

**GREATER HARRISON COUNTY PUBLIC SERVICE DISTRICT  
HARRISON COUNTY, WEST VIRGINIA**

**WATER LINE EXTENSION TO STEVEN'S RUN**

**ADDENDUM #1**

**JUNE 3, 2021**

**THRASHER PROJECT #010-10084**

TO WHOM IT MAY CONCERN:

A Pre-Bid Conference was held on Thursday, May 20, 2021 on the above-referenced project, a copy of the sign in sheet is included in this Addendum. The following are clarifications and responses to questions posed by contractors for the above reference project.

**A. GENERAL**

1. **THE BID FORM HAS BEEN REVISED. YOU MUST USE THE REVISED BID FORM WHEN PREPARING YOUR BID PACKAGE FOR THIS PROJECT.**

**B. SPECIFICATIONS**

Specification section 012000 has been updated as part of this Addendum.  
Specification section 333213.1 has been updated as part of this Addendum.

**C. DRAWINGS**

Sheet 13 has been updated as part of this Addendum.  
Sheet 14 has been updated as part of this Addendum.  
Sheet 15 has been updated as part of this Addendum.

**D. QUESTIONS AND RESPONSES**

**QUESTION**

1. **Is a field office trailer required?**

**RESPONSE**

Yes, one field office trailer is required for this contract. See specification section 015000.

**QUESTION**

2. Does the contractor need to pay for any WVDOH fees?

**RESPONSE**

No. The contractor is not responsible for the payment of any WVDOH fees. Owner will pay WVDOH fees.

**QUESTION**

3. Is there a trench width requirement or can a trencher be used for carrier mainlines?

**RESPONSE**

Yes, a trencher can be used where approved by the Engineer and WVDOH, when applicable as long as it meets the minimum trench width in accordance with the specifications.

**QUESTION**

4. Was it mandatory to attend the Pre-Bid Conference?

**RESPONSE**

No.

**QUESTION**

5. What is the approximate award date?

**RESPONSE**

We intend to issue the Notice of Award shortly after the Bid Tab is certified to allow you to lock in prices. We are working with the funding agency to award the contract within 30 days.

**QUESTION**

6. If there is a delay in getting pipe and materials can the start date be delayed?

**RESPONSE**

Yes, we intend to issue a shutdown, if requested, to allow for all materials to be delivered before the Contract times will start. Owner will pay for stored materials during the shutdown.

**E. CLARIFICATIONS**

1. **THE BID FORM HAS BEEN REVISED. YOU MUST USE THE REVISED BID FORM WHEN PREPARING YOUR BID PACKAGE FOR THIS PROJECT.**

2. There are no local B&O taxes or building permits required on this project.
3. Precast Stabilization Blocks for valve boxes will not be accepted.
4. The Engineer's construction cost estimate is \$620,000.00.
5. The bidding process is a two (2) envelope system. Envelope No. 1 must have the following information presented on the front:

Name and address of Bidder

Bid on Contract #1 – Water Line Extension to Steven's Run Road

Received by the Greater Harrison County PSD

Envelope No. 2 labeled "Bid Proposal" shall be placed inside of Envelope #1

Envelope No. 1 will be opened first and the Bid Opening Requirement items will be checked for compliance as outlined on the Bid Opening Checklist (BOR-1). If such documents are found to be in order, Envelope No. 2 "Bid Proposal", will be opened and will be publicly read aloud. If the documents required to be contained in Envelope No. 1 **are not in order**, Envelope No. 2 "Bid Proposal", **will not be opened** and the Bid will be considered non-responsive.

6. The Bid Opening Requirements consist of the *blue* pages of the contract books and are labeled with BOR at the bottom of the page. The Bid Form consists of the *yellow* pages of the contract books. **THE BID FORM HAS BEEN REVISED. YOU MUST USE THE REVISED BID FORM WHEN PREPARING YOUR BID PACKAGE FOR THIS PROJECT.**
7. Mailed/Shipped bid packages shall be sent to The Thrasher Group 600 White Oaks Blvd, Bridgeport, West Virginia 26330. The Thrasher Group phone number is (304) 624-4108 Bidders should **not** assume guaranteed early (10:30 am) delivery is available and shall be mailed/shipped in sufficient time. It is the Bidder's responsibility to deliver the Bid on time.
8. All work is to be coordinated through the Engineer and the District to ensure no disruption to the existing distribution system.
9. Engineer's Approved Equal means material, equipment, or method approved by the engineer for use in the work, as being acceptable as an equivalent in essential attributes to the material, equipment, or method specified in the contract documents.
10. Sealed Bids for the construction of Contract #1 – Water Line Extension to Steven's Run will be received by, Greater Harrison County Public Service District, at 600 White Oaks Blvd, Bridgeport, WV 26330 until 2:00 pm. local time on June 10, 2021 at which time the Bids received will be opened publicly and read in person and via Microsoft Teams teleconference at the following address: <https://tinyurl.com/StevensRunBidOpening> or audio at Call-In Number 1-304-935-0841; Conference Number 757 942 690#.

If you have any questions or comments, please feel free to contact me at your earliest convenience. As a reminder, bids will be received until 2:00 p.m. on Thursday, June 10<sup>th</sup>, 2021, at 600 White Oaks Blvd, Bridgeport, WV.

Sincerely,

THE THRASHER GROUP, INC.



CLAY P. RILEY, P.E.  
Project Manager



Enclosures:    Pre Bid Meeting Sign In Sheet  
                  C-410 Bid Form  
                  Specification 012000 – Price and Payment Procedures  
                  Specification 333213.1 – Above Ground Pumping Station with Modular Bldg.  
                  Plan Sheet 13  
                  Plan Sheet 14  
                  Plan Sheet 15

**GREATER HARRISON COUNTY PUBLIC SERVICE DISTRICT  
HARRISON COUNTY, WEST VIRGINIA  
STEVEN'S RUN WATER LINE EXTENSION**

**PRE-BID CONFERENCE**

Thursday, May 20, 2021

Thrasher Project #010-10084

Name	Representing	Phone #	Email Address
LOGAN ALASTHROS	Thrasher		
Clay Riley	Thrasher		
Zack Dobbin	SD Utility		
RICHARD BARNETT	ENVIROCLEAN		RBARNETT.EES@FRONTIER.COM
DERRICK NICHOLSON	Enviro Clean		DNicholson@EnviroClean WV.com
Bob Elder	"		BElder@EnviroClean WV.com
Deanna Williams	Davis Marine Ser. Inc.	304-265-0188	dmsgraffon@aol.com
Gary Johnston			
JACK (Mountain Hawk)			

Name	Representing	Phone #	Email Address
Rob Lafon			
Tim Carr			

**GREATER HARRISON COUNTY PUBLIC SERVICE DISTRICT  
HARRISON COUNTY, WEST VIRGINIA  
STEVEN'S RUN WATER LINE EXTENSION  
THRASHER PROJECT #010-10084**

**BID FORM**

**ARTICLE 1 – BID RECIPIENT**

- 1.01 This Bid is submitted to:
- Greater Harrison County Public Service District  
151 Peninsula Park Boulevard  
West Milford, WV 26451*
- 1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

**ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS**

- 2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

**ARTICLE 3 – BIDDER'S REPRESENTATIONS**

- 3.01 In submitting this Bid, Bidder represents that:
- A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

**Addendum No.**

**Addendum Date**


- B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous

Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

- E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.
- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

#### **ARTICLE 4 – BIDDER'S CERTIFICATION**

##### **4.01 Bidder certifies that:**

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
  - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
  - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
  - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and



4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

## ARTICLE 5 – BASIS OF BID

### GENERAL

The Bidder shall take notice of and shall be responsible for any local or state taxes levied and applicable, and the cost for the same shall be included as part of the submitted Bid.

The total Bid cost stated includes a complete operating installation including furnishing and installation of any and all changes or additions in plans, piping, mechanical work, additional electrical work, accessories, controls, etc. necessary to accommodate alternative equipment systems or materials used in construction.

### **BID PROPOSAL**

The Bidder agrees to perform all required Work described in the detailed Specifications and as shown on the Plans for the complete construction and placing in satisfactory operation the Steven's Run Water Line Extension. The Project "Sequence of Construction" has been detailed in the Drawings and Specification Division 1, Project Summary, Section 011000. The Bidder agrees to perform all the Work proposed for the total of the following Bid prices.

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

### **PROPOSED**

### **STEVEN'S RUN WATER LINE EXTENSION FOR THE**

### **GREATER HARRISON COUNTY PUBLIC SERVICE DISTRICT HARRISON COUNTY, WEST VIRGINIA**

### **BID SCHEDULE**

**NOTE: Bid Unit PRICE amounts are to be shown in both words and figures. In case of discrepancy, the amount shown in words will govern. Bids shall include sales tax and all other applicable taxes and fees.**

<b>Item</b>	<b>Quantity</b>	<b>Description with Unit Price Written</b>	<b>Unit Price</b>	<b>Total Price</b>
1	LS	Mobilization/Demobilization		
			Dollars	
			Cents	
2	LS	Erosion and Sediment Control		
			Dollars	
			Cents	

Item	Quantity	Description with Unit Price Written	Unit Price	Total Price
3	8,775 LF	6" CL-150 Water Pipe	Dollars Cents	
4	60 LF	6" Duct. Iron CL-50 P.JT. Water Pipe	Dollars Cents	
5	3,270 LF	4" CL-150 Water Pipe	Dollars Cents	
6	200 LF	2" PC-160 Water Pipe	Dollars Cents	
7	3 EA	6" M.JT. Gate Valve, Complete w/Box and Lid	Dollars Cents	
8	2 EA	4" M.JT. Gate Valve, Complete w/Box and Lid	Dollars Cents	
9	1 EA	2" M.JT. Gate Valve, Complete w/Box and Lid	Dollars Cents	
10	3 EA	2" Post Flushing Hydrant Assembly	Dollars Cents	
11	25 LF	12" Steel Casing (Open Cut) w/Casing Spacers	Dollars Cents	

Item	Quantity	Description with Unit Price Written	Unit Price	Total Price
12	17 EA	LPMS (Low Pressure Meter Setting) _____ Dollars _____ Cents	_____ _____	_____
13	15 EA	HPMS (High Pressure Meter Setting) _____ Dollars _____ Cents	_____ _____	_____
14	100 LF	3/4" Polyethylene Service Tubing (Bore) _____ Dollars _____ Cents	_____ _____	_____
15	450 LF	3/4" Polyethylene Service Tubing (Open Cut) _____ Dollars _____ Cents	_____ _____	_____
16	665 LF	Gravel Driveway/Road Repair _____ Dollars _____ Cents	_____ _____	_____
17	185 LF	HMA Driveway/Road Repair _____ Dollars _____ Cents	_____ _____	_____
18	1 EA	Air Release Valve At High Point _____ Dollars _____ Cents	_____ _____	_____
19	LS	45 GPM Booster Pump Station _____ Dollars _____ Cents	_____ _____	_____
20	25 LF	WVDOH Type "B" Trench Repair _____ Dollars _____ Cents	_____ _____	_____

Item	Quantity	Description with Unit Price Written	Unit Price	Total Price
21	100 LF	2" HMA Overlay	Dollars Cents	
22	400 LF	Stream Bank Slope Protection	Dollars Cents	
23	1 EA	6" Tie-Into Existing 6" Water Line, Complete	Dollars Cents	
24	10,800 LF	Reclamation of Disturbed Areas	Dollars Cents	
25	960 LF	WVDOH Rock Lined Ditch	Dollars Cents	
<b>TOTAL BID:</b>				
			(\$	)

(Amounts are to be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.)

**NOTE: THE CONTRACTOR'S UNIT PRICES SHALL INCLUDE PURCHASE AND INSTALLATION, COMPLETE IN PLACE, PER BID ITEM IN ACCORDANCE WITH THE DETAILED SPECIFICATIONS.**

Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and (2) estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

**ADDITIVE ALTERNATE #1**

Item	Quantity	Description with Unit Price Written	Unit Price	Total Price
1	1,864 LF	4" CL-150 Water Pipe	Dollars Cents	
2	1,717 LF	4" CL-200 Water Pipe	Dollars Cents	
3	20 LF	2" C-160 Water Pipe	Dollars Cents	
4	5 EA	4" M.JT. Gate Valve, Complete w/Box and Lid	Dollars Cents	
5	2 EA	2" Post Flushing Hydrant Assembly	Dollars Cents	
6	5 EA	HPMS (High Pressure Meter Setting)	Dollars Cents	
7	56 LF	3/4" Polyethylene Service Tubing (Bore)	Dollars Cents	
8	50 LF	3/4" Polyethylene Service Tubing (Open Cut)	Dollars Cents	
9	83 LF	Gravel Driveway/Road Repair	Dollars Cents	

Item	Quantity	Description with Unit Price Written	Unit Price	Total Price
10	90 LF	Stream Bank Slope Protection	Dollars Cents	
11	2,801 LF	Reclamation of Disturbed Areas	Dollars Cents	
12	677 LF	WVDOH Rock Lined Ditch	Dollars Cents	

**TOTAL ADDITIVE ALTERNATE #1:** \_\_\_\_\_  
 \_\_\_\_\_ (\$ \_\_\_\_\_)

**ADDITIVE ALTERNATE #2**

Item	Quantity	Description with Unit Price Written	Unit Price	Total Price
1	1,438 LF	4" CL-200 Water Pipe	Dollars Cents	
2	1 EA	2" Post Flushing Hydrant Assembly	Dollars Cents	
3	3 EA	HPMS (High Pressure Meter Setting)	Dollars Cents	
4	30 LF	3/4" Polyethylene Service Tubing (Open Cut)	Dollars Cents	

Item	Quantity	Description with Unit Price Written	Unit Price	Total Price
5	20	HMA Driveway/Road Repair		
	LF		Dollars	
			Cents	
6	15	Concrete Driveway/Road Repair		
	LF		Dollars	
			Cents	
7	30	Stream Bank Slope Protection		
	LF		Dollars	
			Cents	
8	20	Rolled Erosion Controlled Product		
	LF		Dollars	
			Cents	
9	1,383	Reclamation of Disturbed Areas		
	LF		Dollars	
			Cents	

**TOTAL ADDITIVE ALTERNATE #2:** \_\_\_\_\_

\_\_\_\_\_ (\$ \_\_\_\_\_)

**METHOD OF AWARD**

If at the time this contract is to be awarded, the lowest total bid submitted by a qualified, responsive, responsible Bidder does not exceed the amount of funds then estimated by the Owner, as available to finance the contract, the construction contract will be awarded. If bids exceed such amount, the Owner may reject all bids.

Awarding of Additive Alternate(s) will not change the lowest Bidder. The Owner may elect to award any or all of the additive alternates in no particular order.

- A. Unit prices have been computed in accordance with paragraph 13.03.A of the General Conditions.

- B. Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

#### **ARTICLE 6 – TIME OF COMPLETION**

- 6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

#### **ARTICLE 7 – ATTACHMENTS TO THIS BID**

- 7.01 The following documents are submitted with and made a condition of this Bid:
- A. Bid Opening Requirements

#### **ARTICLE 8 – DEFINED TERMS**

- 8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.



**ARTICLE 9 – BID SUBMITTAL**

BIDDER: *[Indicate correct name of bidding entity]*

By:

*[Signature]*

*[Printed name]*

*(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)*

Attest:

*[Signature]*

*[Printed name]*

Title:

Submittal Date:

Address for giving notices:

Telephone Number:

Fax Number:

Contact Name and e-mail address:

Bidder's License No.:

*(where applicable)*

**NOTE TO USER:** *Use in those states or other jurisdictions where applicable or required.*

## SECTION 012000 - PRICE AND PAYMENT PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract Documents, including General and Supplementary Conditions, Division 01, and all related Specification Sections, apply to this Section.

#### 1.2 SECTION INCLUDES

- A. Schedule of Values.
- B. Application for Payment.
- C. Change Procedures.
- D. Defect Assessment.
- E. Measurement and Payment.

#### 1.3 SCHEDULE OF VALUES

- A. Submit printed schedule on Progress Estimate Schedule on EJCDC C-620.
- B. Submit Schedule of Values in duplicate within twenty (20) days after date established in Notice to Proceed.
- C. Format: Use Table of Contents of this Project Manual. Identify each line item with number and title of major Specification Section. Also identify site mobilization, bonds and insurance, and demobilization.
- D. Include within each line item, direct proportional amount of Contractor's overhead and profit.
- E. Revise schedule to list approved Change Orders with each Application for Payment.

#### 1.4 APPLICATION FOR PAYMENT

- A. Submit six (6) copies of each Application for Payment on EJCDC C-620 – Contractor's Application for Payment.
- B. Content and Format: Use Schedule of Values for listing items in Application for Payment.
- C. Submit updated construction schedule and payment schedule with each Application for Payment.

- D. Payment Period: Submit at intervals stipulated in the Agreement.
- E. Submit submittals with transmittal letter as specified in Section 013300 - Submittal Procedures.
- F. Substantiating Data: When Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
  - 1. Current construction photographs.
  - 2. Partial release of Liens from major subcontractors and vendors.
  - 3. Record Documents as specified in Section 017000 - Execution and Closeout Requirements, for review by Owner, which will be returned to Contractor.
  - 4. Affidavits attesting to off-site stored products.
  - 5. Construction Progress Schedule, revised and current, as specified in Section 013300 - Submittal Procedures.

#### 1.5 CHANGE PROCEDURES

- A. Carefully study and compare Contract Documents before proceeding with fabrication and installation of Work. Promptly advise Engineer of any error, inconsistency, omission, or apparent discrepancy.
- B. Requests for Interpretation (RFI) and Clarifications: Allot time in construction scheduling for liaison with Engineer; establish procedures for handling queries and clarifications.
  - 1. Use Request for Information Form for requesting interpretations (provided by Engineer upon request).
  - 2. Engineer may respond with a direct answer on the Request for Information form, separate Engineer Response, EJCDC C-942 - Field Order, or EJCDC C-940 - Work Change Directive Form.
- C. Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions on EJCDC C-942.
- D. Engineer may issue Notice of Change including a detailed description of proposed change with supplementary or revised Drawings and Specifications, a change in Contract Time for executing the change with stipulation of overtime Work required, and the period of time during which the requested price will be considered valid. Contractor will prepare and submit estimate within ten (10) days.
- E. Contractor may propose changes by submitting a request for change to Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change and the effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on the Work by separate or other Contractors.
- F. Stipulated Sum/Price Change Order: Based on Proposal Request or Work Change Directive and Contractor's maximum price quotation or Contractor's request for Change Order, as approved by Engineer.
- G. Unit Price Change Order: For Contract unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of that which are not

predetermined, execute Work under Work Directive Change. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.

- H. Work Change Directive: Engineer may issue directive, on EJCDC C-940 - Work Change Directive, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.
- I. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. Engineer will determine change allowable in Contract Sum/Price and Contract Time, as provided in Contract Documents.
- J. Maintain detailed records of Work done on time and material basis. Provide full information required for evaluation of proposed changes and to substantiate costs for changes in the Work.
- K. Document each quotation for change in Project Cost or Time with sufficient data to allow evaluation of quotation.
- L. Change Order Forms: EJCDC C-941 - Change Order.
- M. Execution of Change Orders: Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.
- N. Correlation of Contractor Submittals:
  - 1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
  - 2. Promptly revise Progress Schedules to reflect change in Contract Time, revise sub-schedules to adjust times for other items of Work affected by the change, and resubmit.
  - 3. Promptly enter changes in Record Documents.

#### 1.6 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of Engineer or Owner, it is not practical to remove and replace the Work, Engineer or Owner will direct appropriate remedy or adjust payment.
- C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Owner.
- D. Defective Work will be partially repaired according to instructions of Engineer, and unit sum/price will be adjusted to new sum/price at discretion of Owner.
- E. Individual Specification Sections may modify these options or may identify specific formula or percentage sum/price reduction.
- F. Authority of Owner to assess defects and identify payment adjustments is final.

- G. Nonpayment for Rejected Products: Payment will not be made for rejected products for any of the following reasons:
1. Products wasted or disposed of in a manner that is not acceptable.
  2. Products determined as unacceptable before or after placement.
  3. Products not completely unloaded from transporting vehicle.
  4. Products placed beyond lines and levels of the required Work.
  5. Products remaining on hand after completion of the Work.
  6. Loading, hauling, and disposing of rejected products.

## 1.7 MEASUREMENT AND PAYMENT

### A. General Requirements

1. Contractor shall take measurements and compute quantities. Resident Project Representative and Engineer will verify measurements and quantities.
2. Unit Quantities: Quantities and measurements indicated on Bid Form are for Contract purposes only. Actual quantities provided shall determine payment.
  - a. When actual Work requires more or fewer quantities than those quantities indicated, provide required quantities at Contracted unit sum/prices.
  - b. If the extended price of a particular item of Unit Price Work amounts to 5 percent or more of the Contract Price (based on estimated quantities at the time of Contract Formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 25 percent from the estimated quantity of such item indicated in the Agreement.
3. Payment Includes: Full compensation for required labor, products, tools, equipment, plant and facilities, transportation, services and incidentals; erection, application, or installation of item of the Work; overhead and profit.
4. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities accepted by Engineer multiplied by unit sum/price for Work incorporated in or made necessary by the Work.

### B. Measurement of Quantities

1. Weigh Scales: Inspected, tested, and certified by applicable West Virginia weights and measures department within past year.
2. Platform Scales: Of sufficient size and capacity to accommodate conveying vehicle.
3. Metering Devices: Inspected, tested, and certified by applicable West Virginia department within past year.
4. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel, or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
5. Measurement by Volume: Measured by cubic dimension using mean length, width, and height or thickness.
6. Measurement by Area: Measured by square dimension using mean length and width or radius.
7. Linear Measurement: Measured by linear dimension, at item centerline or mean chord.
8. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed item or unit of the Work.

C. Unit Price Schedule:

1. Mobilization/Demobilization (Lump Sum)

- a. This item shall include the performance of construction preparatory operations, including the movement of equipment and personnel to and from the Project Site, establishment and decommissioning of Contractor's Field Office, storage buildings, and other facilities necessary to conduct Work under this Contract. This bid item is to include payment of all bonding costs incurred by the contractor. Also included in this bid item are materials, the project sign, and equipment unloading, transporting and reloading. The balance of the lump sum bid item shall be considered demobilization and shall be paid at contract close out.
- b. The bid for Mobilization/Demobilizations shall be lump sum.
- c. Partial Payments of the LS Bid amount for mobilization/demobilization shall be as follows:
  - 1) No greater than 33.3% of the total lump sum bid price shall be claimed on the first pay request. No greater than 66% of the total lump sum price shall be claimed when the project meets or exceeds 50% complete. The remaining balance shall be paid upon final pay request.

2. Erosion and Sedimentation Control (Lump Sum)

- a. The cost for this Work shall be Lump Sum.
- b. This Bid item shall include all costs associated with erosion and sedimentation controls including all materials and labor for installation, maintenance, and removal.
- c. The cost of this Work shall be paid for at the lump sum Bid price for all erosion and sedimentation controls at all locations directly and/or indirectly disturbed by the Work.

3. 6" Class 150 Water Line (Linear Foot)

- a. The pipe installed under this item shall be measured and paid for by the linear feet of pipe for each of the types and sizes as specified on the plans or as directed by the Engineer and installed compete in place. The measurements under this item shall be the length of the various sizes and classes of pipe and fittings installed in place and accepted and shall be measured in the horizontal plane along the centerline of each pipe installed, measured centerline of tie-in to centerline of tie-in.
- b. The quantities determined as provided above will be paid for at the contract unit prices bid for the items listed in the Proposal Form. Prices and payments shall be full compensation for excavation, bedding, backfilling, waring tape, tracer wire, and furnishing all materials and doing all the work herein prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, testing and incidentals necessary to complete the work.
- c. Fitting, whether used in ductile iron, PVC, or HDPE, will be paid for as part of linear foot of pipe, if shown on the plan or not.
- d. Any tie-ins to existing service lines, cutting and capping of existing lines or abandonments of existing services are to be considered incidental to the unit cost of installing the water line unless specifically identified in the Bid Schedule.

- e. For areas where no specific surface repair is identified, the cost of seeding, mulching, and reclamation shall be included in the linear foot bid price for the water line installed.
- 4. 6" Ductile Iron CL-50 P.JT. Water Line (Linear Foot)
  - a. The pipe installed under this item shall be measured and paid for by the linear feet of pipe for each of the types and sizes as specified on the plans or as directed by the Engineer and installed compete in place. The measurements under this item shall be the length of the various sizes and classes of pipe and fittings installed in place and accepted and shall be measured in the horizontal plane along the centerline of each pipe installed, measured centerline of tie-in to centerline of tie-in.
  - b. The quantities determined as provided above will be paid for at the contract unit prices bid for the items listed in the Proposal Form, which prices and payments shall be full compensation for excavation, bedding, backfilling, waring tape, tracer wire, and furnishing all materials and doing all the work herein prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, testing and incidentals necessary to complete the work.
  - c. Fitting, whether used in ductile iron, PVC, or HDPE, will be paid for as part of linear foot of pipe, if shown on the plan or not.
  - d. Any tie-ins to existing service lines, cutting and capping of existing lines or abandonments of existing services are to be considered incidental to the unit cost of installing the water line unless specifically identified in the Bid Schedule.
  - e. For areas where no specific surface repair is identified, the cost of seeding, mulching, and reclamation shall be included in the linear foot bid price for the water line installed.
- 5. 4" Class 150 Water Line (Linear Foot)
  - a. The pipe installed under this item shall be measured and paid for by the linear feet of pipe for each of the types and sizes as specified on the plans or as directed by the Engineer and installed compete in place. The measurements under this item shall be the length of the various sizes and classes of pipe and fittings installed in place and accepted and shall be measured in the horizontal plane along the centerline of each pipe installed, measured centerline of tie-in to centerline of tie-in.
  - b. The quantities determined as provided above will be paid for at the contract unit prices bid for the items listed in the Proposal Form, which prices and payments shall be full compensation for excavation, bedding, backfilling, waring tape, tracer wire, and furnishing all materials and doing all the work herein prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, testing and incidentals necessary to complete the work.
  - c. Fitting, whether used in ductile iron, PVC, or HDPE, will be paid for as part of linear foot of pipe, if shown on the plan or not.
  - d. Any tie-ins to existing service lines, cutting and capping of existing lines or abandonments of existing services are to be considered incidental to the unit cost of installing the water line unless specifically identified in the Bid Schedule.
  - e. For areas where no specific surface repair is identified, the cost of seeding, mulching, and reclamation shall be included in the linear foot bid price for the water line installed.

- f. The pipe installed under this item shall be measured and paid for by the linear feet of pipe for each of the types and sizes as specified on the plans or as directed by the Engineer and installed compete in place. The measurements under this item shall be the length of the various sizes and classes of pipe and fittings installed in place and accepted and shall be measured in the horizontal plane along the centerline of each pipe installed, measured centerline of tie-in to centerline of tie-in.
  - g. The quantities determined as provided above will be paid for at the contract unit prices bid for the items listed in the Proposal Form, which prices and payments shall be full compensation for excavation, bedding, backfilling, waring tape, tracer wire, and furnishing all materials and doing all the work herein prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, testing and incidentals necessary to complete the work.
  - h. Fitting, whether used in ductile iron, PVC, or HDPE, will be paid for as part of linear foot of pipe, if shown on the plan or not.
  - i. Any tie-ins to existing service lines, cutting and capping of existing lines or abandonments of existing services are to be considered incidental to the unit cost of installing the water line unless specifically identified in the Bid Schedule.
  - j. For areas where no specific surface repair is identified, the cost of seeding, mulching, and reclamation shall be included in the linear foot bid price for the water line installed.
- 6. 2" CL-160 Water Line (Linear Foot)
  - a. The pipe installed under this item shall be measured and paid for by the linear feet of pipe for each of the types and sizes as specified on the plans or as directed by the Engineer and installed compete in place. The measurements under this item shall be the length of the various sizes and classes of pipe and fittings installed in place and accepted and shall be measured in the horizontal plane along the centerline of each pipe installed, measured centerline of tie-in to centerline of tie-in.
  - b. The quantities determined as provided above will be paid for at the contract unit prices bid for the items listed in the Proposal Form, which prices and payments shall be full compensation for excavation, bedding, backfilling, waring tape, tracer wire, and furnishing all materials and doing all the work herein prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, testing and incidentals necessary to complete the work.
  - c. Fitting, whether used in ductile iron, PVC, or HDPE, will be paid for as part of linear foot of pipe, if shown on the plan or not.
  - d. Any tie-ins to existing service lines, cutting and capping of existing lines or abandonments of existing services are to be considered incidental to the unit cost of installing the water line unless specifically identified in the Bid Schedule.
  - e. For areas where no specific surface repair is identified, the cost of seeding, mulching, and reclamation shall be included in the linear foot bid price for the water line installed.
- 7. 6" M.JT. Gate Valve, Complete w/ Box and Lid (Each)
  - a. The Contractor's Unit Bid Price for new gate valves shall include the purchase an installation of the valve including the poured concrete thrust block, cast iron riser box, concrete stabilization block around the riser box, centering rings, mud plugs, and valve markers.



8. 4" M.JT. Gate Valve, Complete w/ Box and Lid (Each)
  - a. The Contractor's Unit Bid Price for new gate valves shall include the purchase and installation of the valve including the poured concrete thrust block, cast iron riser box, concrete stabilization block around the riser box, centering rings, mud plugs, and valve markers.
9. 2" M.JT. Gate Valve, Complete w/ Box and Lid (Each)
  - a. The Contractor's Unit Bid Price for new gate valves shall include the purchase and installation of the valve including the poured concrete thrust block, cast iron riser box, concrete stabilization block around the riser box, centering rings, mud plugs, and valve markers.
10. 2" Post Flushing Hydrant Assembly, Complete (Each)
  - a. The Contractor's Unit Bid Price for 2" post flushing hydrant assembly shall include the purchase and installation of the 2" post flushing hydrant, 2" gate valve, mechanical joint reducer (if needed) and up to 10' length of 2" waterline between the 2" gate valve and the flushing hydrant and all appurtenances as shown on the details of the contract drawings.
11. 12" Steel Casing (Open Cut) w/ Casing Spacers (Linear Foot)
  - a. Measurement and Payment for installation of steel casing using the open cut construction method shall be for the overall length of the casing pipe satisfactorily installed. Payment shall include all labor and materials necessary for, and incidental to, the construction of the crossing, including excavation, sheeting, bracing, backfilling, grouting, link seal, blocking, etc. and all required fittings and casing spacers. Payment shall be for casing pipe only. Carrier pipe shall be paid by the unit bid price per foot. Unauthorized footage beyond those called for in the plans and specifications shall not be compensated for.
12. Low Pressure Meter Setting (Each)
  - a. The Contractor's Unit Bid Price for setting a new customer service shall include the location and excavation of existing customer service line, purchase and installation of water meter (to match PSD's existing meters) well, lid, coppersetter for connection of meter to Low Pressure Meter Setting, corporation stop and saddle, and including a 5' stub of ¾" polyethylene service tubing on the customer side of the meter.
13. High Pressure Meter Setting (Each)
  - a. The Contractor's Unit Bid Price for setting a new customer service shall include the location and excavation of existing customer service line, purchase and installation of water meter (to match PSD's existing meters), well, lid, coppersetter for connection of meter to High Pressure Meter Setting, corporation

stop and saddle, and including a 5' stub of ¾" polyethylene service tubing on the customer side of the meter.

14. 1 ½" Polyethylene Service Tubing (Bore and Jack) (Linear Foot)

- a. The pipe installed under this item shall be measured and paid for by the linear feet of pipe for each of the types and sizes as specified on the plans or as directed by the Engineer and installed compete in place. The measurements under this item shall be the length of the various sizes and classes of pipe and fittings installed in place and accepted and shall be measured in the horizontal plane along the centerline of each pipe installed, measured centerline of tie-in to centerline of tie-in.
- b. The quantities determined as provided above, will be paid for at the contract unit prices bid for the items listed in the Bid Schedule, which prices and payments shall be full compensation for excavation, bedding, backfilling, waring tape, tracer wire and furnishing all materials and doing all the work herein prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, testing and incidentals necessary to complete the work.
- c. Fitting, weather used in ductile iron, PVC or HDPE, will be paid for as part of linear foot of pipe, if shown on the plan or not.
- d. Any tie-ins to existing service lines, cutting and capping of existing lines, or abandonments of existing services are to be considered incidental to the unit cost of installing the water line unless specifically identified in the Bid Schedule.

15. 1 ½" Polyethylene Service Tubing (Open Cut) (Linear Foot)

- a. The pipe installed under this item shall be measured and paid for by the linear feet of pipe for each of the types and sizes as specified on the plans or as directed by the Engineer and installed compete in place. The measurements under this item shall be the length of the various sizes and classes of pipe and fittings installed in place and accepted and shall be measured in the horizontal plane along the centerline of each pipe installed, measured centerline of tie-in to centerline of tie-in.
- b. The quantities determined as provided above, will be paid for at the contract unit prices bid for the items listed in the Bid Schedule, which prices and payments shall be full compensation for excavation, bedding, backfilling, waring tape, tracer wire and furnishing all materials and doing all the work herein prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, testing and incidentals necessary to complete the work.
- c. Fitting, weather used in ductile iron, PVC or HDPE, will be paid for as part of linear foot of pipe, if shown on the plan or not.
- d. Any tie-ins to existing service lines, cutting and capping of existing lines, or abandonments of existing services are to be considered incidental to the unit cost of installing the water line unless specifically identified in the Bid Schedule.

16. 1" Polyethylene Service Tubing (Bore and Jack) (Linear Foot)

- a. The pipe installed under this item shall be measured and paid for by the linear feet of pipe for each of the types and sizes as specified on the plans or as directed by

the Engineer and installed compete in place. The measurements under this item shall be the length of the various sizes and classes of pipe and fittings installed in place and accepted and shall be measured in the horizontal plane along the centerline of each pipe installed, measured centerline of tie-in to centerline of tie-in.

- b. The quantities determined as provided above, will be paid for at the contract unit prices bid for the items listed in the Bid Schedule, which prices and payments shall be full compensation for excavation, bedding, backfilling, waring tape, tracer wire and furnishing all materials and doing all the work herein prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, testing and incidentals necessary to complete the work.
- c. Fitting, weather used in ductile iron, PVC or HDPE, will be paid for as part of linear foot of pipe, if shown on the plan or not.
- d. Any tie-ins to existing service lines, cutting and capping of existing lines, or abandonments of existing services are to be considered incidental to the unit cost of installing the water line unless specifically identified in the Bid Schedule.

17. 1" Polyethylene Service Tubing (Open Cut) (Linear Foot)

- a. The pipe installed under this item shall be measured and paid for by the linear feet of pipe for each of the types and sizes as specified on the plans or as directed by the Engineer and installed compete in place. The measurements under this item shall be the length of the various sizes and classes of pipe and fittings installed in place and accepted and shall be measured in the horizontal plane along the centerline of each pipe installed, measured centerline of tie-in to centerline of tie-in.
- b. The quantities determined as provided above, will be paid for at the contract unit prices bid for the items listed in the Bid Schedule, which prices and payments shall be full compensation for excavation, bedding, backfilling, waring tape, tracer wire and furnishing all materials and doing all the work herein prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, testing and incidentals necessary to complete the work.
- c. Fitting, weather used in ductile iron, PVC or HDPE, will be paid for as part of linear foot of pipe, if shown on the plan or not.
- d. Any tie-ins to existing service lines, cutting and capping of existing lines, or abandonments of existing services are to be considered incidental to the unit cost of installing the water line unless specifically identified in the Bid Schedule.

18. ¾" Polyethylene Service Tubing (Bore and Jack) (Linear Foot)

- a. The pipe installed under this item shall be measured and paid for by the linear feet of pipe for each of the types and sizes as specified on the plans or as directed by the Engineer and installed compete in place. The measurements under this item shall be the length of the various sizes and classes of pipe and fittings installed in place and accepted and shall be measured in the horizontal plane along the centerline of each pipe installed, measured centerline of tie-in to centerline of tie-in.
- b. The quantities determined as provided above, will be paid for at the contract unit prices bid for the items listed in the Bid Schedule, which prices and payments shall be full compensation for excavation, bedding, backfilling, waring tape,

tracer wire and furnishing all materials and doing all the work herein prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, testing and incidentals necessary to complete the work.

- c. Fitting, weather used in ductile iron, PVC or HDPE, will be paid for as part of linear foot of pipe, if shown on the plan or not.
- d. Any tie-ins to existing service lines, cutting and capping of existing lines, or abandonments of existing services are to be considered incidental to the unit cost of installing the water line unless specifically identified in the Bid Schedule.

19. ¾" Polyethylene Service Tubing (Open Cut) (Linear Foot)

- a. The pipe installed under this item shall be measured and paid for by the linear feet of pipe for each of the types and sizes as specified on the plans or as directed by the Engineer and installed compete in place. The measurements under this item shall be the length of the various sizes and classes of pipe and fittings installed in place and accepted and shall be measured in the horizontal plane along the centerline of each pipe installed, measured centerline of tie-in to centerline of tie-in.
- b. The quantities determined as provided above, will be paid for at the contract unit prices bid for the items listed in the Bid Schedule, which prices and payments shall be full compensation for excavation, bedding, backfilling, waring tape, tracer wire and furnishing all materials and doing all the work herein prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, testing and incidentals necessary to complete the work.
- c. Fitting, weather used in ductile iron, PVC or HDPE, will be paid for as part of linear foot of pipe, if shown on the plan or not.
- d. Any tie-ins to existing service lines, cutting and capping of existing lines, or abandonments of existing services are to be considered incidental to the unit cost of installing the water line unless specifically identified in the Bid Schedule.

20. Gravel Driveway/Road Repair (Linear Foot)

- a. Gravel Driveway/Road Repair shall be paid for on a linear foot basis measured along the center line of the pipe or length of area disturbed as shown on the plans or directed by the Engineer.
- b. Width shall not be considered. The Contractor shall repair all stone areas disturbed as determined by the Engineer or his representative. Stone areas disturbed by the Contractor where water line was not installed shall be replaced at the Contractor's expense.
- c. Stone base or flowable fill shall be included in the price of the pavement repair as called for in the plans.
- d. Stone materials, and the maintenance thereof, shall be included in the price of the pavement repair when the pavement is not replaced immediately.
- e. All areas of pavement disturbed due to any of the Contractor's operations which are not along the centerline of the water line construction shall also be satisfactorily repaired, at no additional cost to the Owner.
- f. Payment for trench repair shall include at a minimum, the width of the excavation. Payment for footages that have less than the excavation width shall be prorated per linear foot.

21. HMA Driveway/Road Repair (Linear Foot)

- a. HMA Driveway/Road Repair shall be paid for on a linear foot basis measured along the center line of the pipe or length of paved area disturbed as shown on the plans or directed by the Engineer.
- b. Width shall not be considered. The Contractor shall repair all pavement disturbed as determined by the Engineer or his representative. Pavement disturbed by the Contractor where water line was not installed shall be replaced at the Contractor's expense.
- c. Stone base or flowable fill shall be included in the price of the pavement repair as called for in the plans.
- d. Stone materials, and the maintenance thereof, shall be included in the price of the pavement repair when the pavement is not replaced immediately.
- e. All areas of pavement disturbed due to any of the Contractor's operations which are not along the centerline of the water line construction shall also be satisfactorily repaired, at no additional cost to the Owner.
- f. Straight, perpendicular saw cuts between the existing asphalt or concrete surfaces shall be included in the Contractor's Unit Bid Price for this work.
- g. Payment for trench repair shall include at a minimum, the width of the excavation. Payment for footages that have less than the excavation width shall be prorated per linear foot.
- h. Payment for trench repair and overlay area shall include all required stripes and painting.

22. Concrete Driveway/Road Repair (Linear Foot)

- a. The Bid item installed shall be measured and paid for at the unit price Bid per linear feet of concrete repair measured along the centerline of the pipe. Width of repair will not be considered.
- b. This Bid item shall include all required labor, materials, equipment and all other costs associated with concrete repair including but not limited to traffic control, saw cutting existing concrete, removal and proper disposal of existing concrete, stone base, forming, pouring, curing and form removal.
- c. No payment will be made for temporary repairs required during construction for the maintenance of driveways and sidewalks. All concrete repair work shall be included in this linear foot Bid Price.

23. Air Release Valve at High Point (Each)

- a. The Contractor's Unit Bid Price for air release valve shall include the purchase and installation of the 3/4" air release valve, meter, well, and lid, 3/4" corporation stop and saddle, 3/4" Type K copper connecting tubing between the corporation stop and the 3/4" ball valve all as shown in the plans. Air releases shall all include one (1) cubic foot of clean size 57 stone in bottom of well.

24. 45 GPM Package Hydro-Pneumatic Booster Pump Station (Lump Sum)

- a. The lump sum bid price for the booster pump station, shall include all material, labor, equipment, and site work necessary to construct the booster pump station as shown on the plans. This bid item shall include everything inside the property line as shown on the plans.

- b. The Lump Sum Price for the Package Booster Pump Station shall also include the start-up services of a qualified factory representative for the station.
- c. The lump sum bid price shall include all costs associated with providing the required electrical service including power drop from the nearest electrical service pole to the pump station, main disconnect, and meter socket.
- d. The booster station shall include a manual transfer switch that is to be mounted as shown on the plans.
- e. The lump sum bid price shall include all costs associated with the purchase and installation of Satellite-Cellular telemetry as shown in the plans and specifications.

25. WVDOH Type "B" Trench Repair (Linear Foot)

- a. The Bid item installed shall be measured and paid for at the unit price Bid per linear feet of trench repair measured along the centerline of the pipe. Width of repair will not be considered.
- b. This Bid item shall include all required labor, materials, equipment and all other costs associated with trench repair including but not limited to traffic control, milling as necessary in order to prevent an unacceptable drainage pattern, heal in joints, saw cutting existing pavement and removal and proper disposal of existing asphalt.
- c. No payment will be made for temporary paving required during construction. All asphalt repair work shall be included in this linear foot Bid Price.

26. 2" HMA Overlay (Linear Foot)

- a. The Bid item installed shall be measured and paid for at the unit price Bid per Linear Foot of asphalt installed at the thickness described in the plans.
- b. This Bid item shall include all required labor, materials, equipment and all other costs associated with overlay including but not limited to pavement markings, traffic control, milling necessary in order to prevent unacceptable drainage pattern, heal in joints, saw cutting existing pavement, removal and proper disposal of existing asphalt, tack coat and cleaning of the road prior to application.
- c. No payment will be made for temporary paving required during construction or for additional tonnage as a result of damage to the existing roadway caused by the construction activity.

27. Stream Bank Slope Protection (Linear Foot)

- a. Measurement and Payment for this item shall be included in the linear foot bid price for stream bank protection and shall include all stone, fabric, excavation and labor required to stabilize the stream bank slope as required.

28. 6" Tie-Into Existing 6" Water Line. Tie-In to include 6" M.JT. Gate Valve Complete with Box and Lid. (Each)

- a. The Contractor's Unit Bid Price for this item shall include the purchase and installation of all required material in order to perform the tie-in or hot tap as shown. This Unit Bid Price shall include the location and excavation of the water line, all required gate valves, all fittings (including reducers), and the necessary

ductile iron solid sleeve(s) or dresser coupling(s), stainless steel tapping sleeve(s), thrust blocking, bedding, backfilling, etc.

29. Rolled Erosion Controlled Product (Linear Foot)

- a. Installation of rolled erosion control matting shall be paid for by the unit bid price installed.

30. Restoration (Linear Feet)

- a. Measurement and Payment for this item shall be included in the linear foot bid price for Restoration and shall include the purchase of seed and mulch, and its application to all disturbed areas along with the fertilizer and any other amendments applications.

31. WVDOH Rock Lined Ditch Repair (Linear Foot)

- a. Measurement and Payment for this item shall be included in the linear foot bid price for WVDOH Rock Lined Ditch Repair and shall include the purchase, transportation and placement necessary to complete the work in all disturbed areas along with the project and any other amendments applications.
- b. All areas of rock lined ditch disturbed due to any other of the contractor's operations which are not designed as part of the project construction shall also be satisfactorily repaired, at no additional cost to the Owner.

1.8 BASIS FOR PAYMENT

- A. Payment for work listed under the previously listed sections shall be as follows unless otherwise noted.

1. When a separate bid item has been included in the Bid Schedule, payment shall be under the lump sum and/or unit bid items as shown on the Bid Schedule.

OR

2. When no separate bid item has been included in the Bid Schedule, payment for such work shall be included in the lump sum and/or unit bid items as to which such work under this item is incidental.
3. In either situation, payments shall be full compensation for the furnishing of all materials and performing of all the work as shown, in a workman like and acceptable manner, including all labor, tools, supplies and incidentals necessary to complete the work.

1.9 ALTERNATES

- A. Alternates are used when Owner or Engineer wants to competitively bid additional work or bid different product or system compared to product or system specified as an integral part of base

Project requirements. Submitted Bids for Alternates are expressed as cost increases or decrease to the base bid.

- B. Coordinate related Work and modify surrounding Work. Description for each Alternate is recognized to be abbreviated but requires that each change shall be complete for scope of Work affected.
  - 1. Coordinate related requirements among Specification Sections as required.
  - 2. Include as part of each Alternate: Miscellaneous devices, appurtenances, and similar items incidental to or necessary for complete installation.
  - 3. Coordinate Alternate with adjacent Work and modify or adjust as necessary to ensure integration.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012000



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### **Above Ground Pumping Station with Modular Building**

The contractor shall furnish and install a factory designed and assembled automatic water booster station with all necessary pumps, internal valves, piping, electrical controls and accessories as shown on the plans and specified herein.

The station shall be complete with all needed equipment factory installed on a fabricated steel base and enclosed in an insulated modular steel building. Station shall be as manufactured by USEMCO, Inc., Tomah, Wisconsin or approved equal. Proposed equal equipment must be submitted to the engineer at least 15 days prior to bid. Submittals must include data on all equipment included in the station along with a drawing showing the proposed station. Proposed equal equipment not submitted 15 days prior to the bid date will not be considered.

To ensure total quality control, the complete unit will be designed, fabricated, assembled and tested in-house by the station manufacturer. The complete pump station will be UL listed under 'QCZJ - Packaged Pumping Systems'.

### **Constant Pressure with Variable Speed Motor**

The booster pump station is to provide water service to a closed distribution system at a constant pressure. Two service pumps, each sized for the normal peak flow conditions, are provided. The pumps alternate at the end of each cycle and the back-up pump will also operate with the duty pump during periods of unusually high consumption. System pressure is controlled by varying the speed in direct ratio to the discharge pressure.

The centrifugal pumps and motors shall be suitable for operating under the following design conditions:

Pump No.	GPM	TDH	HP	RPM	EFF
1	45	253	5	3500	
2	45	253	5	3500	

The pump motors shall be of the type specified and shall be suitable for 230 volt, 3 phase, 60 hertz, 3 wire electrical service. The station incoming electrical service shall be 230 volt, 1 phase, 60 hertz, 3 wire electrical service. The variable frequency drives shall also be used to convert incoming single phase power to pump three phase power.

### **Equipment Base**

The equipment chamber's common base shall be fabricated from a minimum 3/8" structural grade steel plate, reinforced with adequate sized steel channels to prevent deflection due to equipment weight and stresses imposed from lifting and setting of equipment.

Bolt on lifting eyes shall be placed about the perimeter of the equipment base to facilitate lifting and handling of the station. The lifting eyes shall be easily removable after the station has been set in place.

The steel plate and structural employed in the base shall meet or exceed the requirement of ASTM-A36.

### **Equipment Building**

The booster pump station will be complete with a factory assembled modular building affixed to the steel equipment base supporting the booster pumps as shown on the plans. The completed booster station shall be one piece when delivered and require only off loading, installation on the prescribed foundation slab, pipeline hook up and electrical service to complete the installation. **Field erected buildings or buildings using steel C studs as wall framing members and C joists as roof trusses will not be acceptable.**

The polyurethane foam core shall be classified by Underwriters Laboratories as having flame spread of 25 or lower and smoke generation of less than 450 when tested in accordance with UL Standard 723 (ASTM Standard E-84).

All sidewall and ceiling panels shall consist of interior and exterior metal skins formed with steel dies and roll-forming equipment and checked with gauges for uniformity and accuracy. The panel shall be furnished with an embossed finish pressed into the galvanized steel panel. Polyurethane shall be foamed-in-place (poured, not frothed) and, when completely heat-cured, shall bond to the metal skins to form a rigid 4" thick insulated panel. Overall coefficient of heat transfer ("U" factor) shall be a minimum of .033 (R-30) for 4" thick walls. Wood reinforcement shall be placed inside the wall and ceiling panels where required to support the station equipment loads. Any wood reinforcement in a wall and ceiling panel shall be totally enclosed within the panel and clad with the exterior and or interior metal skins. To ensure tight joints, panel edges must have foamed-in-place tongues and grooves with a flexible vinyl gasket also foamed-in-place on the interior and exterior of all tongue edges.

Panels shall be equipped with cam lock joining devices. The distance between locks shall not exceed 46". Each locking device shall consist of a cam-action, hooked locking arm placed in one panel, and a steel rod positioned in the adjoining panel, so that when the locking arm is rotated, the hook engages over the rod and draws the panel tightly together with cam action. The locking arms and steel rods shall be housed in individual steel pockets set into the panel. Press fit caps shall be provided to close lock wrench holes. A cam lock wrench shall be supplied with the building. lock wrench holes.

Exterior of building shall be a minimum of .018" (26 ga.) thick galvanized steel panel. The building exterior shall be covered with panels that have natural aggregate embedded in a reinforced polymer to produce a composite panel that is lightweight, fire resistant and durable. The panels shall be attached to wood reinforcement panels that are imbedded in the

building panels. The panels shall be warranted to be free from unnatural discoloration, cracking or aggregate loss for 15 years. Acceptable products are O'MNIS Steni medium aggregate in Smokey Mountain Gray or approved equal.

Interior of building shall be a minimum of .018" (26 ga.) thick galvanized steel panel, protected by a spray and baked white color polyester protective coating. The use of FRP (fiberglass reinforced plastic) sheeting attached to plywood sheets as an interior finish is not acceptable. FRP sheeting may be applied over the galvanized steel panel in chemical feed rooms only.

Hinged entrance door shall be a steel commercial type, insulated hollow core. Matching metal jambs shall be furnished to fit prefab panels without the use of any interior framing. Jamb members shall attach to panels with sheet metal screws. The door shall be supplied with weather-stripping and a wiper gasket. Entrance opening shall be a minimum 36" x 78" clear opening size. Hardware for doors shall be cylindrical lockset with satin stainless steel finish. Each door shall have three tamper-proof pinned butt hinges. All doors for outdoor structures shall be supplied with a metal shield above the door to divert rain and snow from the door opening. An extruded aluminum sillplate shall be provided on outdoor buildings.

The ceiling panels shall be covered by a single piece EPDM rubber membrane to provide a waterproof covering. The membrane shall be white and a minimum of 45 mil. The roof shall be peaked with a center ridge 12" high.

### **Lifting Device**

A spreader bar type lifting device, built to lift the modular building from each corner of deck structure without impinging the lifting chain/cables on the modular building sidewalls, shall be provided by the installing contractor.

### **Welding**

All welding shall be in accordance with standard AWS practices, with proper fillet section and continuity to assure a sound, watertight structure. All welds shall be sound and free from embedded scale or slag, shall have tensile strength across the weld not less than that of the thinner of the connected sections, and shall be watertight. Butt welds shall be used for all welded joints in line pipe assemblies. Fillet welds shall be used for flange attachment in accordance with AWWA C207. All welds in contact with soil or water shall be tested with a dye penetrant to assure the watertight integrity of the weld system. All pipe and fittings shall be welded by welders certified for ASME type IX pipe welding.

### **Protective Coating**

All mill scale, rust, weld flux and other foreign matter shall be removed from all steel surfaces by steel shotblasting to SSPC SP-10 specification for near-white blast cleaning. Surface irregularities shall be removed by grinding.

Steel and cast/ductile iron surfaces shall receive a minimum of two coats of hi-build epoxy coating. The coating material shall show excellent resistance to immersion in seawater as well as to splash or spillage of water, petroleum products, and salt solutions. The surfaces shall receive two coats a minimum of 3 mils each to a total of 6 mils dry.

Piping interior shall have a fusion bonded epoxy coating applied after shotblasting. The coating shall meet AWWA C-213 standards and be applied to a minimum thickness of 12 mils.

Paint touch-up kits shall be provided with the station for coating areas damaged in shipping.

The floor in all working areas within the station shall be protected with heavy neoprene matting.

### **Multi-Stage Centrifugal Pumps**

The pump end shall be of the vertical multi-stage design with the motor mounted directly to the top of the pump. The pump models shall be furnished as shown on the plans and installed in accordance with the recommendations of the manufacturer.

The pump suction/discharge chamber, motor stool and pump shaft coupling shall be constructed of cast iron. The impellers, pump shaft, diffuser chambers, outer discharge sleeve, and impeller seal ring or seal ring retainers shall be constructed of stainless steel. The impellers shall be secured directly to the pump shaft by means of a splined shaft arrangement. Intermediate and lower shaft bearings shall be tungsten carbide and ceramic. Pumps shall be equipped with a high temperature mechanical seal assembly with tungsten carbide seal faces mounted in stainless steel seal components.

The pump motor shall be sized to insure the pump is non-overloading when operating on the specified pump curve. The motor shall be of the horsepower, voltage, phase and cycle as shown on the drawings. Motor design shall be of the open drip proof with a NEMA C face design operating at a nominal 3500 RPM with a minimum service factor of 1.15. Lower motor bearings shall be adequately sized to insure long motor life.

### **Pipe & Fittings**

All internal transmission piping and fittings shall be of schedule 40 black, seamless steel pipe and will be manufactured in accordance with the dimensional tolerances and material specifications of the AWWA C-200-75 for steel pipe and steel butt-welded fittings.

All piping shall be sized as shown on the plans.

### **Compression Couplings**

Compression couplings, where shown on the drawings, shall consist of steel sleeves with compression gaskets and followers. Couplings will be bolted style for over 2" and threaded style for 2" and less.

### **Gate Valves**

Gate valves, sized as shown on the plans, shall be of the resilient wedge type, non-rising stem design. The valve body shall be of high quality cast iron construction, bronze stems with O-ring seals located above the thrust collar. Gates for all valve sizes shall be encapsulated in rubber where exposed to line velocity, be field replaceable and provide a dual seat on the mating body seat. The valve shall meet or exceed AWWA specifications.

### **Butterfly Valves**

Wafer type butterfly valves shall be used as isolation valves in the unit and shall be installed as shown on the plans. The disc of butterfly valves, while in the open position, shall not strike any other valve or other equipment items.

The valve body shall be of cast iron construction with a centering rib to assure accurate positioning. The valve stem shall be of full diameter through the valve body and be isolated from the fluid medium. The valve disc shall be of ductile iron accurately machined for proper contact with the replaceable a seating surface.

Valves 6 inches and smaller shall be equipped with lever handles and throttling plates.

Valves 8 inches and larger shall be equipped with totally enclosed gear operators with hand wheels.

### **Silent Check Valves**

Each pump discharge piping shall include a wafer style, non-slam check valve, sized as shown on the plans and designed for installation between two Class 150 flanges. The valve body shall be of cast iron construction, bronze plug, seat and guide bushings with stainless steel valve spring and seat retainer. The valve plug shall be guided at both ends by a center shaft integral with the valve plug. Alignment of the center shaft shall be provided through the usage of guide bushings. The check valve shall be designed to prevent water hammer by returning the valve plug to the seat before reversal of flow occurs.

### **Air Release Valve**

Air release valves shall be provided where shown on the drawings. The valve shall be automatic float operated to release accumulated air in a piping system while in service and under pressure. The valve body shall be cast iron with threaded NPT connections. The orifice, float and linkage mechanism shall be constructed of 304 stainless steel. Valve shall be Val-Matic model 15A.

### **Hydropneumatic Bladder Tank**

A hydropneumatic tank with a replaceable bladder shall be supplied with the station. The tank shall be ASME coded and stamped. Internal bladder shall be heavy duty butyl rubber. Tank exterior shall be painted with red oxide primer and finish coat. Pressure rating shall be 200 PSI and volume of 53 gallons.

### **Flowmeter Magnetic**

A magnetic flow meter shall be installed in the common discharge line, sized as shown on the plans. The flowmeter shall be of the low frequency electromagnetic induction type and shall produce a DC pulse signal directly proportional and linear to the liquid flowrate. The meter shall be designed for operation on 24 VDC + 1-10%, 60 Hertz with a power consumption of less than 15 watts.

The meter shall be provided with a neoprene liner, metering tube and electrodes of 316 stainless steel construction. Ultrasonic cleaning of the electrodes shall be provided. The electronics portion of the magnetic flowmeter shall include both a magnetic driver to power the magnetic coils and signal converter. The output signal shall be 4-20 MA D.C. analog frequency.

The signal converter shall be completely solid state with integrated circuitry.

The meter shall be hydraulically calibrated and shall be in accordance with the national bureau of standards. The accuracy of the metering system shall be 1% of rate for maximum range settings of 3 to 31 feet per second.

Complete zero stability shall be an inherent characteristic of the meter system to eliminate the need to zero adjust the system with a full pipe at zero flow.

### **Pressure Gauges**

Pressure gauges shall be provided to indicate suction and discharge pressure and shall be wall mounted on a steel plate as near to the pressure source as possible. The gauges shall

have 4 1/2 inch minimum diameter faces with molded black phenolic case, turret type with snap ring face mounting. The gauge internal construction shall include phosphor bronze bourdon tube with bronze movement. The gauges shall have 1/4" N.P.T. bottom connections, flexible sensing lines, bronze snubbers and needle valves.

Pressure gauge ranges shall be as follows:

Suction Pressure: 0 to 100 PSI.

Discharge Pressure: 0 to 200 PSI.

### **Electrical Control System**

The electrical control system shall be assembled into a NEMA I enclosure fabricated of 14 gauge steel. Clear space shall be provided in front of the panel to adequately meet the requirement of Article 110-16 of the National Electrical Code in regard to working space.

The control panel shall be constructed in compliance with Underwriter's Laboratories Industrial Control Panels listing and follow-up service, utilizing UL listed recognized components where applicable. The control panel shall bear a UL 508 serialized label.

Properly sized, UL listed, molded case circuit breakers shall be provided for each pump motor and the lighting distribution interior.

### **Panel Mount Load Center**

As part of the water booster control panel, an electrical distribution center consisting of thermal magnetic circuit breakers with a capacity of 15 amps, shall be provided for each branch circuit including the following:

- Control
- Dehumidifiers
- Blowers
- Heaters
- Convenience Receptacle
- Lighting

The circuit breakers shall indicate when the circuit is open and shall have means provided for manual switching. All breakers shall be labeled as to function with permanently attached phenolic nameplates.

### **Variable Frequency Drive**

#### **Quality Assurance**

A. The manufacturer of the VFD shall be a certified ISO 9001 and ISO 14000 facility.



- B. The VFD, including its internal electronic thermal overload protection circuit, shall be UL and cUL Listed in accordance to UL 508C - Power Conversion Equipment.
- C. UL / cUL labels shall be attached on the outside of each VFD as verification.
- D. The VFD shall be designed in accordance with NEMA, IEC, EN, UL and CSA standards.
- E. The VFD manufacturer shall have 20 years of experience, minimum, in the design, construction and application of variable frequency drives.
- F. The VFD manufacturer shall have an existing service organization.
- G. The manufacturer of the VFD shall have the ability to design and manufacture insulated gate bipolar transistors (IGBT) to be incorporated into the construction of the VFD.
- H. The manufacturer of the VFD shall have the ability to evaluate any component failure at their own analysis lab. The services available shall include x-ray magnification of components, complete electrical testing, and the ability to analyze failures within the components.

### **General Description**

- A. The VFD shall convert the input AC mains power to an adjustable frequency and adjustable voltage as defined in the following sections.
- B. The input power section shall utilize a full wave 6-pulse bridge design incorporating diode rectifiers. The diode rectifiers shall convert AC line power of fixed voltage and frequency to fixed DC voltage. This power section shall be insensitive to phase sequence of the AC line voltage.
- C. The DC bus shall have external connections for external braking and allow for customer common DC Bus for multiple drive regeneration.
- D. The output power section shall change fixed DC voltage to adjustable frequency AC voltage. This section shall utilize insulated gate bipolar transistors (IGBT's).

### **Construction**

- A. The VFD shall be rated UL Type 1 and shall be UL Listed as a plenum rated VFD.
- B. The VFD shall employ built-in RS-485 communication via an RJ45 connection or terminal block.
- C. The VFD shall employ built-in Modbus-RTU communication via a terminal block connection.
- D. The VFD shall employ a standard control panel with built-in parameter copy functionality.
- E. The VFD shall utilize one (1) connector slots for internally mounting plug-in options.
- F. The VFD shall employ a removable control terminal block.
- G. The VFD shall employ sink/source selectable control logic.
- H. The VFD shall employ modular cooling fans – no tools required to exchange (up to 75Hp).
- I. The VFD shall include a standard DC link reactor for ratings 100Hp and above.

### **Application Data**

- A. The VFD shall be sized to operate a Variable Torque load.

- B. The speed range shall be from a minimum speed of 0.5 Hertz to a maximum speed of 400Hertz.

#### **Environmental Ratings**

- A. The VFD shall be designed to operate in the following Ambient Temperature range: Non-freezing.
  - a) Variable Torque and Constant Torque loads: -10C to +50C (14 to 122F).
- B. The storage temperature shall be -20C to +65C (-4 to 149F), non-condensing. Applicable for short periods, such as during transit.
- C. The maximum relative humidity shall be 90% at 50C (122F), non-condensing.
- D. The VFD shall be rated to operate at altitudes less than or equal to 1000m (3280ft). For altitudes above 1000m (3280ft):
  - a) Sizes up to 75Hp: Reduce the rated output current (Amperes) by 3% for every 500m (1640ft), up to 2500m (8200ft) maximum (91% of rated).
  - b) Sizes 100Hp and larger: Reduce the rated output current (Amperes) by 2% for every 500m (1640ft), up to 3000m (9842ft) maximum (92% of rated).
  - c) Consult factory for higher altitudes.
- E. The VFD shall be designed according to IEC 60068-2-6 to resist vibration.

#### **VFD Ratings**

- A. The VFD shall be designed for operation with the following input voltages.
  - a) FR-F720, 1Hp to 75Hp: 170-242Vac 50HZ, 170-264Vac 60Hz, 200-240Vac (+10%/-15%).
  - b) FR-F740, 1Hp to 800Hp: 323-528Vac 50/60Hz, 380-480Vac (+10%/-15%).
- B. The speed range shall be from a minimum of 0.5 Hz to a maximum of 400Hz, adjustable by increments of 0.01Hz. Operation above 60Hz shall require programming changes to avoid over speeding the application.
- C. The input voltage frequency range shall be 47.5 to 63 Hz.
- D. The displacement power factor shall not be less than 0.93 with optional DC line reactor at 100% load factor. (DC reactor included as standard for VFD's 100HP and above.)
- E. The efficiency of the VFD at 100% speed and load shall not be less than 95%.
- F. The VFD shall conform to the European Union ElectroMagnetic Compatibility directive, CE labeled. The VFD shall meet product standard EN61800-3 for Second (2<sup>nd</sup>) Environmental.
- G. Frequency precision shall not be less than:
  - a) Using analog input: Within +/- 0.2% of maximum output frequency. (25C +/-10C)
  - b) Using digital input: Within +/- 0.01% of set output frequency.
- H. The Over-current capacity shall be:
  - a) Variable torque (LD): 120% for 1 min or 150% for 3sec, at 50C (continuous).
  - b) Variable torque (SLD): 110% for 1 min or 120% for 3sec, at 40C (continuous).
- I. The VFD shall minimize the audible motor noise through the use of an adjustable carrier frequency.
- J. The Speed Control Range shall be:
  - a) 20:1 while running between 3 and 60 Hz.

### **Protection**

- A. The VFD shall be UL 508C Listed for use on distribution systems with 65kArms available fault current, based upon the UL short-circuit test.
- B. Upon power-up and before operational control is allowed to begin, the VFD shall check for valid operation of memory, pre-charge circuit, fan operation, and option board communication.
- C. The VFD shall be protected against short circuits between the output phases & ground and the logic & analog outputs.
- D. Once operational, monitoring shall continually take place and an abnormality will result in an alarm.
- E. The following Circuit protection shall be allowed:
  - a) The VFD shall be rated for use with the appropriate UL class fuse.
  - b) Alternately, circuit breakers may be used, provided that they are listed or certified by an accredited electrical testing laboratory such as Underwriters Laboratories.
- F. For a fault condition other than an internal fault, an auto restart function shall provide up to 10 programmable restart attempts. The programmable time delay before each restart shall range from 0 to 10 seconds.
- G. The deceleration ramp of the VFD shall be programmable for normal and fault conditions. Stop modes shall include: dc injection braking, controlled deceleration to stop and coast to stop.
- H. Upon loss of the analog speed reference signal:
  - a) The VFD shall follow the programmed deceleration ramp to a controlled stop.
  - b) Hold the VFD speed based upon the last good value and trigger a warning alarm.
- I. The VFD shall have solid state I<sup>2</sup>t protection that is evaluated in accordance with UL 508C. The minimum adjustment range shall be from 0 to 150% of the current output of the VFD.
- J. The VFD shall include Metal Oxide Varistors (MOVs) wired to the incoming AC terminals.
- K. STOP key on the keypad shall be functional at all time, drive mode insensitive.
- L. The VFD shall be insensitive to input power phase sequence.
- M. The VFD shall include 3 skip frequency ranges that can each be programmed with a selectable bandwidth of the user's choice. The skip frequencies shall allow independent programming for back-to-back or overlap.
- N. The output frequency shall be parameter setting enabled to fold back when the motor is overloaded.
- O. The VFD shall monitor the main circuit capacitors, control circuit capacitor, in-rush suppression circuit, and cooling fan and shall provide a pre-alarm so that maintenance can be scheduled.
- P. The VFD shall include an output timer function so that peripheral equipment maintenance can be scheduled.
- Q. The VFD shall include parameter selectable input and output phase loss protection.
- R. The VFD basic insulation level shall be tested based upon ANSI/IEEE C62.41-1999.

### **Adjustments and Configurations**

- A. The VFD shall be factory pre-set to operate most common applications.
- B. Choice of four (4) types of acceleration and deceleration patterns shall be available: linear, S-curve shaped – two types, and backlash compensated.

- C. The acceleration and deceleration ramps shall be individually adjustable from 0.00 to 3600 seconds.
- D. The volts per hertz ratios shall be user selectable.
- E. The VFD shall store the last eight (8) alarm faults and data at time of fault. The data shall include output frequency, output current, output voltage and VFD operation time at fault occurrence.
- F. The VFD shall have user programmable DC injection braking to stop the motor's rotation. DC injection braking voltage is adjustable between 0 to 30% and up to 10 seconds of continuous operation.
- G. Cooling fan control shall be selectable: Operates continuously during run operation, and dependent upon temperature at stop.
- H. The VFD shall have adjustable accel/decel ramp profiles.
- I. The VFD shall have the ability to start into a reverse rotating motor (anti-windmill) and achieve the set speed.
- J. The VFD shall have two (2) different selectable settings for accel/decel times, torque boost, base frequency, stall prevention frequency and current, and output frequency detection functions.
- K. The VFD shall have coast to stop functionality by parameter setting.
- L. The VFD shall automatically compute the motor's slip compensation.
- M. The VFD shall be able to limit motor rotation to only one direction.
- N. The VFD shall have two (2) output current detection functions which are able to trigger individual alarms.
  - a) Zero current detection level.
  - b) High output current detection.
- O. The VFD shall include two (2) parameters for user entry. (Unit or machine number, install date).

### **Operational Features**

- A. The VFD shall allow the motor to be switched in sequence to line power when operating at the base frequency.
- B. The VFD shall be able to start into a rotating motor (any speed or direction) and accelerate (decelerate) to set speed without tripping or component loss.
- C. There shall be a regenerative avoidance function to minimize the effect of opposite rotation of another fan within the same duct.
- D. The VFD shall allow for automatic optimization of the VFD output, during accel/decel and constant speed, characteristic based upon the application and load.
- E. The VFD shall incorporate PID control for process controls such as flow rate, air volume, or pressure.
  - a) The VFD shall include programmable PID shutoff for energy savings in low speed region. (PID sleep)
  - b) The VFD shall include the capability to monitor values of PID setpoint, process value, and deviation.
  - c) The VFD shall include PID forward/reverse operation switchover by external signal.
- F. The VFD shall allow for controlled deceleration to stop following an input power loss.
- G. The VFD shall include automatic pump sequencing, which will allow the VFD to sequence up to 4 pumps across the line without additional controllers or software.
- H. The VFD shall contain three (3) skip frequency ranges that can be programmed within a selectable range of 0-400Hz with a minimum bandwidth of 0.01Hz. Each skip range shall be independently programmable.

- I. The VFD shall be able to perform bi-direction rotation following a –10 to +10Vdc input.
- J. The VFD shall be able to run for at set hold time at the start frequency to smooth motor start.
- K. Communication options include:
  - a) RS-485 (standard).
  - b) Modbus RTU.
  - c) LonWorks™
  - d) CC-Link
  - e) Profibus DP
  - f) DeviceNet™
  - g) Metasys-N2
- L. The VFD output signals shall be able to be utilized in lieu of a remote output terminal of a programmable logic controller when the VFD is being controlled via RS 485 or network.

### **Operator Interface**

- A. Six (6) key Control Panel, with setting dial, shall be mounted on each drive and shall be removable & interchangeable regardless of the Hp rating. The customer control shall include the following functionality.
  - a) Furnished with each VFD as standard.
  - b) Batch parameter read, copy and verification functionality.
  - c) Four (4) digit numerical display.
  - d) Standard RS-485 communication through a RJ 45 port.
  - e) Allows direct access for parameter changes.
  - f) Includes an electronic parameter write disable feature.
  - g) Stores/displays last four (4) alarm faults and data at time of fault. The data shall include output frequency, output current, output voltage and VFD operation time at fault occurrence.
  - h) Forward, Reverse and Stop keys command normal starting and stopping as programmed when the VFD is in keypad control mode.
  - i) Display of I/O and output terminal ON/OFF states.
  - j) STOP key is functional at all time, drive mode insensitive.
  - k) Can be mounted at a distance of 20 meters from the VFD.
- B. Twenty-four (24) key parameter unit shall be available as an optional accessory and shall be removable & interchangeable regardless of the Hp rating. The customer control shall include the following functionality.
  - a) Batch parameter read, copy and verification functionality.
  - b) Standard RS-485 communication through a RJ 45 port.
  - c) Alpha numeric LCD display.
    - 4 Lines x 16 characters.
    - Adjustable LCD contrast.
  - d) Includes a parameter write disable feature.
  - e) Stores last eight (8) alarm faults and operation data (frequency, voltage, current, and VFD run time) at time of fault occurrence.
  - f) Forward, Reverse and Stop keys command normal starting and stopping as programmed when the VFD is in keypad control mode.
  - g) STOP key is functional at all time, drive mode insensitive.
  - h) Can be mounted at a distance of 20 meters from the VFD.

- i) Eight (8) languages available selectable among English, Japanese, German, French, Spanish, Italian, Swedish and Finnish.
  - j) Allows direct access for parameter changes individually, by function set and by user selected groups. Parameters can be listed by definition, factory default setting, or user changed values.
  - k) Calibration of frequency meter or bias/gain settings.
  - l) Arrow keys shall provide the ability to scroll through menus and screen, select or activate functions or change the value of a selected parameter.
  - m) HELP functionality shall include the following:
    - 1) Monitoring of data: Running frequency, motor current, output voltage, set frequency, running speed (RPM), DC bus voltage, over-current load %, peak output current, peak dc bus voltage, input & output power used (kW), input and output signal state (ON or OFF).
    - 2) Stores/displays last eight (8) alarm faults and data at time of fault. The data shall include output frequency, output current, output voltage and VFD operation time at fault occurrence.
    - 3) Troubleshooting hints shall reference alarm definitions in plain English and point to applicable parameter settings.
    - 4) Display of installed options and software version shall be available.
- C. Computer interface via RS-485 option
- a) An optional VFD Software program shall be available which supports serial communication between a PC and network of 1 to 32 variable frequency drives (VFD's) through the Parameter Unit ports.  
Capabilities include:
    - Edit drive parameters, transfer settings to and from the drive, and save them to disk
    - Monitoring of I/O, analog outputs, and VFD status using a variety of available displays
    - Diagnostics
    - Help screens that include detailed parameter descriptions
    - Access to parameters grouped by function (for example, all parameters related to accel / decel, braking, or options).

## Control

- A. The control power for the digital inputs and outputs shall be 24Vdc, selectable to sink or source. Optional 120Vac control power for the digital inputs and outputs shall be available.
- B. All logic connections shall be furnished on a removable terminal strip.
- C. External devices shall be able to be connected to the terminal strip for starting/stopping the VFD, speed control and indicating operation status.
- D. Speed command input shall be by means of:
  - a) Keypad.
  - b) Analog input.
  - c) Serial communications.
  - d) Floating point input shall accept a three-wire input
  - e) There shall be three (3) parameter assignable analog inputs.
  - a) The selection consists of the following configurations: 0-5Vdc, 0-10Vdc, 4-20mA dc, -5 to +5 Vdc, and -10 to +10 Vdc.

- b) Two (2) terminals shall be selectable for either voltage or current reference input.
- c) Combinations of the above speed references can be selected and be switched via remote terminal.
- F. There shall be twelve (12) logic inputs that are parameter assignable.
  - a) The selection consists of PTC, 15 preset speeds (up to four inputs), second functions, jog, current input selection, auto restart, external thermal relay, PID control, Advanced PID control to allow motor sequencing, PU to external switch-over.
  - b) Optional 3-digit BCD or 12-bit binary input terminals (3) shall be available as relay contact or open collector signals.
- G. Output signals shall consist of:
  - a. Five (5) open collector outputs shall be available, which are parameter assignable and are optically isolated.
    - 1) Can be selected for positive or negative logic.
    - 2) The selection of assignments shall consist of: Running, Up to speed, Power failure/Under-voltage, Overload, Output frequency detection (first & second), Electronic over-current pre-alarm, PU mode, Inverter ready, Zero current detection, PID upper limit, PID lower limit, PID reverse rotation output, Commercial power supply switch over (MC1-MC3), Fan fault, Fin (heatsink) overheat pre-alarm, Power savings, Minor and Major fault outputs as standard selections.
    - 3) The VFD's output terminals shall allow control through network commands.
    - 4) Optional relay output contact signals (3) shall be available and selectable.
    - 5) Optional digital outputs (5) shall be available and selectable through open collector terminals.
  - b. Pulse or Analog output signal shall be selectable in the form of either:
    - 1) Analog output signal, 4-20mA dc.
    - 2) Analog output signal, 0-10Vdc
  - c. Two (2) Form (C) relay outputs with selectable Normally Open or Normally Closed alarm outputs shall be available.
    - 1) Alarm terminals shall be individually parameter assignable.

### **Braking**

- A. The VFD shall provide terminals for adding an external braking unit to allow for dissipation of excessive electrical energy from the motor.
- B. The following shall be available:
  - a) DC dynamic braking – Including adjustable operation frequency, time and voltage.
  - b) External line regeneration.
  - c) Can be used for common bus systems for multiple drive regeneration.

### **Drive Operation**

With the H-O-A switch in the "HAND" position, the drive shall be controlled by the manual speed potentiometer on the drive door.

With the H-O-A switch in "AUTOMATIC", the drive shall start from the automatic pump controller and its speed shall be controlled by a 4-20mA signal from this controller.

With the H-O-A switch in the "OFF" position, the run circuit will be open and the VFD will not operate.

### ***H2Pro*™ Programmable Logic Controller - Variable Speed**

The **H2Pro**™ control system described hereinafter is a system as manufactured by USEMCO Inc., Tomah, Wisconsin. The naming of a manufacturer of equipment in this specification is not intended to eliminate competition or prohibit qualified manufacturers from offering equipment, but is to establish a standard of excellence for the material used, and to indicate a principle of operation desired.

### **System Coordination And Single Source Responsibility**

The equipment provided shall be a completely integrated microprocessor based automatic control and monitoring system consisting of the required controller, power equipment, motor starters, pressure/flow and alarm monitoring equipment in a factory wired and tested assembly. The automatic control and alarm/monitoring system components shall be standard, catalogued, stocked products of the system supplier to assure one source responsibility, immediately available spare/replacement parts, proper system interconnections and reliable long term operation.

### **USEMCO H2pro™ Pump Controller**

The control system shall utilize standard "off the shelf" equipment. Job specific, "one-of-a-kind" customized software and hardware components will not be accepted. A standard system is defined, as one, which has published literature, is available at time of bid, with fully tested hardware and software, such that no development must be done beyond system configuration.

The equipment shall be protected from transient voltages and surges induced into the signal lines. The contractor shall provide a permanent earth ground connection to the panel ground lug in order to insure proper operation of transient protectors.

A microprocessor-based automatic pump and alarm control system shall be provided for each booster pumping station incorporating an industrial-grade, 16-bit CMOS microcomputer and associated elements suitable for achieving performance as hereinafter described. The controller will incorporate the following:

- Internal diagnostics.
- Real time clock calendar.



- Floating-point math.
- Battery back up.
- Non-proprietary RTU communication.
- (4) PID loops.

The system shall incorporate UL 508 Industrial Control Panel approved elements as required of all components of these project panels and be furnished with all necessary hardware and software to accomplish level-responsive pump and alarm operation with software specifically suited to this project.

All of the discrete I/O circuitry of the computer-based system shall be built to the IEEE 472 (1974) Surge Withstand Capability Standards. The automatic pump and alarm control system computer shall be the standard product of the control system manufacturer and specifically suited for this type of industrial control panel service. All job connections shall be a UL recognized clamp type barriered screw terminals accepting up to two AWG 14 conductors per terminal.

The variable speed drive equipment shall be programmed to respond to variations in the discharge pressure and/or flow in a manner wherein the hydraulic requirement will be accommodated in the pumping program using simple menu-related operator interface routines.

Upon power-up, the Controller shall go through a timing routing, which allows the analog signal and display to stabilize before any control, or alarm outputs are enabled. After the stabilization period, the control circuits of the Controller shall be sequentially enabled on a time-step arrangement.

In addition to the time delay upon power-up, the differential-level control circuits shall each be forced to an off condition upon power up so that a pressure and/or flow excursion will need to go past their turn-on elevation for them to operate.

An alternator shall operate the pumps in a First-on/First-off (FOFO) sequence and can be configured to sequence the pumps every start, every 24 hours, on the lowest run time or manually.

The alternator shall be capable of accepting pump failure and/or advance inputs and shall automatically transfer to the next pump sequence when failure condition is sensed.

The alternator shall provide automatic transposing of the operating sequence of the control relays for the pumps on successive starts. The FOFO alternator sequencing shall operate such that the next load turned on is always the one that has had the longest opportunity to rest since its last operation.

It is the specific intention of this functional requirement that a standard programmable logic controller will be employed with features as herein described and be a fully integrated assembly. That is, the furnishing of similar functions using a proprietary controller with

custom software, a multiplicity of set points, modules or extensive relay-timer logic to accomplish control sequences, etc., is specifically precluded by this specification and will not be acceptable.

Microprocessor based, programmable controller and operator interface shall provide all of the above controls and operations.

The automatic pump and alarm control shall employ a backlit LCD operator interface having a 320 x 240 pixel eight color display with touch screen. The operator interface shall be IEC standard IP65F rated. The display also must support bar graphs or analog meters for wetwell levels, VFD #1, #2, #3 speed indication. Operator interface must support screen scrolling and three levels of password protection. The interface must support a printer port.

A Configuration and Operations Manual will be included for the pump controller. The Manual shall include the following information as a minimum:

- How to view and change between the various displays.
- How to configure the controller.
- How to display alarms.
- How to display statuses.
- Analog control set point adjustment.
- Analog alarm set point adjustment.
- How to view and reset pump run times.
- How to view and reset pump start counters.
- Security Password usage.
- An example of programming values.
- Adjustment of the real-time calendar/clock.
- A listing of values programmed at the factory.
- A worksheet for entering the values programmed in the field.

The intent of the specification is that a standard controller be provided, with standard documentation. A custom written Description of Operation is not acceptable.

### **Controller Configuration**

The pump controller operates via a discharge pressure transmitter and shall be capable of being configured at the factory or jobsite to perform operating functions as described below. All configurations are password protected and shall be provided as a minimum as follows:

- Duplex Pump operation.
- Flow Sensor (4-20mA or Pulse Input).
- Suction Transmitter and Pressure Switch.
- Clock hours (0-23) and minutes (0-59).
- Calendar day of week (0-6 for Monday - Sunday).
- Minimum 1 Pump Speed.

- Minimum 2 Pump Speed.
- Maximum 1 Pump Speed.
- Maximum 2 Pump Speed.
- Discharge transducer rating (5-300 PSI).
- Alternate service pumps every 24 hours.
- Suction transducer rating (5-150 PSI).
- Flow meter rating (5-6999 GPM).
- Sequence pumps via set points based on pressure, flow or both.

The pump controller will include the field adjustable delay timers. All timer settings are password protected and shall be provided as follows:

- 
- Pump 1 start fail delay (0-99 seconds).
- Pump 2 start fail delay (0-99 seconds).
- Lead pump start delay (0-99 seconds).
- Lag pump start delay (0-99 seconds).
- Lead pump stop delay (0-99 seconds).
- Lag pump stop delay (0-99 seconds).
- Minimum Lead pump run time (0-5 minutes).
- Minimum Lag pump run time (0-5 minutes).
- Delay between calls (0.1-9.9 minutes).
- Low suction on delay (0-5 minutes).
- Low suction reset (0-5 minutes).

The pump controller will include the field adjustable set points. Set points are password protected and provided as follows:

- Lead pump start pressure.
- Lead pump stop pressure.
- Lag pump start pressure.
- Lag pump stop pressure.
- High-pressure alarm set point.
- Low-pressure alarm set point.
- Low suction pressure alarm.
- Low suction alarm reset.

### **Controller Test**

A password-protected screen will be included to simulate the discharge and suction pressure and the flow rate. For each of these, the Up and Down arrows are used to select automatic increment, automatic decrement, or hold the reading. When the test screen is displayed, the simulate mode is turned on or off by pressing the 'Toggle On/Off' button. If none of the simulate controls are changed by the operator for a period of ten minutes, the simulate mode will be automatically turned off and normal operation will resume.

## Sequence Selection

The controller will allow the operator to select an alternating sequence for the normal service pumps. Depending upon the configuration of the controller, it will allow alternating or fixed sequence of duplex or triplex systems.

## Alarm Messages

In the event of an alarm condition the operator interface will display an alarm message. Press the 'Alarm Ack' button to acknowledge the alarm and 'Alarm Reset' button to clear the alarm. The following list of alarms shall be provided:

**FLOW AND SUCTION SWITCH OVERLAP** message occurs when both a suction pressure switch and no flow switch has been factory configured for the system. Since the devices use the same digital input, one of the devices must be disabled.

**SETPOINT OVERLAP CHECK THE SETTINGS** message occurs when the controller has detected inconsistencies in the on and off set points between the service pump and third pump configured.

**COMMUNICATION FAULT WITH REMOTE STATION** message occurs when the remote discharge sensor configuration is enabled and the controller detects a communication problem.

**LOW SUCTION ALARM** message occurs when either the suction pressure switch goes active or the suction pressure falls below the low suction pressure set point for the alarm delay period. When this alarm occurs, the pumps will be turned off during the low suction condition (one factory configuration allows a high capacity pump to continue to run in spite of the low suction condition). This event will also activate the assigned low suction alarm telemetry contact.

**HIGH DISCHARGE ALARM FLOW IS XXXX** message occurs when the discharge pressure reaches the high discharge pressure alarm set point. At the time of the fault, the flow rate is saved and displayed on the alarm screen. This flow rate will be applicable when the flow control configuration is enabled. The pumps will be disabled, and will resume operation when the discharge pressure falls to the jockey or lead pump start set point (one factory configuration allows a high capacity pump to continue to run in spite of the high discharge condition). This event will also activate the assigned high discharge alarm telemetry contact.

**LOW DISCHARGE ALARM** message occurs when the discharge pressure falls below the low pressure alarm set point.

**PUMP 1 FAULT ALARM** message occurs when the assigned pump 1 fault digital input goes active. This event will also activate the assigned normal service pump fail telemetry contact.

**PUMP 1 START FAIL ALARM** message occurs when the assigned pump 1 run signal does not go active with the activation of the associated pump call relay. This event will also activate the assigned normal service pump fail telemetry contact.

**PUMP 2 FAULT ALARM** message occurs when the assigned pump 2 fault digital input goes active. This event will also activate the assigned normal service pump fail telemetry contact.

**PUMP 2 START FAIL ALARM** message occurs when the assigned pump 2 run signal does not go active with the activation of the associated pump call relay. This event will also activate the assigned normal service pump fail telemetry contact.

**PUMP 3 FAULT ALARM** message occurs when the assigned pump 3 fault digital input goes active. This event will also activate the assigned pump 3 fail telemetry contact.

**PUMP 3 START FAIL ALARM** message occurs when the assigned pump 3 run signal does not go active with the activation of the associated pump call relay. This event will also activate the assigned pump 3 fail telemetry contact.

### **Shop Drawings**

A complete set of drawings shall be supplied to insure successful installation and operation of the control system. The shop drawings shall consist of all of the following:

- Sufficient detail to evaluate compliance with these specifications.
- A detailed component list including manufacturer and catalog number.
- A custom-wiring diagram for this specific application to facilitate and insure accurate field connections to the control panel by electrical installation personnel.
- A description of operation for the control system.
- An enclosure dimension print.

### **Telemetry**

Provide the following input contacts from telemetry:

- Lead Pump Start
- Lag Pump Start
- Lead Pump Stop
- Lag Pump Stop

Provide the following output contacts to telemetry:

- Low Suction
- Pump 1 Run
- Pump 2 Run
- VFD 1 Fail
- VFD 2 Fail
- Pump #1 H-O-A switch in Auto
- Pump #2 H-O-A switch in Auto
- Pump #3 H-O-A switch in Auto

- Intrusion Alarm in Pump Room
- Intrusion Alarm in Chem Room
- Flow Meter Pulse
- Low Pump House Temperature Alarm signal
- Low Chem Room Temperature Alarm signal
- Flow Meter Pulse Output

Provide the following input contacts from telemetry:

- Call Pump 1
- Call Pump 2

Provide the following analog outputs to telemetry:

- Suction Pressure
- Discharge Pressure
- Flow Rate
- Pump Room Temp
- Chem Feed Room Temp

### **Low Suction Pressure Cutout**

A pressure switch shall be provided to shut down the pumps in the event of an operator determined low suction pressure. The pressure switch shall be the snap action type rated for 5 amps at 240 VAC and have an adjustable differential. Switch shall be mounted on the control panel.

### **Unauthorized Entry Alarm**

A limit switch shall be provided and mounted on each door. The switch will be wired to circuitry including a disable switch, time delay relay and relay in the control panel. The circuitry will require someone entering the station to operate the disable switch within an operator designated time delay or an alarm signal will be activated.

### **Pressure Transmitters**

Variable capacitance transmitters shall be provided for station inlet discharge pressure. The transmitters shall provide a 4-20 mA signal to the programmable controller. The transmitter shall have adjustments for zero and span. The housing shall be welded 17-4 PH stainless steel and have the following performance specifications at a minimum:

accuracy of  $\pm 0.13\%$  FS at constant temperature; non-repeatability 0.02% FS; ambient operating temperature -40°F to 260°F; EMI/RFI effect <1.0% FS @ 10 V/M.

## **Wiring**

All wiring shall comply with the National Electric Code and applicable state and local codes. Wiring shall be completely factory installed except for the power lines that run to the control panel continuously from the external disconnect switch.

All wiring within the equipment chamber and outside the control panel shall be run in PVC rigid conduit except for the liquidtight metallic flexible conduit to connect the pump motors. Accessory items such as the sump pump, dehumidifier, etc. with approved manufacturer's rubber cord may be plugged into polarized grounded outlets.

It shall be the responsibility of the local electrical contractor to furnish and install correctly sized service wires from the service pole outside the equipment chamber to the control panel. It shall also be the responsibility of the electrical contractor to furnish and install, if required, any exterior disconnects or switching mechanisms.

## **Lights**

The equipment chamber shall be well lighted by 6 dual, 40 watt, rapid start fluorescent light fixtures with guards installed within the equipment chamber. An automatic and manual light switch shall be provided and shall be conveniently located at the top of the entrance tube.

## **Dehumidifiers**

Packaged dehumidifier assemblies with hermetically sealed Freon refrigeration type compressor, expansion coil, fan and condenser coil shall be furnished to maintain the relative humidity of the air to prevent condensation on the walls. The dehumidifier shall be controlled automatically by an adjustable humidistat located on the dehumidifier. A low-temperature thermostat shall be provided for the dehumidifier.

The dehumidifier shall be housed in a heavy steel enclosure and shall be floor mounted. The condensate shall be drained to the station drain.

The dehumidifier shall have a capacity of 24 pints per 24 hours at 80 degrees F and 60% relative humidity. The dehumidifier performance shall be as certified by the Association of Home Appliance Manufacturers.

## **Ventilation Systems**

A ventilating system shall be provided to maintain a fresh air system in the equipment chamber and chemical feed room. The exhaust blower shall be sized and rated to change the equipment chamber air 6 times per hour. The blower shall be of the centrifugal, squirrel cage design with statically balanced wheel to assure quiet performance and maximum air delivery. The blower shall be thermostatically controlled and shall also be provided with a automatic and a manual switch located near the door.

## **Heaters**

The equipment chamber and chemical feed room shall be provided with a 3000-watt electric heater suitable for 240 volt, single-phase service. The heater shall be of the fan-forced, with fan delay, and complete with an integral, automatic, snap action thermostat. Fan motor is to be totally enclosed and impedance protected. The heater shall be wall mounted, with an 18-gauge steel grille surface-mounting frame. Heater shall be hard wired into the station electrical system.

## **Inspection and Test**

Prior to assembly, all station components shall be inspected for quality and tested for proper function and freedom from defects. Upon completion, the station shall be connected to a test tank and an operational test performed under simulated field conditions while a final inspection is conducted. Any deficiencies or irregularities shall be corrected at the factory. Automatic controls shall be adjusted to approximate job requirements.

## **Initial Operation**

After the job installation is complete, the manufacturer shall provide the services of a factory trained representative for a maximum period of one day to perform initial start-up of the pump station and to instruct the owner's operating personnel in the operation and maintenance of the equipment. Four (4) copies of O and M manuals will be supplied to the owner prior to initial operation.

## **Guarantee**

The manufacturer of the pump station shall guarantee for a period of one year from the date station is placed into operation or eighteen months from date of shipment, whichever occurs first, that the entire station and all equipment therein shall be free from defects in design, materials and workmanship. In the event a component fails or is proven defective during the guarantee period, the manufacturer will provide a replacement part without cost, upon return of the defective part. Normal use items, such as grease, light bulbs, mechanical seals, packing and belts are excluded.



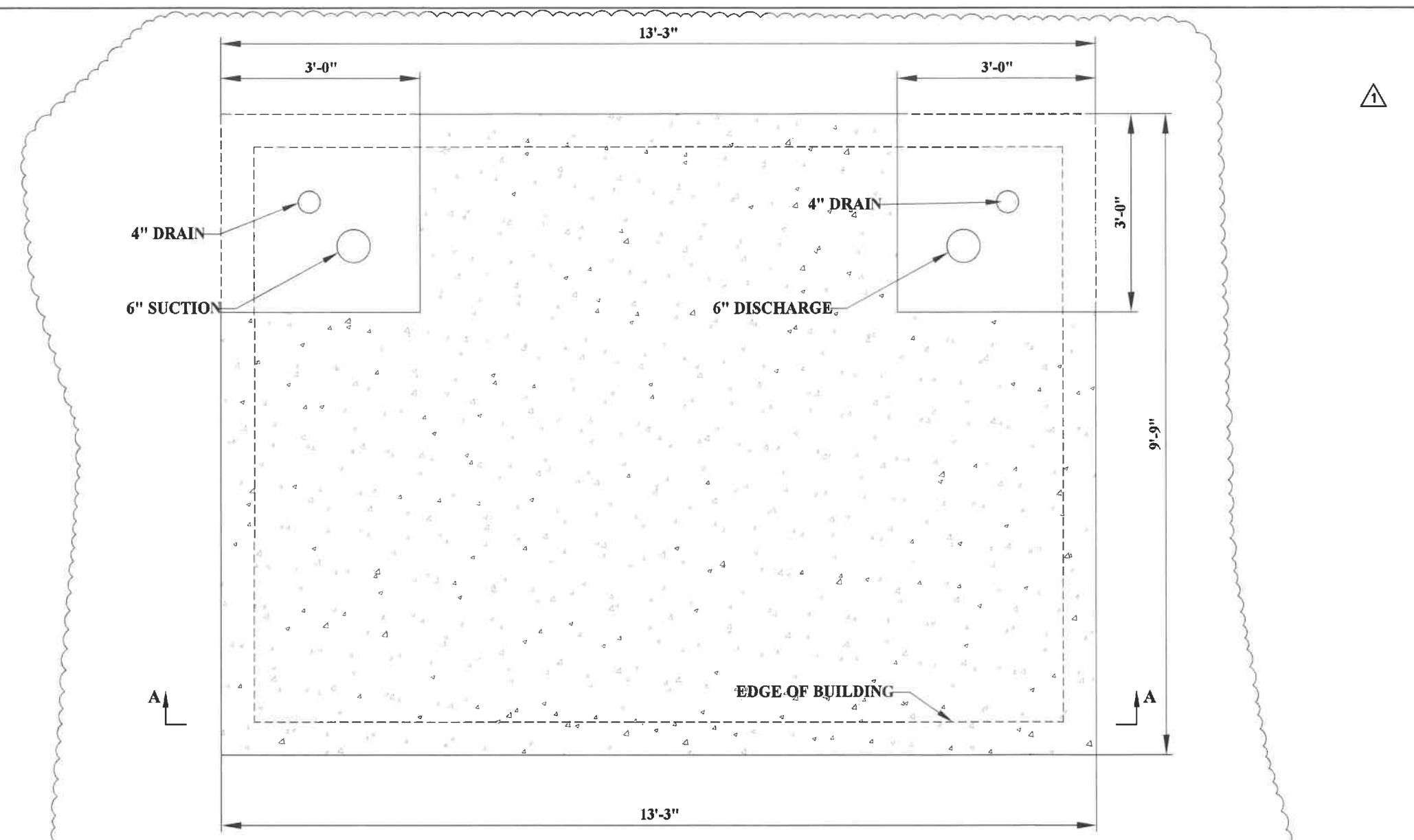




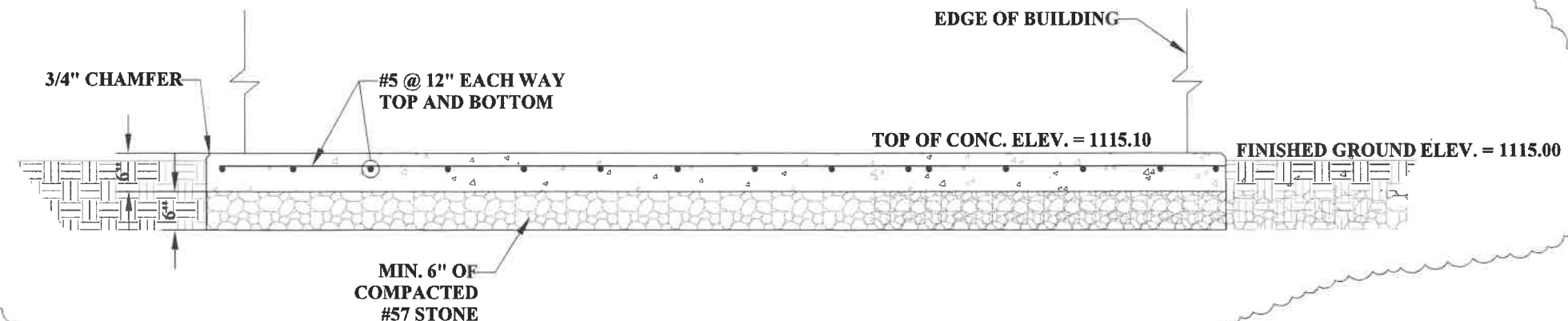


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USER: philip iontz  
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**BOOSTER PUMP STATION CONCRETE PAD PLAN VIEW**  
NOT TO SCALE



**BOOSTER PUMP STATION CONCRETE PAD SECTION A-A**  
NOT TO SCALE

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1	PL	5/21	ADDENDUM No. 1
NO.	BY	DATE	DESCRIPTION

SCALE: AS NOTED	
DRAWN: A. SAYRE	DATE: 12/2020
CHECKED:	DATE:
APPROVED:	DATE:
SURVEY DATE:	
SURVEY BY:	
FIELD BOOK No.:	

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PHASE No.	
CONTRACT No.	
PROJECT No.	101-010-10084

GREATER HARRISON COUNTY P.S.D.  
PROPOSED WATER LINE EXTENSION  
TO STEVEN'S RUN ROAD  
HARRISON COUNTY, WEST VIRGINIA  
BOOSTER STATION DETAILS