipment of sufficient size and design to prevent injury or damage. Station manufacturer shall provide written instruction for proper handling. Immediately after off-loading, contractor shall inspect complete pump station and appurtenances for shipping damage or missing parts. Any damage or discrepancy shall be noted in written claim with shipper prior to accepting delivery. Validate all station serial numbers and parts lists with shipping documentation. Notify the manufacturer's representative of any unacceptable conditions noted with shipper.

9.2 INSTALLATION

Install, level, align, and lubricate pump station as indicated on project drawings. Installation must be in accordance with written instructions supplied by the manufacture at time of delivery.

Check motor and control data plates for compatibility to site voltage. Install and test the station ground prior to connecting line voltage to station control panel.

Prior to applying electrical power to any motors or control equipment, check all wiring for tight connection. Verify that protective devices (fuses and circuit breakers) conform to project design documents. Manually operate circuit breakers and switches to ensure operation without binding. Open all circuit breakers and disconnects before connecting utility power. Verify line voltage, phase sequence and ground before actual start-up.

After all anchor bolts, piping and control connections are installed, completely fill the grout dam in the pump station base with non-shrink grout.

Manufacturers Start-up Services

Coordinate station start-up with manufacturers technical representative. The representative or factory service technician will inspect the completed installation. Calibrate and adjust instrumentation, correct or supervise correction of defects or malfunctions, and instruct operating personnel in proper operation and maintenance procedures.

The manufacturer shall provide 8 hours of onsite start-up training for the Owner, in addition to all other training, calibration or inspection visits listed above.

END SECTION 11938

